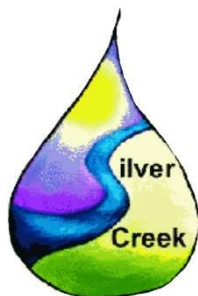


SILVER CREEK WATERSHED-BASED PLAN

Illinois EPA Section 319 Financial Assistance Agreement 3191402



Illinois Environmental Protection Agency
Bureau of Water
Watershed Management Section
July 2016



**SILVER CREEK WATERSHED-BASED PLAN
RESOURCE INVENTORY**

**ILLINOIS EPA FAA # 3191402
JULY 2016**

Prepared For:

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF WATER – WATERSHED MANAGEMENT SECTION
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SILVER CREEK WATERSHED-BASED PLAN

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Appendix 1: Illinois EPA 2013 Water Quality Data for Silver Creek.

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Appendix 3: Concordia University / Village of Melrose Park Water Quality Data

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ACKNOWLEDGEMENTS

On behalf of the Silver Creek Steering Committee and the Silver Creek Watershed Committee, please find below the Silver Creek Watershed Resource Plan. The Silver Creek Watershed Committee (SCWC) is represented by local, county, state, and federal government agencies, universities, and concerned citizens in the Silver Creek watershed. There are eight (8) major municipalities and townships within the Silver Creek watershed. These 8 communities include Bensenville, Chicago (O'Hare Airport), Franklin Park, Leyden Township, Maywood, Melrose Park, Northlake, and Wood Dale. Other representatives included DuPage County Stormwater Management, Metropolitan Water Reclamation District, North-Cook Soil and Water Conservation District, Natural Resources Conservation Service (NRCS), O'Hare Airport Authority, and other organizations. The SCWC has been engaged since 1998 to guide the development of strategies to protect and restore Silver Creek and its tributaries.

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Silver Creek Watershed Plan coordinators included Ed Stoelinga (Village of Melrose Park, Village Engineer), and Ted Gray (Living Waters Consultants).

SILVER CREEK WATERSHED-BASED PLAN

Illinois EPA Section 319 Financial Assistance Agreement 3191402

EXECUTIVE SUMMARY

A watershed-based plan was completed for the Silver Creek (IL_GM-01) watershed. The Silver Creek watershed is 10.6 square miles (6,766 acres) in area. It is a subwatershed of HUC 071200040506 and it is a tributary to the Des Plaines River.

Part of the 10.57 square mile Silver Creek watershed (22.2%) is located in DuPage County but most of the watershed (77.8%) is located west-central Cook County, Illinois. There are eight (8) major municipalities and townships within the Silver Creek watershed. These 8 communities include Bensenville, Chicago (O'Hare Airport), Franklin Park, Leyden Township, Maywood, Melrose Park, Northlake, and Wood Dale. The watershed includes major transportation, commercial, industrial, and residential land use areas of Cook and DuPage Counties. O'Hare Airport is located at the north boundary of the watershed. Large-scale railroad corridors also occur. Silver Creek flows into the Des Plaines River at the southeast part of the watershed, in the Villages of Maywood and Melrose Park. Most of the watershed's urban development occurred between 1950 and 1969.

Over 47% of the soils within the Silver Creek watershed have very low permeability values less than 0.02 inches per hour. This means that rainfall runoff can be significant, even in non-developed areas. Over 94% of the watershed has been developed. Existing (2010) land use within the Silver Creek watershed in 2010 is dominated transportation / utility / right-of-way area (33%), residential (32 percent), and industrial (19%) land uses. The remaining land includes commercial (6%), vacant (4%), institutional (3%), and open space (2 %). The percent of the watershed that is paved (impervious to rainfall) is estimated at 46%. This high level of imperviousness has a direct impact on the volume of runoff discharged into Silver Creek and the load of pollutants delivered to the creek. Flood impacts are significant in certain locations of the watershed. High imperviousness is correlated with significant ecological impacts such as on fish communities in streams. Over 21% of the entire creek length is contained below ground in pipes or culverts. Thus over 2 miles of the creek is buried within underground conveyance structures. Despite these degraded conditions, there are significant opportunities for enhancement. Streambank biotechnical and bioengineering stabilization demonstration projects within the Silver Creek watershed in the Village of Melrose Park indicate the potential enhancement that can occur in Silver Creek.

Illinois EPA assessment in 2013 at one station (GM-02) in Segment IL_GM-01 (near 15th Avenue, in Melrose Park) indicates that causes of impairment include:

Aquatic Life Impairment:

- dissolved oxygen
- total phosphorus.

Aesthetic Quality Impairment:

- debris/floatables/trash

Illinois EPA Identified Causes of Nonsupport for Aquatic Life Include:

- alteration in stream-side or littoral vegetative covers (84),
- other flow regime alterations (319),
- dissolved oxygen (DO; 322), and
- loss of instream cover (501).

Illinois EPA Causes of Nonsupport for Aesthetics Include:

- floating debris (181)
- visible oil (519).

Illinois EPA Sources of Impairment Include:

- loss of riparian habitat (72),
- site clearance (land development or redevelopment; 122),
- streambank modifications/destabilization (125),
- urban runoff/storm sewers (177), and
- channelization (20).

In addition to the Illinois EPA assessment, Concordia University (CU) in partnership with the Village of Melrose Park has been collecting water quality data on Silver Creek since 2013. The CU data also corroborate that dissolved oxygen is a significant impairment in Silver Creek.

Pollutant loading rates were estimated for Silver Creek. Urban development land uses (transportation, industrial, residential, commercial areas) from the 10.6 square mile watershed contribute approximately 29% of the total suspended solids, 35% of the total phosphorus, and 91% of the total nitrogen to Silver Creek. Streambank erosion contributes approximately 71% of the total suspended solids, 65% of the total phosphorus to Silver Creek.

Pollutant load reduction targets were provided for dissolved oxygen, biological oxygen demand (materials that consume oxygen from the water column), total nitrogen, ammonia nitrogen, total phosphorus, total suspended solids, and chloride. Chloride is typically discharge through application of road salt during winter in the watershed.

Based on land use analysis, over 94% percent of the watershed area has already been developed. Watershed imperviousness is 46%. Therefore, most watershed improvement recommendations are by necessity based on either retrofitting existing developed areas, or through converting existing developed parcels into environmentally sound areas to improve pollutant filtration and water quality values. Goals of the Silver Creek Watershed Plan include the following.

Goals:

- To protect and improve the water quality, ecological health, aquatic habitat, aesthetic value, and other benefits of Silver Creek for the watershed stakeholders.
- To engage municipalities, educational institutions, government agencies, residents, and private enterprises with a common goal to improve and protect Silver Creek.
- To reduce streamside development and encroachment along the banks of Silver Creek and to expand a more natural riparian corridor along the stream and its tributaries.
- To convert existing impervious surfaces into pervious areas to reduce pollutant runoff loads and to increase runoff infiltration.
- To implement recommended site-specific and watershed-wide BMPs within 5 to 10 years.
- To observe measurable progress in the improvement of Silver Creek over time.
- To convert the aquatic life use from non-support into full support per the Illinois EPA evaluation criteria.
- To achieve the Pollutant Load Reduction Targets described in this report for the Silver Creek Watershed.
- To identify and implement improvements to allow Silver Creek to be converted from a degraded system to a community asset within the watershed.

Objectives:

- Improve the water quality of Silver Creek through land acquisition, property buyout, land preservation, and land protection within the stream corridor to alleviate the severe channel encroachment that has occurred through development.
- Implement policies to encourage chloride reduction programs, stormwater best management practices for runoff control,
- Harness the energy for local flood reduction relieve by incorporating water quality improvement measures in flood control initiatives to provide multiple benefits to enhance, protect, restore, and naturalize Silver Creek.
- Education government officials, engineers, planners to modify past practices of stream channel containment within extensive underground conveyance systems and to daylight the stream for multiple benefits including aesthetics, provision of community amenities, and water quality improvement.
- Encourage policies to land preservation and restoration within the watershed for the protection of Silver Creek.
- Encourage watershed units of government to adopt a Green Infrastructure Plan and Conservation Design planning to help inform future land use decisions, and reduce the potential for detrimental water quality impacts.
- Implement innovative best management practices as demonstrations projects to protect and enhance the stream.
- Encourage the formation of environmental organizations within each municipality to help guide the protection of Silver Creek and to identify opportunities for stream improvement.

- Educate residents, school children, and other stakeholders to get a vision for how the protection of Silver Creek can benefit the communities.
- Maximize the effectiveness of Cook County and DuPage County Stormwater Ordinances that protect riparian / wetland buffers, conservation easements, and stormwater Best Management Practices.
- Encourage continued quarterly meetings among municipalities to work together to solve not only flood reduction issues but also Silver Creek enhancement opportunities.
- Support limited funding for a part-time Watershed Coordinator to implement the Silver Creek Watershed Plan, to participate in relevant meetings, and to encourage stakeholders to adopt recommended practices.
- Promote watershed-wide monitoring to refine causes and sources of impairment such as dissolved oxygen, nutrients, total suspended solids, fecal coliform bacteria, etc.

Several objectives were described to achieve these goals. Over 38 site-specific best management practices (BMPs) have been described to improve water quality, increase runoff infiltration, reduce flood volumes, and improve aquatic habitat (See Table ES-1 below). These BMPs include detention basin retrofits, permeable pavers, installation of native plantings, streambank stabilization, and other measures. In addition, conceptual plans are suggested for daylighting Silver Creek, and for re-directing creek flow through two large existing basins. Other measures include supporting voluntary residential and/or industrial property buyout programs (most of these properties are subject to recurring flood impacts because they were built within flood-prone areas and/or to close to the banks and floodplain of Silver Creek). An important component of property buyouts would be to utilize the available parcel areas by converting them into naturalized BMPs such as wetlands, flood storage basins, and side-channel wetland areas.

In addition to the site-specific BMPs described, recommendations are provided for over 20 watershed-wide BMPs. These watershed-based BMPs range from road salt (chloride) reduction, to promotion of residential rain barrel and rain garden programs, street sweeping, use of phosphate-free fertilizers for lawn areas, pet waste cleanup, watershed-wide permeable pavers for parking lots, expanded monitoring for water quality assessment, and other measures. The overall implementation timeframe for many of the BMP recommendations in this plan is five (5) to ten (10) years, with the expectation that the watershed plan would be revisited in 2021, and again in 2026. Updates in 2021 would pertain to revision in design-based recommendations to improve water quality.

The primary method to be used for measuring the success of plan implementation will be the implementation of the site-specific and watershed-wide recommendations provided in the Plan. Implementation of these measures would be accompanied by updated water quality calculations to ensure that pollutant load reduction targets are being met. Total watershed pollutant load reductions represent an independent, measurable method for evaluating plan implementation.

In addition, the following is recommended. Additional water quality monitoring within Silver Creek is also recommended to assess in-stream conditions more accurately.

Education and outreach will be an essential measure to implement the recommended BMPs. Municipalities, park districts, county departments, and the FPD-CC can each be further engaged. Relevant COGs include the Southwest Conference of Mayors, the Cook County Governmental League, and the South Suburban Mayors and Managers Association. Another significant way to promote long-term improvement of Silver Creek will be to engage the energy and enthusiasm of students to care and protect it. There are several major schools in the watershed. It is suggested that a part-time paid staff person, a Watershed Coordinator position, would be made available through grant funding and local match funding to facilitate implementation of the Silver Creek Watershed-Based Plan. The Watershed Coordinator would facilitate with building momentum, conducting outreach, coordinating workshops, assisting with project design and/or review, preparing and submitting grant applications, and permits. It is possible that the Watershed Coordinator may also facilitate direct implementation of BMP projects.

Table ES-1: Site-Specific BMPs Recommended for Implementation Within 5 to 10 Years of Plan Adoption.

Item	Basin Code or Reach Code ID	BMP & Description	Quantity	Unit	Project Oversight	Implementation Cost	Annual Maintenance Cost	Sediment Reduction (tons/yr)	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)	Priority
S-1	1.G.	Detention Basin Retrofit: Wetland Enhancement, 3 Sediment Forebays At 3 Inlets / Minor Grading, Remove Concrete Baseflow Channel, Re-Grade Outlet, Native Planting Installation, Educational Signage, Install Walking Trail Spur. (1.8 Acres; 1492 LF Perimeter). Located near E. Potter Avenue and Catalpa Ave.	1.8	AC	Village of Wood Dale.	\$120,000	\$5,000	2.6	15	4	A
S-2	3.1	Streambank Bioengineering Stabilization, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation. Installation of Side Channel Rain Garden Demonstration With Signage In Park. Located Between Irving Park Road and Church Street.	1,206	LF	Village of Bensenville.	\$230,000	\$6,000	62	124	62	A
S-3	3.2	Streambank Bioengineering Stabilization, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation. Located Between Church Street and Mason Street.	2,880	LF	Village of Bensenville.	\$440,000	\$7,500	157	315	157	A
S-4	3.2.B, 3.2.C, 3.2.D	Detention Basin Retrofits: Shoreline Stabilization and Native Planting Enhancement. (1.2 Acres; 1902 LF Perimeter).	1.2	AC	Village of Bensenville.	\$110,000	\$4,000	2.5	24	6	B
S-5	4	Two-Stage Stream Channel Construction, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation Along Upstream 350 LF of Reach 4. Located Between Mason Street and Irving Park Road.	700	LF	Village of Bensenville.	\$210,000	\$2,500	42	84	42	B
S-6	4	Recommendation: Rain Garden Demonstration Project With Bioswales at Fenton High School.	850	LF	Fenton High School.	\$126,000	\$2,500	2	18	3	B
S-7	5.1, 5.2, & 6	Native Plantings: Outreach With O'Hare Officials and USDA at Airport to Develop a Canada Goose-Deterring Native Plant Seed Mix for Installation in Managed Turf Areas. Goals Would Include Conversion Away From Turf Grass Which Attracts Canada Geese Into Native Prairie Which Can Deter Canada Geese.	1	LS	Silver Creek Watershed Committee. O'Hare Airport.	\$4,500	\$1,000	-	-	-	A
S-8	6	Stream Stabilization: Stream Re-Meandering, Riffle Grade Control, and Native Plant Enhancement in Downstream 2,955 LF of Reach 6. Maintenance Costs Assume that Adjacent Wetland Annual Maintenance Is Provided By Others. Located at O'Hare Airport North of Irving Park Road, at Far Downstream Side of Reach 6.	5,910	LF	Silver Creek Watershed Committee. O'Hare Airport.	\$600,000	\$8,500	50	100	50	B

S-9	7 and 7-A	MWRD Flood Storage Basin (PL566) Retrofit: Daylight Silver Creek (Within Culvert Over 963 LF) at MWRD Basin PL566. Relocate Creek Through East Basin Into a 1,600 LF Re-Meandered and Restored Channel. Route Creek Through Long Flow Path in Bottom 20 Acres of Existing MWRD Basin. Remeander Creek Channel Through Bottom of Basin. Install Native Plants Over 36 Acres of Basin. Annual Maintenance Costs Include Annual Electricity Costs to Pump Silver Creek Upgradient Into the Outlet Channel. Basin PL566 Located South of Irving Park Road, North of Railroad Yard.	1,600	LF	To Be Determined (TBD).	\$1,200,000	TBD	1,029	15,859	2,053	A
S-10	8 and 8-A	Detention Retrofit: Provide Additional 70 Acre-Feet of Water Quality Treatment for Polluted Runoff. Use Gravity Sewer System From Existing Pump-Based Railroad Yard Runoff Collection System to Re-Direct Runoff Northerly Into the 36-Acre MWRD Basin PL566. Jack and Bore 670 LF of Piping with 550 LF of Open Cut Piping for Gravity Sewer (72-in. diam.) From Railroad Northerly to MWRD Basin. Once Flow Reaches MWRD Basin, Route Flow Through Long Flow Path in Bottom 20 Acres of Existing MWRD Basin With Limited Grading. Balance Earthwork. Annual Maintenance Include Electricity Costs to Pump Flow Out of MWRD Basin Up Into Silver Creek Channel at the Basin Outlet. Basin PL566 Located South of Irving Park Road, North of Railroad Yard.	1	LS	MWRD, Municipalities, and Railroad Officials.	\$1,600,000	\$40,000	515	7,930	1,027	A
S-11	8	Install On-Line Sediment Trap at South Side of Railroad Yard Where Silver Creek Daylights (North of Franklin Avenue).	1	LS	To Be Determined (TBD).	\$100,000	\$3,000	37	0	37	A
S-12	8	Recommendation: Design and Implement A System to Increase Runoff Volume Storage, Infiltration, and Filtration Within High-Permeability Railroad Yard Ballast / Aggregate Adjacent to Tracks. (Possibly Use Subsurface Clay Core Berms, Retrofit Existing Storm Pipe System, or Other Practices.)	30+	AC	To Be Determined (TBD).	TBD	TBD	-	-	-	A
S-13	8	Ditch Stabilization: Convert Roadside Ditches at Railroad North of Franklin Avenue (south of Railroad Yard) Into Native Plantings with Over 40 Rock Check Grade Control for Silt Stabilization. Install Soil Amendments Where Appropriate. Located from I-294 on the east to northwest of Acorn Lane on the west.	10,634	LF	To Be Determined (TBD).	\$350,000	\$7,500	37	0	37	A
S-14	9	Stream Stabilization and Riffle Grade Control From Franklin Avenue to I-294 (upstream side of Reach 9). Stream Reach Length = 453 LF.	906	LF	Village of Franklin Park.	\$170,000	\$3,500	92	185	92	A
S-15	9	Streambank Stabilization With Side-Channel Wetland Runoff Storage On West Side of Silver Creek. Project Reach Located Between I-294 and Belmont Avenue.	2,862	LF	Village of Franklin Park.	\$530,000	\$12,000	165	229	165	A
S-16	9	Naturalized Runoff Storage: Convert 30-Acre Tank Farm of Magellan Industrial Property East of Silver Creek Into Large-Capacity Naturalized Runoff Storage Basin.	30.2	AC	Village of Franklin Park.	\$5,800,000	\$25,000	1,029	15,859	2,053	A
S-17	10	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert Up to 25 Homes South of Belmont Avenue West of Silver Creek Into Naturalized Wetland Runoff Storage Area.	5.0	AC	Village of Franklin Park and Leyden Township.	\$980,000	\$12,000	515	7,930	1,027	A

S-18	10	Install Sediment Trap on Silver Creek Downstream of Cullerton Street at Railroad Tracks.	1	EA	To Be Determined (TBD).	\$40,000	\$3,000	13	104	32	B
S-19	11	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert Between 5 to 10 Homes Into Riparian Runoff Storage / Side Channel Wetland Area. Project Located Between Grand Ave. & Rt. 45 West of Silver Creek. Replace Concrete Revetment Mat With Streambank Bioengineering Stabilization on Both Sides of Creek. Install Rock Riffle Grade Control Structures. Install Trash Retention Device. (Reach 2,281 LF.)	4,562	LF	Leyden Township.	\$1,300,000	\$9,000	290	581	290	A
S-20	12.2	Detention Retrofit: Convert Turf Grass Into Native Plants in over 8.7 Acre Jack B. Williams Storage Facility to Discourage Canada Geese and to Improve Water Quality. Convert 2-Acre Basin Bottom With Earthwork and Native Plantings Into Shallow Wetland Detention to Improve Water Quality.	8.7	AC	Village of Franklin Park.	\$425,000	\$9,000	211	3,343	426	B
S-21	12.2	Detention Retrofit Recommendation: Route Baseflow from Silver Creek Through Jack B. Williams Reservoir Basin Bottom With Frequent Pumpout for Water Quality and Aquatic Habitat Improvement. Excavate Bottom of Reservoir Slightly (Depth to be Determined Through Engineering Study) So That Baseflow Elevations Resulting from Flow Routing Do Not Reduce Existing Flood Storage Volume.	8.7	AC	Village of Franklin Park.	TBD	TBD	1,055	16,717	2,128	A
S-22	12.2	Naturalized Runoff Storage Recommendation: Convert 0.5 Acres of Parking Lot Area West of Riverside Street into Expanded Creek Corridor. Convert Concrete Channel Into Re-Graded Side Slopes With Native Plantings. Install Bioswale(s) In Current Parking Lot to Reduce Runoff Into Silver Creek.	882	LF	To Be Determined (TBD).	\$315,000	\$4,000	28	99	31	A
S-23	13	Stream Enhancement Recommendation: Convert Concrete Revetment Mat Side Slopes and Velocity Dissipators Channel Into Re-Graded Side Slopes With Rock Toe, Re-Shaped Slopes, and Native Plantings. Install Rock Riffle Structures as Energy Dissipators. From Scott Street to Fullerton Avenue.	5,004	LF	To Be Determined (TBD).	\$640,000	\$6,000	149	298	149	B
S-23	13	Bioswale at Gouin Park Along North and West Boundaries of Park (Northwest of Intersection of Fullerton Ave. and Scott Street, Franklin Park).	1,400	LF	Veterans Park District	\$160,000	\$5,500	6	79	11	A
S-24	9	Streambank Stabilization With Side-Channel Wetland Runoff Storage. Remove and Replace or Retrofit Lunker Structures Where Applicable (Approx. 1,750 LF). Project Reach Located Between Fullerton Avenue and Armitage Avenue. Install Native Plantings Along Silver Creek Trail. Note Severe Erosion Upstream of Palmer Avenue.	6,580	LF	Leyden Township.	\$890,000	\$9,000	271	542	271	A
S-25	9	Trash and Debris Containment System.	1	Lump Sum	Leyden Township.	\$20,000	TBD	-	-	-	B
S-26	13	Bioswale at Roy Elementary School Along Roy Avenue, Northlake.	400	LF	City of Northlake.	\$20,000	\$3,000	2	26	4	A
S-27	13	Bioswale at Kahl Park Near Dickens Avenue, Northlake.	300	LF	City of Northlake.	\$15,000	\$3,000	1	12	2	B

S-28	10	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert 3 Homes at Altgeld Street and Melrose Avenue Into Naturalized Runoff Storage Area.	1.0	AC	City of Northlake.	\$132,800	\$5,000	0.5	18	3	A
S-29	16	Naturalized Runoff Storage: Restoration to Convert 8-Acre Existing Industrial Site Into Riparian Runoff Storage / Side Channel Wetland Area. Install Streambank Stabilization and Rock Riffle Grade Control Structures. Project Located South of Armitage Avenue.	2,366	LF	Village of Melrose Park	\$1,600,000	\$5,000	500	8,498	2,212	A
S-30	16	Install On-Line Sediment Trap With Baffles Along Unnamed Access Road Between Two Industrial Buildings Where Silver Creek Daylights (North of North Avenue).	1	LS	TBD. Possible Private Assistance.	\$50,000	\$5,000	22	138	26	B
S-31	16	Native Plantings & Permeable Pavers: Install 1,980 LF of Streambank Native Plantings Along Silver Creek Just Upstream of North Avenue. Install 2 Acres of Permeable Pavers in Parking Lot to Filter Runoff.	2	AC	TBD. Possible Private Assistance / Village of Melrose Park.	\$1,200,000	\$3,500	56	207	57	A
S-32	18	Bioswale at Bulger Park Up to 30 Feet Wide Along West and South Boundaries of Park Southeast of Intersection of LeMoyne Street and 17th Avenue, Melrose Park). Not Included, But Recommended to Replace Northerly Asphalt Path With Permeable Pavers and Bioswale.	400	LF	Veterans Park District	\$115,000	\$7,500	3	34	5	B
S-33	18	Recommendation for Permeable Pavers at Back Alley at Winston Plaza Mall: Install 2.7 Acres of Permeable Pavers in Back Alley Between Mall and Creek to Filter Runoff.	2.7	AC	TBD. Private Landowner.	\$1,500,000	\$3,500	3	102	5	A
S-34	18 & 19	Stream Stabilization and Riffle Grade Control Along Winston Plaza From Upstream of 15th Avenue Through Elsie Drive. Remove Failing Concrete Banks. Install Native Plant Materials. Stream Reach Length = 3,328 LF.	6,656	LF	Village of Melrose Park	\$1,100,000	\$12,000	1,018	2,036	1,018	B
S-35	20 & 21	Stream Stabilization, Riffle Grade Control, and Riparian Wetland Enhancement From 5th Avenue Through the Des Plaines River. Include Riparian Restoration at Mouth of Silver Creek on Des Plaines River. Stream Reach Length = 1,860 LF.	3,720	LF	Village of Melrose Park, Village of Maywood, Forest Preserve District of Cook County. Possibly Illinois DOT.	\$975,000	\$8,500	634	1,270	634	A
S-36	21	Recommendation: Rain Garden Demonstration Project With Bioswales at Walther Christian Academy Campus.	850	LF	Walther Christian Academy	\$126,000	\$3,000	2	18	3	B
S-37	21	Recommendation: Rain Garden Demonstration Project With Bioswales at Bataan Park / Jane Adams School.	850	LF	Jane Adams School / Veterans Park District.	\$126,000	\$3,000	2	18	3	B
S-38	21	Permeable Paver or Grasscrete Walking Path(s) In Locations to be Determined.	TBD	LF	Village of Maywood	TBD	TBD	-	-	-	B

Notes:

- 1) Quantities for Streambank (LF) Include Both Banks of the Stream Channel (Not Just the Stream Centerline Length).
- 2) Most of the municipalities in the watershed do not contain Village Hall within the watershed area.

Table ES-2: Partial List of Potential Funding Sources for Projects Recommended for Implementation Within 5 to 10 Years of Plan Adoption.

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Water Quality						
Capitalization Grants for Clean Water State Revolving Funds	US EPA/Office of Wastewater Management	Loan revolving fund	No limit on wastewater funds Drinking water up to 25% of available funds	Local government, Individuals Citizen groups Not-for-profit groups	Wastewater treatment Nonpoint source pollution control; Watershed management; Restoration & protection of groundwater, wetlands/riparian zones, and habitat	http://www.epa.gov/owm/cwfinance/index.htm
Non-point Source Management Program (319 grants)	Illinois EPA	Matching Grant (60% funded)	No set limit on awards	Local government Businesses Individuals Citizen & environment groups	Controlling or eliminating non-point pollution sources Stream bank restoration Pesticide and fertilizer control	http://www.epa.state.il.us/water/financial-assistance/non-point.html
Illinois Green Infrastructure Grant Program for Stormwater Management	Illinois EPA	Matching Grant Minimum Local Match CSO: 15% Retention and Infiltration: 25% Green Infrastructure Small Projects: 25%	Up to: CSO: \$3M or 85% of project costs Retention and Infiltration: \$750,000 or 75% of project costs Green Infrastructure Small Projects: \$75,000 or 75% of project costs	Any entity that has legal status to accept funds from the state of Illinois, including state and local governmental units, nonprofit organizations, citizen and environmental groups, individuals and businesses	Green infrastructure best management practices (BMPs) for stormwater management to protect or improve water quality	http://www.epa.state.il.us/water/financial-assistance/igig.html
Sustainable Agriculture Grant Program	Illinois Department of Agriculture	Matching Grant (60% funded)		Organizations, governmental units, educational institutions, non-profit groups, individuals	Practices are aimed at maintaining producers' profitability while conserving soil, protecting water resources and controlling pests through means that are not harmful to natural systems, farmers or consumers	http://www.agr.state.il.us/Environment/conserv/index.html

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Streambank Stabilization and Restoration Program	Illinois Department of Agriculture	Matching grant (amount funded not specified)		Landowners, Citizen groups, Not-for-profit groups	Naturalized streambank stabilization in rural and urban communities, work with SWCD	http://www.agr.state.il.us/Environment/conserv/index.html
Conservation Innovation Grants	Natural Resources Conservation Service	Matching grant (50% funded)	Up to \$75,000 under State Component	Landowners, Organizations	Projects targeting innovative on-the-ground conservation, including pilot projects and field demonstrations	http://www.il.nrcs.usda.gov/programs/cig/
Water Quality Improvement	DuPage County	Matching Grant	25% of Construction	Landowners Organizations BMPs	Stream stabilization, permeable pavers BMPs.	https://www.dupageco.org/EDP/Stormwater_Management/Water_Quality/1312/
Partners for Fish and Wildlife Habitat Restoration Program	Department of Interior, US Fish and Wildlife Service	Cost-share (50% funded)	up to \$25,000	Private landowners	Voluntary restoration or improvements of native habitats for fish and wildlife Restoration of former wetlands, native prairie stream and riparian areas and other habitats.	http://www.fws.gov/policy/640fw1.html
Bring back the Natives Grant Program	National Fish and Wildlife Foundation	Matching Grant (33% funded)	Varies with project (\$50,000-\$75,000)	Not-for-profit groups, Universities Local governments	Restoration of damaged or degraded riverine habitats and native aquatic species through watershed restoration and improved land management.	http://www.nfwf.org/AM/Template.cfm?Section=charter_programs_list&CONTENTID=18473&TEMPLATE=/CM/ContentDisplay.cfm
Wildlife Habitat Incentives Program	US Department of Agriculture	Grant, Matching Grant (at least 75% funded)		Private landowners, Not-for-profit groups	Establishment and improvement of fish and wildlife habitat on private land	http://www.nrcs.usda.gov/programs/whip/
Native Plant Conservation Initiative	National Fish and Wildlife Foundation	Matching Grant (50% funded)	\$10,000-\$50,000	Community and watershed groups Nonprofit groups Educ. institutions Conservation districts Local governments	"On-the-Ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities.	http://www.nfwf.org/programs/npci.htm
Wetlands						
Wetlands Reserve Program	USDA NRCS	Direct contracts with landowners Easement (100%)	No set limit on awards	Individual Citizen groups, Not-for-profit groups	Wetlands restoration or protection through easement and restoration agreement	http://www.nrcs.usda.gov/programs/wrp/states/il.html

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Wetlands Program Development Grants	US EPA	Cost Share and 30 year easements (75%) Matching Grant (75% funded)	No set limit on awards	Not-for-profit groups Local government	Developing a comprehensive monitoring and assessment program; Improving the effectiveness of compensatory mitigation; Refining the protection of vulnerable wetlands and aquatic resources	http://www.epa.gov/owow/wetlands/grantguidelines
Northeastern Illinois Wetlands Conservation Account	US Fish and Wildlife Service/The Conservation Fund	Grant/Matching Grant (50% match strongly suggested)	Average of ~\$38,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Restoration of former wetlands; Enhancement and preservation of existing wetlands; Creation of new wetlands Wetlands education and stewardship	http://www.conservationfund.org/node/133
Small Grants Program	North American Wetlands Conservation Council	Matching Grant	Up to \$75,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Long-term acquisition, restoration, enhancement of natural wetlands	http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtml
Wetland Restoration Fund	Openlands	Grant	\$5,000-\$100,000	Local government Not-for-profit groups Citizen groups Other organizations	Wetlands and other aquatic ecosystem restorations within the six-county Chicago region on land under conservation easement or owned by a government agency	
Five Star Restoration Program	National Fish and Wildlife Foundation	Matching Grant (50% funded)	One-year projects: \$10,000-\$25,000 Two-year projects: \$10,000 -\$40,000	Any public or private entity that can receive grants	Seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships for wetland and riparian habitat restoration	http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=60&ContentID=17901

SILVER CREEK WATERSHED-BASED PLAN

WATERSHED RESOURCE INVENTORY

A watershed resource inventory (Inventory) is described below for the Silver Creek (IL_GM-01) watershed (a 6,766 acre subwatershed of HUC 071200040506), a tributary to the Des Plaines River and located in DuPage and Cook Counties, Illinois.

Watershed Jurisdictions

Part of the 10.57 square mile Silver Creek watershed (22.2%) is located in DuPage County but most of the watershed (77.8%) is located west-central Cook County, Illinois. The watershed includes major transportation, commercial, industrial, and residential land use areas. O'Hare Airport is located at the north boundary of the watershed. Large-scale railroad corridors also occur. Silver Creek flows into the Des Plaines River at the southeast part of the watershed, in the Villages of Maywood and Melrose Park. Most of the watershed's urban development occurred between 1950 and 1969.

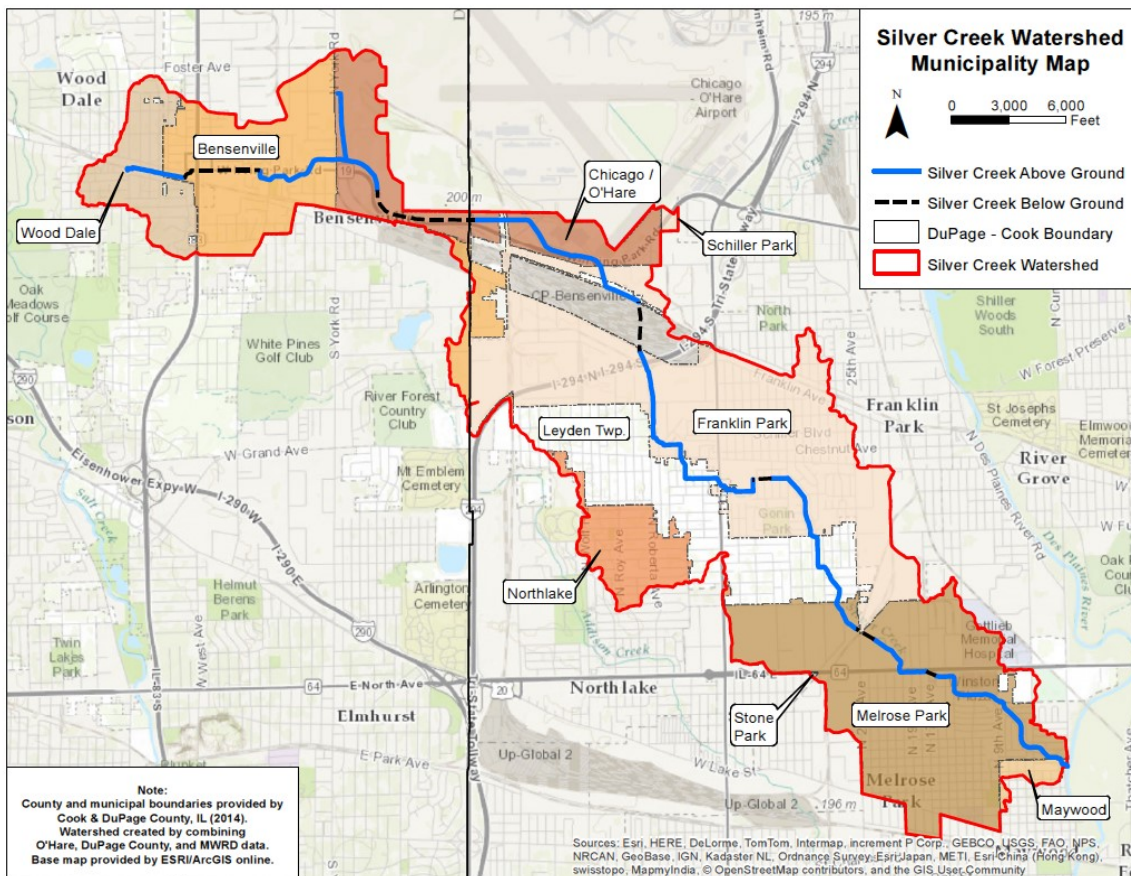


Fig. 1: Silver Creek Watershed Boundary Map With Municipal Jurisdictions.

There are eight (8) major municipalities and townships within the Silver Creek watershed. These 8 communities include Bensenville, Chicago (O'Hare Airport), Franklin Park, Leyden Township, Maywood, Melrose Park, Northlake, and Wood Dale. Stone Park located in the southwest part of the watershed area contains less than 2 acres of area draining to Silver Creek near North Avenue. (This runoff appears to flow via pumps to the east into Silver Creek.) Municipalities and unincorporated areas located within the watershed are displayed in Figure 1 and Table 1.

Table 1. Municipalities and Unincorporated Areas of Silver Creek Watershed.

Municipality	Area (AC)	sq. mi	%
Bensenville	870	1.36	13%
Chicago (O'Hare)	580	0.91	9%
Franklin Park	1882	2.94	28%
Leyden Township	1179	1.84	17%
Maywood	56	0.09	1%
Melrose Park	1496	2.34	22%
Melrose Park (Uninc.)	31	0.05	0%
Northlake	305	0.48	5%
Stone Park	2	0.00	0%
Wood Dale	359	0.56	5%
Wood Dale (Uninc.)	7	0.01	0%
Total	6,766	10.57	100%

Approximately 82% (8.67 square miles) of the Silver Creek watershed was incorporated as of 2010, with portions of 8 major municipalities located within the watershed.

Watershed Boundaries

The watershed boundary delineation was completed based on existing topographic information, storm sewer coverage, municipal watershed maps, DuPage County watershed maps, MWRD watershed maps, and with review and comment from representatives from watershed municipalities and agencies. The north watershed boundary has recently been dramatically changed based in the past few years based on recent O'Hare Airport Modernization Program (OMP) engineering plans. OMP plans included modification and expansion of airport runway facilities, and significant modification of watershed boundaries. For example, much of the O'Hare Airport area has been modified to drain into a new "south detention basin" that flows away from Silver Creek and east to the Metropolitan Water Reclamation District of Greater Chicago interceptor. With the O'Hare modifications, the area north of the Silver Creek watershed boundary now flows through oil-water separators into the MWRD Stickney Wastewater

Treatment Plant system before discharge into the Chicago Sanitary and Ship Canal. The OMP plans and construction activities included significant channelization and re-alignment of Silver Creek along over 6,000 LF of Silver Creek in the Irving Park Road vicinity. A 1990s Silver Creek Watershed Boundary maps prepared by NRCS estimated the watershed area at 11.65 square miles. Currently, the watershed is 9% smaller in area, and approximately 10.57 square miles in area.

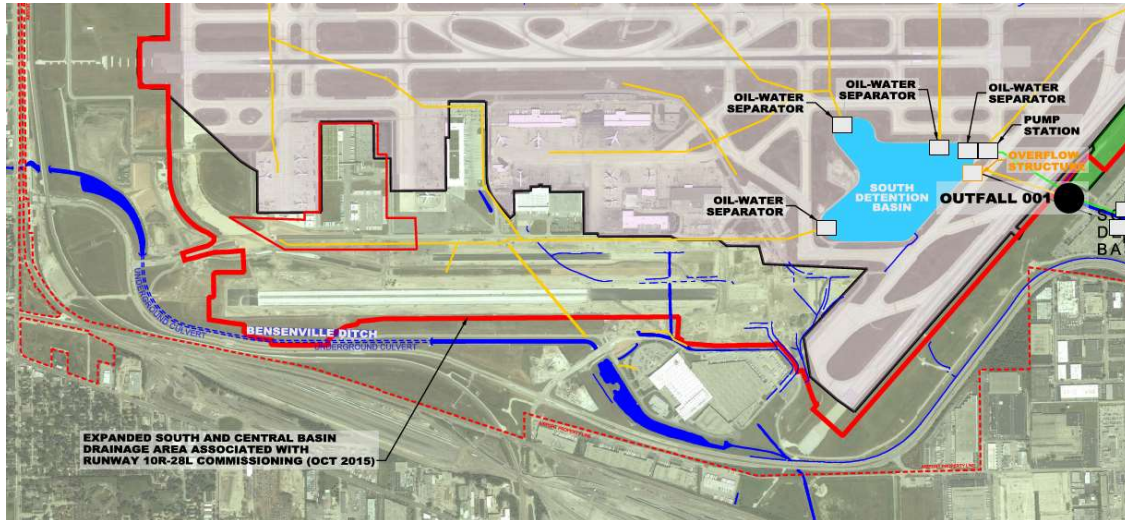


Fig. 2: O'Hare Airport 2014-2015 Modifications of Silver Creek channel (locally labelled "Bensenville Ditch") and Silver Creek watershed area (depicted by the red line).

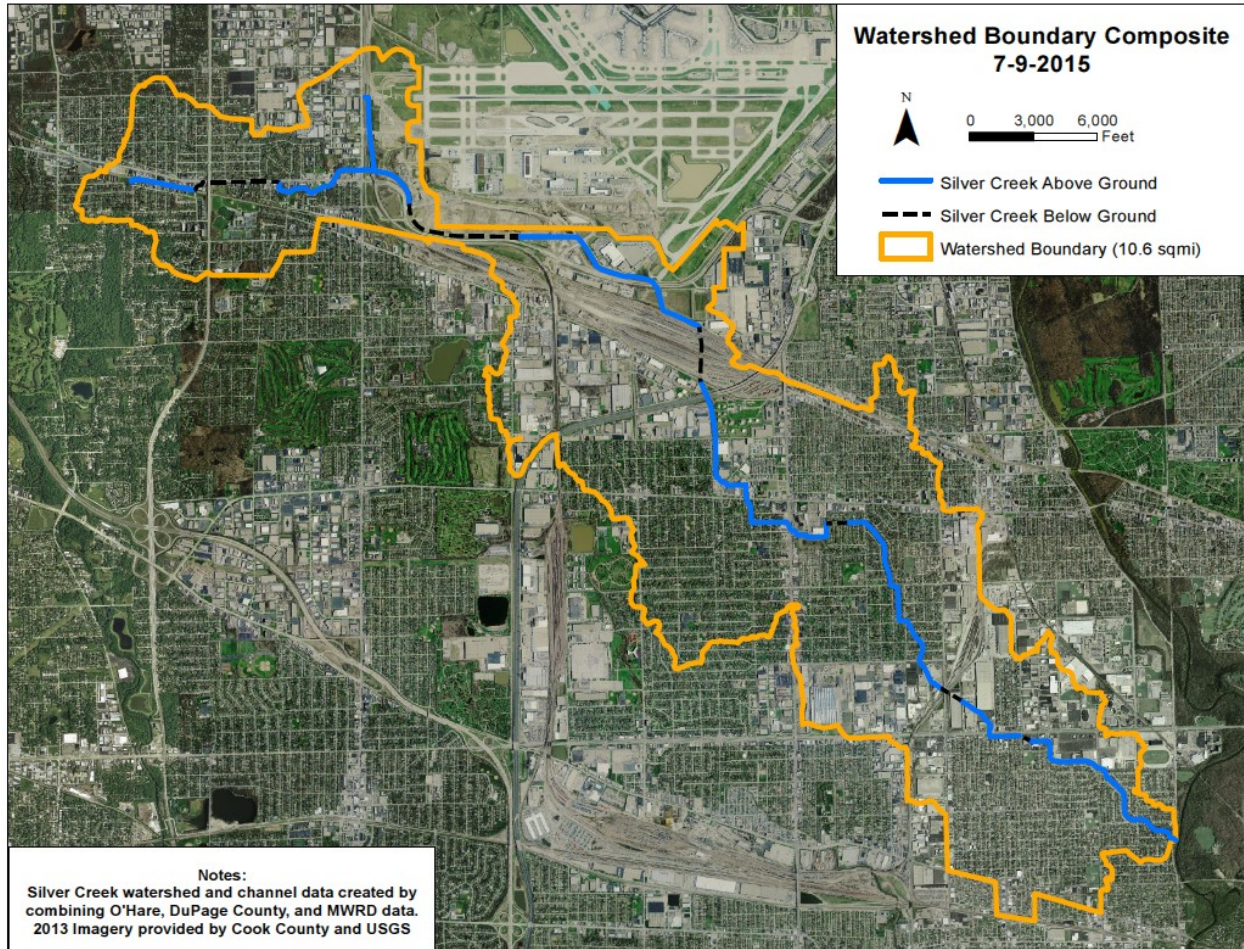


Fig. 3: The Silver Creek Aerial Map depicts extensive urban and developed area within Cook and DuPage Counties. Most of the development occurred between 1950 and 1969.

Government Roles and Jurisdictions

The U.S. Army Corps of Engineers (USACE) regulates wetlands through Section 404 of the Clean Water Act. Developments that impact wetlands or wetland buffer is required to be mitigated under these regulations. USACE also regulates fill-related impacts to rivers, streams, lakes, wetlands, floodplains and other “waters of the U.S.” By definition, waters of the U.S. includes a water resource feature that is hydrologically connected to what are considered “navigable waters.” As described below, DuPage County and Cook County also regulate wetlands and other aspects of stormwater management through county Stormwater Ordinances.

The U.S. Fish and Wildlife Service (USFWS), Illinois Department of Natural Resources (IDNR), Forest Preserve Districts, and the Illinois Nature Preserves Commission (INPC) play a critical role in protecting high quality habitat and threatened and endangered species.

The Illinois Environmental Protection Agency (IEPA) Bureau of Water regulates wastewater and stormwater discharges to streams, rivers, and lakes through the National Pollutant Discharge

Elimination System. The NPDES Phase I Stormwater Program applies to large and medium-sized Municipal Separate Storm Sewer Systems (MS4's), several industrial categories, and construction sites disturbing 5 acres of land or more. The NPDES Phase II program covers additional MS4 categories, additional industrial sites, and construction sites disturbing more than 1 acre of land. Under the NPDES Phase II program, all municipalities with small, medium, and large MS4's are required to complete a series of Best Management Practices (BMPs) and measure goals for six minimum control measures, including public education and participation, illicit discharge detention, construction site runoff control, and pollution prevention.

For construction sites over one acre in size, which are covered by the NPDES Phase II Program, the developer or owner must develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP shows how the site will be protected to control erosion and sedimentation through final stabilization of the site.

The U.S. Geological Survey occasionally monitors flows on Silver Creek at four sites in Franklin Park and Melrose Park through the USGS "n-Values Project." Discharge, cross sectional area, velocity, and other stream flow and channel geometry data are available (<http://il.water.usgs.gov/proj/nvalues/db/sites/05530700.shtml>).

The North-Cook Soil and Water Conservation District, and the Kane-DuPage Soil and Water Conservation District (SWCDs), under the Natural Resources Conservation Service (NRCS), influence watershed protection through soil and sediment control and pre and post-development site inspections. They also provide technical assistance to regulatory agencies and the public. In the early 1990s, NRCS had prepared an earlier Silver Creek Watershed Plan.

DuPage County's Stormwater Management Department and Cook County's Metropolitan Water Reclamation District regulate developmental impacts on stormwater management and wetlands in unincorporated areas. DuPage County's Stormwater Ordinance contains a BMP Manual requiring the use of stormwater best management practices for certain types of development. The Metropolitan Water Reclamation District's Watershed Management Ordinance regulates impacts from development in unincorporated areas. The MWRD WMO contains Standards and Notes describing various stormwater BMPs. County Boards have the power to adopt, override, and alter policies and regulations. County planning, zoning, and development departments help shape development policies. O'Hare Airport in Cook County is regulated by the Federal Aviation Administration. FAA safety policies include Wildlife Hazard Management Plans to identify hazardous wildlife attractants and provide appropriate management techniques to minimize the wildlife hazard. FAA wildlife guidelines typically pertain to projects under NEPA review.

Local municipalities must at a minimum meet the relevant Cook and DuPage County stormwater and floodplain standards. Other municipal regulations can influence development such as Flood Hazard Ordinances, Zoning Ordinances, Land Use Plans, Subdivision Ordinances, and/or Stormwater Ordinances. Each incorporated municipality except for unincorporated Leyden Township is a member of the National Flood Insurance Program (NFIP).

Local ordinances can also encourage conservation development, native landscaping, and other desirable stormwater management practices. Five of the eight communities currently allow native landscaping (Table 2 below). Five of the 8 communities currently use storm drain stenciling (such as “Dump No Waste, Drains to River”). Several communities employ camera monitoring to illicit discharge detection. One community, Leyden Township, will use fecal sampling in 2016. Four of the 8 communities use alternative road de-icing strategies to reduce chloride loading. Wood Dale uses anti-icing over approximately 25% of the roads in the City. Their goal is to increase that to 100% coverage in the future. They utilize road salt pre-wet with “Beet Heet” at the auger or spinner on snow fighting equipment. Wood Dale’s salt application rates are set at 300 lb/mile of road (this includes ground speed control). Five of the 8 communities currently allow include information regarding stormwater BMPs on their websites.

Table 2: Selected Municipal Programs and Activities Related to Pollutant Load Reduction.

Community	Is Native Landscaping Allowed	Member NFIP	Municipal Stormwater Ordinance	Storm Drain Stenciling	MS4 Community
Bensenville	Yes	Yes	Yes	Yes (new inlets)	Yes
Chicago (O'Hare)	Yes	Yes	Yes	Yes	Yes
Franklin Park	Yes	Yes	Yes	Yes	Yes
Leyden Township (Uninc.)	No	N/A	N/A	No	Yes
Maywood	Not addressed.	Yes	Yes	No	Yes
Melrose Park	Not addressed.	Yes	Yes	Yes	Yes
Northlake	Yes	Yes	Yes	No	Yes
Wood Dale	Yes	Yes	Yes	Yes	Yes

Community	Sewer Camera Monitoring or Sewer Fecal Sampling	Des Plaines River CSO Discharge	Alternatives for Road Salt De-Icing	Stormwater BMPs on Website
Bensenville	No	No	Yes	Yes
Chicago (O'Hare)	Yes	Yes	Yes	Yes
Franklin Park	MS-4 dry weather monitoring.	Yes	Yes	Yes
Leyden Township (Uninc.)	Fecal sampling in 2016.	No	No	No
Maywood	No	Yes	No	Yes
Melrose Park	MWRD monitors CSO sewers.	Yes	Yes	No
Northlake	Camera monitoring.	No	No	No
Wood Dale	Camera monitoring.	No	Yes	Yes

Geology

The geology of a watershed provides a significant context on how the structure of soils and groundwater affects the shape and behavior of stream channels, the erodibility of streambanks, stream flows, and flooding. The Silver Creek watershed lies in the Great Lakes and Till Plains Sections of the Central Lowland Province, a glaciated lowland that extends from the Appalachian Plateau on the east to the Great Plains of Kansas, Nebraska, and the Dakotas to the west.

The surficial geology of the Silver Creek watershed includes a transition between lake plain deposits to the east, and Tinley Moraine / Tinley Groundmoraine materials to the central and west watershed areas. Primary shallow geological deposits include clayey and silty clayey till material with a relatively low content of sand, pebbles, cobbles, or boulders.⁸



Fig. 4: Surface Geology includes lake plain (lp) to the east, and Tinley Moraine (t) / Tinley Groundmoraine (tg) to the central and west watershed areas (Willman, 1971).

⁸ Willman, H. B. 1971. *Summary of the Geology of the Chicago Area*. Illinois State Geological Survey; Circular 460; Urbana, IL.

According to the Summary Geology of the Chicago Area, the following descriptions of surficial geology area provided:

Lake Plain (lp): Floors of glacial lakes, flattened by wave erosion and by minor deposition in low areas; largely underlain by glacial till; thin deposits of silt, clay and sand.

Tinley Moraine (t) / Tinley Groundmoraine (tg): Wadsworth Member of the Wedron Formation. Mostly gray clayey and silty clayey till, relatively low in content of pebbles, cobbles, and boulders; contains local lenses of silt, commonly mantled with 1 to 2 feet of leached silt (loess) and soil.

These surficial deposits are consistent with surficial soil characteristics described below.

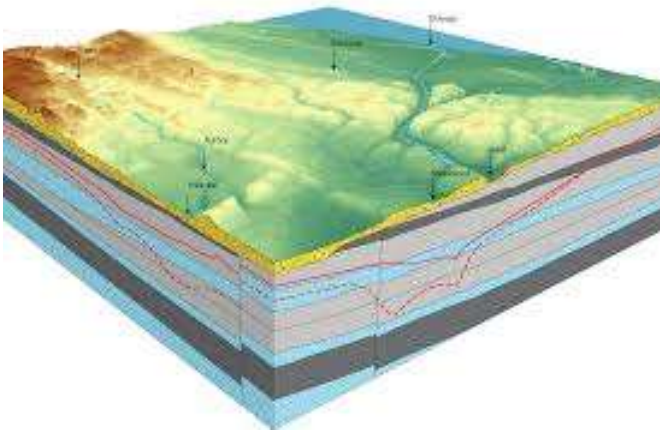


Fig. 5: Geology of the Chicago region underlying the Silver Creek watershed affects drainage patterns, topography, soils composition, and other conditions in the watershed. (Source: Illinois State Water Survey.)

Topography and Channel Gradient

Topographic elevations range from 710 ft in the upper watershed (Wood Dale) to approximately 620 ft in the far lowest watershed area (Melrose Park). Average contour slopes throughout the watershed are quite gentle to flat in most areas (0.3% to 0.5%). This is in keeping with the lake plain and ground moraine geologic conditions described above.

The channel proper of Silver Creek ranges in elevation from 705 ft in the upstream watershed to approximately 612 ft in the lower watershed (at the mouth near the Des Plaines River). There is an elevation change of approximately 93 feet over the entire channel length of 57,410 linear feet. The average channel gradient or slope is 0.0016 ft (or 0.16%) of drop in elevation per each LF of stream channel. This is equal to a drop in elevation of 8.6 ft per each 1 mile of stream channel.

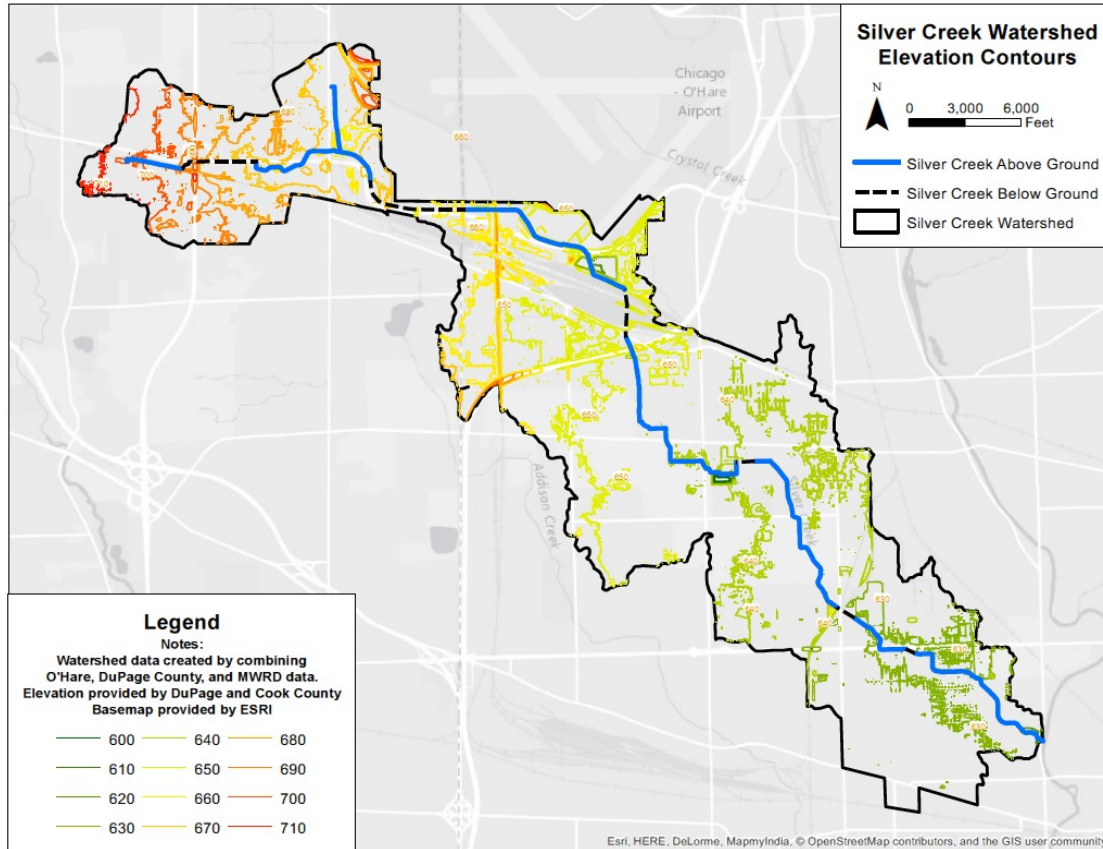


Fig. 6: Topographic Contours in the Silver Creek Watershed. The channel proper of Silver Creek ranges in elevation from 705 ft in the upstream watershed to approximately 612 ft in the lower watershed (at the mouth near the Des Plaines River).

Climate

Available climate data for the Silver Creek Watershed include the following. According to the National Climatic Data Center, U.S. Department of Commerce Record of Climatological Observations, the following have been recorded at the Chicago O'Hare International Airport, IL (Station: US GHCND: USW00094846).

Table 3: Annual Average Temperature and Precipitation Data For Chicago O'Hare International Airport, IL (Station USW00094846) from 2010 through 2014. (Source: National Climatic Data Center.)

Date	Temperature (F)										Precipitation (in.)				
	Mean Max.	Mean Min.	Mean	Highest	Lowest	Number Of Days				Total	Snow, Sleet, Hail		Number Of Days		
						Max>=90	Max<=32	Min<=32	Min<=0		Total Fall	Max Depth	>=.10	>=.50	>=1.0
2010	60.0	42.8	51.4	94	-1	21	64	120	2	37.64	49.6	9	70	22	6
2011	58.9	42.4	50.7	99	-9	22	44	113	4	49.85	43.4	21	83	30	11
2012	63.8	45.0	54.4	103	0	46	17	100	0	26.95	19.0	5	65	18	4
2013	57.9	40.4	49.1	96	-6	13	51	138	6	42.12	44.5	10	76	31	8
2014	56.5	38.7	47.5	91	-16	3	72	134	19	39.50	69.9	14	72	26	9

Table 4: Monthly 2014 Temperature And Precipitation Data For Chicago O’Hare International Airport, IL (Station USW00094846). (Source: National Climactic Data Center.)

Date	Temperature (F)										Precipitation (in.)					
	Mean Max.	Mean Min.	Mean	Highest	Lowest	Number Of Days				Total	Greatest Observed	Snow, Sleet, Hail		Number Of Days		
						Max>=90	Max<=32	Min<=32	Min<=0			Total Fall	Max Depth	>= .10	>= .50	>= 1.0
1	24.8	7.0	15.8	45	-16	0	21	31	11	2.83	0.80	33.7	11	8	2	0
2	25.9	9.1	17.4	49	-8	0	23	27	7	2.48	1.16	19.6	14	4	1	1
3	41.0	22.6	31.8	68	-2	0	8	24	1	1.71	0.48	12.3	6	6	0	0
4	59.2	37.9	48.6	80	26	0	0	6	0	2.84	0.81	1.4	1	6	3	0
5	71.1	49.6	60.4	89	37	0	0	0	0	4.98	2.09	0.0	0	9	3	2
6	81.0	61.0	70.9	91	49	2	0	0	0	7.81	2.60	0.0	0	10	5	3
7	79.7	61.0	70.3	90	54	1	0	0	0	2.15	0.63	0.0	0	5	2	0
8	82.2	65.3	73.8	88	52	0	0	0	0	7.30	2.76	0.0	0	8	4	2
9	73.6	54.1	63.9	88	41	0	0	0	0	2.71	1.31	0.0	0	6	2	1
10	60.6	43.3	52.0	77	32	0	0	1	0	2.49	0.88	0.1	0	4	3	0
11	41.5	25.9	33.6	62	7	0	12	21	0	1.41	0.63	2.8	0	3	1	0
12	36.9	27.1	32.0	50	-4	0	8	24	0	0.79	0.32	0.0	0	3	0	0
Summary	56.5	38.7	47.5	91	-16	3	72	134	19	39.50	2.76	69.9	14	72	26	9

Data for Northeast Illinois show an annual precipitation of 37.1 inches per year, however the variations from year to year can be large. For example, the lowest annual rainfall was 23.9 inches and the highest annual rainfall was 46.9 inches study (Rainfall Trends in Northeast Illinois available from <http://www.sws.uiuc.edu/atmos/statecli/climatechange/NE-IL-trends/rainfall.htm>). According to the 2010-2014 summary data for O’Hare Airport, average annual precipitation ranged from 26.95 inches, to 49.85 inches. The 2010 rainfall level of 37.64 inches represents approximately 22,383 acre-feet of rainfall when applied to the entire watershed area. *If even only 25% of this rainfall became runoff, this represents 5,595 acre-feet of runoff throughout the watershed in 2010. This volume of runoff represents a runoff depth of 0.8 ft distributed over the entire watershed.* The number of days with over 0.10 inch of precipitation per year ranged from 65 to 83. According to the monthly 2014 data (Table 4), monthly precipitation ranged from 0.79 inches (December) to 7.81 inches (June). Monthly temperatures were relatively moderate in 2014, with a mean maximum of 82.2 degrees in August. Both precipitation and temperature can strongly influence water quality in the Silver Creek watershed. Temperature influences a number of chemical, biological, and physical water properties including reducing the capacity of the water column to retain dissolved oxygen.

Soils

Evaluating the soil characteristics is an important part in developing an understanding of watershed hydrology including potential surface runoff and groundwater flow. It is also important to note for the Silver Creek watershed, that soils characteristics will be affected by the extent of impervious surfaces (parking lots, roads, rooftops) that are installed over the soil layer.

Soils exhibit different infiltration capabilities. Knowing the infiltration capabilities of the watershed’s soils can be used to determine optimal design and location of BMPs, such as wetland restoration projects or detention basins. Soils also exhibit differences in erodibility

depending on their composition and slope. Erodibility of soils is not only for stream channel erosion but also for watershed disturbance, including construction, which can affect delivery of pollutants into the stream channel.

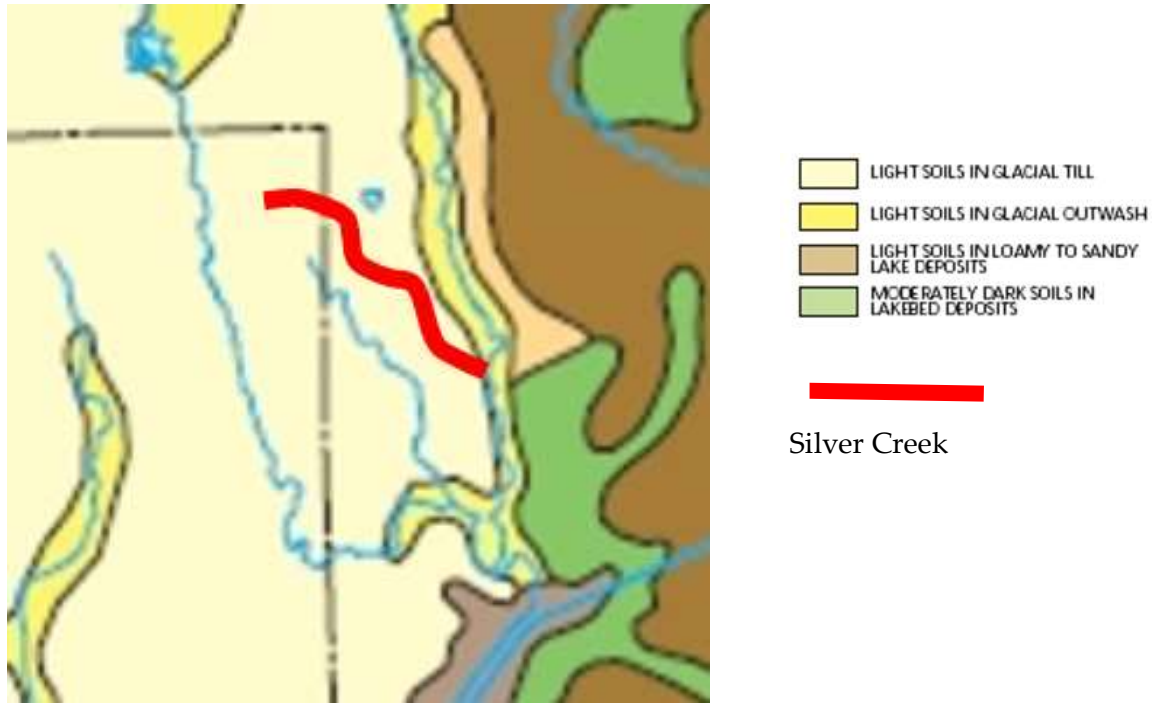


Fig. 7: Geological Deposits and Soil Lithology in the vicinity of the Silver Creek watershed (Source: Chicago Wilderness). Most Silver Creek watershed soils were formed in glacial till or glacial outwash deposits.

The Cook County and DuPage County Natural Resource Conservation Services (NRCS) Soil Surveys were used to conduct a soil analysis for the Silver Creek watershed. The data was used to map the soil series, extent of hydric soils, soil erodibility, and the infiltration capacity. A combination of geological, biological, physical, and chemical variables including climate, drainage patterns, vegetation, and topography can all affect the soils found today.

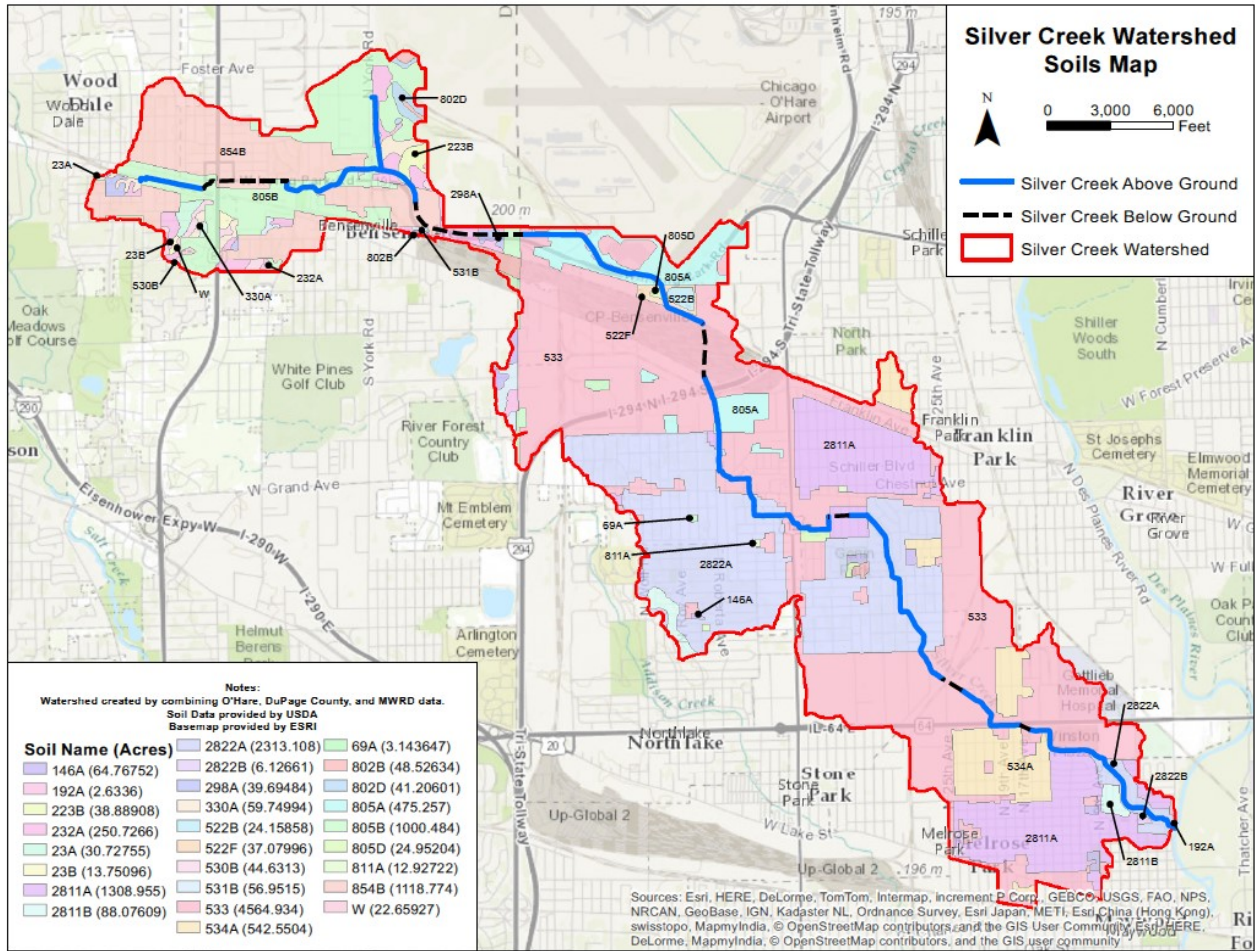


Fig. 8: Soil Types and Soil Area (Acres) within the Silver Creek Watershed (Cook County and DuPage County NRCS Soil Survey).

Based on the NRCS Soil Survey information, the majority of soil area coverage within the Silver Creek watershed is classified as either silty clay loam (43 percent) or urban (42 percent). Loam, silt loam, or silty clay makes up the balance of the watershed soils.

Table 5: Area (Acres) Per Each Soil Classification in the Silver Creek Watershed (NRCS).

Soil Class	Area (Acres)	Area (Percent)
loam	50	1%
silt loam	161	2%
silty clay loam	2,888	43%
silty clay	829	12%
urban	2,825	42%
water	13	0.2%
Total	6,766	100%

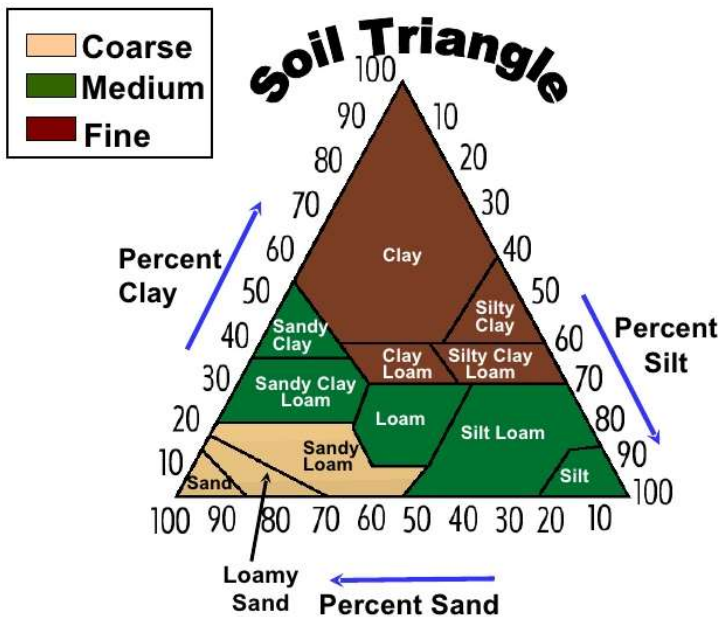


Exhibit 1: Soil classification types including loam, silt loam, silty clay, etc. vary depending on the percent silt, sand and clay present (NRCS). Most of the watershed soils present are considered “fine” soils, dominated by silt and clay components. These types of soils are noted for low to moderate rates of infiltration.

Table 6: Soils Characteristics in the Silver Creek Watershed (NRCS Soil Surveys).

Soil Number	Soil Name	Texture	Hydrologic Soil Group	Surface Permeability (in/hr)	Erodibility (Kw)	Hydric Soils	Soil Area (Acres)	Percent Area (%)
23A / 23B	Blount	silt loam	C	0.6-2.0	0.32		25	0.4%
69A	Milford	silty clay loam	B/D	0.6-2.0	0.20	Hydric	2	0.0%
146A	Elliott	silt loam	C	0.6-2.0	0.24		36	0.5%
192A	Del Rey	silt loam	C	0.6-2.0	0.32		1	0.0%
223B	Varna	silt loam	C	0.6-2.0	0.28		21	0.3%
232A	Ashkum	silty clay loam	B/D	0.2-0.6	0.20	Hydric	139	2.0%
298A	Beecher	silt loam	C	0.6-2.0	0.28		22	0.3%
330A	Peotone	silty clay loam	B/D	0.6-2.0	0.32	Hydric	33	0.5%
522B / 522F	Orthents, clayey, refuse substratum	silty clay loam	B	0.06-0.20	0.37		34	0.5%
530B	Ozaukee	silt loam	C	0.6-2.0	0.32		25	0.4%
531B	Markham	silt loam	C	0.6-2.0	0.32		31	0.5%
533	Urban land	n/a	"not rated"	"not rated"	"not rated"		2,525	37.3%
534A	Urban land	n/a	C	0.06-0.20	0.37		300	4.4%
802B / 802D	Orthents, loamy	loam	B	0.2-0.6	0.43		50	0.7%
805 A / 805B / 805D	Orthents, clayey, rolling	silty clay	B	0.02-0.06	0.43		829	12.3%
811A	Alfic Udarents, clayey	silty clay loam	C	0.06-0.20	0.37		7	0.1%
854B	Markham / Askhum / Beecher complex	silty clay loam	C	0.2-0.6	0.28	Hydric	618	9.1%
2811A / 2811B	Urban land - Alfic Udarents, clayey	silty clay loam	C	0.06-0.20	0.37		773	11.4%
2822A / 2822B	Urban land - Alfic Udarents, clayey	silty clay loam	C	0.06-0.20	0.37		1,283	19.0%
Water	n/a	Water	n/a	n/a	n/a		13	0.2%
Totals							6,766	100%

Hydrologic Soil Groups (HSG)

The Hydrologic Soil Group (HSG) of a soil is an estimate of the runoff potential. HSG ratings can range from A through D. An “A” HSG rating soil has the highest permeability, the lowest runoff potential and the highest runoff infiltration potential. This is especially desirable when trying to reduce potential pollutant runoff into Silver Creek. On the other hand, a “D” HSG rating have the lowest permeability, are the most poorly drained, and/or have the lowest infiltration runoff potential (highest runoff potential). The following are more detailed descriptions of HSG ratings.

HSG Group A: Soils having a high runoff infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. “Group A” HSG soils comprise 0% of the watershed.
HSG Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist deep, moderately relatively well drained soils with a fine to coarse texture. Group B HSG soils comprise 13% of the soils in the Silver Creek Watershed.
HSG Group C: Soils having a slow infiltration rate when thoroughly wet. These soils often have a layer that impedes the downward movement of water and/or that have a moderately fine texture. Group C HSG soils comprise 46% of the soils in the Silver Creek Watershed.
HSG Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. This includes clays that have a high shrink-swell potential, soils with a high water table, and/or soils with a claypan or clay layer at or near the surface. These occur in 0% of the watershed.
HSG Group B/D: If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Group B/D soils occur in 3% of the watershed.
HSG Group B/D: If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Group B/D soils occur in 3% of the watershed.

Table 7: Hydrologic Soil Group (HSG) Classifications in the Silver Creek Watershed.

Hydrologic Soils Group (HSG)	Area (Acres)	Area (Percent)
A	0	0%
B	913	13%
B/D	173	3%
C	3,143	46%
D	0	0%
Not Rated	2,525	37%
Water	13	0%
Total	6,766	100%

HSG ratings for soils in the Silver Creek Watershed are dominated by HSG Class C (46%). Urban development over soils is often “not rated” due to uncertainty regarding the underlying type of fill that may have occurred (clay, trash, other materials) in a given developed area. It is likely that the “Not Rated” HSG area for the Silver Creek watershed (37%) is characterized by urban and development land cover which is either impervious to rainfall infiltration, or which has a low permeability level. Therefore, most of the Silver Creek watershed can be regarded as slow infiltration, and low infiltration potential. This is also characteristic of soils in the “lake plain” geology in the central and east parts of the watershed (Fig. 4). Interestingly, 13% of the watershed has an HSG “B” rating, with moderate infiltration. These soils are located in the upper watershed areas in Wood Dale and Bensenville.

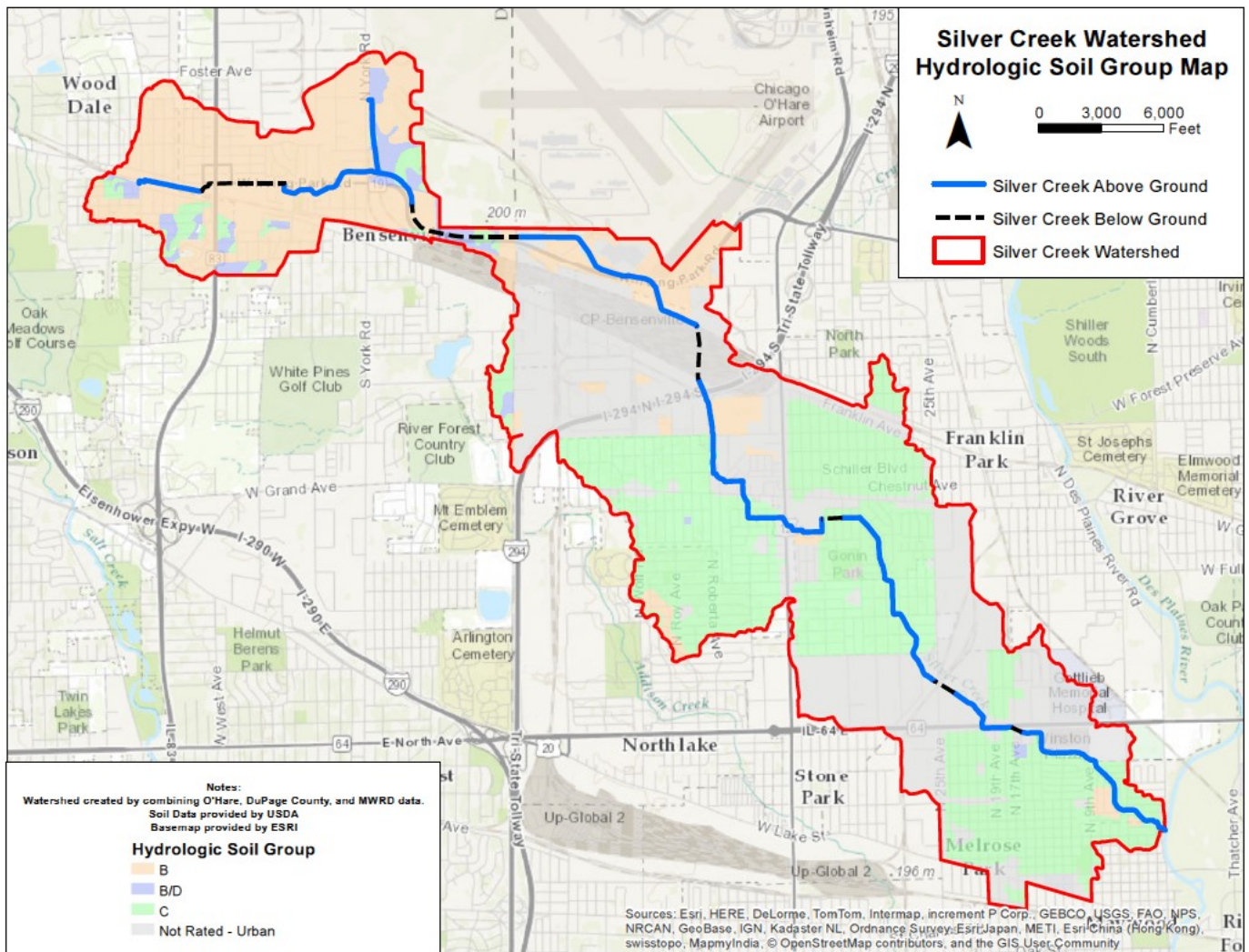


Fig. 9: Hydrologic Soil Groups (HSG) within the Silver Creek Watershed (Cook County and DuPage County NRCS Soil Survey). Parts of the upper watershed area contain “B” HSG ratings, with moderate infiltration levels. Most of the central and downstream watershed

area is characterized HSG “C” ratings with slow to very slow infiltration. Large areas particularly in Cook County (37% of the watershed) are not rated.

Soil Permeability

The surface permeability of a soil refers to the ease with which voids or pore spaces within the soil column can transmit water when the soil is saturated.² Permeability is related to HSG. But permeability is specifically measured as the “saturated hydraulic conductivity” of the soil. Permeability can be an important consideration in considering and designing stormwater Best Management Practices. For instance, a BMP intended to have runoff infiltration may require amended subsoils if it is sited over a location with overall low to moderate soil permeability. Construction activity and related disturbance can also compact soils and reduce soil permeability. Urban development impacts on soil permeability therefore also need be evaluated in making BMP design recommendations.

Over 47% of the soils within the Silver Creek watershed have very low permeability values less than 0.02 inches per hour. Large areas of urban land (37% of the watershed) are not rated for permeability due to uncertainty in the character of soils. Portions of the watershed with moderate permeability values (0.2 to 2.0 inches per hour) are generally located within the areas with HSG C soils.

Table 8: Soil Surface Permeability Rates (inches per hour) in the Watershed.

Surface Permeability (in/hr)	Area (Acres)	Area (Percent)
< 0.06	829	12%
0.06 - 0.20	2,397	35%
0.2 - 0.6	806	12%
0.6 - 2.0	196	3%
Not Rated	2,525	37%
Water	13	0%
Total	6,766	100%

Soil Erodibility

The susceptibility of soil to erosion by water is one factor used in predicting soil loss caused by sheet and rill erosion. The Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) are commonly used to predict the average annual rate of soil loss by sheet and rill erosion. The USLE and RUSLE are also commonly used in the identification of highly erodible lands and in the planning and design of soil conservation practices and stormwater Best

² NRCS Soil Data Viewer Version 5.1.000.0012.

Management Practices. The K Factor in these equations represents the susceptibility of a soil to sheet and rill erosion by water and is based on soil characteristics such as percentage of silt, sand, and organic matter and saturated hydraulic conductivity.³ The K Factor values range from 0.02 to 0.69 with higher values representing increased susceptibility of the soil to sheet and rill erosion by water. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The estimates are based primarily on percentage of silt, sand, and organic matter, topography, soil structure and permeability. The NRCS Soil Survey describes *erosion factor Kw* to characterize the erodibility of the whole soil. Kw estimates can be modified by the presence of rock fragments.

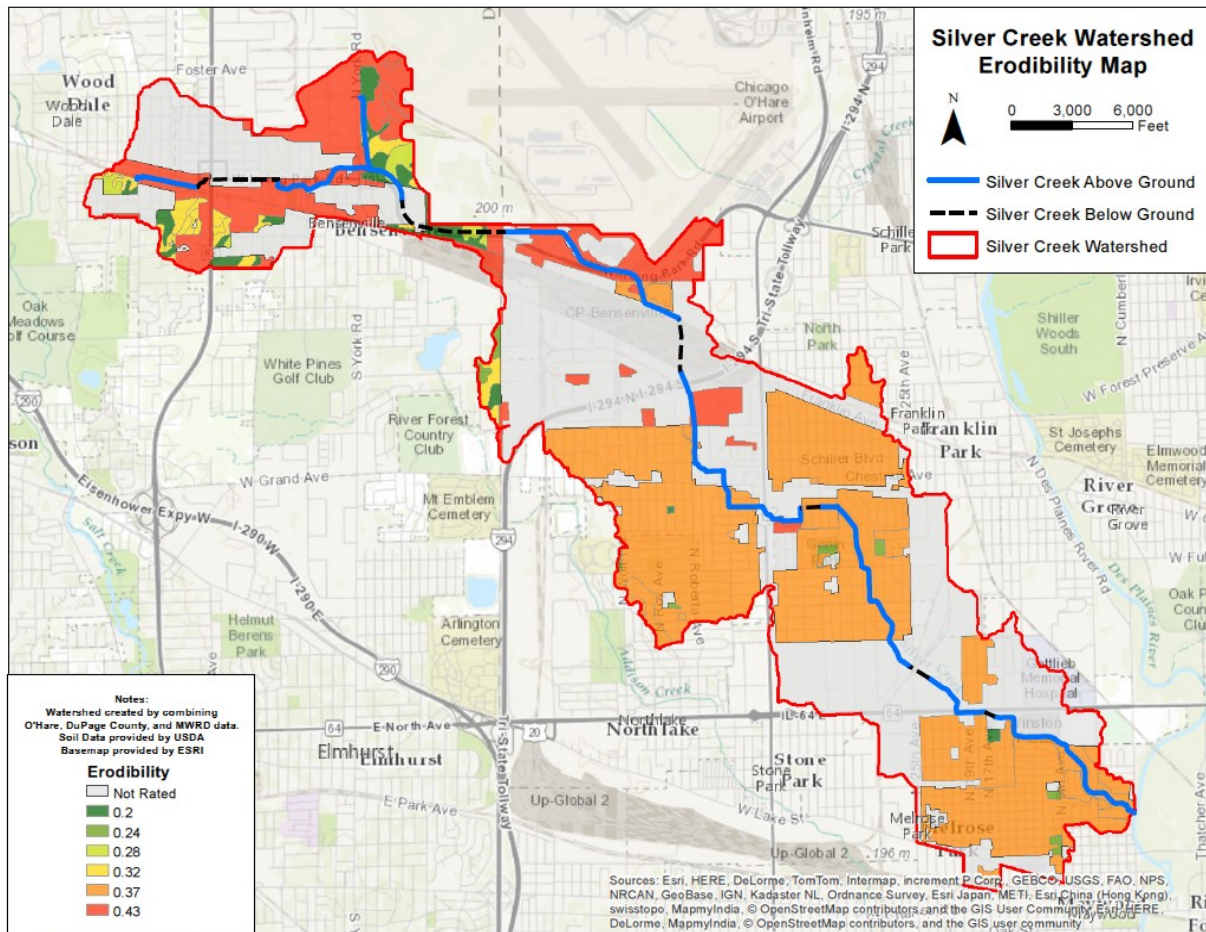


Fig. 10: Soil Erodibility (K_w) within the Silver Creek Watershed (Cook County and DuPage County NRCS Soil Survey). Higher K_w values represent increased susceptibility of the soil to sheet and rill erosion by water. The highest K_w values (0.43) are located in the upper and central watershed area. Moderate / high K_w values (0.37) are predominant in the central and lower watershed. Few areas have low K_w values.

³ NRCS Soil Data Viewer Version 5.1.000.0012

Table 9: Soil Erodibility (Kw) in the Silver Creek Watershed.

Soil Erodibility (Kw)	Area (Acres)	Area (Percent)
0.2	140	2%
0.24	36	1%
0.28	662	10%
0.32	115	2%
0.37	2,397	35%
0.43	879	13%
Not Rated	2,537	37%
Total	6,766	100%

Only 15% of the Silver Creek watershed has soil erodibility rates that are at or below 0.32. Over 50% of the watershed contains Kw values between 0.32 and 0.43. An additional 37 percent of the watershed was not rated for Kw, likely due to urbanization and associated modification of underlying soil layers. As can be seen in Figure 10 many of the soils within the watershed with relatively higher susceptibility to erosion (i.e. K factor values equal to or greater than 0.32) are generally dispersed across the watershed.

Hydric Soils and Wetland Areas

Hydric soils are defined as soils “that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.”⁴ Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. As such, the presence of hydric soils is used as one of the 3 key indicators to the existence or historical presence of wetlands. Hydric soils within the Silver Creek watershed are shown in Figure 9. Approximately 791 acres, or 12 percent of the soils within the Silver Creek watershed are rated as “All Hydric”⁵ However, due to the extent of impervious surfaces and associated development and drainage, the extent of wetlands within the watershed is much smaller than the percent area with hydric soils.

⁴ <http://soils.usda.gov/use/hydric/intro.html>

⁵ The hydric rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. "All hydric" means that all components listed for a given map unit are rated as being hydric, while "not hydric" means that all components are rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made.

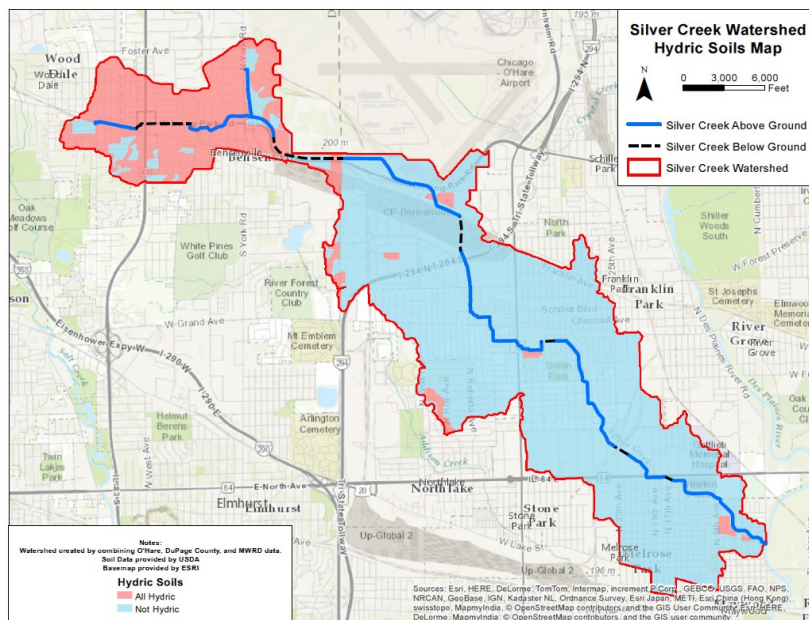


Fig. 11: Hydric Soils within the Silver Creek Watershed are predominant in the upper watershed (Cook County and DuPage County NRCS Soil Survey). Approximately 791 acres, or 12 percent of the soils within the Silver Creek watershed are rated as “All Hydric.” However, due to urbanization, encroachment, and disturbance, the coverage of wetland is much lower in the watershed than the extent of hydric soils. Many of the Lower Watershed Soils Have Been Disturbed by Urban Fill.

Wetland information for the Silver Creek watershed is available from three sources. These sources include the National Wetland Inventory (NWI), the DuPage County wetland inventory, and the field watershed inventory. The NWI has identified 53.8 acres of wetland area in the watershed. The DuPage County wetland inventory includes NWI areas, as well as an additional 4.0 acres of wetland habitat. Thus the total wetland area in the Silver Creek watershed is only 0.9% of the watershed area. Fig. 12 below represents recent historic wetland coverage in and near the Silver Creek watershed.

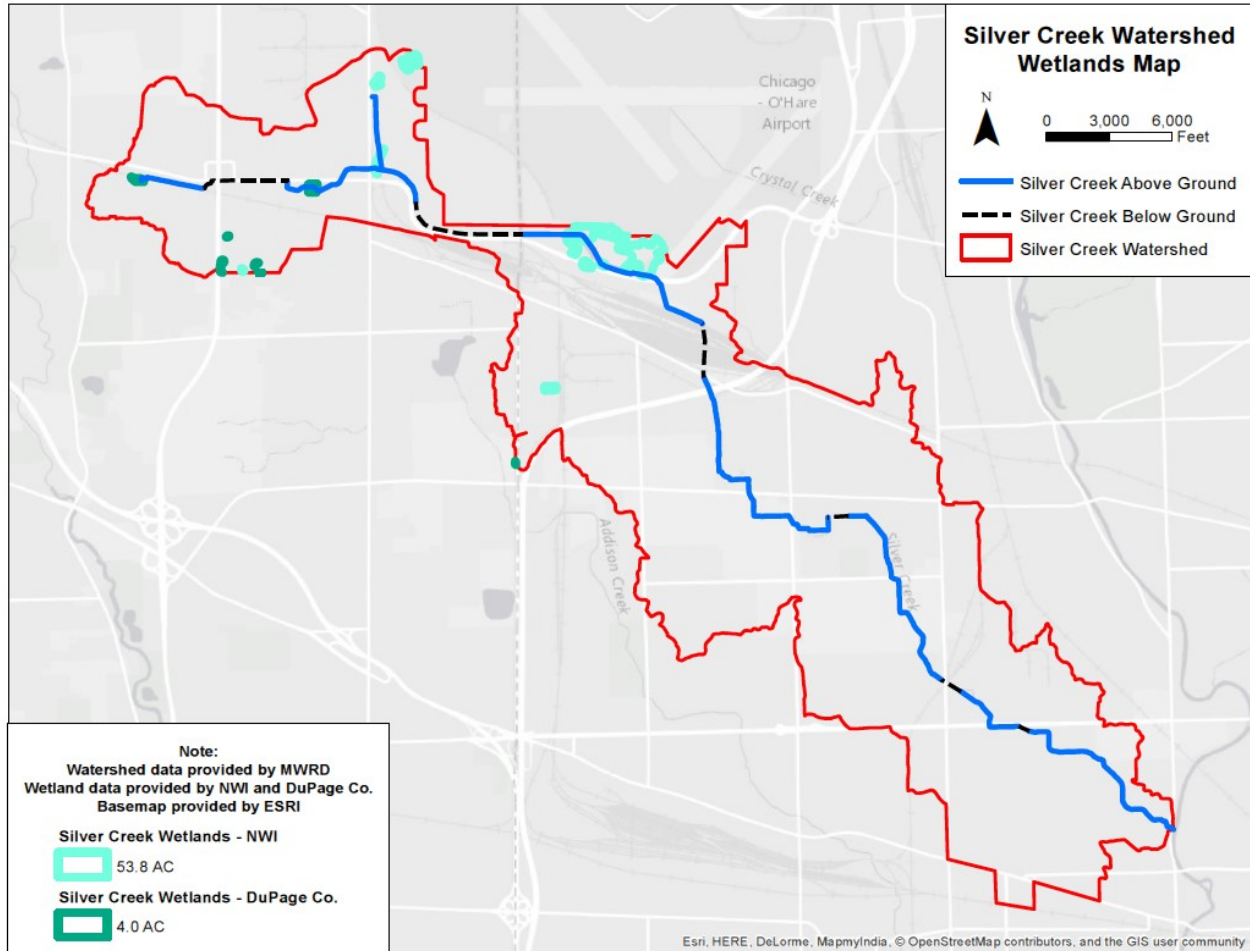


Fig. 12: Wetland Areas based on the National Wetland Inventory and the DuPage County Wetland Inventory. Despite extensive hydric soils in the upper watershed (Fig. 11), wetland habitat is lacking.

The central and downstream watershed area in Cook County is nearly devoid of wetland habitat. In entirety, even though hydric soils cover 12% of the watershed, less than 1% of the watershed contains wetland habitat. The most extensive wetland area adjacent to the Silver Creek watershed is the downstream Des Plaines River corridor.



Photo 1: The farthest upstream headwaters of Silver Creek (channel at left) in Wood Dale are located within a detention facility. Examples of wetland habitat adjacent to the stream channel are lacking throughout the watershed. This area is mowed around the perimeter. But the central area perhaps was too wet to be mowed at the time of this photo.

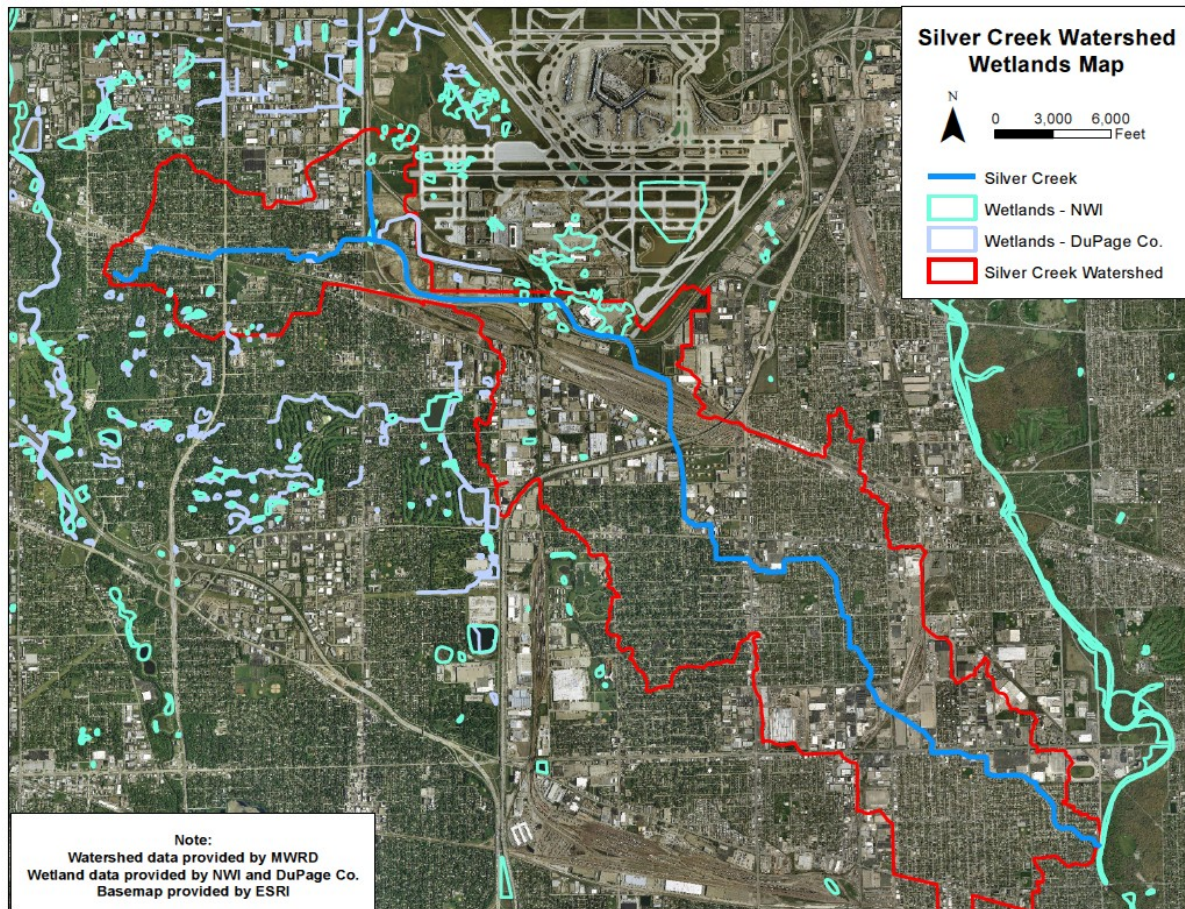


Fig. 13: Wetland Areas (Aerial Basemap) within and adjacent to the Silver Creek watershed based on the National Wetland Inventory and the DuPage County Wetland Inventory. The most extensive wetland area adjacent to the Silver Creek watershed is the downstream Des Plaines River corridor. Recent modifications at the O'Hare Airport with subsequent wetland mitigation have resulted in some boundary modifications for wetland areas (not depicted).

It should also be noted that wetland areas depicted in Fig. 12 and Fig. 13 are based on available GIS data and have not been field reviewed or field verified at this time. Based on field observations to date, the extent of wetlands near O'Hare Airport has been modified with the O'Hare Modernization Plan. Further wetland modifications are expected to occur at O'Hare Airport to attempt to reduce airplane wildlife strikes.



Photo 2: Wetland mitigation area along Silver Creek. This wetland area is located north of Thorndale Avenue in the O'Hare Airport vicinity.

Demographics

Demographic data can be used to evaluate population trends and understand the composition of the citizenry of the watershed. This information in turn can be used to provide the guide strategies to educate the public regarding water quality improvement techniques and opportunities. For instance, multiple language formats could be considered (Spanish, etc.) to educate watershed stakeholders.

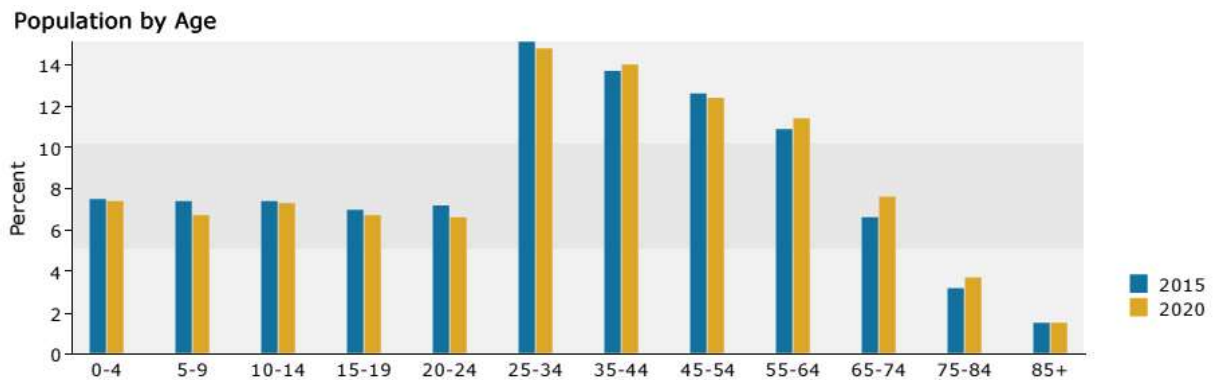


Fig. 14 Population Change By Age For 2015 And 2020 In The Silver Creek Watershed (Source: U.S. Census Bureau 2010, With ESRI Forecasts For 2015).

Table. 10: Population Forecasts For the Silver Creek Watershed (Source: U.S. Census Bureau 2010, With ESRI Forecasts For 2015 and 2020).

Population Summary	
2000 Total Population	51,164
2010 Total Population	50,769
2015 Total Population	50,973
2015 Group Quarters	34
2020 Total Population	51,416
2015-2020 Annual Rate	0.17%



The total population information presented in the Table 9 indicates that little net change in population may occur between 2015 and 2020.

Table. 11: Median Household Income Projections For The Silver Creek Watershed (Source: U.S. Census Bureau 2010, With ESRI Forecasts For 2015 And 2020).

Median Household Income	
2015	\$53,614
2020	\$60,411

Table 12: Median Age And Per Capita Income In The Silver Creek Watershed (Source: U.S. Census Bureau 2010, With ESRI Forecasts For 2015 And 2020).

Per Capita Income	
2015	\$21,320
2020	\$24,169
Median Age	
2010	33.4
2015	34.0
2020	35.3

Table 13: Employment Sectors And Services In The Silver Creek Watershed (Source: U.S. Census Bureau 2010, With ESRI Forecasts For 2015 And 2020).

2015 Employed Population 16+ by Industry	
Total	25,237
Agriculture/Mining	0.3%
Construction	6.9%
Manufacturing	23.9%
Wholesale Trade	3.5%
Retail Trade	10.3%
Transportation/Utilities	6.9%
Information	1.5%
Finance/Insurance/Real Estate	4.4%
Services	39.7%
Public Administration	2.5%
2015 Employed Population 16+ by Occupation	
Total	25,238
White Collar	41.9%
Management/Business/Financial	8.1%
Professional	9.0%
Sales	8.6%
Administrative Support	16.3%
Services	18.5%
Blue Collar	39.7%
Farming/Forestry/Fishing	0.2%
Construction/Extraction	6.4%
Installation/Maintenance/Repair	4.7%
Production	17.1%
Transportation/Material Moving	11.3%

The Silver Creek watershed contains an economy dominated by the service sector, manufacturing, and retail trade. Employed persons are also almost equally divided between blue color and white collar jobs.

Land Use and Impervious Cover

CMAAP 2010 land use data were used to construct an existing land use map. In addition, land use classification for several parcels were modified to reflect current land use based on 2015 observations. For instance, some detention areas were re-categorized from “transportation” into

“open space” land use. Future land use was determined based on available Municipal Comprehensive Plans or Future Plans and associated future changes in land use.

Table 14: Existing (2010) Land Use Within The Silver Creek Watershed.

Existing Land Use (2010)	Area (Acres)	Percent (%)
COMMERCIAL	376.1	6%
INDUSTRIAL	1,305.5	19%
INSTITUTIONAL	213.0	3%
OPEN SPACE	155.1	2%
RESIDENTIAL	2,176.7	32%
TRANSPORTATION / ROW	2,256.3	33%
VACANT	279.1	4%
WATER	4.5	0.1%
TOTAL	6,766	100%

Existing (2010) land use within the Silver Creek watershed in 2010 is dominated transportation / utility / right-of-way area (33%), residential (32 percent), and industrial (19%) land uses. The remaining land includes commercial (6%), vacant (4%), institutional (3%), and open space (2 %).

Definitions for Each of the Watershed Land Use Types:

- Residential – Single Family:** Includes housing where a single family resides.
- Residential – Multi-Family:** Includes housing where multiple separate housing units are contained in one building or complex.
- Commercial/Retail:** Includes shopping malls and associated parking, single building offices, office parks, restaurants, auto repair shops, grocery stores, inc.
- Open Space – Conservation:** Includes nature preserves, game preserves, botanical gardens and forest preserves.
- Open Space – Park:** Includes all parks such as athletic fields and recreational trails.
- Open Space – Golf Course:** Includes all public and private golf courses.
- Industrial:** Includes mineral extraction, manufacturing, warehousing/distribution centers and industrial parks.
- Gov’t/Institutional:** Includes military bases and associated living quarters, medical and healthcare facilities, educational facilities, government administration and services (fire, police, post offices, etc.) and correctional facilities.
- Wetland:** Includes land uses that are saturated with water seasonally or permanently and contain hydric vegetation.
- Open Water:** Includes rivers, streams, canals (wider than 200ft), lakes, reservoirs and lagoons.
- Transportation:** Includes roadways, road right-of-ways, interstates, toll roads, bus facilities and air transportation centers.
- Utilities:** Includes waste water facilities, landfills, railroads, telephone poles and cell towers.
- Agriculture – Greenhouse/Nursery:** Includes nurseries, orchards and vineyards.
- Agriculture – Row Crop:** Includes row crops, pasture, fallow lands, dairy and other livestock enterprises.
- Agriculture – Equestrian:** Includes land uses for recreational horseback riding.
- Cemetery:** Includes cemeteries of all sizes.
- Vacant:** Includes any land use that does not fall under any of the above land use types.



Photo 2: Transportation land use such as railroad, road, and O'Hare airport along with commercial / industrial development have heavily impacted Silver Creek. Here, the far upstream headwaters are channelized in a narrow corridor between these two land uses.

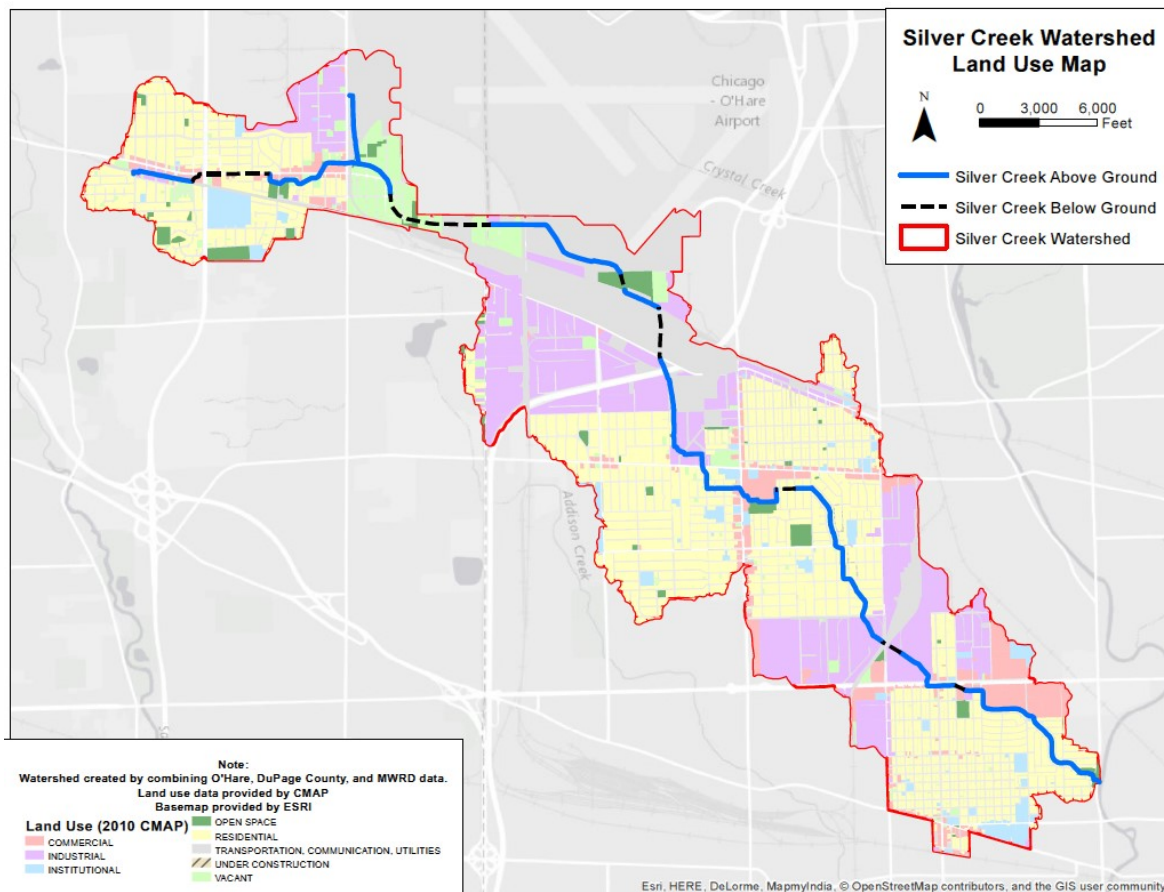


Fig. 15: Existing (2010) Watershed Land Use Map.

Table 15: Future Projected Land Use Within The Silver Creek Watershed.

Future Land Use	Area (Acres)	Percent (%)
COMMERCIAL	378.2	6%
INDUSTRIAL	1309.0	19%
INSTITUTIONAL	205.4	3%
OPEN SPACE	165.7	2%
RESIDENTIAL	2181.7	32%
TRANSPORTATION / ROW	2,258.0	33%
VACANT	263.9	4%
WATER	4.5	0.1%
TOTAL	6,766	100%

Future land use within the Silver Creek watershed does not significantly change versus existing conditions. There is a gain of 10 acres of open space. Vacant area is reduced by 14 acres. Institutional area is reduced by 8 acres. There are slight gains in commercial, industrial, and transportation land uses.

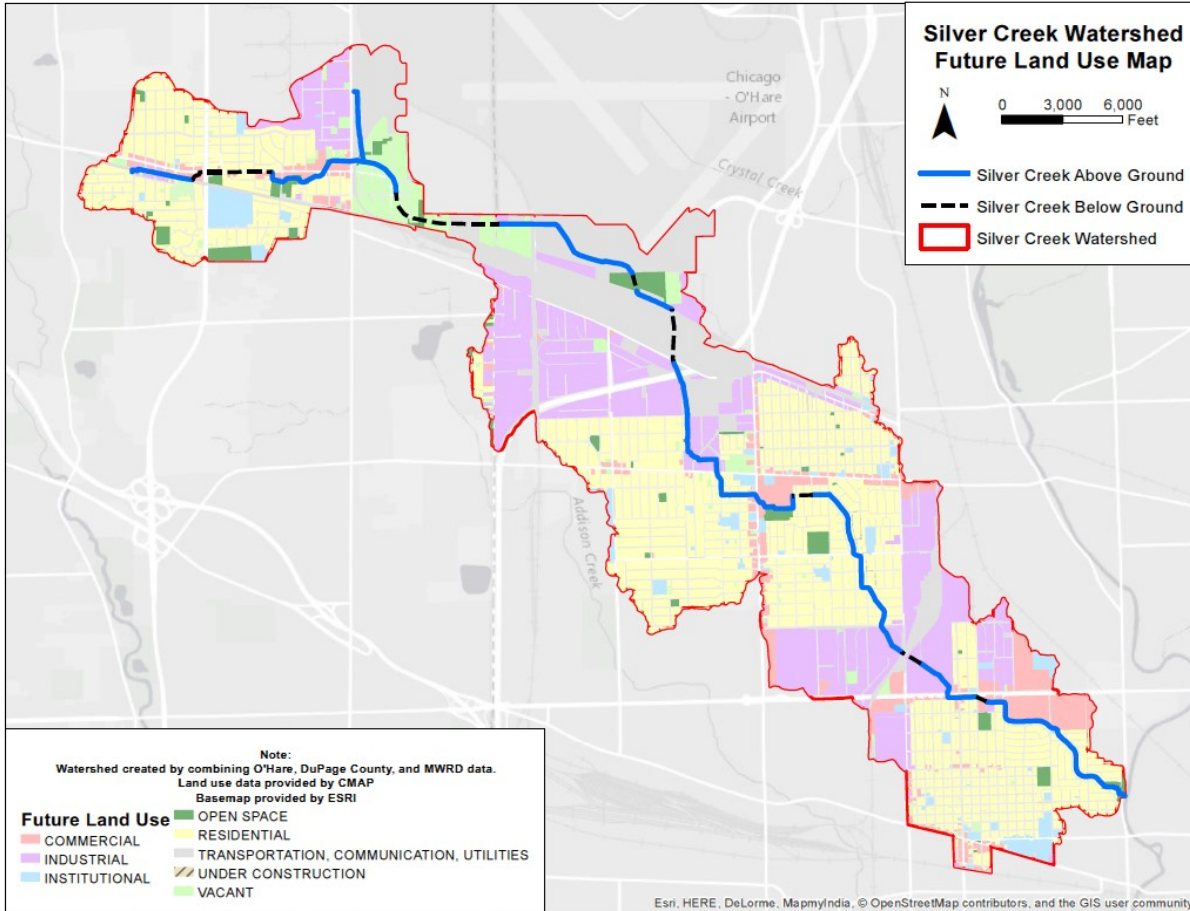


Fig. 16: Future Projected Land Use in the Silver Creek Watershed. There are no major changes in the percent land use per each category. There is a gain of only 10 acres of open space.

Percent Imperviousness per each land use was assigned based on available data. For instance, the Environmental Protection Agency (EPA) TR55 Hydrologic Model documentation contains information on impervious cover. These data were modified and applied to Lake County, Illinois land uses by Lake County Stormwater Management Commission for the Bull Creek / Bull's Brook Watershed-Based Plan. However, site-specific percent imperviousness values were also provided for the Silver Creek Watershed by the DuPage County GIS Department (Mary Beth Falsey, pers. comm.). One significant modification was that institutional land use was modified based on watershed conditions to a lower value (from 72% to 60% imperviousness) based on the DuPage County data, and because throughout the watershed, most institutional parcels are schools with adjacent open space field areas. Another modification was that railroad yard areas (transportation land use) were assigned a lower imperviousness since most of these areas in the watershed have extensive gravel placement on the ground surface, which reduces effective impervious cover. Next, GIS computational analysis was used to estimate percent impervious cover in the watershed on an average basis.

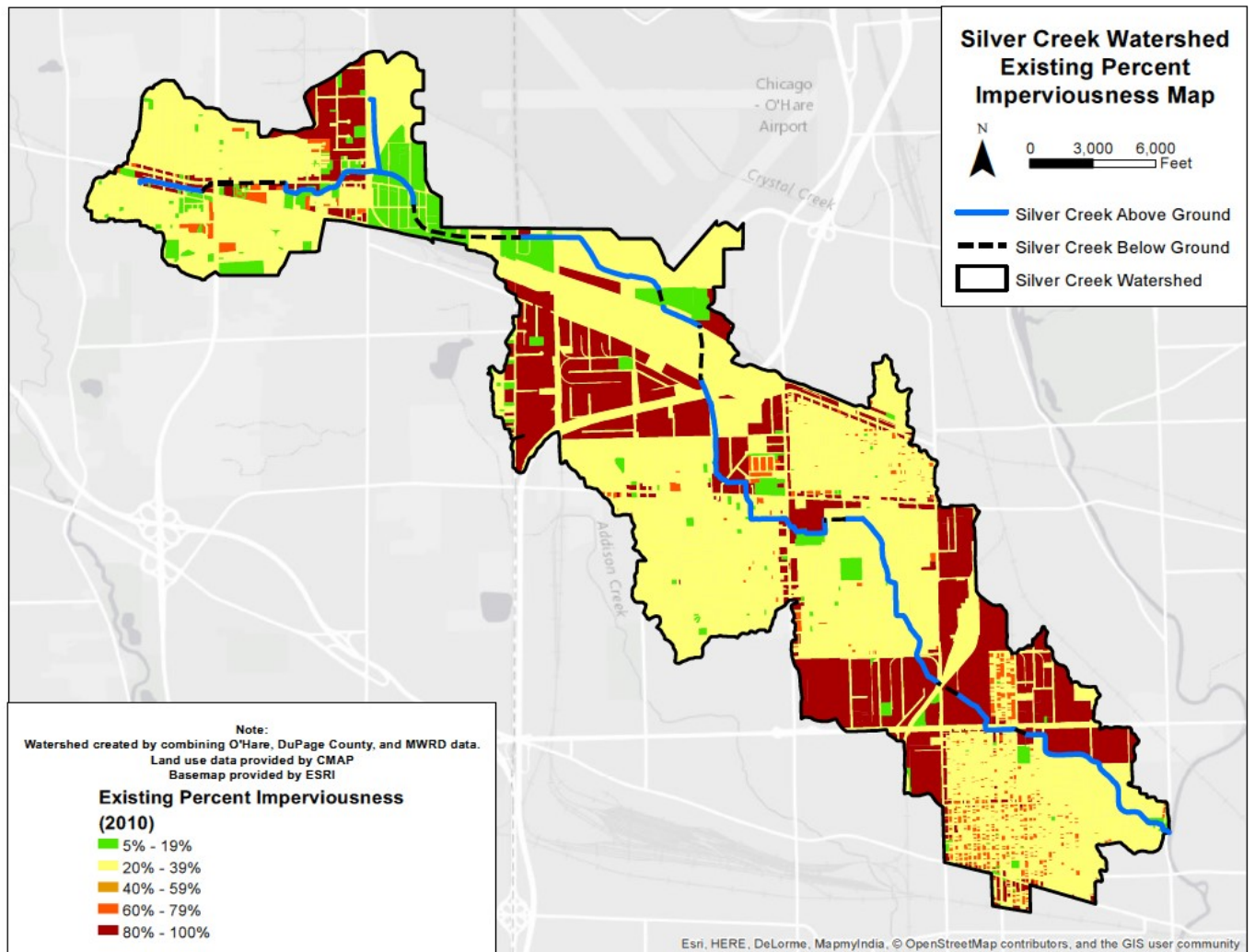


Fig. 17: Percent Imperviousness in the Silver Creek Watershed. Watershed impervious calculations were based in part on DuPage County GIS analysis for various land uses.

The following is a summary of watershed percent imperviousness.

Table 16: Existing Percent Imperviousness in the Silver Creek Watershed.

Existing Land Use (2010)	Existing Area (Acres)	Existing Percent Imperviousness (%)
COMMERCIAL	376.1	85%
INDUSTRIAL	1,305.5	80%
INSTITUTIONAL	213.0	38%
OPEN SPACE	155.1	15%
RESIDENTIAL - SINGLE FAMILY	1,996.9	38%
RESIDENTIAL -MULTI-FAMILY	179.9	65%
TRANSPORTATION / ROW	1,899.0	36%
TRANSPORT. - RAILROAD	357.3	20%
VACANT	279.1	5%
WATER	4.5	75%
TOTAL	6,766.4	46%

Note: Percent Imperviousness values based on DuPage County GIS measurements in the watershed and supported by TR55 Hydrological Model methods.

Average imperviousness is extremely high in the watershed at 46%. This is owing to the extent of urbanization with large areas of industrial and residential land use. In many areas, these urban land uses also encroach close to the stream channel.

Impervious cover is extremely important to understanding overall impacts on aquatic ecosystems.⁵ Studies on impervious areas have indicated that stream health begins to degrade when the watershed reaches approximately 10% to 15% impervious cover. This is caused by impacts of urbanization on vegetative cover, increased runoff volumes, reductions in stream base flows, increased delivery of pollutants, and other factors. In the case of Silver Creek, the watershed has an imperviousness of 46%.

⁵ Center for Watershed Protection, Monograph 1, Impacts of Impervious Cover on Aquatic Ecosystems, 2003.

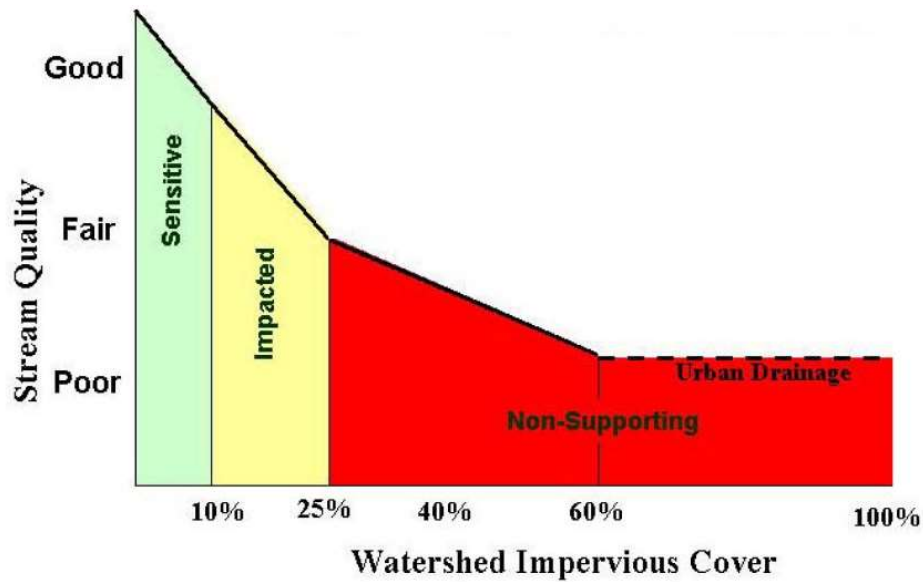


Fig. 18: Impervious cover (roads, parking lots, etc. that are impervious to rainfall infiltration) has a direct negative impact on aquatic ecosystems. Stream health begins to degrade when impervious cover is only 10% (consistent with a mix of agriculture and low-density residential development). For Silver Creek, the watershed is 46% imperviousness. As discussed later in this Plan, reversing the impact of impervious cover will be very important to restoring and enhancing Silver Creek.

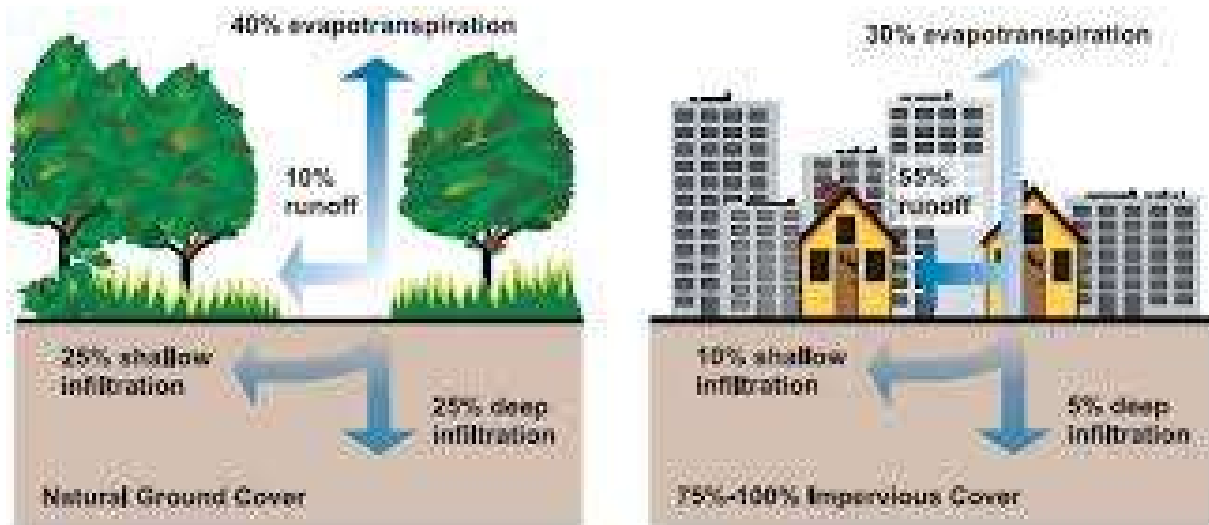


Fig. 19: One of the reasons that urbanizations impacts streams is that during a rainfall event, instead of the runoff infiltration into the ground (left), instead with storm sewers and impervious surfaces (right) the runoff rapidly sheds directly into the stream channel. Pollutants are carried with the runoff into the stream.

The Illinois Natural History Survey ⁶ in 1981 determined that there are 5 major variables that affect the health of the fish community in a stream. In fact, the diversity and types of fish and macroinvertebrates can be used as a direct indicator of stream quality and health. The five major variables that affect fishes are the energy source (carbon input through leaf litter versus algae growth), water quality, habitat quality, flow types, and biotic interactions with other species (such as carp or other invasive and aggressive species).

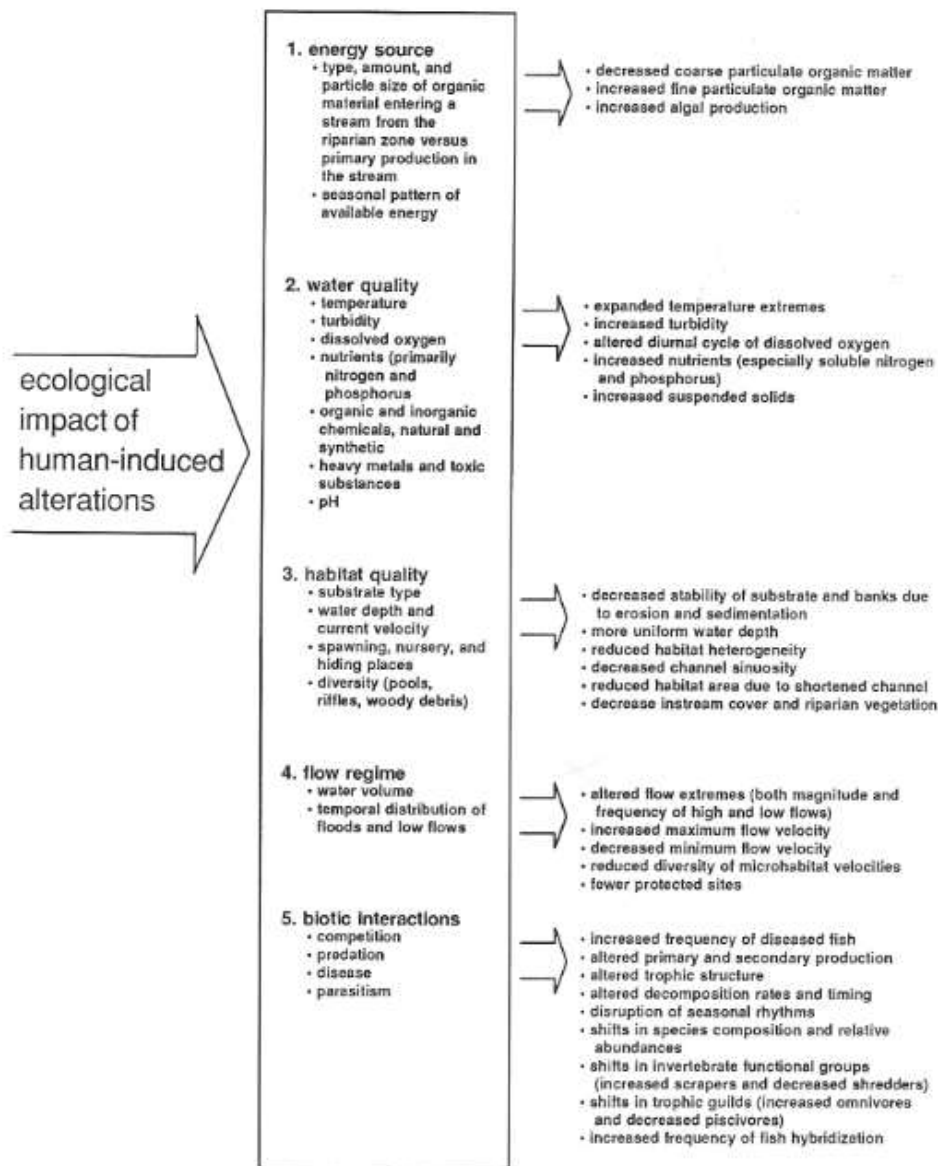
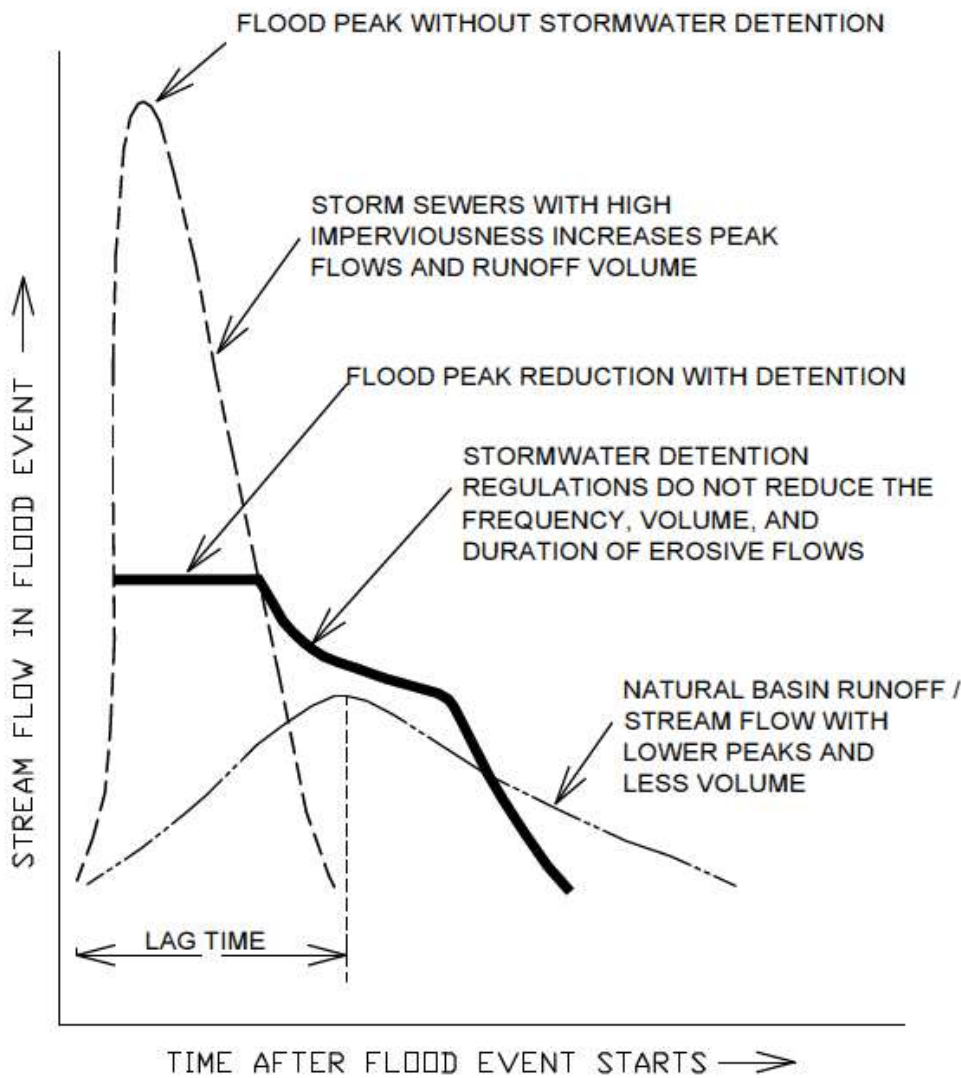


Fig. 20: Five major factors that affect stream health include the effect on food / energy sources in the stream, and the effect on water quality, habitat, stream flow, and biotic interactions among species. Many of these factors are inter-related.

⁶ Karr, J.R. and D. R. Dudley, 1981. Ecological perspectives on water quality goals. Environ. Mgt. 5:55-68.

Stream flows are vastly different before versus after watershed development. In addition, pollutant loading within the runoff that flows directly into streams is greatly increased. Many stormwater advocates maintain that stormwater detention protects stream channels from eroding. But this is typically not the case. Stormwater detention is designed to reduce peak flooding impacts. But detention does not reduce the volume of runoff associated with urbanization (the more roads and parking lots, the more runoff and the less infiltration).



SOURCE: MODIFIED FROM WILEY & GOUGH, 1995

Fig. 21: Stormwater detention is designed to reduce peak flooding impacts. But detention does not reduce the volume of runoff associated with urbanization. Improving water quality often includes best management practices that also reduce the volume of runoff discharged into the stream channel.

Watershed Drainage System

The channel length of Silver Creek is 10.87 miles in length. Approximately 79% of the length of Silver Creek is above ground. But over 21% of the channel length, or 2.29 miles of channel, is contained in underground piping.

Table 17: Silver Creek Above Ground Channel Length Versus Below-Ground Length.

Silver Creek Condition	Creek Length		
	(ft)	(mi)	(%)
Above Ground Creek Length	45,340	8.59	79%
Below Ground Creek Length	12,070	2.29	21%
Total Length	57,410	10.87	100%

In some locations, extensive contiguous lengths of Silver Creek are below ground within various infrastructure conveyance systems (storm sewer pipes, box culverts, etc.; see Fig. 2). Three upstream locations where extensive lengths of Silver Creek are below ground include:

- 1) Village of Bensenville near Irving Park Road,
- 2) O'Hare Airport along Irving Park Road, and
- 3) Canadian Pacific Railroad facility in Leyden Township (Fig. 2).

In many stream reaches evaluated both upstream and downstream in the watershed, the vegetated riparian corridor buffer width is relatively narrow and/or encroached by adjacent development. Based on the watershed inventory, there are few above-ground (daylighted) tributary channels draining into Silver Creek. This is due in part to extensive storm sewer networks that drain local land uses and discharge polluted runoff directly into Silver Creek.

As described previously, the channel of Silver Creek ranges in elevation from 705 ft in the upstream watershed to approximately 612 ft in the lower watershed (at the mouth near the Des Plaines River). There is an elevation change of approximately 93 feet over the entire channel length of 57,410 linear feet. The average channel gradient or slope is 0.0016 ft (or 0.16%) of vertical drop in elevation per each horizontal foot of stream channel. This is also equal to a drop in elevation of 8.6 ft per each 1 mile length of Silver Creek. Please find below tables describing channelization, riparian conditions, and streambank erosion per each stream reach evaluated. The following is supplemental narrative describing observed conditions per Stream Reach.

Reach # 1

Silver Creek's headwaters begin near Catalpa Avenue and E. Potter Avenue (Section 15) of Addison Township, in the municipality of Wood Dale, DuPage County (Reach # 1). This upstream localized area within a detention basin contains a channelized stream segment adjacent to wetland vegetation. The vegetative buffer around the wetland is currently mowed. The stream is locally mapped as the Bensenville Ditch. The stream remains highly channelized through Reach # 1, as it flows alongside railroad tracks located south of Irving Park Road (Rt. 19; see Photo 4).



Photos 3 and 4: The farthest upstream Reach # 1 headwaters of Silver Creek within a detention facility. Wetland vegetation adjacent to the channelized ditch helps to reduce pollutant loading from adjacent residential and mowed turf areas. Farther downstream (right photo), Reach # 1 remains highly channelized, likely with intermittent flow, adjacent to railroad tracks located south of Irving Park Road and west of Rt. 83. Small pockets of water contains frogs, ducks, and other wildlife in the area.

Reach # 2

The Reach # 2 stream segment is below ground over 2,750 LF between Spruce Ave. and Rt. 83.



Photo 5: Reach # 2 is piped below ground alongside Irving Park Road.

Reach # 3.1

In Reach # 3.1, the creek daylights downstream of Irving Park Road in Bensenville into a park setting. Approximately 20% of the 588 LF length of Reach # 3.1 contains severe streambank erosion.



Photo 6 (left): Silver Creek is above ground in Bensenville beginning immediately south of Irving Park Road. Reach # 3.1 (and Reach # 3.2 described below) contains some of the largest non-developed vegetated buffer along located along Silver Creek. Some areas contain severe stream bank erosion. Invasive reed canarygrass occurs immediately along the channel. But the dominant riparian vegetation is turf grass, which is known to contribute significant pollutant loading. Turf grass is also problematic for stream enhancement because it does not effectively stabilize eroding banks. Photo 7 (right): The existing park area contains significant existing amenities, as well as opportunities for streamside BMPs and channel enhancement.

Reach # 3.2.

Reach # 3.2 (as with Reach # 3.1) continues to contain a relatively wider vegetated riparian buffer along Silver Creek. Open space is adjacent to the stream channel in nearly all areas. Approximately 35% of Reach # 3.2 is moderately eroded. This reach contains three detention basins.



Photos 8 and 9: A continued primarily vegetated riparian buffer occurs through Reach # 3.2. Some moderate erosion occurs. Vegetation is primarily invasive species and bank heights are relatively tall. Three detention areas occur through this 1,425 LF long stream reach.

Reach # 4

Reach # 4 contains consistent characteristics throughout its length between Mason Street and York Road. The creek is relatively incised, with tall banks. Consistent side slopes occur. Most of the riparian vegetation is mowed. But a narrow non-mowed area with a mixture of native and non-native vegetation occurs within several feet on each side of the creek.



Photos 10 and 11: Reach # 4 contains a wide, excavated creek area with tall banks and extensive mowed vegetation.

Reach # 5.1

Reach # 5.1 is approximately 2,438 LF in length. It commences east of York Road through the O'Hare Airport area. An extensive, excavated channel area is present with a relatively smaller baseflow channel, and tall banks to provide in-channel runoff storage capacity. Foot or car access to the creek channel off Irving Park Road in the O'Hare vicinity is relatively limited and/or restricted.



Photos 12 and 13: The excavated channel in Reach # 5 is relatively wide. Reduced baseflow velocities appear to support invasive wetland vegetation include cattails. Beyond the lower channel banks, extensive areas of mowed vegetation (turf grass or fescue and other meadow grass) occurs. It is likely that water quality issues in this vicinity may be more related to excessive sedimentation or deposition (related to an over-widened baseflow channel) rather than bank scouring (photos taken off South Access Road).

Reach # 5.2

Downstream of the South Access Road (photos above), Silver Creek is located below ground for approximately 3,750 LF (0.71 miles).



Photo 14: Silver Creek below ground for 0.71 miles of creek length.

Tributary T1-1

A channelized tributary flows into Silver Creek from the north. The tributary channel is 2,705 LF in length. It is located west of O'Hare Airport and east of York Road. The tributary channel vegetation appears to be mowed. Foot or car access to Reach T1-1 is limited.

Reach # 6

Reach # 6 is approximately 3,125 LF in length. It begins west of Taft Road where Silver Creek begins to re-emerge flowing above ground. Reach 6 then it extends east through the remainder of the O'Hare properties until Silver Creek turns south across Irving Park Road. West of Taft Road, Silver Creek has a rock-line, wide channel area. East of Taft Road, Silver Creek appears to have been converted into an on-line detention / stormwater storage area. Invasive Cattail and Phragmites vegetation are dominant through the detention area, and along the channel. Both east and west of Taft Road, the channel is very wide with tall side slopes set back from the channel.



Photos 15 and 16: Silver Creek in Reach # 6 appears to have been converted into more of a runoff storage facility. West of Taft Road (left photo) the channel is rock-lined near the toe of slope. East of Taft Road (right photo) an on-line detention area occurs with cattails and Phragmites along the creek channel. With a very wide channel, sediment deposition is likely extensive. However, emergent wetland vegetation would act to reduce or mitigate some water quality impacts.



Exhibit 2: Silver Creek in Reach # 6 was converted into a broad, shallow detention area with extensive adjacent emergent wetland dominated by cattails. It is assumed that maximized flood storage capacity is a primary purpose for the broad configuration of this detention area.

Reach # 7

South of Irving Park Road, Silver Creek is piped underground 700 LF as the channel flows south through a constructed MWRD Basin Area. The channel elevation is relatively high, while the basin bottom extends approximately 25 ft below Silver Creek. The Basin is depicted below. There are few ongoing water quality benefits for Silver Creek associated with the basin as currently operational. Between 2007 and mid-2015, Silver Creek has only flowed into the basin on 18 events (just over 2 events per year on average).



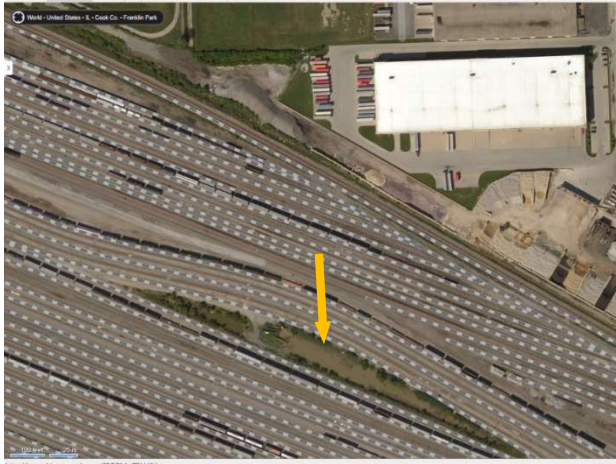
Photo 17: MWRD Flood Storage basin along Silver Creek located immediately south of O'Hare Airport (off Seymour Road). The MWRD Basin has an extensive runoff storage volume (501 acre-feet). However, Silver Creek is piped below ground (in a 60-inch culvert) over 700 LF along the site. Silver Creek overflows into the Basin (from the north) only during extreme flood events.



Photos 18 and 19: The MWRD Basin (left photo) contains some surface water storage at the bottom of the facility. The facility is overall managed to be pumped relatively dry. Mowed turf grass is dominant along the tall side slopes of the 36-acre facility. Silver Creek (right photo) flows below ground and does not interface with the MWRD Basin except during extreme flood events. Both facility modifications and operational modifications would be needed in order for the existing basin configuration to be allowed to provide improved water quality benefits along Silver Creek.

Reach # 8

Reach # 8 consists of the Canadian Pacific Railroad Yard where Silver Creek is piped below ground for a length of 2,750 LF. There is one very small surface detention area within the Railroad Yard. The site owner holds 4 NPDES permits regulating discharge from the facility area. (See NPDES discharge discussion below.) The NPDES permit descriptions indicate that Stormwater Runoff and Process Water are regulated. Total suspended solids (TSS), total phenols, oil and grease are each monitored at the facility. Based on site observations upstream and downstream of the railroad yard, there could be water quality impacts that appear to affect Silver Creek downstream of the railroad yard (see Reach # 9 below).



Photos 20 and 21: The Canadian Pacific railroad yard in Franklin Park contains railroad facilities underlain by gravel with some storm pipe drainage. One surface pond is maintained at the site. Otherwise, Silver Creek is piped below ground at the facility. The small basin (right photo, facing east) collects piped subsurface flow. It is pumped out during flood events and discharged into Silver Creek. The basin appears to be capable of only minor water quality improvement.



Photos 22 and 23: The small runoff collection basin receives storm pipe inflow from the railroad yard. During major flood events, flood waters are not detained long, but are pumped out with large capacity overhead pumps (right photo) into Silver Creek when the flood stage recedes.



Photos 24 and 25: The Canadian Pacific railroad yard reach contains extensive gravel areas (left photo). The gravel materials improve potential runoff infiltration, provides at least limited filtering of oil, grease, or other materials, and reduces potential runoff volume into Silver Creek. The south parcel of the railroad yard contains office building, parking, and other impervious surfaces. Perhaps the most significant concern (and opportunity for water quality improvement) is the ditch approximately 4,500 LF in length along Franklin Avenue. This non-vegetated ditch contains significant bank erosion, rills, and gullies. During the site visit, vegetated along the ditch was being herbicided (we are uncertain if rock improvement is being proposed along the ditch.) Sediment deposits in the channel bottom are extensive. This ditch is periodically dredged to remove sediment deposits.



Photos 26 and 27: Sediment deposits at the downstream end of the CP Railroad Ditch along Franklin Avenue, near Silver Creek. A ditch check has been installed, but non-vegetated banks contribute significant sediment loads. Right Photo: Sediment deposits in Silver Creek as it emerges from below-ground through the CP Railroad. It should be noted that not all sediment deposits depicted emanate from the CP facility. The fact that the creek is piped below ground implies that all sediment from upstream areas is also conveyed through the site. Such sediment from onsite and from upstream becomes deposited as soon as the creek width widens out enough to reduce velocities and allow for sediment deposition.

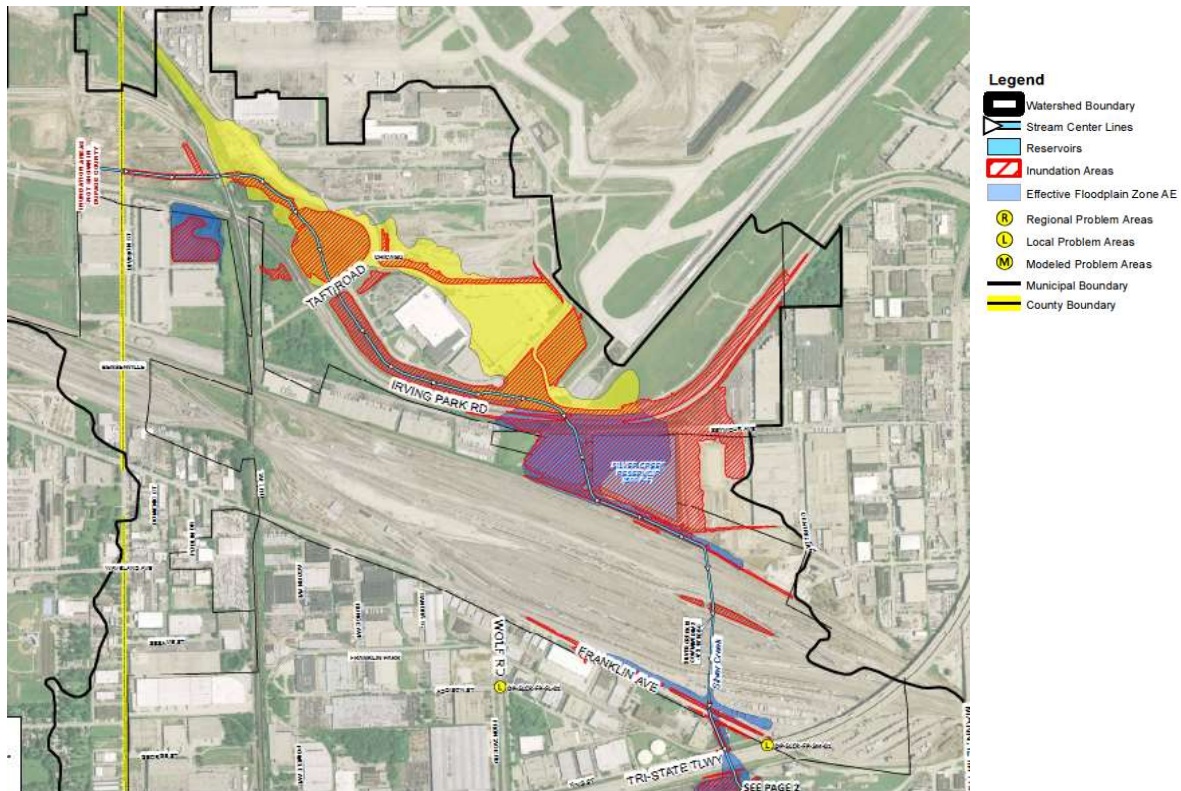


Exhibit 3: MWRD Flood Study (2010) in the Cook County portion of the Upper Watershed of Silver Creek between Division Street and I-294 near Franklin Avenue. (Note: The MWRD watershed boundary depicted is no longer applicable; See Fig. 2.)

The extent of flood-related problems in the upper watershed appears to be lower compared with the central watershed area. Recent modifications at O’Hare Airport divert much of the flow north of Irving Park Road away from Silver Creek (see Fig. 2). The MWRD Basin provides up to 501 acre-feet of flood storage. The CP railroad area has extensive gravel (fewer impervious surfaces compared to other watershed areas) that acts to reduce runoff. However, runoff collected at the CP facility is rapidly pumped and discharged into Silver Creek. One possible BMP that would not only reduce polluted runoff into Silver Creek but that may further reduce downstream flooding areas of concern would be if the CP railroad discharge could be diverted northward, if possible, into the MWRD Basin. These policies are suggested for consideration since “We all live downstream.” (Note: Flooding in DuPage County is relatively limited as well, compared to other areas.)

Reach # 9

Reach # 9 begins south of Franklin Avenue. This reach contained significant qualitative observations of water quality impacts. Channel sedimentation appeared to be high in some areas. (This was confirmed with sediment upstream described in Reach # 8.) Flow constriction contributing to extended inundation may be an issue, although no readily detected dam or

impoundment structures have been observed to date. Algae growth was also high, indicating nutrient loads are significant. Bank erosion along the toe and middle slope areas of the steeper west bank were evident. Other than Reach # 3.1, this was the first area that had extensive bank erosion. The east side of Silver Creek includes a large industrial tank farm area, Magellan Pipeline. Numerous safety / spill control features were observed around the tank areas. Magellan holds 6 NPDES permits which regulate xylene, BOD, ethylbenzene, total phenols, benzene, and oil and grease. However, no discharge of these pollutants was reported. It would appear that the NPDES permit may be in the event of certain potential circumstances (perhaps including catastrophic flooding) that could result in the discharge of such pollutants. As a general note, the vegetation at the Magellan facility is dominated by extensive areas of mowed turf grass. As stated previously, mowed turf grasses can contribute nutrient discharge into Silver Creek. Turf grasses also have weak root structures which do a poor job of protecting streambanks from erosion.



Photos 28 and 29: The upstream end of Reach # 9 can be described as a marked change in channel characteristics and water quality impacts compared with upstream areas. For instance, sedimentation was more apparent even though no online impoundment structure was observed (left photo). Algae growth was also high. Also, lower and middle bank slopes had low levels of vegetative coverage (right photo). Channel conditions including lack of lower channel vegetation and sedimentation deposits are indicative of persistent, long-term inundation. (Lack of bank vegetation continued downstream through Reach # 10.)



Photo 30: The downstream area of Reach # 9 located north of Belmont Avenue, immediately west of an industrial tank farm. This area contains a broad, linear, mowed riparian side channel (left side of photo) that could be converted into a significant water quality improvement feature to enhance Silver Creek.

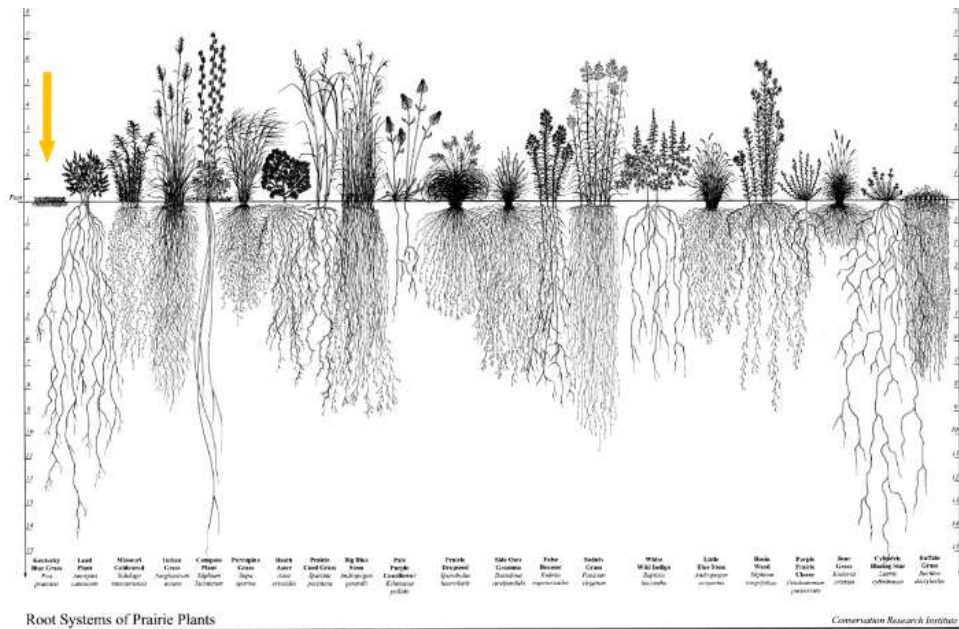


Exhibit 4: Turf grass (far left) has a much more shallow root system compared with native plant species. Moreover, compared to natives, turf requires extensive fertilizer, herbicide, and pesticide applications that can discharge into adjacent waters.

Reach # 10

Reach # 10 from Belmont Avenue to Grand Avenue. In contrast to upstream areas, Reach # 10 contains severe channel encroachment from the east by industrial / commercial development. The creek is highly channelized, and exhibits a particularly low level of recovery from channelization.



Photos 31 and 32: Reach 10 is highly encroached on both channel bank areas by large industrial, commercial, or residential developments. In some areas, green rooftops and/or other BMPs could be considered to reduce the volume of polluted runoff. Bank conditions are consistent with Reach # 9, marked by a lack of lower channel vegetation and sedimentation deposits, indicative of persistent, long-term inundation.

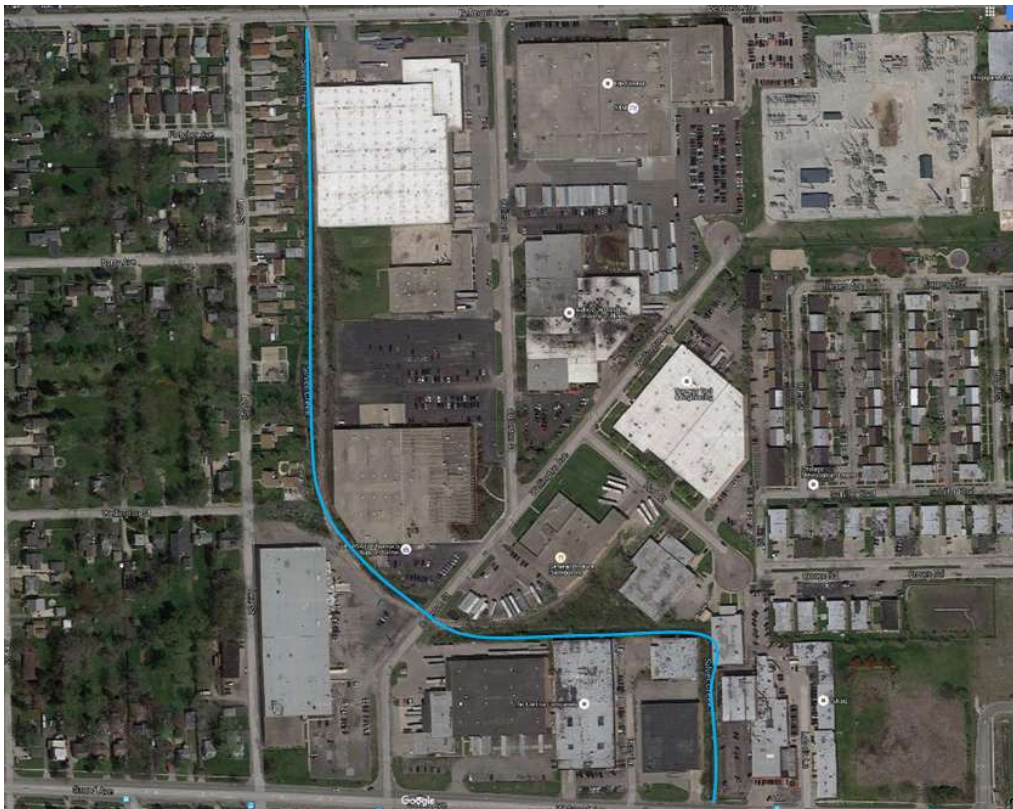


Exhibit 5: Example of encroachment on the channel and floodplain area along Reaches # 9 and # 10 between Belmont Avenue and Grand Avenue by industrial / commercial development to the east, and residential areas to the west.

Reach # 11

Reach # 11 begins immediately downstream of Grand Avenue and extends through Mannheim Road (Rt. 45). Accumulations of pollutants common to roadway runoff include oil sheens and surface scum (Photo 33). The entire channel area in this reach has been modified with placement of concrete revetment structures. In-stream habitat appears to be lacking and scouring is common. Residential development lines the channel on both banks throughout this area.



Photos 33 and 34: Runoff from Grand Avenue (left photo) includes accumulations of oil, grease, scum, and solids (left photo). Throughout this reach, Silver Creek is fenced, perhaps for resident safety. It is likely that flood flow velocities are high. Partially vegetated concrete revetments are on all bank areas. Bank heights are relatively low, but riparian conditions include residential encroachment directly at the overbank area. Resident flooding concerns appear to be extensive.

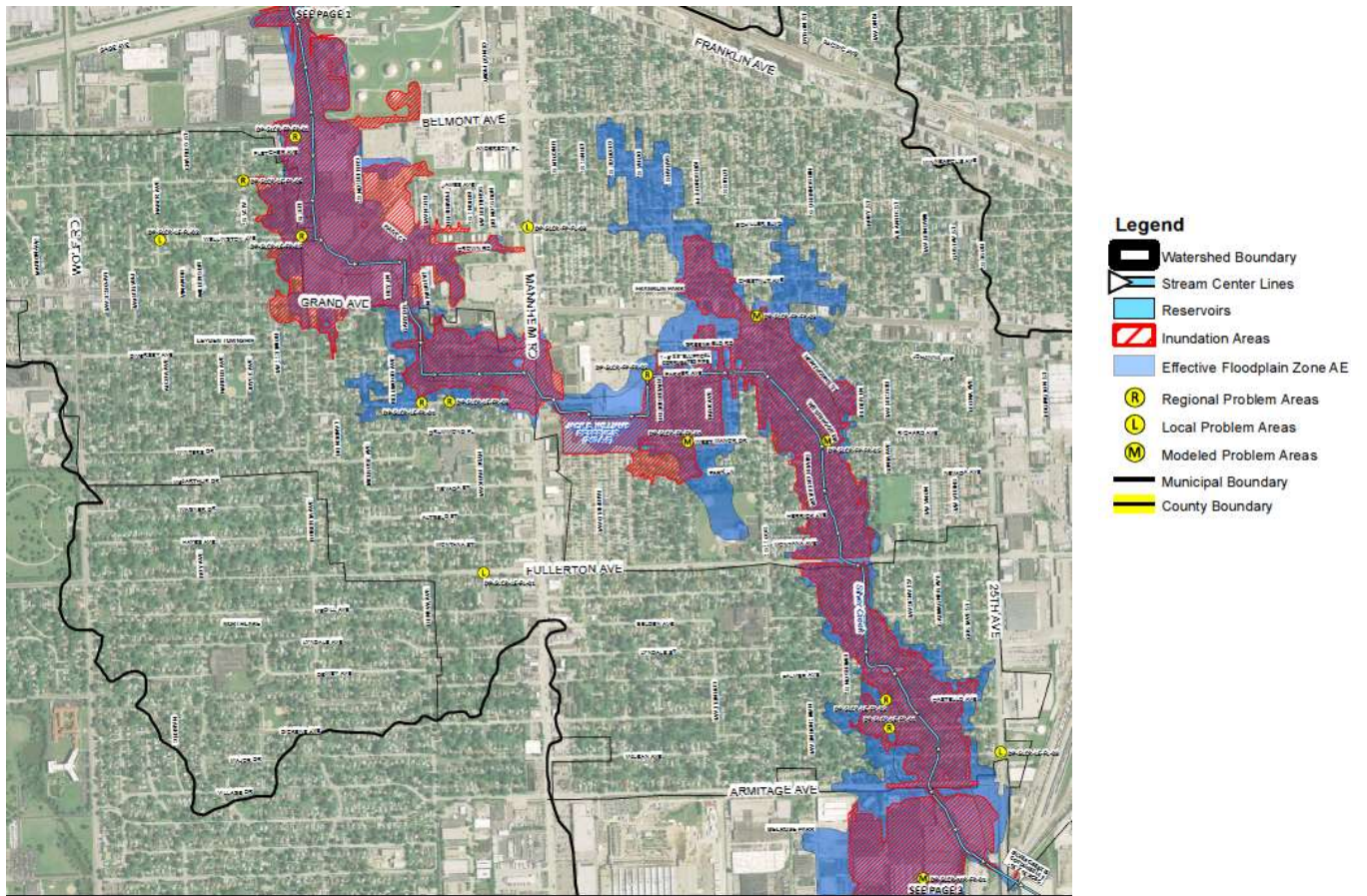


Exhibit 6: MWRD Flood Study (2010) depicting the Central Watershed Area between Belmont Avenue and Armitage Avenue. (Note: The MWRD watershed boundary depicted has been modified in areas; See Fig. 2). The extent of flood-related problems in the central watershed near the channel is extensive. There is a lack of near-channel runoff storage. Development encroachment and extensive impervious surfaces, including within the floodplain likely contribute to flooding impacts.

Reach 12

Between Mannheim Road (Rt. 45) and Riverside Avenue. Channel modification is extensive. Channel alignment includes vertical concrete banks, and concrete sloped banks. The Jack B. Williams Reservoir is immediately adjacent (south) of this very degraded reach of the Silver Creek channel. However, this reservoir is only filled during major flood conditions (see Photo 94). The concrete-lined Silver Creek channel (at left) completely bypasses the reservoir except during flood flows. Therefore, no consistent water quality improvement occurs at this time. This is significant in part because the Silver Creek corridor adjacent includes some of the most degraded reaches in the entire watershed (See Photos 35 through 39).



Photos 35 and 36: Channel alignment includes vertical concrete banks, and concrete sloped banks. Such highly engineered approaches to channel management provide no pollutant filtration or pollutant reduction. Washoff from extensive adjacent mall parking areas is also piped directly into the stream. A high percent of pollutants in the channel are then confined in the channel, and/or washed downstream in the next runoff event. These conditions also raise water temperatures in the channel, further diminishing site suitability for aquatic life.



Photo 37: Reach 12 has a trash rack and fencing to prevent dumping. With underground piping, debris can block flow conveyance and contribute to adjacent flood impacts.

Reach 13

The upper reach between Riverside Street to Fullerton Avenue was undergoing channel modifications during the site survey. These modifications appear to be related to daylighting part of the below-ground channel. But the proposed channel conditions appears to include more concrete banks, and/or near-vertical retaining walls.



Photos 38 and 39: Recent channel improvements may daylight the creek channel in areas where it is currently below ground (left photo). But the resulting channel and riparian conditions include 100% impervious surfaces (see Photo 40).



Photos 40 and 41: Reach 13 channel conditions include street paving and concrete placement directly within and alongside the creek channel. Proposed changes to the existing condition appear to include vertical retaining walls and hard armoring. These modifications appear to be designed for slightly increased flood storage, and/or conveyance of flood waters and will likely provide little to no benefit in improving potential water quality or aquatic habitat. Right photo: Typical and extensive concrete revetment conditions along residential areas throughout Reach 9. Flow restrictor structures (see arrow) approximately 1.5 feet high, occur in several areas. These structures may in part be designed to reduce otherwise potentially very high runoff velocities and associated scouring through the reach.

Reach 14

Between Fullerton Avenue and Palmer Avenue in Leyden Township, the Silver Creek channel has been daylighted. Residential construction is somewhat more setback from the edge of channel. An open channel bottom is present. Occasional riffle and pool habitat was observed. Banks were stabilized at one time with the use of lunker box structures. Some of these structures

have since been scoured. In contrast to areas immediately upstream, Reach 14 contains vegetated banks, and occasional native planting areas. However, turf grasses dominate most of the bank vegetative condition.



Photos 42 and 43: Reach 14 contains vegetated banks, and occasional native planting areas. However, turf grasses dominate most of the bank vegetative condition

Reach 15

From Palmer Avenue to Armitage Avenue, the lunker boxes continue to line the toe of slope along the creek banks. Native plantings are less common here, and turf grasses predominate.



Photos 44 and 45: In some locations, lunker boxes are highly scoured. Turf grasses predominate. Right Photo: Interestingly, a side-channel walking path, the "Silver Creek Trail," allows residents to view the open stream channel condition.

Reach 16

Industrial encroachment characterizes the reach between Armitage to North Avenue. Steep and tall creek banks occur adjacent to an industrial concrete crushing plant. The creek is contained below ground in part of this reach. Scoured banks are evident.



Photos 46 and 47: Creek banks are tall and relatively scoured adjacent to industrial areas.



Photos 48 and 49: Industrial storage near the materials processing plant is not all contained, and is being deposited along Indian Boundary Road. This site is located immediately adjacent to the creek area. Right Photo: The creek is daylighted north of North Avenue. Mowed turf grasses predominate on the banks. The broader creek channel width has facilitated the deposition of sediment. This site attracts a Canada Goose population, perhaps in part due to feeding activities as well as the mowed turf grass. (Geese are not seen just downstream where woody vegetation occurs on the banks.)

Reach 17

Between North Avenue and 14th Avenue, the creek banks are vegetated with woody shrubs, cut trees, or non-turf herbaceous species. Sediment deposits are apparent. But riffle structures also occur with higher channel gradient downstream of North Avenue.



Photos 50 and 51: Vegetated streambanks along North Avenue. Riffle structures occur in areas with slightly higher channel gradients.



Photos 52 and 53: Industrial and parking lot encroachment impacts occur in the downstream reach. The channel is also enclosed below ground in one commercial parcel. The Illinois EPA Intensive Basin Monitoring Site on Silver Creek is located in this vicinity. Right: Open space adjacent to the creek is limited along North Avenue. In areas like these near residential sites, pet waste deposits can be common due to a lack of adjacent open space for pet walking. Dog waste bags can remind the public to dispose of pet waste.

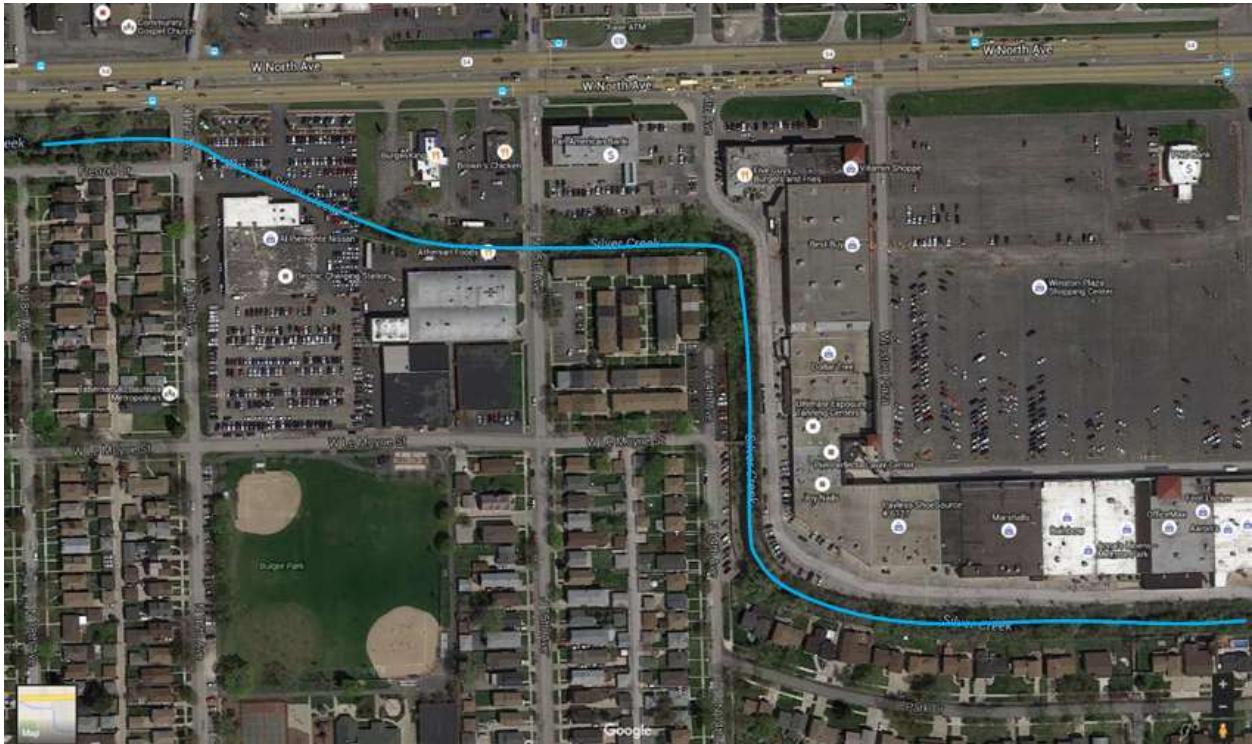


Exhibit 7: Example Industrial and Residential Development Encroachment In Reach 19 Along North Avenue. The Creek Is Below Ground In The Upper Part Of This Exhibit.

Reach 18

Between 14th Avenue and 9th Avenue, Silver Creek contains predominantly woody vegetation cover. Channel conditions include some further recovery from channelization, including some riffles, pools, and limited aquatic habitat.



Photos 54 and 55: In areas where channelization includes 90-degree channel bends, the banks have been modified with concrete armor (left photo). Since installation, the concrete is cracked in many locations and vegetation is growing through the openings. For water quality, such a condition is more beneficial than concrete alone. Root structures can help to further stabilize banks, absorb runoff, and shade the channel. Right Photo: Woody cover typical of Reach 18 conditions. Occasional moderate erosion occurs. Runoff is received from the Winston Plaza mall (left bank) and residential areas (right bank).



Photos 56 and 57: Students from Concordia University are engaged with the multi-year water quality sampling on Silver Creek through agreement with the Village of Melrose Park. The results of the Concordia water quality analysis are described in Appendix 3.

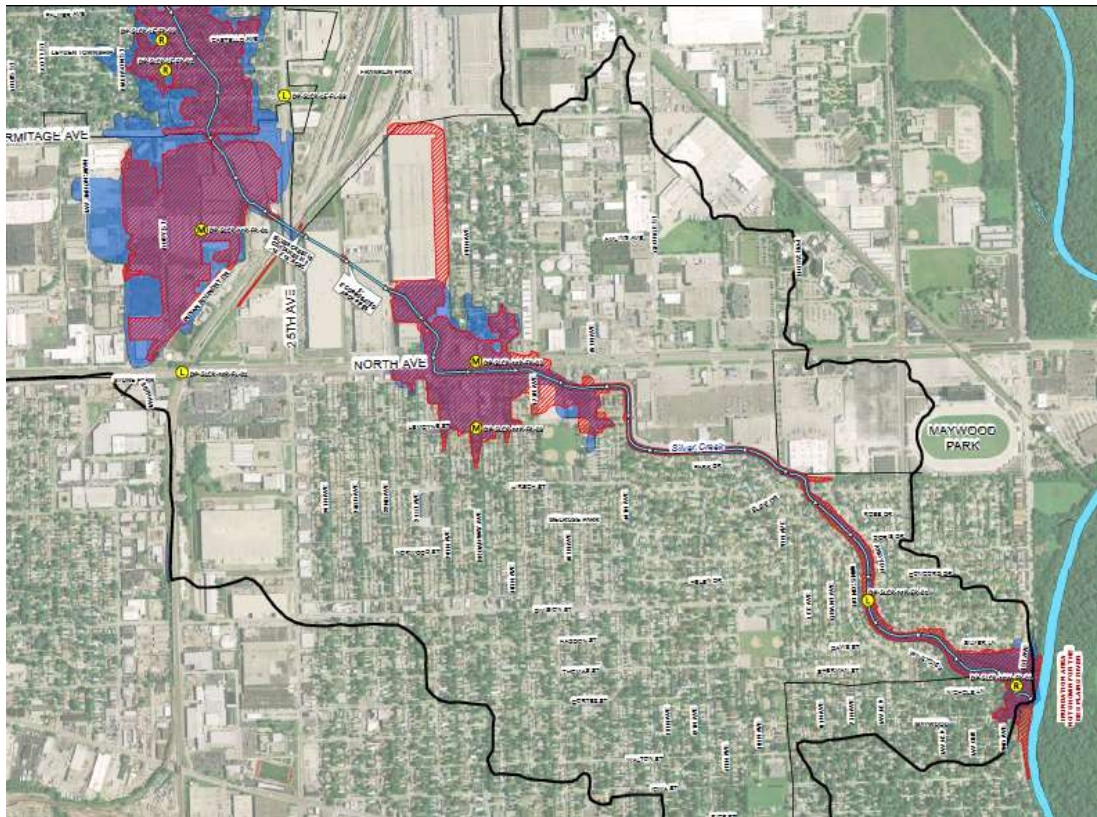


Exhibit 8: MWRD Flood Study (2010) depicting the Lower Watershed Area between Armitage Avenue and the Des Plaines River (arrow added for reference only). The extent of flood-related problems in the lower watershed is extensive along North Avenue and upstream. But flooding is limited to near-channel areas downstream of LeMoine Avenue even though residential areas continue to encroach directly up to the stream channel. The far downstream watershed area near the Des Plaines River contains more open space which can absorb recurring floodwaters. It is possible that the extent of flooding is less in downstream areas due to taller creek bank heights, (typical bank heights in the less-flooded areas are 9 feet or more above the normal water level elevation).

Reach 19

Between 9th Avenue and Elsie Drive, channel gradient is relatively high, and streambank erosion is extensive and severe. Bank conditions include exposed tree roots in many areas. It is likely that several feet of bank has been lost due to erosion in this area.



Photos 58 and 59: Streambank erosion is severe downstream of the 9th Avenue Bridge.

Reach 20

In contrast to many degraded areas of Silver Creek, the reach between Elsie Drive and 5th Avenue is marked by restored and stabilized streambank conditions. These reaches which had previously had severe channel erosion have been stabilized in three project phases since 2007 by the Village of Melrose Park. The stabilization techniques have included environmentally sound methods such as rock toe, re-shaped slopes, rock riffles, vortex weirs, and native plantings. The area is bounded by residential development. Community response to the streambank treatments has been positive overall.



Photos 60 and 61: Before and After Photos of the Phase 3 Silver Creek Stabilization Project completed in 2010 by the Village of Melrose Park near Elsie Drive. Rock toe, re-shaped slopes, rock vortex weirs, rock riffles, and native plantings were installed. Bank stabilization can reduce loadings of pollutants such as total suspended solids, total phosphorus, and/or total nitrogen.



Photos 62 and 63: Dissolved oxygen levels can be improved using instream rock riffle habitat structures to re-aerate the water column. Right Photo: Project Sign for one of the Streambank Stabilization Project Phases informs the public about the Illinois EPA Section 319 Grant Program and the resulting water quality improvement.



Photos 64 and 65: Before and After Construction of the Phase 2 Silver Creek Stabilization Project completed in 2008 by the Village of Melrose Park, near 5th Avenue. Rock toe, rock points, and re-shaped slopes with native plantings are depicted. Mature willow trees that had been falling into the channel were selectively removed. Native plantings are maintained annually, which is an important ingredient for their establishment and longevity.



Photos 66 and 67: Past (1950s) conditions along Silver Creek with enjoyment of frozen water conditions. This photo was likely soon after channelization during residential development. Right: Spiderwort blooming along restored banks Silver Creek. Silver Creek plays an important role in community life, open space, and recreational opportunity for watershed residents.

Reach 21

The reach between 5th Avenue to 1st Avenue is characterized by severe and moderate channel erosion. However, residential development is setback much farther from the creek channel in this area. Open space within the floodplain area has resulted in relatively unique conditions along Silver Creek that otherwise were only observed in far upstream areas of the watershed.



Photos 68 and 69: Severe channel erosion downstream of 5th Avenue. Right Photo: Storm Sewer outfalls deliver runoff directly into Silver Creek, contributing to pollutant loading and scouring.



Photos 70 and 71: Deer and other wildlife are frequent visitors to uplands and woodland habitat near 1st Avenue. However, lower floodplain conditions (right photo) could be significantly improved. Silt deposits are commonly observed after overbank flood events. In some cases, vegetative growth is partially impeded, at least temporarily, by the silt accumulations.



Photo 72: In-stream trees mark past channel bank locations. In some areas, scouring associated in part with debris accumulations has resulted in flows scouring adjacent banks. The resulting sediment loss has since been deposited in the downstream Des Plaines River.

Reach 21

As with Reach 20, the short distance downstream of 1st Avenue through Des Plaines River is dominated by an open space stream corridor and floodplain habitat.



Photos 73 and 74: Bridge at 1st Avenue (facing upstream). There is local community interest in enhancing Silver Creek in the lower reaches to include recreational opportunities for canoeing (such as a canoe launch), a naturalized passive recreational park, or other open space opportunities near 1st Avenue. Right Photo: mouth of Silver Creek during winter at the Des Plaines River.



Photos 75 and 76: Example of channel flooding in the downstream area of Silver Creek near 5th Avenue. Overbank flooding has affected residences adjacent to Silver Creek. But relatively tall bank heights (9 ft or more) may prevent further flooding impacts. Right Photo: Example bottomland woodland habitat at the Des Plaines River floodplain near Silver Creek. Water quality impairment along Silver Creek is often impacted by the Des Plaines River conditions due to backwater flooding from the Des Plaines into Silver Creek during major flood events. During spring flooding conditions, the Des Plaines River can be inundated for several weeks at a time.

There may be not only unique conditions in Reach 20 and 21, but also opportunities for public education and water quality improvement, in part due to potential recreation use with naturalized site improvements.

Table 18. Summary of Stream Reach Channelization.

Stream or Tributary Name	Reach Code	Upstream Boundary	Downstream Boundary	Stream Length Assessed (ft)	None or Low Channelization		Moderate Channelization		High Channelization (ft / %)		Recovery from Channelization (None, Low, Mod., High)	Comments
						(ft/%)	(ft/%)					
Silver Creek	1	Catalpa Road	Spruce Ave. / Rt. 83	3034	0	0%	0	0%	3034	100%	Low Recovery But Vegetation Provides More Diverse Channel.	Creek Channelized In All Areas Including Low Flow Concrete Channel in Upstream Detention Area
Silver Creek	2	Spruce Ave. / Rt. 83	Irving Park Road	2431	0	0%	0	0%	2431	100%	None (Creek In Pipe)	Creek In Pipe Below Ground
Silver Creek	3.1	Irving Park Road	Church Road	603	0	0%	0	0%	603	100%	Moderate Recovery With Some Pools Forming.	Some Severe Streambank Erosion.
Silver Creek	3.2	Church Road	Mason Street	1440	0	0%	0	0%	1440	100%	Moderate Recovery With Some Pools Forming.	Vegetated Banks With Open Space Adjacent to Channel, But Dominated by Non-Native Species.
Silver Creek	4	Mason Street	York Road	1587	0	0%	0	0%	1587	100%	Low	High Entrenchment, Tall and Sloped Banks.
Silver Creek	5.1	York Road	O'Hare South Access Road	2428	0	0%	0	0%	2428	100%	Low	Over-Excavated Channel Width. Sluggish Flows. Sedimentation Likely.
Silver Creek	5.2	O'Hare South Access Road	West of Taft Road	4350	0	0%	0	0%	4350	100%	None (Creek In Pipe)	Creek Below Ground
Tributary 1	T1-1	Pleasant Street	Gateway Road	2705	0	0%	0	0%	2705	100%	Low / None	Narrow Ditched Tributary to Silver Creek.
Silver Creek	6	West of Taft Road	Irving Park Road	5467	2734	50%	1367	25%	1367	25%	Moderate	Expansive Online Wetland Detention Basin. Occasional Baseflow Channel Through Cattails Likely Periodically Excavated.
Silver Creek	7	Irving Park Road	Waveland Ave.	963	0	0%	0	0%	963	100%	None (Creek In Pipe)	Large MWRD Basins Adjacent to Creek, But Creek Piped In Elevation Above Basin Bottom.
Silver Creek	8	Waveland Ave.	Franklin Ave.	3244	0	0%	0	0%	3244	100%	None (Creek In Pipe)	Railroad Yard - Creek Piped Below Ground.
Silver Creek	9	Franklin Ave.	Belmont Ave.	2167	0	0%	0	0%	2167	100%	Low. Some Small Riffles Present.	Significant Channel Entrenchment. Development Encroaches Throughout. Channel Erosion in Upstream Area. Less So In Central and Downstream Areas. Lower Banks Unvegetated and Periodic Silt Accumulations Throughout. Algae Bloom in Channel.
Silver Creek	10	Belmont Ave.	Grand Ave.	2972	0	0%	0	0%	2972	100%	Low / None. Some Small in Central Area.	Severe Channel Encroachment by Industrial and Residential Development. High Channel Entrenchment. Lower Banks Unvegetated. Algae Blooms.
Silver Creek	11	Grand Ave.	Mannheim Rd. (Rt. 45)	2281	0	0%	0	0%	2281	100%	Low / None	Severe Channelization. Creek Banks and/or Channel Bottom Armored With Concrete Revetment Mats. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities.
Silver Creek	12.1	Mannheim Rd. (Rt. 45)	Upstream Side of J.B. Williams Reservoir	461	0	0%	0	0%	461	100%	None. Habitat Lacking due to Highly Scoured Channel. Vegetation Lacking	Severe Channelization. Creek Bends Highly Channelized.
Silver Creek	12.2	Upstream Side of J.B. Williams Reservoir	Riverside Street	1556	0	0%	0	0%	1556	100%	None. Habitat Lacking due to Highly Scoured Channel. Vegetation Absent.	Severe Channelization. Channel Banks Paved With Concrete. South of Mall Channel Contains Vertical Concrete Banks.

Silver Creek	13	Riverside Street	Fullerton Ave.	3778	0	0%	0	0%	3778	100%	None. Habitat Lacking due to Highly Scoured Channel. Vegetation Absent.	Severe Channelization. Channel Banks Paved With Concrete Revetment Mats. Creek Bed Frequently Armored. Several In-Channel Concrete Flow Restrictors Present.
Silver Creek	14	Fullerton Ave.	Palmer	1753	0	0%	0	0%	1753	100%	Low / Moderate. Some Small Riffles and Pools Present.	Lunker Structures and Vegetation Along Banks. Channel Bottom Open. Some Riffles Present.
Silver Creek	15	Palmer	Armitage	1537	0	0%	0	0%	1537	100%	Low / Moderate. Some Small Riffles and Pools Present.	Silver Creek Trail Walk on East Bank. Lunker Structures Along Banks. Open Channel Bottom Present. Trash Rack at Armitage Ave.
Silver Creek	16	Armitage	North Ave. (Rt. 64)	3810	0	0%	0	0%	3810	100%	Low. Channel Highly Entrenched and Scoured. Some Small Riffles Present.	High Entrenchment. Severe Industrial Encroachment. Channel Below Ground Through Central Reach. Sedimentation High in Lower Reach.
Silver Creek	17	North Ave. (Rt. 64)	14th Ave. (Extended)	2119	0	0%	0	0%	2119	100%	Moderate. Riffles and Pools More Frequent. Higher Gradient.	Channelized, But Herbaceously Vegetated Banks with Pool and Riffle Habitat. Sedimentation Moderate.
Silver Creek	18	14th Ave. (Extended)	9th Ave.	2276	0	0%	0	0%	2276	100%	Moderate. Riffles, Bars, and Pools Present.	Channelized, But Woody Vegetated Banks with Pool and Riffle Habitat.
Silver Creek	19	9th Ave.	Elsie Drive	588	0	0%	0	0%	588	100%	Moderate Recovery. Riffles, Bars, and Pools Present.	Channelized. Severe Scouring. Pool and Riffle Habitat Present.
Silver Creek	20	Elsie Drive	5th Ave.	1981	0	0%	0	0%	1981	100%	Moderate Recovery. Riffles, Bars, and Pools Present.	Channelized. But Slight Re-Meandering in Downstream Areas.
Silver Creek	21	5th Ave.	1st Ave.	1680	0	0%	840	50%	840	50%	Moderate Recovery. Riffles, Bars, and Pools Present.	Channelized. But Slight Re-Meandering in Downstream Areas.
Silver Creek	22	1st Ave.	Des Plaines River	180	90	50%	90	50%	0	0%	Low Channelization and Moderate Recovery. Floodplain Delta Habitat at Des Plaines River.	Mouth of Silver Creek at Des Plaines River.
Totals				57,391	2,824	5%	2,297	4%	52,271	91%		

Table 19. Summary of Stream Reach Riparian Conditions.

Stream or Tributary Name	Reach Code	Upstream Boundary	Downstream Boundary	Stream Length Assessed (ft)	Good Condition (ft/%)		Fair Condition (ft/%)		Poor Condition (ft/%)		Comments
Silver Creek	1	Catalpa Road	Spruce Ave. / Rt. 83	3034	607	20%	910	30%	1517	50%	Upstream Detention Basin Contains Narrow Unmowed and Diverse Wetland but Mowed Turf Beyond That. Central and Downstream Reach Has Severe Encroachment With Railroad Tracks.
Silver Creek	2	Spruce Ave. / Rt. 83	Irving Park Road	2431	0	0%	0	0%	2431	100%	Creek Below Ground
Silver Creek	3.1	Irving Park Road	Church Road	603	0	0%	302	50%	302	50%	Open Park Setting With Larger Potential Riparian Corridor. Reed Canarygrass Along Banks with Turf Grass Beyond Top of Banks.
Silver Creek	3.2	Church Road	Mason Street	1440	720	50%	720	50%	0	0%	Open Park Setting With Larger Potential Riparian Corridor. Detention Adjacent in Central and Downstream Areas. Vegetated Banks. Non-Native Vegetation. High Entrenchment. Vacant Moderate Quality Woodland Starting 100 Feet South of Creek.
Silver Creek	4	Mason Street	York Road	1587	635	40%	952	60%	0	0%	Tall, Vegetated Banks. High Entrenchment. Channel Has No Riparian Access to Overbank Area.
Silver Creek	5.1	York Road	O'Hare South Access Road	2428	971	40%	1457	60%	0	0%	Rip-rap At Toe of Slope With Long and Vegetated Banks. High Entrenchment. In Some Areas, Large Open Space Adjacent. Native Plants Occasional or Lacking.
Silver Creek	5.2	O'Hare South Access Road	West of Taft Road	4350	0	0%	0	0%	4350	100%	Creek Below Ground
Tributary 1	T1-1	Pleasant Street	Gateway Road	2705	0	0%	812	30%	1894	70%	Narrow Ditched Channel. Mowed Near Banks.
Silver Creek	6	West of Taft Road	Irving Park Road	5467	3280	60%	2187	40%	0	0%	Expansive Online Wetland Detention Basin. Occasional Baseflow Channel Through Cattails and Phragmites.
Silver Creek	7	Irving Park Road	Waveland Ave.	963	0	0%	0	0%	963	100%	Creek Dis-Connected From Large Adjacent Riparian Area. Large Potential High Quality Riparian Area. But 36-Acre MWRD Basins Located Below Elevation of Piped Creek Channel. Basin Water Volume Limited Due to Pumping.
Silver Creek	8	Waveland Ave.	Franklin Ave.	3244	0	0%	0	0%	3244	100%	Railroad Yard But Gravel Reduces Runoff. Creek Extensively Piped Below Ground.
Silver Creek	9	Franklin Ave.	Belmont Ave.	2167	0	0%	542	25%	1625	75%	Potential Riparian Corridor to West and Possibly East of Channel. Potential Wetland Restoration Area at Central Area. Extensive East Bank Turf Could Be Considered For Conversion to Native Species. Otherwise, Mowed Turf Extensive. Lower Banks Unvegetated. Low Entrenchment. Encroachment Varies.
Silver Creek	10	Belmont Ave.	Grand Ave.	2972	0	0%	0	0%	2972	100%	Severe Channel Encroachment by Industrial and Residential Development. High Entrenchment. Lower Banks Unvegetated. Algae Blooms. Narrow Vegetated Buffer Along Banks With Invasive Shrub Species.
Silver Creek	11	Grand Ave.	Mannheim Rd. (Rt. 45)	2281	0	0%	228	10%	2053	90%	Poor Riparian Quality Due to Turf and Concrete Revetments. Moderate Channel Scouring. Algae Blooms. Oil Sheens and Scum / Debris Accumulations. Severe Residential Encroachment. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities.

Silver Creek	12.1	Mannheim Rd. (Rt. 45)	Upstream Side of J.B. Williams Reservoir	461	0	0%	231	50%	231	50%	Fair condition Over Part of Area Contains Trees at Banks. But Turf Grass is Extensive.
Silver Creek	12.2	Upstream Side of J.B. Williams Reservoir	Riverside Street	1556	0	0%	389	25%	1167	75%	High Potential for Improvement. But Creek Banks and/or Channel Bottom Armored With Vertical Concrete Walls Or With Concrete Revetment Mats. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities. Severe Channelization. Severe Scouring and Lack of Vegetation. However, J.B. Williams Reservoir Adjacent to the South.
Silver Creek	13	Riverside Street	Fullerton Ave.	3778	0	0%	0	0%	3778	100%	Extremely Poor Riparian Quality. Habitat Lacking. Highly Scoured Channel. Channel Vegetation Absent. Turf Grass Extensive. Concrete Revetment Banks Extensive. Fenced Channel.
Silver Creek	14	Fullerton Ave.	Palmer	1753	0	0%	1578	90%	175	10%	Improved Riparian Conditions. Homes Farther Set Back. Less Mowing at Edge of Bank. Native Plants Occasional. Lunkers at Toe of Slope (Varying Condition). Some Riffles Present. Some Landscape Waste Dumping.
Silver Creek	15	Palmer	Armitage	1537	0	0%	1230	80%	307	20%	Consistent With Reach 14 But Creekside Walking Path Present. Improved Riparian Conditions. Homes Farther Set Back. Less Mowing at Edge of Bank. Native Plants Occasional. Lunkers at Toe of Slope (Varying Condition). Some Riffles Present. Some Landscape Waste Dumping.
Silver Creek	16	Armitage	North Ave. (Rt. 64)	3810	0	0%	572	15%	3239	85%	Severe Industrial Encroachment. Banks Vegetated, But Overbank is Extensively Paved. Highly Entrenched. Channel Below Ground Through Central Reach
Silver Creek	17	North Ave. (Rt. 64)	14th Ave. (Extended)	2119	0	0%	1271	60%	848	40%	Improved Near-Channel Conditions. More Extensive Vegetative On Banks and Near Creek. But Overbank Development and Imperviousness Still High. Channel Below Ground Through One Parcel.
Silver Creek	18	14th Ave. (Extended)	9th Ave.	2276	0	0%	1366	60%	910	40%	Improved Near-Channel Conditions With More Extensive Woody Vegetative Buffer. But Overbank Development and Imperviousness High.
Silver Creek	19	9th Ave.	Elsie Drive	588	0	0%	353	60%	235	40%	Overbank Parking Lots and Impervious Surfaces Common. Channel Banks Contain Woody Vegetation.
Silver Creek	20	Elsie Drive	5th Ave.	1981	0	0%	1981	100%	0	0%	Banks Well-Vegetated and Dominated Native Plant Species. Recent Bioengineering Stabilization. Rock Toe, Re-Shaped Slopes, and Several Riffles. Wildlife More Prevalent with Amphibians, Reptiles, and Bird Diversity. Overbank Dominated by Residential Encroachment.
Silver Creek	21	5th Ave.	1st Ave.	1680	840	50%	840	50%	0	0%	Wider Area of Open Space at Floodplain Corridor. More Diverse Habitat. Significant Local Wildlife Usage. But Wooded Area Dominated by Black Willow and Silver Maple. Residences Farther Set Back From Creek. Erosion and Sedimentation Both High.
Silver Creek	22	1st Ave.	Des Plaines River	180	180	100%	0	0%	0	0%	Des Plaines River Bank Floodplain Corridor Dominated by Black Willow and Silver Maple. Extensive Adjacent Wetland. Wildlife Use Likely High. Riparian Sedimentation High.
Totals				57,391	7,233	13%	17,921	31%	32,241	56%	

Table 20. Stream Reach Bank Erosion.

(Note: Lengths Refer to Stream Channel Length. Total Length of Both Banks Would Be Twice the Lengths Indicated.)

Stream or Tributary Name	Reach Code	Upstream Boundary	Downstream Boundary	Stream Length Assessed (ft)	None or Low Erosion		Moderate Erosion		High Erosion		Comments
					(ft)	(%)	(ft)	(%)	(ft)	(%)	
Silver Creek	1	Catalpa Road	Spruce Ave. / Rt. 83	3034	3034	100%	0	0%	0	0%	Upstream Area Contains Detention Basin With Central Narrow Wetland Area. Central and Downstream Reach Channelized Along Railroad Tracks.
Silver Creek	2	Spruce Ave. / Rt. 83	Irving Park Road	2431	2188	90%	243	10%	0	0%	Creek In Pipe Below Ground
Silver Creek	3.1	Irving Park Road	Church Road	603	271	45%	211	35%	121	20%	Some Severe Streambank Erosion.
Silver Creek	3.2	Church Road	Mason Street	1440	936	65%	504	35%	0	0%	Some Moderate Erosion Due to Channel Entrenchment.
Silver Creek	4	Mason Street	York Road	1587	1270	80%	317	20%	0	0%	High Entrenchment. But Wide Channel Bottom Width Reduces Erosion.
Silver Creek	5.1	York Road	O'Hare South Access Road	2428	2428	100%	0	0%	0	0%	Over-Widened Channel Bottom Width. Low Erosion.
Silver Creek	5.2	O'Hare South Access Road	West of Taft Road	4350	4350	100%	0	0%	0	0%	Creek In Pipe Below Ground
Tributary 1	T1-1	Pleasant Street	Gateway Road	2705	2705	100%	0	0%	0	0%	Narrow Ditched Channel But Low Flows.
Silver Creek	6	West of Taft Road	Irving Park Road	5467	5467	100%	0	0%	0	0%	Expansive Existing Wetland and Online Detention Basin. No Erosion.
Silver Creek	7	Irving Park Road	Waveland Ave.	963	963	100%	0	0%	0	0%	Large MWRD Basins Adjacent, But Creek Piped Above Basins.
Silver Creek	8	Waveland Ave.	Franklin Ave.	3244	3244	100%	0	0%	0	0%	Railroad Yard - Creek Extensively Piped Below Ground.
Silver Creek	9	Franklin Ave.	Belmont Ave.	2167	975	45%	867	40%	325	15%	Moderate and Some Severe Erosion Due to Lack of Vegetation and High Entrenchment In Areas. Sedimentation Common.
Silver Creek	10	Belmont Ave.	Grand Ave.	2972	1486	50%	1189	40%	297	10%	Moderate and Some Severe Erosion Due to Channel Entrenchment. Lower Banks Unvegetated.
Silver Creek	11	Grand Ave.	Mannheim Rd. (Rt. 45)	2281	2281	100%	0	0%	0	0%	Creek Banks and/or Channel Bottom Armored With Concrete Revetment Mats. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities. Severe Channelization.
Silver Creek	12.1	Mannheim Rd. (Rt. 45)	Upstream Side of J.B. Williams Reservoir	461	0	0%	461	100%	0	0%	Moderate Erosion with Turf Grass Banks. Creek Piped Below Manheim Road Upstream. Concrete Revetment Mats Upstream May Increase Velocities. Creek Bends Occur but Channelization is High.
Silver Creek	12.2	Upstream Side of J.B. Williams Reservoir	Riverside Street	1556	1556	100%	0	0%	0	0%	Creek Banks and/or Channel Bottom Armored With Vertical Concrete Walls Or With Concrete Revetment Mats. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities. Severe Channelization. Severe Scouring and Lack of Vegetation.
Silver Creek	13	Riverside Street	Fullerton Ave.	3778	3778	100%	0	0%	0	0%	Creek Banks and/or Channel Bottom Armored With Concrete Revetment Mats. In-Channel Concrete Flow Restrictors Installed to Reduce Velocities. Severe Channelization. Severe Scouring and Lack of Vegetation.

Silver Creek	14	Fullerton Ave.	Palmer	1753	877	50%	526	30%	351	20%	Toe Scouring and Perhaps 20% Compromised Lunker Structures Present. Bank Vegetation Ranges From Turf to Native Plant Species. Middle to Upper Bank Scouring Is Less Common Except for Severe Erosion at Downstream Outside Bends.
Silver Creek	15	Palmer	Armitage	1537	845	55%	461	30%	231	15%	Toe Scouring and Perhaps 20% Compromised Lunker Structures Present. Bank Vegetation Ranges From Turf to Native Plant Species. Middle to Upper Bank Scouring Is Less Common Except for Severe Erosion at Downstream Outside Bends.
Silver Creek	16	Armitage	North Ave. (Rt. 64)	3810	2667	70%	762	20%	381	10%	Severe / Steep Slopes Along Spoil Pile Area. Channel Contains Rock Lining in Downstream Area. Other Areas Below Ground.
Silver Creek	17	North Ave. (Rt. 64)	14th Ave. (Extended)	2119	1377	65%	636	30%	106	5%	Most Channel Banks Vegetated But Some Areas Moderately Eroded.
Silver Creek	18	14th Ave. (Extended)	9th Ave.	2276	1138	50%	797	35%	341	15%	Upstream Banks Lined With Concrete. Central and Downstream Banks Have Extensive Moderate Erosion and/or Toe Scouring.
Silver Creek	19	9th Ave.	Elsie Drive	588	118	20%	235	40%	235	40%	Extensive Bank Recession With Severe Mass Wasting Along South Bank Despite Tree Cover. Downstream East Banks Moderately Eroded.
Silver Creek	20	Elsie Drive	5th Ave.	1981	1684	85%	297	15%	0	0%	Past Severe Erosion Now Appears to be Stabilized With Extensive Bioengineering Channel Stabilization. Occasional Bank Scour Near Rock Toe Structures or Non-Stabilized Areas
Silver Creek	21	5th Ave.	1st Ave.	1680	672	40%	672	40%	336	20%	Extensive Bank Recession In Some Locations With Severe Mass Wasting In Upstream Narrow Channel Zone. Central and Downstream Areas Undergoing Some Channel Migration and Bank Erosion. 1st Avenue Embankment Severely Eroded.
Silver Creek	22	1st Ave.	Des Plaines River	180	99	55%	54	30%	27	15%	Some Moderate Erosion But Scouring Lower Due To Downstream Des Plaines River and Velocity Dissipation Across Width of Large Floodplain Area.
Totals				57,391	46,409	81%	8,232	14%	2,751	5%	

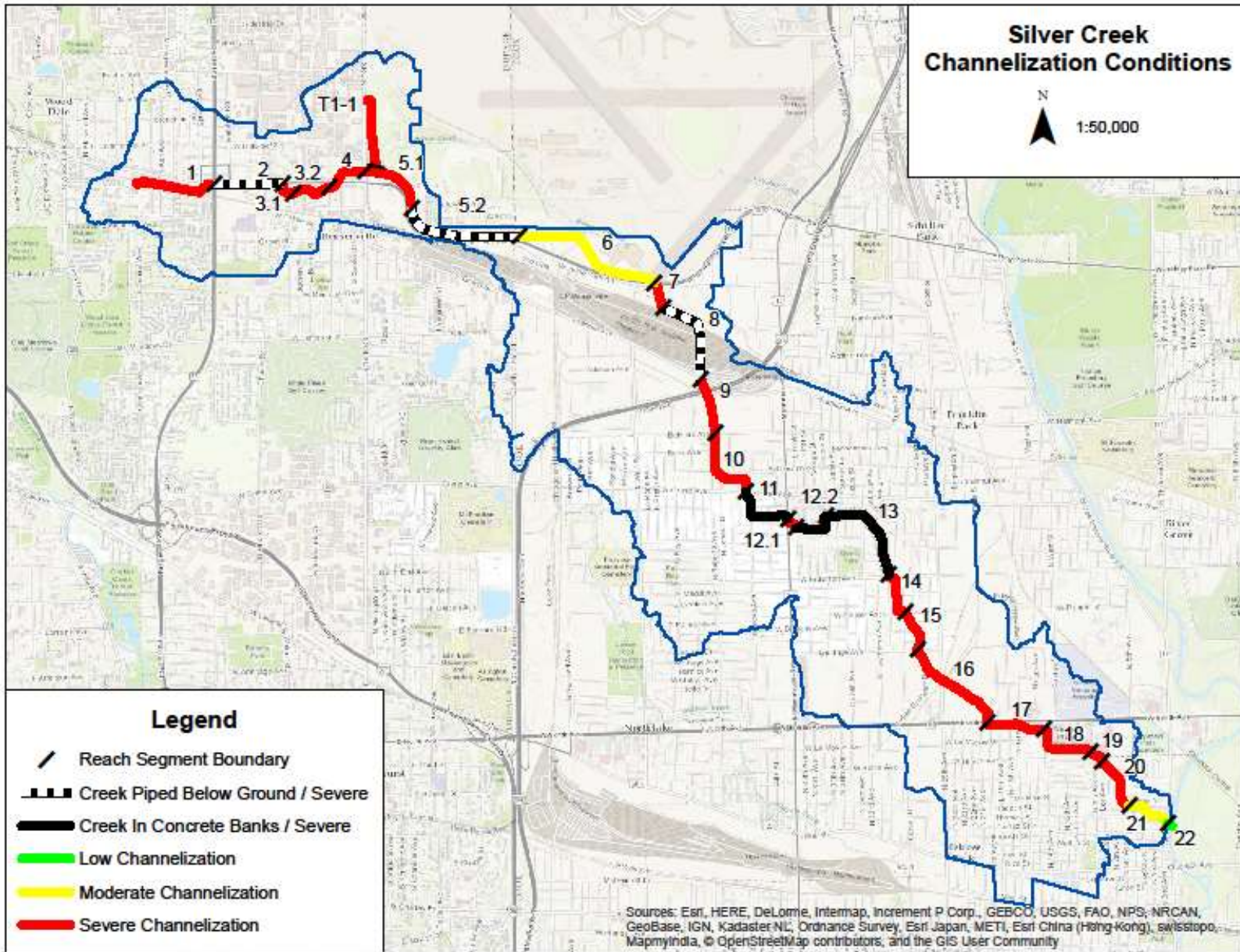


Fig. 22: Silver Creek Stream Reach Channelization Conditions.

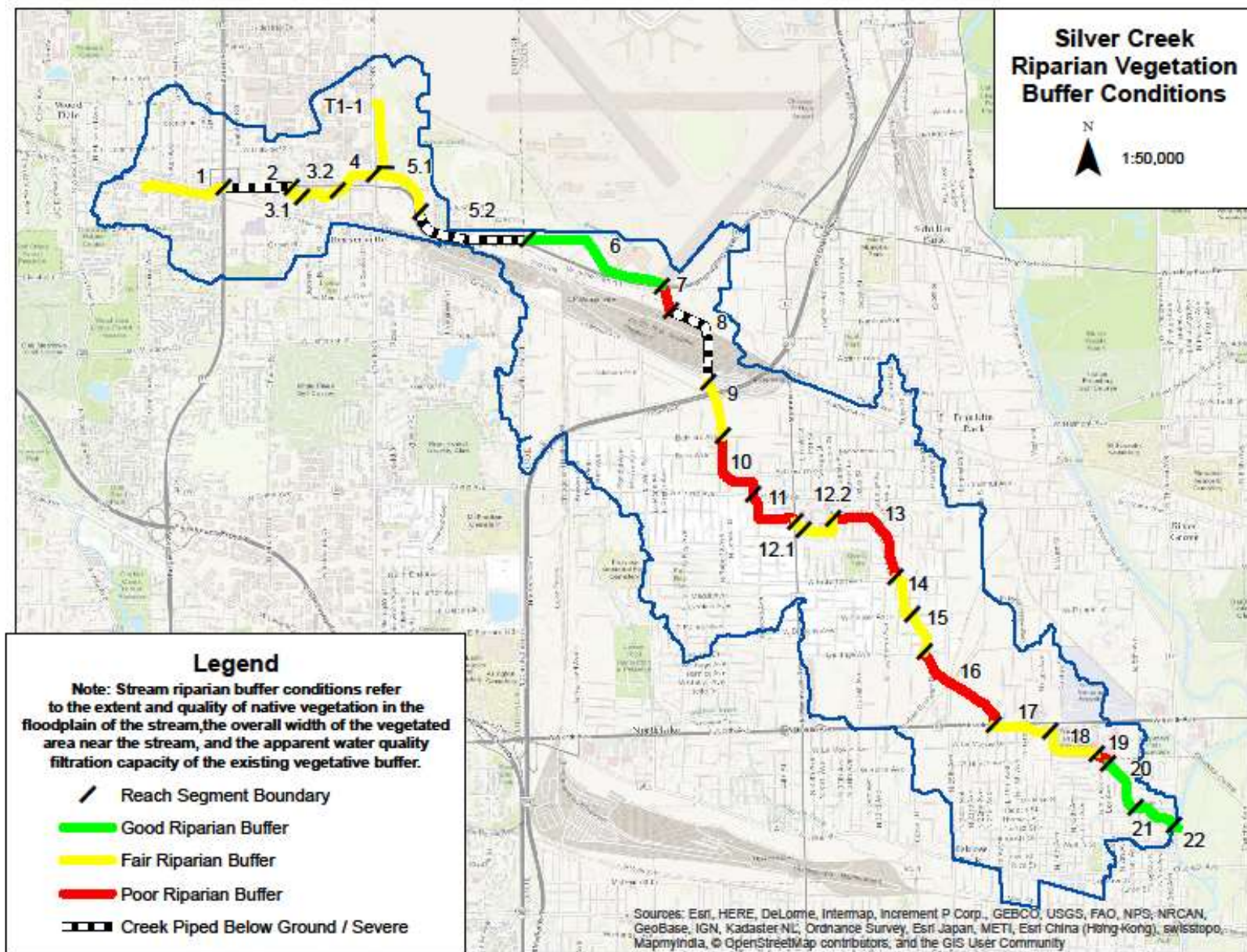


Fig. 23: Silver Creek Stream Reach Riparian Buffer Conditions.

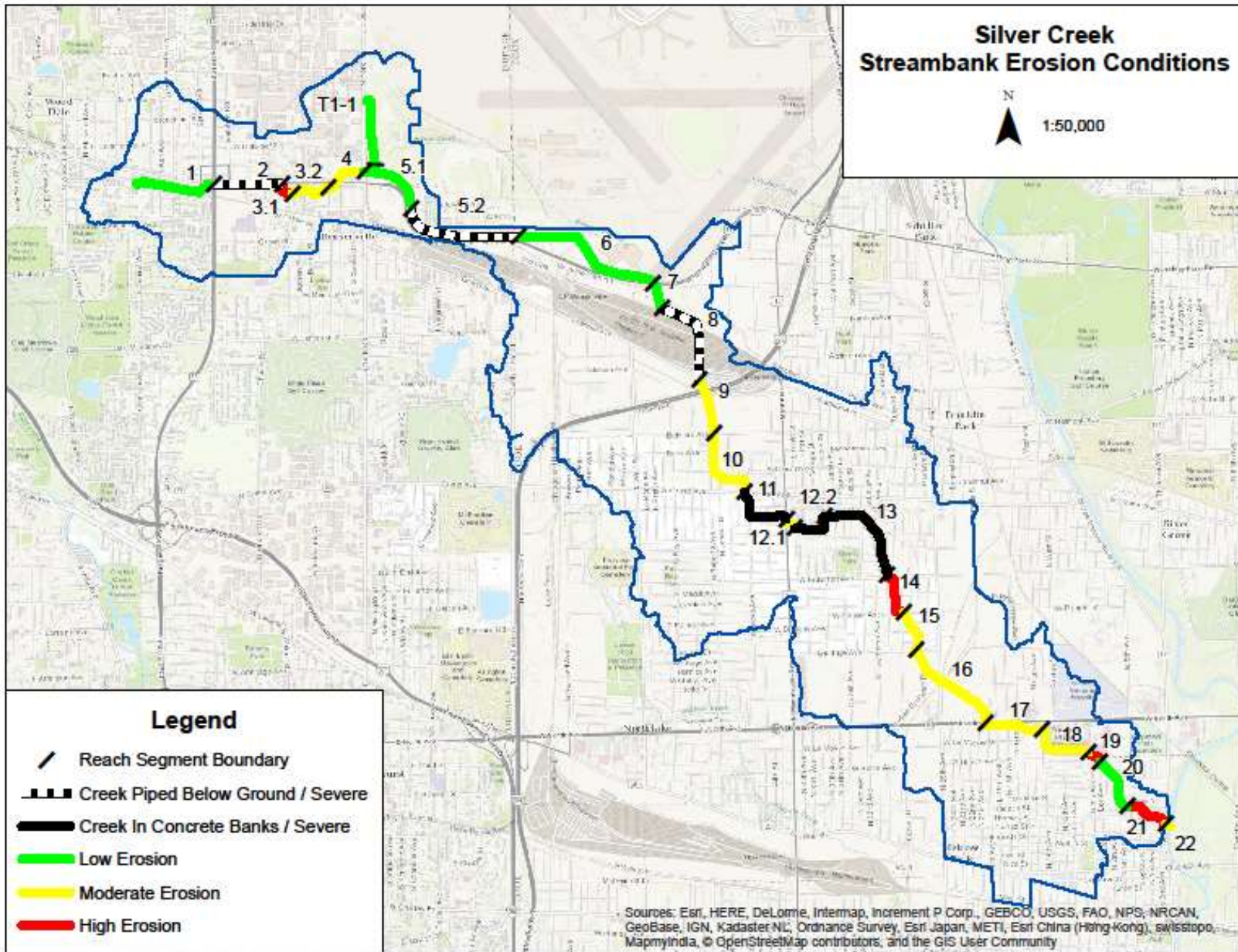


Fig. 24: Silver Creek Stream Reach Bank Erosion Conditions.

Lakes, Wetlands, Ponds, and Detention Basins

Perhaps in part due to watershed development prior to the 1970s, there are few detention basins, ponds, or lakes located in the Cook County part of the watershed. Despite extensive hydric soils in the upper watershed, wetland areas are also lacking. The following is a summary of the inventory of existing lakes, wetlands, ponds and detention basins in the watershed.



Photos 77 and 78: The detention basin depicted (Basin 1-H) appears to be associated with recent re-development in the upper watershed area. The basin contains mowed cattails. Retaining wall are common, likely in part to maximize runoff storage. The right photo depicts an example of a rooftop downspout that is disconnected from the basin. This allows rooftop runoff to filter and/or infiltrate through the gravel media provide before discharging into the basin.



Photos 79 and 80: Lake Mini Ha-Ha is located in a small park in a residential area on the edge of the watershed boundary. Perhaps due in part to limited space available, the shoreline is mowed

turf grass. Converting turf to low-profile native plants would reduce pollutant loading impacts into the lake and downstream waters.



Photos 81 and 82: The far upstream detention area previously described (see also Photos 18 and 19) contains a concentric wetland area surrounded by mowed turf and meadow grasses. In some cases, public education can help to improve the public's acceptability of an aesthetic of taller native grasses in a residential area. Increase wetland and native plant coverage would reduce pollutant loading into the creek from this site, and improve the filtration rate of pollutants from offsite areas.



Photos 83 and 84: An unnamed lake (Basin 1-B) with residential areas along the shoreline contains extensive turf grasses at the shoreline with a variety of shoreline stabilization treatments ranging from retaining wall, to rip-rap, to re-shaped turf slopes. It is likely that turf grass pollutant runoff contributed to algae blooms that appear to be present.



Photos 85 and 86: (left photo): Street cul-de-sac areas contain curb and gutter which efficiently sheds runoff into adjacent lakes. Right Photo: Consideration can be given to convert these areas into depressional storage areas with native plant rain gardens. This can not only provide a site amenity but would improve water quality in adjacent areas (University Minnesota, St. Anthony Falls Laboratory).

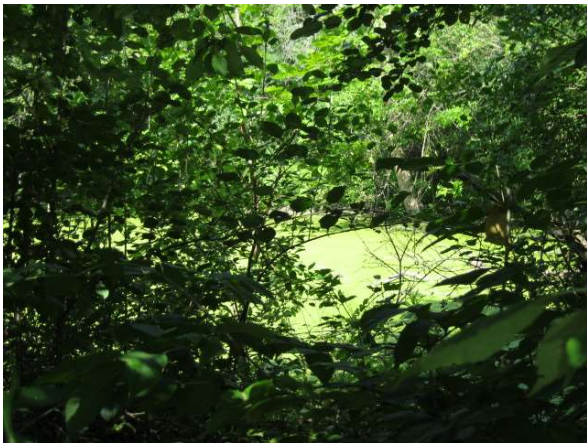


Photo 87: Wetlands or ponds surrounded by a riparian woodland buffer are rare in the Silver Creek Watershed. These areas not only filter, absorb, and infiltrate polluted runoff, but they also provide wildlife habitat. Historically, prior to development this habitat would have been fairly common in the upper watershed area.



Photo 88: This mowed turf detention area (Basin 2.A) in a multi-family residential development has a low-flow concrete channel in the bottom of the basin. Impervious surfaces such as concrete increase the rate and velocity of discharge of runoff from the basin, and prevents the infiltration of runoff into the ground. This site receives some runoff from Rt. 83 during flood events.



Photos 89 and 90: The O'Hare Airport (left photo) online detention areas previously described (see also Photos 16 and 17) has emergent wetland shoreline vegetation. This along with the open water area provides areas for settling and removal of nutrients and solids from upstream areas. On the negative side, online basins directly on the creek can reduce dissolved oxygen levels and increase water temperatures in the creek. Right Photo: A separate meandering "off-line" creek channel separate from a runoff storage basin during normal baseflow conditions can be constructed to improve water quality. During flood events, the creek overflows into the storage basin for a comprehensive BMP (Source: Living Waters Consultants, Inc.)



Photos 91 (above) and 92 (below): The largest and most expansive basin in the watershed is the MWRD Basin (a pumped storage facility). This storage area (Basin 7.A.) covers 36 acres of area and is capable of storing 501 acre-feet of runoff. However, Silver Creek is piped through this area. Therefore, the frequency of water quality improvement is extremely rare, and currently limited only to large-scale flood events. It would be desirable to not only install native plantings on the side slopes to improve runoff storage and infiltration and possibly lower maintenance costs, but also to evaluate alternatives to divert stream flows through the lower basin area as a more consistent water quality improvement technique.





Photo 93: The 50 acre-foot volume Jack B. Williams reservoir in Franklin Park. The concrete-lined Silver Creek channel (at left) completely bypasses the reservoir except during flood flows.



Photo 94: Water levels in the reservoir are pumped out to provide flood storage capacity. This basin could be modified to improve water quality by installing native plant side slopes. (Note: Some communities such as Franklin Park have ordinance restrictions on plant heights.) Other improvements could include constructing a wet detention basin, a meandering low-flow creek corridor, and/or wetland habitat within the basin. Unfortunately, at present Silver Creek flows are not routed through this basin, except during flood flows. Therefore, no consistent water quality improvement occurs at this time. This is significant in part because the Silver Creek corridor adjacent includes some of the most degraded reaches in the entire watershed (See Photos 35 through 39).



Photo 95: Industrial detention areas vary widely in condition. Some have no shoreline vegetation. Some are located immediately adjacent to large parking lots or other paved surfaces. Basin # 16.A. depicted contains a mixture of mowed turf grass and taller native plantings (foreground).

Table 21. Summary of Shoreline Buffer Zones.

Basin Name	Basin Code	Basin Type	Municipality	Shoreline Length Assessed (ft)	Good Condition (ft/%)		Fair Condition (ft/%)		Poor Condition (ft/%)		Comments
Lake Min-HaHa	1.A.	Wet	Wood Dale	800	0	0%	400	50%	400	50%	Dominated by Mowed Turf Shore Buffer. Aeration Present.
Unnamed	1.B.	Wet	Wood Dale	1310	0	0%	655	50%	655	50%	Turf Buffer in Most Areas. Aeration Present.
Unnamed	1.C.	Wetland	Wood Dale	650	650	100%	0	0%	0	0%	Undeveloped wetland / woodland.
Unnamed	1.D	Wetland	Wood Dale	861	861	100%	0	0%	0	0%	Undeveloped wetland / woodland.
Unnamed	1.E.	Wetland	Wood Dale	824	0	0%	0	0%	824	100%	Steeply sloped mowed turf banks. Encroachment of Paved Surfaces at Top of Bank.
Unnamed	1.F.	Dry	Wood Dale	433	0	0%	0	0%	433	100%	Mowed Turf Bottom, Retaining Wall Side Slopes. Dry Detention Basin. High Encroachment of Paved Surfaces at Top of Bank.
Headwaters Wetland Detention	1.G.	Wetland	Wood Dale	1492	746	50%	0	0%	746	50%	Wetland Vegetation With Native Species in Central Area Surrounded By Mowed Turf.
Unnamed	1.H.	Wetland	Wood Dale	381	0	0%	191	50%	191	50%	Mowed Cattails. High Encroachment of Paved Surfaces at Top of Bank.
Unnamed	2.A.	Dry	Bensenville	572	0	0%	0	0%	572	100%	Mowed Turf Detention Basin. Concrete Low-Flow Channel. High Encroachment of Paved Surfaces at Top of Bank.
Fenton High School Basin	2.B.	Wetland	Bensenville	946	0	0%	284	30%	662	70%	Cattail Vegetation in Central Area. Surrounded by Mowed Turf.
Veterans Park Basin	3.2.A.	Dry	Bensenville	658	0	0%	395	60%	263	40%	Vegetated Banks, But Mowed Turf Detention Basin.
Heritage Square Central	3.2.B.	Wetland	Bensenville	397	0	0%	397	100%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
Heritage Square South	3.2.C.	Wetland	Bensenville	805	0	0%	805	100%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
Heritage Square North	3.2.D	Wetland	Bensenville	700	0	0%	700	100%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
McDonalds Basin	3.2.E.	Wetland	Bensenville	400	0	0%	400	100%	0	0%	Cattail Detention Area With Retaining Wall. High Encroachment of Paved Surfaces at Top of Bank.
Fenton - North	3.2.F	Dry	Bensenville	6320	0	0%	6320	100%	0	0%	Linear Vegetated Ditch Basin Along Railroad Tracks
Unnamed	5.A	Online Wet	Chicago / O'Hare	4,500	0	0%	4500	100%	0	0%	Mowed Meadow and Non-Mowed Cattail Vegetation Along Irving Park Road.
Online Wetland Detention at O'Hare Airport	6.A.	Online Wetland	Chicago / O'Hare	12,027	9622	80%	2405	20%	0	0%	Online Wetland Detention near Taft Road at O'Hare Airport. Dominated by Cattails With Some Phragmites.
O'Hare Airport Dry Basin	6.B.	Dry	Chicago / O'Hare	2053	0	0%	2053	100%	0	0%	Mowed Turf Detention Basin.
MWRD Reservoirs	7.A	Dry	Chicago / MWRD	4849	0	0%	2425	50%	2425	50%	Mowed Turf Side Slopes. Mixture of Turf and Wetland Colonizing Species in Basin Bottom. Pumped Detention Basin (MWRD Basin).
Seymour Ave. Basin	7.B.	Dry	Chicago	1062	0	0%	1062	100%	0	0%	Dry Detention at FNS Facility. Turf Side Slopes and Non-Mowed Bottom.

CP Railroad Yard Basin	8.A.	Dry	Franklin Park	2233	0	0%	1340	60%	893	40%	Gravel Provides Limited Runoff Infiltration at Canadian Pacific Railroad Yard Basin. Detention Area is Piped and Pumped Dry. Fair to Poor Riparian Vegetation Quality. No Overbank Vegetation Due to Railroad Yard.
Unnamed	9.A.	Dry	Franklin Park	882	0	0%	0	0%	882	100%	Mowed Turf Detention Basin. Goose Population Present. Steep Side Slopes. High Encroachment of Paved Surfaces at Top of Bank.
Unnamed	9.B.	Wet	Franklin Park	623	0	0%	374	60%	249	40%	Non-Mowed Vegetation Along Banks. High Encroachment of Paved Surfaces at Top of Bank.
Unnamed	9.C.	Wet	Franklin Park	659	0	0%	0	0%	659	100%	Stone at Most of Shoreline Moderate Vegetative Coverage.
Unnamed	9.D.	Wet	Franklin Park	452	181	40%	136	30%	136	30%	Wet Basin with Cattail Coverage at Shoreline. Mowed Turf Beyond Wet Area.
Unnamed	9.E.	Dry	Franklin Park	1201	0	0%	721	60%	480	40%	Mowed Meadow / Mowed Turf Basin.
Unnamed	9.F.	Wet	Franklin Park	634	0	0%	190	30%	444	70%	Stone at Most of Shoreline But Low Vegetative Coverage. Adjacent to Truck Weighing Station. High Encroachment of Paved Surfaces at Top of Bank.
Unnamed	9.G.	Wetland	Franklin Park	626	0	0%	188	30%	438	70%	Shoreline Vegetated With Invasive Shrubs and Trees.
Unnamed	9.H.	Dry	Franklin Park	1294	0	0%	388	30%	906	70%	Mowed Turf Vegetation on Banks. Silt Deposits Prior to Inundation.
Jack B. Williams Reservoir	12.A.	Dry	Franklin Park	4684	2342	50%	2342	50%	0	0%	Approximately 40 Acre-Foot Volume for 50-Year Storm Event Within Two Connected Basins. Mowed Side Slopes. Some Unmowed Meadow and Wetland In Bottom of Basin. Apparently, Ordinance Plant Height Restrictions Appear to Necessitate Mowing.
Unnamed	13.A.	Wet	Franklin Park	366	366	100%	10	0%	0	0%	Cattail Dominated Detention Area. Private / Limited Access.
Unnamed	16.A.	Wet	Melrose Park	753	226	30%	527	70%	0	0%	Native Plants / Non-Mowed Over 30% of Shoreline. Turf in Other Areas
Unnamed	16.B.	Wet	Melrose Park	624	562	90%	62	10%	0	0%	Native Plants Over 100% of Shoreline.
Navistar Northeast Basin	16.C.	Wetland	Melrose Park	470	0	0%	10	100%		0%	Appears to Contain Cattail and Turf Side Slopes. Limited Access. Private and Fenced.
Navistar Southeast Basins	16.D.	Wet	Melrose Park	1560	0	0%	10	100%	0	0%	Wet Basins With Crown Vetch / Shorter Plants on Banks.
Interlake Basin	17.A.	Wetland	Melrose Park	1744	0	0%	1744	100%	0	0%	Cattail and Phragmites Dominated Vegetation in Basin.
Totals				60,845	15,556	26%	31,034	51%	12,258	20%	

Table 20. Summary of Shoreline Erosion.

Basin Name	Basin Code	Basin Type	Municipality	Shoreline Length Assessed (ft)	None or Low Erosion		Moderate Erosion		High Erosion		Comments
					(ft)	(%)	(ft)	(%)	(ft)	(%)	
Lake Min-HaHa	1.A.	Wet	Wood Dale	800	560	70%	240	30%	0	0%	Low erosion but Mowed Turf Buffer. Aeration Present.
Unnamed	1.B.	Wet	Wood Dale	1310	1179	90%	131	10%	0	0%	Shoreline Stabilization Treatments Vary from Retaining Wall to Boulder or Other Materials.
Unnamed	1.C.	Wetland	Wood Dale	650	650	100%	0	0%	0	0%	Undeveloped wetland / woodland.
Unnamed	1.D.	Wetland	Wood Dale	861	861	100%	0	0%	0	0%	Undeveloped wetland / woodland.
Unnamed	1.E.	Wetland	Wood Dale	824	824	100%	0	0%	0	0%	Low erosion but steeply sloped turf buffer.
Unnamed	1.F.	Dry	Wood Dale	433	433	100%	0	0%	0	0%	Mowed Turf Bottom, Retaining Wall Side Slopes. Dry Detention Basin.
Headwaters Wetland Detention	1.G.	Wetland	Wood Dale	1492	1492	100%	0	0%	0	0%	Diverse Native Wetland Vegetation in Central Area Surrounded By Mowed Turf.
Unnamed	1.H.	Wetland	Wood Dale	381	381	100%	0	0%	0	0%	Mowed Cattails.
Unnamed	2.A.	Dry	Bensenville	572	572	100%	0	0%	0	0%	Mowed Turf Detention Basin. Concrete Low-Flow Channel.
Fenton High School Basin	2.B.	Wetland	Bensenville	946	946	100%	0	0%	0	0%	Cattail Vegetation in Central Area. Surrounded by Mowed Turf.
Veterans Park Basin	3.2.A.	Dry	Bensenville	658	658	100%	0	0%	0	0%	Mowed Turf Detention Basin.
Heritage Square Central	3.2.B.	Wetland	Bensenville	397	397	100%	0	0%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
Heritage Square South	3.2.C.	Wetland	Bensenville	805	805	100%	0	0%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
Heritage Square North	3.2.D.	Wetland	Bensenville	700	700	100%	0	0%	0	0%	Cattail Vegetation with Woody Scrub Growth Adjacent.
McDonalds Basin	3.2.E.	Wetland	Bensenville	400	400	100%	0	0%	0	0%	Cattail Detention Area With Retaining Wall.
Fenton - North	3.2.F.	Dry	Bensenville	6320	6320	100%	0	0%	0	0%	Linear Vegetated Ditch Basin Along Railroad Tracks
Unnamed	5.A.	Online Wet	Chicago / O'Hare	4,500	4500	100%	0	0%	0	0%	Mowed Meadow and Non-Mowed Cattail Vegetation Along Irving Park Road.
Online Wetland Detention at O'Hare Airport	6.A.	Online Wetland	Chicago / O'Hare	12,027	12027	100%	0	0%	0	0%	Online Wetland Detention near Taft Road at O'Hare Airport. Dominated by Cattails & Phragmites.

O'Hare Airport Dry Basin	6.B.	Dry	Chicago / O'Hare	2053	2053	100%	0	0%	0	0%	Mowed Turf Detention Basin.
MWRD Reservoirs	7.A	Dry	Chicago / MWRD	4849	4849	100%	0	0%	0	0%	Mowed Turf Side Slopes. Mixture of Turf and Wetland Colonizing Species in Basin Bottom. Pumped Detention Basin (MWRD Basin).
Seymour Ave. Basin	7.B.	Dry	Chicago	1062	1062	100%	0	0%	0	0%	Dry Detention at FNS Facility. Turf Side Slopes and Non-Mowed Bottom.
CP Railroad Yard Basin	8.A	Dry	Franklin Park	2233	0	0%	1563	70%	670	30%	Canadian Pacific Railroad Yard Basin Pumped Detention Area. Some Erosion Along Side Slopes. Failed Geoweb Applications.
Unnamed	9.A.	Dry	Franklin Park	882	441	50%	441	50%	0	0%	Mowed Turf Detention Basin. Goose Population Present. Steep Side Slopes
Unnamed	9.B.	Wet	Franklin Park	623	498	80%	125	20%	0	0%	Non-Mowed Vegetation Along Banks.
Unnamed	9.C.	Wet	Franklin Park	659	395	60%	264	40%	0	0%	Stone at Most of Shoreline But Low Vegetative Coverage. Adjacent to Truck Weighing Station.
Unnamed	9.D.	Wet	Franklin Park	452	452	100%	0	0%	0	0%	Wet Basin with Cattail Coverage at Shoreline.
Unnamed	9.E.	Dry	Franklin Park	1201	1201	100%	0	0%	0	0%	Mowed Meadow / Mowed Turf Basin.
Unnamed	9.F.	Wet	Franklin Park	634	380	60%	254	40%	0	0%	Stone at Most of Shoreline But Low Vegetative Coverage. Adjacent to Truck Weighing Station. High Encroachment of Paved Surfaces at Top of Bank.
Unnamed	9.G.	Wetland	Franklin Park	626	563	90%	63	10%	0	0%	Shoreline Vegetated With Invasive Shrubs and Trees.
Unnamed	9.H.	Dry	Franklin Park	1294	1165	90%	13	1%	0	0%	Mowed Turf Vegetation on Banks. Silt Deposits Prior to Inundation.
Jack B. Williams Reservoir	12.A.	Dry	Franklin Park	4684	4684	100%	0	0%	0	0%	Approximately 40 Acre-Foot Volume for 50-Year Storm Event. Mowed Side Slopes. Some Unmowed Meadow and Wetland In Bottom of Basin. Apparently, Ordinance Plant Height Restrictions Appear to Necessitate Mowing.
Unnamed	13.A.	Wet	Franklin Park	366	329	90%	10	10%	0	0%	Cattail Dominated Detention Area. Private / Limited Access.
Unnamed	16.A.	Wet	Melrose Park	753	678	90%	10	10%	0	0%	Native Plants / Non-Mowed Over 30% of Shoreline. Turf in Other Areas
Unnamed	16.B.	Wet	Melrose Park	624	624	100%	10	0%	0	0%	Native Plants Over 100% of Shoreline.
Navistar Northeast Basin	16.C.	Wetland	Melrose Park	470	470	100%	10	0%	0	0%	Appears to Contain Cattail and Turf Side Slopes. Limited Access. Private and Fenced.
Navistar Southeast Basins	16.D.	Wet	Melrose Park	1560	1560	100%	10	0%	0	0%	Wet Basins With Crown Vetch / Shorter Plants on Banks.
Interlake Basin	17.A.	Wetland	Melrose Park	1744	0	0%	1744	100%	0	0%	Cattail and Phragmites Dominated Vegetation in Basin.
Totals				60,845	55,109	91%	4,888	8%	670	1%	

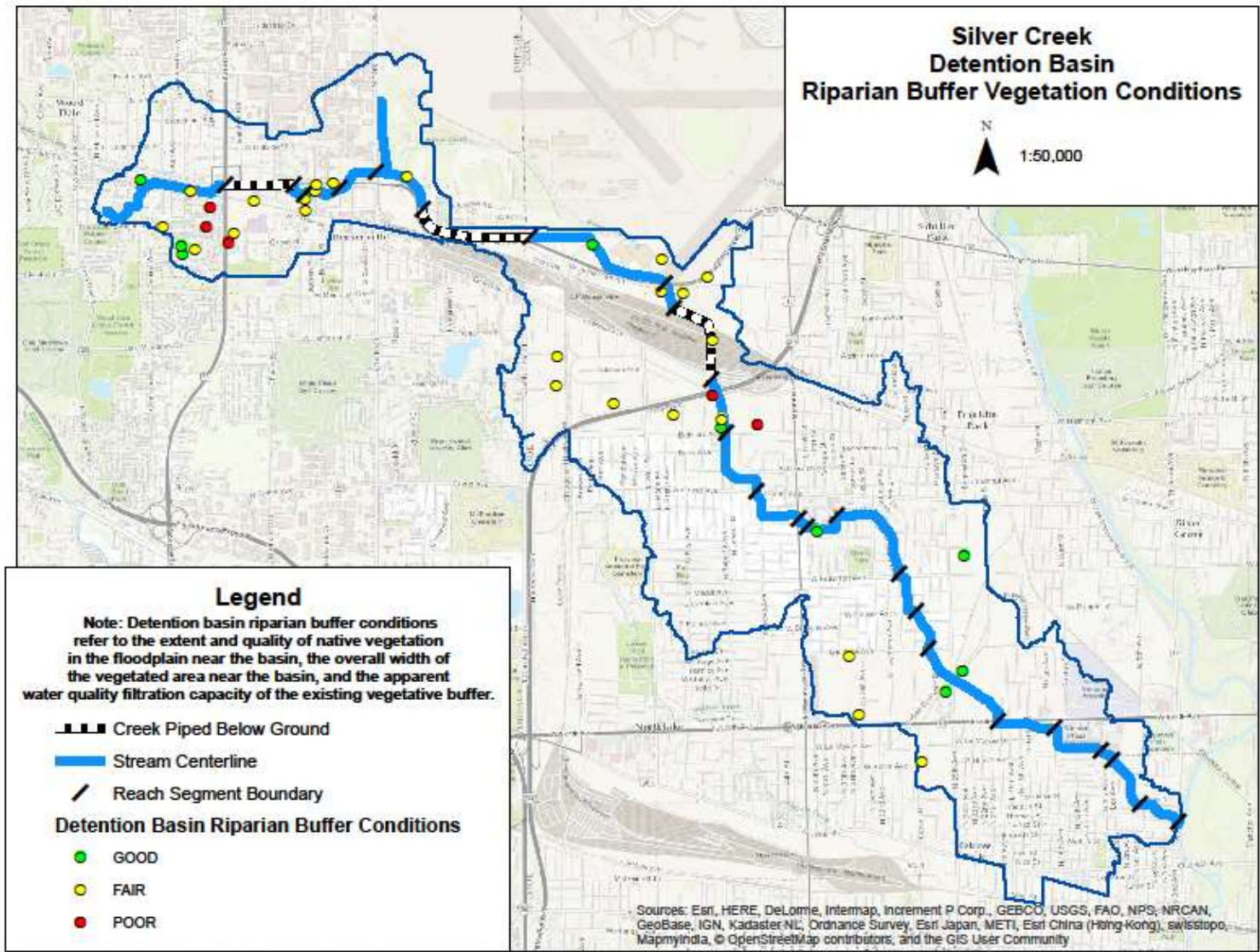


Fig. 25: Detention Basin Riparian Buffer Conditions.

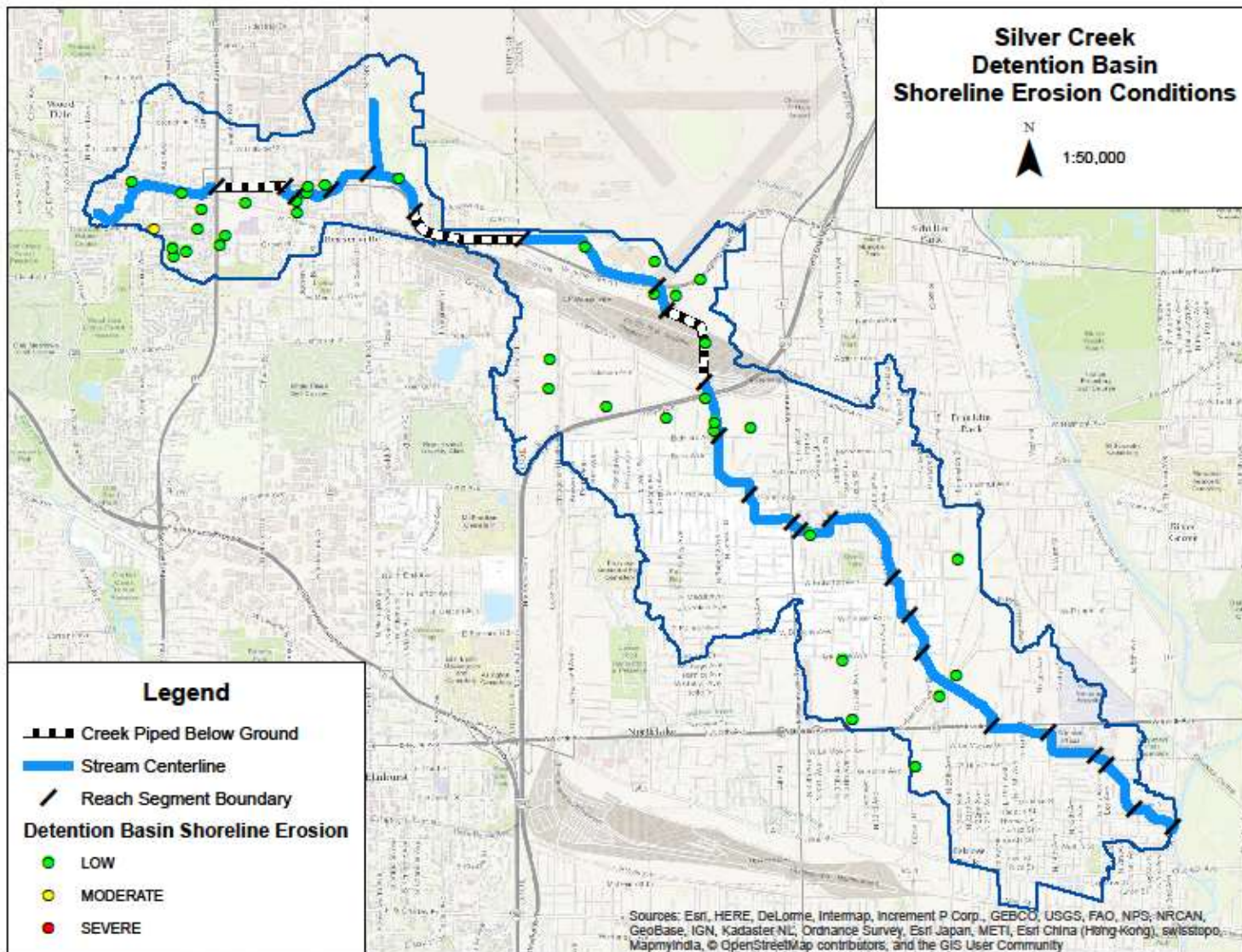


Fig. 26: Detention Basin Shoreline Erosion Conditions.

Water Quality Assessment – Integrated Water Quality Report

Silver Creek (GM) was assessed recently for the 2016 Integrated Report based on data collected in 2013 at station GM-02. Silver Creek Segment IL_GM-01 (4.57 miles in length) begins at the Des Plaines River) and it extends upstream. Segment IL_GM-01 includes Station GM-01 (at the Des Plaines River) and Station GM-01 (near 15th Avenue, in Melrose Park). Data was not collected at station GM-01 in 2013. According to the 2016 303d List App. A-1, causes of impairment for Aquatic Life in the Silver Creek (IL_GM-01) include:

Aquatic Life Impairment:

- dissolved oxygen
- total phosphorus.

Aesthetic Quality Impairment:

- debris/floatables/trash

According to 303d App. B-2, based on Station GM-02 results in 2013, Silver Creek (IL_GM-01) was assessed as nonsupport (poor) for aquatic life use (N582) and nonsupport for aesthetics use (N590). Causes of nonsupport for aquatic life use attainment were:

Causes of Nonsupport for Aquatic Life Use Attainment:

- alteration in stream-side or littoral vegetative covers (84),
- other flow regime alterations (319),
- dissolved oxygen (DO; 322), and
- loss of instream cover (501).

Causes of Nonsupport for Aesthetics Use Attainment:

- floating debris (181)
- visible oil (519).

Sources of Impairment for Silver Creek Use Attainment Include:

- loss of riparian habitat (72),
- site clearance (land development or redevelopment; 122),
- streambank modifications/destabilization (125),
- urban runoff/storm sewers (177), and
- channelization (20).

The following information pertains to the Des Plaines River. According to the 2016 303d List App. A-1, causes of impairment for Aquatic Life in the Des Plaines River (IL_G-30) include Chloride, DO, TP, and TSS. According to 303d App. B-2, Specific Assessment for Streams 2016, the Des Plaines River was assessed as nonsupport for aquatic life (N582), nonsupport for fish consumption (N583), and nonsupport for primary contact recreation (585). Causes of nonsupport for aquatic life in the Des Plaines River (IL_G-30) include chloride (138), DO (322), TSS (403), and

TP (462). Causes of nonsupport for fish consumption include mercury (274) and PCBs (348). The cause of nonsupport for primary contact recreation is fecal coliform (400). Sources of impairment for the Des Plaines River include CSOs (23), highway/road/bridge runoff (49), municipal point source discharges (85), urban runoff/storm sewers (177), atmospheric deposition/toxics (10), and source unknown (140). (It should be noted that CSOs and municipal point source discharges do not discharge directly into Silver Creek.) Even though these assessments occurred for the Des Plaines River, they may provide some indication of causes and sources of impairment on nearby Silver Creek. This is suggested in part because watershed land uses are as or more urbanized in the Silver Creek watershed as in the Des Plaines River watershed.

2013 Water Quality Assessment – Illinois EPA Water Quality Monitoring Data

The Illinois EPA Northern Monitoring Unit indicated that the most recent water quality data sampling occurred in 2013 on Silver Creek at sample site GM-02 (Appendix 1). The sample location is near 15th Avenue extending upstream approximately 300 feet; this is the location of Stream Reach # 17 studied in this Plan. Upstream of Site GM-02, Silver Creek is underground extending upstream through 17th Avenue. (As described below, prior to 2013, the next previous water quality sampling on Silver Creek occurred in 1983 at Site GM-02.) Water quality samples were collected June 18, August 28, and September 30, 2013.

Table 23: Selected Illinois EPA Water Quality Test Results from Site GM-02 on Silver Creek from 2013.

Sample Date	DO (mg/)	Turbidity NTUs	Total Suspens. Solids (mg/L)	Total Phosphorus (mg/L)	Ammonia Nitrogen (mg/L)	Total Inorganic N	Kjeldahl Nitrogen (Organic) N	Total Nitrogen (mg/L)	Total Chloride (mg/L)
6/18/2013	3.85	6.4	12	0.10	0.41	1.05	0.96	2.0	229
8/28/2013	2.81	4.5	9	0.18	0.38	0.17	0.84	1.0	186
9/30/2013	7.23	6.1	10	0.07	0.07	0.52	0.68	1.2	126
Average	n/a	5.7	10	0.12	0.29	0.58	0.83	1.4	180

Some concerns from the 2013 water quality results from site GM-02 include extremely low dissolved oxygen (DO) levels. Generally, DO levels below 5.0 mg/L can become toxic to fish. On Silver Creek, DO levels were 3.85 on June 18, and 2.81 on August 28. Thus, 67% of the time the DO was measured, it was below the 5.0 mg/L. Ammonia levels are 187% higher than target ammonia nitrogen levels of 0.1 mg/L (see target pollutant concentrations under Pollutant Load Reduction Targets below). High ammonia levels (a constituent typically very low in concentration when DO is present), also implies DO impairment. Together, ammonia and DO data indicate that a sustained dissolved oxygen impairment is occurring. Causes for low DO levels can include high respiration by plants. Typically this occurs where high nutrient levels

occur. Phosphorus and nitrogen are moderately high, and approximately 20% on average above desirable levels (see target concentrations under Pollutant Load Reduction Targets below). Nutrients such as phosphorus and nitrogen can contribute to algae growth in the stream system. Excessive algae growth can contribute to DO fluctuations during night-time respiration from algae and plants. But site observations do not indicate particularly high periphyton or algae on rock substrates. Moreover, total volatile solids, a measure of planktonic plant production, was not high. Therefore, other causes for low DO could be occurring. These could include the below-ground pipe condition over a commercial parcel 300 feet upstream of GM-02. With below-ground conditions, plant photosynthesis is prevented. This condition was directly upstream of the Illinois EPA GM-02 sample site location. Other possible causes include the following. DO levels could be impaired due to sediment deposition and/or fecal contamination. Site observations especially upstream (north of North Avenue) indicate sluggish flow conditions after the creek emerges from a below-ground condition through Reach # 16. Sedimentation is apparent. Also, a small goose population has been observed in this area. Observations of stream channel erosion and/or sedimentation also appear in most areas of Silver Creek. Sedimentation can contribute to oxygen consumption and reduced DO levels. Silver Creek is likely a significant contributor of TSS, TP, and TN to the Des Plaines River.

Chloride concentrations are approximately 50% higher than the target chloride concentration (see target concentrations under Pollutant Load Reduction Targets below). High levels of chloride can be toxic to certain types of plants and aquatic life. Sources of chloride include road salt applications during winter. Chloride is not readily processed by biological, physical, or chemical activity. Higher levels of chloride tend to occur during winter (December through March) with snow cover and snowmelt. However, no sampling activity for chloride occurred during expected peak winter chloride levels. The timing of peak chloride levels in winter and early spring can coincide with fish migration from the Des Plaines River into the mouth and headwaters of Silver Creek with fish spawning and fish larvae rearing activities.

Habitat and aquatic macroinvertebrate samples were collected by Illinois EPA on August 28, 2013. The macroinvertebrate Index of Biotic Integrity (m-IBI) is a metric used by Illinois EPA to evaluate water quality and stream health based on the aquatic insect population in the creek. The Silver Creek m-IBI was 10.9 on August 28, 2013 at Site GM-02. This indicates a very poor aquatic insect taxa richness at GM-02 in Silver Creek (INHS, 2007). The habitat was evaluated based on the Qualitative Habitat Evaluation Index (QHEI). The QHEI score was 34.5. This result suggests a fair representation of aquatic habitat. Types of habitat noted included undercut bank, root mat, boulder, and woody vegetation.

In summary, causes of nonsupport for aquatic life use identified by Illinois EPA were dissolved oxygen, loss of instream cover, alterations in stream-side or littoral vegetative covers, and other flow regime alterations. Causes of nonsupport for aesthetics use were visible oil and floating debris

Historic Water Quality Assessment – Illinois EPA Water Quality Monitoring Data

Both Illinois EPA Sample Site GM-02 and Sample Site GM-01 have been historically occasionally monitored on Silver Creek. Site GM-02 was samples at 12 Avenue (as opposed to 15th Ave.) on March 24, 1983 and November 16, 1983. Numerous parameters were analyzed (App. 2). Observations of note included fecal coliform levels of 3,700 colony forming units (CFUs) per 100 ml. Dissolved oxygen levels typically are not problematic in March, and they were reasonable 10 mg/L. Site GM-02 was also samples in November 16, 1983. Aluminum levels were high, at 282 ug/L. Phenols were detected at 10 ug/L. This suggests that industrial discharge and/or polluted runoff were being detected in the creek. Fecal coliform levels were 45,000 CFU/100 ml. Such high fecal levels can indicate historic discharge of fecal materials in the stream channel. DO levels were relatively high 11 mg/L, and could suggest high primary plant production.

Site GM-01 is located near 1st Avenue in Maywood (mouth of Silver Creek at Des Plaines River in Maywood). Illinois EPA water quality samples were collected on Silver Creek from Site GM-01 from 1967 through 1974. Unfortunately, Site GM-01 results could be significantly influenced by the nearby Des Plaines River. For example, during flood events, under certain circumstances the Des Plaines River flows can backflow upstream into Silver Creek. Site GM-01 results indicate historic DO impairment with 2 mg/L on July 26, 1967. On August 6, 1968, fecal coliform levels were 17,000. DO levels were 4 mg/L. On August 27, 1968, DO levels were 3 mg/L. Chemical Oxygen Demand was 15 mg/L. Fecal coliform bacteria was 15,000 CFU/100 ml. Such low DO levels, whether occasional or consistent, are likely toxic to many species of fish.

NPDES Point Source Discharge Monitoring Data – Illinois EPA

The Illinois EPA makes National Pollutant Discharge Elimination System (NPDES) permit holders throughout Illinois. The Silver Creek watershed contains 3 organizations that hold 6 NPDES permits. These organizations include Canadian Pacific (CP) Railroad, Magellan Pipeline, and International Truck & Engine (Navistar). CP Railroad holds 4 permits, while Magellan Pipeline and Navistar hold 1 permit each.

Table 24: NPDES Outfalls and Permit Holders in the Silver Creek Watershed.

NPID	FACILITY_NAME	TYPE	DSDG	DESCRIPTION	LAT	LONG
IL0002151	CANADIAN PACIFIC-SOO LINE RR	R	0300	STORMWATER RUNOFF-WEST YARD	415635	-875335
IL0045209	MAGELLAN PIPELINE CO-CHIC TERM		0010	SW, PETROL CW, HYDROSTATIC	415618	-875336
IL0002046	INTERNATIONAL TRUCK&ENGINE COR		0010	NCCW,CONDENSATE, BLOWDOWN,SW	415406	-875048
IL0002151	CANADIAN PACIFIC-SOO LINE RR		029Q	QUARTERLY REPORTING AT 029	415635	-875335
IL0002151	CANADIAN PACIFIC-SOO LINE RR	R	0281	STORMWATER RUNOFF-EAST YARD	415630	-875345
IL0002151	CANADIAN PACIFIC-SOO LINE RR		0290	PROCESS WATER & STORMWATER	415635	-875335

According to the U.S. EPA Discharge Monitoring Report Pollutant Loading Tool, the aforementioned NPDES permit holders discharged the pollutants listed below into Silver Creek on an annual basis (Table 25). The largest poundage of discharge is 20,134 lb/yr (over 10 tons per year) of TSS by CP Railroad. The next largest discharge was 10,419 lb/yr (over 5 ton/year) of BOD 5. BOD includes oxygen-consuming materials that can reduce dissolved oxygen levels in the streambed. Next, Navistar discharges 16.9 lb/yr of TSS (relatively minor). However, Navistar also discharges 6.69 lb/yr of oil and grease. Chlorine can be toxic to aquatic life. But Navistar only discharges 0.101 lb/yr on an annual basis.

Table 25: NPDES Pollutant Discharge Loads by Permit Holders into Silver Creek.

NPDES ID	Facility Name	City, State	SIC Code	HUC-12 Code	Top Pollutant	Top Pollutant Pounds (lbs/yr)	Average Daily Flow (MGD)
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Solids, total suspended	<u>20,134</u>	1.5
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	BOD, 5-day, 20 deg. C	<u>10,419</u>	1.5
IL0002046	NAVISTAR INC C E P	MELROSE PARK , IL	3714	071200040403	Solids, total suspended	<u>16.9</u>	0.00105
IL0002046	NAVISTAR INC C E P	MELROSE PARK , IL	3714	071200040403	Oil and grease	<u>6.69</u>	0.00105
IL0002046	NAVISTAR INC C E P	MELROSE PARK , IL	3714	071200040403	Total Residual Chlorine	<u>0.101</u>	0.00105
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Oil and grease	0	1.5
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Xylene	0	1.5
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Toluene	0	1.5
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Ethylbenzene	0	1.5
IL0002127	UNION PACIFIC RAILROAD- MELROSE C E P	MELROSE PARK , IL	4013	071200040403	Benzene	0	1.5

Fish Surveys – Illinois DNR

Historically, Illinois DNR only indicates that one fish survey was completed in 1976 on Silver Creek. When contacted, Illinois DNR was unable to locate details of the fish survey results. But the Fish Index of Biotic Integrity Rating was 19. This is indicative of very degraded conditions. The following is also provided according to the Upper Des Plaines River Watershed Restoration Action Strategy. One historic Illinois EPA Monitoring Survey was completed on Silver Creek in 1976. This sample site was located at Site GM-02 near 12th Avenue (lat/long 41.90515 / -87.84817). The 1976 results indicated that there was partial use support and moderate impairment for overall use and aquatic life. Causes of impairment were not determined but urban runoff / storm sewers (m) were identified as sources contributing to impairment. An Adjusted IBI (AIBI) rating of 23 indicates poor stream health (D rating) at that time. There is a need for an updated fish survey

and fish IBI rating in Silver Creek. While a fish survey location may be most appropriate near Illinois EPA site GM-02, it is possible that the best observed fish habitat on Silver Creek may occur between the 9th Avenue and 5th Avenue vicinity. Fish sampling could also occur near the 1st Avenue area, but sedimentation appears especially high in that area.



Photos 96 and 97: Fish surveys are important because the diversity of the fish population is a direct indicator of stream health. Since fish live continuously in the water, they may indicate cumulative impacts on stream health in ways that discrete testing of water quality impairments may not detect. The last fish survey on Silver Creek was completed in 1976.

Interestingly, anecdotal fish observations on Silver Creek include the following. The Village of Franklin Park has observed northern pike in Silver Creek during creek de-watering operations associated with stabilization improvements. Up to 11 northern pike were observed and relocated. The approximate size range was 12 to 24 inches in length. It is our opinion that these fish likely migrated upstream from the Des Plaines River into Silver Creek during spring spawning season. Among other observations, it is interesting to note that fish barriers did not prevent migration at least upstream through the vicinity of Parker Avenue at the time. In general, northern pike require relatively clear water transparency since they are site feeders. They often occupy areas with aquatic vegetation. They spawn among aquatic plants in marshy or wetland habitat.

Concordia University Water Quality Monitoring Data

Concordia University (River Forest, IL) and the Village of Melrose Park have been working together to collect onsite water quality data on a monthly basis on Silver Creek since July, 2013. The sample sites are located at 2036 W North Avenue, 841 Elsie Drive, near the 5th Avenue Bridge, and at the 1st Avenue Bridge area. Water quality monitoring data are contained in App. 3. Sampling occurred on 24 different dates thus far between July, 2013 and August, 2015. Thus a total of 96 sampling collections have been made (24 dates x 4 monitoring sites).

There were several sampling dates when the Concordia data were collected proximate to the sent Illinois EPA water quality data (6-18-2013, 8-28-2013, and 9-30-2013 for Illinois EPA dates versus Concordia dates of 7-15-2013, 8-15-2013, 9-15-2013, and 10-13-2013). It is acknowledged that water quality sample results can change based on runoff, flow, diurnal, and other conditions. TSS and turbidity agreement comparison results are mixed. In half of the comparison, reasonable agreement occurred. In other cases, the Concordia TSS and turbidity testing produced lower results than the Illinois EPA test results. Total nitrogen may be consistently high in the Concordia results. There is reasonable agreement in comparing sample results for DO, pH, and total phosphorus between the Concordia results and the Illinois EPA results.



Photo 98: Concordia University students and professors have been collecting water quality samples from Silver Creek since 2013.

The Concordia University water quality data represents the longest recent and consistent data collection effort on Silver Creek. August is typically a time period when DO levels are lower in streams due to higher temperatures, lower flow velocities, or other factors. Monitoring results for DO indicate that in August 2013, DO levels were below 5 mg/L (3.1 to 4.5 mg/L) at each of the 4 sample sites on Silver Creek. In 2014, DO levels were higher in summer due to creek flooding conditions in June, 2014. No monitoring occurred in August, 2014. But in July 2015, DO levels were again below desirable levels with 3.5 mg/L at 1st Avenue, 3.8 at Elsie Drive. In June, 2015 during high water conditions DO was 4.4 at 1st Avenue in June. These data indicate an ongoing DO impairment in Silver Creek. A total of 7 observations of low DO were recorded for the 96 samples collected. Of the lowest 7 DO events, 3 occurred at 1st Avenue, 2 occurred at Elsie Drive,

1 occurred at North Avenue (the lowest level recorded of 3.1 mg/L), and 1 occurred at 5th Avenue. This suggests that both upstream and downstream areas are affected by low DO. The site least affected, at 5th Avenue, is located downstream of extensive bioengineering streambank stabilization (between Elsie Drive and 5th Avenue).

Biological Oxygen Demand (5-day) monitoring also occurred. This is significant because BOD5 was not monitored by Illinois EPA. Monitoring near North Avenue by Concordia University was the closest location to the Illinois EPA GM-02 monitoring site. Based on results from the North Avenue site, the percent of BOD5 observations above the target concentration of 4.4 mg/L was over 30%. (See also concentration (see target concentrations under Pollutant Load Reduction Targets below).

Turbidity results (NTU) indicate that levels above 25 NTU were observed in over 12 of the sampling collections (10% of the samples collected). Readings ranged from 72.8 NTU to 26 NTU. Five of the high readings (including the 3 highest readings) occurred at 1st Avenue. The 3 highest TSS readings (12.8 to 21.7 mg/L) were also seen at 1st Avenue. High turbidity at 1st Avenue may be attributed in part to high sedimentation through this reach, just upstream of the Des Plaines River. Of the remaining high NTU levels, 3 were observed at North Avenue, 2 at Elsie Drive, and 1 at 5th Avenue. This suggests that North Avenue turbidity is somewhat problematic. This may be due to upstream sedimentation described previously. It is also of interest to note that low turbidity levels were observed at 5th Avenue. This is consistent with extensive recent bioengineering streambank stabilization upstream of 5th Avenue and downstream of Elsie Drive. The results suggest that streambank stabilization may be acting to reduce local turbidity (and presumably TSS).

Of the 96 sample collections, over 40 had total nitrogen (TN) levels over 5 mg/L (41%). These high readings ranged from 5.6 to 17.4 mg/L (Note: some chemistry expirations may have interfered with at least 2 of the recorded data points; these points were excluded). The high TN readings typically occurred in spring or winter. Although natural background nitrogen levels can be higher in the late winter / spring, it is also possible that anthropomorphic factors including but not limited to lawn fertilization runoff could be contributing to high TN levels. The high TN readings occurred almost equally across all monitoring sites.

Of the 96 sample collections, over 56 had total phosphorus (TP) levels over 0.1 mg/L (58%). These high readings ranged from 0.102 to 0.407 mg/L The high TP readings occurred at various seasons of the year, and almost equally across the 4 location sampled (17 at 1st Avenue; 14 at 5th Avenue; 13 at North Avenue; and 12 at Elsie Drive).

Aquatic Macroinvertebrate Surveys – Riverwatch

Riverwatch surveys were performed on 8 different years between 1996 and 2011. Six of the samples were collected by one to several Fenwick High School students. Two of the samples were collected by Village of Franklin Park consulting staff members. Test results for the Macroinvertebrate Biotic Integrity (MBI) ranged from 6.1 to 10.0. Test score interpretations indicates fair to poor stream conditions in Franklin Park. There is a need to perform additional Riverwatch monitoring in remaining areas of Silver Creek, and to update the Franklin Park test results.

Other Aquatic Macroinvertebrate Surveys

An assessment from the 1987 Lower Des Plaines River Tributary Final Watershed Plan, indicates that based on a Silver Creek macroinvertebrate analysis the water quality of Silver Creek is "semi-polluted." The study states that the stream receives significant fecal contamination, exhibits wide fluctuations in dissolved oxygen levels, and has recorded toxic levels of ammonia-nitrogen periodically. Ammonia-nitrogen levels would typically only be problematic under conditions of low DO.



Photo 99: Aquatic macroinvertebrates such as mayflies are good indicators of overall stream health. Mayflies consume leaf litter and algae. They in turn support the food chain. Aquatic insect surveys have been conducted through the Riverwatch Program in only a few locations. Professional ecological surveys are lacking.

MWRD & Citizen Observations of Chemical Spills

In April, 2010 the Village of Melrose Park officials responded to citizen reports of an oil sheen in Silver Creek. Jim Chodora with MWRD was contacted regarding the spill. According to MWRD, the responsible party was identified as Body Coat, located east of Ruby Street, west of Indian Boundary Drive. Apparently there was a release of quench oil. The company was cooperative in the cleanup effort according to MWRD, and utilized a boom to control the spill. MWRD mentioned that historically oil spills have occurred from other sources in the watershed. He also noted that some fecal contamination discharge likely occurs due to cross-connections between storm sewer and sanitary sewer discharge. Since contacting MWRD, the Silver Creek Watershed Committee has prepared an educational brochure and alerted citizen monitors on reporting chemical spills to MWRD which maintains a 24-hour spill response line (phone: 312-787-3575).

U.S. Geological Survey – Stream Gage Monitoring Data

It is significant to note that the U.S. Geological Survey maintains a stream gage near 9th Avenue on Silver Creek. Dates of observations range from 2006 through 2007. The website below contains cross section information, discharge, velocity, study reach parameters, and other information. <http://il.water.usgs.gov/proj/nvalues/db/sites/05530700.shtml>

Pollutant Loading Rates

Based on the watershed land uses as calculated, the following pollutant loading rates were calculated using the Illinois STEPL polluting loading model. It is assumed that all land uses are storm sewered.

Based on the information provided, approximately 29% of the annual TSS load comes from urban land uses. Over 71% of the TSS loading can be attributed to streambank erosion. Urban land uses account for 35% of the annual TP loading. Streambank erosion accounts for 65% of the annual total phosphorus loading. Most of the total nitrogen loading is attributable to urban land uses (91%). Transportation and industrial land uses are particularly large contributors of nitrogen loading. Most of the BOD loading in the watershed (96%) is attributable to urban land uses, especially transportation and industrial areas. NPDES discharge may account for around 4% of the watershed BOD loading. Future Pollutant Loading Rates results (Table 26) based on future projected land use are very similar to Existing Pollutant Loading Rates. This is due to the advanced stage of existing watershed development.

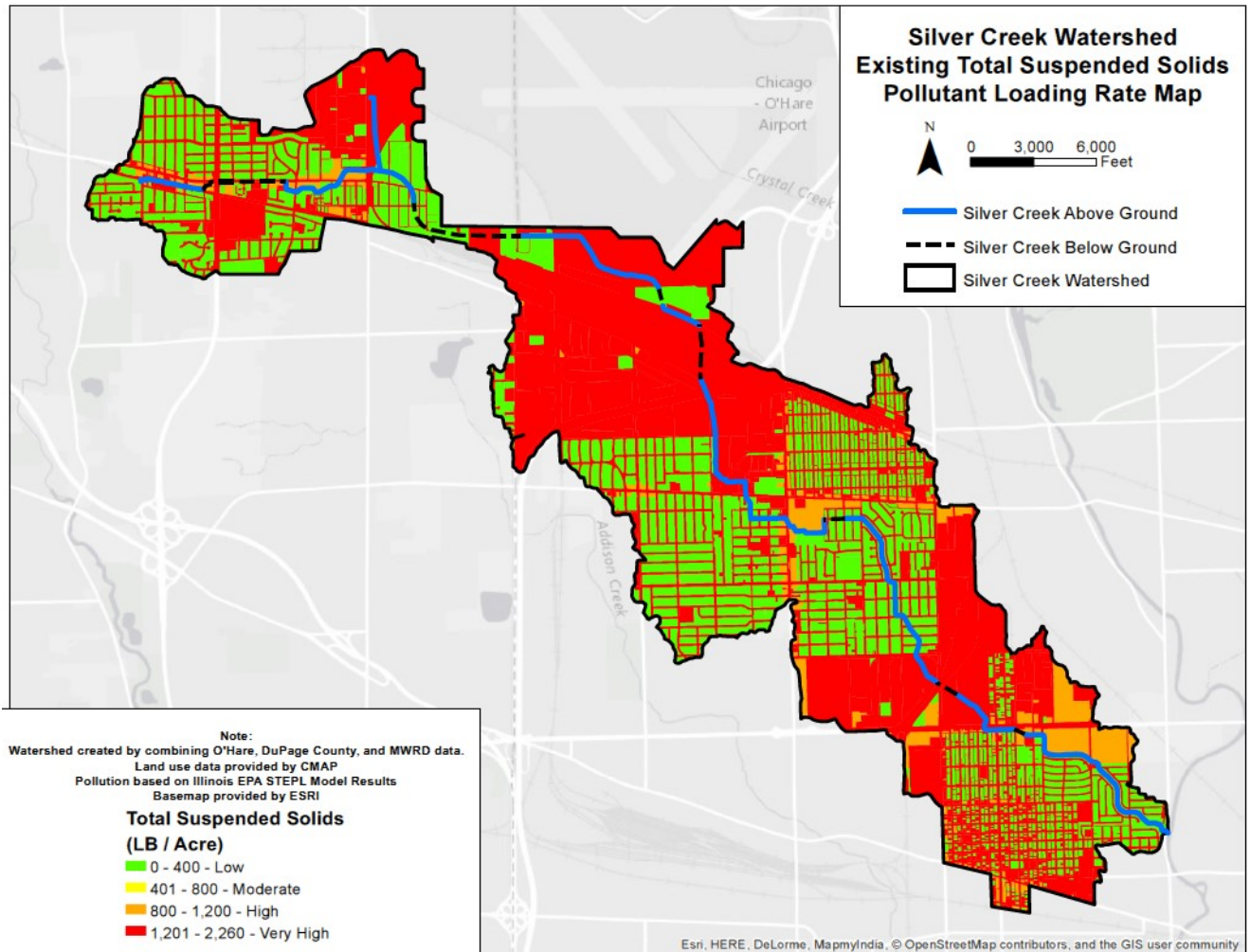


Fig. 27: Pollutant Loading Rates for Total Suspended Solids in the Silver Creek Watershed. Transportation, Industrial, Commercial, Institutional, and Multi-Family land uses have the highest TSS loading rates according to Illinois EPA.

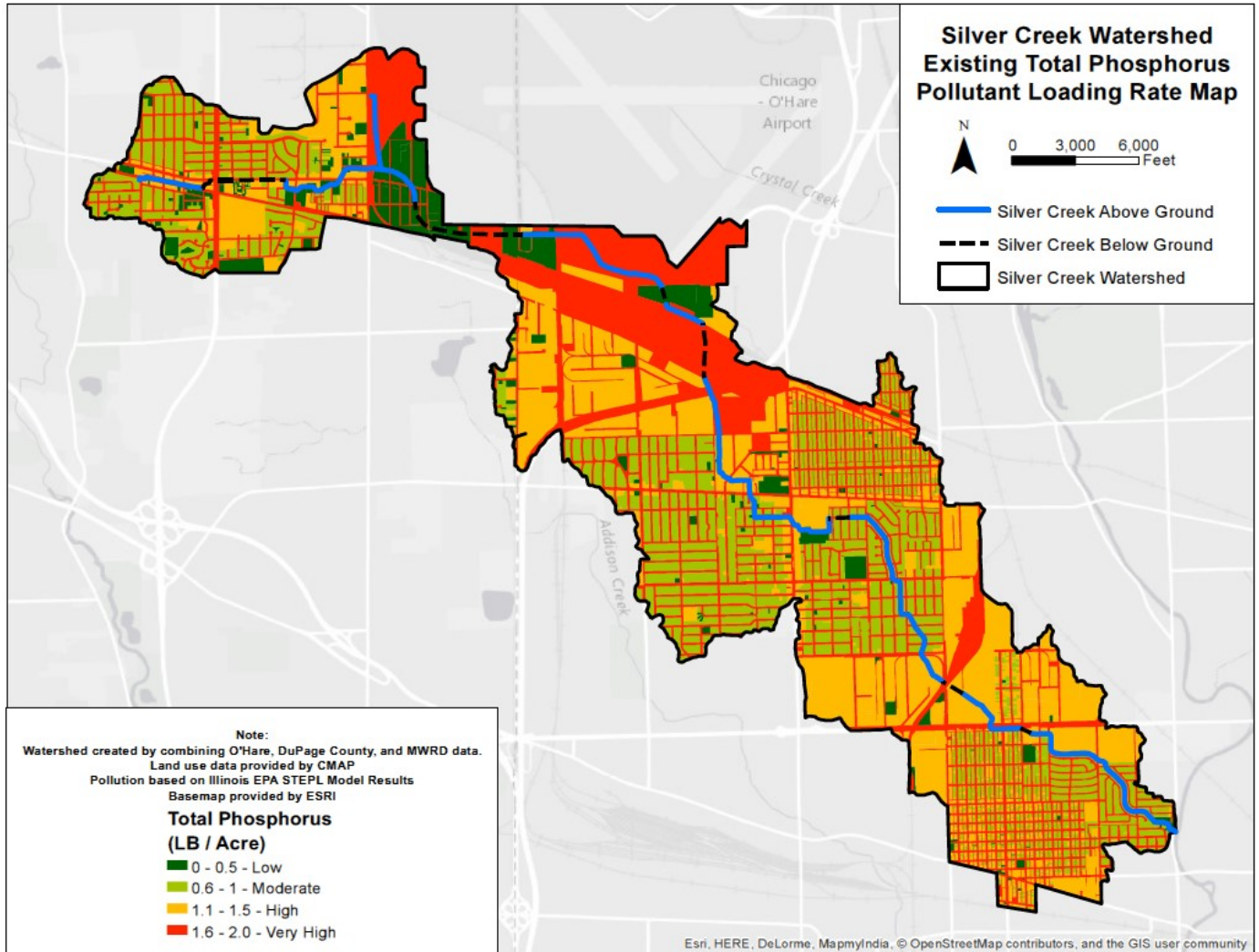


Fig. 28: Pollutant Loading Rates for Total Phosphorus in the Silver Creek Watershed. Transportation, Industrial, Commercial, Institutional, and Multi-Family land uses have the highest TP loading rates according to Illinois EPA.

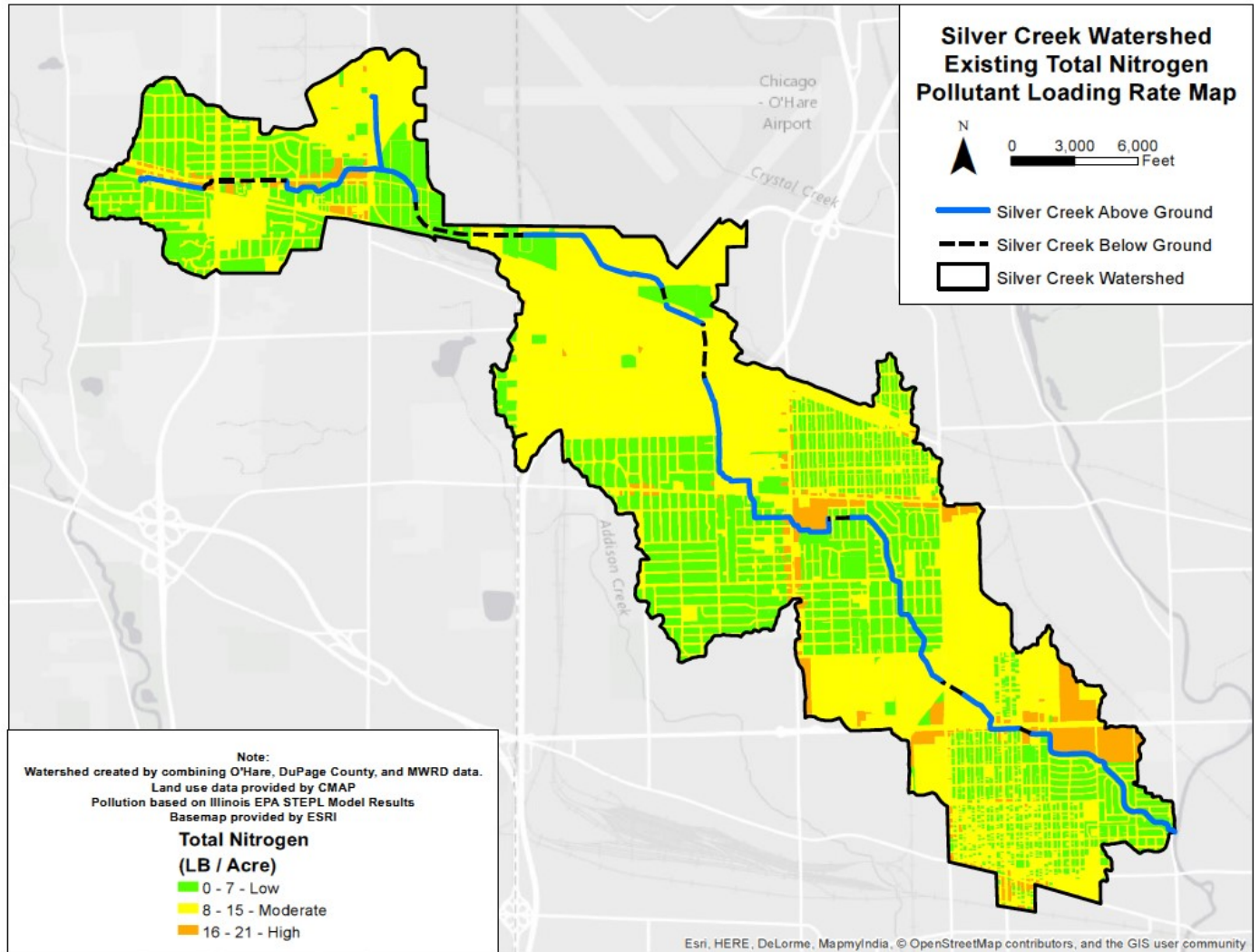


Fig. 29: Pollutant Loading Rates for Total Nitrogen in the Silver Creek Watershed. Transportation, Industrial, Commercial, Institutional, and Multi-Family land uses have the highest TN loading rates according to Illinois EPA.

Table 26: Existing Pollutant Loading Rates Estimated Using the STEPL Pollutant Loading Model.

Existing Land Use (2010)	Units	Quantity	TSS			TP			TN			BOD		
			(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%
LAND USE														
COMMERCIAL	Acres	376.1	1,180	443,798	2%	1.3	489	2%	21	7,898	10%	85	31,969	11%
INDUSTRIAL	Acres	1,305.5	1,240	1,618,820	6%	1.5	1,958	8%	14	18,277	23%	50	65,275	23%
INSTITUTIONAL	Acres	213.0	1,320	281,160	1%	1.4	298	1%	11	2,343	3%	52	11,076	4%
OPEN SPACE	Acres	155.1	61	9,461	0%	0.4	60	0%	1	155	0%	1	155	0%
RESIDENTIAL - SINGLE FAMILY	Acres	1,996.9	309	617,042	2%	0.8	1,617	6%	6	11,981	15%	22	43,932	15%
RESIDENTIAL -MULTI-FAMILY	Acres	179.9	1,320	237,468	1%	1.4	252	1%	11	1,979	2%	52	9,355	3%
TRANSPORTATION / ROW	Acres	2,256.3	2,260	5,099,238	18%	1.8	4,061	16%	13	29,332	37%	50	112,815	40%
VACANT	Acres	279.1	100	27,910	0%	0.2	61	0%	1	279	0%	2	558	0%
WATER	Acres	4.5	N/A	N/A	N/A	4.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SUB-TOTAL - URBAN	Acres	6,766.4		8,334,897	29%		8,796	35%		72,244	91%		275,135	96%
STREAMBANKS														
NO EROSION	LF	56,250		Not Calc.			Not Calc.			Not Calc.			Not Calc.	
LOW EROSION	LF	37,500		3,000,000	10%		1,500.0	6%		3,000.0	4%		Not Calc.	
MODERATE EROSION	LF	16,464		2,634,200	9%		1,317.1	5%		2,634.2	3%		Not Calc.	
HIGH EROSION	LF	5,502		1,584,600	5%		792.3	3%		1,584.6	2%		Not Calc.	
SUB-TOTAL - STREAMBANKS	LF	115,716		20,680,845	71%		16,527.4	65%		7,218.8	9%		Not Calc.	
SUB-TOTAL - NPDES DISCHARGE				20,134	0.1%		0	0%		0	0%		10,419	4%
GRAND TOTAL				29,035,876	100%		25,323	100%		79,463	100%		285,554	100%

Table 27: Future Pollutant Loading Rates Estimated Using the STEPL Pollutant Loading Model.

Future Land Use	Units	Quantity	TSS			TP			TN			BOD		
			(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%	(LB / Acre)	Annual Load (LB / Year)	%
LAND USE														
COMMERCIAL	Acres	376.1	1,180	443,798	2%	1.3	489	2%	21	7,898	10%	85	31,969	11%
INDUSTRIAL	Acres	1,305.5	1,240	1,618,820	6%	1.5	1,958	8%	14	18,277	23%	50	65,275	23%
INSTITUTIONAL	Acres	213.0	1,320	281,160	1%	1.4	298	1%	11	2,343	3%	52	11,076	4%
OPEN SPACE	Acres	155.1	61	9,461	0%	0.4	60	0%	1	155	0%	1	155	0%
RESIDENTIAL - SINGLE FAMILY	Acres	1,996.9	309	617,042	2%	0.8	1,617	6%	6	11,981	15%	22	43,932	15%
RESIDENTIAL -MULTI-FAMILY	Acres	179.9	1,320	237,468	1%	1.4	252	1%	11	1,979	2%	52	9,355	3%
TRANSPORTATION / ROW	Acres	2,256.3	2,260	5,099,238	18%	1.8	4,061	16%	13	29,332	37%	50	112,815	40%
VACANT	Acres	279.1	100	27,910	0%	0.2	61	0%	1	279	0%	2	558	0%
WATER	Acres	4.5	N/A	N/A	N/A	4.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SUB-TOTAL - URBAN	Acres	6,766.4		8,334,897	29%		8,796	35%		72,244	91%		275,135	96%
STREAMBANKS														
NO EROSION	LF	56,250		Not Calc.			Not Calc.			Not Calc.			Not Calc.	
LOW EROSION	LF	37,500		3,000,000	10%		1,500.0	6%		3,000.0	4%		Not Calc.	
MODERATE EROSION	LF	16,464		2,634,200	9%		1,317.1	5%		2,634.2	3%		Not Calc.	
HIGH EROSION	LF	5,502		1,584,600	5%		792.3	3%		1,584.6	2%		Not Calc.	
SUB-TOTAL STREAMBANKS	LF	115,716		20,680,845	71%		16,527.4	65%		7,218.8	9%		Not Calc.	
SUB-TOTAL - NPDES DISCHARGE				20,134	0.1%		0	0%		0	0%		10,419	4%
GRAND TOTAL				29,035,876	100%		25,323	100%		79,463	100%		285,554	100%

Pollutant Load Reduction Targets

An important goal for Silver Creek would be to convert the aquatic life use from non-support into a full support. From the water quality perspective, achieving this goal would require pollutant load reduction targets to be determined. Determination of watershed-specific pollutant load reduction targets is dependent on an understanding of the water quality standards and guidelines needed to allow full support of the aquatic life. Ideally, water quality standards needed to provide full support for aquatic life would be evaluated based on a long-term monitoring study specifically in Silver Creek evaluating aquatic life, water chemistry, and other factors that impair aquatic life. However, such a detailed study is rarely conducted in any watershed in an attempt to determine a watershed-specific water quality standard. The following alternative methods evaluated for determining pollutant load reduction targets are provided as supporting information.

1) State Water Quality Standards – Aquatic Life Use

The Illinois EPA provides some water quality standards for pollutants affecting the aquatic life use support. Technically these standards are regulatory, although in actuality they are not enforced across the state. The Silver Creek Watershed would be considered a General Use Waters for the State of Illinois and therefore not a Secondary Contact Waters area. The following standards are based on Illinois EPA standards for the Clean Water Act, described in Title 35: Environmental Protection Subtitle C: Water Pollution Chapter I: Pollution Control Board , Part 302 Water Quality Standards, Subpart D: Secondary Contact and Indigenous Aquatic Life Standards. Of these some of the most notable include:

- Dissolved oxygen standard = Minimum 4.0 mg/L
- Qualitative observation that waters “shall be free from unnatural sludge or bottom deposits, floating debris, visible oil, odor, unnatural plant or algal growth, or unnatural color or turbidity.”
- There is no standard for total nitrogen (TN).
- There is no standard for total phosphorus (TP).
- There is no standard for total suspended solids (TSS).
- Further information regarding Water Quality Standards criteria are available at:
<http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.aspx>

2) Water Quality Guidelines

In contrast to the standards described above, there are several additional “guidelines” that are recommended by Illinois EPA to protect the aquatic life use. These are listed in the Illinois EPA Guidelines for Identifying Potential Causes of Impairment (see Table C-12 of the 2016 Integrated Water Quality Report). Selected guidelines include the following:

- Dissolved oxygen guideline = 4.0 mg/L. . (That is, DO levels should not go below 4.0 mg/L at any time.)
- Total suspended solids guideline = 116 mg/L.
- Total dissolved solids guideline = 1500 mg/L.
- Conductivity guideline = 2500 umhos/cm.
- Oil and grease guideline = 15 mg/L.

- pH guideline = 6.0 to 9.0
- Un-ionized ammonia guideline = 0.1 mg/L.
- There is no standard for total nitrogen (TN).
- There is no standard for total phosphorus (TP).

3) Reference Watersheds

In some cases, reference watersheds that have full support of the aquatic life use can be used to determine appropriate pollutant load reduction levels. This approach is valid for large watersheds that contain streams (or sub-watersheds) with full use support for aquatic life. The stream segments need to be monitored for water quality parameters, such as TSS and TP, over a relatively long time period. Recorded pollutant concentrations under various flow regimes would then form the basis for establishing acceptable ranges of pollutant concentrations that can support aquatic life. (The data collected could be an average of validated data from each reference sub-watershed monitoring area.). Based on available data from a variety of rural or partially urbanized watersheds across the state, such monitoring has indicated that acceptable TP pollutant concentrations may range as high as 0.7 mg/L. Acceptable TSS pollutant concentrations may range as high as 40 mg/L. However, the resulting data would only be considered applicable to the larger watershed surrounding the monitoring area. Therefore, this information is not necessarily considered directly applicable to Silver Creek. The overall approach and methodology outlined above does not appear to be potentially applicable to Silver Creek before there are no sub-watershed areas to be monitored that currently have full support of the aquatic life use.

4) Monitoring Results Other Urban Watersheds (Salt Creek)

The DuPage River Salt Creek Workgroup completed a comprehensive Salt Creek Bioassessment, 2010. This Study included extensive water quality and biological monitoring in the highly urbanized Salt Creek watershed. Note: The Salt Creek watershed is different from the Silver Creek watershed in that the former contains CSO discharges, as well as municipal wastewater treatment plant discharges. However, the extent of urbanization is not unlike the Silver Creek watershed. The results of the water quality monitoring included ranking several pollutants into ranges of “normal, elevated, high, and/or very high” levels. The following information is provided:

Note: CSOs, WWTPs, and/or dams occurred in most of the Salt Creek monitored areas.

- Salt Creek Bioassessment Guideline Pollutant Concentrations based on Ohio Unpolluted Streams was based on median to 75th percentile pollutant ranges for reference streams. The pollutant results Includes the Following:
 - TSS = ca. 10 mg/L
 - TP =ca. 0.1 mg/L
 - TN = ca. 1.1 mg/L

- NH₃-N = 0.1 mg/L
- TKN = ca. 1.0 mg/L
- Ranges in Chloride Monitoring Results in the Salt Creek Bioassessment:
 - “normal” chloride = 70 to 118 mg/L
 - “high” chloride = 118 to 168 mg/L
 - “Very high” chloride = 168 – 229 mg/L
 - “Anomalous” chloride = 229 – 329 mg/L
 - “Decidedly salty” chloride = 327 – 465 mg/L
- Ranges in Ammonia Monitoring Results in the Salt Creek Bioassessment:
 - “normal” ammonia-N = 0.05 – 0.08 mg/L
 - “elevated” ammonia-N = 0.08 – 0.14 mg/L
 - “high” ammonia-N = 0.14 – 0.28 mg/L
 - “Very High” ammonia-N = 0.28 – 0.47 mg/L
- Ranges in Total Kjeldahl Nitrogen (TKN) Monitoring Results in the Salt Creek Bioassessment:
 - “normal” = 0.30 – 0.70 mg/L
 - “elevated” = 0.70 – 1.16 mg/L
 - “high” = 1.16 – 1.70 mg/L
 - “Very High” = 1.70– 2.47 mg/L
- Ranges in CBOD₅ Monitoring Results in the Salt Creek Bioassessment:
 - “normal” = 1.0 – 2.3 mg/L
 - “elevated” = 2.3 – 3.7 mg/L
 - “high” = 3.7 – 5.0 mg/L

5) Illinois Nutrient Loss Reduction Strategy

In 2011, the Illinois EPA and Illinois Department of Agriculture prepared the Illinois Nutrient Loss Reduction Strategy (NLRS). The purpose for the NLRS is two-fold: 1) to reduce the discharge of nutrients into Illinois’ waters, and 2) to meet the goals of a 2008 U.S.EPA study (Gulf Hypoxia Action Plan) designed to reduce the hypoxic condition occurring at the Mississippi River delta in the Gulf of Mexico. The Gulf hypoxia condition is believed to be caused primarily by total nitrogen but also by total phosphorus. Based on scientific study and the recommendations of panels of experts, the following goals have been suggested:

- 2025 NLRS Goals:
 - Reduce statewide phosphorus loss by 25 percent by 2025.
 - Reduce statewide nitrate-nitrogen loss by 15 percent by 2025.
- Other Future NLRS Goals:
 - Reduce loss of phosphorus to Mississippi River by 45%.
 - Reduce load of nitrate-nitrogen to Mississippi River by 45%.

Pollutant Concentration Targets for the Silver Creek Watershed

Based on available methods and results above, as well as the previously described water quality monitoring data for the Silver Creek watershed, we suggest that the following are important pollutant levels for protecting and improving the water quality of Silver Creek.

- Target Dissolved Oxygen Level = Minimum 4.0 mg/L (Illinois EPA Standard).
At no time should DO be less than 3.5 mg/L.

- Target BOD = 4.4 mg/L
(Based in part on DRSCW 2010 Salt Creek Bioassessment elevated data for CBOD.)
(Note: BOD was not measured by Illinois EPA. But it was measured by Concordia University.)

- Target Total Suspended Solids =
 - o 25 mg/L for Flows at or below 5-Year Flood Stage.
 - o 80 mg/L for Flows Above 5-Year Flood Stage
(Based in part on Illinois EPA Guideline).

- Target Total Nitrogen = 1.2 mg/L (DRSCW)
(Based in part on DRSCW 2010 Salt Creek Bioassessment for unpolluted streams)
 - o Target Total Kjeldahl Nitrogen Level = 1.0 mg/L
 - o Target Ammonia-Nitrogen Level = 0.1 mg/L (Illinois EPA Guideline)

- Target Total Phosphorus = 0.1 mg/L
(Based in part on DRSCW 2010 Salt Creek Bioassessment for unpolluted streams)

- Target Qualitative Observation: waters “shall be free from unnatural sludge or bottom deposits, floating debris, visible oil, odor, unnatural plant or algal growth, or unnatural color or turbidity.” (Illinois EPA Standard)

- Target Chloride =
 - o 120 mg/L Between April and November
 - o 200 mg/L Between December and March
(Based in part on DRSCW 2010 Salt Creek Bioassessment)

(Note: Conductivity may be used as a surrogate monitoring parameter as long as a statistically significant regression correlation is established between chloride and conductivity.)

- Target Oil & Grease = Maximum 15 mg/L (Illinois EPA Guideline)

6) Pollutant Load Reduction Targets for the Silver Creek Watershed

Recommended pollutant load reduction targets for the Silver Creek Watershed are provided as follows. The pollutant concentration targets described above were compared to the Illinois EPA measured field data from 2013 for Silver Creek. The results were useful in most cases to assign preliminary load reduction targets for the Silver Creek watershed.

Dissolved Oxygen

- Dissolved Oxygen Target Concentration = 4.0 mg/L
 - Avg. DO of Non-Compliant Values Measured by IEPA = 3.3 mg/L
 - Minimum DO Increase Needed = 17% Increase
 - Proposed DO Increase Needed = 20% Increase
- (Note: Percent of DO Observations Below 4.0 mg/L Measured by Illinois EPA = 67%)

Biological Oxygen Demand (BOD5)

- Biological Oxygen Demand Target Concentration = 4.4 mg/L
 - Avg. BOD of Non-Compliant Values Measured by Concordia University = 7.2 mg/L
 - Minimum Target Load Reduction Needed = 64% Reduction
 - Proposed Target Load Reduction = 50% Reduction
 - The Existing & Future BOD Load of 285,554 lb/year Reduced by 50% Provides the Following Load Reduction = 142,777 lb/year
- (Note: Percent of BOD Observations Above 4.4 mg/L Measured by Concordia Univ. = 30%)

Total Nitrogen

- Total Nitrogen Target Concentration = 1.2 mg/L
- Average Total Nitrogen Measured by Illinois EPA = 1.4 mg/L
- Minimum Target Load Reduction Needed = 17% Reduction
- Proposed Target Load Reduction = 20% Reduction
- The Existing & Future TN Load of 79,463 lb/year Reduced by 20% Provides the Following Load Reduction = 15,893 lb/year

Ammonia Nitrogen

- Total NH₃-N Target Concentration = 0.1 mg/L
 - Average Total NH₃-N Measured by Illinois EPA = 0.29 mg/L
 - Minimum Reduction Needed = 187% Reduction
 - Proposed Target Reduction = 200% Reduction
- (Note: Mitigation of NH₃-N Levels Can Also Occur By Increasing Dissolved Oxygen Levels.)

Total Phosphorus

- Total Phosphorus Target Concentration = 0.10 mg/L
- Average Total Phosphorus Measured by Illinois EPA = 0.12 mg/L
- Minimum Target Load Reduction Needed = 17% Reduction
- Proposed Target Load Reduction = 20% Reduction
- The Existing & Future TP Load of 25,323 lb/year Reduced by 20% Provides the Following Load Reduction = 5,065 lb/year

Total Suspended Solids

- Total Susp. Solids Target Concentration (below 5-Year Flood Stage) = 25 mg/L
- Average TSS Measured by Illinois EPA = 10 mg/L
- Minimum Target Load Reduction Needed = N/A
- Proposed Target Load Reduction = 20% Reduction
- (Note: Recommended Target Load Is Based on Impact of TSS and streambank erosion on TP, TN, BOD, and DO concentrations as described in Tables 25 and 26 above.)
- The Existing & Future TSS Load of 29,035,876 lb/year Reduced by 20% Provides the Following Load Reduction = 5,807,175 lb/year

Total Chloride

- Total Chloride Target Concentration (April-Nov.) = 120 mg/L
- Average Total Chloride Measured by IEPA (April-Nov.)= 180 mg/L
- Minimum Target Load Reduction Needed = 50% Reduction
- Proposed Target Load Reduction = 50% Reduction

WATERSHED-BASED PLAN

Based on the preceding Watershed Resource Inventory, please find below the Silver Creek Watershed-Based Plan. Silver Creek Causes of Nonsupport for Aquatic Life Use Attainment include:

- alteration in stream-side or littoral vegetative covers (84),
- other flow regime alterations (319),
- dissolved oxygen (DO; 322), and
- loss of instream cover (501).

Sources of Impairment for Silver Creek Use Attainment Include:

- loss of riparian habitat (72),
- site clearance (land development or redevelopment; 122),
- streambank modifications/destabilization (125),
- urban runoff/storm sewers (177), and
- channelization (20).

The following goals and objectives are identified below to guide recommendations for watershed improvement.

Goals:

- To protect and improve the water quality, ecological health, aquatic habitat, aesthetic value, and other benefits of Silver Creek for the watershed stakeholders.
- To engage municipalities, educational institutions, government agencies, residents, and private enterprises with a common goal to improve and protect Silver Creek.
- To reduce streamside development and encroachment along the banks of Silver Creek and to expand a more natural riparian corridor along the stream and its tributaries.
- To convert existing impervious surfaces into pervious areas to reduce pollutant runoff loads and to increase runoff infiltration.
- To implement recommended site-specific and watershed-wide BMPs within 5 to 10 years.
- To observe measurable progress in the improvement of Silver Creek over time.
- To convert the aquatic life use from non-support into full support per the Illinois EPA evaluation criteria.
- To achieve the Pollutant Load Reduction Targets described in this report for the Silver Creek Watershed.
- To identify and implement improvements to allow Silver Creek to be converted from a degraded system to a community asset within the watershed.

Objectives:

- Improve the water quality of Silver Creek through land acquisition, property buyout, land preservation, and land protection within the stream corridor to alleviate the severe

channel encroachment that has occurred through development.

- Implement policies to encourage chloride reduction programs, stormwater best management practices for runoff control,
- Harness the energy for local flood reduction relieve by incorporating water quality improvement measures in flood control initiatives to provide multiple benefits to enhance, protect, restore, and naturalize Silver Creek.
- Education government officials, engineers, planners to modify past practices of stream channel containment within extensive underground conveyance systems and to daylight the stream for multiple benefits including aesthetics, provision of community amenities, and water quality improvement.
- Encourage policies to land preservation and restoration within the watershed for the protection of Silver Creek.
- Encourage watershed units of government to adopt a Green Infrastructure Plan and Conservation Design planning to help inform future land use decisions, and reduce the potential for detrimental water quality impacts.
- Implement innovative best management practices as demonstrations projects to protect and enhance the stream.
- Encourage the formation of environmental organizations within each municipality to help guide the protection of Silver Creek and to identify opportunities for stream improvement.
- Educate residents, school children, and other stakeholders to get a vision for how the protection of Silver Creek can benefit the communities.
- Maximize the effectiveness of Cook County and DuPage County Stormwater Ordinances that protect riparian / wetland buffers, conservation easements, and stormwater Best Management Practices.
- Encourage continued quarterly meetings among municipalities to work together to solve not only flood reduction issues but also Silver Creek enhancement opportunities.
- Support limited funding for a part-time Watershed Coordinator to implement the Silver Creek Watershed Plan, to participate in relevant meetings, and to encourage stakeholders to adopt recommended practices.
- Promote watershed-wide monitoring to refine causes and sources of impairment such as dissolved oxygen, nutrients, total suspended solids, fecal coliform bacteria, etc.

Recommended BMPs

Recommendations for Best Management Practices (BMPs) in the Silver Creek watershed are provided in two categories:

- General Watershed Plan Recommendations are applicable to the entire watershed area.
- Site-Specific Recommendations are provided for specific project-based locations identified in the Silver Creek Watershed.

Based on land use analysis, over 94% percent of the watershed area has already been developed. Watershed imperviousness is 46%. Therefore, most watershed improvement recommendations are by necessity based on either retrofitting existing developed areas, or through converting existing developed parcels into environmentally sound areas to improve pollutant filtration and water quality values.

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

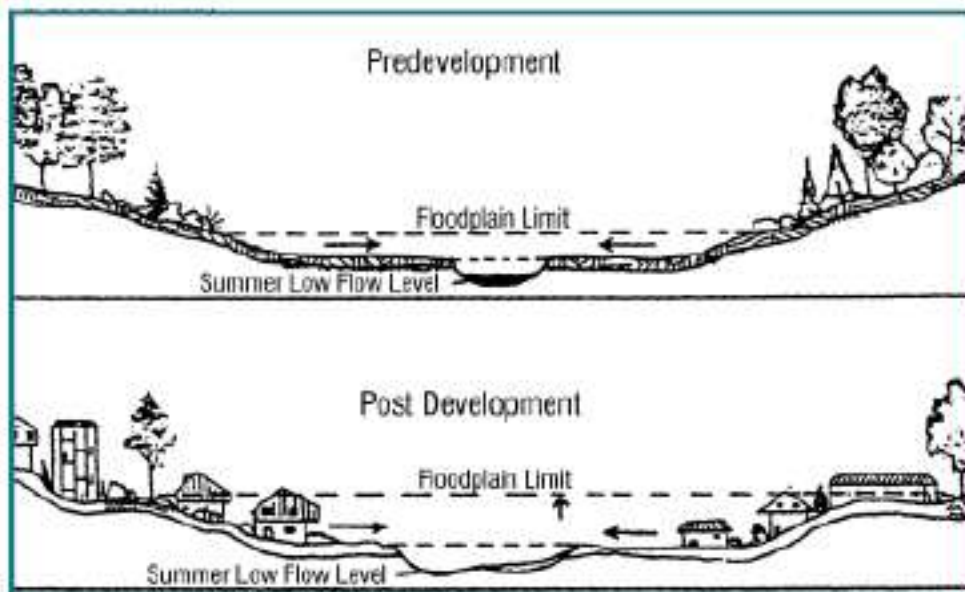


Fig. 30: Development and channel encroachment in floodplain areas not only directly impacts stream health, but it also increases flood risk in affected properties. These factors have affected many areas in the Silver Creek watershed. ⁷

⁷Schueler, T. 1995. The Architecture of Urban Stream Buffers.” Watershed Protection Techniques 1(4):155-163.

A variety of urban BMPs could be used throughout the watershed, many of which could provide multiple benefits. This plan proposes the installation of permeable pavers, conversion of developed areas into runoff storage, acquisition of developed areas encroaching onto Silver Creek streambanks and conversion to riparian open space, bioswales, streambank stabilization, and other practices as primary BMP practices. Opportunities for site re-development should be evaluated closely for water quality improvement. For example, re-development could incorporate conservation design and green infrastructure during initial site design. Goals for both water quality and flood management should include:

- Manage pollutants and runoff at the source of the runoff. This is opposed to the historic, conventional practice of routing runoff as rapidly as possible (through piping, concrete channels, etc.) to downstream areas.
- Strive to store, infiltrate, detain, and filter runoff before it is discharged downstream.
- Recommend effective techniques that will make a difference either singly or cumulatively to help to convert degraded areas into community assets.

Bioswales / Bioretention Areas / Rain Gardens

Bioswales, bioretention areas, or rain gardens, include either linear depressional storage (such as a bioswale along a roadway) or a localized depression (such as a rain garden) that stores and filters stormwater runoff. These facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. A critical component of bioretention is the over-excavation of the depressional area and backfill placement with subgrade aggregate (sand or gravel) materials. This dramatically increases the infiltration and storage potential of the excavated area. Bioswales and bioretention have been known to also reduce local nuisance flooding conditions during 10-year storm recurrence events. Optional underdrain system can be used, if needed, to direct overflow conditions away from the site.



Photos 100 and 101: Urban bioswales can be retrofitted along street rights-of-way to significantly reduce runoff volumes and associated pollutant loading. Signage can help to educate the public.

Bioswales and bioretention areas remove pollutants through a variety of physical, biological, and chemical treatment processes. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Nutrients can be taken up by microbes, bacteria, and plant roots, reducing downstream impacts. Planting treatments can include native plants with deep root systems to increase subgrade infiltration. Bioretention areas have a wide range of applications and can be incorporated into existing residential, commercial, and industrial areas. These facilities are very versatile and can be easily integrated into landscaped areas and within roadway right-of-ways. Runoff from the site is typically conveyed in shallow engineered open conveyances, shallow pipes, curb cuts, or other innovative drainage structures. Where underlying soils have limited infiltration capacity, an underdrain should be included. Additional storage and infiltration can occur if the perforated pipe is placed above the bottom of the subgrade gravel drainage layer.

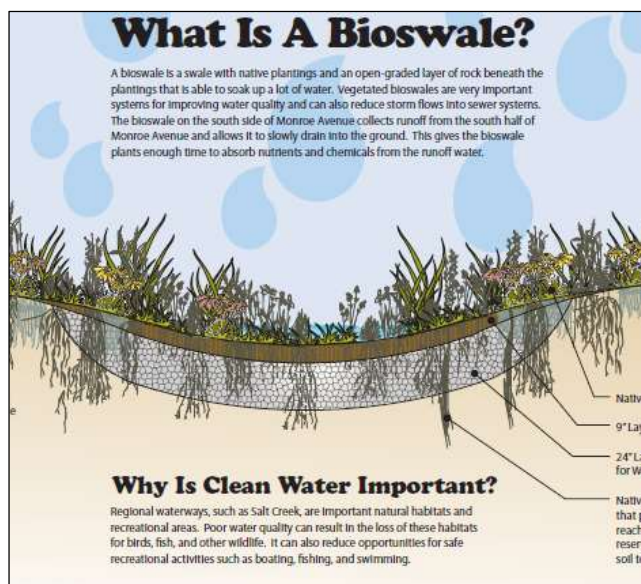


Photo 102 and Exhibit 9: In contrast to bermed parking lot islands with which rapidly shed runoff, depressional bioswales with (depicted) with aggregate areas below-ground can absorb and filter runoff. Native plants can help improve runoff absorption.

Rain Gardens are often considered to be most applicable to depressional areas in residential backyards or front yards. However, they can also be installed in commercial and institutional locations. Downspouts are typically intentionally diverted into rain garden areas. Sizing should be considered to store the volume of runoff to be discharged into the site. Plant species considerations should also take into account the duration of soil saturation that may occur after a runoff event.



Photo 103: Rain gardens can be expanded for industrial and commercial areas. They can be constructed within and adjacent to impervious surfaces such as parking lots. In some cases, rain gardens can store and treat up to 10% of the parking lot runoff.

Commercial and Institutional BMPs

Commercial, industrial, and institutional areas comprise over 28% (1,894 acres) of the watershed. Potential BMPs for impervious surfaces such as parking lots include permeable paver park lots, parking lot bioswales, rain gardens for downspout treatment (depicted above), green rooftops, cisterns to contain or detain runoff, or other measures.



Photo 104: Example permeable pavers (right) and porous concrete (left) in a parking lot to infiltrate large volumes of stormwater runoff prior to discharge (Photo Courtesy Village of Franklin Park at the Police Station).



Photo 105: Office building equipped with a large cistern to collect rooftop runoff. Cisterns can be fitted with hoses, or integrated with landscape sprinklers to water the property's landscaping instead of using drinking water. If implemented extensively, cisterns can reduce runoff, pollutant loading, and nuisance flooding in developed areas.



Photo 106: Installation of a linear bioswale with native plants in a setting with expansive parking lots.



Photo 107: Curb cuts can direct runoff into adjacent vegetative grass filtration areas, rather than collecting 100% of the runoff into the storm sewer system. Treating runoff at the source includes directing it to infiltration areas to the extent practicable. Once runoff enters the storm drain system, all pollutants are then efficiently conveyed into Silver Creek.



Photo 108: While vegetated areas are preferred, even low-maintenance gravel areas can be used to infiltrate runoff into soils before the pollutants are discharged into the sewer system.

Detention Basin Retrofits and Constructed Wetlands

Although most of the watershed was developed by the 1950s, there are many detention basins installed in the watershed associated with re-developed parcels. Both dry detention and wet basin detention facilities are common. Dry basins were typically vegetated with turf grass and designed to drain completely after storm events. Dry basins also commonly have low flow channels (often concrete chutes) that are designed to convey runoff to downstream areas and that allow for little infiltration. In other cases, part or all of a detention area or open space area can be converted into a constructed wetland. As water flows through a wetland, there can be several water quality benefits. The velocity of the water decreases, allowing suspended solids to settle out. The microbial community that thrives in the soils of wetlands transforms or removes pollutants, such as phosphorous and nitrogen. Phosphorous retention occurs through sorption, precipitation, and sedimentation. Nitrogen (in nitrate form) is removed through anaerobic denitrification and other processes.

Detention basin recommendations for improved water quality are several-fold:

- Concrete channels in dry detention basins can be removed and replaced with rip-rap (for increased infiltration) or solid vegetation on the channel bottom.
- The length of the basin between the storm pipe inlet and the outlet control is referred to as the “flow path length.” To improve water quality, the length of the flow path should not be short-circuited, but should be as long as possible (potentially meandering throughout the bottom of the basin) to increase the length of time in which runoff is detained in the basin before being discharged downstream. This increases infiltration, and reduces runoff volumes.
- Inlets of detention systems can be excavated to contain “sediment forebays.” Sediment forebays are only a few feet in depth. They act to store sediment before it is distributed into a pond or lake environment. This can reduce future dredging costs since the sediment is more localized for easy removal on an occasional basis.
- Turf vegetation can be replaced with native plantings.
- Stabilize eroding shoreline areas with rock, native plantings, or other materials. This protects the pond from sediment accumulations in the bottom.
- Consider alum applications in ponds, wet basins, and wetlands to clarify the water, reduce algae growth, and reduce nutrient (phosphorus) levels. Repeated alum applications can seal off pond bottom sediments from releasing phosphorus into the water column. This can significantly reduce nuisance algae blooms.
- Dry bottom basins to the extent practicable can be converted into wet bottom (pond) basins or wetland basins to improve pollutant removal effectiveness.
- Wetland type detention basins can be provided with energy dissipation structures, a sediment forebay to settle out coarse solids and to facilitate maintenance, shallow sections planted with wetland vegetation, deeper areas or micro pools, and a two stage outlet structure to improve water quality treatment. Meandering swales can also be incorporated into the basins to increase the residence time during low flow conditions.

- Review potential outlet control modifications with state licensed professional water resources engineers and municipal consultants familiar with stormwater detention requirements. These can be used to adjust outflow rates, adjust wet pool depths, increase detention flow duration, and provide other benefits.

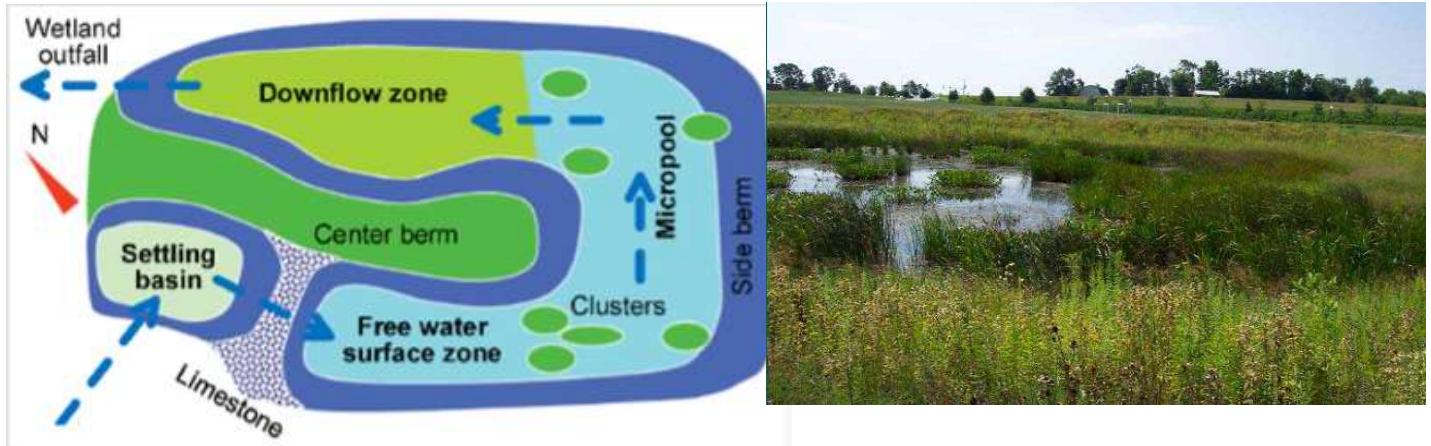


Exhibit 10 and Photo 109: Example wetland filtration basin. Note maximum flow path through wetland area to improve water quality (Source: Watershed Management 2000 Conference, Water Environment Federation).



Photo 110: Storm sewer inlets into ponds or detention basins can be modified by constructing sediment forebays (typically the larger the better). Sediment forebays can contain runoff and settle suspended solids before they are carried into the pond area.



Photo 111: Conversion of turf grasses into native plantings directly reduces nutrient loading into ponds, basins, and downstream Silver Creek.

Stream Stabilization / Stream Restoration

Several of the causes and sources of impairment for Silver Creek as determined by Illinois EPA are related to stream stabilization and the health of the riparian vegetation in the stream corridor. Stream stabilization, de-channelization, and restoration of stream-side vegetative cover are each considered to be an important recommendation to improve conditions along Silver Creek. Studies in Illinois have noted that 20% to 50% of sediment loading in stream channels can be attributed to stream erosion. Eroding streams can also be significant sources of sediment as well as sediment-bound nutrients. Eroding stream banks and downcutting channels can detrimentally affect loss of property and degradation of wetland habitat and infrastructure. Remedial actions to address channel stability concerns require a detailed understanding of the processes causing the channel instability. For example, an



Photos 112 and 113: Before (left) and after (right) example of streambank stabilization on Silver Creek in a residential setting with limited access for construction. BMPs installed by the Village of Melrose Park include re-shaped slopes, vegetation management, rock toe, rock points, boulder energy dissipators (riffles (not pictures), wetland enhancement, and other measures.

exposed stream bank may be the result of bank erosion by stream flows or may be caused by downcutting of the stream channel and subsequent slumping of the stream bank. Remedial actions need to account for the severity of the channel instability. Moderate cases of stream bank instability may be addressed through relatively simple methods, including minor grading and establishment of deep-rooted vegetation as opposed to mowed turf grass. Areas with severe erosion will typically require more involved evaluation and remedies.

In some areas such as Leyden Township, older lunker structures were installed in the 1990s. Since then, scouring has occurred above many of the structures. Therefore, remediation of past stabilization efforts is also needed since in many cases either design methods were not adequate, or stream conditions have adjusted due to watershed impacts. All of these factors should be considered for long-term, environmentally sound stream stabilization. Stream stabilization may also require rock riffle structures to prevent channel downcutting, vegetated geogrid, and/or other measures where the stream has encroached adjacent to structures.



Photos 114 and 115: Example before and after conditions illustrate the implementation of stabilization and restoration practices such as rock riffle structures, rock toe, tree rootballs, vegetated geogrid lifts along the bank, and native plantings to implement stream stabilization.



Photo 116: Riffle structures can be installed on Silver Creek to re-oxygenate the water column. This riffle structure on Silver Creek is located approximately 0.5 miles upstream of 5th Avenue. Riffles also dissipate flow energy, and provide increased habitat diversity.

Options for stream enhancement include over-excavating the inside bank to construct a two-stage floodplain channel. This can protect structures as well as increase flood storage. Wetland filtration areas can be constructed within the two-stage channel. The excavated channel can be vegetated with native plantings. Biotechnical slope stabilization may be needed. Rock riffle grade control structures upstream and downstream dissipate erosion energy and re-aerate the water column. This approach would increase runoff storage and improve filtration of pollutants.

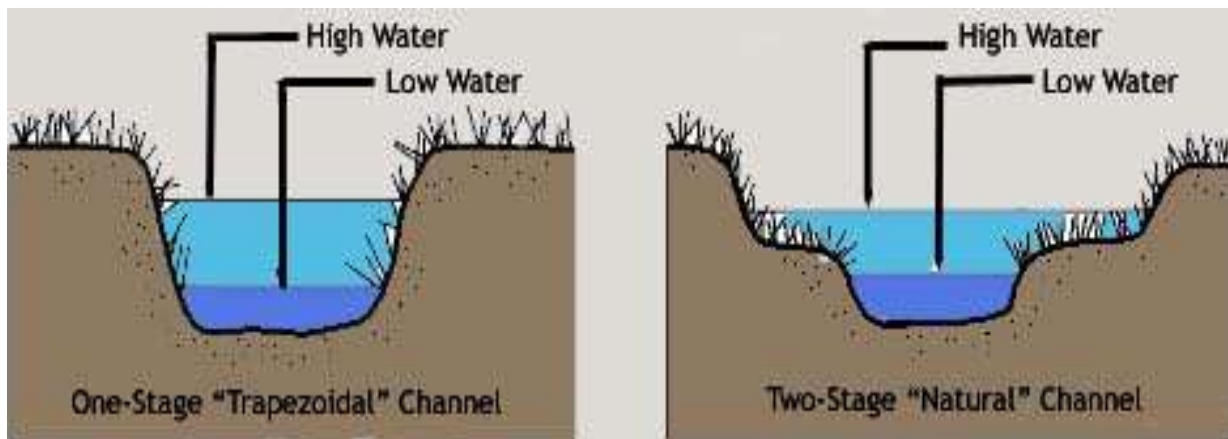


Fig. 31. Existing trapezoidal-shaped ditches on Silver Creek (left) can be converted into two-staged floodplain channels (right) for multiple benefits. Two-stage channels can alleviate erosive forces, increase flood storage, and filter pollutants (Source: Ohio State University).

In other areas, concrete banks and/or concrete revetment mats are extensive along Silver Creek. Concrete banks have multiple impacts including acceleration of flow velocities, increase erosion in adjacent bank areas, lack of pollutant filtration, lack of aquatic habitat, high water

temperatures, and safety concerns. Often, concrete materials must be fenced to keep pedestrians away from the structures. Energy dissipators may also be required due to supercritical flows achieved in concrete reaches. Therefore, it is proposed that concrete banks and/or concrete revetment mats along Silver Creek be retrofitted or replaced with environmentally sound stream improvement methods. Retrofits can include concrete coring to cut out sections of concrete to allow installations of native shrubs, trees, and herbaceous plants. Or, entire sections of concrete can be replaced with biotechnical and bioengineering erosion control, and natural grade control structures.

Stream Channel Daylighting / Storm Pipe Daylighting

Over 21% of the length of Silver Creek mainstem is located in below-ground channel. Below-ground channels have several comprehensive impacts. Lack of primary production often reduces dissolved oxygen levels. Lack of UV light exposure means that natural remediation of fecal coliform bacterial levels is lacking. All pollutants that enter the below-ground channel are transferred downstream, with little to no physical, chemical, or biological processing or transformation of pollutants. Aquatic habitat is devoid. Overall ecosystem functions are lacking in entirety. An urban BMP growing in popularity is the conversion of below-ground streams contained in box culverts or pipes into open channel, “daylighted” natural stream channels. One barrier to stream daylighting is the reality or perception of increased flood impacts associated with over-development adjacent to the channel. Therefore, daylighting projects must account for any changes in flood elevations. In many cases, if at least some adjacent riparian area can be incorporated into the restored channel, then typically the restored stream will provide improved flood reduction benefits for adjacent areas. This is due to an increased flood storage potential, and increased runoff conveyance during high flow events. Daylighting and naturalizing the channel allows for a multitude of water quality benefits to be provided including vegetative uptake of pollutants, re-instating a balance in sediment transport, chemical and physical processing of pollutants, and aquatic habitat restoration. It is in part for these reasons that channel daylighting is strongly encouraged. In the same way, tributary channels encased in large diameter storm pipes can also be daylighted where the opportunity allows.

Vegetated Swales

Vegetated swales are shallow, open conveyance channels with low-lying vegetation covering the side slopes and bottom of the swale. Swales collect and slowly convey runoff through the vegetated bottom to downstream discharge points. Swales remove stormwater pollutants by filtering flows through vegetation (usually grasses) and by allowing suspended pollutants to settle if shallow flow depths and slow velocities are present. Biochemical processes also provide treatment of dissolved constituents. Vegetated swales can also provide effective volume reduction through infiltration and evapotranspiration processes. An effective vegetated swale achieves uniform sheet flow through a densely vegetated area for a period of at least 10 minutes. The vegetation in the swale can vary depending on its location within a

development project. When appropriate, swales that are adjacent to heavy infrastructure can include turf or other more manicured landscaping. Swales that are located in less trafficked areas, within parks, or close to other open space can also be planted with native plant species for increased infiltration and reduced flow velocities.

Swales have a wide range of applications. They are used in residential, commercial, and industrial areas as well as treatment for linear projects such as roadways. In some cases, swales are used for conveying high flows since an open swale can convey more discharge than a storm pipe. Yet in contrast to pipes, vegetated swales provide treatment of the water quality and can replace curbs, gutters, and storm drain systems. Flow rates in swales can be modified by including periodic outlets along the length of the swale, underdrain perforated piping, or modifications into bioswales (described previously) with subgrade aggregate installations. Swales can be modified by including check dams where longitudinal slopes exceed six percent. Check dams enhance sediment removal by causing stormwater to pond, allowing coarse sediment to settle out.

Residential BMPs

There is extensive residential development that drains through storm sewer networks into Silver Creek. Considerations in the residential area could include green (permeable paver) streets, infiltration areas, rain gardens, rain barrels, education regarding phosphate-free fertilizer use, street sweeping, and other BMPs.



Photo 117: Residential areas can be equipped with rain barrels to reduce runoff volume.

Rain barrels or cisterns to capture rainwater from roof tops and storing it in containers for future uses, such as water for landscaping. While the rain barrel concept can be very effective with residential landowners, it could even be applied to much larger applications such as existing commercial buildings. In these cases, a large tank could be attached to the side of a building and collect all or part of the rain falling on the roof. This tank could then be attached to an underground landscape sprinkler system and used to water the property's landscaping

instead of using valuable drinking water. Many cities across the United States have successfully implemented rain garden or rain barrel programs and if implemented extensively, they can reduce runoff and associated pollutant loads in developed areas.



Photo 118: Residential areas can also contain rain gardens to filter runoff before discharging into storm sewer systems at the streetside area.

For improved lawn maintenance practices that can protect water quality, please also refer to the Sea Grant “Lawn to Lake” Program (<http://www.iisgcp.org/l2l.php>).



What is Porous Pavement?

Permeable paving materials include interlocking concrete (or clay) unit pavers, porous concrete, or porous asphalt. These systems allow rainwater to flow through the paving surface into underlying layers of gravel and soil. The water moves very slowly through the underground layers where it is cleansed, slowly evaporated, and released to deeper soil layers or storm sewers. These systems reduce stormwater runoff, reducing ponding in the neighborhood and flooding downstream and improving water quality. In comparison to a traditional system, the quantity of water that drains to the storm sewers from permeable pavement is significantly reduced and the quality is improved.

Photo 119: Green streets installed with permeable pavers can reduce runoff volumes by 50% or higher during large rainfall events. Pavers may reduce the need for road salt applications since less ponding will occur. (Source: CDF, Inc. Charles City, Iowa public brochure.)

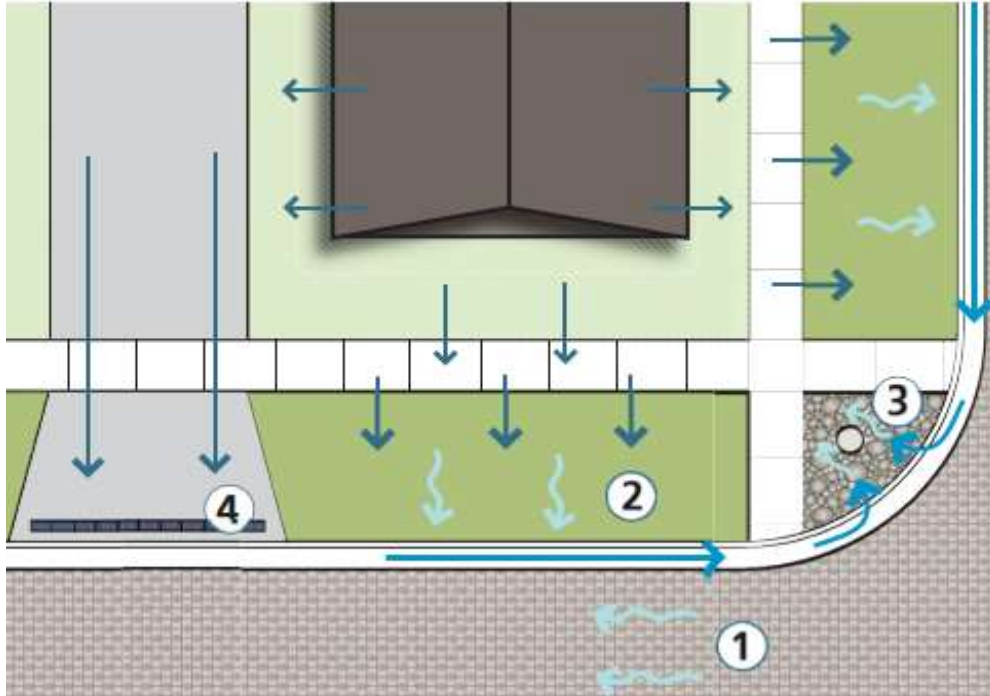


Fig. 32: Residential areas can be converted into environmentally sound stormwater management areas using (1) porous paving, (2) amended soil infiltration areas, (3) cobble infiltration areas, and (4) trench drain infiltration areas. Examples are provided below. (Source: CDF, Inc. Charles City, Iowa public brochure.)

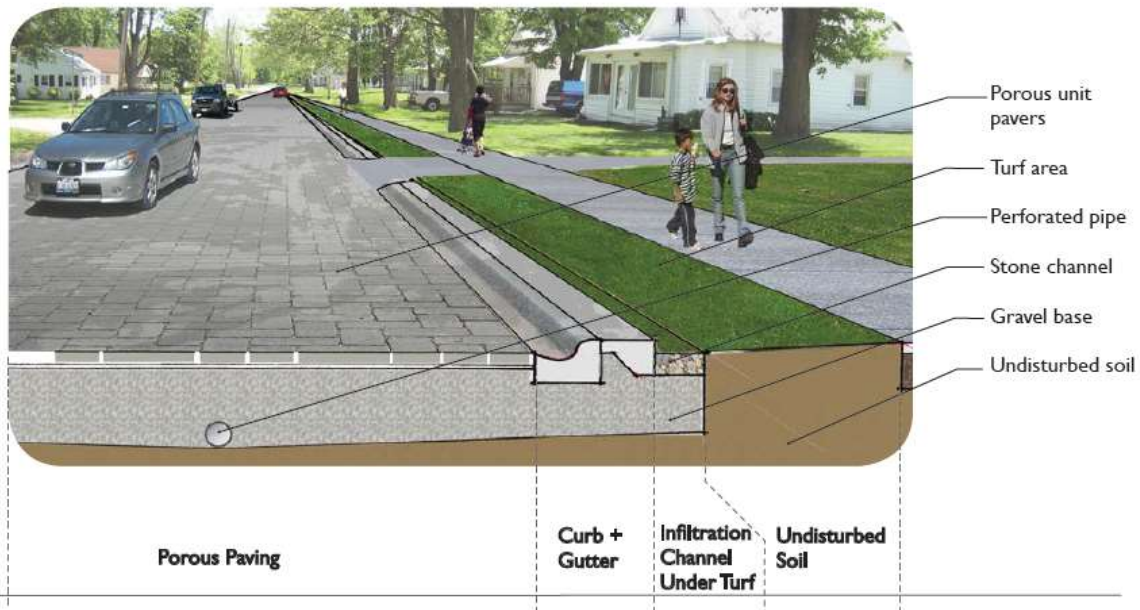


Fig. 33: Cross section of potential residential street BMPs including porous paving with aggregate base layer, stone channels with infiltration alongside curbs, and amended soils.

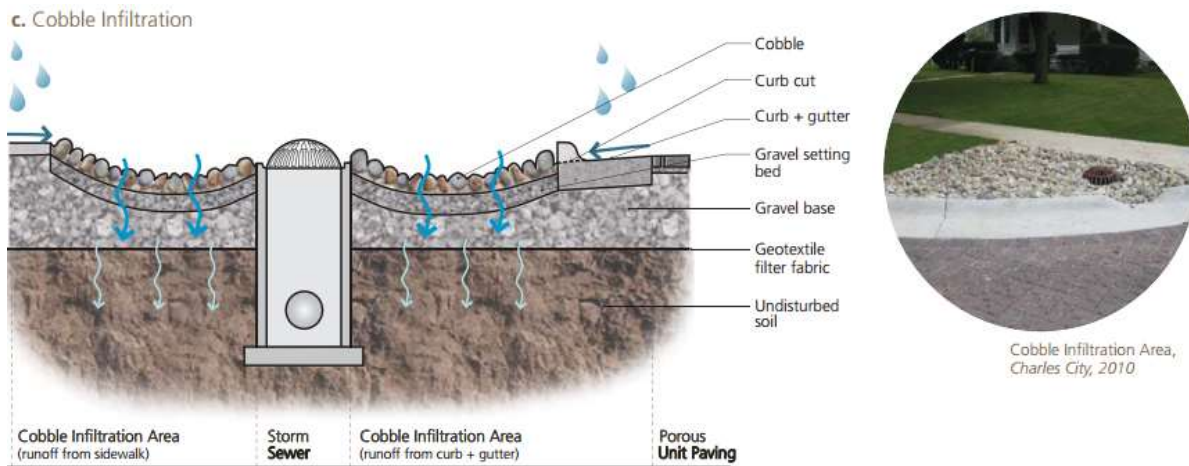


Fig. 34: Residential corners can be retrofitted with paver-lined or rock-lined infiltration areas. These depressional infiltration areas can reduce runoff volumes and improve water quality.

Chloride Control

Several studies have established correlations linking rock salt to elevated chloride concentrations in surface waters. Applications of rock salt on roads with curb-and-gutter drainage systems can efficiently convey chloride directly into Silver Creek. Chloride is a somewhat unusual pollutant in that it cannot be effectively reduced using chemical or biological means. Therefore, source reduction is critical to protect aquatic life. Since chloride is not readily filtered by watershed BMPs, control is difficult. Source reduction is typically balanced with requirements for roadway and pedestrian safety. Five of 8 communities in Silver Creek use alternative road de-icing strategies to reduce chloride loading. Wood Dale uses anti-icing over approximately 25% of the roads in the City. Their goal is to increase that to 100% coverage in the future. Wood Dale's salt application rates are set at 300 lb/mile of road (this includes ground speed control). Many of the 5 communities utilize road salt pre-wet with "Beet Heet" at the auger or spinner on snow fighting equipment. For further information see http://www.ktechcoatings.com/sites/default/files/docs/beet_heet_technical_data_sheet.pdf.

These methods can save money and substantially reduce the volume of calcium chloride utilized. Moreover, costs of traditional rock salt include not only environmental degradation but also damage to pavement, bridges, culverts, and other structures. Limitations of some liquid pre-wetting agent are they can be less effective if rain precedes snow, or if temperatures are below 15 F. However, with adoption of these techniques, and improved technology, impacts to Silver Creek may be reduced while money is saved at the same time.

Phosphate-Free Turf Fertilization

Phosphorus control should include source reductions in the watershed. Most manicured turf lawn areas include applications of fertilizers that include phosphorus. However, soil testing should occur to determine whether phosphorus is needed to maintain a lawn area (lab testing for phosphorus costs less than \$20). It is recommended to the extent practicable that phosphate-free fertilizer ordinances have been adopted. Soil testing can occur in lawn areas to determine if phosphorus is needed in the maintenance regiment. This is an extremely inexpensive method for reducing phosphorus input into Silver Creek. It is hoped that Park Districts and municipalities can lead the way for the community by demonstrating that phosphate-free lawn fertilization can be successful and can save money. Organic lawn fertilization solutions can also be utilized to reduce pollutant runoff from turf areas.

Pre-Fabricated Devices for Storm Pipe Networks

Existing storm pipe networks can be retrofitted with structural water quality devices to capture pollutants before they are discharged into the receiving water body. The same practices can be implemented in the Silver Creek Watershed. There are numerous water quality devices developed in recent years that have been specifically designed for installation within an existing storm sewer network. These are typically installed near the downstream end of the sewer network, just above the sewer outfall to the receiving stream. Larger storm sewer networks may require several structures distributed throughout the sewer network.

In addition, oil and grit separators can be used as pre-fabricated storm pipe network structures to reduce pollutant loading. Many industrial and commercial sites and parking lots are located in the watershed. In some cases, parking lots encroach up to the top of bank of the creek. In these and other areas, oil and grease separators are needed for pollutant control and removal.

Trash Controls

It was noted by Illinois EPA that trash and debris accumulations were a significant cause of aesthetic impacts. Both traditional structural measures as well as more recent non-structural measures can be employed for trash control. Typically, most trash consists of plastic bags, foam containers, bottles, and cans. Non-structural measures include the following:

- Requesting that restaurants and grocery stores stop serving prepared food in polystyrene (foam) containers
- Requesting restaurants and grocery stores serve prepared food in recyclable containers only.
- Requiring a \$0.05 cent fee on all plastic bags distributed by business as purchases.
- The Silver Creek Annual Cleanup began in 2007 under the leadership of the Silver Creek Watershed Committee with the Village of Melrose Park. The SCWC is committed to preserving the creek as a natural resource and is dedicated to maintaining its beautification, stabilization and water quality. The Annual Silver Creek Cleanup is an

important community service project that preserves the creek as a natural resource and maintains its beautification.

- Signage, such as that used by the Potomac River Watershed (below).



Exhibit 11: Trash Control Signage Campaigns can be used to reduce trash generation.

BMP Selection Criteria For Federally-Based Projects With NEPA Permit Review

It has been noted by some municipalities near O'Hare Airport that there can be restrictions of types of BMPs allowed within 5 miles of O'Hare Airport runway zones due to waterfowl or wildlife collision concerns. The 5-mile radius from O'Hare essentially includes nearly all of the Silver Creek Watershed Area, with the exception of the mouth of Silver Creek east of 1st Avenue. Agencies and organizations involved with managing wildlife strikes include but are not limited to USDA, FAA, City of Chicago, U.S. EPA, O'Hare consultants, and others. BMP projects that could become wildlife attractants within 5 miles of O'Hare could be affected. Federally funded projects such as those that include National Environmental Policy Act (NEPA) permit review would be particularly affected. An example project may include a Tollway funded project (where a federal NEPA impact statement is involved). Any practices recommended in the Silver Creek Watershed Plan that may be implemented in the future shall comply with the Memorandum of Agreement Between F.A.A., U.S. Air Force, U.S. Army, U.S. EPA, and U.S.D.A. to address Aircraft-Wildlife Strikes signed 2002-2003 as well as the U.S.D.O.T. and F.A.A.. Advisory Circular AC No. 150/5200-33 dated 5/1/97. This having been said, it has also been observed that there are many examples of existing or recently installed project areas within the 5-mile radius area that include standing water (ponds), wetlands, native plants, and other best management practices.

USDA has recently commenced compiling a "preferred airport plant list" that includes native plant species for use in the 5 mile radius area. It is possible that additional native plant species may be considered to be included in the working list. Example native plant species on the

USDA preferred plant list include Iris, Little Bluestem, Big Bluestem, Rudbeckia, selected Carex, Red Dogwood, and others. Limited examples of practices that could be subject to review could include those that increase the surface area of standing water that is not subject to a long-term drawdown condition. USDA approval of native plant species is very important to water quality improvement in the Silver Creek Watershed Plan. In our opinion, properly installed wetland basins, wet detention, use of native plants, and related BMPs will effectively improve water quality. Example projects that have been permit-approved for installation within 5 miles of O'Hare include innovative wetland detention facility at the Franklin Park Police Station. Other facilities near O'Hare such as existing MWRD basin (PL-566 site) have been observed to contain ongoing standing water. One of the wildlife species of concern that is also harmful to water quality includes Canada Geese. It is recommended that the Silver Creek Steering Committee work with O'Hare, USDA, and/or FAA officials at the Airport to develop a Canada Goose-Detering Native Plant Seed Mix for installation in managed turf areas. Goals would include conversion of turf in nearby watershed areas to native plants in order to detract use by Canada geese. Since Canada Geese can be associated with airplane strikes, it is anticipated that inclusion of more native plantings will directly reduce the Canada goose population at O'Hare Airport. It should also be noted that with possible future modification of existing wetland mitigation areas, removal of standing water may be accomplished while still providing water quality improvement BMPs for Silver Creek. Some example BMPs are described below including below-ground infiltration systems, conversion of standing water to flowing water, two-stage channel construction, and other opportunities..

Dam Modification

Fortunately for Silver Creek, installation of dams has not been observed. Dams can significantly alter the physical, chemical and biological characteristics of a stream. The effects of dams on the stream corridor often include barriers to fish passage, disruption of in-stream sediment transport processes, accumulation of sediment and associated pollutants (e.g., various metals, phosphorus, etc.) in the dam impoundments, changes in water temperature, and highly variable dissolved oxygen levels creating adverse conditions for aquatic organisms adapted to flowing conditions. Additionally, the original use of the dam may no longer be necessary; however, the current owners retain the responsible for maintenance of the structures and the associated liability. Dams can also present a safety hazard to recreational users of the stream, including paddlers. Stream channel obstructions for fish passage may also include downcut channels, underground piping which may have high velocities, or other impediments to fish passage.

Interestingly, in terms of fish passage on Silver Creek it has been reported that desirable fish species such as northern pike (*Esox lucius*) have been able to migrate up Silver Creek as far as the Village of Franklin Park. It is suspected that northern pike may travel up Silver Creek during spring spawning season from the Des Plaines River.

Where they may occur, stream obstructions or fish passage barriers can be modified using several types of procedures. Modification options include rock ramps below the dam, complete

dam removal, partial dam removal, or a combination of these options. Considerations for dam modification projects include management of the accumulated sediment behind the dam, fish passage and other habitat improvement opportunities, effects on downstream flooding, riparian corridor restoration, and improvements for recreational use. Dam removal projects should be undertaken with the assistance of state licensed professional water resources engineers and/or municipal consultants familiar with stormwater ordinances and requirements.

Canada Geese / Native Plantings

Canada geese can contribute to total phosphorus and nitrogen loading. Studies and evaluations of lake nutrient budgets, however, often indicate that waterfowl phosphorus loading is not a dominant source of TP input (USGS Water Resources Investigations Report 98-4087, 1998). Goose defecation is, however, is also an important aesthetic issue for park users and other open space areas. Moreover, during goose nesting, the birds can become aggressive toward humans in the effort of nest protection. Options for Canada Goose control include egg oil-coating programs and the installation of native plantings instead of turf grass.



Photo 119: Turf grass along shorelines and parks can serve to attract Canada geese. Geese prefer turf grass for feeding. They may also prefer turf because it gives them a sense of protection from predators. Turf grass also lacks the capacity to stabilize shoreline soils. Due to a lack of root structure and infiltration capacity, runoff from turf can contribute to nuisance weed growth within a basin.



Exhibit 12: Mowing costs can be high. Not only that, it requires a lot of chemical and watering input to be maintained. Native plants can reduce runoff, reduce maintenance costs, reduce pollutant discharge, and improve water quality. Native plants can also help to deter Canada goose populations.



Photo 120: Some large-scale industrial areas in the Silver Creek watershed could in some cases be converted to partial or full native plant coverage. Where implemented, native plantings can reduce maintenance costs, reduce runoff, increase infiltration, and provide more habitat diversity.

Regional Green Infrastructure Plans

Silver Creek is a critical environmental corridor for the watershed. The protection of critical environmental corridors and linkages can be accomplished by protecting the stream corridors, wetlands, and floodplain areas, and linking them with existing open space areas, county parks, and privately owned natural areas. These areas can collectively be referred to as the “Green Infrastructure” of the watershed. For example, if a parcel contains natural areas, stream corridors, wetlands, or woodlands, collectively referred to as “Green Infrastructure”, development should be avoided to the extent practicable in those areas. Adequate buffers around such sites should also be provided. As a trade-off, portions of the parcel that are not sensitive could be allowed to be developed at a higher density. The intent is to minimize the footprint of development, mitigate any potential impacts, and create permanently protected, properly managed open space areas. These concepts in general can also be referred to as “Conservation Design”, “Smart Growth” or “Low Impact Development.”

In 2004, the Northeastern Illinois Planning Commission (NIPC, now part of CMAP) completed a Green Infrastructure Vision for the Chicago Wilderness (CW) region. This product identified large resource protection areas and recommended protection approaches for each, including additional land preservation, ecological restoration, or development restrictions. These recommendations were based primarily on charrettes that distilled the professional judgment of natural resource experts within Chicago Wilderness. Since then, Chicago Wilderness was formed and has further refined the importance and benefits of green infrastructure for multiple benefits including water quality and aquatic habitat.



The Chicago Wilderness Vision

Our vision is to create a sustainable network of natural areas to provide critical homes for plant and animals, and vibrant open spaces for people.

Chicago Wilderness is an alliance of more than 300 diverse organizations protecting the lands and waters on which we all depend. We represent:

- A metro region spanning 38 counties, over 500 municipalities and more than 10 million people across parts of four states
- More than 545,000 acres of protected areas
- A potential network of 1.9 million acres of protected, restored or connected lands and waters
- More than \$14 million in federal conservation funds, leveraged to \$280 million over 17 years
- Over 500 conservation, sustainable development and environmental education projects funded

Chicago Wilderness

The Vision was created with support from the Illinois Department of Transportation and Chicago Metropolitan Agency for Planning, as well as the Gaylord and Dorothy Donnelley Foundation.

www.chicagowilderness.org

Exhibit 13: Green Infrastructure Vision for the Chicago Wilderness (CW) region. Silver Creek and other green infrastructure components in the watershed collectively improve water quality, recreational opportunity, provide flood control, and perform other benefits for the community.

Wastewater Reclamation and Reuse

Although wastewater discharge is not a dominant source of pollutant loading in Silver Creek, wastewater treatment plant discharge can contribute to water quality degradation. A more innovative approach to wastewater treatment includes wastewater reclamation and reuse (WRRS). In a WRRS system, the treatment time can be up to 36 days. After treatment and disinfection, the reused water can be used to irrigate turf grass, golf course, park lands, and other open space. As a result, the nutrients in the water are recycled into vegetative growth rather than discharged into the receiving stream. Irrigation occurs during the vegetative growing season and it is applied at a slow rate. In the process, discharge of pollutants to the Des Plaines River is reduced. Treated water is stored in a storage reservoir during the non-irrigation (winter) season. WRRS systems can improve water quality for streams, rivers, and other waterways. Wastewater reclamation and reuse systems (WRRS) differ from conventional WWTP in several respects.

Table 28. Comparison of Traditional Wastewater Treatment and WRRS Treatment.

Description	Traditional Wastewater Treatment	Wastewater & Reuse Treatment
Duration of Treatment	ca. 1-2 Days	36 Days
Energy Efficiency	Lower	Higher
Effluent Discharge	To Stream Channel	Land Application
Use of Treated Water for Irrigation	None. Pollutants Discharged to Stream.	Irrigation of Turf, Parks, Natural Areas, or Crops in Growing Season
Duration of Winter Storage of Treated Water	0 Days	150 Days
Sludge Generation	High	Low
Sludge Hauling Costs/ Land Application of Sludge	High	Low

(Source: Living Waters Consultants, 2012)



Photo 121: Example wastewater reuse spray irrigation system for turf grass.

Table 29: Site-Specific BMPs Recommended for Implementation Within 5 to 10 Years of Plan Adoption. Prioritization Is Based In Part On Preliminary Water Quality Improvement Benefit and/or Cost-Effectiveness. However, All Projects Are Expected to Significantly Improve Water Quality in the Silver Creek Watershed.

Item	Basin Code or Reach Code ID	BMP & Description	Quantity	Unit	Project Oversight	Implementation Cost	Annual Maintenance Cost	Sediment Reduction (tons/yr)	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)	Priority
S-1	1.G.	Detention Basin Retrofit: Wetland Enhancement, 3 Sediment Forebays At 3 Inlets / Minor Grading, Remove Concrete Baseflow Channel, Re-Grade Outlet, Native Planting Installation, Educational Signage, Install Walking Trail Spur. (1.8 Acres; 1492 LF Perimeter). Located near E. Potter Avenue and Catalpa Ave.	1.8	AC	Village of Wood Dale.	\$120,000	\$5,000	2.6	15	4	A
S-2	3.1	Streambank Bioengineering Stabilization, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation. Installation of Side Channel Rain Garden Demonstration With Signage In Park. Located Between Irving Park Road and Church Street.	1,206	LF	Village of Bensenville.	\$230,000	\$6,000	62	124	62	A
S-3	3.2	Streambank Bioengineering Stabilization, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation. Located Between Church Street and Mason Street.	2,880	LF	Village of Bensenville.	\$440,000	\$7,500	157	315	157	A
S-4	3.2.B, 3.2.C, 3.2.D	Detention Basin Retrofits: Shoreline Stabilization and Native Planting Enhancement. (1.2 Acres; 1902 LF Perimeter).	1.2	AC	Village of Bensenville.	\$110,000	\$4,000	2.5	24	6	B
S-5	4	Two-Stage Stream Channel Construction, Riffle Grade Control, Bank Re-Shaping, and Native Plant Installation Along Upstream 350 LF of Reach 4. Located Between Mason Street and Irving Park Road.	700	LF	Village of Bensenville.	\$210,000	\$2,500	42	84	42	B
S-6	4	Recommendation: Rain Garden Demonstration Project With Bioswales at Fenton High School.	850	LF	Fenton High School.	\$126,000	\$2,500	2	18	3	B
S-7	5.1, 5.2, & 6	Native Plantings: Outreach With O'Hare Officials and USDA at Airport to Expand the USDA Preferred Plant List to Deter Canada Geese in Managed Turf Areas. Goals Would Include Conversion Away From Turf Grass Which Attracts Canada Geese Into Native Prairie Which Can Deter Canada Geese.	1	LS	Silver Creek Watershed Committee. O'Hare Airport.	\$4,500	\$1,000	-	-	-	A
S-8	6	Stream Stabilization: Stream Re-Meandering, Riffle Grade Control, and USDA Preferred Native Plants in Downstream 2,955 LF of Reach 6. Located at O'Hare Airport North of Irving Park Road, at Far Downstream End of Reach 6. Alternatively, Future Modification of This Area by O'Hare With De-Watering Could Include BMPs Such as Infiltration Zones to Improve and Enhance Water Quality.	5,910	LF	Silver Creek Watershed Committee. O'Hare Airport.	\$600,000	\$8,500	50	100	50	B
S-9	7 and 7-A	MWRD Flood Storage Basin (PL566) Retrofit: Daylight Silver Creek (Within Culvert Over 963 LF) at MWRD Basin PL566. Relocate Creek Through East Basin Into a 1,600 LF Re-Meandered and Restored Channel. Route Creek Through Long Flow Path in Bottom 20 Acres of Existing MWRD Basin. Remeander Creek Channel Through Bottom of Basin. Install Native Plants Over 36 Acres of Basin. Annual Maintenance Costs Include Annual Electricity Costs to Pump Silver Creek Upgradient Into the Outlet Channel. Basin PL566 Located South of Irving Park Road, North of Railroad Yard.	1,600	LF	To Be Determined (TBD).	\$1,200,000	TBD	1,029	15,859	2,053	A

S-10	8 and 8-A	Detention Retrofit: Provide Additional 70 Acre-Foot of Water Quality Treatment for Polluted Runoff. Use Gravity Sewer System From Existing Pump-Based Railroad Yard Runoff Collection System to Re-Direct Runoff Northerly Into the 36-Acre MWRD Basin PL566. Jack and Bore 670 LF of Piping with 550 LF of Open Cut Piping for Gravity Sewer (72-in. diam.) From Railroad Northerly to MWRD Basin. Once Flow Reaches MWRD Basin, Route Flow Through Long Flow Path in Bottom 20 Acres of Existing MWRD Basin With Limited Grading. Balance Earthwork. Annual Maintenance Include Electricity Costs to Pump Flow Out of MWRD Basin Up Into Silver Creek Channel at the Basin Outlet. Basin PL566 Located South of Irving Park Road, North of Railroad Yard.	1	LS	MWRD, Municipalities, and Railroad Officials.	\$1,600,000	\$40,000	515	7,930	1,027	A
S-11	8	Install On-Line Sediment Trap at South Side of Railroad Yard Where Silver Creek Daylights (North of Franklin Avenue).	1	LS	To Be Determined (TBD).	\$100,000	\$3,000	37	0	37	A
S-12	8	Recommendation: Design and Implement A System to Increase Runoff Volume Storage, Infiltration, and Filtration Within High-Permeability Railroad Yard Ballast / Aggregate Adjacent to Tracks. (Possibly Use Subsurface Clay Core Berms, Retrofit Existing Storm Pipe System, or Other Practices.)	30+	AC	To Be Determined (TBD).	TBD	TBD	-	-	-	A
S-13	8	Ditch Stabilization: Convert Roadside Ditches at Railroad North of Franklin Avenue (south of Railroad Yard) Into Native Plantings with Over 40 Rock Check Grade Control for Silt Stabilization. Install Soil Amendments Where Appropriate. Located from I-294 on the east to northwest of Acorn Lane on the west.	10,634	LF	To Be Determined (TBD).	\$350,000	\$7,500	37	0	37	A
S-14	9	Stream Stabilization and Riffle Grade Control From Franklin Avenue to I-294 (upstream side of Reach 9). Stream Reach Length = 453 LF.	906	LF	Village of Franklin Park.	\$170,000	\$3,500	92	185	92	A
S-15	9	Streambank Stabilization With Side-Channel Wetland Runoff Storage On West Side of Silver Creek. Project Reach Located Between I-294 and Belmont Avenue.	2,862	LF	Village of Franklin Park.	\$530,000	\$12,000	165	229	165	A
S-16	9	Naturalized Runoff Storage: Convert 30-Acre Tank Farm of Magellan Industrial Property East of Silver Creek Into Large-Capacity Naturalized Runoff Storage Basin.	30.2	AC	Village of Franklin Park.	\$5,800,000	\$25,000	1,029	15,859	2,053	A
S-17	10	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert Up to 25 Homes South of Belmont Avenue West of Silver Creek Into Naturalized Wetland Runoff Storage Area.	5.0	AC	Village of Franklin Park and Leyden Township.	\$980,000	\$12,000	515	7,930	1,027	A
S-18	10	Install Sediment Trap on Silver Creek Downstream of Cullerton Street at Railroad Tracks.	1	EA	To Be Determined (TBD).	\$40,000	\$3,000	13	104	32	B
S-19	11	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert Between 5 to 10 Homes Into Riparian Runoff Storage / Side Channel Wetland Area. Project Located Between Grand Ave. & Rt. 45 West of Silver Creek. Replace Concrete Revetment Mat With Streambank Bioengineering Stabilization on Both Sides of Creek. Install Rock Riffle Grade Control Structures. Install Trash Retention Device. (Reach 2,281 LF.)	4,562	LF	Leyden Township.	\$1,300,000	\$9,000	290	581	290	A
S-20	12.2	Detention Retrofit: Convert Turf Grass Into Native Plants in over 8.7 Acre Jack B. Williams Storage Facility to Discourage Canada Geese and to Improve Water Quality. Convert 2-Acre Basin Bottom With Earthwork and Native Plantings Into Shallow Wetland Detention to Improve Water Quality.	8.7	AC	Village of Franklin Park.	\$425,000	\$9,000	211	3,343	426	B

S-21	12.2	Detention Retrofit Recommendation: Route Baseflow from Silver Creek Through Jack B. Williams Reservoir Basin Bottom With Frequent Pumpout for Water Quality and Aquatic Habitat Improvement. Excavate Bottom of Reservoir Slightly (Depth to be Determined Through Engineering Study) So That Baseflow Elevations Resulting from Flow Routing Do Not Reduce Existing Flood Storage Volume.	8.7	AC	Village of Franklin Park.	TBD	TBD	1,055	16,717	2,128	A
S-22	12.2	Naturalized Runoff Storage Recommendation: Convert 0.5 Acres of Parking Lot Area West of Riverside Street into Expanded Creek Corridor. Convert Concrete Channel Into Re-Graded Side Slopes With Native Plantings. Install Bioswale(s) In Current Parking Lot to Reduce Runoff Into Silver Creek.	882	LF	To Be Determined (TBD).	\$315,000	\$4,000	28	99	31	A
S-23	13	Stream Enhancement Recommendation: Convert Concrete Revetment Mat Side Slopes and Velocity Dissipators Channel Into Re-Graded Side Slopes With Rock Toe, Re-Shaped Slopes, and Native Plantings. Install Rock Riffle Structures as Energy Dissipators. From Scott Street to Fullerton Avenue.	5,004	LF	To Be Determined (TBD).	\$640,000	\$6,000	149	298	149	B
S-23	13	Bioswale at Gouin Park Along North and West Boundaries of Park (Northwest of Intersection of Fullerton Ave. and Scott Street, Franklin Park).	1,400	LF	Veterans Park District	\$160,000	\$5,500	6	79	11	A
S-24	9	Streambank Stabilization With Side-Channel Wetland Runoff Storage. Remove and Replace or Retrofit Lunker Structures Where Applicable (Approx. 1,750 LF). Project Reach Located Between Fullerton Avenue and Armitage Avenue. Install Native Plantings Along Silver Creek Trail. Note Severe Erosion Upstream of Palmer Avenue.	6,580	LF	Leyden Township.	\$890,000	\$9,000	271	542	271	A
S-25	9	Trash and Debris Containment System.	1	Lump Sum	Leyden Township.	\$20,000	TBD	-	-	-	B
S-26	13	Bioswale at Roy Elementary School Along Roy Avenue, Northlake.	400	LF	City of Northlake.	\$20,000	\$3,000	2	26	4	A
S-27	13	Bioswale at Kahl Park Near Dickens Avenue, Northlake.	300	LF	City of Northlake.	\$15,000	\$3,000	1	12	2	B
S-28	10	Naturalized Runoff Storage: Voluntary Residential Property Buyout & Restoration to Convert 3 Homes at Altgeld Street and Melrose Avenue Into Naturalized Runoff Storage Area.	1.0	AC	City of Northlake.	\$132,800	\$5,000	0.5	18	3	A
S-29	16	Naturalized Runoff Storage: Restoration to Convert 8-Acre Existing Industrial Site Into Riparian Runoff Storage / Side Channel Wetland Area. Install Streambank Stabilization and Rock Riffle Grade Control Structures. Project Located South of Armitage Avenue.	2,366	LF	Village of Melrose Park	\$1,600,000	\$5,000	500	8,498	2,212	A
S-30	16	Install On-Line Sediment Trap With Baffles Along Unnamed Access Road Between Two Industrial Buildings Where Silver Creek Daylights (North of North Avenue).	1	LS	TBD. Possible Private Assistance.	\$50,000	\$5,000	22	138	26	B
S-31	16	Native Plantings & Permeable Pavers: Install 1,980 LF of Streambank Native Plantings Along Silver Creek Just Upstream of North Avenue. Install 2 Acres of Permeable Pavers in Parking Lot to Filter Runoff.	2	AC	TBD. Possible Private Assistance / Village of Melrose Park.	\$1,200,000	\$3,500	56	207	57	A
S-32	18	Bioswale at Bulger Park Up to 30 Feet Wide Along West and South Boundaries of Park Southeast of Intersection of LeMoyné Street and 17th Avenue, Melrose Park). Not Included, But Recommended to Replace Northerly Asphalt Path With Permeable Pavers and Bioswale.	400	LF	Veterans Park District	\$115,000	\$7,500	3	34	5	B
S-33	18	Recommendation for Permeable Pavers at Back Alley at Winston Plaza Mall: Install 2.7 Acres of Permeable Pavers in Back Alley Between Mall and Creek to Filter Runoff.	2.7	AC	TBD. Private Landowner.	\$1,500,000	\$3,500	3	102	5	A

S-34	18 & 19	Stream Stabilization and Riffle Grade Control Along Winston Plaza From Upstream of 15th Avenue Through Elsie Drive. Remove Failing Concrete Banks. Install Native Plant Materials. Stream Reach Length = 3,328 LF.	6,656	LF	Village of Melrose Park	\$1,100,000	\$12,000	1,018	2,036	1,018	A
S-35	20 & 21	Stream Stabilization, Riffle Grade Control, and Riparian Wetland Enhancement From 5th Avenue Through the Des Plaines River. Include Riparian Restoration at Mouth of Silver Creek on Des Plaines River. Stream Reach Length = 1,860 LF.	3,720	LF	Village of Melrose Park, Village of Maywood, Forest Preserve District of Cook County. Possibly Illinois DOT.	\$975,000	\$8,500	634	1,270	634	A
S-36	21	Recommendation: Rain Garden Demonstration Project With Bioswales at Walther Christian Academy Campus.	850	LF	Walther Christian Academy	\$126,000	\$3,000	2	18	3	B
S-37	21	Recommendation: Rain Garden Demonstration Project With Bioswales at Bataan Park / Jane Adams School.	850	LF	Jane Adams School / Veterans Park District.	\$126,000	\$3,000	2	18	3	B
S-38	21	Permeable Paver or Grasscrete Walking Path(s) In Locations to be Determined.	TBD	LF	Village of Maywood	TBD	TBD	-	-	-	B

Notes:

- 1) Quantities for Streambank (LF) Include Both Banks of the Stream Channel (Not Just the Stream Centerline Length).
- 2) Most of the municipalities in the watershed do not contain Village Hall within the watershed area.

Table 30: Watershed-Wide BMPs Recommendations Recommended for Implementation Within 5 to 10 Years of Plan Adoption:

ID	BMP & Description	Quantity	Unit	Implementation Cost	Annual Maintenance Cost	Sediment Reduction (tons/yr)	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)
W-1	Chloride / Road Salt Reduction Coordination: Coordinate With Public Agencies And Private Entities to Promote Road Salt Reduction Opportunities Including Pre-Wetting Applications (Beet Heet, Etc.), Precision Application Devices, GPS Tracking, And Other Measures To Reduce Road Salt Application Volumes. Review Procedures For Road Salt Application Reduction And Storage.	235	Road Miles	\$18,000	\$5,000	-	-	-
W-2	Permeable and Porous Pavers in New Parking Lots and/or Retrofit Existing Parking Lots. (This is Also of Interest in the O'Hare Property Boundary Area.)	305	AC	\$159,575,962	\$1,595,760	148	3,761.3	260
W-3	Purchase and Preserve Existing Vacant Land. Convert from Impervious Surfaces to Runoff Storage and/or Native Plantings. Convert Streamside Sites to Side Channel Runoff Storage and/or Wetland Filtration Basins.	279	AC	\$69,750,000	\$697,500	165	3,318	251
W-4	Streambank Stabilization	56,064	LF	\$4,204,800	\$210,240	2,221	4,443	2,221
W-5	Stream Channel Daylighting With Native Plantings.	12,070	LF	\$5,431,500	\$271,575	616	1,231	616
W-6	Concrete & Concrete Revetment Stream Channel Retrofit Option: Evaluation, Design and Installation of Core Holes and Native Plantings in Existing Concrete Channels.	16,430	LF	\$1,643,000	\$82,150	279	558	279
W-7	Bioswales / Bioretention / Rain Gardens	124,080	LF	\$18,612,000	\$930,600	219	2,628	438
W-8	Phosphate-Free Fertilizers / Adoption of Ordinances With Implementation for Phosphate-Free Lawn Fertilizers. (Implementation Cost Includes Soil Test from Qualified Lab for Phosphate Content at \$20 Per Test.)	1,353	AC	\$20	\$20	0	0	1,082
W-9	Rainwater Harvesting Systems / Cisterns / Rain Barrels	400	EA	Varies	Varies	Not Estimated	Not Estimated	Not Estimated
W-10	Detention Basin Retrofits (Convert Manicured Turf Grass Into Native Plantings, Alum Applications, Sediment Forebays, Shoreline Stabilization, etc. See Narrative BMPs)	60,845	LF	\$3,042,250	\$152,113	131	1,774	201
W-11	Urban Vegetative Filtration	TBD	LF	Varies	Varies	-	-	-
W-12	Education and Outreach: Part-Time Watershed Coordinator	1	Watershed	\$25,000	TBD	-	-	-

W-13	Pet Waste Management: 100 Pet Waste Bag Dispenser Stations with Signage at Parks and Public Open Space Areas. Weekly Re-Filling.	100	Stations	\$45,000	\$52,000	-	-	-
W-14	Street Sweeping (Bi-Weekly)	470	Curb Miles	TBD	TBD	-	-	-
W-15	Biofiltration - Filterra and/or Bacterra Products	3,102	EA	\$31,020,000	TBD	-	-	-
W-16	Oil & Grease Traps on Storm Sewer Systems (Grand Ave., etc.)	50	EA	\$500,000	TBD	-	-	-
W-17	Wetland Enhancement	16	AC	\$160,000	\$24,000	4	86	8
W-18	Green Roofs	10	AC	\$6,000,000	\$420,000	4	126	8
W-19	Trash Controls With Non-Structural and Structural Controls	1	Watershed	TBD	TBD	-	-	-
W-20	Monitoring for Dissolved Oxygen, TN, TP, and Fecal Coliform Bacteria at 10 Strategic Locations in the Watershed on a Bi-Weekly Basis.	1	YR	\$130,000	TBD	-	-	-

Table 31: Partial List of Potential Funding Sources for Projects Recommended for Implementation Within 5 to 10 Years of Plan Adoption.

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Water Quality						
Capitalization Grants for Clean Water State Revolving Funds	US EPA/Office of Wastewater Management	Loan revolving fund	No limit on wastewater funds Drinking water up to 25% of available funds	Local government, Individuals Citizen groups Not-for-profit groups	Wastewater treatment Nonpoint source pollution control; Watershed management; Restoration & protection of groundwater, wetlands/riparian zones, and habitat	http://www.epa.gov/owm/cwfinance/index.htm
Non-point Source Management Program (319 grants)	Illinois EPA	Matching Grant (60% funded)	No set limit on awards	Local government Businesses Individuals Citizen & environment groups	Controlling or eliminating non-point pollution sources Stream bank restoration Pesticide and fertilizer control	http://www.epa.state.il.us/water/financial-assistance/non-point.html
Illinois Green Infrastructure Grant Program for Stormwater Management	Illinois EPA	Matching Grant Minimum Local Match CSO: 15% Retention and Infiltration: 25% Green Infrastructure Small Projects: 25%	Up to: CSO: \$3M or 85% of project costs Retention and Infiltration: \$750,000 or 75% of project costs Green Infrastructure Small Projects: \$75,000 or 75% of project costs	Any entity that has legal status to accept funds from the state of Illinois, including state and local governmental units, nonprofit organizations, citizen and environmental groups, individuals and businesses	Green infrastructure best management practices (BMPs) for stormwater management to protect or improve water quality	http://www.epa.state.il.us/water/financial-assistance/igig.html
Sustainable Agriculture Grant Program	Illinois Department of Agriculture	Matching Grant (60% funded)		Organizations, governmental units, educational institutions, non-profit groups, individuals	Practices are aimed at maintaining producers' profitability while conserving soil, protecting water resources and controlling pests through means that are not harmful to natural systems, farmers or consumers	http://www.agr.state.il.us/Environment/conserv/index.html

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Streambank Stabilization and Restoration Program	Illinois Department of Agriculture	Matching grant (amount funded not specified)		Landowners, Citizen groups, Not-for-profit groups	Naturalized streambank stabilization in rural and urban communities, work with SWCD	http://www.agr.state.il.us/Environment/conserv/index.html
Conservation Innovation Grants	Natural Resources Conservation Service	Matching grant (50% funded)	Up to \$75,000 under State Component	Landowners, Organizations	Projects targeting innovative on-the-ground conservation, including pilot projects and field demonstrations	http://www.il.nrcs.usda.gov/programs/cig/
Water Quality Improvement	DuPage County	Matching Grant	25% of Construction	Landowners Organizations BMPs	Stream stabilization, permeable pavers BMPs.	https://www.dupageco.org/EDP/Stormwater_Management/Water_Quality/1312/
Partners for Fish and Wildlife Habitat Restoration Program	Department of Interior, US Fish and Wildlife Service	Cost-share (50% funded)	up to \$25,000	Private landowners	Voluntary restoration or improvements of native habitats for fish and wildlife Restoration of former wetlands, native prairie stream and riparian areas and other habitats.	http://www.fws.gov/policy/640fw1.html
Bring back the Natives Grant Program	National Fish and Wildlife Foundation	Matching Grant (33% funded)	Varies with project (\$50,000-\$75,000)	Not-for-profit groups, Universities Local governments	Restoration of damaged or degraded riverine habitats and native aquatic species through watershed restoration and improved land management.	http://www.nfwf.org/AM/Template.cfm?Section=charter_programs_list&CONTENTID=18473&TEMPLATE=/CM/ContentDisplay.cfm
Wildlife Habitat Incentives Program	US Department of Agriculture	Grant, Matching Grant (at least 75% funded)		Private landowners, Not-for-profit groups	Establishment and improvement of fish and wildlife habitat on private land	http://www.nrcs.usda.gov/programs/whip/
Native Plant Conservation Initiative	National Fish and Wildlife Foundation	Matching Grant (50% funded)	\$10,000-\$50,000	Community and watershed groups Nonprofit groups Educ. institutions Conservation districts Local governments	"On-the-Ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities.	http://www.nfwf.org/programs/npci.htm
Wetlands						
Wetlands Reserve Program	USDA NRCS	Direct contracts with landowners Easement (100%)	No set limit on awards	Individual Citizen groups, Not-for-profit groups	Wetlands restoration or protection through easement and restoration agreement	http://www.nrcs.usda.gov/programs/wrp/states/il.html

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Wetlands Program Development Grants	US EPA	Cost Share and 30 year easements (75%) Matching Grant (75% funded)	No set limit on awards	Not-for-profit groups Local government	Developing a comprehensive monitoring and assessment program; Improving the effectiveness of compensatory mitigation; Refining the protection of vulnerable wetlands and aquatic resources	http://www.epa.gov/owow/wetlands/grantguidelines
Northeastern Illinois Wetlands Conservation Account	US Fish and Wildlife Service/The Conservation Fund	Grant/Matching Grant (50% match strongly suggested)	Average of ~\$38,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Restoration of former wetlands; Enhancement and preservation of existing wetlands; Creation of new wetlands Wetlands education and stewardship	http://www.conservationfund.org/node/133
Small Grants Program	North American Wetlands Conservation Council	Matching Grant	Up to \$75,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Long-term acquisition, restoration, enhancement of natural wetlands	http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtml
Wetland Restoration Fund	Openlands	Grant	\$5,000-\$100,000	Local government Not-for-profit groups Citizen groups Other organizations	Wetlands and other aquatic ecosystem restorations within the six-county Chicago region on land under conservation easement or owned by a government agency	
Five Star Restoration Program	National Fish and Wildlife Foundation	Matching Grant (50% funded)	One-year projects: \$10,000-\$25,000 Two-year projects: \$10,000 -\$40,000	Any public or private entity that can receive grants	Seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships for wetland and riparian habitat restoration	http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=60&ContentID=17901

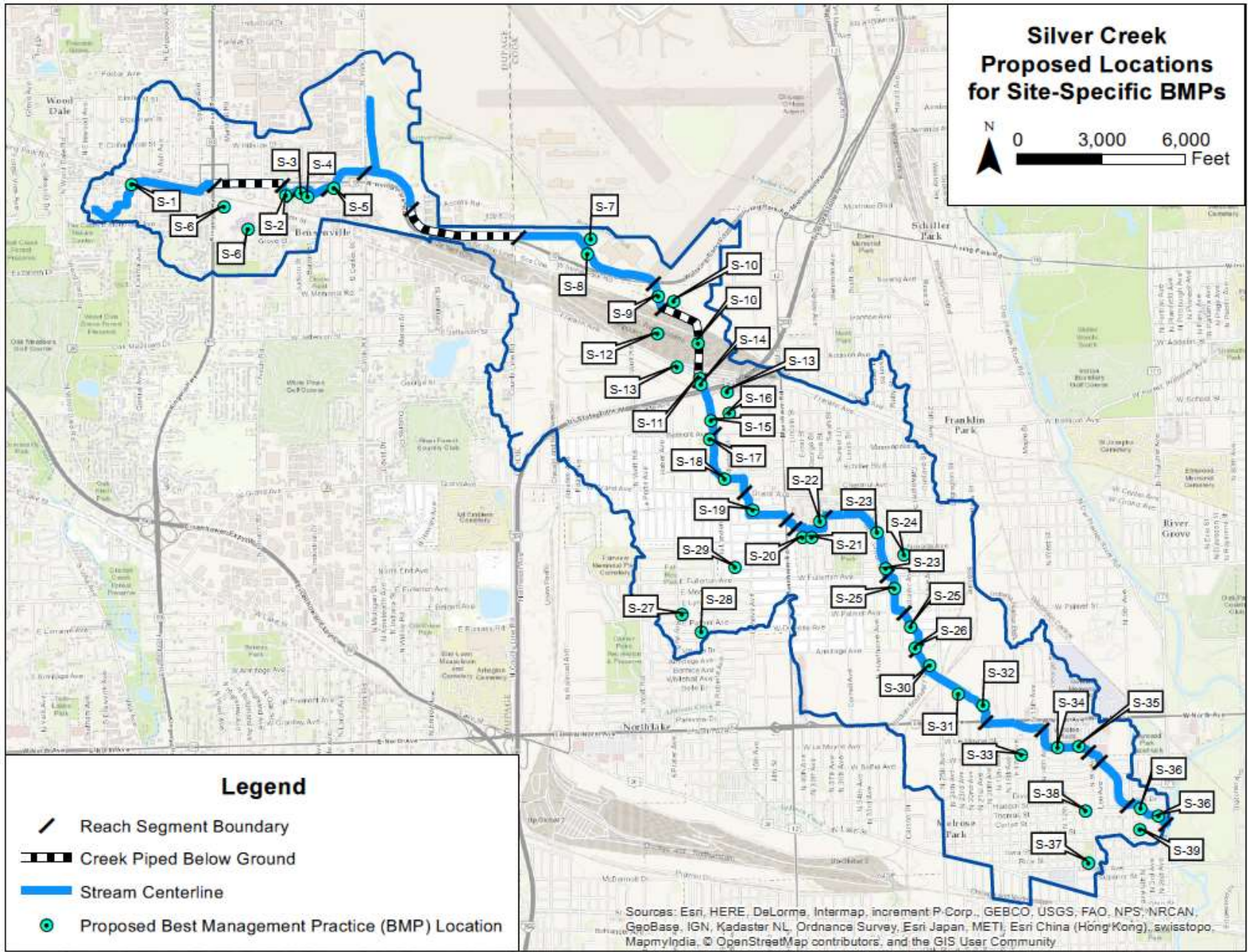


Fig. 35: Site-Specific BMP Location Map.

Education and Outreach

Education and outreach is a critical component of plan implementation. The following is proposed to ensure that watershed-based water quality education continues to be pursued.

- The SCWC will continue to meet on typically a quarterly basis to discuss watershed plan findings, seek input and feedback on watershed issues, site-related opportunities for management measures, and review of progress towards implementing certain management measures and education programs.
- A website has been established at [www. Silvercreekwatershed.org](http://www.Silvercreekwatershed.org) to post the watershed plan and findings. A well-designed, interactive, user-friendly website will be an important asset to the SCWC as it continues to progress through watershed implementation and communication with stakeholders.
- The Silver Creek Annual Cleanup began in 2007 under the leadership of the Silver Creek Watershed Committee with the Village of Melrose Park. The SCWC is committed to preserving the creek as a natural resource and is dedicated to maintaining its beautification, stabilization and water quality. The committee is scheduled to meet quarterly. The annual cleanup is planned and discussed by committee members at the April meeting and typically conducted in early May. The Annual Silver Creek Cleanup is an important community service project that preserves the creek as a natural resource and maintains its beautification.



Photo: The Silver Creek Annual Cleanup is a community event in the Village of Melrose Park that has over 40 volunteers attend. Students, residents, and agency personnel all collaborate to reduce trash and debris accumulations.

- It is hoped that the Silver Creek Annual Cleanup activity can be expanded to our adjacent municipalities, especially those that have open channel sections of Silver Creek.
- The SCWC, Village of Melrose Park and Concordia University have been working together since July 2013 (projected through at least 2017) on a collaborative environmental effort that has benefitted all parties involved. In the interest of improving Silver Creek and keeping it clean, Melrose Park and Concordia University have developed a plan to

work together toward a common goal. Professors and students from Concordia University have been monitoring the creek by taking water samples at routine intervals and analyzing them for levels of contaminants typically found in urban streams. With Melrose Park providing the supplies and lab materials, Concordia University has made this a learning experience for its students. Professors at Concordia have plans to structure an environmental science class around the sampling program. The collaborative effort has been mutually beneficial for the watershed community, the university, and for Silver Creek monitoring. Future collaborative efforts may include outreach with elementary, middle, or high school students, Boy Scouts, or Girl Scouts to assist with conducting monitoring and evaluating water quality monitoring results on Silver Creek.

- Several municipalities include stormwater postings that include components to protect and improve water quality in the watershed. These listings include:
 - o http://www.villageoffranklinpark.com/departments/engineering/stormwater_quality/
 - o <http://www.bensenville.il.us/index.aspx?NID=671>
- The Forest Preserve Districts of Cook and DuPage Counties conduct habitat restoration activities in several of their holdings within the watershed. In many cases, volunteers are used to conduct physical labor, such as woody vegetation removal with hand tools in prairie restoration. Typically the Districts will own tools, while volunteers are managed by a volunteer site steward or by District staff. Given the existing volunteer programs, the SCWC could help most by generating more interest in volunteering, including that by students, church groups, and other organizations.
- MWRD has a Watershed Management Ordinance developed July, 2014. The new WMO contains provisions for BMPs such as bioswales, permeable pavers, and other practices for site development requirements.
- MWRD has recently commenced a “Green Infrastructure” design-implementation program. BMP demonstration projects have been installed in several locations since approximately 2014. MWRD guest speaker, John Watson, presented at our SCWC BMP Workshop in February, 17, 2016. Demonstration projects have included porous pavement, permeable pavers, bioswales, athletic field infiltration areas, and other BMPs. Planning for a rainwater harvesting project has occurred. At present, there are no MWRD demonstration projects in the Silver Creek watershed. It is hoped that a demonstration project can be planned in the near future.
- DuPage County Stormwater Management Department contains educational materials for wetland protection, streambank stabilization, and the promotion of BMPs. DuPage County also has a Water Quality Improvement Program which provides grant funding for up to 25% of construction costs for relevant BMPs.
- Park Districts in the watershed have volunteer programs with which connections need to be established and to the extent practicable, expanded.
- It is hoped that stream monitoring programs such as Riverwatch which has already conducted some work on Silver Creek, and the StreamLeaders Program through Openlands can be utilized to generate more volunteer leadership.



Photo: The Silver Creek Watershed Bus tour included elected officials, technical personal, wetland scientists, and other agency personnel.

- The SCWC needs to engage in more outreach to planning level and technical staff from local governments. Preparation of the Watershed Plan has opened many doors in this regard. But implementation of BMPs is also being sought. Municipalities, county departments, the FPDCC, and park districts can each be further engaged. Relevant COGs include the Southwest Conference of Mayors, the Cook County Governmental League, and the South Suburban Mayors and Managers Association.
- Another significant way to promote long-term improvement of Silver Creek will be to engage the energy and enthusiasm of students to care and protect it. There are several major schools in the watershed (Fenton High School, Jane Adams School, Roy Elementary School, Walther Christian Academy), and some include community service. Other schools such as Concordia University are not located in the watershed, but are established participants in stream monitoring and in the annual Stream Cleanup. It is possible that specific activities or studies could be established for students to participate in to improve Silver Creek. Other related activities to engage youth that may not otherwise participate in environmental activities could include hosting basketball tournaments and other sporting events as fundraisers or to raise awareness for Silver Creek.
- The Boy Scouts of America have at least two relevant merit badges – Soil and Water Conservation and Environmental Science, the requirements of which could be partially fulfilled through projects already available within the SCWC. The Soil and Water Conservation badge in particular can involve practical environmental improvement project
- Girl Scouts may have programs such as “Eco-Action” which could call for local volunteer work. Girl Scouts can also earn a “Get With the Land” patch through collaborative projects with state or federal resource agencies.
- Coordinate with Izaak Walton League local Chapter on the Des Plaines River watershed for educational partnerships. www.facebook.com/Izaak-Walton-League-Des-Plaines-Chapter-152836154758015/
- Each year, most municipalities organize community festivals. Typically, these festivals include booths. It is recommended that promotional materials and signage be prepared for a “Silver Creek Water Quality Improvement” booth. This could be an important

mechanism to outreach to the local community about ongoing efforts to improve the creek, and how stakeholders can actively participate.

- Support schoolyard rain gardens, bioswales, or other BMPs. Involve students, clubs and organizations in watershed service projects.
- Consideration should be given to establishing multiple canoe launches on Silver Creek. Stream reaches through Leyden Township, Maywood, and Melrose Park could be included. Water Trail development could also be considered. It is hoped that this would encourage local residents to participate in improved appreciation for Silver Creek.

Part-Time Watershed Coordinator

To successfully implement a large scale watershed plan, a significant amount of time and effort would be spent on working with watershed stakeholders. The Watershed Coordinator would facilitate with building momentum, conducting outreach, coordinating workshops, assisting with project design and/or review, preparing and submitting grant applications, and permits. It is possible that the Watershed Coordinator may also facilitate direct implementation of BMP projects.

Very often, watershed planning efforts make assumptions that the actual coordination and implementation of the watershed plan will be undertaken by existing government units, agencies, not-for-profit groups, or committed volunteers. The reality is that due to budget, staffing, and workload constraints, most government, agency, and not-for-profit employees are often pressed to complete their normal work duties. Expecting this level of effort from volunteers, who are often exhausted from their efforts in helping prepare the watershed plan, is not likely.

The Silver Creek watershed, 10.6 square miles overall, contains several detailed BMP recommendations. In order to implement recommended projects over the long-term, it will be important to strive to implement multiple projects during every Section 319 grant cycle. In part for these reasons, it is recommended that funding be secured to allow a part-time watershed coordinator position to be established. The duties of a watershed coordinator would include:

- Conducting initial outreach with government agencies, business, and others who may be able to participate in BMP implementation.
- Coordinating with project partners to ensure coordination between local cost-share match revenue timing and grant submittal / contract approval.
- Preparing Grant Applications for implementation projects.
- Possible engineering and/or environmental design assistance and/or design review for recommended BMPs.
- Possible coordination with regulatory agencies to facilitate permitting.
- Overseeing implementation of BMP projects.
- Managing grant reports, final reports, and progress reports.
- Collecting water quality / biological data as part of expanded monitoring program.

It is suggested that a part-time paid staff person, a Watershed Coordinator position, would be made available through funding sources such as stormwater utility fees, municipal or agency membership contributions to watershed implementation, or other opportunities. If implemented, this would be helpful to facilitate implementation of the Silver Creek Watershed-Based Plan. Several other successful watershed groups have hired at least a part-time coordinator. Future grant opportunities could also be considered to help to support a part-time watershed coordinator. Activities would include grant writing for BMP implementation, hosting meetings, and performing BMP outreach as described in the watershed plan.

Plan Implementation and Schedule

This section is intended to provide an implementation schedule and measurable milestones for the plan recommendations. The overall implementation timeframe for many of the recommendations in this plan is five (5) to ten (10) years, with the expectation that the watershed plan would be revisited in 2021, and again in 2026. Updates in 2021 could pertain to revision in design-based recommendations to improve water quality.

Table 32: Silver Creek Watershed Plan Implementation Schedule (2016 – 2026).

Planning & Implementation Action Item	2016	17	18	19	20	21	22	23	24	25	2026
Completion of Silver Creek Watershed-Based Plan	X										
Watershed Meetings & Stakeholder Coordination	X	X	X	X	X	X	X	X	X	X	X
ID of Funding Sources for Implementation	X	X	X	X			X				
Implementation of Recommended BMPs		X	X	X	X	X	X	X	X	X	
Education and Outreach	X	X	X	X	X	X	X	X	X	X	X
Monitoring and Milestone Evaluations (See Below)	X	X	X	X	X	X	X	X	X	X	X
Review and Revise Watershed-Based Plan						X					X

The recommendations included in this plan are multi-faceted. In some cases, policy implementation is called for. In other cases, engineering design is required. In all cases, multiple partnerships are needed for implementation. Inter-governmental collaboration is essential for several recommendations. Completion of these recommendations along with educational efforts within the suggested timeframe would be aided by continued collaboration between the watershed communities with assistance from the Silver Creek Watershed Committee (or successor organization). In turn, these measures will be greatly assisted by hiring a part-time watershed coordinator. Some of the watershed-wide recommendations including full streambank stabilization, detention retrofits, stream channel daylighting, and other measures is expected to be an on-going effort.

Monitoring and Measureable Milestones

The primary means for measuring the success of plan implementation is expected to be the implementation of the site-specific and watershed-wide recommendations provided in the Plan. Implementation of these measures would be accompanied by updated water quality calculations (such as STEPL) to ensure that pollutant load reduction targets are being met. Total watershed pollutant load reductions represent an independent, measurable method for evaluating plan implementation. In addition, the following is recommended.

Additional monitoring within Silver Creek is recommended to assess in-stream conditions more accurately. Concordia University (CU) is monitoring multiple parameters but only within the Melrose Park portion of the watershed. In addition, certain parameters such as phosphorus, nitrogen, and BOD should be measured using professional laboratory services for higher

accuracy and precision. Chloride levels and fecal coliform which are not currently tested by CU, should also be lab-tested for accurate results. Together, the additional lab-tested data will help to establish a more reliable benchmark to gauge baseline site conditions for future improvements. Currently, CU tests these parameters on a monthly basis. It is suggested that monthly testing continue but with the lab testing for the following to supplement the CU results:

- TP
- TN (including ammonia-N)
- BOD
- Chloride (added)
- fecal coliform (added)

It is also recommended that at least four (4) additional monitoring sites be established in the watershed in the following locations:

- Bensenville west of York Road
- Cook County, downstream of the MWRD reservoir PL566.
- Franklin Park at Fullerton Avenue
- Leyden Township at Armitage Drive

Recommended parameters to be tested at these four (4) additional locations once (1) per month over a time period of two (2) years include:

- TP
- TN
- Ammonia-N
- BOD
- Chloride
- fecal coliform
- Temperature
- pH
- Conductivity
- Turbidity
- DO
- COD
- TSS

In addition, the following biological and ecological monitoring is recommended:

- Fish Index of Biotic Integrity Once (1) Per Year at Each of Two (2) Sites (continue monitoring at IEPA site near 15th Avenue, but add 1 site near Elsie Drive or near 5th Avenue).
- Macroinvertebrate IBI Once (1) Per Year at Each of Two (2) Sites (IEPA site near 15th Avenue, but add 1 site near Elsie Drive or near 5th Avenue).
- Qualitative Habitat Evaluation Index (QHEI) Once (1) Per Year at Each of Two (2) Sites (at IEPA site near 15th Avenue, but add 1 site near Elsie Drive or near 5th Avenue).

Biological and ecological monitoring is recommended at two (2) sites over a two (2) year time period. The samples shall be collected once (1) per year.

The USGS maintains a stream gauge near 9th Avenue. Coordination should occur with USGS to enable stream stage gauge monitoring to occur on at least a monthly basis.

Together, these data will improve 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. Included in this monitoring plan recommendation is the recommendation that the data be collected in accordance with an IEPA-approved Quality Assurance Project Plan (QAPP).

Table 33: Silver Creek Watershed Monitoring and Measurable Milestone Schedule (2016-2026).

Monitoring and Measurable Milestone Schedule Item	2016	17	18	19	20	21	22	23	24	25	2026
Track and Record Implementation of Recommended BMPs, Other BMPs, and Pollutant Load Reductions	X	X	X	X	X	X	X	X	X	X	X
Concordia University / Village of Melrose Park Water Quality Monitoring	X	X	X	X	X	X	X	X	X	X	X
Water Quality Monitoring at Four (4) Additional Watershed Locations		X	X	X	X	X	X	X	X	X	X
Fish IBI Monitoring at Two (2) Sites		X	X			X	X			X	X
Aquatic Macroinvertebrate MIBI Monitoring at Two (2) Sites		X	X			X	X			X	X
Qualitative Habitat Evaluation Index (QHEI) at Two (2) Sites		X	X			X	X			X	X
USGS Stream Gauge Monitoring	X	X	X	X	X	X	X	X	X	X	X