

Cal-Sag Channel Watershed-based Plan

Executive Summary

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

The Watershed-based Plan (WBP) for the Cal-Sag Channel 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 these nine elements.

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

About the Watershed

The Cal-Sag Channel originates near the confluence of the Little Calumet River with the Calumet River at Calumet Park and continues west toward the I&M Canal. There are 3 large tributaries to the Cal-Sag Channel and 8 smaller tributaries. The drainage area of the Cal-Sag Channel watershed is approximately 103 square miles. Based on the 2010 census, the population in the planning area is estimated to be approximately 423,000. Portions of 26 municipalities and 9 townships are within the Cal-Sag Channel Planning Area.

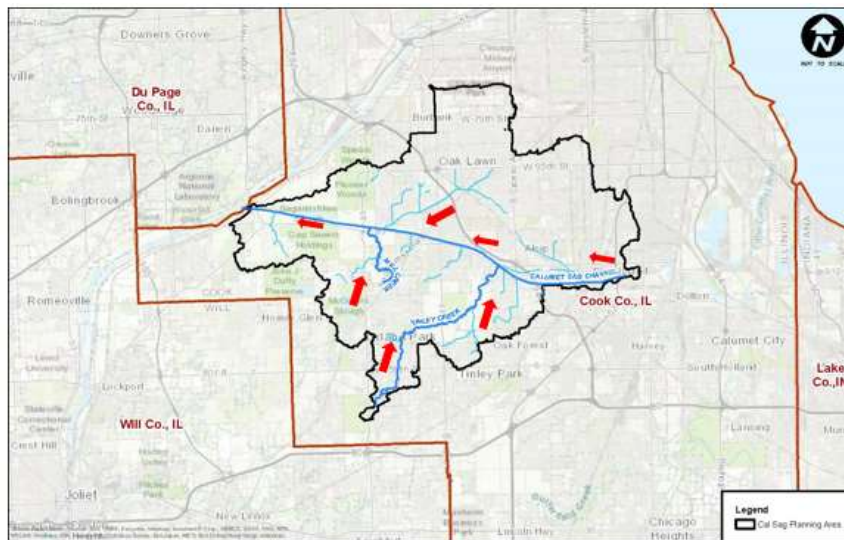


Figure 1 – Cal-Sag Channel WBP Planning Area

The watershed planning area outside of the forest preserve areas is decidedly developed and densely populated. As would be expected in an urbanized watershed, much of the land area is covered with impervious surfaces. Much of the development in the watershed occurred prior to the 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 significant pollutant loadings to the water bodies.

Watershed Goals

The goal for implementation actions in the Cal-Sag Channel 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 Channel 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)
4%	5%	2%	17%

These loading reductions will noticeably contribute to water quality improvement.

Stormwater BMP Implementation

Reflecting the identified sources of pollutant loadings, the plan recommends 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, which can include rain gardens, bioswales, permeable pavements and green roofs, capture and treat runoff, resulting in reduced stormwater volumes and reduced pollutant loads. The WBP 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 – Parking Lot with Bioretention

The WBP 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, as well as numerous other 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. Sediment is identified on the State list of impaired waters as one of the causes of use impairments in the Cal-Sag Channel watershed. The stormwater BMPs recommended in the plan typically do a very good job of reducing amounts of sediment/total suspended solids.

Key Pollutants - Nutrients (Nitrogen and Phosphorus)

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 algal growth blocks light in the water column that is needed for plants to grow. In addition, when algae die and decay, this process uses the oxygen in the water leading to low levels of dissolved oxygen in the water, which is harmful for aquatic species.

Water quality monitoring in the Cal-Sag Channel watershed has shown elevated levels of nutrients. Increased nutrient levels are present throughout the planning area; excess growth in receiving streams, lakes and ponds was visible in a majority of the locations inspected as part of the planning work. Reducing nutrient loadings will be especially valuable in areas that are upstream of the numerous and valued lakes and sloughs on Forest Preserve property in the watershed.

Key Pollutants - Chlorides

Another pollutant of concern in the watershed is chlorides. Chlorides can impair uses and in high concentrations are toxic to aquatic ecosystems. The primary source of chloride loadings within the Cal-Sag Channel planning area is deicing activities. Following application to a roadway surface, chloride (road salt) will run off into receiving waterbodies where the concentration in the waterbody will increase, particularly throughout the winter months when chloride concentrations spike. Chloride levels in soils and waterbodies can also continue to be elevated several months after winter has ended. In a study conducted by the USGS, chloride concentrations have increased substantially over time with average concentrations approximately doubling from 1990 to 2011.



Figure 3 – Loading Spreader Trucks with Salt for Road De-icing

The highly-urbanized Cal-Sag Channel planning area includes significant roadway and ROW land uses; ROW makes up nearly 20-30% of some of the urbanized watershed planning units. Loading estimates developed as part of the watershed planning work indicate very high amounts of chloride are being released into the watershed each year. Best practices associated with optimizing the use of salt for deicing will be needed to reduce chloride loadings. The WBP identifies generally accepted best practices for reducing chloride loadings.

Quantifying Effects

The WBP models and quantifies the loadings being released in the 22 watershed planning units (see Figure 4). The pollutants and the loading amounts are closely related to land use. There are high loadings of sediment, chlorides, and other pollutants in areas with residential land use, industrial land use, and road right-of-ways.

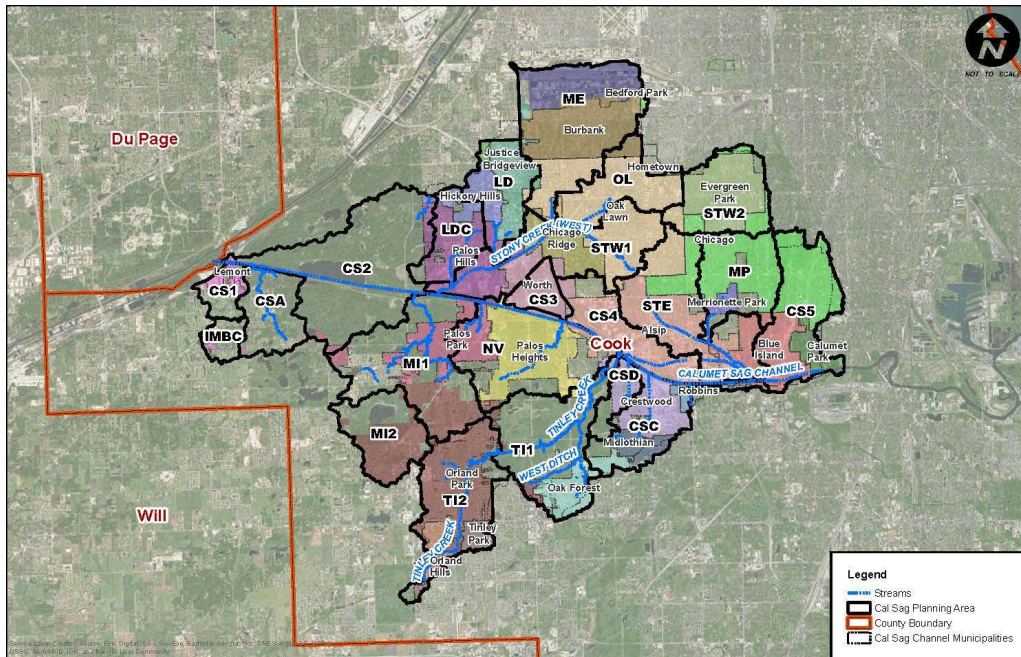


Figure 4 - Watershed Planning Units and Land Use in the Cal-Sag Channel Watershed

An aggressive level of BMP implementation will be needed to achieve substantial pollutant load reductions. The WBP identifies BMP scenarios or templates that are suitable for the various land uses in the watershed. The plan proposes a target degree of BMP implementation or saturation. Specifically the WBP recommends that 25% 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 WBP estimates the magnitude of BMPs that would need to be implemented in each watershed planning unit, reflecting the 25% implementation level, and quantifies the load reductions that will be achieved in each area.

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 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 been conducting 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

The costs to implement urban runoff/stormwater BMPs will be significant—very considerable BMP implementation will be needed to reduce the pollutant loadings to the water bodies and restore and protect water quality. The WBP estimates that BMP implementation costs over the 25-year time horizon will be approximately \$227 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 5 - Cal-Sag Channel