Metropolitan Council

Metropolitan Area Water Supply Planning: Clean Water Fund Activities

Report to the Legislature: January 15, 2011

CLEAN WATER LAND & LEGACY AMENDMENT

Metropolitan Council
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Metropolitan Area Water Supply Planning

The Twin Cities seven-county metropolitan area is home to over half of Minnesota's population. Securing their safe and plentiful drinking water, while protecting the region's diverse water resources, requires coordinated, interdisciplinary and ongoing effort.

Legislative Charge and Funding

In 2005, the Minnesota State Legislature directed the Metropolitan Council (Council) to "carry out planning activities addressing the water supply needs of the metropolitan area," including the development of a Twin Cities Metropolitan Area Master Water Supply Plan (Master Plan) which was completed in March 2010 (Minnesota Statutes, Section 473.1565).

In 2009, the Legislature allocated $400,000 to the Council for FY10 from the Clean Water Fund for implementation of the Master Plan. In 2010, the Legislature allocated an additional $400,000 from the Clean Water Fund for FY11 for "projects that include, but are not limited to, protection of the Seminary Fen and Valley Branch Trout Stream; lessening groundwater vulnerability by mapping glacial aquifers; creation of a comprehensive map of known groundwater contaminant plumes; and the design of plans that can be used by communities for reusing stormwater." This legislation also required that "By January 15, 2011, the Council shall report to the chairs and ranking minority members of the legislative committees and divisions that make recommendations for appropriations from the Clean Water Fund on the outcomes of the Council's water supply planning activities." This report fulfills that requirement.

Overview of the Metropolitan Area Master Water Supply Plan

The requirements of Minnesota Statute 473.1565 were addressed in two phases. During the first phase, culminating in a January 2007 report to the Legislature, the Council conducted a preliminary evaluation of communities' water supply availability, examined the decision-making and approval process for water appropriation permits, and explored the merits of a regional approach in dealing with water supply safety, security and reliability.

Building on the work done in Phase I, the second phase of work refined the water resource availability assessment. The Council evaluated the issues associated with continued reliance on and expansion of groundwater supplies, the source for virtually all the region's growing suburbs. Phase II analyses focused on several issues, identified

by stakeholders that have limited water supply availability in the region in the past and could occur in the future:

- Impact to surface water features due to groundwater withdrawals
- Significant aquifer drawdown
- Well interference due to groundwater withdrawals
- Impact to trout streams or calcareous fens due to groundwater withdrawals
- Aquifer vulnerability to contamination from land-use activities
- Presence of special well construction areas

The Council and its partners developed a variety of analyses and tools, including a regional groundwater model, Metro Model 2, to assess these issues. Scenarios were run to estimate the aquifer drawdown from projected groundwater withdrawals, including a scenario that assumed full urban development density across the entire region. In all scenarios, groundwater was assumed to be the selected source to meet growing water demand. These analyses indicate that the magnitude of aquifer declines will vary across the metropolitan area but that the aquifers will not be depleted. Generally, in the developed central cities and inner-ring suburbs, aquifer decline is expected to be minimal as water demand remains constant or declines. In outer-ring suburbs and rural areas, particularly in the southern metropolitan area, aquifer decline on the order of 100 feet may occur.

The ramifications of this decline vary from aquifer to aquifer and from place to place. In some areas, the projected decline will have little impact on natural resources, while other areas may experience adverse impacts to aquifer productivity and/or surface water features that rely on groundwater discharge. In areas where adverse impacts from use of groundwater withdrawals are predicted, communities will need to conduct local studies and monitoring to ensure that projected demands can be met without impacting natural resources. This may include developing alternative sources such as other aquifers, surface waters, conservation and cooperation with neighboring communities.

A more thorough discussion of the activities and results of the planning activities can be found in the 2010 Metropolitan Area Master Water Supply Plan, the 2007 Report to the Legislature and the 2010 State Water Plan.

Recognizing the complex and dynamic nature of the region’s water demand and sources, the Master Plan establishes a dynamic process for collecting new information, updating analytical tools, and improving guidance to address anticipated water resource issues.

This ongoing effort will identify sustainable sources to meet long-term demand for the entire Twin Cities metropolitan area. Results will include developing sub-regional or local plans that identify water supply sources; establishing management thresholds linked to resource monitoring networks; monitoring and managing withdrawals; and identifying options to address potential limitations. That is the focus of the Clean Water Fund activities described in this report.

Progress Report: Clean Water Fund Activities

The activities summarized in this report have been or will be funded through the Clean Water Fund. These activities support the process described in the Master Water Supply Plan to address local issues and refine the regional assessment of availability. They also generate local and regional analyses and tools needed by suppliers and water resource managers across the region.

The information collected from these projects has multiple uses. Many of the projects are producing tools immediately available to municipalities and water resource managers that will help to improve water resource management decisions. The projects also provide information needed to update the regional analysis of water availability. In turn, this improves the predictive capability of the tools and resources developed for assisting local water management decisions.

Evaluation of Groundwater and Surface Water Interaction

Clean Water Fund Expenditure: ***$101,000***

The relationship between groundwater and surface water was analyzed for metropolitan area lakes, wetlands, streams and springs. The study identified surface waters that could be impacted by groundwater withdrawals in the region (Figure 1). Information about effective monitoring site selection, data collection frequency, and equipment installation and maintenance costs was also collected.

Deliverables:

This effort generated maps and supporting information to characterize the relationship between surface waters and groundwater, identifying surface waters most likely to be impacted by groundwater withdrawals in the region. This project also provides guidance on effective resource monitoring strategies and costs for each type of surface water feature. The report and supporting files are available on the Metropolitan Council website.

Outcomes:

This product benefits communities planning for future water supplies and regulatory agencies evaluating potential impacts of new or increased water appropriations. Communities anticipating increased groundwater withdrawals in areas with sensitive surface water features will be able to more effectively plan for the costs for the assessment, monitoring and management needed to evaluate and mitigate the potential effects of the withdrawals. This project also provides information for sub-regional and regional water supply planning, particularly through refinement of the regional groundwater model.

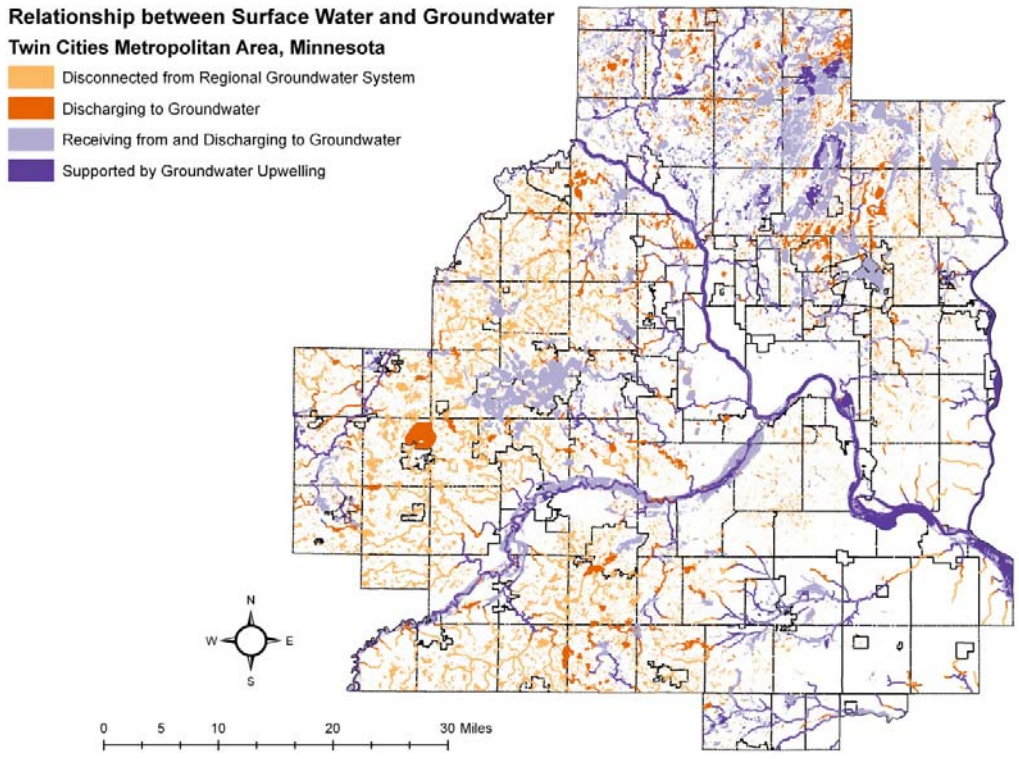

Figure 1. The relationship between surface water features and groundwater varies across the region. Management strategies should reflect this.

Clean Water Fund Expenditure: $110,200

The Council assessed the local water resources in the City of East Bethel area, where the city and Council are working closely to design a water reclamation and reuse facility intended to treat wastewater generated by future growth. This project evaluated plans for land use, water and sewers using a local groundwater flow model to identify potential risks to high-value water resources. It focused on the additional groundwater withdrawals that would result from serving growth as well as the effects of infiltrating reclaimed wastewater (Figure 2).

Deliverables:

A groundwater model and corresponding report were completed that describe the efforts, results and recommended management strategies.

Outcomes:

Project results are being used to help develop water supply system options and monitoring strategies to avoid adverse water resource impacts from projected withdrawals and water reclamation. This project is also being used as a pilot to demonstrate how water supply planning can be aligned with regional planning, including sewer service expansion.

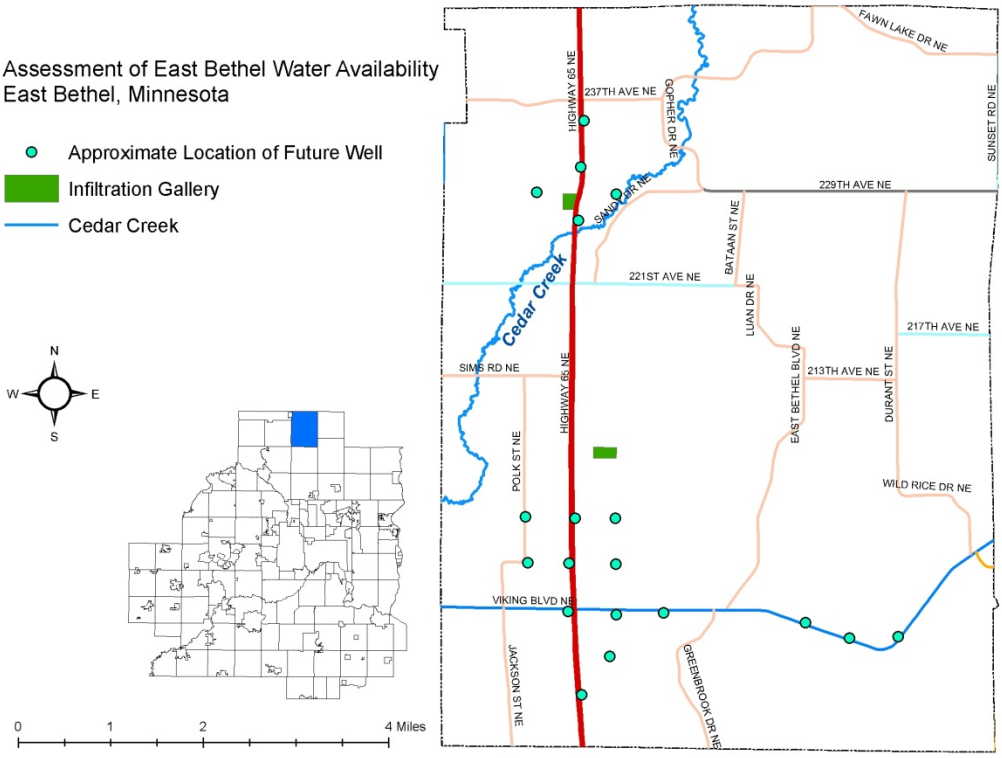

Figure 2. The analysis considered projected wastewater infiltration and groundwater demand to evaluate impacts to high-value surface water resources such as Cedar Creek.

Geologic Mapping & Groundwater Chemistry Assessment

Clean Water Fund Expenditure: ***$74,200***

On behalf of the Metropolitan Council, the Minnesota Geological Survey collected information and conducted an assessment of the hydraulic properties and chemistry of selected aquifers in the metro area. A robust database of groundwater age, aquifer hydraulic conductivity and groundwater chemistry data was developed to make the information easily accessible to water resource managers (Figure 3).

Deliverables:

A robust database previously available only in scattered paper reports was developed. The database and a project report are available on the Metropolitan Council website.

Outcomes:

The information generated by this project will be used by resource managers to: optimize management of existing wells; site future wells to maximize productivity and minimize impacts from withdrawals; and better understand the vulnerability of groundwater resources to land-use activities. The detailed information collected during this study also increases the understanding of aquifer availability, capacity and vulnerability in the region, and is extremely valuable for improving the predictive capability of the regional groundwater flow model.

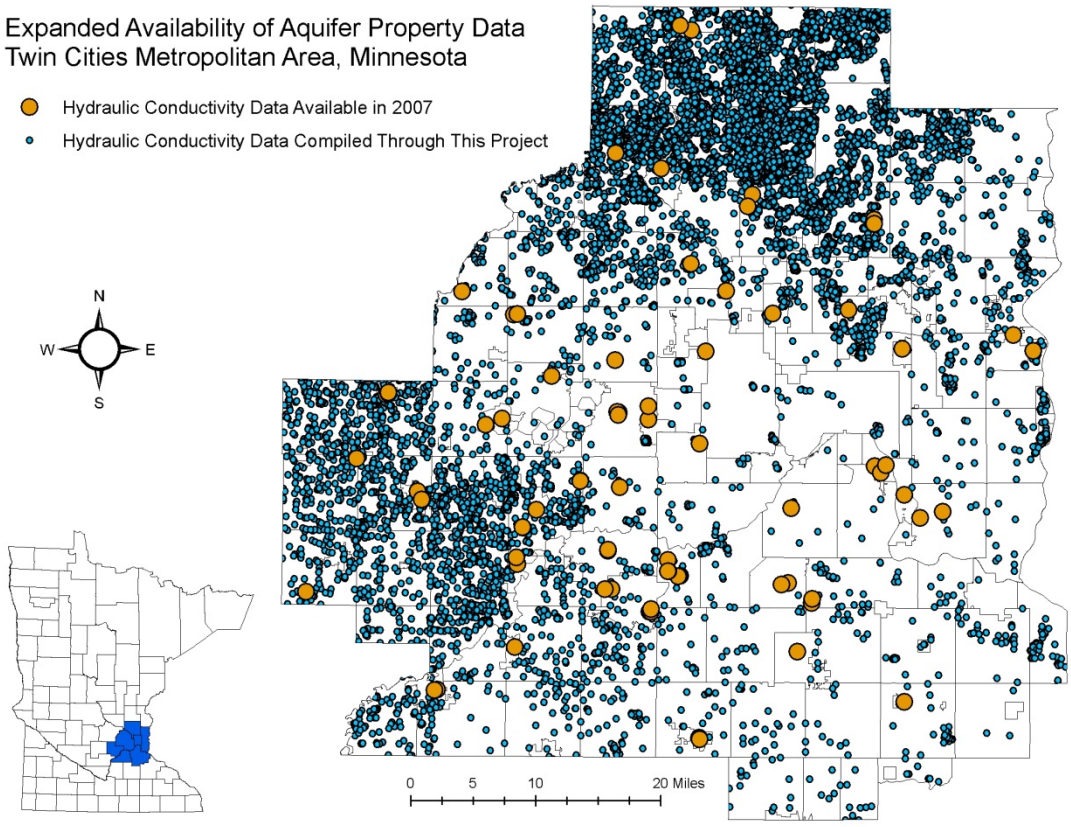

Figure 3. This project provides significantly more data to water resource managers than was previously available.

Clean Water Fund Expenditure: $77,000

Water conservation can help communities avoid capital expenditures and reduce demands on water resources. The incentive for conserving water in the Upper Midwest is not as strong as in other areas of the country. A project was conducted to assist communities to evaluate the benefits of water conservation programs and determine their value in comparison with developing traditional water supply sources. Tools to calculate potential water savings, estimate program implementation costs, and test the effects of various water conservation rate structures were developed (Figure 4). Information about water conservation programs implemented around the country was also collected.

Deliverables:

The project generated a matrix of water conservation programs used across the country with information about the costs and benefits. Tools were also developed to allow users to calculate potential water savings, estimate program implementation costs, and test the effects of various water conservation programs and rate structures. Completed project deliverables will be available through the Metropolitan Council website.

Outcomes:

Communities are able to evaluate different water conservation rate structures and quantify costs and benefits of implementing water conservation programs. This will assist communities in the selection of effective measures to reduce per capita demand and reduce capital expenditures.

	Existing Fee Structure					Proposed Fee Structure			
	Minimum	Maximum	$/mo	Revenue		Minimum	Maximum	$/mo	Revenue
Customer Account Fee, $/month			$ -	-		-	-	-	-
Water Base Facility Fee, $/month			$13.86	157		-	-	19.50	221
Waste Water Base Facility Fee, $/month			$16.22	184		-	-	19.50	221
Water Commodity Fee 1, $/kGal	0	9999	$ 3.48	220		-	3	1.50	47
Water Commodity Fee 2, $/kGal	0	0	$ -	0		3	6	4.67	79
Water Commodity Fee 3, $/kGal	0	0	$ -	0		6	15	5.80	78
Water Commodity Fee 4, $/kGal	0	0	$ -	0		15	9,999	7.50	12
Water Commodity Fee 5, $/kGal	0	0	$ -	0		-	-	-	0
Waste Water Commodity Fee 1, $/month	0	9999	$ 5.75	363		-	12	4.00	235
Waste Water Commodity Fee 2, $/month	0	0	$ -	0		-	-	-	0

Total Revenue: Existing Fee Structure $ 923,131
Total Revenue: Proposed Fee Structure $ 892,952
Surplus/(Deficit) $ (30,179)

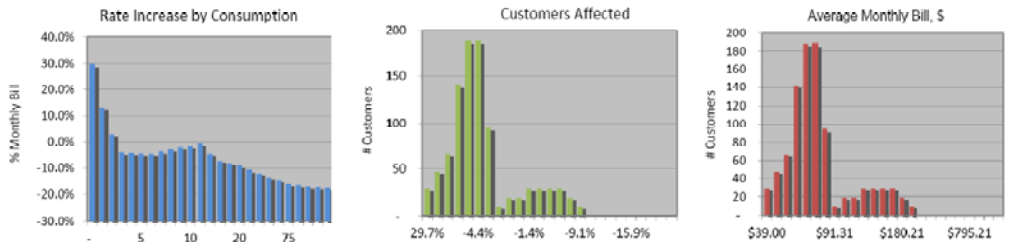

Figure 4. Example of a tool to test the impact of proposed water conservation rates, allowing users to quickly find options that meet revenue requirements.

Groundwater Contaminant Plume Mapping

Clean Water Fund Expenditure: ***$75,000 (estimated; project ongoing)***

In cooperation with the Minnesota Department of Health and the Minnesota Geological Survey, the Metropolitan Council is developing a map index (Figure 5) of existing groundwater contaminant plumes in the metro area.

Deliverables:

This project will generate an interactive map of known groundwater contaminant plumes. Completed project deliverables will be available through the Metropolitan Council website.

Outcomes:

This project supports water resource managers and land-use planners to evaluate potential water quality issues related to proposed well installation and contaminant plume migration. The map will also support long-term planning to ensure that decisions about where to site wells do not result in unintended consequences that could compromise the ability of future generations to obtain clean water.

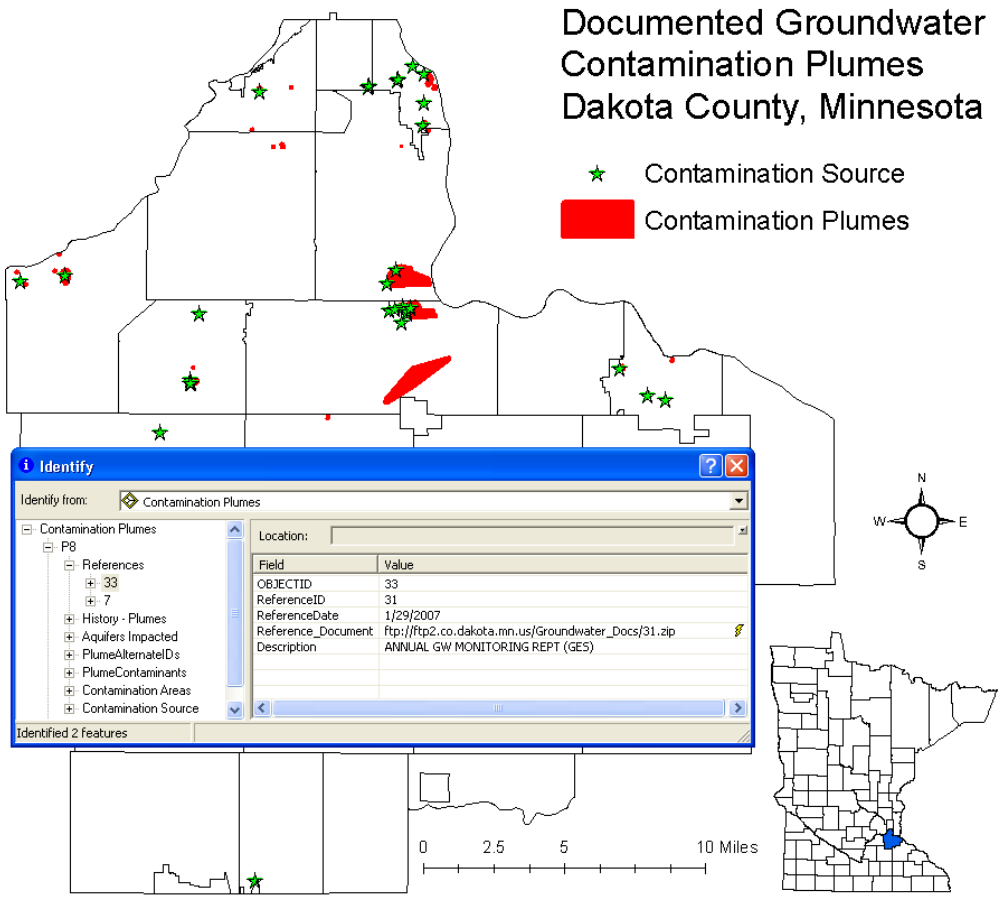

Figure 5. An interactive map allows users to click on a plume or contamination source to immediately access information regarding pollutants, impacted aquifers and scanned documents.

Seminary Fen Protection

Clean Water Fund Expenditure: $90,000 (estimated; project ongoing)

The Metropolitan Council is conducting technical analyses and leading a stakeholder process to evaluate potential threats to the Seminary Fen, a calcareous wetland in southeastern Carver County. This rare and sensitive water feature, protected by Minnesota Statutes 103G.223, relies on the discharge of groundwater to sustain a unique and protected plant community. Growing communities near the fen also rely on groundwater for their water supply (Figure 6). The technical analysis will evaluate potential effects of current and projected groundwater withdrawals, surface water management and land-use activities on the Seminary Fen.

Deliverables:

This effort will result in the development and implementation of a resource stewardship plan to guide management activities addressing pressures that affect the health of the fen, including groundwater withdrawals, stormwater runoff, water quality and invasive species.

Outcomes:

Communities will have more certainty about what water sources can be developed to meet projected demands without compromising the integrity of the fen. Land use and natural resource managers will have a comprehensive plan for addressing various the needs of the growing communities while protecting the fen.

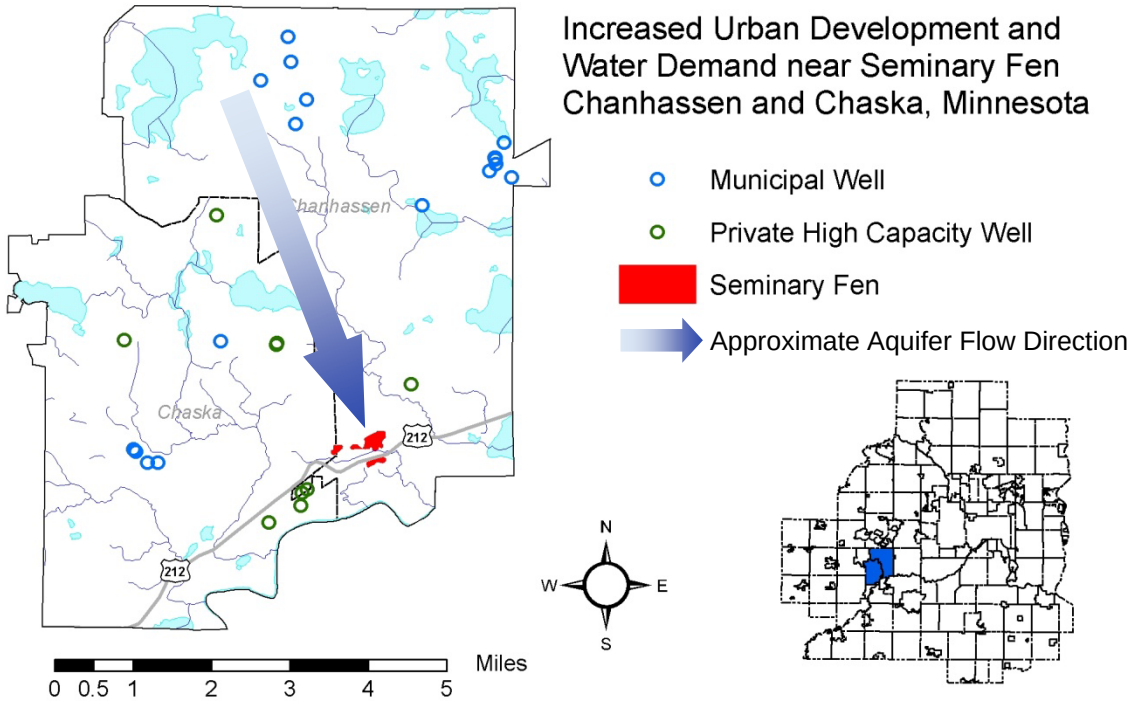

Figure 6. Urban development and increasing water demand in Chanhassen and Chaska could impact Seminary Fen.

Clean Water Fund Expenditure: ***$103,000 (estimated; project ongoing)***

A study is underway to evaluate the feasibility of using stormwater runoff for irrigation and other purposes that traditionally rely on potable water. Effective implementation of stormwater reuse practices (Figure 7) can lower demands on drinking water supplies and reduce impacts from aquifer decline, while simultaneously reducing mass loading of pollutants to surface waters. The project will include an analysis of factors that influence the feasibility assessment, scoping and implementation of stormwater reuse projects; an analysis of the requirements, challenges, benefits, and capital, operations and maintenance costs of stormwater reuse systems; and the development of stormwater collection, storage, treatment and distribution component options.

Deliverables:

The effort will generate technical guidance for communities that is specifically tailored to the Minnesota hydrologic cycle, cold climate/deicing issues and local permitting processes. Guidelines and conceptual plans will be developed that communities can use as a "how to" guide to assess the feasibility of, and to scope and implement, stormwater reuse projects. This project will complement and support existing stormwater guidance manuals, such as the Minnesota Stormwater Manual.

Outcomes:

Communities will be able to more easily evaluate and adopt stormwater best management practices that meet stormwater infrastructure goals while simultaneously benefiting water supply planning through reduction in potable demand.

Figure 7. Example of stormwater collection and reuse project in St. Anthony, Minnesota. (http://www.wsbeng.com/Services/ProjectPages/sustain_Reuse.html)

Clean Water Fund Expenditure: $40,000 (estimated; project ongoing)

On behalf of the Metropolitan Council, the Minnesota Geological Survey, in cooperation with the Minnesota Department of Health, is evaluating the vulnerability of glacial aquifers in the Twin Cities metropolitan area. The project will incorporate newly-compiled aquifer property data and geologic maps and blend methods used by the Minnesota Departments of Health and Natural Resources to assess groundwater vulnerability across the metro area (Figure 8).

Deliverables:

This project will generate maps showing pathways of groundwater movement through glacial materials to bedrock. The maps will be supported by a database of aquifer property and chemistry information developed through a related Clean Water Fund study. Maps and supporting files will be made available on the Metropolitan Council website.

Outcomes:

Information supplied by this project will be used by municipal water suppliers to evaluate potential groundwater sources for availability and vulnerability. It will also be a resource for land use planning to ensure that activities at the land surface consider the potential for adversely affecting groundwater quality.

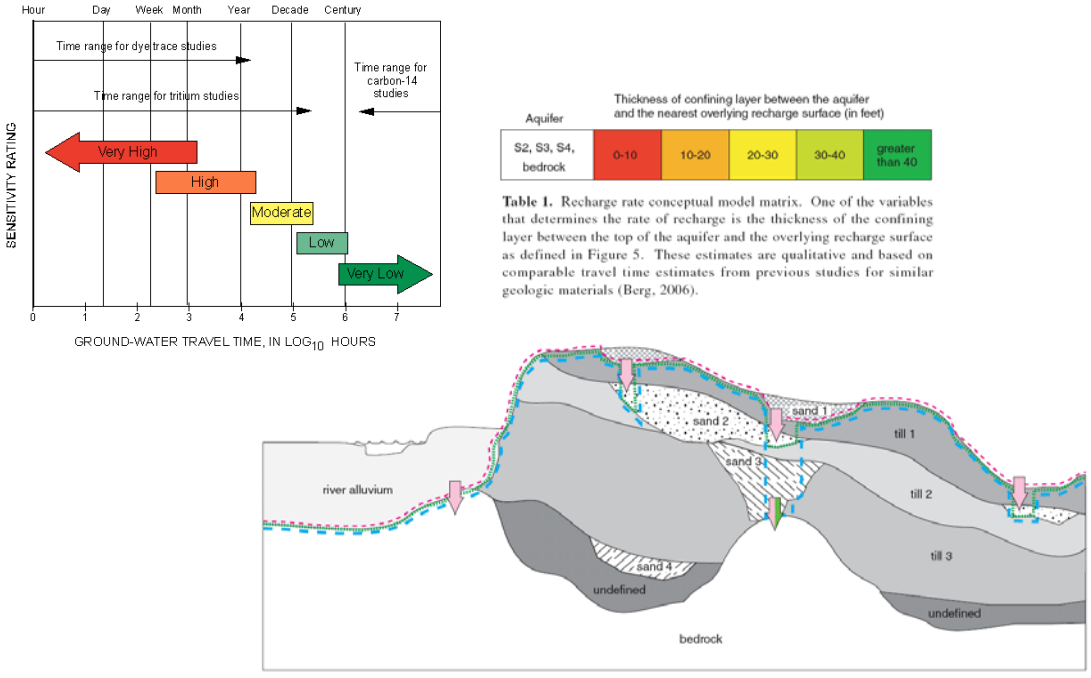

Figure 8. The figure above illustrates the approach taken by the Department of Natural Resources using groundwater age data and glacial mapping.

Clean Water Fund Expenditure: ***$92,000 (estimated; project ongoing)***

The goal of this project is to evaluate projected water demand, groundwater contamination and potential natural resource impacts in southern Washington County (Figure 9) to ensure water supplies are developed sustainably. An important part of this project involves working with stakeholders to identify common goals and objectives, as well as ways to enhance coordination amongst water suppliers and water resource managers. Partners include state agencies, Washington County, watershed districts and the cities of Woodbury and Cottage Grove.

Deliverables:

The project includes conducting technical analyses to evaluate water availability, effects of projected demands on natural resources including the Valley Branch trout stream, and migration of known groundwater contaminant plumes. Supply options will be developed to address issues identified early in the process.

Outcomes:

The project will result in the development and implementation of a water supply/water management plan to ensure that a high quality water supply is available to meet projected demand while protecting natural resources in the area.

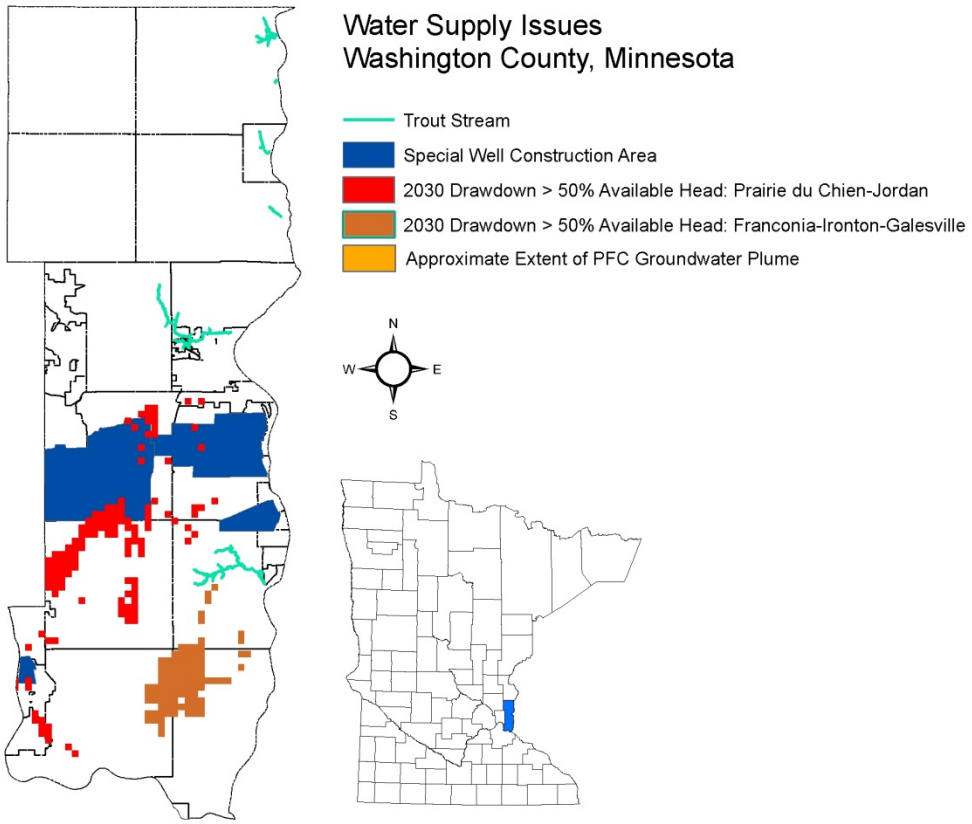

Figure 9. Several water supply development challenges are present in southern Washington County.

Ongoing Efforts

To address the changing demands on water supplies, the planning process must be ongoing, collaborative and dynamic. It is linked to long-term planning and based on a continuously improving foundation of technical information and management strategies (Figure 10).

This planning effort recognizes the value of an adaptive approach to water supply management, guided by management tools developed with the best available information. The Master Water Supply Plan describes in detail the ongoing process for incorporating new information. In summary, the plan calls for:

- Improved water supply availability technical analyses, including an update of the metropolitan area groundwater model, with new data, methods and information. Updated analyses will evaluate various land-use, climate and growth scenarios to identify potential local and regional water supply limitations as well as options to meet projected demands.
- Updated water supply planning tools and guidance, including the water conservation toolbox, water supply development guidance and online water supply mapping. These tools are used by cities and regulators to identify appropriate actions and sustainable water sources to meet future demands without adverse impacts to natural resources.
- Collection of data and information on: water levels, hydrogeologic properties, water chemistry, recharge rates, geology, water use, wells, water supply systems, water conservation, groundwater contamination and groundwater/surface water interactions. This information may be collected by the Council or others through regular programs or special studies, and will be used to improve the water supply availability analysis and planning tools.

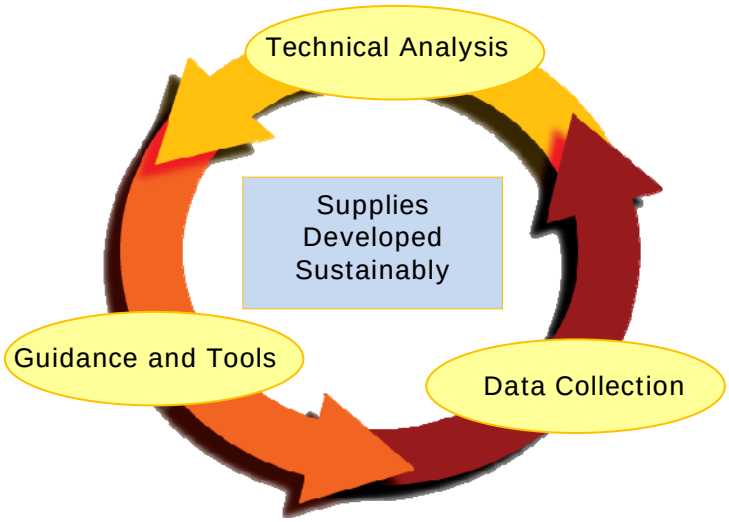

Figure 10. The ongoing and dynamic planning process.

In addition to robust data collection and analysis, inclusion and transparency create the organizational basis that inspires better decision-making. In order to continue the collaborative process established in development of the Metropolitan Area Master Water Supply Plan, stakeholders are engaged through a variety of collaborative processes.