# The Kent Lake Subwatershed Management Plan:

*A Strategy to meet the Total Maximum Daily Load for Kent Lake*

**Prepared by the**
**Kent Lake Subwatershed Workgroup**

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"The 19th century was the century of exploration of our rivers,
and the 20th century of their exploitation and destruction.
Now it's up to us to make the new century one of restoration."

*Robert Hass, U.S. Poet Laureate (1995-97)*

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# *EXECUTIVE SUMMARY*

**Introduction to the Kent Lake Subwatershed**

The Kent Lake Subwatershed is located in southwestern Oakland County. This 556 square-mile (100,000 acres) area, which extends from the headwaters of the Huron River downstream to the Kent Lake impoundment in the Kensington Metropark, contains nearly 700 individual lakes comprising approximately 9,000 acres, Pettibone and Norton Creeksheds, and innumerable wetlands providing water quality and aesthetic value. The subwatershed lies within Oakland County and comprises all or portions of Commerce Township, Highland Township, Lyon Township, Milford Township, Springfield Township, Village of Milford, Village of Orchard Lake, Village of Wolverine Lake, Waterford Township, West Bloomfield Township, White Lake Township, the City of Walled Lake, and the City of Wixom. Land use in the Kent Lake Subwatershed ranges from heavily commercial and residential areas in the east and south to small rural farms and housing in the north and west. Included in the subwatershed are two Metroparks and four state recreation areas, along with numerous county, city, and village parks, totaling roughly 22,000 acres of publicly owned land. So exceptional is the ecological value of this area that The Nature Conservancy recently deemed portions of the subwatershed as "Globally Significant."

**Problem Statement**

Based on water quality monitoring studies, in 1998 the Michigan Department of Environmental Quality (MDEQ) listed Kent Lake as threatened on the State's 303(d) list of impaired waters requiring Total Maximum Daily Load (TMDL) establishment. The reason for the threatened status was cited as excess nonpoint source phosphorus loading in the subwatershed that eventually enters Kent Lake.

Simply stated, nonpoint source pollution is defined as a diffuse source of pollution that cannot be traced to a particular discharge such as an industrial or wastewater treatment plant. Rainfall or snowmelt moving over and through the ground is the main cause of nonpoint source pollution. As the runoff travels, it picks up and carries pollutants to lakes, rivers, and wetlands, or even to underground sources of drinking water. Pollutants often found in stormwater runoff are numerous and include phosphorus and nitrogen, dirt and sediments, oils/greases, vehicle lubricants, herbicides and insecticides, metals, and garbage.

The intensity and frequency of nonpoint source pollution is directly related to the amount of hard (impervious) surfaces in a subwatershed because these areas facilitate the travel of water over ground. The anticipated increase in development and subsequent hard surfaces in the Kent Lake Subwatershed, combined with the loss of open space, is expected to cause an increase in an already excessive nonpoint source pollution situation.

**Purpose of the Kent Lake Subwatershed Management Plan**

The Kent Lake Subwatershed Management Plan sets forth a comprehensive, long-term effort to restore and protect the water quality of the area with the goal of attaining the Total Maximum Daily Load for Kent Lake. Secondly, the Kent Lake Subwatershed contains numerous communities who will be required to obtain a state or federal permit for stormwater runoff under the National Pollutant Discharge Elimination System Phase II program. This plan aims to establish a protocol to help those communities wishing or required to obtain a permit to meet the minimum requirements of the program.

**Kent Lake Subwatershed Workgroup**

In 2000, communities, county agencies, key business interests, citizen groups, and other stakeholders in the subwatershed were invited to participate in establishing a Workgroup to help guide the development of the comprehensive subwatershed plan. This group has met quarterly since the spring of 2000 and is the essential guiding group in the development of this subwatershed plan.

**Management Alternatives**

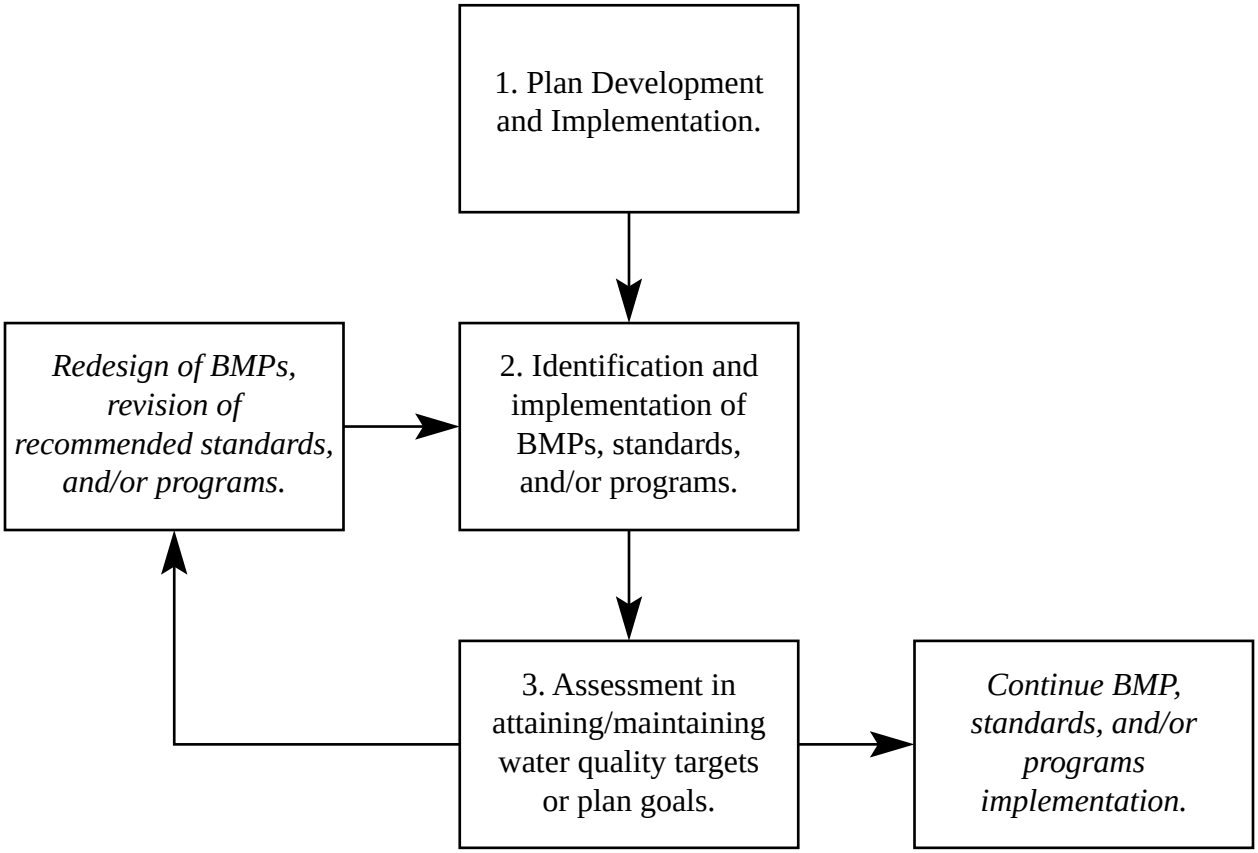
After establishing goals for the subwatershed, the Workgroup discussed various management alternatives which would conceivably meet the Total Maximum Daily Load and address subwatershed concerns. This resulted in four distinct categories of management alternatives, or Best Management Practices (BMPs), for the subwatershed.

- ***Structural Stormwater BMP Retrofitting.*** Based on studies performed by Tetra Tech MPS as part of this project, the subwatershed exhibits numerous conditions where the control and mitigation of stormwater runoff is either non-existent or inadequate. Utilizing a cost-efficiency model, this condition can be significantly mitigated and the Total Maximum Daily Load met by the implementation of grassed swales, constructed wetlands, infiltration, bioretention, and other BMPs in key areas of the subwatershed.
- ***Conservation Planning and Standards Adoption/Revision.*** The future of the subwatershed holds many concerns, including increased nonpoint source pollution from projected land use change. To mitigate the impacts of these changes, the plan recommends enhanced planning and standards such as natural resource inventories and assessments, wetland, stormwater, and natural features protection ordinances, and the revision of community design standards to promote low impact design.
- ***Waterbody Restoration.*** During the course of plan development, it was noted that several waterbodies in the subwatershed exhibited degraded conditions. To address this situation, actions to control the impact of peak flows or address destabilized streambeds and streambanks were considered and an initiative for study and implementation presented.
- ***Education and Stewardship.*** The short and long-term success of any subwatershed plan depends on enhancing the knowledge of water quality and watershed issues. This plan provides the framework for an information and education (I/E) plan and program initiatives to promote stewardship.

**Subwatershed Plan Institutionalization, Coordination, and Assessment**

One of the most important aspects of any subwatershed plan is assuring implementation, coordination of activities, and assessment of successes and failures. In order to provide well-organized process for implementing this subwatershed plan, a Huron Headwaters Steering Committee (Committee) of Workgroup members and other key stakeholders is proposed as well as a resolution for local government and agency adoption. The basis of the resolution and Committee is the Middle Huron Initiative (MHI) and to a lesser extent the Lake Macatawa Coordinating Committee. During implementation and review of the plan, new data and information may become available which might require a decision to revise or not to revise the plan. The process used to make this decision at regular Committee meetings is based on the Middle One Rouge River Subwatershed Management Plan and is illustrated below.

**Subwatershed Plan Revision Process**



# CHAPTER 1. INTRODUCTION

## *1.1 Value of Watershed Protection*

Healthy watersheds are important to all communities as they embody our sense of place in the landscape, protect economic and personal interests (e.g., flood protection), provide sources of drinking water and recreation, and support wildlife and sensitive plant species habitat, among other benefits. As a result, communities quickly find a vast number of reasons to take an interest in and protect local watersheds.

However across the nation, scientists and communities are finding that their water resources are degrading in response to past and present growth and development methods. They now find themselves facing billions of dollars in expenses in order to restore our waters because of the impact of our actions. They are also discovering that they can only protect these local water resources by thinking on a new level—a watershed level. Numerous diverse local watershed management efforts have begun to be initiated in recent years in response to the observed water quality degradation. For example, some communities are trying to save salmon habitat in the Pacific Northwest or Maryland crab and oyster populations in Chesapeake Bay, while others are striving to maintain drinking water quality for New York City reservoirs. In the Huron River area, communities surrounding Ann Arbor and Ypsilanti have sought to reduce and prevent lake degradation caused by excess phosphorus loading that resulted in recreational and property value loss for Ford and Belleville Lakes since the late 1990s.

Each community often has their own unique rationale for protecting watersheds. Some may place a high value on the aquatic biological community living in waters or wildlife protection for sensitive mammals and amphibians, while others may be more concerned about reducing flood events or stream channel erosion to the real estate in their back yard. Regardless of the reasons, it is clear that most communities are recognizing the value of local watersheds and are taking steps to restore and protect these resources (CWP, 1999).

Healthy watersheds provide millions of dollars worth of protection due to their natural attributes and functions. Some benefits from healthy watersheds include:

- ***Human Life and Property Protection***. Estimates indicate the United States loses billions of dollars each year from flood damage to buildings, not including loss of life (CWP, 1999). Wetlands, floodplains, and undeveloped open spaces in watersheds help protect adjacent and downstream properties from potential flood damage and even death by collecting and slowly releasing floodwater. The cost of replacing natural flood control function in a watershed can sometimes be several million dollars.

- ***Recreation***. More than half of all U.S. adults hunt, hike, fish, canoe, birdwatch, or photograph nature, spending billions of dollars annually. Recreational fishing by Americans alone generates at least $37.8 billion annually in revenue (CADFG, 2002). Kent Lake, and the associated Kensington Metropark, receives approximately 2 mil-

lion visitors each year who spend money at local restaurants and other local businesses (Schafer, 2000).

- ***Water Supply.*** Healthy watersheds provide clean drinking and recreational waters. Wetlands, kettle lakes, prairie potholes, and other open spaces have significant water storage and groundwater recharge. However, groundwater supplies are sensitive to activities that alter watershed hydrology. Improper development lowers the water table and reduces the groundwater recharge and discharge.

- ***Water Quality.*** Healthy watersheds maintain and improve the water quality of our nation's streams, rivers, lakes, and wetlands. As runoff and surface water pass through these systems, pollutants are removed or transformed through physical, chemical, and biological processes. This cycle helps protect the water we drink and use for recreation, as well as the water animals and plants depend on to survive.

- ***Erosion Control.*** The native trees and plants surrounding lakes, streams, and wetlands in healthy watersheds protect soil from the erosive energy and flows of water. These areas help protect water quality, reduce the need and dependence on seawalls and dredging, and provide valuable habitat for wildlife.

- ***Culture.*** Watersheds have archeological, historical, and cultural values. Most societies traditionally formed along bodies of water. The cultures of Egypt, Louisiana, and the Chesapeake Bay formed as a result of their vibrant watersheds. Many painters and writers have used watershed landscapes as their subject matter. Now, people with cameras and camcorders spend billions of dollars to capture the scenery that healthy watersheds provide.

- ***Economic Vitality.*** A study by the American Farm Trust looked at the local government costs and revenues associated with different land uses in Marshall, MI. They found that for every $1.00 in revenue generated by residential development, $1.47 was required in public services (e.g. schools, fire and police protection, infrastructure, and road maintenance). For every $1.00 generated by farms and open land, only $0.27 was required for associated services, and for every $1.00 of revenue from commercial/industrial uses, $0.20 was spent in services (AFT, 2001). Healthy watersheds provide a basis for commercially important products harvested from them. This includes fish, shellfish, agriculture, timber, and even some medicines derived from soils and plants.

- ***Habitat.*** Diverse species of plants, insects, amphibians, reptiles, birds, fish, and mammals depend on healthy watersheds for food, breeding, habitat, and shelter.

- ***Scientific Advancement.*** Scientists are only beginning to understand the complex processes of watersheds. Because most watersheds have been significantly altered, protecting what is left for study and understanding is a prime concern for many water-quality professionals.

In addition to the cultural benefits of healthy watersheds, watershed planning and protection holds notable benefits to local governments. Most significantly, watershed planning can:

- ***Proactively address*** forthcoming federal and state regulations on TMDLs and watershed plans,
- Allow communities opportunities to progress towards requirements of the ***Michigan Voluntary NPDES Phase II stormwater permit,***
- Give local governments access to specialized state and federal ***grant programs*** (e.g., Clean Michigan Initiative, Clean Water Act Section 319 funds, etc.),
- ***Reduce costs*** of remedial actions by preventing future problems,
- Maintain ***quality of life*** within region,
- Heighten ***public awareness and support,***
- ***Enhance decision making*** on land use requests,
- ***Streamline development review*** process,
- ***Enhance coordination*** of government resources and programs in the watershed, and
- ***Reduce*** potential of legal actions within TMDL watersheds.

## *1.2. Problem Statement*

The Huron River supplies drinking water to nearly 140,000 people, supports one of the Michigan's best smallmouth bass fisheries, and is the State's only designated Scenic River in southeast Michigan. However, numerous waterbodies in the Huron River Watershed are encountering ever-increasing incidences of nuisance algae blooms as the result of phosphorus enrichment. These algae—or algal—blooms threaten to alter the structure of flora and fauna, decrease dissolved oxygen in the water, and degrade designated uses for waterbodies by causing recreational loss, fish kills, and other environmental and human health consequences.

In recent years, the Kent Lake Subwatershed and the Huron River Watershed as a whole have experienced amplified developmental pressures from a flourishing economy and urban flight. In fact, according to the Southeast Michigan Council of Governments (SEMCOG), the population of Oakland County, where the subwatershed is located, increased 16% from 907,871 to 1,083,592 individuals from 1970 to 1990. Projections to 2020 estimate a further 25% increase in population from 1990 levels, or an additional 360,508 individuals. In order to accommodate the increased population as well as the businesses and services to satisfy them, it estimated that under current development practices 40% of the remaining open spaces will be developed within the watershed (HRWC, unpublished). Much of this projected loss of undeveloped land will

occur in the Kent Lake Subwatershed where it will further threaten the hydrology and water quality of groundwater and surface waters.

The projected increase in development and corresponding hard (impervious) surfaces combined with the loss of unaltered land is of particular concern since these areas are significant contributors of nonpoint source pollution (NPS). Simply stated, NPS is defined as a diffuse source of pollution that cannot be traced to a particular discharge such as an industrial plant. For instance, when rain or snowmelt occurs on impervious surfaces such parking lots, rooftops, lawns, and roads or disturbed land like construction sites, the resulting water runoff—called stormwater runoff—picks up pollutants that may be on these surfaces and carries them, often untreated, to local streams, lakes, or wetlands. Pollutants often found in stormwater runoff are numerous and include phosphorus and nitrogen, dirt and sediments, oils/greases, vehicle lubricants, herbicides and insecticides, animal wastes, metals, and garbage. But because there are hundreds of thousands of small sources of stormwater runoff in the subwatershed, addressing NPS is often complex and problematic.

There is, however, another source of NPS that is not associated with stormwater runoff. Impaired or compromised decentralized wastewater treatment systems—septic systems—can be a significant yet difficult-to-quantify source of phosphorus and nitrogen, bacteria, and untreated medicines to surface and ground waters.

Based on water quality studies performed on Kent Lake in 1979 and 1999, the Michigan Department of Environmental Quality (MDEQ) determined that although point source reductions in phosphorus loading have improved water quality in Kent Lake from 1970s observations, increased nonpoint source loading is threatening to negate these improvements. According to the MDEQ studies, nonpoint source phosphorus loads currently account for 80% of the total phosphorus load to Kent Lake (Alexander, 1999a).

In response to these findings, MDEQ listed Kent Lake as threatened on the State's 1998 303(d) list of impaired waters requiring Total Maximum Daily Load (TMDL) establishment due to excess nonpoint source phosphorus loading in the subwatershed. A TMDL is the maximum amount of a particular pollutant a waterbody can assimilate without violating numerical and/or narrative water quality standards.

The threatened status was assigned to Kent Lake because of the increased developmental pressures in the subwatershed that threaten to increase the contribution of NPS and result in an expected violation of the State's narrative water quality standards. As a result of extensive field studies, MDEQ established a TMDL target concentration of 30 micrograms per liter (µg/L) of phosphorus so as to assure satisfactory water quality for Kent Lake (Alexander, 1999a).

## *1.3 Purpose of the Kent Lake Subwatershed Plan*

The Kent Lake Subwatershed Management Plan represents a broad effort to restore and protect the water quality integrity of Kent Lake and the upstream waterbodies that drain into the lake. The purpose of this plan is to establish a state-approved methodology to diminish the adverse

effects of nonpoint source phosphorus pollution to the lake and meet the established TMDL. This plan outlines both quantitative and qualitative steps considered necessary to meet water quality goals for Kent Lake and its subwatershed.

In order for a watershed plan to be approved by the state of Michigan, it must meet the following criteria as established in State Rule 324.8810:

> *A watershed management plan submitted to the MDEQ for approval under this section shall contain current information, be detailed, and identify all of the following:*
>
> *(a) The geographic scope of the watershed.*
>
> *(b) The designated uses and desired uses of the watershed.*
>
> *(c) The water quality threats or impairments in the watershed.*
>
> *(d) The causes of the impairments or threats, including pollutants.*
>
> *(e) A clear statement of the water quality improvement or protection goals of the watershed management plan.*
>
> *(f) The sources of the pollutants causing the impairments or threats and the sources that are critical to control in order to meet water quality standards or other water quality goals.*
>
> *(g) The tasks that need to be completed to prevent or control the critical sources of pollution or address causes of impairment, including, as appropriate, all of the following:*
>
> *(i) The best management practices needed.*
>
> *(ii) Revisions needed or proposed to local zoning ordinances and other land use management tools.*
>
> *(iii) Informational and educational activities.*
>
> *(iv) Activities needed to institutionalize watershed protection.*
>
> *(h) The estimated cost of implementing the best management practices needed.*
>
> *(i) A summary of the public participation process, including the opportunity for public comment, during watershed management plan development and the partners that were involved in the development of the watershed management plan.*
>
> *(j) The estimated periods of time needed to complete each task and the proposed sequence of task completion.*

In addition, there are numerous communities in the Kent Lake Subwatershed who will be required to obtain a state or federal permit for stormwater runoff under the National Pollutant Discharge Elimination System (NPDES) Phase II program. The Townships of Commerce, Highland, Milford, Springfield, Waterford, West Bloomfield, and White Lake, the Villages of Orchard Lake and Wolverine Lake, and the Cities of Walled Lake and Wixom are included within the regulation areas.

## *1.4 Establishment and Role of Community Liaison Workgroup*

Community-based partnerships are key to effective watershed management. Through a partnership, different people and organizations work together to address common interests and concerns. As such, partnerships represent the easiest way to develop and implement a successful

watershed management plans because everyone is involved from the initiation. Consequently, the final plan achieves input and consensus of all parties who have a stake in the watershed.

A community liaison-working group (Workgroup) was formed between the Spring and Fall 2000 in order to understand the water quality and environmental concerns for the subwatershed by local communities and residents and to garner grassroots support for the watershed management process. Overall, the goal of the Workgroup was to guide the creation of a watershed management plan to meet TMDL targets for the Kent Lake Subwatershed. To facilitate this goal, key stakeholders throughout the subwatershed were identified and contacted about possible participation. Invitees included representatives from all local governments within the subwatershed, county health, road, drain, and planning department representatives, state agency employees, environmental interest groups, concerned citizens, development interests, chambers of commerce representatives, and community engineers. It is important to note that while all communities were invited, not all chose to participate. A list of workgroup participants is presented earlier in this document.

## *1.5 Relation with Rouge River Subwatershed Plans*

As part of the Great Lakes Water Quality Agreement between governments of the United States and Canada, a Rouge River Remedial Action Plan (RAP) was developed in 1989. The intent of the RAP was to set forth a 20-year plan to restore the water quality of the Rouge River, and subsequently, the Great Lakes Region. The focus of the plan was the reduction of the most easily addressed pollution sources and of large industrial and municipal wastewater treatment discharges into the river. Although improvements have been made, pollution still exists and is impairing our water quality.

The Michigan Department of Environmental Quality (MDEQ) established a voluntary watershed-based approach, called the Michigan General Storm Water Permit, to address the forthcoming requirement that numerous southeast Michigan communities obtain a federal National Pollutant Discharge Elimination System (NPDES) Phase II stormwater permit. This program initiated the Rouge River Wet Weather Demonstration Program with a unique watershed-based voluntary permit. Several of the communities within the Rouge River Watershed also have land area within the Kent Lake Subwatershed, and have already taken actions to meet permit requirements. These communities include the Townships of Commerce, West Bloomfield, and Lyon, the Cities of Walled Lake and Wixom, and the Village of Orchard Lake.

Unlike the Rouge River Subwatershed Plans that focused on meeting and obtaining a Michigan General Storm Water Permit, the Kent Lake Subwatershed planning process concentrates on meeting and sustaining a quantifiable water quality target for phosphorus loading to Kent Lake (i.e., TMDL). Hence, while many similarities exist amongst the planning processes and recommendations for the two plans, to demonstrate feasibility in meeting the Kent Lake phosphorus TMDL a thorough quantitative and qualitative procedure is required. Nonetheless, many of the communities and agencies that participated in the Rouge River Subwatershed Plans are already committed to many of the actions in this plan.