Executive Summary
Poplar Creek Watershed-based Plan

A Water Quality-Focused Supplement to MWRD's Detailed Watershed Plan

The Watershed-Based Plan (WBP) for the Poplar Creek Planning Area is a comprehensive overview of the water quality conditions in the watershed and measures that need to be implemented to restore and protect water quality. The United States Environmental Protection Agency and the Illinois Environmental Protection Agency have identified nine key elements that need to be addressed in watershed plans to achieve improvements in water quality. The WBP addresses the nine elements.

The WBP is a supplement to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) Detailed Watershed Plan (DWP) for the Poplar Creek planning area. The DWP focuses on flooding concerns in the watershed. The complementary WBP focuses on water quality.

This WBP was prepared using United States Environmental Protection Agency funds appropriated under Section 319(h) of the Clean Water Act and distributed through the Illinois Environmental Protection Agency. The findings and recommendations summarized in the WBP and this Executive Summary are not necessarily those of the funding agencies.

About the Watershed

Poplar Creek originates from several wetlands at the Crabtree Forest Preserve located in South Barrington and flows south and then west towards the Fox River. Runoff from an approximately 44 square mile land area drains to the Creek, which generally flows from north to south before flowing from east to west toward the Fox River. There are six tributaries to the mainstem of Poplar Creek. The watercourses north of the mainstem Poplar Creek generally flow south and the watercourses south and east of the mainstem Poplar Creek flow west.

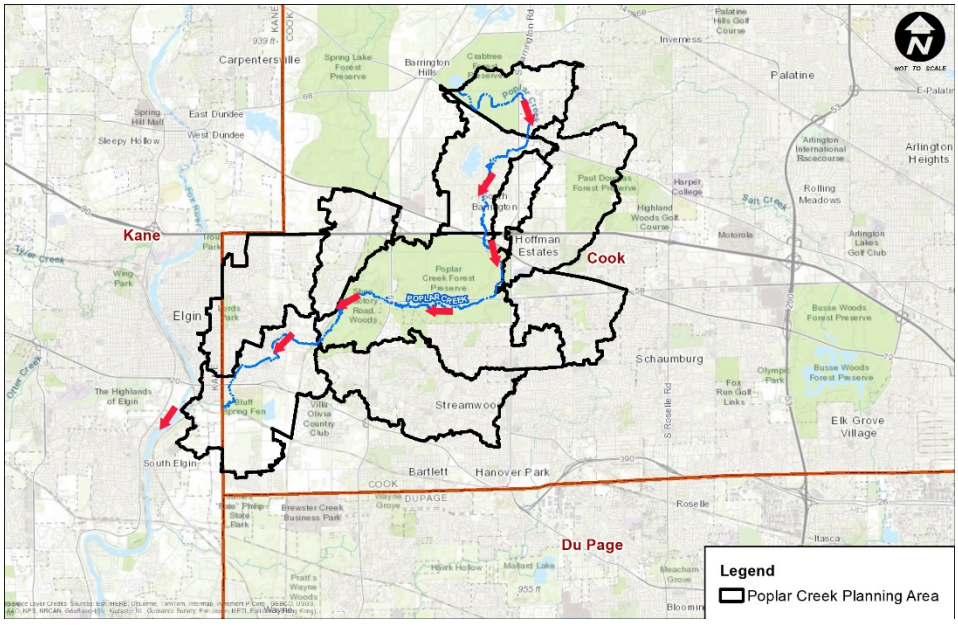

Figure 1 – Poplar Creek WBP Planning Area

The planning area is approximately 71% developed excluding the forest preserves. As would be expected in an urban/suburban watershed, much of the land area is covered with impervious surfaces. Much of the development in the watershed occurred prior to 1970's and stormwater control measures such as detention or volume control were not systematically integrated into the developed areas. The result today is high volumes of stormwater runoff and pollutant loadings to the water bodies.

Watershed Goals

The goal for implementation actions in the Poplar Creek watershed is to improve water quality so that designated uses can be supported. The uses to be attained include recreational uses for people and habitat for aquatic species.

To improve water quality in the Creek and tributaries, pollutant loadings to the watershed need to be reduced. Analyses of the sources of water pollution and pollutant loadings revealed that stormwater runoff is the most significant source of pollutant loadings in the watershed. The plan identifies a target level of Best Management Practices (BMP) implementation which will result in the following load reductions:

Nitrogen Reduction	Phosphorus Reduction	BOD Reduction	Sediment Reduction
(lbs/yr)	(lbs/yr)	(lbs/yr)	(tons/yr)
5%	7%	5%	15%

These loading reductions will noticeably contribute to water quality improvement.

Stormwater BMP Implementation

Reflecting the identified sources of pollutant loadings, the plan recommends types of BMPs to better manage urban runoff and stormwater. Many of the recommended BMPs will have the function of intercepting and treating runoff, including green infrastructure practices. Green infrastructure practices including rain gardens, bioswales, permeable pavements and green roofs, capture and treat runoff, resulting in reduced stormwater volumes and reduced pollutant loads. The plan also notes the importance of non-structural controls, including but not limited to measures that communities will carry out in conformance with MS4 permit provisions.

Figure 2 - Rain Garden

An aggressive level of BMP implementation will be needed to achieve substantial pollutant load reductions. The Plan proposes a target degree of BMP implementation. Specifically the Plan recommends that 20% of the land areas with the different land uses/land covers in the watershed will have BMPs applied to reduce runoff volumes and pollutant loads. This is the maximum degree of implementation expected to be practicable, given public vs. private land ownership, budgets, community-buy-in, and other factors.

The plan identifies *types* of BMPs that would address the sources of loadings, but does not list or *prescribe* specific BMPs in specific places. The sizes and designs of BMPs and the optimal places for BMPs will need to be determined by communities and other stakeholders taking into account where benefits will be the greatest but also numerous factors including land ownership, budgets, community buy-in, and how maintenance will be assured. Also, new concepts or designs for BMPs may be developed during the plan implementation period. The plan intends there be flexibility to incorporate new BMP concepts if they cost-effectively reduce pollutant loadings from urban runoff and stormwater discharges.

Key Pollutants – Sediment

Sediment is one of the most common pollutants in U.S. rivers, streams, and lakes. Sediment in stream beds disrupts the natural food chain by destroying the habitat where the smallest stream organisms live and causing declines in fish populations. Sediment also acts as a vehicle for other stormwater pollutants, providing a mechanism to transport nutrients, hydrocarbons, metals and pesticides. Water quality monitoring in the Poplar Creek watershed has shown relatively higher sediment loadings in developed areas. The stormwater BMPs recommended in the plan typically do a very good job of reducing releases of sediment/total suspended solids.

Key Pollutants – Biological Oxygen Demand (BOD)

Dissolved oxygen (DO) in waterbodies is essential for aquatic life. The amount of DO in waterbodies is dependent on water temperature, the amount of oxygen taken out of the system by respiring and decaying organisms, and the amount of oxygen put back into the system by photosynthesizing plants, stream flow, and aeration. The temperature of a waterbody affects the amount of dissolved oxygen present because less oxygen dissolves in warm water than cold water.

DO concentrations can also be a surrogate for overall water quality as a low concentration of DO suggest the presence of oxygen demanding pollutants. These pollutants may include nutrients, metals, hydro-carbons, synthetic organic and inorganic compounds.

Figure 3 - Stormwater as a Source of Pollutant Loadings

BOD is a pollutant measurement that indicates the degree to which the pollution will deplete DO in the receiving water. Stormwater is a contributor of BOD, and stormwater BMPs can help reduce BOD loadings.

Key Pollutants – Nutrients (Nitrogen and Phosphorous)

Nutrient pollution is one of America's most widespread, costly and challenging environmental problems. Nutrient pollution is the process where too many nutrients are introduced into receiving streams and act like fertilizer in the water, leading to growth of algae. Algae creates nuisance conditions limiting recreational uses, and certain types of algae emit toxins creating serious health risks.

With respect to water quality and aquatic habitat, excessive amounts of nutrients can lead to low levels of dissolved oxygen. Severe algae growth blocks light in the water column that is needed for plants to

grow. In addition, when algae die and decay, this process uses oxygen in the water leading to low levels of dissolved oxygen.

Key sources of nutrient pollution can include runoff of fertilizers, stormwater runoff, and car and power plant emissions. Stormwater BMPs can help reduce nutrient loadings to the watershed; some BMPs can be especially designed to provide effective nutrient removal.

Geographic Area Priorities

Figure 4 below shows the watershed planning unit areas examined in the WBP, well as land use in the watershed. Of note are areas with residential, commercial, and transportation-related land uses. In general pollutant loadings are relatively higher in these areas vs. other areas in the watershed. The areas in green in Figure 4 are open space areas, largely Forest Preserves of Cook County lands. As would be expected, pollutant loadings in these areas are relatively lower.

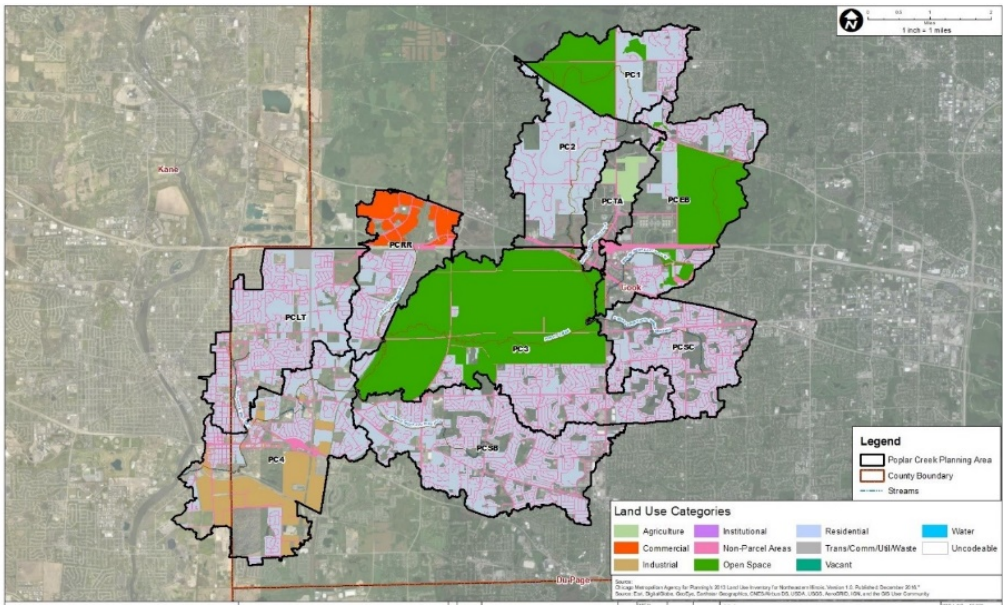

Figure 4 - Watershed Planning Units and Land Use in the Poplar Creek Watershed

The WBP models and quantifies the loadings being released in the 10 watershed planning units. Table 1 and Figure 5 below provide more specific information about pollutant loadings in the watershed planning unit areas. Cells highlighted in red in the Table show where the loadings are relatively the highest. Similarly, the areas show in red in Figure 5 are the geographic areas where loadings are relatively the highest.

SUB	N Load (lb/ac)		P Load (lb/ac)		BOD Load (lb/ac)		Sed Load (tons/ac)		Chloride Load (t/ac)		Channel	Riparian	Erosion	RIP Score	Priority Score
PCRR	10.8	4	2.4	4	34.6	4	2.21	4	0.18	3	MOD	POOR	HIGH	3	22
PCTA	8.3	4	1.5	4	27.5	4	0.51	4	0.18	3	HIGH	FAIR	MOD	2	21
PC4	6.9	4	1.3	4	23.9	3	0.44	3	0.16	1	MOD	POOR	MOD	3	18
PCLT	6.8	3	1.2	3	24.6	4	0.28	2	0.28	4	HIGH	FAIR	HIGH	2	18
PCSB	6.2	2	1.0	2	23.0	3	0.17	1	0.26	4	HIGH	FAIR	LOW	2	14
PCSC	6.2	3	1.0	2	22.9	2	0.20	1	0.32	4	HIGH	FAIR	LOW	2	14
PC2	5.9	2	1.2	3	21.4	2	0.49	4	0.18	2	HIGH	GOOD	MOD	1	14
PCEB	5.5	1	0.9	1	19.5	1	0.24	2	0.18	2	HIGH	FAIR	MOD	2	9
PC3	3.0	1	0.7	1	10.0	1	0.34	3	0.14	1	LOW	GOOD	MOD	1	8
PC1	3.3	1	0.6	1	11.8	1	0.16	1	0.13	1	HIGH	GOOD	LOW	1	6

Table 1 - Poplar Creek Planning Area
Pollutant Loads by Watershed Planning Unit

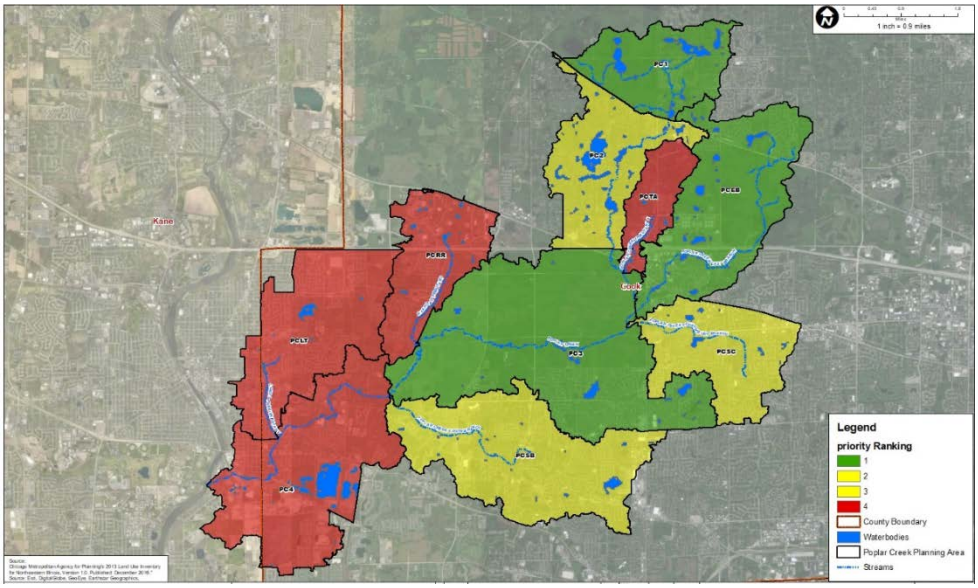

Figure 5 - Poplar Creek Watershed Priority Area Ranking by Watershed Planning Unit

Quantifying Effects

The WBP Plan identifies BMP scenarios or templates that are suitable for the various land uses in the watershed. For example the plan recommends bioretention practices and detention basin retrofits in areas with residential land use. The plan sets out a target level of BMP implementation or saturation. An aggressive level of BMP implementation will be needed to achieve substantial pollutant load reductions. Specifically, the Plan recommends that 20% of the land areas with the different land uses/land covers in the watershed will have BMPs applied.

The plan estimates the expanses of BMPs that would need to be implemented in each watershed planning unit, reflecting the land uses, and the load reductions that will be achieved in each area. The total load reductions that will be achieved are those shown on page 1 of this Executive Summary.

Schedule and Implementation Tracking

The plan establishes a 25-year implementation period, and identifies milestones that can be used to gauge progress. Evaluating plan implementation and measuring progress will involve tracking the implementation of BMPs and the estimated the loading reductions being achieved.

Water quality monitoring will be needed to assess the water quality changes that occur during the plan implementation period. MWRD has conducted monitoring in the watershed, and Illinois EPA and Illinois DNR have conducted monitoring when resources allowed. The data produced was critical for the development of the watershed plan. Monitoring efforts will be important for characterizing water quality conditions over time in the watershed.

Costs

Because of the size of the watershed and the amount of developed area, the target BMP implementation level is a substantial enterprise. The costs to implement BMPs will be significant. However, very considerable BMP implementation is needed to reduce the pollutant loadings to the water bodies and restore and protect water quality. The plan estimates that BMP implementation costs over the 25-year time horizon will be approximately $225 million. The plan identifies funding and financing programs which municipalities and other stakeholders may be able to access to help fund plan implementation.

Conclusion

Implementing the WBP will be a challenging undertaking. However, with creative thinking and strong resolve on the part of watershed decision-makers, businesses, and residents, significant progress can be made toward a healthy watershed that can be appreciated and enjoyed by all.

Figure 6 – Poplar Creek Mainstream