

# Water Resources Management Plan

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The Saint Paul Comprehensive Plan 2008

## **Preliminary Draft\***

\*The Water Resources Management Plan is one of six chapters of the draft 2008 Saint Paul Comprehensive Plan. The draft policies of the Water Resources Plan were directed by a task force of Saint Paul citizens, professionals, and planning commissioners that convened monthly between March 2007 and March 2008. This preliminary draft is **not** a public hearing draft; a public hearing draft is anticipated to be complete by late spring/early summer 2008. Public hearings for each chapter of the Comprehensive Plan are tentatively scheduled to begin late summer/early autumn 2008. Comments on this draft can be directed to [compplan@ci.stpaul.mn.us](mailto:compplan@ci.stpaul.mn.us).

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Force

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## Introduction

A nation that fails to plan intelligently for the development and protection of its precious waters will be condemned to wither because of its shortsightedness. The hard lessons of history are clear, written on the deserted sands and ruins of once proud civilizations.

Lyndon B. Johnson, 36<sup>th</sup> President of the United States

For the people of Saint Paul and Minnesota, water is a precious, yet often overlooked aspect of our life. Water has carved Saint Paul's history and may define its future. This Saint Paul Water Plan\* provides for the protection, regulation and safeguarding of water's many interconnections with our lives.

The Water Plan focuses on three main topics: municipal water, surface water, and sanitary sewers. On each of these topics the City is required by state law to do plans and meet standards. The City has done technical plans that meet the requirements.

- **Municipal drinking water** is supplied by the Saint Paul Regional Water Service (SPRWS), a distinct governmental entity associated with the City of Saint Paul. SPRWS completed a Water Supply Plan (WSP), which was approved by the Metropolitan Council in 2007. (Appendix A contains an executive summary of the WSP.)
- **Surface water management** deals with how rain and snowmelt are handled on private and public property. The city's surface water management requirements were recently fulfilled by the Saint Paul Local Surface Water Management Plan (LSWMP), which was approved by the Metropolitan Council in 2006. (Appendix B contains an executive summary of the LSWMP.)
- **Sanitary sewers** are integral to the health and functioning of our City; yet, buried underground, they are rarely considered by citizens. Saint Paul's Department of Public Works has fulfilled the Metropolitan Council's requirements for sanitary sewer planning. (Appendix C contains a technical summary of the City's sanitary sewer planning to meet legal requirements.)

The Water Plan simplifies and combines the main points from these three technical plans to make them useful for a general audience and to integrate water planning with other chapters of the Comprehensive Plan, such as Land Use, Parks, and Transportation. On some issues the Water Plan goes beyond the technical plans that have already been approved and raises policy issues that are farther out on the horizon.

### **Purpose of the Water Plan**

The general purposes of the Saint Paul Water Plan are:

1. To continue ensuring the safety and proper use of water for the health of citizens and the protection of water resources.
2. To strengthen, consolidate and disseminate the City of Saint Paul's position on water issues.
3. To educate Saint Paul citizens, government officials, and city staff and raise the public profile of water issues on the City agenda.

*\*Technically, for Metropolitan Council's purposes, this is the city's "Water Resources Management Plan".*

4. To integrate water policies with other Comprehensive Plan chapters.
5. To meet the requirements of the Metropolitan Council.

#### **Overview of Agencies and Legislation Managing Water Resources**

Even more than most resources, water requires interagency collaboration. Water is not confined by municipal boundaries and how one municipality uses its water affects water quantity and quality elsewhere. Not surprisingly, multiple agencies attempt to manage water. Therefore, cooperation and coordination between the various water management agencies is necessary. A list of agencies and legislation involved with Saint Paul's water is included in Appendix \_\_\_.

#### **Brief History of Water Resources**

Saint Paul and the region developed alongside abundant water resources. The rivers, lakes, and streams were crucial to the development of the region, although most of them within the city were modified in some way. Early developers turned some wetlands into lakes, like Como Lake; others were drained and filled. Creeks were buried in pipes. Though water resources were integral to the area's early prosperity, they were commonly neglected and abused. Raw sewage was running into the Mississippi River as late as the 1970's. In recent decades, pollution has been reduced in our waterways. The river's ecology is improving and the downtown riverfront is revitalizing. Today, Saint Paul relies on the Mississippi for trade, recreation, and our water supply. Furthermore, Saint Paul is embarking on a new chapter in riverfront revival with the National Great River Park Plan, which will bring city neighborhoods and residents into closer contact with the river.

#### **Water Resources Inventory Today**

Plentiful water supplies characterize the City and the State. Several lakes and wetlands lie within Saint Paul including Como Lake and Phalen Lake, which are centers for major parks. Battle Creek and Fish Creek flow briefly through Saint Paul on their way to the Mississippi River. Saint Paul and the region also rest above several high-quality aquifers.

Insert sidebar: The following water bodies lie completely or partially within the boundaries of Saint Paul:

- Airport Marsh
- Ames Lake\*
- Battle Creek
- Beaver Lake
- Burlington Pond
- Como Lake
- Crosby Lake
- Eagle Lake (North Star Lake)
- Fish Creek\*
- Frost Lake
- Lake Phalen
- Little Pig's Eye Lake
- Loeb Lake
- Mallard Marsh/Hwy 280 Ponds
- Mississippi River
- Pickerel Lake
- Pig's Eye Lake
- Pike Island Marsh
- Suburban Pond
- Upper Lake
- The aquifer system\*

Each of these water bodies is discussed briefly in Appendix D.

\*Not public water bodies, which are lakes, wetlands and watercourses over which Minnesota Department of Natural Resources (DNR) Waters has regulatory jurisdiction. A definition of public waters can be found in Appendix D.

### **Trends and Assumptions**

Saint Paul is in the middle of a changing America. As outlined at the beginning of the Comprehensive Plan, demographic, environmental, and economic changes abound and they will be manifested in the city's future form and character, including our water bodies and infrastructure.

Global climate change will become increasingly severe over the lifetime of this plan. It will affect the distribution, timing and quantity of water, impacting Minnesota's agriculture and tourism economies. But the global climate will change much more than our economic choices in certain sectors; it is going to affect our daily lives in ways that we are only beginning to discern.

Threats to our waterways will continue. While point-source pollution has decreased dramatically due to the Clean Water Act, non-point source pollution has become increasingly problematic. Non-point source pollution does not originate from a single factory or pipe and is more difficult to regulate and control. Agricultural and industrial chemicals are now being found throughout the state's waters. A lack of understanding of how water moves through the earth has exacerbated contamination of aquifers. Moreover, with scientific advances, chemicals are being found at lower and lower concentrations and their effects on humans and the environment are being uncovered.

(Definition box on the side with a graphic or picture representing each kind.)

*Point source pollution:* a single, localized and identifiable source of pollution, such as a smokestack, storm sewer or effluent pipe.

*Non-point source pollution:* a general, diffuse pollution source such as surface runoff or atmospheric deposition.

More regulations will be put in place to safeguard both surface water and groundwater. A recent Metropolitan Council survey documents that Twin Cities' residents believe we are not doing a good enough job of safeguarding our water resources and improvement is a high priority. But tight governmental budgets at all levels will be a constraint on how far government initiatives will be able to reach.

The bottled water industry has grown rapidly. It offers convenience, but it is also playing off consumers' fears and heightening them. In fact, our municipal water supplies are free of contaminants, entirely safe, better tasting than ever, and environmentally superior to bottled water for several reasons. Citizens need to be convinced and educated about the effects of their choice of drinking water.

### **Water's Meanings**

Water is essential to all life on earth, with power to both give and take away life. As water changes so do biological systems. Humanity apprehends both the beneficence and the destructive power of water. Beyond the mundane, water imagery pervades our symbols, myths, art, literature, and religions.

Taking the Mississippi River as our local example, it is a blue ribbon that defines and unifies Saint Paul. The river is the great mid-continent flyway for bird migrations. The Mississippi and Minnesota rivers predestined the location of our metropolitan region. As a transportation spine, the Mississippi extends Saint Paul's influence, linking us to St. Louis, Memphis, and New Orleans. Mark Twain's *Adventures of Huckleberry Finn* is a landmark in American literature. The river has also influenced several musical genres such as jazz, which began in New Orleans, the spiritual "Ol' Man River" and "When the Levee Breaks" made famous by the rock band Led Zeppelin.

Only one percent of earth's total water is fresh water available for use; terrestrial life—all of us included--depends on it.

## **1.0) Water Supply**

### **Description of Municipal Water System**

The local water supply system began in the late 1860s. The fledgling private water supply company was bought by the City of Saint Paul in 1882 and grew quickly. A water treatment plant was built in 1921 and the Mississippi River became the source of our municipal water in 1925. Frequent improvements have been made since then to allow Saint Paul Regional Water Services (SPRWS) serve over 400,000 residents of the East Metro today.

The municipal water system is owned by the City of Saint Paul, operated by Saint Paul Regional Water Services (SPRWS) and governed by the Board of Water Commissioners of the City of Saint Paul, as established by the Minnesota Special Laws of 1885. The seven member Board of Water Commissioners consists of three Saint Paul City Council members, two Saint Paul citizen members representing the public and two members representing the suburbs served by SPRWS. The Board of Water Commissioners conducts monthly meetings in the Saint Paul City Hall that are open to the public.

SPRWS provides retail water service to the cities of Saint Paul, Falcon Heights, Lauderdale, Maplewood, Mendota, Mendota Heights, and West Saint Paul, and wholesale service to the cities of Little Canada, Roseville and Arden Hills (via Roseville). Within Saint Paul, the distribution system is divided into two main service areas. The low-lying service area includes downtown, the low-lying regions to the south and southwest of downtown and the suburban areas south of the Mississippi River. The upland region includes the rest of Saint Paul and the suburbs lying to the north and east of Saint Paul. Each service area has a reservoir system for storage.

### **Municipal Water Planning and Regulations**

Minnesota Statute 473.859 requires water supply plans to be completed by all local government units in the seven county metropolitan area as part of the local comprehensive planning process. Additionally, under Minnesota statute section 103G.291, SPRWS, as a public supplier serving more than 1,000 people, is required to prepare a Water Emergency and Conservation Plan to be reviewed by the Minnesota Department of Natural Resources (MnDNR) every 10 years. SPRWS prepared a Water Supply Plan (WSP) in 2006 and the plan was checked for consistency and approved by the Metropolitan Council in January, 2007. As of April 2008, **the plan has yet to be approved by the DNR.**

After the Metropolitan Council reviewed and approved the WSP, Saint Paul's legal requirements for the Metropolitan Council's water supply section of the Water Chapter of the Comprehensive Plan were met. Due to its length and technical detail, the WSP will not be added in its entirety to this Saint Paul Water Plan, but it is herewith incorporated into the City's Comprehensive Plan by reference. Most of the municipal water supply trends and policies below are drawn from the WSP.

## **Strategy 1: Ensure a safe and affordable water supply system.**

### **Objective: Completely Reliable Municipal Water Sources ("Raw" Water)**

Most of the "raw" water processed by SPRWS, comes from three principal sources, the Mississippi River, the Vadnais Lake watershed and wells. The Mississippi River supplies around 75 percent of the total raw water. River water is pumped from the Fridley intake and flows into the Vadnais chain of lakes. The Vadnais Lake watershed consists of four interconnected, natural lakes with a combined watershed area of 28 square miles and an available supply of 3.6 billion gallons (enough water for 20 to 30 days). The Vadnais chain of lakes is an important natural purification and storage system for SPRWS. From Vadnais Lake, water flows through conduits to McCarrons Treatment Plant. Several wells are connected to these conduits to augment the flow of water to McCarrons when needed. These wells draw from the Prairie du Chien-Jordan aquifer and are currently able to pump about 27 million gallons per day (MGD). (See Appendix F.)

### **Policy 1.1 Coordinate with the state of Minnesota to implement the Upper Mississippi River Source Water Protection Plan.**

Lead Actor: SPRWS

Role: Supporter, Coordinator, Advocate

Cleaner water is cheaper and easier to purify for municipal use. Therefore, the cities of Saint Paul, Minneapolis and Saint Cloud in conjunction with the Minnesota Department of Health (MDH), Metropolitan Council and the Minnesota Rural Water Association have established an Upper Mississippi River Source Water Protection Plan (finished 2007, not yet adopted). Although the plan is not required by the Federal Safe Drinking Water Act (SDWA) (see Appendix E), the cities have collaborated to ensure water of high quality enters the municipal water system. The plan priorities are to identify possible pollutant sources, determine emergency measures, and educate about the sources of and risks to drinking water.

**Policy 1.2 Advocate for Vadnais Lake Area Watershed Management Organization (VLAWMO) to comply with its adopted Watershed Management Plan within the Vadnais chain of lakes.**

Lead Actor: City and SPRWS  
Role: Adviser, Supporter

VLAWMO oversees the surface water management within the watershed. The Metropolitan Surface Water Management Program (M.S. 103B) requires VLAWMO to review and update its Water Management Plan every ten years. VLAWMO is doing this in 2007 and 2008. Their plan will set minimum water quality standards which, when met, will benefit the chain of lakes and reduce maintenance and purification costs for SPRWS.

**Policy 1.3 Ensure the implementation of the Wellhead Protection Plan done by the SPRWS in 2007.**

Lead Actor: SPRWS  
Role: Implementer

SPRWS has six deep wells that draw from the Prairie du Chien-Jordan aquifer. The wells are constructed to provide emergency supply backup. The six wells have the capacity to draw more than 25 million gallons per day (MGD). SPRWS plans to finish six more wells within five years for a total of 12 wells. Twelve wells will provide enough capacity to cover basic (winter level) demand of 48-50 MGD. The wells are located to the southwest of Vadnais Lake, along the conduits that transmit water from the lake to the treatment plant.

The Wellhead Protection Plan, written specifically for SPRWS' municipal wells, designates a wellhead protection area with the goal of reducing potential contaminants from entering this area. The Plan seeks to identify and reduce pathways where pollutants are likely to enter the groundwater. The Plan also identifies potential land use conflicts to reduce the impacts of development on ground water.

**Policy 1.4 Minimize use of municipal well water during times when the Mississippi River has normal or high flows with normal water quality.**

Lead Actor: SPRWS  
Role: Implementer

When the flow of the Mississippi River is sufficient for municipal water needs, the SPRWS should eliminate unnecessary ground water withdrawals. SPRWS does use ground water to mitigate extremes in surface water temperatures. This practice saves money and can improve water quality; it should be continued, but monitored to minimize groundwater withdrawals.

**Policy 1.5 Prohibit new private wells where public water service is available and encourage the discontinuation of existing ones. Discontinued wells should be properly sealed.**

Lead Actor: Saint Paul, SPRWS (Ramsey County?)  
Role: Supporter, Financial and Non-financial assistance

Private well use is difficult to track and private well water is not tested for safety as rigorously as the public water supply. In addition, wells are direct routes for the contamination of groundwater and should be properly sealed when they are no longer in use.

**Objective: Water Conservation**

The SPRWS has seen per capita water consumption decrease in recent years in Saint Paul (see appendix F). This is a result of successful water conservation strategies, loss of major industries, and no major droughts. Water conservation programs are intended to reduce water demand, reduce water losses, and increase efficiency of use.

The city's sources of water (river, chain of lakes, wells) are adequate to meet current and projected demands, including normal dry summer conditions. When extreme drought conditions occur, the source system is adequate to meet the foreseeable demand if demand is properly managed. This would entail a conservation strategy laid out in the WSP, and, if necessary, additional groundwater or river water pumping. However, the Minnesota Environmental Quality Board is making a renewed call to cities and counties—and especially Ramsey County, as the state's most urbanized—to conserve water and reduce draw-downs from local aquifers. (See Appendix G for EQB's 2007 report, Use of Minnesota's Renewable Water Resources: Moving Towards Sustainability.)

**Policy 1.6      Become a regional leader in public education for water conservation.**

Lead Actor:      SPRWS and the City

Role:              Coordinator, Financial and Non-financial assistance

The City and the SPRWS have ongoing educational and information campaigns. Many Minnesotans do say they conserve water, although they also fail to change some everyday habits that could save a lot of water, for example, taking shorter showers, turning the faucet off when brushing teeth or shaving, and watering lawns only during mornings or evenings (from Metropolitan Council's Minnesota Report Card on Environmental Literacy, 2002).

Becoming a more visible leader in water education and conservation would be a change for SPRWS; however, education is an increasingly valuable tool in protecting water quality and quantity. The SPRWS, as the public water supplier for Saint Paul, is the right entity to step forward and lead in water conservation and education efforts.

**Policy 1.7      Promote and advocate ways to reduce indoor water use through better fixtures and appliances and also by changing personal habits.**

Lead Actor:      Saint Paul, SPRWS

Role:              Implementer

Indoor water use accounts for roughly 35 percent of the total per capita water use. The SPRWS should explore several options to reduce indoor water use:

- a. Restarting a retrofit program for high efficiency water fixtures and appliances. This could be coordinated with the federal Environmental Protection Agency's (EPA) Water Sense program, which labels fixtures, appliances and services that conserve water;
- b. Starting a retrofit-upon-sale ordinance in which new, efficient fixtures are required when a building is sold to a new owner; and
- c. Enactment of green development guidelines such as Leadership in Energy and Environmental Design (LEED) or the state B3 guidelines. Saint Paul has committed to achieving LEED-silver or B3 for new City-owned buildings.

(Insert table on water usage rates - which fixtures use how much)

**Policy 1.8      Advocate for clarification of the state plumbing code to allow for the safe reuse and recycling of gray water.**

Lead Actor:      Green Policy Working Group, City, SPRWS

Role:              Advocate

The state plumbing code currently does not address water reuse or recycling adequately. Gray water systems are becoming more popular and are included in guidelines for green development such as LEED. At this time, gray water systems are not allowed in Minnesota and should not be used until a standard process and designation is developed. Eventually gray water systems could be used for landscape irrigation or even to reuse water within buildings.

**Policy 1.9 Advocate for reduced lawn watering needs through the use of native plants, rain barrels, gray water for irrigation, drip irrigation systems etc.**

Lead Actor: City and Watershed Districts

Role: Provide information, provide incentives

Lawn watering accounts for a significant percentage of municipal water use in the summer. Data from the last 10 years indicates that summer water use increases from 15 to 40 percent over winter rates. Since virtually no outdoor water use occurs during the winter, most of this increase in water use is attributable to outdoor water use and lawn watering. (See Appendix F on water use during the summer vs the winter.)

Multiple solutions are available to reduce lawn watering needs:

- a. For landscaping that needs irrigation, use drip irrigation or install and maintain moisture-sensors on sprinklers;
- b. Watering only in the mornings or evenings;
- c. Native landscaping, which saves water, reduces use of fertilizers and herbicides, reduces mowing (less air pollution), provides habitat, and restores the soil's fertility and permeability.

**Policy 1.10 Seek continual reductions in the amount of lost ("unaccounted-for") water throughout the system.**

Lead Actor: SPRWS

Role: Implementer

SPRWS has an excellent record of holding the amount of lost or "unaccounted-for" water down to a minimum. The American Water Works Association (AWWA) recommends that unaccounted-for water not exceed ten percent. The average percent of unaccounted-for water for SPRWS over the last five years is 9.89%. (See Appendix F.) SPRWS should:

- a. Continue the leak detection and survey;
- b. Continue aggressive replacement of mains; and
- c. Institute new operations or maintenance if they are cost effective.

**Objective: Excellent Municipal Water ("Finished" Water)**

Mississippi River water flows from the Fridley intake to the Vadnais chain of lakes which serve as a natural filtration system. At the McCarrons Treatment plant, water is purified to meet federal drinking water standards and refine its taste and odor. The treatment plant has a capacity of 144 MGD, approximately three times the average daily demand of the service area (48 MGD estimated from 1995 – 2004). Once the water leaves the plant it can be used immediately or stored. If the water is not drawn off for immediate use, it is piped to water storage tanks, reservoirs and standpipes located throughout Saint Paul and the nearby communities. The system has 131 million gallons of finished water storage capacity, nearly three times the average daily demand. Care must be taken to preserve the safety and quality of water in storage until it is delivered to consumers' taps.

**Policy 1.11 Continue programs that ensure the overall safety and quality of water reaching the consumer. THIS IS THE PREEMINENT AND OVERRIDING POLICY IN THE MUNICIPAL WATER SUPPLY SECTION OF THE PLAN.**

Lead Actor: SPRWS

Role: Implementer

The EPA imposes strict regulations that limit the amount of contaminants in water provided by public water utilities. Water is continuously tested as it leaves the plant to ensure compliance with the standards set by the EPA and the Minnesota Department of Health. By law, SPRWS is required to notify its consumers if the water is ever in non-compliance with federal or state

drinking water standards. SPRWS' preeminent objective is to provide water that is both safe and appealing.

**Policy 1.12 Continue efforts to increase SPRWS' customer base to include nearby municipalities.**

Lead Actor: SPRWS  
Role: Advocate

SPRWS projects water demand will increase by roughly 10 percent between now and 2030 due to population increases in the municipalities it serves. (See Appendix F.) With an average current daily demand of around 44 MGD, an expected increase to 49 MGD, and a daily capacity of 144 MGD, the SPRWS's plant is operating significantly below its capacity.

If the McCarrons Treatment Plant increased its daily output, it would achieve a higher level of operating efficiency and the cost per gallon of finished water would be lower. Providing water to another suburb or two would bring about this increase in the plant's efficiency. Moreover, extending the SPRWS would help to diversify the metro area's water supply and reduce groundwater demands since the suburbs that are not connected to the Saint Paul or Minneapolis systems rely on groundwater as their only water source.

**Policy 1.13 Promote Saint Paul public drinking water as a safe and cheaper alternative to bottled water.**

Lead Actor: City, SPRWS  
Role: Provide Information, Reform regulations

The City and SPRWS should promote the high quality water that SPRWS distributes. As an alternative to single-serving bottled water, tap water is at least as safe, comparable in taste, and much cheaper. But the clincher is the high environmental cost of single-serving bottled water due to the shipping and the plastic. The following steps should be considered:

- a. Further reducing or eliminating altogether City purchases of bottled water for events and canceling its bottled water contract;
- b. Reviving the "Quality on Tap" marketing program of the SPRWS; and
- c. Endorsing or joining the national "Think Outside the Bottle" campaign as Minneapolis has done.

**Policy 1.14 Maintain and provide clean drinking fountains in public spaces.**

Lead Actor: City of Saint Paul  
Role: Financial assistance

Drinking fountains can be an essential service in public spaces. (See map in Appendix H.) They can be heavily used, especially during special events or hot weather. Knowing that public drinking fountains are available is likely over time to decrease private purchases of bottled water.

**Objective: Being Prepared for Emergencies**

Most emergencies can be mitigated with proper planning. In the event of an emergency (e.g., drought, spill of contaminants, sabotage, or power outage), the SPRWS maintains an emergency plan to reduce the extent and duration of any service loss.

River levels have never dropped so low that the SPRWS has been restricted from withdrawing water. However, global climate change may cause greater fluctuations in river levels. If there are severe water shortages in the future, the SPRWS has created a water use priority system in accordance with MN Statutes 103 G.261.

**Policy 1.15 Review and update SPRWS' Emergency Preparedness and Response plan every year.**

Lead Actor: SPRWS  
Role: Implementer

In conjunction with CTE Engineers, Inc., SPRWS created an Emergency Preparedness and Response (EPR) Plan in July 2003. It was updated in 2007.

**Policy 1.16 Continue to seek funding for the connection of the Minneapolis and Saint Paul municipal water supply systems.**

Lead Actor: SPRWS and the City  
Role: Coordinator, Financial Assistance

For the benefit of the entire Twin Cities, the SPRWS and Minneapolis Water Works systems should be interconnected. The connection would provide a partial backup if one or the other of the major treatment plants went offline. Minneapolis' need seems quite critical. If river water became unusable for any reason, Saint Paul with its chain of lakes, has at least 20 to 30 days of raw water available in reserve; whereas, Minneapolis has much less.

**Objective: Future Capital Investments**

The SPRWS is entirely self-supporting with revenue obtained through the sale of water and payments for other services. State law provides that the rates charged be adequate to cover all costs of facilities, operations, and maintenance. The utility receives no tax money.

**Policy 1.17 Maintain a clear capital budgeting system to preserve and improve infrastructure for the municipal water supply system.**

Lead Actor: Saint Paul and SPRWS  
Role: Financial Assistance

The municipal water supply is an essential public service; capital budgeting for it must provide for its long-term maintenance, repair, and updating.

Capital Investments Planned: 2008-2017

1. Water main replacement
2. Lead service replacement
3. Hydrant replacement
4. Drill new wells
5. Aeration system at Pleasant Lake
6. New water meters and metering system
7. Saint Paul - Minneapolis interconnect

**Objective: An Educated Public on Water Supply**

Increasing public education can reduce water usage. Technical and mechanical improvements increase water use efficiency, but residential customers are the primary end users of water from SPRWS. Changes in customers' daily habits could conserve significant amounts of water.

**Policy 1.18 Augment existing educational programs for school-age children.**

Lead Actor: SPRWS  
Role: Financial and Non-Financial assistance

SPRWS should do more to educate children about our municipal water supply. It is never too early to learn about water conservation and the safety of our water supply. SPRWS should explore allowing school groups to visit the treatment plant, as personal experience can be the best educational method.

**Policy 1.19 Expand and broaden general public education efforts.**

Lead Actor: SPRWS

Role: Financial assistance, non-financial assistance

Small amounts of educational information are currently included in the water bill and SPRWS quarterly reports. More could be done. Efforts to reach and engage a broader population should be initiated, although SPRWS should not be solely responsible for their initiation or implementation. Some topics for future educational efforts might be:

- a. The inter-relationship of the water cycle and water users across geographic scales and through time.
- b. Antibiotics, drugs and water. An initiative describing the dangers of flushing antibiotics and drugs into the water (leftover drugs should be discarded in the garbage).
- c. Groundwater protection. The public should have a greater appreciation of the need to protect groundwater, for example, finding and sealing abandoned wells.
- d. Communicating to a multicultural population. Different cultures learn and spread knowledge in various ways; thus, different media may be needed to reach different demographic groups.

## **2.0) Surface Water Management**

### **Sources of Water Pollution**

Water pollution comes from many sources. For regulatory purposes, they are divided into two broad categories: point source pollution and non-point source pollution. Point source pollution (e.g., from industries and sewage treatment plants) has been largely regulated by the Clean Water Act of 1977 and has become a relatively smaller threat. However, as urbanization has expanded, non-point source pollution (e.g., from rooftops parking lots, and roads) has become the larger source of urban water pollution and it is more complicated to control and regulate. Therefore, managing surface water runoff has gained importance as a method of improving urban water quality. The techniques for managing runoff are also rapidly evolving. Therefore, this section of the Water Plan contains more and greater policy changes than the sections on the municipal water supply and sanitary sewers.

In the natural, predevelopment savannah of central Minnesota, around 50 percent of rain water infiltrated into the ground; 40 percent transpired or evaporated; and only 10 percent ran off the land (see graphic). Natural contours and gravity defined how water flowed, both above and below ground, to wetlands, lakes and rivers.

With urban development, impervious surfaces—the rooftops, parking lots, and roads--prevent water from soaking into the ground. With increasing amounts of impervious cover, more and more water runs off the surface, disrupting an essential part of the water cycle. Runoff is captured by storm drains and sewers which pipe the water underground to ponds, lakes and rivers. Over 90 percent of the runoff in Saint Paul goes directly to the Mississippi River through storm sewers and surface drainage; the rest goes to the area's lakes before ending up in the river (see graphic on next page).

(Insert map of subwatersheds)

### **Intergovernmental Roles**

Governmental roles in surface water management are confusing due to the multiple layers of regulation and governmental units that have a role in carrying them out. A web of laws and organizations regulate surface water management. Different levels of government regulate different aspects of surface water. (See sidebar for a list and Appendix E for brief descriptions of each agency.)

(Insert list in sidebar: Governmental bodies involved in water management: Federal Environmental Protection Agency (EPA), Minnesota Department of Natural Resources (DNR), Minnesota Pollution Control Agency (MPCA), Minnesota Board of Soil and Water Resources (BWSR), Metropolitan Council, City of Saint Paul – Public Works, Department of Safety and Inspections, Capitol Region Watershed District, Ramsey-Washington Metro WD, Lower Mississippi River WMO, Mississippi WMO.

Minnesota statute 103B provides for special purpose governmental units that govern a particular watershed's surface water management. These units, which can take the form of joint powers watershed management organizations (WMOs) or watershed districts (WDs) follow the natural boundaries of a watershed, cutting across municipal lines. WDs are independent governmental bodies that can levy their own taxes and set rules that the City and citizens must follow. WMOs are established by joint powers agreements among the affected cities and counties and they typically choose to exercise fewer powers than WDs.

Two watershed districts encompass the majority of Saint Paul: the Capitol Region Watershed District (CRWD) and the Ramsey-Washington Metro Watershed District (RWMWD). The two districts' regulations are virtually identical. The West Side and a section of Saint Anthony Park are each controlled by separate WMOs: respectively, the Lower Mississippi River and the Mississippi River WMOs. (See Appendix H.)

In 2006 the Metropolitan Council approved the Saint Paul Local Surface Water Management Plan, which for legal purposes is incorporated by reference as an addendum to this Water Chapter of the Saint Paul Comprehensive Plan. The policies and recommendations for surface water management that follow are consistent with the Local Surface Water Management Plan; they both summarize the approved plan and extend its recommendations into emerging issue areas.

## **Strategy 2: Reduce pollutant loads to water bodies through augmenting public education, meeting regulations, and increasing local enforcement.**

### **Objective: Cleaner Run-off Through Public Education**

Saint Paul's original drainage system of wetlands, creeks and streams flowing into the Mississippi River has been greatly altered. Few wetlands or streams remain. The smaller water features were filled in decades ago and trunk storm sewers were built deep under the city. Returning to any semblance of the natural drainage system would require removing homes and businesses to restore topographical features that absorb or convey water. This is, with rare exceptions, infeasible. We have to start from what we have and make incremental improvements.

Runoff from rooftops, parking lots, roads, and even lawns flows into storm sewers and directly into the Mississippi River or a lake. Pollutants that are washed into storm sewers are carried into public water bodies. As a practical matter, water must be treated or filtered before it reaches a storm sewer and drops underground. This means that in order to improve water quality in the metropolitan region both public and private property owners must change their management of surface water on their own properties.

Therefore, all Saint Paul property owners should act as though their property were waterfront property. Significant water quality improvements in Saint Paul will come from minor changes made by many property owners. A few examples of these behavioral changes would be: picking up pet waste; redirecting downspouts from pavement to landscaped areas; clearing leaves and debris from storm sewer grates; reducing the use of fertilizers and de-icers; and washing cars at car wash businesses (their drains connect to sanitary sewers) instead of on the street. These individual choices and actions can reduce non-point source pollution.

**Policy 2.1 In collaboration with other organizations, ensure delivery of public education programs on urban water quality.**

Lead Actor: City and Watershed Districts

Role: Financial and technical assistance, Coordinate, Implement

Public education is critical to changing habits that cause water pollution. A variety of governmental and non-profit organizations offer education about water quality. The City should assist and coordinate these efforts and fill in gaps where they exist. Some of the educational material should be targeted to developers and City staff to inform them of various best management practices (BMPs) and to become comfortable using them. (See Appendix I for explanations and examples of urban BMPs.)

**Policy 2.2 Disseminate knowledge of the regulations regarding surface water management and engage citizens and other stakeholders in meeting regulations through best management practices (BMPs).**

Lead Actor: Watershed Districts and City

Role: Coordinate, Implement, Financial and technical assistance

Saint Paul and the watershed districts need to raise the level of public knowledge surrounding regulations and storm water management techniques. There are many ways this can be done, such as:

- a. Investigate the creation of a City website dedicated to information regarding regulations, storm sewers, BMPs, sanitary sewers etc.
- b. Work closely with district councils to incorporate water quality into local planning and encourage active communication between district councils, the City Water Resources Coordinator, watershed districts and other partners to effectively leverage opportunities for achieving Saint Paul's water-related goals.
- c. Collaborate with both traditional and non-traditional partners on water issues. Organizations and entities that may not normally deal with water issues, such as churches or school groups can help the city reach a wider audience.
- d. Raise public awareness of watershed organizations.
- e. Undertake demonstration projects.
- f. Use the National Great River Park Plan to help meet this policy.

(Partners with Saint Paul on water issues: Watershed Districts and Management Organizations, Ramsey County Conservation District, FMR, Great River Greening, Lower Phalen Creek Project, Clean Water Action, MNRRA, Metro WaterShed Partners)

**Objective: Cleaner Lakes/Cleaner River**

High quality water is an expectation of Minnesotans and many believe pollution controls could be stricter (Minnesota Report Card on Environmental Literacy, 2002). The general goal of surface water management is to move back toward more natural, "predevelopment" conditions by reducing surges of runoff and minimizing pollutants.

Impervious cover, of course, disrupts the normal water cycle by blocking water from infiltrating into the ground and causing runoff. The watershed districts have done estimates of the amount of impervious cover in their parts of the city. Taken as a whole, about 40 percent of Saint Paul is covered with impervious surfaces; streets, parking areas, and rooftops are the major categories. (See Appendix J for Graphs of Impervious Surface Percentages for Each Watershed District.)

The major contaminants of non-point source pollution include sediment, organic compounds (in excess of natural levels), trace metals and chlorides. (See Appendix J for Table X: Urban Storm Water Pollutants and Their Effects.)

These pollutants are contaminating and disrupting the natural balance in many of Saint Paul's water bodies. The primary method for achieving better water quality and reducing surges of runoff is to infiltrate more water into the ground. (See appendix J for Table X: Estimated Pollutant Removal Effectiveness for Infiltration Basins.)

**Policy 2.3 Comply with existing and future plans, permits, laws and rules for surface water management, and update them when required.**

Lead Actor: Saint Paul  
 Role: Implement

Surface water management regulations are becoming tougher due to both federal and local requirements. Total maximum daily load (TMDL) studies, a result of the Clean Water Act, are becoming increasingly common and require local reduction of pollutant loads to impaired waters. It is anticipated that the City will comply with regional and state requirements and rules, which among other things, require developments to infiltrate rainfall. (See Appendix E for a list of existing plans, permits and other regulations that apply to property owners in the city.)

Impervious cover associated with transportation infrastructure has the highest pollutant load of any land use (Storm Water Strategies: Community Responses to Storm Water Pollution, 1999). While roads don't actually produce pollutants, they hold pollutants until they are cleaned up or washed into storm drains. Current BMP programs such as street sweeping and cleaning out catch basins reduce the amount of pollution that reaches local waterways.

**Policy 2.4 Establish a Litter-Free Saint Paul campaign in conjunction with district councils and other non-profits.**

Lead Actor: City, District Councils and Watershed Districts  
 Role: Coordinate, Financial and non-financial assistance

Not all trash makes it to landfills; in fact the amount found on our roadways is staggering. (See appendix J for Table X: Amount of Litter Found on Ohio Roads Annually.) Hardly anyone would just throw trash into a lake or the river, but most of us pass by litter lying in a gutter where it will be washed down a storm sewer and into a lake or the river. This litter is not only unsightly, it also harms wildlife and, as it degrades, releases pollutants into the water.

**Policy 2.5 Strengthen the City ordinance against raking leaves into the street, and disseminate information about the damage autumn leaves do to water quality. (Reference: City Legislative Code, Sec. 106.02)**

Lead Actor: Saint Paul  
 Role: Implement

The current ordinance allows property owners to rake leaves into the street, if they have fallen from trees on public property. The ordinance should be revised to prohibit raking any leaves into the street. Leaves and sticks in the street that are flushed down storm sewers cause high phosphorus levels in the receiving water bodies.

**Policy 2.6 For the Mississippi River, meet water quality standards set by the Minnesota Pollution Control Agency (MPCA) and the Environmental Protection Agency.**

Lead Actor: Saint Paul and Watershed Districts  
 Role: Coordinate, Implement

The largest Total Maximum Daily Load (TMDL) study in Minnesota is the Lake Pepin TMDL, expected to be completed in 2009. Saint Paul, lying upstream from Lake Pepin, will be impacted by the findings and requirements to reduce sediment loads reaching the River. Other impairments for the Mississippi River have been found and will be addressed through other TMDLs.

**Policy 2.7 Participate in total maximum daily load (TMDL) studies and implement programs and projects to comply with load requirements set by approved TMDLs.**

Lead Actor: Saint Paul

Role: Coordinate, Implement

Several water bodies in Saint Paul have been found to be impaired by the MPCA (see sidebar). Each of these will require its own TMDL study and will have localized effects.

As part of Battle Creek's TMDL for chlorides, an educational or citizen engagement component should be developed. Then the results should be used and communicated citywide to help citizens and businesses understand the importance of appropriate salt use and application.

(sidebar: Saint Paul's impaired waters list as of 2008, MPCA. The Mississippi River adjacent to Saint Paul is impaired for fecal coliform, turbidity, PCBs and PFOs in fish tissue (and mercury in water column and fish tissue). Como (mercury in fish) and Beaver Lake (mercury in fish) each have too much phosphorus. Battle Creek is impaired for chlorides. Lake Phalen is impaired for PFOs in fish tissue. Eagle Lake is impaired for PCB with a fish consumption advisory. (Mercury impairments should be delisted if draft 2008 TMDL list is approved by EPA)

(Sidebar: What is a total maximum daily load (TMDL)? As part of the Clean Water Act, states are required to submit a list of impaired waters to the U.S. Environmental Protection Agency every two years. A water is impaired if it fails to meet one or more basic federal water quality standards. As a result of an impairment, the state (administered by the PCA) must evaluate the pollutant sources and make reasonable progress towards addressing the impairment.

A TMDL study is undertaken for each of the impairments. Each study is composed of several parts. The study determines the amount of a pollutant that is currently entering the water. Then, it determines the maximum amount of the pollutant that can be present in the water while meeting water quality standards. The difference between these two levels is how much pollutant must be removed from the system. A list of the contributing water bodies must be prepared, indicating how much of the pollutant they contribute and how much they will have to reduce their pollutant loads. Timelines are created for actions to be taken within two years, within five years, and longer term. More information on TMDL's can be found either through the EPA or the MPCA.)

**Policy 2.8 Reduce erosion throughout Saint Paul.**

Lead Actor: Saint Paul

Role: Implement

According to the 2006 CRWD monitoring report, from April through November, nearly 3,000,000 pounds of suspended solids entered city water bodies from nearly 11,000 acres of land. That means roughly 270 pounds per acre of suspended solids washed into water bodies in less than one year. (See Appendix J). This is a staggering amount, and it needs to be reduced through the following methods:

- a. Improve Saint Paul's regulatory enforcement and management of erosion control in construction zones. The City must do this in accordance with the National Pollution Discharge Elimination System (NPDES) permit issued to the City by the Pollution Control Agency.
- b. Reference policy 2.16 (Identify and implement standards for sites less than one acre); and
- c. Identify erosion-prone areas of publicly-owned land and determine solutions case by case, which may involve revising mowing practices, replanting with native vegetation, re-grading, or adding retaining walls.

**Policy 2.9 Reduce the negative impacts that roadways in the city have on water quality and water resources.**

Lead Actor: Saint Paul, Watershed Districts  
Role: Implement, Support

Paved roads cover more acres in the city than any other category of impervious surface. Many strategies exist to reduce runoff and pollutant loads from streets and roads even in built-up communities. The Residential Street Vitality Program (RSVP) is the City's primary paving program. Most RSVP projects fall under Watershed District requirements for infiltrating water. During RSVP projects, the City should:

- a. Work with district councils to meet city and neighborhood needs while also meeting regional and State requirements. (Refer also to Policy 2.2b.)
- b. Use or consult Low Impact Design (LID) concepts and tools;
- c. Undertake demonstration projects or programs; and
- d. Encourage the construction of residential rain gardens without sacrificing boulevard tree health or residential densities (Refer also to Policy 2.20).

**Policy 2.10 Reduce the negative impacts that parking lots in the city have on water quality and water resources.**

Lead Actor: Saint Paul, Watershed Districts  
Role: Implement, Support

Parking lots are another major source of impervious surfaces in the city. Many methods exist to reduce runoff and pollutant loads from these areas. As with streets, the solutions tend to be more difficult and costly to accomplish in urban areas. The City should change its off-street parking requirements and implement other actions to reduce the size of surface parking lots. (Add reference to the Transportation Plan).

**Policy 2.11 Reduce the negative impacts that alleys in the city have on water quality and water resources.**

Lead Actor: Saint Paul, Watershed Districts  
Role: Implement, Support

Alleys can play a role in surface water management. Alleys should take on more importance as the city becomes denser. (Add reference transportation plan). The City should do the following:

- a. Consider alternatives to standard alley resurfacing, such as giving citizens the option to repave their alley with porous pavement, that will reduce alley runoff and be more aesthetically appealing.

**Policy 2.12 Implement the practices and equipment improvements recommended in the Minnesota DOT Guidance document, Minnesota Snow and Ice Control - Field Handbook for Snowplow Operators.**

Lead Actor: Saint Paul  
Role: Implement

- a. Recent research shows that many communities, in their winter maintenance programs, are switching to straight salt or high-salt de-icers instead of sand and salt mixtures. This change in de-icers without corresponding changes in equipment and application procedures is resulting in chloride impairment of waters throughout the region, including Battle Creek in Saint Paul. By implementing the recommendations in the Minnesota Snow and Ice Control field handbook (August 2005), such as advanced truck calibration equipment and road temperature sensors, safety on roadways will be maintained while the application of salt will be cut back.

[

**Policy 2.13 Reduce the negative impacts of rooftop runoff on water quality and water resources.**

Lead Actor: Saint Paul  
Role: Support, Implement

The final major category of impervious surface in the city is rooftops. Many strategies exist to reduce runoff and pollution from rooftops. The City should control runoff from its municipal buildings and encourage others to do likewise at their buildings through the following techniques:

- a. Using cisterns and rain barrels, which first reduce runoff and then conserve on municipal water needed for irrigating lawns and gardens;
- b. Redirecting downspouts towards pervious areas or through planter boxes; and
- c. Constructing green roofs. Green roofs come in a variety of depths and costs. Depending on the desired function, they can be as thin as a few inches planted in succulents or as thick as a foot of soil planted with grasses, shrubs or even vegetables. Depending on rain intensity and green roof depth, between 15 and 90 percent of potential runoff can be absorbed; 50 percent is typical ([source](#) and [source2](#)). Green roofs have additional benefits such as decreasing the urban heat island effect, decreasing building energy costs, extending roof lifespan and making the cityscape more beautiful.

**Policy 2.14 Continue to use site plan review as an opportunity to improve surface water management on proposed developments.**

Lead Actor: Saint Paul  
Role: Implement

While maintaining the density and economic feasibility of projects undergoing site plan review, the City should encourage:

- a. Designs and landscaping that clean and minimize runoff i.e., above-ground BMPs;
- b. Maximizing pervious areas; and
- c. Preservation of natural areas and mature trees.

The City should also:

- d. Develop and maintain a catalog of BMPs to be used during site plan review;
- e. Encourage the use of Low Impact Development (LID) concepts and tools during larger redevelopment projects like new urban villages; and
- f. Continue to work with the watershed district staff on projects that trigger their rules (projects over one acre in size).

**Policy 2.15 Explore ways to reduce storm water runoff and improve water quality from existing sites.**

Lead Actor: Saint Paul and Watershed Districts  
Role: Support, Implement

Only new construction at sites larger than one acre is subject to watershed district rules. Therefore, improvements in overall water quality due to the existing regulations will be tediously incremental. Additional methods that encourage retrofitting current sites to reduce storm water runoff should be pursued. The City should:

- a. Reevaluate, as information systems grow, whether it would be practical to change the City's storm sewer service charge from generalized land use categories to site-specific charges, that is, a system for charging each property for the actual amount of runoff it contributes to the storm sewer system;
- b. Develop incentives for property owners to retrofit their storm water systems voluntarily to meet infiltration and water quality standards;
- c. Encourage the use of cisterns and construction of rain gardens in appropriate areas with good soils and low or no pollutant loads; and
- d. Standardize the City's process for deciding on curb cut requests for boulevard rain gardens.

**Policy 2.16 Develop and adopt appropriate standards for storm water management on development sites small than one acre.**

Lead Actor: Saint Paul  
Role: Implement, Coordinate

Within the Capitol Region watershed district, 85 percent of all parcels are smaller than an acre in size. These parcels make up roughly 3,000 of the 11,000 acres of the district. Comprising over 25 percent of the district, including virtually every residential lot, these areas can connect citizens to appropriate surface water management techniques. The City should:

- a. Set up an interagency process to establish criteria for parcels smaller than an acre (reference policy 2.14); and
- b. Update the Ramsey County handbook that requires site plan review regulations (61.402.c) to deal with issues such as erosion (reference policy 2.8).
- c. Revise Saint Paul's storm water ordinance (Saint Paul's Legislative Code, Sec. 52).

**Policy 2.17 Work on an area-wide or citywide scale to identify and use sites to meet volume reduction requirements in the best and most cost-effective manner. The results must recognize different land uses and emphasize cooperation and communication between City departments.**

Lead Actor: Saint Paul, WMO's  
Role: Coordinate, Study, Implement

A 2008 study categorizes the infiltration potential of land citywide. Different areas of the City have good or bad infiltration potential. The City will identify infiltration opportunities on good sites in order to bank infiltration credits. City departments will have to cooperate and communicate about the amount of water to be infiltrated, who will maintain the BMPs and how it will balance with other uses of the site. Other factors to consider:

- a. The City and Watershed Districts may need to acquire land in certain situations to help meet area-wide requirements;
- b. The City should work to establish area-wide infiltration "banks" to meet volume reduction requirements; and
- c. The City will need to solicit input and assistance from other agencies, and local government units such as Watershed Districts, MnDOT, Ramsey County, Saint Paul Public Schools, and adjacent municipalities.

**Policy 2.18 Strive toward consistent surface water management regulations throughout the city.**

Lead Actors: City and WMOs  
Role: Coordinate, Study, Implement

Multiple layers of regulation exist and, due to watershed district boundaries, part of St. Anthony Park and all of the West Side neighborhood have different regulations than the rest of Saint Paul (see map). Steps toward simplifying the rules and regulations could aid development and public participation in water management. Saint Paul should:

- a. Form an interagency coordination committee to attempt to harmonize and streamline requirements citywide. The committee should review storm water guidelines and the Wetland Conservation Act (WCA) authority with respect to areas outside of watershed district jurisdiction. Erosion control authority should also be reviewed.

**Objective: A Water-Wise City Landscape**

Saint Paul is an older, fully developed city. Close to 70 percent of the land in the city is built up, half of that with housing. The other 30 percent is not built up and includes parks, cemeteries, golf courses, the lakes and river. This variety of land uses contributes to a gradation of landscapes in

the city. Some areas, like downtown, are almost completely covered in impervious surfaces with little greenery, while most residential districts have boulevard trees, lawns and gardens. There are also areas along the Mississippi River that are largely unmanaged and left wild.

This objective focuses on the non-built environment. In terms of water management, plants and soils are not all equal. Some areas are good at infiltrating water, some are erosion-prone, some are polluted and some are too compacted to soak up much water. Sand and undisturbed, un-compacted native soils are the best at infiltrating water. Wetlands can remove pollutants from water as can other plants and soil. Green areas of the city provide many benefits; among them is the improvement of water quality. More policies related to this objective for a water-wise city landscape can be found in the Parks and Recreation Chapter.

**Policy 2.19 Encourage the use of native vegetation for appropriate land uses.**

Lead Actor: Saint Paul and Watershed Districts  
 Role: Support, Non-financial assistance

Deep-rooted plants can improve soil conditions by building and loosening soil, increasing infiltration and reducing erosion. They are especially useful on urban soils which are compacted or disturbed. Saint Paul has a preference for native plants and cultivars, but non-native plants that are deep-rooted and non-invasive are certainly acceptable. Invasive non-natives should be discouraged. The City should collaborate with partners to provide technical assistance about desirable and undesirable plant species.

**Policy 2.20 Promote tree planting and improved tree planting strategies to reduce runoff by increasing the survival rates and lifespans of trees.**

Lead Actor: Saint Paul  
 Role: Support, Financial or Non-financial assistance

Trees play a role in storm water management as well as overall city aesthetics (see sidebar). The City requires trees to be planted in parking lots, around developments and along boulevards. Unfortunately, many trees die young before their benefits are realized. Research from Chicago estimates that trees must live between nine and 18 years before the benefits outweigh the costs to the community (Chicago's urban forest ecosystem: results of the Chicago Urban Forest Climate Project, McPherson E.G, 1994). Typical problems for urban trees include limited soil volume and organic matter, compacted soil, elevated temperatures, and lack of watering. Therefore, the City should:

- a. Evaluate proposed landscaping requirements for parking lots in the Mississippi River corridor and possibly apply them citywide. Draft regulations for parking lots in the Mississippi River Critical Area, which are under review by the Planning Commission in 2008, would require two square feet of landscaped area for every ten square feet of paving (double the current level); one canopy tree per six parking spaces in lots with less than 100 spaces and one canopy tree per eight parking spaces in lots with greater than 100 spaces;
- b. Promote better designs, and planting and management techniques such as increasing soil volumes, reducing soil compaction before planting and ensuring adequate amounts of topsoil are used;
- c. Promote design standards for trees that incorporate storm water collection and infiltration that improve tree survival rates and reduce storm water volumes;
- d. Encourage increased tree planting by private property owners possibly by creating, assisting or strengthening tree planting programs;
- e. Identify tree canopy cover citywide; and
- f. Coordinate with the Complete Streets movement as described in the Transportation Plan.

(Include in sidebar: Trees intercept rainfall in their leaves and bark, decreasing the amount that reaches the ground. Tree canopies also decrease the intensity of rainfall, decreasing erosion and runoff. Research estimates that 100 mature trees intercept 100,000 gallons of water a year in

their canopies (source?). Of course trees provide many benefits beyond their hydrological ones-- they improve aesthetics, decrease energy costs, reduce air pollutants, sequester carbon, decrease air temperatures, increase property values, and provide habitat.)

**Policy 2.21 Preserve and restore native shorelines to improve water quality.**

Lead Actor: Saint Paul Parks Department, Watershed Districts  
Role: Implement

Shoreline land use and vegetation type and quality can affect water quality, habitat value and human health. Regulations for shoreline buffers depend on whether they are for the Mississippi River or other water bodies in the city. For the river, the Mississippi River Critical Area amendments, which are under review by the Planning Commission in 2008, propose changes to the current regulations (Article II. 68.210 of the Zoning Code). These amendments will set stricter standards and regulations for development in the Critical Area.

For other water bodies, the DNR has authority to require local adoption of model shoreland standards by ordinance. The DNR has not exercised this authority in Saint Paul because virtually all of Saint Paul's water bodies are surrounded by parkland, and the DNR has higher priorities for its shoreland program elsewhere. Whenever the DNR gets to Saint Paul and requests the City to adopt a shoreland ordinance, Saint Paul will do so.

Even in the absence of an ordinance, the Parks and Recreation Department has been and will continue to redesign and renaturalize shorelines of many of the lakes and streams in the city. Doing so is broadly consistent with the City's own goals. Additional policies are found in the Parks and Recreation Chapter.

**Policy 2.22 Preserve or improve accessibility to water bodies.**

Lead Actor: Saint Paul  
Role: Implement

Saint Paul has more Mississippi River shoreline than any other city. Preserving public access to the river and to other city water bodies—consistent, of course, with public safety-- is a priority. Places where one can see, hear, and touch bodies of water grip the imagination and lend a special charm to the city. This topic is also discussed in the Parks and Recreation Chapter. (See water access features map in Appendix H.)

**Policy 2.24 Study the benefits that density has for water quality as discussions of higher densities and taller buildings occur.**

Lead Actor: Saint Paul  
Role: Implement

For many years, lower density housing and development has been presumed to be better for water quality because each site has less impervious cover. But recent research shows that, at the metro scale, lower density development can regionally lead to increased runoff and greater water pollution, primarily due to the increased amount of developed land (Protecting Water Resources with Higher Density Development, EPA 2006). Higher densities in neighborhoods designed for walking and public transit can redirect urban sprawl and reduce rooftops, roads and parking lots in the metro area. In addition, with higher densities the costs of implementing BMPs can be decreased per person by sharing the costs with greater numbers of people.

**Objective: Aquifers With Pure Water**

Groundwater is an invaluable resource that is out of sight and almost always out of mind. It is hard to regulate since it flows with no relationship to jurisdictional boundaries, not even watershed boundaries. Aquifers are used primarily for municipal water supplies, but they are tapped for some other uses as well. Groundwater movement and its interactions with surface water are not

completely understood. Contaminated surface water and leaking pollutants seep into the groundwater and can move into rivers and lakes through shallow aquifers or may continue sinking over a long period of time into the deeper aquifers that are used for wellwater. Thus, restrictions on hazardous materials or land uses in areas with sensitive groundwater make sense to protect groundwater quality and human health. (See related policy 1.3. Also see Appendix H for a map of Sensitive Groundwater Areas in Saint Paul.)

**Policy 2.25 Strongly encourage an update to the Ramsey County Groundwater Quality Protection Plan that will include specific action steps for municipalities.**

Lead Actor: Ramsey County and Ramsey Conservation District  
Role: Support

Within Minnesota, counties typically are the entities to monitor and protect groundwater resources. The 1996 Ramsey County Groundwater Quality Protection Plan was written to provide:

- An assessment of groundwater resources in Ramsey County and threats to it;
- Create a framework for coordinating groundwater protection among local governmental units; and
- Design programs/techniques for the protection of this resource.

Implementation of the plan is voluntary and relies on proactive preventative activities to maintain the amount and quality of groundwater. However, the plan needs to be updated and should contain at least the following:

- a. Action steps to protect groundwater from contamination;
- b. Recommendations for each municipality; and
- c. Identification of abandoned wells in Saint Paul that need to be sealed as required by Minnesota Department of Health rules.

**Policy 2.26 Advertise and communicate the importance of well-sealing programs.**

Lead Actor: Watershed Districts, Ramsey Conservation District, Saint Paul  
Role:

It is truly less expensive to prevent pollution than to clean it up. More efforts must be taken to protect groundwater for human and ecological health. The watershed districts and county currently have well-sealing cost share programs that should be more advertised and expanded if necessary. The City should assist in advertising the programs. The Ramsey Conservation District should also advertise the abandoned well rules of the state Department of Health and rehire a groundwater specialist.

**Objective: Wetlands**

Wetlands provide valuable functions such as cleaning runoff, infiltrating water, recharging aquifers, providing habitat and reducing flooding. Historically Saint Paul had many more wetlands, but most have been drained or converted into lakes. Wetlands are regulated largely by the Minnesota's Wetland Conservation Act (WCA), which is administered locally and requires no-net-loss of wetlands (through a two-to-one replacement ratio).

**Policy 2.27 Complete a Wetland Management Plan for Saint Paul and implement its findings.**

Lead Actor: Saint Paul  
Role: Implement

In 2008 the City is working on a Wetland Management Plan to protect and enhance wetlands. The objectives of the plan are to collect background information, coordinate departments and agencies, conduct assessments, classify wetlands and develop management strategies.

**Objective: Sustainable Funding for Effective Water Infrastructure**

Providing storm drains and sewers for the city is a valuable function that increases safety and health. However, many of them were constructed a hundred or more years ago and are expensive to maintain or replace.

**Policy 2.28 Remain abreast of the rapidly evolving field of storm water BMPs in order to find the most efficient and cost-effective ones. Work to minimize maintenance costs and improve the functioning of BMPs.**

Lead Actor: Saint Paul and Watershed Districts  
Role: Implement, Coordinate

With continuous improvement in storm water BMPs in the coming decade, ongoing training and feedback will be essential for staff, policy leaders and construction companies that install them. (Also see related policy 2.2.) Monitoring the performance, maintenance and cost effectiveness of various BMPs will be important.

**Policy 2.29 Operate and maintain adequate storm sewer infrastructure and service in all parts of the city.**

Lead Actor: Saint Paul  
Role: Implement

Saint Paul operates over 450 miles of storm sewer pipes and tunnels. There are 106 discharge points from the storm sewer system, of which almost 60 go to the river. In addition, there are over 26,000 catch basins and 20 storm water ponds. This all adds up to a system with enough redundancy so that it hasn't flooded in any significant way or caused a combined sewer overflow (CSO) in over 10 years.

**Policy 2.30 Provide adequate funding to support replacement of deteriorating infrastructure.**

Lead Actor: Saint Paul  
Role: Implement

The Sewer Utility's 2007 budget is \$54 million, of which the major expenditures include: debt service of \$11 million, payment to the regional treatment facility (MCES) of \$16 million, capital improvements of \$11 million, and six million for operations and maintenance. This includes both storm and sanitary sewers. In addition, \$1.2 million is budgeted annually to implement watershed rules on street projects.

(More work is forthcoming on this policy and policy 3.6. But in this case, the question is what level of funding is needed for sustaining the infrastructure, or what is the plan for determining that amount?)

### **3.0) Wastewater Plan**

#### **Introduction**

Collecting and treating sanitary sewage is a shared responsibility between Saint Paul and the Metropolitan Council. The sanitary sewer collects wastewater from homes and other buildings and conveys it to huge regional sewer interceptor pipes leading to the Pig's Eye treatment plant. After treatment, the water that is put back into the river is cleaner than the normal flow in the river. An effective sewage treatment system is critical for public health and the natural environment.

Saint Paul owns and operates 806 miles of sanitary sewers and 23 sanitary sewage pumping stations, which would cost more than a billion dollars to replace. This section of the Water Plan is about the maintenance and operation of the City's sanitary sewer system.

The Metropolitan Council Environmental Services (MCES) is charged with planning for wastewater treatment throughout the Twin Cities area. In addition, they own and operate the regional interceptors and eight treatment plants. The Metropolitan Wastewater Treatment Plant (the Pig's Eye plant) is the largest plant, treating nearly 80 percent of the Twin Cities' wastewater. Designed to treat 251 million gallons daily (MGD) of wastewater, the plant treated an average of 185 MGD in 2006. The average flow has actually decreased from 200 MGD to 185 MGD recently due to reductions of combined sewer overflow events (see graphic of WWTP flows). The Metro Plant has an outstanding record of compliance with state and federal clean water discharge permits, regularly winning awards and recognition. Apart to what is included in this plan, MCES has additional requirements for municipal wastewater planning that are being addressed directly by the Public Works Department.

(Insert in sidebar or appendix: History of Saint Paul's Sanitary Sewer System)

Saint Paul's sewer system dates back to the mid-1800's. Extensions of the basic system corresponded to the development of the City and natural topography. In the original system, both sanitary sewage and storm water runoff were carried in a single pipe called a combined sewer and discharged without treatment to the Mississippi River. Since Saint Paul started as a river town, the original sewers drained to the Mississippi River or to several natural streams draining to it. As early as 1900, city engineers began to question the capacity of the system to accommodate the rapidly expanding city.

Impending capacity problems and increased concerns over pollution of the Mississippi River forced the need for major sewer construction during the 1920's and 1930's. In 1933, St. Paul and Minneapolis formed the Minneapolis-Saint Paul Sanitary District to treat the sewage from both cities and adjacent suburbs. The Metropolitan Wastewater Treatment Plant was constructed in 1938, the first in a large city on the Mississippi River. Finally, sanitary sewage was diverted from the river to the treatment plant near Pigs Eye Lake in Saint Paul. However, during periods of wet weather, the combination of storm water and sanitary flow exceeded the capacity of the interceptor sewers and the treatment plant, spilling sewage directly into the river.

As Saint Paul, became more densely developed, sewage capacity problems became increasingly apparent. The major problem was that combined sewers could back up into homes, businesses and streets or overflow, spilling sewage into the Mississippi River. In the mid-1950's after severe flooding and sewer backups, the City embarked on a long-range program of relief sewer construction. In some cases, the relief sewers were reconnected to the combined sewers where capacity was adequate. In other cases, storm water was separated from the combined sewers.

In 1984, Saint Paul, Minneapolis, South Saint Paul and the Metropolitan Council, under the direction of the U.S. Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA), decided to complete the construction of separate sewer systems for sanitary sewage and storm water in all three cities. Saint Paul had a head start by beginning separation in the early 1960's and by 1986 about sixty percent of the City was completed. From 1986 to 1996, Saint Paul's Department of Public Works accelerated the Combined Sewer Separation Program (CSSP) and completed sewer separation.

Completion of Saint Paul's sewer separation program was a great success. It resulted in significant improvement in the quality of the Mississippi River because combined sewer overflows (CSOs) were eliminated, illustrating Saint Paul's commitment to stewardship of the environment. An equally important success of the program was improving the quality of life in neighborhoods by eliminating basement backups and intersection flooding. Saint Paul is one of a few cities its size to completely separate its sewers.)

**Strategy 3: Operate and maintain a cost effective sanitary sewer infrastructure that preserves the health of people and the environment.**

**Policy 3.1 Operate and maintain the sanitary sewer infrastructure and provide service throughout the city.**

Lead Actor and Role: The Saint Paul Public Works Department is responsible for all of the recommendations in the Wastewater section of this plan, so notes on lead actor and role for each policy are unnecessary.

Ongoing sanitary sewer operation, maintenance and rehabilitation programs include:

- a) Major Sewer Repair: The purpose of this program has been to repair both sanitary and storm sewer systems throughout the City to extend service life and reduce inflow and infiltration (I&I).
- b) Sewer Inspection: In 2004, the City began inspecting its sanitary sewers on a ten-year cycle. Since 2004, 35 percent of the City's sanitary sewers have been cleaned and inspected.
- c) Sewer Lining: The Sewer Utility has been lining approximately 14 miles of sewer annually since 1997 with another 150 miles scheduled to be lined. The lining process prolongs the life of the pipe by 50 years, decreases friction within the pipe which increases flow speed, and eliminates I&I, which is explained under Policy 3.5.
- d) Tunnel Rehabilitation: This program was started in 2006 and includes the rehabilitation of both storm and sanitary sewer tunnels. Each year needed repairs are scheduled into this capital improvement program.
- e) Maintenance: Routine maintenance keeps sewers in good and safe condition by repairing defects as they occur including debris removal, removal of tree roots, removal of blockages and repair of minor sewer defects.

Within Saint Paul around 120 properties do not have sewer connections and therefore these programs do not pertain to them. These properties are concentrated in the Highwood area of Saint Paul.

**Policy 3.2 Provide sanitary sewer service, wherever practical, to properties now operating on-site disposal systems with a goal of eliminating on-site systems by 2025.**

In 2008 about 120 residential properties are not served by sanitary sewers, down from about 200 in 1998. These properties remain unconnected to the sanitary system because of high bedrock, low density development and other reasons that lead to high costs for sewer construction. They are concentrated in the Highwood area, although a few are scattered throughout the rest of the city. (See Appendix H for a map of ISTS locations.)

A step toward implementing the goal of eliminating on-site systems would be for plan checkers who review plans for new houses in Highwood to advise builders on whether the elevation of lowest floor is compatible with a gravity connection to a future sewer or will require pumping.

**Policy 3.3 Ensure that individual sewage treatment systems are operated effectively within the standards set by the Minnesota Pollution Control Agency.**

Saint Paul's management and control program of individual sewage treatment systems (ISTS) meets the current Minnesota Pollution Control Agency (MPCA) standards. A description of Saint Paul's program and a copy of the ordinance, which was updated in 1998, is included in Appendix K.

**Policy 3.4 Ensure adequate sanitary sewer capacity for more intensive redevelopment.**

Sanitary sewer capacity is ample for the city's projected growth in population and employment. There is surplus capacity because: (a) sewers that were designed historically to handle both storm and sanitary flow now carry only sanitary; (b) breweries and other industrial water users have closed; (c) water conservation; and (d) new efforts to reduce inflow and infiltration into sanitary sewers. Even so, it is important wherever major redevelopment is planned or proposed to verify that sewer capacities in the vicinity are adequate for the projected increases.

(Insert chart or graph of projected growth and sanitary sewer flows.)

**Policy 3.5 Coordinate with the Metropolitan Council Environmental Service towards a fair, comprehensive and cost-effective resolution to the reduction of inflow and infiltration into the sanitary sewer system.**

"Inflow" refers to clear water or rainwater that enters the sanitary sewers through connections or leaks in the plumbing systems of buildings. "Infiltration" refers to groundwater that seeps into the sanitary sewers through cracks or joints of manholes and pipes, and leaking water lines to houses. Infiltration occurs most often in areas with clay soils and high groundwater levels. Inflow and infiltration (called I&I) result in higher sewage treatment costs because clean water is being piped to the sewage treatment plant.

In 2006, Metropolitan Council Environmental Services (MCES) adopted a Surcharge Program to impose significantly higher wastewater treatment fees in municipalities that have excess amounts of I&I and fail to implement programs to reduce it over time. Fifty-six communities including Saint Paul and Minneapolis exceeded their I&I allowances, and therefore face the threat of high waste treatment bills (which come to property owners as a line item on their water bills). For MCES, reducing I&I is much more cost-effective than building additional sewer capacity and to continue accommodating high volumes of I&I.

The biggest source of inflow in the city used to be rainleaders from rooftops connected directly to the sewers. Since 1985, almost all of the rainleaders have been disconnected and now discharge onto the ground. (See sidebar on the Rainleader Program and Appendix L for more information on I&I.)

In 2007, Saint Paul did a pilot study of I&I in the Highland Park neighborhood. "Smoke" was forced through the pipes to see where leaks were. The City is working with the MCES during 2008 to develop an implementation plan for Saint Paul to seal up leaks and apply the findings in other areas of the city.

However, MCES needs to consider the I&I occurring in its own interceptor pipes as they flow under Saint Paul. Saint Paul has far more MCES interceptors, with much more wastewater from other communities, than any other municipality. Therefore Saint Paul is potentially charged for I&I that is occurring on MCES interceptors.

(insert sidebar: Rain Leader Disconnect Program: In 1985, the City began a voluntary Rain Leader Disconnect Program. At that point in time surveys indicated that approximately 18,000 homes and 4,000 commercial buildings having rain leaders connected to the sanitary sewer system. This voluntary

program was made mandatory when the City Council adopted a rain leader disconnect ordinance on March 5, 1987 (Section 41.03 of the City's legislative code).

Enforcement of St. Paul's Rain Leader Disconnect Program continues today. The program requires property owners to disconnect rain leaders and other connections for storm water and clear water from the sanitary sewer system. Since 1985 a large number of homeowners and commercial properties have been disconnected in St. Paul. Between 1985 and 1987 alone over 12,000 homes and 1,000 commercial properties were disconnected.)

Together inflow and infiltration is termed I&I. I&I increases the risk of a sewer pipe collapse, sinkhole or surface depressions. I&I also unnecessarily raises the amount of water a treatment plant treats, increasing the costs for all communities. Lastly, it also can cause Combined Sewer Overflows (CSOs) if the combined clear water and wastewater are greater than the treatment plant's capacity.)

**Policy 3.6 Provide adequate funding to support replacement of deteriorating infrastructure and to avert the risk of a significant unfunded liability.**

Sanitary sewer projects financed by 2008 sewer bonds:

|                     |             |
|---------------------|-------------|
| Sewer Lining        | \$6,400,000 |
| Major Sewer Repairs | \$1,960,000 |
| Total               | \$8,360,000 |

It is estimated that the replacement cost of the entire sewer system would be well over one billion dollars. The Sewer Utility's 2007 budget is \$54 million, of which the major expenditures include: debt service of \$11 million, payment to the regional treatment facility (MCES) of \$16 million, capital improvements of \$11 million and six million for operations and maintenance.

**Policy 3.7 Maintain the integrity of the Sewer Utility Enterprise Fund.**

The Metropolitan Council bills the City monthly for sanitary sewer treatment charges based on the volume of water measured by the Metropolitan Council. The City in turn bills property owners as part of the water billing system. The payments go into the Sewer Utility Enterprise Fund, which receives no tax money from the City's General Fund. The Sewer Utility Enterprise Fund is dedicated to the maintenance and operation of the storm and sanitary sewer system.

Sewer fees are set by the City Council by resolution after a public hearing. Approximately 70,000 residential customers contribute 48 percent of the sewer flow, but pay about 40 percent of the sewer fees. Rates are slightly higher for commercial and industrial properties, which contribute 52 percent of the flow and pay about 60 percent of the fees.

**Policy 3.8 Prevent, minimize and report sanitary sewer overflows according to EPA standards.**

A sanitary sewer overflow is an overflow, spill or diversion of wastewater from a sanitary sewer system. The City shall properly operate and maintain all facilities and systems of treatment to prevent and minimize sanitary sewer overflows. Overflows must be reported to the MPCA as required.

**Policy 3.9 Report inter-municipal sanitary sewer connections to the MCES as required.**

The City has several small inter-municipal connections on the edges of Saint Paul. Just over 200 properties citywide are connected to other municipalities. (See Appendix M.)

**Policy 3.10 Investigate alternative systems that reuse gray water and advocate changes in the state plumbing code to allow alternative treatment systems *as long as health and safety are maintained.***

Alternative ways to reduce water demands and reuse wastewater are being devised in other parts of the country. Water reuse is becoming more popular, and gray water alternative treatment systems are included in many green building standards. The State of Minnesota Sustainable Building Guidelines (MSBG) defines guidelines for alternative proposals of gray water treatment.

The City should be supportive of experimental and educational models and, *within the constraints of public health*, investigate ways to use gray water for non-potable water uses. These uses could include, but are not limited to, gray water reclamation, and ecologically appropriate toilets and related systems. The City will evaluate the need to develop water reuse policies and requirements and, if necessary, investigate State plumbing code changes. (Reference Policy 1.8.)

**Policy 3.11 Explore using the sanitary sewer system as conduit for a fiber optic cable system that reaches every property in the city.**

In 2007 the Saint Paul Broadband Advisory Committee, which was established by the City Council, recommended that the city move in the direction of providing fiber optic cable throughout the city to provide for high-capacity transmission of data and entertainment. This type of service is becoming a criterion for corporate location decisions and a factor in economic competition among cities. The Broadband Advisory Committee's report said that some cities are stringing fiber-optic cable through the sewers because it is much more cost-effective than digging new trenches or stringing another cable system on poles along utility easements.

This proposal is worth studying. From the sewer utilities' perspective, there may be risks and opportunities. How would sewer maintenance and cleaning be affected? But on the positive side, could user fees for cable help to support the sewer system?