

Water Supply Planning in the Twin Cities Metropolitan Area

Report to the 2007 Minnesota State Legislature

January 2007



Mission

The mission of the Metropolitan Council is to develop, in cooperation with local communities, a comprehensive regional planning framework, focusing on wastewater, transportation, parks and aviation systems, that guides the efficient growth of the metropolitan area. The Council operates wastewater and transit services and administers housing and other grant programs.

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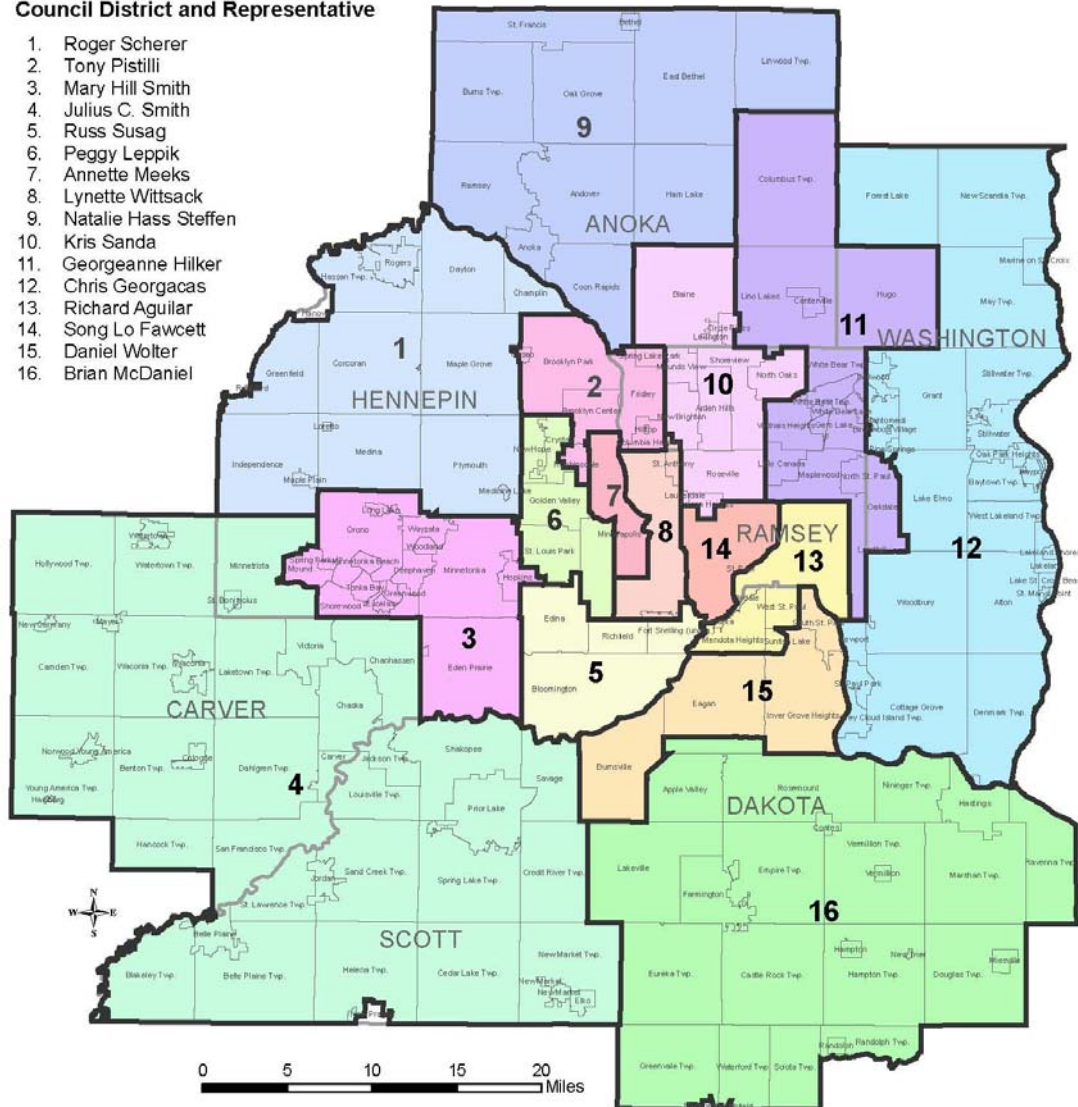
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EXECUTIVE SUMMARY

The Twin Cities metropolitan area is fortunate to have abundant supplies of generally high-quality water. However, these supplies are not limitless and they are not always located where needed most. There have been instances where withdrawals have adversely impacted sensitive natural resources or other users. Groundwater or surface water contamination has led to limits on supplies or increased costs for treatment. In addition, there is a lack of sufficient information on the extent, capacity and vulnerability of groundwater systems, which has led to delays in the water supply decision-making process in the region. Many of these issues cut across community boundaries; however, municipalities typically make water system investments and conduct resource evaluations on a local level without consideration of regional implications. As the region continues to grow, demands on supplies will continue to increase and a coordinated planning effort is necessary to ensure that resources are developed in a sustainable, efficient manner.

The 2005 Minnesota Legislature directed the Metropolitan Council (Council) to “carry out planning activities addressing the water supply needs of the metropolitan area” (Minnesota Statutes, Section 473.1565). Specifically, the Council is charged with developing a base of technical information for water supply planning decisions and to prepare a metropolitan area master water supply plan. The legislature also established a Water Supply Advisory Committee to assist the Council in its planning activities, and directed the Council to submit regular reports to the legislature detailing progress. This report satisfies the requirement of Minnesota Statutes, Section 473.1565, Subdivision 3, as the first report to the legislature; subsequent reports are due to the legislature every five years hereafter.

In order to address the legislature’s directive, the Council organized its efforts in two phases. During the first phase, culminating in this report to the Legislature, the Council undertook several activities to assess water supply availability, evaluate the decision-making and approval process and address water supply safety, security and reliability. Details on the methods and results of activities conducted during the first phase can be found in the Council’s *Water Supply Planning Technical Report* (Metropolitan Council 2007) prepared in conjunction with this report. Through these activities, the Council has identified next steps and recommendations for improving and streamlining the water resource evaluation, planning and decision-making and approval process. Implementation of these steps and recommendations will result in a process for evaluating water resource availability prior to growth and early in the decision-making process, as part of the master water supply plan development. The master water supply plan will include an assessment of water resources availability and water demand projections based on regional growth forecasts and evaluated on a regional/sub-regional scale to identify areas with potential supply limitations. For areas where potential local limitations exist, options will be developed in cooperation with municipalities and regulatory agencies, resulting in greater certainty for communities that future water needs can be met and that the proposed withdrawals will be acceptable to regulatory agencies. This will eliminate many of the delays that have occurred in the decision-making and approval process by putting the analysis earlier and as a cooperative approach.

The Council has worked, and will continue to work closely, with the Water Supply Advisory Committee and water supply stakeholders to ensure that it adequately addresses water supply issues in the region and in the development of the master water supply plan. Activities conducted to date, next steps and recommendations are described below.

Water Demand and Availability

As a first step toward developing the base of technical information needed for sound water supply decisions, the Council collected water supply system and resource monitoring location information from throughout the region. The Council also performed an initial analysis of regional water demand projections and water resource availability. While the region's water supplies are relatively abundant, this initial analysis highlighted areas in the region where uncertainty exists regarding whether water supplies are adequate to serve projected growth. During the second phase of activity, the Council will work with the Water Supply Advisory Committee and stakeholders to:

- Improve understanding of water supply sustainability
- Facilitate collection, sharing and analysis of regional data
- Examine water supply alternatives in areas where resource limitations are identified

Water Supply Decision-Making and Approval Process

With guidance from the Water Supply Advisory Committee and input from stakeholders, the Council evaluated the current water supply decision-making and approval process and agency roles. The Department of Natural Resources (DNR), Minnesota Department of Health (MDH), and the Council each play a unique role in the water supply decision-making and approval process. While coordination exists among these agencies, opportunities were identified for improving coordination and streamlining the process. The development of the master water supply plan, which includes evaluating water resource availability for future growth early in the planning process, will alleviate many of the issues that have led to regulatory delays in the past. Another issue identified was overlapping community water supply plan requirements. In order to implement the proposed process and clear up confusion regarding local water supply plan requirements, the following legislative action is recommended:

RECOMMENDATION #1 - Approve changes clarifying agency roles in water supply plan review and consolidating into one statute the requirements of community water supply plans in the metropolitan area. Link water supply planning to comprehensive planning.

The Council will continue to work with the Water Supply Advisory Committee and stakeholders to implement the following administrative steps. The steps listed below are designed to streamline the decision-making and approval process both before and after the proposed statutory changes would take effect.

- Formalize the current Council/DNR community water supply planning review process
- Support the DNR's efforts to streamline water emergency and conservation plans and evaluate and implement the 10-year permit process
- Develop a water conservation toolbox to help communities implement best management practices, improve water use efficiencies, and meet requirements of the 10-year permit
- Work with the DNR and MDH to develop a process for multi-agency water supply system/water appropriation approvals

Safety, Security and Reliability

The Council evaluated a range of safety, security and reliability issues as part of its first phase activities. Contamination (both intentional and accidental in both the distribution system and the source water area), loss of power, and natural disasters were identified as the most significant short-term risks to the region's water supplies. While a number of federal and state regulations and programs are already in place requiring communities to identify and establish protocols for protecting the safety, security and reliability of their water supplies, there may be an opportunity in some areas to improve the protection of water supplies through a regional approach. A number of stakeholders identified the need for backup supplies as a priority for ensuring water supply reliability in the region. The Council recommends legislative action to begin improving the safety, security and reliability of water supplies in the metropolitan area, as follows:

RECOMMENDATION #2 – Upon the request of local governmental units, support an appropriate level of state funding for interconnections and other physical water system improvements to ensure water supply reliability, natural resource protection, and/or safety and security, including economic security, of the region and state. Consistent with this recommendation, support an appropriate level of state funding for the proposed Minneapolis and St. Paul water supply systems interconnection.

To further enhance the security and safety of the region's water supplies, the Council will partner with the Water Supply Advisory Committee and stakeholders to:

- Evaluate and support state/regional activities that improve safety, security and reliability of local water systems
- Support source water protection efforts and impaired waters initiatives

Institutional Arrangements and Funding

A preliminary analysis of funding and institutional arrangements was conducted in this first phase of activity. There was general agreement among stakeholders, the Advisory Committee and the Council that a strategy for ongoing support will be necessary to make the current long-term water supply planning effort effective. In addition, there may be a need for alternate institutional arrangements to ensure the sustainability and reliability of water supplies. The Council will, therefore, take the following steps in its next phase of activities:

- Work closely with local jurisdictions and the Advisory Committee to explore and identify governance mechanisms to implement improvements and programs if needed
- Develop strategies for ongoing and long-term funding for metropolitan area water supply planning activities and capital improvements

1. INTRODUCTION

1.1. Background

The seven-county metropolitan area is fortunate to have a relative abundance of high quality water. In many respects, the Twin Cities area is among the most water-rich regions in the nation. Prior to European settlement, several Native American communities utilized the region's plentiful water resources to sustain their settlements. The availability of ample water was also important to the original development of the growth centers of Minneapolis and St. Paul, i.e., the flour mills, breweries, etc. In addition, the water resources of the region have provided residents with a reliable, potable water source as well as recreational opportunities and natural amenities. Reliably available water supplies are critical to the region's economic viability and also provide it with a competitive advantage. Protecting this resource and passing it on to future generations is one of the foremost goals of the Metropolitan Council (Council).

COUNCIL POLICIES – Water Supply

- The Metropolitan Council will work with state agencies and communities to promote and support the efficient use of water resources to ensure that supplies are adequate for the region's projected growth.
- The Council will work with regional partners to protect the water supply system for the region.

While the region is fortunate to have abundant supplies of high quality water, these supplies are not limitless, and additional research may be necessary to verify the extent of resources and reserves of our water supply. There is currently insufficient information on the availability of groundwater in the region. The impact of withdrawals on surface waters has not been well quantified and is not always considered in planning for growth. Although supplies are typically of high quality, contamination has led to withdrawal limitations or increased costs in some locations.

1.2. Legislative Charge

Minnesota Statutes, Section 473.1565, directs the Council to carry out planning activities addressing the water supply needs of the metropolitan area. The law requires the Council to develop and maintain a base of technical information that supports sound water supply development decisions. The Council is also directed to provide recommendations to clarify local, regional and state government roles related to water supply, streamline the water supply decision-making and approval process, and establish long-term funding for planning and capital investments. Findings and recommendations arising from initial planning activities must be reported to the Minnesota Legislature in January 2007 and every five years thereafter. This report is intended to meet the requirement for the report to the 2007 Minnesota State Legislature.

The legislature also required the Council to develop and periodically update a metropolitan area master water supply plan. The Council anticipates it will complete the master plan in 2008. The plan will provide guidance for local water supply systems and future regional investments. It will emphasize conservation, interjurisdictional cooperation and long-term sustainability; and will address reliability, security and cost effectiveness.

The legislation also established the Metropolitan Area Water Supply Advisory Committee to assist the Council in its planning activities. The Advisory Committee is made up of the following members:

Peter Bell	Chair, Metropolitan Council, Committee Chair
Peggy Leppik	Metropolitan Council District 6, Committee Vice Chair
Gene Hugoson	Commissioner, Department of Agriculture
Greg Buzicky	Department of Agriculture, Alternate
Dianne Mandernach	Commissioner, Department of Health
John Stine	Department of Health, Alternate
Gene Merriam	Commissioner, Department of Natural Resources
Jim Japs	Department of Natural Resources, Alternate
Brad Moore	Commissioner, Pollution Control Agency
Faye Sleeper	Pollution Control Agency, Alternate
Dennis Berg	Commissioner, Anoka County
Joe Harris	Commissioner, Dakota County
Tom Furlong	Mayor, City of Chanhassen
Linda Loomis	Mayor, City of Golden Valley
Barry Stock	City Administrator, City of Savage
Bev Aplikowski	Mayor, City of Arden Hills
Chuck Haas	City Council Member, City of Hugo

2. STAKEHOLDER INPUT

The Metropolitan Council (Council) hosted three public workshops and solicited public comments in May and June 2006. While not specifically required by the legislature, the workshops allowed the Council to obtain the opinions of 115 attendees representing 32 communities and other interested parties. Participants discussed issues regarding drinking water quality, supplies, safety and security, and funding and identified **the link of water supply to overall planning as a central issue**. They suggested that evaluating resources in the context of planned growth is necessary to address potential limitations and should occur prior to development. A few comments were also received through email and US mail. Several common themes, linked to the five categories outlined below, emerged:

- **Data and Analysis.** Participants suggested improvements to the collection, sharing, and analysis of data on a regional level to provide more accurate, effective and accepted evaluation of resources. Attendees also urged entities involved in planning for and/or providing drinking water in the metropolitan area to define resource availability and sustainability on a more regional scale to ensure evaluation of the potential cumulative effects of withdrawals.
- **Decision-Making and Approval Process.** Workshop attendees expressed interest in better coordination among agencies involved in the drinking water decision-making process and in streamlining the approval process. Further, workshop participants were concerned about consistency in the application of regulations, community by community. Many participants linked regulatory issues and the need for regional data collection and analysis. They commented that an improved understanding of the balance between resources and withdrawals prior to growth, as well as the development of alternatives where limitations exist, will alleviate many of the communities' "regulatory headaches" related to these issues.
- **Water Conservation.** Workshop participants expressed concern about the lack of consistent water conservation activities and requirements throughout the region. Participants suggested integrating water conservation into local communities' overall planning efforts.
- **Safety/Security/Reliability.** Workshop participants expressed the need for water system interconnections or other backup systems to ensure reliable water supply delivery, particularly in times of emergency. Participants were also concerned about protecting the water quality of our resources and ensuring that communities can provide a safe and reliable supply of water.
- **Funding.** Workshop participants identified inadequate funding as a major constraint and a common concern. A variety of options were suggested as to whom should bear the burden to fund projects or programs that would improve regional water supply reliability and sustainability.

Input from workshop participants helped the Advisory Committee and Council refine the focus of their water supply planning activities. Detailed workshop information can be found in the Council's *Water Supply Planning Technical Report (Technical Report)*, prepared in conjunction with this report. The Council also conducted public outreach to solicit and collect stakeholder comments about a draft of this report. Comments were reviewed by the Metropolitan Area Water Supply Advisory Committee and resulted in changes where deemed appropriate. The *Technical Report* also details comments responding to this document. The Council will continue soliciting stakeholder input while it prepares the master water supply plan.

3. METROPOLITAN AREA MASTER WATER SUPPLY PLAN

Minnesota Statutes, Section 473.1565, requires the Metropolitan Council (Council) to develop and periodically update a metropolitan area master water supply plan that:

- provides guidance for local water supply systems and future regional investments;
- emphasizes conservation, inter-jurisdictional cooperation, and long-term sustainability; and
- addresses the reliability, security, and cost-effectiveness of the metropolitan area water supply system and its local and sub-regional components.

The master plan, when completed, will not only address the legislative charge but will also streamline the decision-making and approval process by evaluating water resource availability early in the planning process (see Chapter 5).

Figure 1 illustrates the conceptual development of the master plan. The first phase included water demand projections and a broad resource analysis to provide a preliminary assessment of water availability for communities in the region (see Chapter 4). The second phase incorporates more detailed resource availability analyses in areas where preliminary assessment indicated it is uncertain whether existing water supplies can adequately meet projected demands. There appears little need for additional analysis in much of the region because local supplies appear sufficient to meet projected demands. Additional evaluation and/or monitoring may later become necessary to ensure continued sustainable utilization of supplies and to assess impacts of changes in withdrawals, demands or knowledge about supply resources.

In areas where the availability analysis identifies potential water supply limitations, a collaborative approach with stakeholders such as utility providers, agencies responsible for water supply management, watershed districts, watershed management organizations and counties, will be used to develop options for communities to utilize in the development of their supply systems. In some cases, options such as interconnections, use of other aquifers or surface water or more robust water conservation measures will be recommended. In others, despite a thorough analysis, remaining uncertainty may warrant additional monitoring and/or analysis while systems are being developed. Ongoing analysis and monitoring will provide a more thorough understanding of resource availability and improve the basis for supply system development/regulatory decisions. The master water supply plan may also need to address water rights issues, particularly for surface water suppliers.

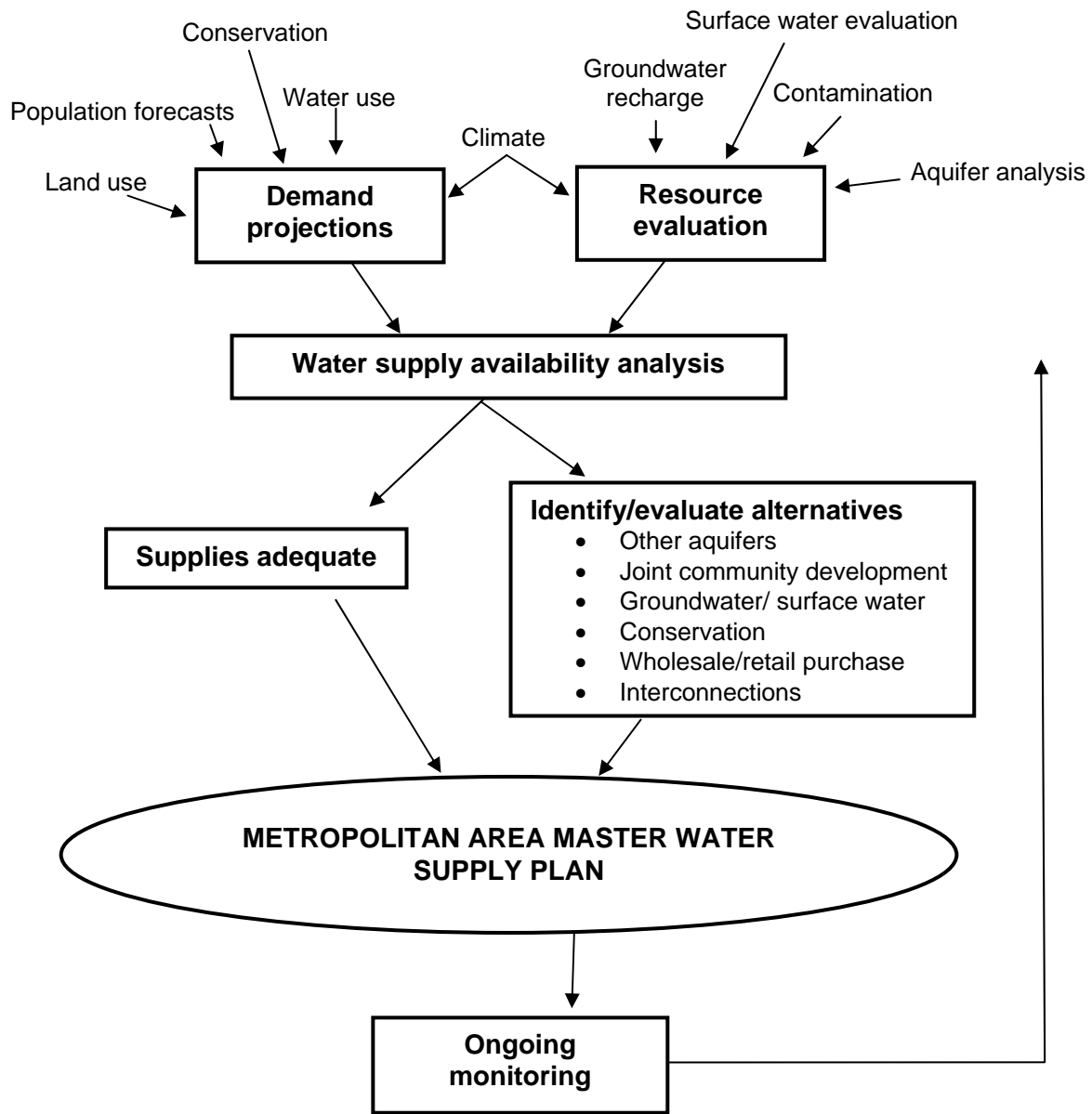
While the master plan will not lay out specific engineering plans for community water supply systems, it may provide the basis for development of supplies by multiple communities or other arrangements beyond the typical individual community municipal system. It will also be used by communities in the development of their local water supply plans to select supply sources which appear to be sustainable, protect resources and improve the security, safety and reliability of supplies in the region. These local plans could then be used to frame water appropriation permitting decisions by the DNR (see Chapter 5).

Water conservation will be an important element in the overall planning effort to ensure wise use and protection of the region's water resources. The master plan's role in developing water conservation

programs will be determined in consultation with the Water Supply Advisory Committee and stakeholders, as part of the Council's ongoing public involvement activities.

The Advisory Committee and Council recognize the importance of including stakeholders in all aspects of the master plan development. The Council will obtain input on specific topics through technical advisory groups. In addition, stakeholder workshops will be held to solicit input on the overall approach to the plan development. Stakeholders will include representatives from municipal water utilities, watershed districts, watershed management organizations, counties, state agencies, and other interested parties.

Figure 1. Master Water Supply Plan



4. WATER DEMAND AND AVAILABILITY

Minnesota Statutes, Section 473.1565 requires the Metropolitan Council (Council) to develop and maintain a base of technical information to support sound water supply decisions. As a first step, the Council collected water supply system and resource monitoring location information from throughout the region. The Council also prepared water demand forecasts and a preliminary analysis of water availability. A detailed description of study methods and data collected is provided in the Council's *Water Supply Planning Technical Report (Technical Report)* prepared in conjunction with this report. This chapter summarizes information collected about the water supplies throughout the metropolitan area and the results of the Council's initial availability analysis. The next phase of this effort will focus on areas where this initial study found water supplies potentially inadequate to meet future growth. Findings and recommendations of that analysis will be included in the metropolitan water supply master plan.

4.1. Water Supply in the Region

In the metropolitan area, 108 municipal water supply systems serve portions of 121 communities. Figure 2 shows communities that are served, in full or in part, by a municipal system correspondent to each system's primary water source.

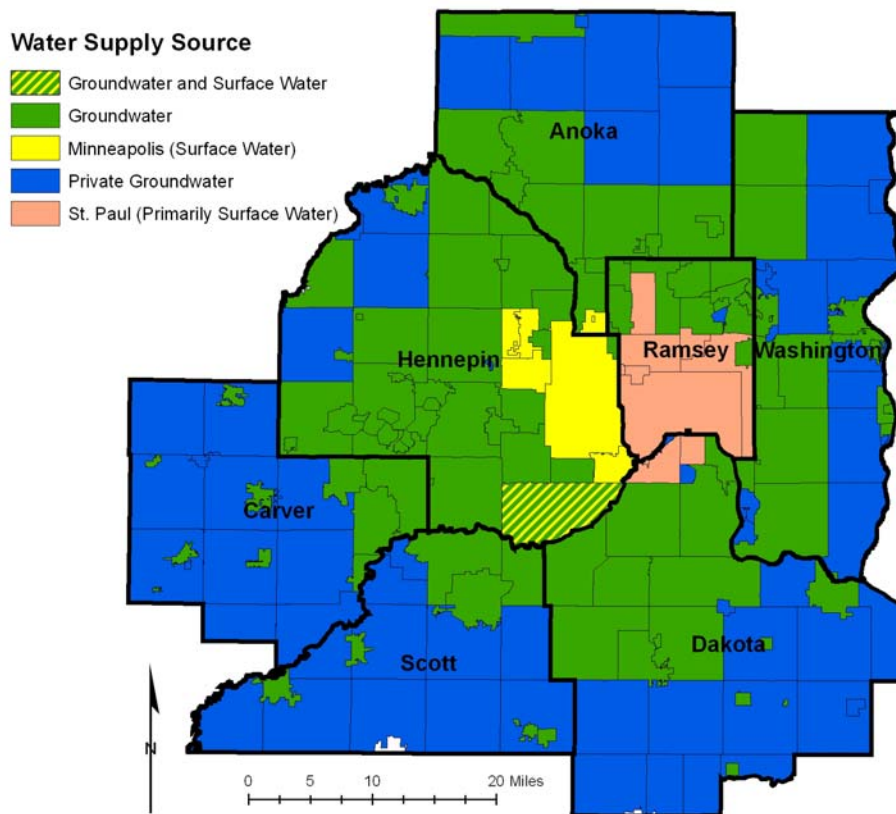


Figure 2. Metropolitan Area Water Supply Source

Surface Water Supplies

Approximately 880,000 people in the metropolitan region rely, at least in part, on surface water¹ as their drinking water source. The Mississippi River serves as the primary water source for the Minneapolis Water Works (MWW) and the St. Paul Regional Water Services (SPRWS), which together serve 16 additional communities with wholesale or retail water delivery. All of the water appropriated by Minneapolis is drawn from the Mississippi River. For St. Paul, the river represents about 70% of its appropriated water supply with the remainder pumped from high-capacity wells, the Rice Creek Chain of Lakes (Centerville Lake) and tributaries to Vadnais Lake.

In addition to supplying the two major water supply systems in the metropolitan area, the Mississippi River also provides navigation access, waste assimilation, recreation, aquatic and terrestrial habitat, and cooling water for two power plants. These competing uses are important considerations when evaluating the Mississippi River’s potential capacity to supply drinking water.

Groundwater Supplies

Groundwater sources provide approximately two-thirds of the water consumed in the metropolitan area, and serve about 1.6 million people through municipal water systems. Figure 3 provides a schematic cross section (profile) of the metropolitan area basin aquifers. The Prairie du Chien-Jordan aquifer system is the most heavily used and most productive in the region. Glacial sand and gravel aquifers, the Franconia-Ironton-Galesville (FIG) aquifer system and the Mt. Simon-Hinckley aquifer system also provide water to portions of the region.

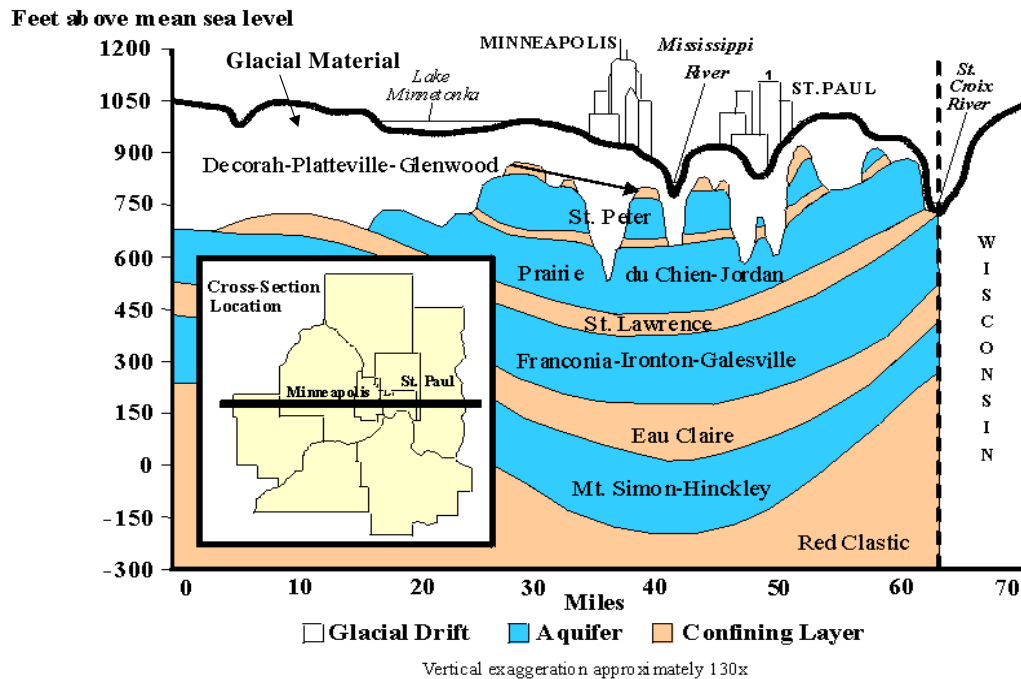


Figure 3. Generalized Twin Cities Metropolitan Area Geologic Cross-Section

¹ Although Bloomington purchases water from MWW, its population was not included in the population relying on surface water. This calculation reflects Bloomington’s ability to supply its average daily water demand from its own groundwater sources.

4.2. Current and Projected Water Demand

In 2004 the metropolitan area used approximately 163 billion gallons² (445 million gallons per day (mgd) of water. About 116 billion gallons (319 mgd) of that water was supplied through municipal systems serving residential, commercial and industrial customers. Residential customers, nearly 2.5 million people, used about 70% of the water supplied by municipal systems; about 290,000 people in the metropolitan area obtained their water from private wells.

Compared to 2004 populations, the metropolitan area is expected to grow by about 33% by 2030, and by about 60% by 2050. The Council's projections for related municipal water use demands include a 27% increase by 2030, and 52% increase by 2050. For these projections, the rate of water use increases at a slightly lower rate than population growth based on the assumption that use of water efficient appliances and general water conservation will increase in the future. Total water demand is projected to increase by only 16% between 2004 and 2030, and by 35% from 2004 to 2050. This is also due to expected improved efficiency as well as reductions in withdrawals associated with once-through cooling, quarry dewatering and agricultural uses during this period.

Between 2004 and 2030, the Council expects that the largest increases in water use will occur in areas served by the MWW and SPRWS. The Council projects the next tier of increases will occur in several rapidly growing suburbs and rural growth centers. Projections show several older suburbs and most rural areas experiencing nominal increases or even small decreases in water use. Similar water use trends are expected to continue in the region through 2050. Figure 4 identifies average water demands in 2004. Figures 5 and 6 illustrate projected demands for 2030 and 2050, respectively.

² For purposes of this report, water used for power generation is not included in water use estimates or projections because most of the water used for power generation is not consumed, and is returned directly to the source from which it was obtained.

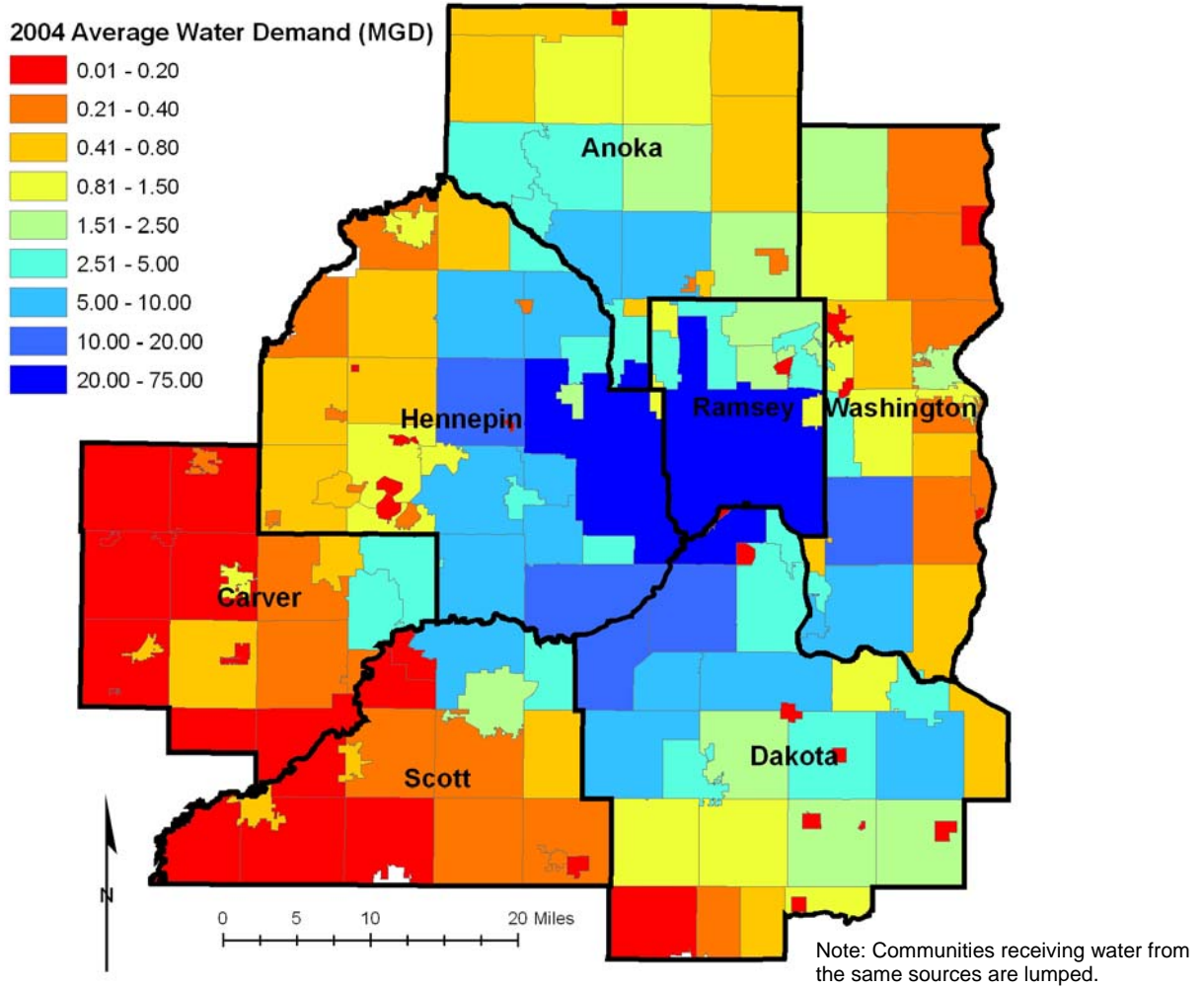


Figure 4. 2004 Water Demand

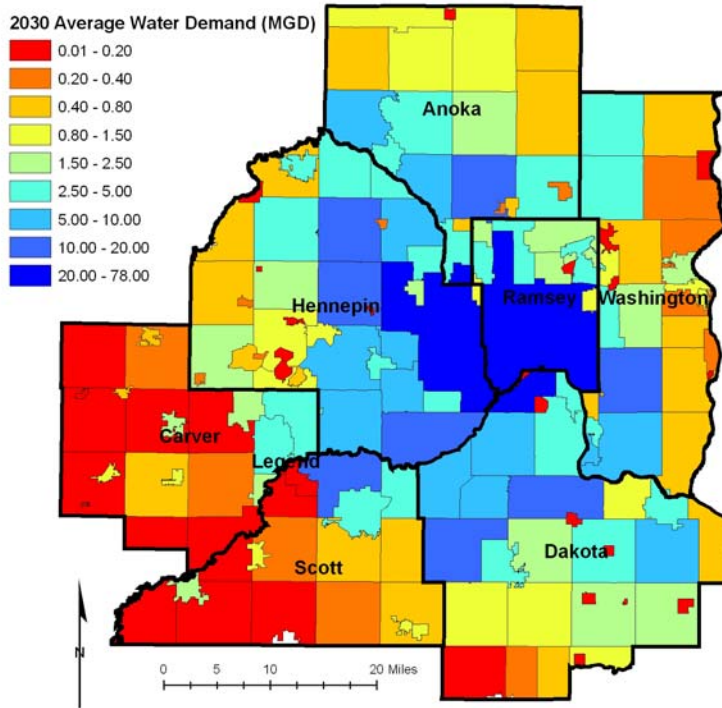


Figure 5. Projected Water Demand 2030

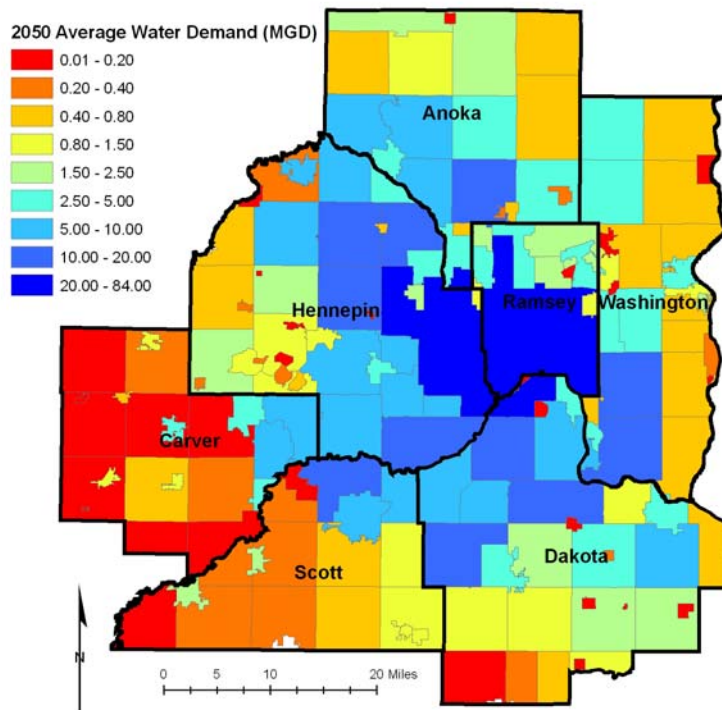


Figure 6. Projected Water Demand 2050

4.3. Surface Water Availability Analysis

Under most conditions, Mississippi River supplies far exceed the water needed by communities that rely on the river. In times of drought or contamination, however, use of river water may be limited. The MWW currently has no alternative water sources to the Mississippi River. This leaves its system vulnerable to events that may limit availability of supplies from the river. SPRWS maintains a reserve to supply approximately 60 days of its ‘practical’ water demand. It stores its reserve in the Rice Creek Chain of Lakes (Centerville Lake) and tributaries to Vadnais Lake, where the water can be withdrawn for use if Mississippi River supplies are limited. The SPRWS recognizes that a 60-day supply may be enough during a summer dry spell but may not meet system needs during an extended drought or large contamination event, and is installing wells able to supply “average day” demands. The wells, scheduled for 2009 completion, would help SPWRS offset potential restrictions on water use from the Mississippi River.

Low Flows

Extremely dry conditions occurred regionally in the 1910s, 1930s, 1950s and, more recently, in the 1970s and 1980s. The more recent events raised public awareness about the recurring nature of drought and its impacts on water availability, especially for communities that depend upon the Mississippi River for drinking water. During the 1988 drought, the state recognized the need for an action plan to address water supply shortages during Mississippi River low flow periods. As a result, the Council prepared a *Metropolitan Area Short-Term Water Supply Plan* (Metropolitan Council 1990), which establishes a critical flow of 554 cubic feet per second (cfs) to supply municipal water systems, generate power, and allow navigation (see box). These minimum flows assume that communities relying on the river as a source of drinking water would implement conservation measures to reduce high summer demands. Recent water use information suggests that the 85 mgd (132 cfs) and 45 mgd (70 cfs) volumes for the MWW and SPRWS, respectively, are still reasonable during critical flow periods. The flow for power plants assumes that the two plants on the Mississippi River in the metropolitan area would consume 1 cfs each as part of their operation, and the 350 cfs for navigation assumes 1 lockage per hour at the lock and dams in the Twin Cities. Lockages could be restricted or suspended during low-flow periods. Historical records indicate that flows at Anoka have been as low as 602 cfs in 1934, 529 cfs in 1976, 842 cfs in 1988, and 1530 cfs during the drought period in 2006. The 529 cfs measured in 1976 was an instantaneous flow resulting from automatic gate operations at the Coon Rapids Dam. The lowest daily average recorded that year was 728 cfs. The *Metropolitan Area Short-Term Water Supply Plan* also included a drought response plan that is triggered by a 72-hour average flow of 2,000 cfs at Anoka, with subsequent decision points occurring at 1,200, 1,000 and 750 cfs.

MISSISSIPPI RIVER CRITICAL FLOW

The critical flow of 554 cfs at Anoka is broken down as follows:

MWW	132 cfs (85 MGD)
SPRWS	70 cfs (45 MGD)
Power Plants	2 cfs
Navigation	350 cfs

In 1992, the Army Corps of Engineers (ACOE) published the *draft Drought Contingency Plans for the six Mississippi River Headwaters Reservoirs*. The plans describe in detail how reservoir operating decisions will be made during a drought. In 1994, in response to a request from the City of Minneapolis, the ACOE prepared the *Water Available from the Mississippi River at Minneapolis and Other Upstream Minnesota Locations During Low Flow Conditions report* (ACOE, 1994). This study presents a tool for determining the volume and travel time for various releases from the headwaters

reservoirs and how flows will recede at Anoka under a variety of conditions. The report illustrates the limited potential of relying on the headwater reservoirs as a source of water supply in the metropolitan area. For instance, if the flow at Anoka is 750 cfs and is forecast to fall to 554 cfs in 37 days, an extra 100 cfs released from Lake Winnibigoshish and Leech Lake (total of 200 cfs) would cause the flow at Anoka to rise to 760 cfs (a 10 cfs net increase) and extend the time it would take the flow at Anoka to fall to 554 cfs by 19 days.

Both of the aforementioned ACOE plans list the steps that must be followed for an agency or water user to request the ACOE to release emergency flows above the values listed in the routine low-flow agreement between the ACOE and the Minnesota Department of Natural Resource (DNR). While ACOE has complete jurisdiction over the release of water from its reservoirs, the ACOE will consult with an Interagency Drought Management Committee, Minnesota Chippewa Tribal government representatives, the DNR, the Bureau of Indian Affairs and other users (resorts, public etc.) before making its final decision on whether to release additional water.

The DNR developed the *Drought Response Plan* (DNR 1993, updated 2006) and a drought coordination matrix following the drought of 1988. The matrix specifies responsibilities, coordination methods, and activities for various levels of government at each stage of a worsening drought.

The ACOE is currently in the process of preparing a *Reservoir Operating Plan Evaluation (ROPE) Study for Mississippi Headwaters Reservoirs*. The report will further clarify information from the 1994 report regarding the utility/feasibility of releasing water from the headwaters reservoirs for use in the metropolitan area and other points downstream.

Despite the work completed following the drought of 1988, confusion continues about the conditions under which releases from the Mississippi River Headwaters Reservoirs could be requested and would be authorized by the ACOE to meet water supply needs, as well as how the triggers and actions in the state drought response plan relate to the request for releases. During the second phase of planning, the Council intends to convene stakeholders to review and clarify the triggers and actions in the state's 2006 *Drought Response Plan* (DNR 1993, updated 2006), the Metropolitan Council's 1990 and 1992 water supply plans and the ACOEs' 1992 drought contingency plan and further clarify the issues surrounding releases from the headwaters reservoirs.

Contamination

In addition to low flows, contamination can limit access to surface water supplies. Surface water supplies are susceptible to both chronic contamination and accidental or intentional releases of contaminants from a variety of sources. Water treatment plants may shut intakes to allow responders to mitigate an upstream release, with the duration of shut downs related to a number of factors, including the types of contaminants as well as the volumes and locations of the spills.

Municipal systems that depend on water from the Mississippi River expressed concerns about both chronic and acute contaminants. They reported that their treatment systems must, on a regular basis, address contaminants from agricultural and urban sources, as well as from naturally occurring constituents. The federal government requires all surface water suppliers in the United States to include filtration and disinfection in their treatment processes as final barriers of defense against contaminants.

In order to address both chronic and acute contaminant concerns, Minneapolis, St. Paul and St. Cloud are working together to develop source water protection plans. Their effort is addressed in further detail in Chapter 5 of this document.

4.4. Groundwater Availability Analysis

While the region is fortunate to have a relative abundance of available groundwater, productive aquifers are not evenly distributed across the region. Withdrawals may be limited by other factors such as contamination, well interference or impacts to surface water features from withdrawals.

Aquifer yield potential

The Council evaluated aquifer productivity based on the presence/extent of each aquifer, geologic influences on potential recharge, observation well trends and capacities of existing wells. This report acknowledges that the Mt. Simon-Hinckley aquifer system serves as a potential source of water to the region, but does not evaluate the aquifer because Minnesota Statutes, Section 103G.271, Subdivision 4a, prohibit new water appropriation permits from the Mt. Simon-Hinckley aquifer unless there are no feasible or practical alternatives to this source, and restrict any such allocations to potable use. Mt. Simon-Hinckley water use restrictions were enacted to respond to the 1988 drought, to alleviate concerns that appropriations exceeded the sustainable yield, and to protect this source of water for future high-priority drinking water requirements.

The Prairie du Chien-Jordan aquifer system is the region's most productive groundwater source, but is not present in much of the northern and western portions of the region. As a result, those areas depend on unconsolidated sand and gravel aquifers and the Franconia-Ironton-Galesville (FIG) aquifer system. In some areas, the unconsolidated aquifers produce significant quantities of water. Their productivity, however, is highly variable and these aquifers are generally more susceptible to contamination. Because the extent and potential yield of unconsolidated aquifers is uncertain, areas where they are not currently in use were not considered as part of the aquifer productivity evaluation. The FIG aquifer, while present throughout the region, exhibits a highly variable potential yield that is generally lower than that from the Prairie du Chien-Jordan aquifer. Water use from the FIG aquifer is limited, therefore, in portions of the metropolitan area. Figure 7 illustrates the results of the Council's aquifer productivity evaluation.

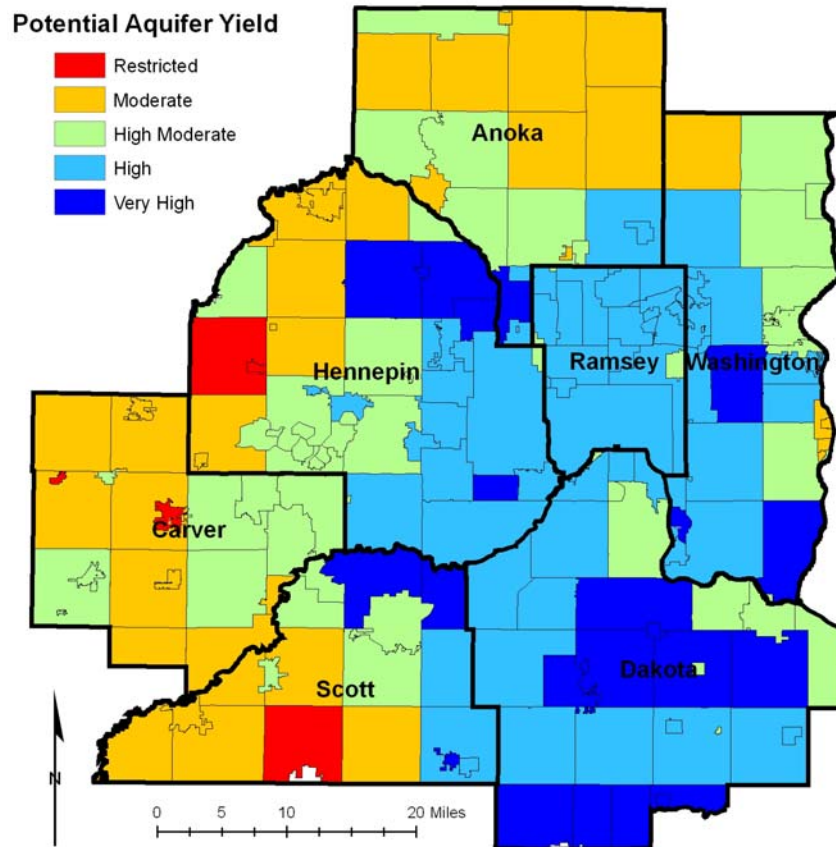


Figure 7. Aquifer Availability

Impact of Groundwater Withdrawals on Surface Waters

Trout streams and calcareous fens, home to rare or sensitive biotic communities, are two surface water features that particularly depend on groundwater inflows. Minnesota Statutes, Sections 97C.005 and 103G.285 (trout streams) and 103G.223 (calcareous fens), provide special protections for these unique surface water features. Within the metropolitan region, there are 16 trout streams and 6 known calcareous fens. All of the calcareous fens, and 13 of the 16 trout streams, occur along the Minnesota and St. Croix River Valleys. Minnesota Statutes protect all surface water bodies in the state to some degree.

Figure 8 identifies areas in the region where withdrawals from major aquifers may influence surface waters, based on surficial geology, land-surface elevation, bedrock geology, and aquifer water levels or pressures. In most areas of the metropolitan region, the impact of groundwater withdrawals on surface water features is not well quantified. Water appropriation applicants must demonstrate their proposed withdrawals will not adversely impact surface water resources before they receive an appropriation permit. It should also be noted that groundwater withdrawals outside the areas identified in Figure 8 may also impact surface water features.

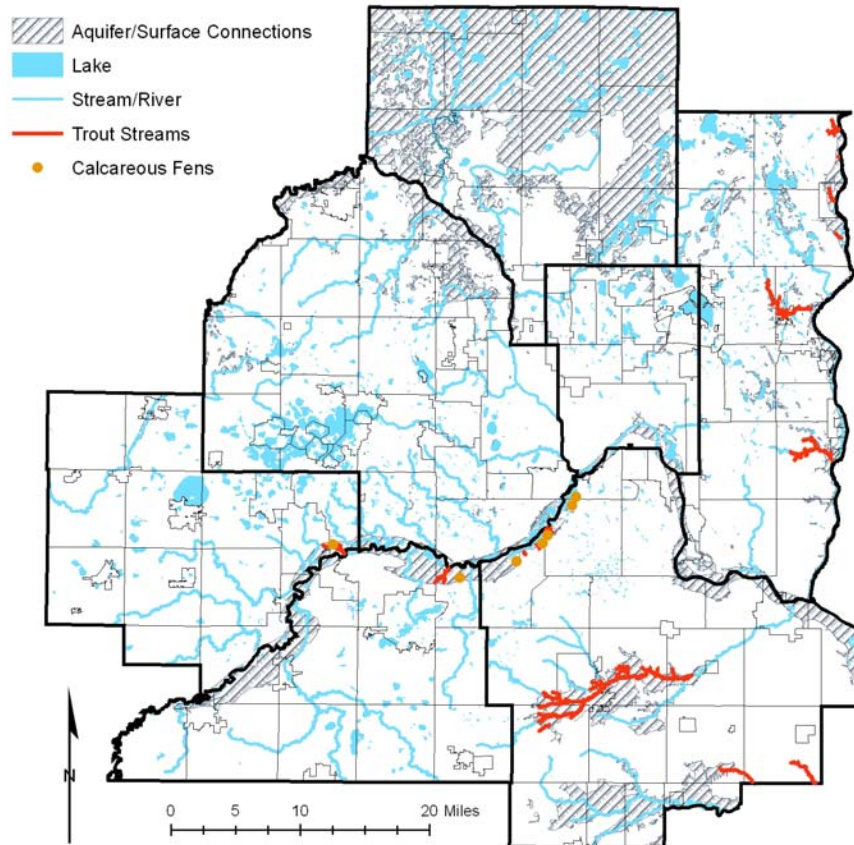


Figure 8. Surface Water under the Influence of Groundwater

Groundwater Contamination

A variety of groundwater contaminants are present in the metropolitan region. Petroleum compounds, solvents, nitrates, fertilizers, pesticides and other manmade contaminants, as well as radioactive elements and other naturally occurring elements, have been found in various portions of the region's groundwater. Removing contaminants from groundwater is often very difficult and costly, and treatment costs can limit the use or cause price increases for groundwater consumers.

The Minnesota Department of Health (MDH) has designated 10 special well construction areas within the metropolitan area to inform the public of potential health risks related to the use of contaminated groundwater in those areas. Special well construction areas help the state provide for the construction of safe water supplies and prevent the spread of contamination due to improper drilling of wells or borings. While special well construction areas have not prevented development of municipal water supplies, the designation has, in some areas, led to limitations on withdrawals and increased production costs for municipal systems.

The Council's groundwater availability analysis includes working with the MDH and other stakeholders to improve groundwater contamination mapping throughout region. The Council will incorporate information derived from the analysis in the master water supply plan.

Aquifer Recharge

The ultimate source feeding groundwater supplies is precipitation. Actual aquifer recharge rates are not well quantified in the region, which leads to uncertainty when assessing sustainable withdrawals.

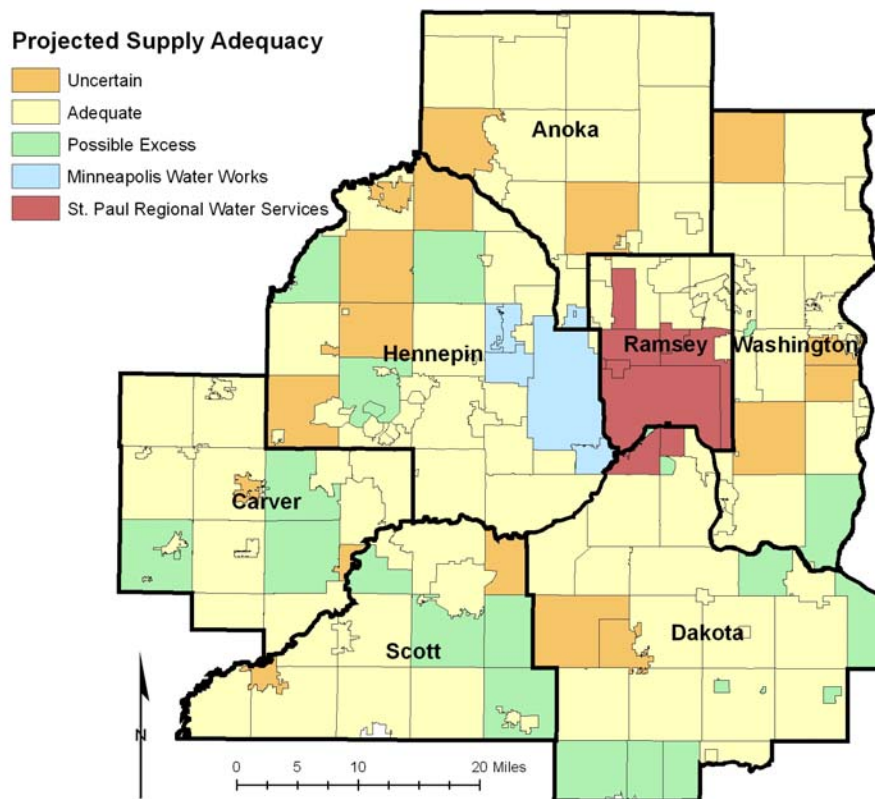
The impacts on recharge from increasing development are also poorly quantified. The Council is working with the Minnesota Geological Survey (MGS) to better understand the recharge rates and mechanics of the region’s aquifers, and will consider the resultant data when developing the master water supply plan.

Well Interference

Well interference, which occurs when a high-capacity well influences other wells to cause reduced productivity, can also potentially limit withdrawals from the region’s aquifers. The Council did not analyze this potential in the first phase but will continue to consider well interference in its ongoing evaluations and in local system development.

4.5. Integrating Demand and Availability

Much of the metropolitan area has adequate water supplies to meet current and projected water use demands. Based on 2030 and 2050 water use demand projections and the water resource availability analysis, however, the Council has begun to identify portions of the region where local supplies may be insufficient to meet projected water use demands (Figure 9). The communities where the adequacy of local water supplies to meet projected water demands was found to be uncertain generally correspond to areas lacking productive aquifers, with known groundwater/surface water interdependence or with high susceptibility to contamination.



Note: The supply of water for the Minneapolis Water Works and St. Paul Regional Water Services is considered adequate for projected demands, except under certain circumstances such as drought or contamination of the Mississippi River

Figure 9. Projected Adequacy of Local Supply 2050

Several western and northern communities within the metropolitan area where large population growth is projected face uncertainty about the adequacy of their future water supplies, due to lack of productive aquifers. In addition, potential impacts to wetlands from groundwater withdrawals may further limit water supplies, contributing to the uncertainty for communities in Anoka County. Some communities, such as the City of Savage, have already experienced local water supply limitations due to groundwater and surface water connections. Withdrawal limits will continue to apply to water from the unconsolidated aquifers and the Prairie du Chien-Jordan aquifer system in the future due to their connection with the east and west branches of Eagle Creek (a designated trout stream), Boiling Springs (a feature sacred to the Shakopee Mdewakanton Sioux Community) and the Savage Fen (a calcareous fen complex). As a result, Savage faces uncertainty about the adequacy of local water supplies to serve its projected growth.

By 2050, Lakeville and Carver will face water supply uncertainties, particularly during peak demand periods, due to potential interference and aquifer availability considerations, respectively. Likewise, increases in demand and close proximity to designated trout streams contribute to uncertainty regarding the adequacy of water supplies in Farmington and Woodbury. The high potential for groundwater contamination in special well construction areas is responsible for uncertainty regarding future water supplies in Baytown and West Lakeland Townships or could result in increased treatment costs to meet the demands caused by growth.

Communities supplied by the Mississippi River have adequate water under most conditions, but face supply limitations during low-flow periods or contamination events.

In addition to the areas already identified as having potential limitations, water supply limitations may arise in areas not currently designated as uncertain. There may be areas where unforeseen impacts arise, demands change, or aquifer capacities vary from those anticipated. Other communities that were designated with adequate or potentially excess water supplies require careful management to optimize their available resources and ensure sustainable withdrawals.

4.6. Summary and Next Steps

During the first phase of activities, the Council considered several factors, including the availability of surface water and groundwater, the productivity of aquifer systems, interdependence between groundwater and surface waters, the effects of climate on water demands, available resources, and cost restrictions or other constraints related to water quality. Although the Council has begun evaluating the adequacy of water supplies to meet projected growth, it will require a better understanding of water resource availability and potential limitations in some areas before determining the adequacy of the supplies. To support the development of the regional water supply master plan, the Council will continue evaluating supply availability and will undertake efforts outlined below.

- **Improve understanding of water supply sustainability**

In addition to the technical studies performed during Phase I, ongoing and more detailed efforts are necessary to adequately evaluate the long-term sustainability of the region's resources and to identify alternatives where limitations exist. The Council will:

- Improve the scientific understanding of the groundwater flow system and impacts of projected withdrawals, with a focus on areas of concern
- Continue to evaluate aquifer recharge and the impacts of land use changes on groundwater supplies

- Continue to map groundwater contamination in the region
 - Refine water demand projections in areas of concern
 - Clarify the issues surrounding releases from the Mississippi Headwaters Reservoirs during low flow periods
 - Work with the DNR and other agencies to review and update the state drought response plan
 - Evaluate the potential impacts of conservation programs on projected water demands
 - Support the efforts of local suppliers and the MDH to identify and address contaminant sources in the region
- **Facilitate collection, sharing and analysis of regional data**

The Council has begun collecting information about the region's water supplies and water resources. The Council will work with agencies and stakeholders to avoid redundant efforts and make collected information available to all users. Specific efforts include:

 - Continue to utilize regional and sub-regional task forces to review limitation issues
 - Encourage continued data collection standardization
 - Update regional groundwater models and datasets
 - Expand the regional water supply data base to include water use data and develop the tools needed to evaluate water use on a regular basis
 - Share the water resource monitoring database developed in Phase I with other stakeholders, and address gaps in the monitoring network
- **Examine water supply alternatives in areas where resource limitations are identified**

In areas where the Council identified resource limitations, supply options will be developed and incorporated into the master water supply plan.

5. WATER SUPPLY DECISION-MAKING AND APPROVAL PROCESS

Minnesota Statutes, Section 473.1565, requires the Metropolitan Council (Council) to provide recommendations for clarifying agency roles and streamlining the water supply decision-making and approval process. The Council has conducted an evaluation of the processes and roles including soliciting stakeholder input about perceptions of and potential improvements to the decision-making and approval process.

5.1. Current Decision-Making and Approval Process

The Minnesota Department of Health (MDH), Department of Natural Resources (DNR) and the Council each have unique roles and perspectives in regional water supply planning oversight. The Minnesota Department of Health (MDH) ensures compliance with the Federal Safe Drinking Water Act and State Well Code, Minnesota Rules, Chapters 4720 and 4725. The DNR develops and manages water resources to ensure an adequate supply to meet long-range seasonal requirements, Minnesota Statutes, Section 103G.265, 103G.271 and 103G.291. The Council supports local efforts to ensure that regional water supplies are sufficient to meet the region's needs, protected from contamination, and conserved by water users (Minnesota Statutes, Sections 473.859 and 473.1565).

Water Supply Plans and Emergency and Conservation Plans

Communities within the metropolitan area that have municipal water supply systems are required to submit water supply plans to the Council as part of their local comprehensive plans. The Council reviews water supply plans to ensure that the requirements of Minnesota Statutes, Section 473.859, are met and that plans are consistent with regional plans and Council policy. Municipal water suppliers that serve over 1,000 people in the state must also submit water emergency and conservation plans to the DNR every 10 years. DNR is required to approve plans to ensure that they address the adequacy of water supplies, for current and future demands and for emergency preparedness. While separate statutes exist and submittal schedules differ slightly, the Council and DNR developed one set of guidelines that allows communities to submit a single plan (water emergency and conservation/water supply plan) that meets the requirements of both agencies. The region's communities must submit plans to the DNR between 2006 and 2008, and communities must incorporate water supply plans in their 2008 comprehensive plan updates. Through an informal agreement between the two agencies, the Council provides comments to the DNR, which are included in the DNR's approval letters.

System Expansion

When a community expands its water supply system, whether by expanding its treatment plant or constructing a new well, it must submit to the MDH an engineering plan and, for new wells, a location siting plan that demonstrates conformance with public health standards.

For new wells, the MDH contacts the DNR to ensure that the community has adequate demand reduction measures in place (Minnesota Statutes, 103G.291). Following approval to expand their water supply systems, communities construct the well(s), perform pump tests, and submit well logs to the state. An application for a DNR water appropriation permit can be submitted at any time; however, the application is not complete until the well log and aquifer test is completed to ensure

that potential resource impacts can be adequately evaluated. The Council reviews appropriation requests for consistency with local and regional plans. Figure 10 shows the existing process for approving new community wells.

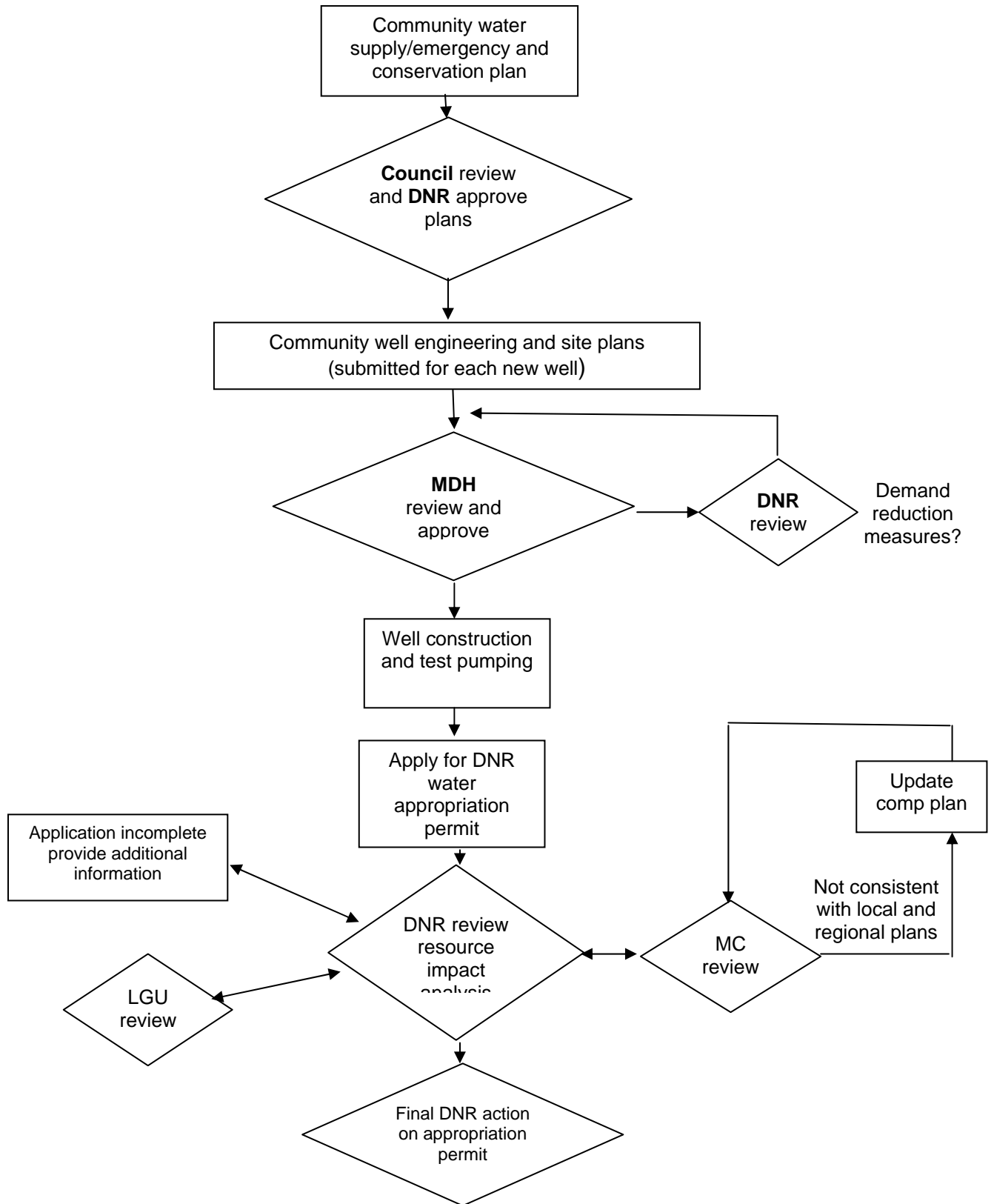
Integrated 10-Year Permit-Plan

The DNR recently developed a more flexible approach to appropriation requests, attempting to integrate water supply planning, permitting and water conservation. Under its 10-year permit-plan concept, a community may apply for pre-approval of a 10-year appropriations permit when it submits its water emergency and conservation plan. As a condition of approval for this permit, communities must meet certain water use benchmarks or, where benchmarks are not met, must commit to water conservation measures and programs that address water use categories related to the benchmarks. The benchmarks, which were developed by a work group consisting of the DNR, Council and representatives of the Minnesota section of the American Water Works Association, include:

- Residential per capita use **less than 75 gallons/capita/day**
- Unaccounted/Unmetered use **less than 10%**
- Average day to peak day demand ratio **less than 2.6**
- Water conserving or “conservation neutral” rate structure
- Approved water quantity monitoring plan
- Mitigation efforts to minimize resource impacts and avoid overdraft

As part of the next phase of activities, the Council will develop a water conservation toolbox to help communities meet the conservation requirements for the 10-year permit (see box on page 29). While use of the permit-plan concept to date has been limited, the Council and DNR expect additional communities will apply for the 10-year permit plan as more emergency and conservation plans are submitted.

Figure 10. Existing Metropolitan Area Water Supply Well Approval Process



5.2. Approval Process Issues

The central issue delaying or restricting water appropriation permits under the current water supply planning decision-making and approval system is inadequate regional evaluation of water resources and potential supply limitations prior to growth. Roads, parks and sewer service capacities are evaluated as part of regional planning, but there is little or no water supply availability assessment prior to growth. The lack of a water supply assessment may have been in part due to a perceived abundance of water resources throughout the region. While water resources remain abundant in much of the region, there are areas that have had, and will continue to experience, limitations in water supply due to adverse impacts to natural resources, lack of high-yielding aquifers, contamination or other reasons (see Chapter 4).

Under the existing approval process, potential resource impacts may not be identified until a community has installed its well, thus delaying or limiting appropriation permits after communities have made significant investments. While this is related to the existing approval process in which communities do not seek approval of water appropriations until after they have constructed the well, the underlying issue is the lack of adequate water resource evaluations prior to growth. The DNR's 10-year permit plan is expected to prevent delays or restrictions on appropriations by allowing communities to request permits before constructing wells, as part of their growth planning. This alleviates some of the issues that delayed permit issuance in the past (lack of conservation programs, forecasts inconsistent with comprehensive plans, known impacts to natural resources), but does not prevent limits to appropriations after a well is constructed in areas where water resource availability is uncertain, or when unforeseen impacts arise.

In addition to factors previously identified, the Council found that water appropriation permits have been delayed due to incomplete applications, community water demand forecasts that are inconsistent with Council forecasts, and DNR staff workloads.

5.3. Streamlining the Process and Clarifying Roles

The Council recommends specific legislative and administrative changes to help simplify the water supply approval process and address water resource limitations early in the growth planning process. The recommendation includes consolidating requirements for the water supply plan and the water emergency and conservation plan into one statute to reduce confusion. In addition, because the master water supply plan will provide a regional analysis of water resource availability and address supply limitations and water conservation (see box), the Council recommends requiring community water supply plans be consistent with the master water supply plan. The Council also recommends that, because of the DNR's role in protecting and managing the state's water resources, current legislation should be expanded to require DNR's assistance in the preparation and, ultimately, DNR's approval, of the metropolitan area master water supply plan.

The recommended changes will clarify local water supply planning requirements, result in the preparation of a master plan (see Chapter 3) and local water supply plans that address availability prior to growth and expansion of the infrastructure. It will help provide the information needed by the DNR to issue water appropriation permits as part of its approval of community water supply plans, for a time frame that corresponds to the life of the plans. This concept differs slightly from the DNR's current 10-year permit plan option, in that it will be based on forecasted growth for the next 25 years conducted in preparation of the master plan. Furthermore, the proposed process will provide communities and the DNR with greater certainty that proposed appropriations for the life of their community water supply plans (10 years) and, in many cases, for the longer-term time frame of the master plan (currently to 2030), will not be limited and will not adversely impact natural resources. This recommendation does not affect current requirements for submitting engineering design plans and location site plans to the MDH for review.

Water Conservation

Minnesota Statutes, Sections 103G.291 and 473.859, require metropolitan area communities with municipal water supply systems to document water conservation programs as part of their water supply plans. Specifically, the statutes require communities to have education programs and to evaluate water conservation rate structures.

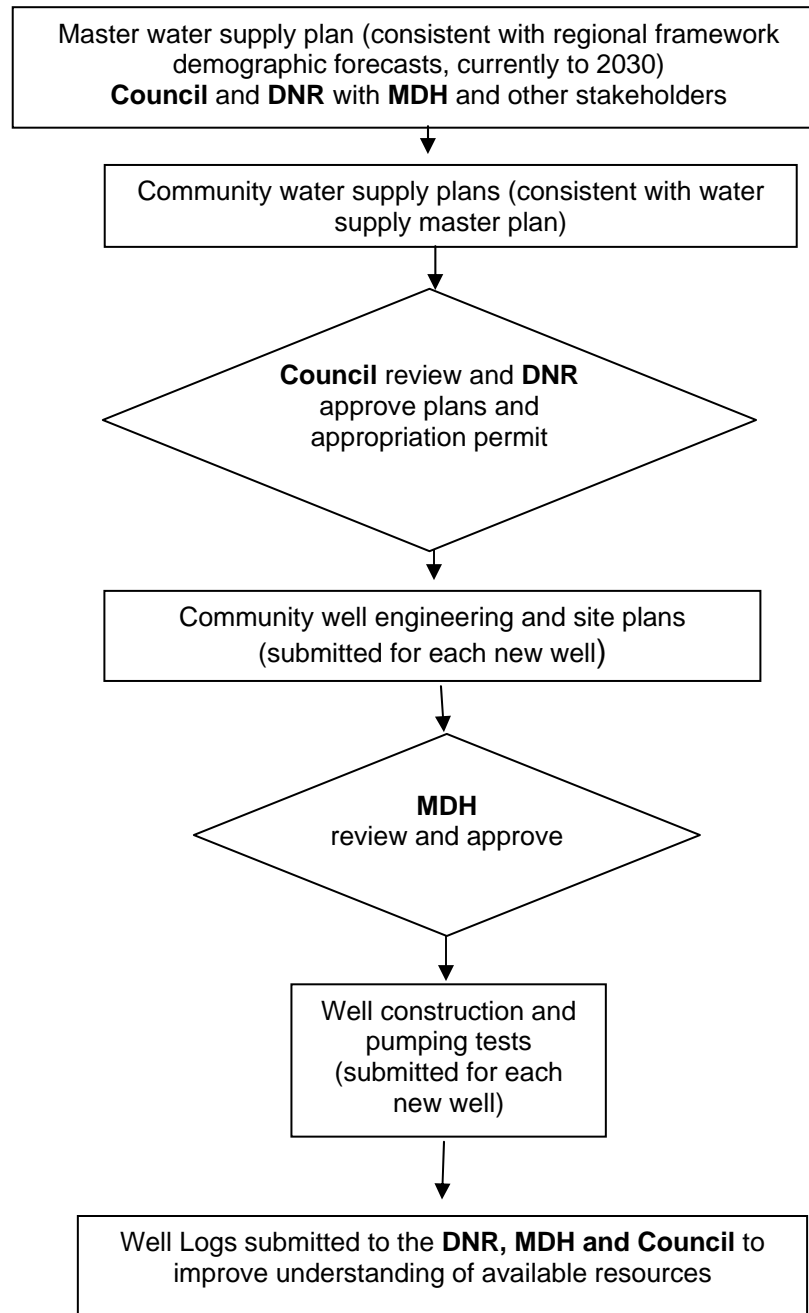
Nearly every community in the metropolitan area currently uses some type of public outreach to educate its customers about ways they can conserve water and the benefits of doing so. All but two of the region's communities use conservation or "conservation neutral" rate structures. Conservation rate structures incorporate cost-of-service principles to motivate customers to reduce waste through the use of increasing block or seasonal rates. Many communities have also implemented water restrictions to offset peak day demands during summer months. Other conservation programs in the region include tree preservation and landscaping ordinances, topsoil preparation regulations and appliance retrofit programs.

As part of developing the master water supply plan, the Council will develop a water conservation toolbox to help communities implement effective conservation programs. The toolbox will be a web based tool that will provide links and information on such things as model ordinances, ideas for media campaigns, education materials, water conservation best management practices and ideas for joint efforts among communities. The toolbox will also provide water conservation examples for residential, commercial, industrial and institutional water users.

In addition, the Council will work with stakeholders and the Advisory Committee to continue its qualitative and quantitative evaluation of the effects of conservation on water use throughout the region.

By evaluating water resources early in the process, the proposed connection between the water supply master plan, community water supply plans, and water appropriation permits will help prevent decision-making and approval process delays. The Council's recommendations will also help communities avoid minor issues that previously caused permitting delays, including the lack of water conservation programs, incomplete applications, and/or inconsistent water demand forecasts. The process that would result is presented in Figure 11.

Figure 11. Proposed Metropolitan Area Water Supply Planning and Well Approval Process



5.4. Summary, Next Steps, and Recommendation

In response to Minnesota Statutes, Section 473.1565, the Council identified several administrative and statutory changes to streamline the water supply decision-making and approval process and help clarify agency roles. Working with the DNR to address water supply as part of the regional planning process through the preparation of the metropolitan area water supply master plan and connecting that plan with local water supply plans and water appropriation permits, will alleviate many of the issues that led to delays and confusion in the existing approval process. In addition, combining the requirements for local water supply plans will clarify those requirements. The Council recommends the legislature:

RECOMMENDATION #1 - Approve changes clarifying agency roles in water supply plan review and consolidating into one statute the requirements of community water supply plans in the metropolitan area. Link water supply planning to comprehensive planning.

The Council also proposes to work with the DNR, MDH and other stakeholders to implement the following administrative measures to improve the decision-making and approval process prior to completion of the master plan and following implementation of the proposed process.

- **Formalize current Council/DNR community water supply planning review process**
- **Support the DNR's efforts to streamline water emergency and conservation plans and evaluate and implement the 10-year permit process**
- **Develop a water conservation toolbox to help communities implement best management practices, improve water use efficiencies and meet requirements of the 10-year permit**
- **Work with the DNR and MDH to develop a process for multi-agency water supply system/water appropriation approvals**

6. SAFETY, SECURITY AND RELIABILITY

Minnesota Statutes, Section 473.1565, requires the Metropolitan Council (Council), in preparation of the metropolitan area master water supply plan, to address the reliability, security and cost-effectiveness of the region's water supply system. Drinking water supplies have long been recognized as vulnerable to disruption from intentional, accidental, or natural events. Recent events, such as the terrorist attacks of September 11, 2001 (9/11), the 2003 East Coast power outage, and the 2005 hurricanes in the Southeastern United States, further exposed the vulnerabilities of water supply systems and raised awareness of drinking water utility safety and security issues.

At its stakeholder workshops, the Council consistently heard from stakeholders about the need to ensure the reliability of water supplies through backups or interconnections. Participants also repeatedly identified concerns about protecting and ensuring water quality. This chapter summarizes federal and state regulations and programs that pertain to the safety, security and reliability of water supply systems. A more detailed discussion is provided in the Council's *Water Supply Planning Technical Report*, prepared in conjunction with this report.

6.1. Federal Regulations and Programs

Safe Drinking Water Act

Originally adopted by Congress in 1974, the Safe Drinking Water Act protects public health by regulating the nation's public drinking water supply. It allows the United States Environmental Protection Agency (EPA) to set health-based standards for contaminants in drinking water. The act originally focused the nation's efforts on treatment; it was amended in 1986 and 1996 to include source water protection, operator training, funding for water system improvements, and public information as important elements to ensure safe drinking water supplies.

Bioterrorism Act

In response to the events of 9/11, Congress adopted the 2002 Bioterrorism Act. The act requires water utilities serving more than 3,300 people to conduct vulnerability assessments (VAs) and develop emergency response plans (ERPs). VAs identify areas where the water system is vulnerable to terrorist or other intentional attacks that may disrupt water supply or make the water unsafe to drink or use. ERPs identify procedures to mitigate the impacts of the potential attacks identified in VAs.

Other Federal Requirements

Homeland Security Presidential Directive Number 5 (HSPD-5) requires water systems to follow National Incident Management System (NIMS) procedures. NIMS is designed to provide consistent emergency response organization and terminology, and to train those who respond to incidents. To be eligible for federal grants, water system staff must be trained in NIMS procedures.

The Bioterrorism Act requires utilities serving over 3,300 people to conduct vulnerability assessments (VAs) and develop emergency response plans (ERPs).

HSPD 7 and HSPD 9 require the development of programs to protect critical infrastructure, including water utilities, from terrorist attacks. EPA is currently implementing HSPDs 7 and 9 for water systems, which include requirements to develop strategies for responding to and preparing for incidents, promotes information exchange among stakeholders, and supports developing and

implementing technological advances to improve water security. The efforts include development of a Contamination Warning System for early detection and awareness of disease, pest, or poisonous agents, and development of a nationwide laboratory network for identifying such agents using existing federal and state laboratory resources.

Pending Security-Related Regulations and Programs

Best management practices to help utilities define the levels and types of security programs to implement continue to evolve. The American Water Works Association, American Society of Civil Engineers, and Water Environment Federation are currently developing consensus security standards as part of the Water Infrastructure Security Enhancement (WISE) program. These organizations created the WISE program with a grant from the EPA to address physical infrastructure security needs through the development of guidance documents, training programs and standards for water supply, wastewater and stormwater, and online contaminant monitoring systems.

The scope of security programs varies for large metropolitan areas. Best management practices for water system security continue to evolve.

The EPA is also developing the WaterSentinel Program, a system that would provide timely contamination detection and response for water supplies. The system uses multiple triggers that serve as potential indicators of contamination and increase opportunities to detect contaminants.

Several states have implemented Water/Wastewater Agency Response Networks (WARN). WARN networks support and promote statewide emergency preparedness, disaster response, and mutual assistance for public and private water and wastewater utilities. The Minnesota Department of Health (MDH) is in the early stages of developing a Minnesota network.

6.2. Regional and State Regulations and Programs

Water suppliers have always been responsible for general planning to handle water system emergencies. In Minnesota, emergency planning for water supplies became more formalized in 1995, when state legislation required all water suppliers serving over 1,000 people (and all water suppliers in the metropolitan area) to prepare water system emergency preparedness plans (water supply plans). This requirement led many utilities to develop their first written emergency procedures.

One significant element of Minnesota's emergency planning requirements, outlined in state statutes, requires a priority system for rationing water during an emergency. Every water supplier must identify triggers for implementing demand-reduction measures consistent with the water use priorities. The plan must also identify alternative water sources for use in the event of shortage.

Many water utilities have implemented security system enhancements at critical facilities in response to the VAs described in section 6.1. In addition to upgrades addressing intentional malevolent acts, water suppliers implemented a variety of other enhancements to address natural disasters and unintentional events. For example, many increased their backup generator capacities, or developed hydraulic models of their distribution systems to optimize storage and reduce the consequences of power loss. Some utilities developed contamination monitoring systems to reduce risks from their source water supplies. Utilities have also developed mutual aid agreements with surrounding communities and local businesses to provide equipment, operating supplies, and alternate water sources during an emergency.

6.3. Backup Supplies and Interconnections

Stakeholders involved in this phase consistently identified a need to ensure the reliability of water supplies through backups or interconnections. A majority of the metropolitan area communities have at least one emergency connection with a neighboring community (Figure 12). Most of these connections occur at relatively small-diameter pipes, and are capable only of augmenting supplies, rather than completely replacing them. Most communities' contingency plans include requesting National Guard assistance and distributing bottled water to residents as part of their ERPs.

The two largest water suppliers in the metropolitan region, the City of Minneapolis Water Works (MWW) and the St. Paul Regional Water Services (SPRWS), are not interconnected. Some of the communities they serve have interconnections with neighboring utilities. These small connections could supplement supplies for their communities, but cannot provide backup supplies to either major system.

Since the 1930s, officials in both cities have sought to connect the two systems to provide ongoing, emergency water to one another should the need arise. Historically, however, the project has had just one of the two parties interested at any given time. While both systems are well suited to supplement the needs of the other, they simply lack the facilities to transfer the water.

Prior to the 2006 legislative session, the Minnesota Department of Health (MDH) recommended to the Governor that a \$10 million state grant be issued to the utilities for construction of the interconnection. The proposed grant would match similar amounts contributed by the two water utilities. The Governor recommended waiting until completion of this report to the legislature, then reconsideration of the matter. The Council's evaluation in this first phase of effort reconfirms the benefits to the region and state of the interconnection.

The total population served by the Minneapolis (not including Bloomington) and St. Paul systems is approximately 466,000 and 415,000, respectively. Loss of water at either system would have severe economic impacts on the metropolitan area and the state of Minnesota as a whole. Based on various assumptions, a temporary disruption (one week) of all economic activity would affect:

- Up to 342,200 jobs in Minneapolis and the five other cities that rely on Minneapolis water, with a payroll of up to \$78.8 million per week and total economic activity of up to \$382.1 million per week.
- Up to 289,600 jobs in St. Paul and nine other cities that rely on St. Paul water, with a payroll of up to \$62.0 million per week and total economic activity of up to \$274.9 million per week.

Other impacts that would occur but are difficult to quantify include:

- Loss of property due to restricted fire protection for businesses and homes
- Inability to provide potable water to over 400,000 people in each system for the following activities that could adversely affect public health:
 - drinking and cooking
 - waste disposal
 - basic hygiene

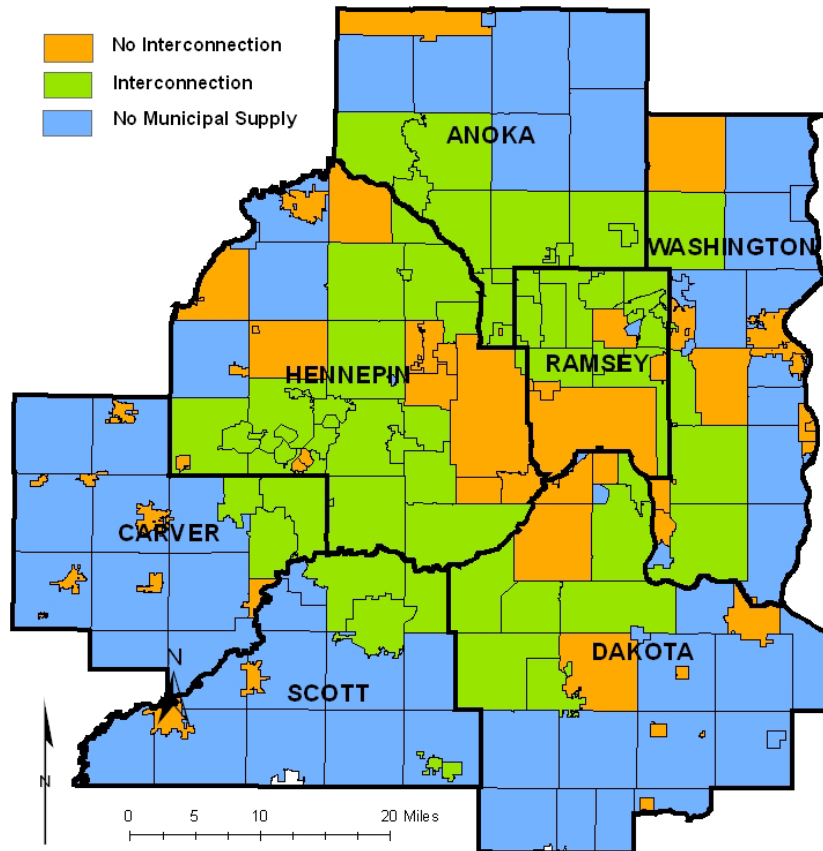


Figure 12. Water Supply System Interconnections

6.4. Source Water Protection

Each public supply system that uses groundwater in Minnesota is required to prepare and implement a wellhead protection plan to protect its supplies from contamination. Surface water suppliers are not required to prepare plans. However, the Minneapolis Water Works, City of St. Cloud and the St. Paul Regional Water Services have teamed up to voluntarily prepare protection plans for the Mississippi River. These suppliers face the challenge of implementing resource protection measures in the upstream area that supplies water to their systems (the upper Mississippi river basin), which is almost entirely outside their jurisdictions. Their efforts to date have established a clear connection between drinking water supply, storm water management, shoreline protection and other water quality programs. The Clean Water Legacy Act, passed in 2006, supports water quality programs that will improve water quality and help protect water supplies for these three surface water suppliers and for most suppliers statewide.

Protecting surface water supplies also requires that agencies respond effectively to contaminant spills. Several entities in the state are responsible for cleaning up spills, including counties, the Minnesota Pollution Control Agency, Minnesota Department of Agriculture, local fire departments and private entities. In the mid-1990s, an effort to coordinate spill response in the area upstream of the Minneapolis, St. Paul and St. Cloud water supplies resulted in the River Defense Network. While much of the spill response equipment is still in place from that effort, the Council identified a need to evaluate whether additional training and/or coordination would benefit response efforts.

6.5. Summary, Next Steps, and Recommendation

A variety of requirements and programs address water supply safety and security. While each water utility is primarily responsible for emergency response planning, there may be some benefit from supporting certain regional efforts. In order to help communities provide safe and reliable water to their customers, the Council will undertake the following activities during the second phase of its water supply planning efforts:

- **Evaluate and support state/regional activities that improve security and reliability of local water systems**
 - Support the development of the state and interstate WARN program
 - Track the development of emerging security standards and programs such as the WISE standards and WaterSentinel Program and determine their applicability to the regional planning effort
 - Evaluate the need for training programs for water suppliers in the region and development of recommendations for who should be trained
 - Evaluate the feasibility of developing regional plans to address the availability of water treatment chemicals, supplies, fuel and power in the event of an emergency
- **Support source water protection efforts and impaired waters initiative**
 - Increase awareness of the connection between efforts to improve surface water quality and the quality of drinking water supplies
 - Determine the need for updating of spill response efforts and training

Many suppliers in the region have emergency interconnections with adjacent communities. The first phase of planning activities made clear that ensuring water supply reliability is a priority for the region and that an interconnection between the Minneapolis Water Works and the St. Paul Regional Water Services would provide a regional and state benefit. The Council recommends that the legislature:

RECOMMENDATION #2 – Upon the request of local governmental units, support an appropriate level of state funding for interconnections and other physical water system improvements to ensure water supply reliability, natural resource protection, and/or safety and security, including economic security, of the region and state. Consistent with this recommendation, support an appropriate level of state funding for the proposed Minneapolis and St. Paul interconnection.

7. INSTITUTIONAL ARRANGEMENTS AND FUNDING

Minnesota Statutes, Section 473.1565, requires the Metropolitan Council (Council) to make recommendations for ongoing and long-term funding of metropolitan area water supply planning activities and capital investments. To ensure supplies are developed in a reliable, cost-effective manner, the region may need to explore a variety of governance. This section briefly describes existing governance structures and funding mechanisms in the metropolitan area. The Council will continue to analyze governance and financing models during the second phase of activities, and will provide its findings in the metropolitan area master water supply plan.

7.1. Existing Governance

In the metropolitan area, 108 municipal water supply systems serve portions of 121 communities. Several communities have paired or grouped together for planning purposes and/or to form mutual aid agreements; some have established other forms of cooperative relationships in order to reduce costs, ensure service to their customers, and achieve other purposes.

Communities in the region without their own municipal systems purchase their water on a wholesale or retail basis from the Minneapolis Water Works (MWW), the St. Paul Regional Water Services (SPRWS) or other local suppliers. Wholesale customers provide water distribution and billing services within their community, while retail customers rely on their supply source provider for water distribution and billing.

A few local examples of communities with their own municipal systems that are working together include the Southwest Metropolitan Ground Water Work Group, the River Defense Network and the Upper Mississippi River Source Water Protection Group. These informal arrangements vary in their scope and the problems they solve, their extent of cooperation, and the activities covered by the arrangements.

The Joint Water Commission (JWC) provides a more formal sub-regional example. The JWC is a joint powers organization for the cities of Crystal, Golden Valley and New Hope. One manager member is appointed by each member city's council to comprise the commission. The JWC has the authority to own, build and contract for facilities, and allocates costs to its members according to a cost-share formula that is based on water consumption.

Interconnections also demonstrate how communities have partnered to help provide adequate water supplies to their customers. Although communities' water capacities vary, most interconnections serve emergency uses only. Several communities have established formal agreements that define the amounts of, and conditions under which, water will be shared.

7.2. Current Funding Mechanisms

A majority of the metropolitan area's water supply renewals, replacements, and expansions are financed through tax-exempt, long-term municipal bonds. Each year a few projects are financed, all or in part, through State Drinking Water Revolving Loan Fund loans administered by the Department of Employment and Economic Development. Sponsors often finance all or a portion of capital projects with cash reserves accumulated from water user charges and water access charges (WAC).

Funding of water system operations and maintenance (O&M) is provided largely by revenue from user charges. A second source of funding for O&M is property tax revenue, though this is rarely used in the region. Specific financing mechanisms discussed with the Water Supply Advisory Committee can be found in the Council's *Water Supply Planning Technical Report*.

While the 2005 State Legislature authorized the use of approximately \$2 million of Council funds for development of the master plan, no funding mechanism currently exists to implement the plan and support ongoing regional water supply planning in the metropolitan area beyond 2008. The stakeholders and the Advisory Committee agreed that a lack of such funding could delay or prevent updates to the metropolitan area water supply plan and defer or eliminate data collection and analysis efforts that might mitigate potential future water supply limitations throughout the region.

In addition to the lack of ongoing and long-term funding for regional water supply planning, funds for capital improvements are limited. Priority for funding from the state drinking water revolving fund is assigned to projects to meet basic water supply needs (e.g., replacing a contaminated supply). If the master plan identifies a need for projects beyond typical supply system expansions to ensure the reliable, sustainable development of the region's water supplies, a new source for funding capital projects may be necessary.

7.3. Summary and Next Steps

Currently, there are 108 separate water supply utilities within the metropolitan area, each with its own particular water supply planning issues. In preparing the master plan, the Council and Advisory Committee may identify a need to develop sub-regional governance structures in some areas to most effectively utilize supplies. In addition, funding may be required to support ongoing planning or capital improvements that benefit the region. While funding is available for development of the master water supply plan; there is general agreement that an ongoing funding strategy will be necessary to implement the plan and support the continued analysis of supplies and available resources.

The Council will continue to evaluate potential funding sources and governance structures by focusing its efforts in the areas identified below.

- **Work closely with local jurisdictions and the Advisory Committee to explore and identify governance mechanisms to implement improvements and programs if needed**
- **Develop strategies for ongoing and long-term funding for metropolitan area water supply planning activities and capital improvements**

8. SUMMARY, NEXT STEPS AND RECOMMENDATIONS

8.1. Summary

Despite abundant water supplies in the region, local water resource issues and complaints about the decision-making and approval process prompted the 2005 Minnesota Legislature to direct the Metropolitan Council (Council) to “carry out planning activities addressing the water supply needs of the metropolitan area.” Specifically, the Council was directed to develop a base of technical information for water supply planning decisions and prepare a water supply master plan for the metropolitan area. The legislature also established a Water Supply Advisory Committee to assist the Council in its planning activities, and directed the Council to submit regular reports to the legislature detailing its progress. The first report is due by the date the legislature convenes in 2007, and subsequent reports are due every five years thereafter. This document satisfies the requirements of Minnesota Statutes, Section 473.1565, Subdivision 3, as the Council’s first report to the legislature.

During the first phase of implementing the legislature’s water supply planning directive, the Council collected information and conducted analyses of water supply systems, water demand projections, resource availability, and water resource monitoring. In addition, the Council evaluated the current decision-making and approval process, agency roles, and water supply safety, security and reliability issues in the region. Recommendations and next steps identified in the initial phase will result in evaluating water resources in the context of long-term projected growth, ensuring sustainable and reliable water supplies throughout region, and improving the decision-making process.

This report presents a summary of the first phase of planning activities, suggests next steps and provides recommendations. A detailed description of activities conducted to develop the report can be found in the Council’s *Water Supply Planning Technical Report* prepared in conjunction with this document.

8.2. Next Steps

The Council identified the following next steps during first phase activities and plans to address them in the master water supply plan.

Water Demand and Availability

- Facilitate collection, sharing and analysis of regional data
- Improve understanding of water supply sustainability
- Examine water supply alternatives for areas where resource limitations are identified

Decision Making and Approval Process

- Formalize the current Council/DNR community water supply planning review process
- Support the DNR’s efforts to streamline water emergency and conservation plans and evaluate and implement the 10-year permit process
- Develop a water conservation toolbox to help communities implement best management practices, improve water use efficiencies and meet requirements of the 10-year permit

- Work with the DNR and MDH to develop a process for multi-agency water supply system/water appropriation approvals

Safety and Security

- Evaluate and support state/regional activities that improve security and reliability of local water systems
- Support source water protection efforts and impaired waters initiative

Institutional Arrangements and Funding

- Work closely with local jurisdictions and the Advisory Committee to explore and identify governance mechanisms to implement improvements and programs if needed
- Develop strategies for ongoing and long-term funding for metropolitan area water supply planning activities and capital improvements

8.3. Recommendations

In addition to the ongoing activities outlined above, the Council recommends the following legislative actions:

RECOMMENDATION #1 - Approve statutory changes clarifying agency roles in water supply plan review and consolidating into one statute the requirements of community water supply plans in the metropolitan area. Link water supply planning to comprehensive planning

RECOMMENDATION #2 – Upon the request of local governmental units, support an appropriate level of state funding for interconnections and other physical water system improvements to ensure water supply reliability, natural resource protection, and/or safety and security, including economic security, of the region and state. Consistent with this recommendation, support an appropriate level of state funding for the proposed Minneapolis and St. Paul water supply systems interconnection.

REFERENCES

U.S. Army Corps of Engineers, St. Paul District, 1994: Water Available from the Mississippi River at Minneapolis and Other Upstream Minnesota Locations During Low Flow Conditions.

Minnesota Department of Natural Resources, Division of Waters, 1993, revised 2006: Drought Response Plan.

Metropolitan Council, 1990: Metropolitan Area Short-Term Water Supply Plan, Publication No. 590-90-035.

ACRONYMS

CWS	Contamination Warning System
Cfs	cubic feet per second
DNR	Minnesota Department of Natural Resources
ERP	Emergency Response Plan
EPA	United States Environmental Protection Agency
FIG	Franconia-Ironton-Galesville
HSPD-5, HSPD-7, HSPD-9	Homeland Security Presidential Directive, Numbers 5, 7 and 9
Council	Metropolitan Council
JWC	Joint Waters Commission
Mgd	million gallons per day
MWW	Minneapolis Water Works
MDH	Minnesota Department of Health
MGS	Minnesota Geological Survey
NIMS	National Incident Management System
ROPE	Reservoir Operating Plan Evaluation
SPRWS	St. Paul Regional Water Services
ACOE	United States Army Corps of Engineers
VA	Vulnerability Assessment
WARN	Water/Wastewater Agency Response Networks
WISE	Water Infrastructure Security Enhancement

