



Dakota County, Minnesota Groundwater Plan 2020-2030

Adopted January 2021



2020-2030 Dakota County Groundwater Plan

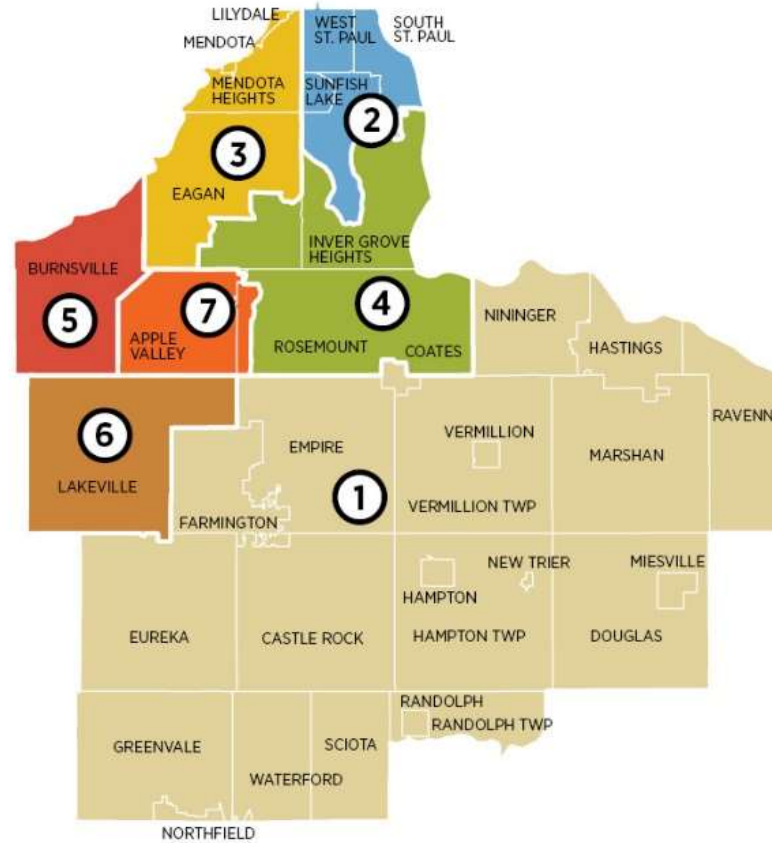
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Thank you

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The Dakota County Groundwater Plan was written by the Dakota County Environmental Resources Department and the Dakota County Office of Planning with input from the Dakota County Board of Commissioners, Planning Commission, and Groundwater Plan Technical Advisory Group. The Dakota County Groundwater Plan is in effect for ten years from the date the Minnesota Board of Water and Soil Resources, representing the State of Minnesota, approved it and the Dakota County Board of Commissioners adopted it.

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Abbreviations and Acronyms

AAI	CERCLA “All Appropriate Inquiries” environmental investigation
ACRE	Agricultural Chemical Reduction Effort
AGQS	Ambient Groundwater Quality Study, or Ambient Study
AMT	Alternative Management Tool
BDWMO	Black Dog Watershed Management Organization
BMP	Best Management Practice
BWSR	Minnesota Board of Water and Soil Resources
Cjdn	(Cambrian) Jordan Aquifer
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CDA	Dakota County Community Development Agency
County	Dakota County, Minnesota
DNR	Minnesota Department of Natural Resources
DWS	Drinking Water Standard
DWSMA	Drinking Water Supply Management Area
EA	Environmental Assessment Program
EIGHWMO	Eagan-Inver Grove Heights Watershed Management Organization
ELF	Environmental Legacy Fund
EPA	Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
FHR	Flint Hills Resources Pine Bend LLC Refinery
FOIA	Freedom of Information Act
GAC	Granular activated carbon
GPCD	Gallons per capita demand
LCCMR	Legislative-Citizen Commission on Minnesota Resources
Legacy Amendment	2008 Clean Water, Land and Legacy Amendment to the Minnesota Constitution
LGU	Local government unit
LMRWD	Lower Minnesota River Watershed District
LMRWMO	Lower Mississippi River Watershed Management Organization
MOU	Memorandum of Understanding
MAWSAC	Metropolitan Area Water Supply Advisory Committee

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MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/L	Micrograms per liter, equivalent to parts per billion
mg/L	Milligrams per liter, equivalent to parts per million
MERLA	Minnesota Environmental Response and Liability Act
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MERLA	Minnesota Environmental Response and Liability Act
MGS	Minnesota Geological Survey
MPCA	Minnesota Pollution Control Agency
MRWA	Minnesota Rural Water Association
MS4	Municipal separate storm sewer systems
MUSA	Metropolitan Urban Service Area
N	Nitrogen (or pounds of active nitrogen available in fertilizer)
NCRWMO	North Cannon River Watershed Management Organization
NFMP	Nitrogen Fertilizer Management Plan
NPDES	National Pollution Discharge Elimination System
NRCS	United States Department of Agriculture, Natural Resources Conservation Service
Opdc	(Ordovician) Prairie du Chien Aquifer
pCi/L	Picocuries per liter
PFCs	Perfluorochemicals
PFAS	Per- and Polyfluoroalkyl Substances
PLP	Permanent List of Priorities
PMP	Pesticide Management Plan
RO	Reverse osmosis system
SWCD	Dakota County Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TAG	Technical Advisory Group
TCMA	Twin Cities Metropolitan Area
Ucs	Unconsolidated sediments aquifer
UMN	University of Minnesota

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USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
VRWJPO	Vermillion River Watershed Joint Powers Organization
WHPP	Wellhead Protection Plan
WIMN	MPCA “What’s In My Neighborhood” website
WMO	Watershed management organization
WSP	Water Supply Plan
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Sufficient high-quality groundwater is critical for Dakota County’s future and the health and wellbeing of its residents, businesses, and ecosystems. Contaminants and increasing groundwater demands threaten the County’s drinking water supply, agriculture and industry water availability, and groundwater-dependent resources such as trout streams, springs, and calcareous fens. Human-caused contaminants that include nitrate, pesticides, and chloride are increasing in private wells, community water systems, and surface waters. In addition, increasing population, weather variability, and irrigation needs create extreme uncertainties about the availability of groundwater in the County in coming years. The potential financial, environmental, and intangible costs to treat undrinkable water, develop alternative water supplies besides groundwater, and rehabilitate damaged natural resources are much higher than the dollars needed to implement this Plan fully. As one of the most groundwater-dependent counties in the state, now is the time to act to protect Dakota County’s groundwater and prevent public health risks and increasing future costs.

A. Plan purpose

Dakota County is part of the seven-county Twin Cities Metropolitan Area (TCMA) and is bordered by Scott, Hennepin, Ramsey, Washington, Rice, and Goodhue Counties in Minnesota and Pierce County, Wisconsin. Groundwater provides 90 percent of the water supply in Dakota County, so groundwater protection is a critical element for meeting the county’s 2017 Strategic Plan goals to be a great place to live with a healthy environment with quality natural areas. The Groundwater Plan states the goals, objectives, scope, and priorities for groundwater protection in the county. It describes the County’s strategic approach for new and ongoing programs for residents, agricultural interests, businesses, industry, and government to protect and improve groundwater quality and quantity.

B. Water supply challenges

For Dakota County’s future, healthy, plentiful water cannot be taken for granted. Providing clean water to all of the county is a challenge: the groundwater is especially vulnerable to contamination because the soils and geology allow pollution that occurs at the surface to soak quickly down to drinking water aquifers. For example, rural Dakota County has widespread, persistent groundwater contamination with agricultural chemicals such as nitrate and pesticides. Furthermore, in parts of the county, the underlying geology leaches naturally occurring arsenic and manganese into the groundwater; in those areas, treating drinking water will be necessary under the best of circumstances. The county has groundwater contamination

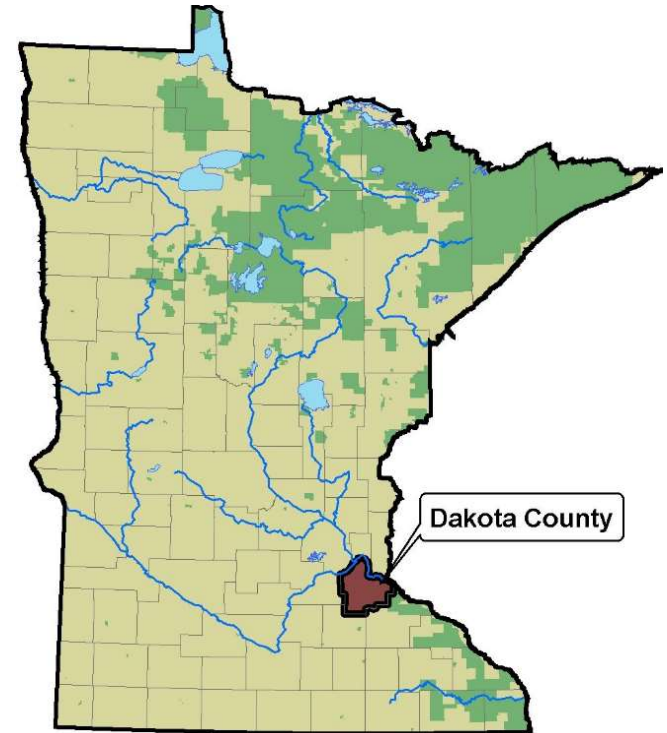


Figure 1 Location of Dakota County

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plumes from Superfund sites, other sources of industrial pollution, and sites that were contaminated in the past that require attention. Other issues facing the county's groundwater quality, such as chloride, stormwater, septic systems, and unsealed wells, are described in more detail within the Groundwater Plan.

In addition, the County has a growing population, increasing the demand for water. Weather patterns are becoming even more unpredictable than before; less water may be available from rainfall or snowmelt to seep down to the groundwater. Like a water "bank account," if withdrawals exceed deposits over time, the "account" will be depleted. The County and its residents must protect groundwater recharge and conserve water to be sure the county's water "balance" stays in the positive in coming years. While it is difficult to predict groundwater recharge rates and availability, future periods of drought are highly likely to result in local shortages. The Metropolitan Council has estimated that parts of the county could have as much as 50% depletion of drinking water aquifers by the year 2040.

Addressing groundwater quality and quantity concerns now is imperative for Dakota County's future. Although there are costs associated with addressing these concerns, not protecting our groundwater can be even more costly in the years to come. For example, treating contaminated water is expensive for both public water suppliers and for people who use private wells. The City of Hastings Public Works Division has already invested more than \$3 million in a nitrate removal system and may need to build another one in the near future. For residents who rely on private wells—an estimated 8,000 households—an effective drinking water treatment system may cost \$800 to \$1,000 to install, plus ongoing maintenance costs. If groundwater supplies run low, an alternative is to use water from the Minnesota or Mississippi Rivers, which is more expensive to transport and treat. Switching to surface water supplies could require as much as \$1.2 billion dollars (Metropolitan Council, 2014). The County's current programs to protect groundwater have worked to some degree, but new and expanded programs presented in this Groundwater Plan are needed to address the County's groundwater problems effectively in the long run.

C. Goals, Issues, and Proposed New Activities

A robust process of public engagement (described in the Planning Overview chapter below) guided staff in identifying major issues and concerns. Many agencies, groundwater stakeholders, and residents were engaged through a process designed and carried out with the assistance of Freshwater, a water science, policy, and advocacy organization. Throughout the process, staff developed and, with stakeholder feedback, refined goals, strategies, and tactics to address water quality, water quantity, education, and governance. The following goals (desired future conditions) define the overarching focus of the County's efforts over the next 10 years:

- 1. Water Quality: Groundwater and drinking water are free from unhealthy levels of contaminants.**
- 2. Water Quantity: Groundwater is sufficient to meet human needs and sustain groundwater-dependent ecosystems.**
- 3. Education: People who live and work in Dakota County are knowledgeable about water issues, conserve water, and prevent pollution.**

4. Governance: Groundwater programs and services are efficient and effective.

<i>Table 1 Identified Major Issues and Concerns</i>	
Goal 1: Water Quality	<ul style="list-style-type: none"> • Private well owners are at much greater risk of having unhealthy drinking water than are people who use a public water supply. Well construction is regulated, but after that, well owners are responsible for testing and treating their own drinking water. • For low-income households that use private wells, water treatment systems may be cost-prohibitive. • Nitrate and herbicides (especially cyanazine breakdown products) associated with row-crop agriculture are long-standing problems in Hastings and rural Dakota County groundwater. Nitrate concentrations are increasing, and elevated nitrate is being found in deeper wells over time. • The county has groundwater contamination plumes from Superfund sites, other sources of industrial pollution, and sites that were contaminated in the past that require ongoing attention. • Naturally-occurring manganese and arsenic are newly-identified health risks in the county’s drinking water aquifers. • Chloride— from road salt, water softeners, fertilizers, or other sources —is rising in the county’s groundwater and surface water resources. • Stormwater can be a source of groundwater recharge but also has the potential to contaminate groundwater. • Residents are concerned about potential contamination from unsealed wells, septic systems, and aggregate mining.
Goal 2: Water Quantity	<ul style="list-style-type: none"> • The public opposes exporting large quantities of Dakota County groundwater. • In coming years, the county’s growing population could use groundwater faster than it is replenished. • State regulations or guidance on water reuse are limited. • Land development and extreme weather events may diminish groundwater recharge. • Groundwater withdrawals could interfere with existing wells and damage fragile cold-water ecosystems such as trout streams, wetlands, and fens.
Goal 3: Education	<ul style="list-style-type: none"> • The general public would like more information about where their drinking water comes from, how to conserve water, and how to prevent groundwater contamination. • Public water suppliers could use help with conveying water-related messages. • People who rely on private wells would benefit from more information about health risks from contaminants, what kind of testing to do, and what kind of water treatment to use if it is needed. • More training is needed for people who maintain roads, parking lots, and sidewalks about how to limit risks from snow and ice while reducing salt usage. • More education is needed for homeowners and professionals who maintain turf, golf courses, and other landscapes on how to conserve and protect water.

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Table 1 Identified Major Issues and Concerns

Goal 4: Governance

- The County could be more of an advocate at the State level for water infrastructure funding and other issues that impact cities and townships in the county.
- Communications and collaboration between the County, public water suppliers, State agencies, and other water stakeholders can be improved.
- County and State regulatory processes for well and water appropriations permits should be reviewed and streamlined.
- The County can do more to make information readily available about groundwater contamination and groundwater levels.

Proposed new activities to address issues and concerns

- Assist private well owners with testing, understanding results, and selecting appropriate drinking water treatment.
- Seek funding to assist qualifying private well owners with cost-share opportunities for water treatment.
- Develop a Dakota County Groundwater Agricultural Chemical Reduction Effort (ACRE) that goes beyond the Minnesota Department of Agriculture (MDA) Nitrogen Fertilizer Management Plan and Groundwater Protection Rule.
- Address chloride contamination by targeting practices that contribute to contamination of runoff and groundwater, such as de-icing salt practices and inefficient water softeners.
- Work with the Minnesota Department of Natural Resources (DNR), other agencies, and local government units as appropriate, on regulatory controls and other measures to limit the exportation of groundwater resources from Dakota County.
- Promote water conservation through a countywide conservation initiative, and cost-share for water-efficiency conservation projects.
- Support development of alternative water supplies to include water re-use and evaluation of surface water sources.
- Support protection of high-quality groundwater recharge areas through land preservation, natural recharge, or artificial recharge projects.
- Develop and provide education materials for the general public as well as targeted audiences on groundwater, water conservation, and pollution prevention.
- Establish a County Groundwater Collaborative.

D. Statutory Elements

Dakota County adopted its first Groundwater Plan in 1993 in accordance with Minnesota Statute § 103B.255, Metropolitan Groundwater Management, and approved an updated plan in July 2000. The County subsequently integrated all its water management objectives into a comprehensive Environment and Natural Resource Management Policy Plan, which the Board of Water and Soil Resources (BWSR) approved on behalf of the State of Minnesota in October 2006. The County Board adopted a Groundwater Plan in May 2009 as a part of the DC 2030 Dakota County Comprehensive Plan, but it was not submitted to the State for approval.

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According to the statute, the period covered by the Groundwater Plan must extend at least five years but no more than 10 years from the date the state approves the plan, so the previous plan expired in October 2016. Dakota County opted to reinstate its Groundwater Plan as a stand-alone document and initiated an update of the plan to fully meet Minnesota Statute requirements. Table 2 provides a comparison between groundwater plan content requirements identified in Minn. Stat. §103B.255 and the Dakota County Groundwater Plan.

<i>Table 2 Minn. Stat. §103B.255 Requirements Compared to Dakota County Groundwater Plan</i>			
§103B.255, Subd. 7	Content Requirement	Chapter	Page No.
(1)	Cover the entire area within the county	Chapter 3. Planning Overview	63
(2)	Describe existing and expected changes to the physical environment, land use, and development in the county	Chapter 7. Population, Land Use, and Development Chapter 8. Physical Environment	127 133
(3)	Summarize available information about the groundwater and related resources in the county, including existing and potential distribution, availability, quality, and use	Chapter 5. Groundwater Issues: Quality and Drinking Water Health Chapter 6. Groundwater Quantity Issues: Use, Drawdown, and Recharge	91 117
(4)	State the goals, objectives, scope, and priorities of groundwater protection in the county	Chapter 1. Goals, Strategies, Tactics, and Outcome Measures Chapter 2. Plan Implementation	1 23
(5)	Contain standards, criteria, and guidelines for the protection of groundwater from pollution and for various types of land uses in environmentally sensitive areas, critical areas, or previously contaminated areas	Chapter 2. Plan Implementation	23
(6)	Describe relationships and possible conflicts between the groundwater plan and the plans of other counties, local government units, and watershed management organizations in the affected groundwater system	Chapter 4. Groundwater Management Roles, Responsibilities, and Official Controls	71
(7)	Set forth standards, guidelines, and official controls for implementation of the plan by watershed management organizations and local units of government	Chapter 4. Groundwater Management Roles, Responsibilities, and Official Controls	89
(8)	Include procedures and timelines for amending the groundwater plan	Chapter 3. Planning Overview	69

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CHAPTER 1. GOALS, STRATEGIES, TACTICS, AND OUTCOME MEASURES

A. Groundwater Plan Terminology

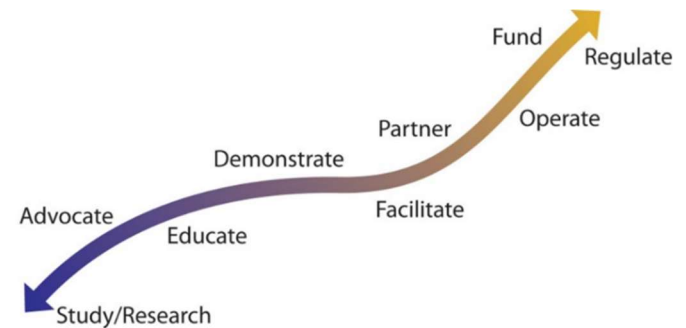
Different planning efforts may use the same terminology to mean different things. In the Dakota County Groundwater Plan, “goals” refer to the County’s aspirations for its desired future condition. “Strategies” are an organized framework of activities to achieve those goals. “Tactics” are the intended activities to implement the strategies. Once the Groundwater Plan is adopted by the Dakota County Board of Commissioners, all the strategies and tactics are important to the ongoing protection of groundwater, but not all will be implemented concurrently. Once the Plan is adopted, the Environmental Resources Department (ERD) will develop annual workplans detailing the activities for the following year. Annual workplans will also add additional detail regarding the implementation of specific strategies and tactics.



B. County Roles in Implementation: Levels of Control and Commitment

For each strategy and tactic described in this Plan, the County has indicated its intended role in the implementation. From right to left, these roles reflect decreasing levels of control and commitment on the County’s part:

- **Regulating** – requiring or forbidding certain activities, where legal authority exists and regulation is desired
- **Funding or operating** – creating changes by directly funding or operating activities, where authority to regulate does not exist or is not desired
- **Partnering, facilitating, or demonstrating** – working with other agencies, local governments, non-governmental organizations, land owners, and other residents
- **Educating** – encouraging behavioral changes through education and outreach
- **Advocating** – encouraging other levels of government to make changes
- **Studying, researching** – monitoring and collecting and analyzing data for informed decision-making



C. Groundwater Plan Principles

In developing and implementing this Plan, County staff intend to follow these principles:

- Use financial and human resources prudently; leverage non-County funding to the extent possible.
- Ensure services and events are accessible, equitable, inclusive, convenient, and practical.
- Provide people who live and work in the county with opportunities to create and implement solutions.
- Promote behavior change, such as water conservation and pollution prevention, through policies, programs, regulations, and incentives.
- Lead by example.
- Use science to support policy and action: support decisions with appropriate, representative groundwater data that are accessible to stakeholders.
- Communicate information about issues, services, and events using plain language and multiple channels and formats.

D. Groundwater Plan Issues, Goals, Strategies, and Tactics

Broadly speaking, the Groundwater Plan’s goals, strategies, and tactics address water quality, water quantity, education, and governance. For the purposes of organizing the Plan, developing annual work plans, and tracking implementation, strategies are assigned to individual goals and tactics are assigned to individual strategies. However, to the extent possible, the strategies and tactics are intended to be complementary with each other, to support multiple goals, and to provide multiple benefits.

The following strategies and tactics were developed to address specific issues identified by stakeholders and from research. Ten-year outcome measures identify what the strategies and tactics should accomplish over the life of this plan. Each strategy is supported by tactics representing specific actions and initiatives, with an indication of the predominant role the County will take and whether the activity is new, expanded from the current level, or a continuation. In the tables below, proposed new activities are **highlighted in green**.

1. Water Quality Goal:

Groundwater and drinking water are free from unhealthy levels of contamination.

Water Quality Issues Identified During Plan Development

- Private well owners are at much greater risk of having unhealthy drinking water than are people who use a public water supply. Well construction is regulated, but after that, well owners are responsible for testing and treating their own drinking water.

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- For low-income households that use private wells, water treatment systems may be cost-prohibitive.
- Water treatment systems may not be certified to remove some contaminants found in Dakota County groundwater – they may be effective, but they are not independently certified.
- Nitrate and herbicides (especially cyanazine breakdown products) associated with row-crop agriculture are long-standing problems in Hastings and rural Dakota County groundwater. Nitrate concentrations are increasing, and elevated nitrate is being found in deeper wells over time.
- Naturally-occurring manganese and arsenic are newly-identified health risks the county’s drinking water aquifers.
- The county has groundwater contamination plumes from Superfund sites, other sources of industrial pollution, and sites that were contaminated in the past that require ongoing attention.
- Chloride— from road salt, water softeners, fertilizers, or other sources –is rising in the county’s groundwater and surface water resources.
- Residents are concerned about potential contamination from unsealed wells, septic systems, and aggregate mining.
- Stormwater can be a source of groundwater recharge but also has the potential to contaminate groundwater.
- Residents and other stakeholders are not aware of County groundwater monitoring results.

GROUNDWATER QUALITY STRATEGIES

STRATEGY GROUP: ASSIST WATER USERS

1A1-Assist public water suppliers in protecting the water supply.

1A2-Assist water users in protecting their drinking water quality by regulating well construction and sealing.

1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment.

STRATEGY GROUP: ADDRESS NON-POINT SOURCE GROUNDWATER CONTAMINATION

1B1-Reduce agricultural chemical contamination.

1B2-Reduce contamination from turf and landscape maintenance.

1B3-Manage stormwater and water retention to prevent groundwater pollution.

1B4-Prevent groundwater contamination from chloride.

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STRATEGY GROUP: ADDRESS POINT SOURCE GROUNDWATER CONTAMINATION

- 1C1-Address industrial pollution and historically contaminated sites.
- 1C2-Prevent groundwater contamination by getting unused, unsealed wells sealed.
- 1C3-Prevent pollution by minimizing wastewater impacts.
- 1C4-Prevent pollution by minimizing impacts of aggregate mining.

STRATEGY GROUP: MONITOR GROUNDWATER QUALITY

- 1D-Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the county.

GROUNDWATER QUALITY TACTICS

Strategy 1A1-Assist public water suppliers in protecting the water supply.

Tactic	Description	Activity	Role
1A1A	Offer public water suppliers technical assistance in preparing, updating, and implementing effective and practical Wellhead Protection Plans (WHPP) and Water Supply Plans (WSP).	Continue	Partner
1A1B	Conduct a feasibility study for establishment of a rural water supply and/or wastewater system to provide healthy water to residents who currently rely on private wells and septic systems.	New	Research

10-Year Outcome Measures

- ✓ Environmental Resources staff have consistently reviewed and commented on municipal WHPP and WSP.
- ✓ Environmental Resources staff have collected best practices and communicated them to public water suppliers.
- ✓ Environmental Resources staff have reviewed proposed Drinking Water Supply Management Areas (DWSMAs) and identified potential water quality threats.
- ✓ Public water suppliers are successful in implementing their WHPPs and reducing water quality threats within the WHP area.
- ✓ Environmental Resources staff have identified unused, unsealed wells within proposed DWSMAs and added the information to the Well Inventory.
- ✓ Rural water supply feasibility study has been completed and County Board has chosen a course of action.

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Strategy 1A2-Assist water users in protecting their drinking water quality by regulating well construction and sealing.

Tactic	Description	Activity	Role
1A2A	Continue administering the Delegated Well Program. Enforce County Ordinance 114, Well and Water Supply Management, to ensure that new wells are constructed and unused wells are sealed to meet health standards and protect aquifers, in accordance with Dakota County and State of Minnesota requirements.	Continue	Regulate

10-Year Outcome Measures

- ✓ Delegated Well Program regulates well construction and sealing effectively and efficiently to protect the aquifers and the people using the wells from having contaminated groundwater.
- ✓ Permit applications have been reviewed and processed in a timely manner.
- ✓ Inspection rates exceed Minnesota Department of Health (MDH) standards.

Strategy 1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment.

Tactic	Description	Activity	Role
1A3A	Assist private well owners by offering fee-for-service water testing (Water Supply Testing Service) through a certified laboratory: <ul style="list-style-type: none"> • advise well owners regarding appropriate water tests based on legal requirements such as property transfer requirements, at-home daycare centers, or others, • facilitate the water testing, • explain their water test results, and • educate them regarding appropriate water treatment so their drinking water meets health guidelines. 	Expand	Educate
1A3B	Research home water treatment options to reduce contaminants found in Dakota County groundwater to healthy drinking water levels and communicate the information to well owners.	Continue	Research
1A3C	Facilitate the installation of appropriate, effective drinking water treatment systems for low-income households that use a private well and have contaminated groundwater.	New	Fund
1A3D	Advocate with MDH to identify point-of-use treatment systems that effectively remove or reduce manganese, cyanazine breakdown products, PFAS, and, as needed, contaminants of emerging concern.	Expand	Advocate
1A3E	Provide private well owners with the opportunity to have their water tested for free for pollutants that present health concerns, such as nitrate, arsenic, manganese, lead, or newly identified contaminants of emerging concern. <ul style="list-style-type: none"> • Facilitate the water testing with a certified laboratory, • Communicate water test results to private well owners, city and township leaders, and other interested parties, and • Educate private well owners regarding appropriate water treatment so their drinking water meets health guidelines. 	Expand	Operate
1A3F	Conduct “before and after” free testing (in conjunction with 1A3E), comparing the results from private well owners’ outdoor faucets with their treated, indoor water.	Continue	Research

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Tactic	Description	Activity	Role
1A3G	Hold free nitrate testing clinics, in cooperation with MDA. <ul style="list-style-type: none"> • Communicate water test results in person with private well owners and other interested parties, and • Educate private well owners regarding appropriate water treatment so their drinking water meets health guidelines. 	Expand	Educate
1A3H	To the extent appropriate and possible, collect demographic data to evaluate if water quality problems disproportionately impact specific populations and to address those inequities.	New	Research

10-Year Outcome Measures

- ✓ Effective and efficient communication was provided to private well owners that resulted in an increase in the use of the water supply testing service, understanding of risk and water treatment options.
- ✓ Demographic groups impacted by unhealthy drinking water have been identified, if present, and County has taken action to address inequities.
- ✓ Water treatment system factsheets and information papers are up to date and identify effective and cost-efficient treatment options for all known Dakota County groundwater contaminants. Information was communicated to all private well owners.
- ✓ State or County has developed and implemented a drinking water treatment system grant program to facilitate installation of drinking water treatment systems to all low-income private well owners with contaminated groundwater.
- ✓ When new contaminants have been detected in Dakota County groundwater, MDH has identified effective point-of-use water treatment systems in a timely manner and Dakota County has communicated that information to well owners.
- ✓ Individual well owners are knowledgeable about the health of their well water.
- ✓ Every household in the county that uses a private well has had the opportunity to have their well tested for free at least once.
- ✓ Dakota County has a robust groundwater quality data set for the entire County.
- ✓ Individual well owners are knowledgeable about the health of their well water and can see if their water treatment system is effective.
- ✓ When a contaminant detected in Dakota County groundwater does not have point-of-use treatment technology that is independently certified to reduce that contaminant to safe drinking water levels, the County has conducted sufficient “before and after” testing to recommend effective treatment options.
- ✓ Households on private wells in rural Dakota County have had their well water tested for nitrate at least once.

Strategy 1B1-Reduce agricultural chemical contamination.

Tactic	Description	Activity	Role
1B1A	Partner with farmers, local farm dealership or co-op agronomists, agribusinesses, farm organizations, or other farming interests, Soil and Water Conservation District (SWCD), University of Minnesota (UMN), and State agencies to promote water quality Best Management Practices (BMPs) and Alternative Management Tools (AMTs).*	Expand	Partner
1B1B	In consultation with farmers, the SWCD, UMN, State agencies, and non-governmental organizations, develop, adopt, and implement a Dakota County Groundwater Agricultural Chemical Reduction Effort (ACRE) with prioritized, targeted, and measurable strategies that are more protective of the health of private drinking water wells than the objectives of the MDA Nitrogen Fertilizer Management Plan and Groundwater Protection Rule.	New	Regulate
1B1C	Provide cost-share funding through SWCD for agricultural water quality BMPs and AMTs.	Expand	Fund

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Tactic	Description	Activity	Role
1B1D	Partner with State agencies and SWCD to install monitoring wells to collect long-term water quality and water level data in high nitrate groundwater areas of the county.	New	Partner
1B1E	Partner with SWCD to facilitate, promote, and potentially provide cost-share funding for irrigation practices and technologies that reduce groundwater contamination and conserve water.	New	Fund
1B1F	Partner with UMN, USDA, or other research institutions to ensure long-term nitrogen fertilizer and other agricultural water quality research is being conducted in Dakota County on fields that have coarse-textured soils and crop irrigation, similar to the Rosholt Research Farm in Pope County or the Olmsted County Soil Health Farm.	New	Partner
1B1G	Leverage County Land Conservation, State, and federal funds and County and SWCD staff expertise to acquire easements on private lands that promote practices that improve water quality.	Expand	Fund

*In the Dakota County Groundwater Plan’s discussions of agricultural water quality, the terms “Best Management Practices (BMPs) and Alternative Management Tools (AMTs)” generally refer to nitrogen fertilizer BMPs or AMTs as defined in Minnesota Statute § 103H.005 and Minnesota Rules Chapter 1573, “Groundwater Protection,” unless otherwise noted.

10-Year Outcome Measures

- ✓ Farmer adoption of BMPs (nitrogen fertilizer practices) and AMTs (non-fertilizer practices to improve water quality) has increased.
- ✓ Nitrate and herbicide levels in shallow groundwater are declining in rural Dakota County.
- ✓ ACRE Plan developed and implemented with farmer involvement and adopted by County Board.
- ✓ Monitoring well nests have been installed in places where agricultural chemical data are lacking; samples are systematically collected and results analyzed.
- ✓ All multi-aquifer agricultural irrigation wells in the county have been upgraded to prevent inter-aquifer mixing.
- ✓ Farmer adoption of “smart” or precision irrigation practices/ technology has increased, resulting in a reduction in water usage and fertilizer and pesticide leaching to groundwater.
- ✓ Understanding of agriculture practice impacts for irrigated soils specific in Dakota County has improved; innovative solutions to address concerns have been generated and tested.
- ✓ Areas of perennial vegetation and practices that improve water quality in rural Dakota County have increased.



Prairie Restoration, Sciota Township, courtesy of Jill Trescott

Strategy 1B2-Reduce contamination from turf and landscape maintenance.

Tactic	Description	Activity	Role
1B2A	Partner with SWCD, cities and townships, watershed organizations, and others to provide turf and landscape maintenance training to home owners, property managers, and landscaping professionals to protect water quality.	Continue	Educate
1B2B	Partner with SWCD, cities and townships, watershed organizations, and others to promote conversion of turf grass and annual vegetation to “Landscaping for Clean Water,” native plant landscapes, raingardens, “Lawns to Legumes” and related programs.	Expand	Partner

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Tactic	Description	Activity	Role
1B2C	Partner with SWCD, cities and townships, watershed organizations, and others to provide cost-share funding for the conversion of turf grass and annual vegetation to “Landscaping for Clean Water,” native plant landscapes, raingardens, “Lawns to Legumes” and related programs.	Expand	Fund
1B2D	Leverage County Land Conservation, State, and federal funds and County and SWCD staff expertise to acquire easements on private lands to restore and preserve natural areas in place of turf grass. (Similar to 1B1G)	Expand	Fund

10-Year Outcome Measures

- ✓ Home owners, other property managers, and landscaping professionals are educated on proper turf and landscape maintenance resulting in reduced use of fertilizers and other chemicals.
- ✓ Areas of perennial vegetation and other practices that improve water quality and save water have increased in urban areas.

Strategy 1B3- Manage stormwater and water retention to prevent groundwater pollution.

Tactic	Description	Activity	Role
1B3A	Manage stormwater to maximize clean groundwater recharge.	Continue	Operate
1B3B	Administer the County Stormwater Program to prevent pollution by sweeping streets, reducing road salt applications, and constructing and maintaining infiltration/ recharge/ runoff practices (County facilities and projects only).	Continue	Operate
1B3C	Advocate that local units of government implement topsoil organic matter requirements for new development to reduce compaction, promote soil health, and reduce runoff and potential impacts to groundwater.	Expand	Advocate
1B3D	Encourage the use of existing natural stormwater retention and detention areas to maintain or improve existing water quality.	Continue	Facilitate

10-Year Outcome Measures

- ✓ Stormwater that infiltrates into the groundwater is free from contamination.
- ✓ Dakota County cities and townships have ordinances or other regulatory mechanisms with topsoil organic matter requirements.
- ✓ Regional surface water retention practices have been implemented in partnership with cities, townships, watershed organizations, and the SWCD.

Strategy 1B4-Prevent groundwater contamination from chloride.

Tactic	Description	Activity	Role
1B4A	Work with County Transportation and Facilities Management Departments to minimize salt use on County roads, sidewalks, and parking lots while protecting public safety, including summer dust suppression as well as winter snow and ice control	Expand	Operate
1B4B	Partner with cities and townships to develop and implement a chloride reduction plan and policies in accordance with the MPCA Statewide Chloride Management Plan and Twin Cities Metropolitan Area Chloride Management Plan.	New	Partner

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Tactic	Description	Activity	Role
1B4C	Promote chloride reduction by advocating and incentivizing the replacement of outdated water softeners with new, efficient on-demand water softeners, in accordance with the Minnesota Pollution Control Agency's (MPCA's) "Guide to Developing a Local Water Softener Rebate Program" (MPCA, 2019) and other guides.	New	Fund
1B4D	Participate in and share county data with chloride-related efforts like the Minnesota Groundwater Association White Paper: Stormwater infiltration and chloride in Minnesota groundwater.	Continue	Partner

10-Year Outcome Measures

- ✓ County has implemented certified Smart Salt program through employee and contractor training and equipment upgrades.
- ✓ County has partnered with all cities and townships to develop and implement a road salt reduction plan that results in an overall reduction in salt-use.
- ✓ The State, Metropolitan (Met) Council, County, or local government units have developed and implemented a water softener replacement program. Runoff from water softener discharges to groundwater is reduced.
- ✓ Collaboration between the County, State, Met Council, and local government units (LGUs) results in better understanding of chloride issues and implementation of effective chloride reduction efforts.

Strategy 1C1-Address industrial pollution and historically contaminated sites.

Tactic	Description	Activity	Role
1C1A	Review and revise the Environmental Assessment and Remediation Program. <ul style="list-style-type: none"> • Conduct Environmental Reviews and respond to requests for information/FOIA requests relating to Environmental Due Diligence/CERCLA "All Appropriate Inquiries" (AAI)/Environmental Assessments. • Investigate and remediate contamination that poses a risk to public health and the environment. • Investigate, remediate, and mitigate contamination on County-owned or managed lands. • Provide technical assistance and expertise to external entities relating to investigation, mitigation, remediation and redevelopment of contaminated sites and brownfields. 	Modify	Operate
1C1B	Provide cost-share funding for investigation, remediation, and mitigation of contamination relating to brownfield redevelopment.	Continue	Fund
1C1C	Administer County Ordinance 110, Solid Waste Management, and County Ordinance 111, Hazardous Waste Regulation, to regulate landfills and other solid and hazardous waste.	Continue	Regulate
1C1D	Administer Registered Well Program to regulate environmental and product recovery wells, observe remediation activities, evaluate monitoring data, and ensure compliance with well codes.	Continue	Regulate
1C1E	Monitor groundwater contamination in the Pine Bend Area Special Well and Boring Construction Area.	Continue	Regulate
1C1F	Expand County household hazardous waste collection efforts.	Expand	Operate

10-Year Outcome Measures

- ✓ Sites that were contaminated in the past but now have development potential have been identified, remediated, and redeveloped.
- ✓ Requests for environmental information are answered with timely, accurate, and pertinent information.

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- ✓ Risk to public health and the environment from contaminated sites has been reduced.
- ✓ Environmental impediments to property redevelopment have been removed.
- ✓ Environmental remediation has restored the public, private, and community value of previously contaminated sites.
- ✓ Quantity of historical documents and data relating to sites, contamination, and cleanups has increased.
- ✓ Solid and hazardous waste: see 2018 Solid Waste Master Plan.
- ✓ Registered Well Program regulates environmental and remediation wells effectively and efficiently to protect the aquifers. Water quality data is properly managed and mapped to identify all groundwater plumes in Dakota County.
- ✓ County staff meet annually with staff from Flint Hills Resources (FHR) Pine Bend Refinery to review and respond to groundwater contamination plume data.

Strategy 1C2-Prevent groundwater contamination by getting unused, unsealed wells sealed.

Tactic	Description	Activity	Role
1C2A	Facilitate the sealing of unsealed wells and assist people buying and developing real estate. <ul style="list-style-type: none"> • Review historical land use information about parcel. • Evaluate the likelihood and probable location of old, unused wells. • Communicate the information to property owners. • Maintain the information for future reference. 	Continue	Facilitate
1C2B	Promote sealing of unused wells by funding well-sealing cost-share grants.	Continue	Fund

10-Year Outcome Measure

- ✓ Unused, unsealed wells in DWSMAs are identified and sealed.

Strategy 1C3-Prevent pollution by minimizing wastewater impacts on groundwater quality.

Tactic	Description	Activity	Role
1C3A	Ensure that subsurface sewage treatment systems in Dakota County will be constructed, operated, and maintained in conformance with Minnesota statutes and rules and County Ordinances No. 50 (Shoreland and Floodplain Management) and No. 113 (Subsurface Sewage Treatment Systems).	Continue	Regulate
1C3B	Promote replacement of failing septic systems by funding septic system cost-share grants and loans.	Continue	Fund
1C3C	Provide technical assistance to township officials to support effective septic system regulation. Support cities and townships in getting failing sewage systems replaced with systems that comply with State rules and their local ordinance.	Continue	Facilitate
1C3D	Provide available septic pumping information to local units of government, consistent with the guideline to implement a 3-year maintenance schedule for individual sewage treatment systems.	Continue	Facilitate
1C3E	Provide training for realtors regarding the property transfer requirements for wells and septic systems.	Continue	Educate

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Tactic	Description	Activity	Role
1C3F	Review and track proposed sites for land application of wastewater treatment plant biosolids to reduce risk of direct human exposure to waste or contamination of groundwater. Advocate that the MPCA effectively regulate this form of disposal to avoid surface waters, ditches or drainageways, shorelands, floodplains, sinkholes, drain tiles, steep slopes, or other locations or circumstances with the potential to adversely affect public health.	Expand	Advocate

10-Year Outcome Measures

- ✓ Septic systems under Dakota County jurisdiction are maintained regularly and failing systems are identified and upgraded.
- ✓ Majority of realtors in Dakota County are trained and understand requirements for properties with wells and septic systems.
- ✓ MPCA effectively regulates land application of wastewater treatment plant (WWTP) biosolids. Dakota County has complete records of biosolid application sites, monitors downgradient receptors for potential exposures, and communicates risks, if documented, to at-risk populations.

Strategy 1C4-Prevent pollution by minimizing impacts of aggregate mining on groundwater quality.

Tactic	Description	Activity	Role
1C4A	Amend Ordinance No. 50, Shoreland and Floodplain Management, to require additional information from applicants seeking mining permits in County-administered shoreland or floodplain.	Expand	Regulate
1C4B	Review the County's model Mining Ordinance, update as appropriate, and distribute to cities and townships.	Modify	Advocate

10-Year Outcome Measures

- ✓ Groundwater does not get polluted by way of current or former aggregate mines.
- ✓ Mine dewatering does not impact groundwater levels beyond the property boundaries of the mine.
- ✓ County staff have worked with cities, townships, and WMOs to develop and adopt recommendations for mining ordinances that protect groundwater from contamination or excessive withdrawals and protect groundwater-dependent surface water and ecosystems such as trout streams, wetlands, and fens from damaging changes to water levels and water quality (including temperature).

Strategy 1D-Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the county.

Tactic	Description	Activity	Role
1D1A	Research groundwater conditions, including contaminants of emerging concern, on an ongoing basis to develop, implement, and evaluate strategies for reducing groundwater contamination and protecting public health in the county.	Continue	Research

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10-Year Outcome Measures

- ✓ Significant patterns of contamination (sources, land use, well construction, depth, aquifer, trends over time, etc.) are identified based on sampling results from private and public drinking water wells, monitoring wells, and other sources of data.
- ✓ Geographic distributions of nitrate, manganese, arsenic, and new contaminants of emerging concern in County groundwater have been documented.
- ✓ Risk factors and trends of major contaminants have been identified and modeled.
- ✓ Contaminants of emerging concern are identified; their prevalence in County groundwater is measured; health implications and water treatment options are identified and communicated to County residents.

2. Water Quantity Goal:

Groundwater is sufficient to meet human needs and sustain groundwater-dependent ecosystems.

Water Quantity Issues Identified During Planning Process

- Public opposes exporting large quantities of Dakota County groundwater.
- In coming years, the county's growing population could use groundwater faster than it is replenished.
- State regulations or guidance on water reuse are limited.
- Land development and extreme weather events may diminish groundwater recharge.
- Groundwater withdrawals could interfere with existing wells and damage fragile cold-water ecosystems such as trout streams, wetlands, and fens.

GROUNDWATER QUANTITY STRATEGIES

STRATEGY GROUP: PROMOTE WATER CONSERVATION AND DEVELOPMENT OF ALTERNATIVE WATER SUPPLIES

2A1-Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports.

2A2-Promote water conservation

2A3-Support development of alternative water supplies.

STRATEGY GROUP: PROMOTE SURFACE WATER RETENTION AND TREATMENT AND CLEAN GROUNDWATER RECHARGE

2B1-Protect and improve high-quality groundwater recharge areas.

2B2-Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams.

STRATEGY GROUP: MONITOR GROUNDWATER QUANTITY

2C-Quantify changes in groundwater levels and flow patterns in response to weather and groundwater pumping.

GROUNDWATER QUANTITY TACTICS

Strategy 2A1- Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports.

Tactic	Description	Activity	Role
2A1A	Work with DNR to ensure that large groundwater appropriation requests are sustainable.	New	Advocate
2A1B	Seek authority to issue and regulate water appropriations permits instead of the DNR. (Greater than 3.6 million gal/year would require a change in State law.)	New	Regulate
2A1C	Revise County Ordinance 114, Well and Water Supply Management to protect long-term water supplies, such as restricting construction of large-capacity wells.	New	Regulate

10-Year Outcome Measures

- ✓ State law, DNR Rules, and County and LGU ordinances establish strong oversight of groundwater appropriations for water to be removed from the state.
- ✓ County is granted delegated authority to issue and regulate water appropriations in Dakota County.

Strategy 2A2-Promote water conservation.

Tactic	Description	Activity	Role
2A2A	Develop and implement a County-wide water supply/conservation initiative, in cooperation with cities, townships, watershed organizations, and large users of water.	New	Partner
2A2B	Provide cost-share funding for water conservation projects, including water conservation audits, crop and non-crop irrigation efficiency projects and projects to replace low-water-efficiency appliances with high-efficiency ones, partnering with potential funding sources such as Metropolitan Council or State agencies.	New	Fund
2A2C	Conduct water use/efficiency/conservation audits for all County facilities.	New	Operate

10-Year Outcome Measures

- ✓ Dakota County and the larger water users have developed a water conservation initiative that results in innovative water conservation ideas and implementation, potentially including development of a model conservation ordinance and/or Memorandum of Understanding (MOU).
- ✓ Every public water supplier in Dakota County has reduced water usage and meets Met Council’s goal of < 75 residential gallons per capita demand (GPCD), < 90 total GPCD, and a reduction in summer-to-winter water usage ratio.

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Strategy 2A3-Support alternative water supplies

Tactic	Description	Activity	Role
2A3A	Advocate with the State on behalf of the cities and townships to clarify the rules and guidelines regarding water reuse.	New	Advocate
2A3B	Provide cost-share funding for water reuse projects.	New	Fund
2A3C	Support efforts of local water suppliers and Metropolitan Council to investigate and develop sources other than groundwater to meet future water demands.	Expand	Advocate

10-Year Outcome Measures

- ✓ State has developed and promulgated water reuse regulations and guidance that are cost-effective and protective of public health and the environment.
- ✓ Dakota County has provided cost-share funding for water reuse projects that result in reduction of water usage to meet Met Council's goal of < 75 residential GPCD, < 90 total GPCD, and a reduction in summer-to-winter water usage ratio.
- ✓ All cities and townships in Dakota County have sufficient water supply to meet future demands.

Strategy 2B1-Protect and improve high-quality groundwater recharge areas.

Tactic	Description	Activity	Role
2B1A	Partner with the Minnesota Geological Survey (MGS) and the DNR to update the Dakota County Geologic Atlas and identify high-quality groundwater recharge areas in addition to those areas not suitable for enhanced recharge.	Continue	Partner
2B1B	Partner with SWCD, cities, townships, and watershed organizations to improve groundwater recharge by promoting and providing cost-share funding for water quality improvement practices such as low impact development; wetland restoration; and permanent vegetation.	Expand	Fund
2B1C	Partner with SWCD, the County Land Conservation Program, cities, and townships to acquire, restore, and preserve open space suitable for natural or enhanced groundwater recharge, based on the Met Council's Regional Feasibility Assessment of suitable recharge areas (Met Council, 2014) or other resource inventories.	Expand	Fund
2B1D	Review MPCA permitting requirements for infiltration in areas that require a "higher level of engineering review" to develop recommendations for the cities and townships for designs, land use restrictions, and practices to maximize clean recharge, to the extent possible.	New	Partner

10-Year Outcome Measures

- ✓ Both parts of County Geologic Atlas have been completed.
- ✓ Cities and townships adopted ordinance or other regulatory mechanisms that require low impact development. Groundwater recharge rates equal or exceed groundwater use needs.
- ✓ High quality groundwater recharge areas are preserved (i.e., limited development); groundwater recharge rates equal or exceed groundwater use needs.
- ✓ County staff have worked with cities, townships, SWCD, and WMOs to develop and adopt local infiltration recommendations to be incorporated in County/City/Township stormwater ordinances governing stormwater infiltration requirements.

Strategy 2B2-Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams.

Tactic	Description	Activity	Role
2B2A	Encourage communities to complete or update wetland protection and management plans, assessments, and update, and incorporate these documents into ordinance.	Continue	Partner
2B2B	Administer wetland rules and regulations through the appropriate city, township, the SWCD or the DNR.	Continue	Partner
2B2C	Develop, monitor, protect, restore, and manage wetlands for water retention and habitat. (Includes wetland restoration initiatives like Wetland Banking)	Expand	Fund
2B2D	Review groundwater appropriations permit applications and advocate with DNR to ensure withdrawals will not compromise wetlands, fens, or trout streams. (Complementary with 2A1A)	Continue	Advocate
2B2E	Partner with watershed organizations to protect and improve groundwater quality, temperature and quantity, in areas that provide groundwater to wetlands, fens or trout streams.	Expand	Partner

10-Year Outcome Measures

- ✓ Cities and townships developed management plans, ordinances, and/or other regulatory mechanisms that protect wetlands.
- ✓ Wetland rules and regulations are efficiently and effectively administered throughout the county.
- ✓ High quality wetland areas are protected and preserved.
- ✓ Acres of wetlands have increased throughout the county.
- ✓ Wetlands, fens, and trout streams are hydrologically and ecologically stable.

Strategy 2C-Quantify changes in groundwater levels and flow patterns in response to weather and groundwater pumping.

Tactic	Description	Activity	Role
2C1A	Partner with public water suppliers to encourage adoption and coordination of advanced technologies, such as “Smart Wellfield” technologies, to monitor groundwater levels and chemistry to optimize well usage and pumping rates.	New	Facilitate
2C1B	Model groundwater flow patterns and water levels to facilitate decision making.	Continue	Research

10-Year Outcome Measures

- ✓ With help from Dakota County, public water suppliers have installed advanced monitoring technologies throughout the county that allow real-time reporting.
- ✓ Dakota County Groundwater Model has been updated for a more accurate representation and understanding of county groundwater quantities and flows.

3. Education Goal:

People who live and work in Dakota County are knowledgeable about water issues, conserve water, and prevent pollution.

Education Issues Identified During Planning Process

- The general public would like more information about where their drinking water comes from, how to conserve water, and how to prevent groundwater contamination.
- Public water suppliers could use help with conveying water-related messages.
- People who rely on private wells would benefit from more information about health risks from contaminants, what kind of testing to do, and what kind of water treatment to use if it’s needed.
- The County could provide more information about wells for well contractors to pass along to well owners.
- More training is needed for people who maintain roads, parking lots, and sidewalks about how to limit risks from snow and ice while reducing salt usage.
- More education is needed for homeowners and professionals who maintain turf, golf courses, and other landscapes on how to conserve and protect water.

EDUCATION STRATEGIES

3A- Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention.
 3B- Provide training and education to targeted audiences, such as well owners, well drillers, real estate professionals, and people who maintain roads and sidewalks (“Smart Salt” practices).

EDUCATION TACTICS

Strategy 3A- Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention

Tactic	Description	Activity	Role
3A1A	Expand groundwater conservation and pollution prevention education and outreach efforts.	Expand	Educate
3A1B	Assist with the production of the annual Metro Area Children's Water Festival and pursue other K-12 educational opportunities	Continue	Educate
3A1C	Apply to host the Minnesota Humanities Center’s traveling “We are Water” or other exhibits or displays.	New	Educate
3A1D	Inform the public about groundwater levels by putting DNR observation well data on the County website.	New	Educate

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Tactic	Description	Activity	Role
3A1E	Work with municipal water suppliers to place signs on County roads indicating where people are entering a DWSMA.	New	Educate
3A1F	Leverage existing educational materials and programs (e.g., State and regional agencies, watershed organizations, non-profit organizations) wherever appropriate.	Expand	Educate
3A1G	Inform the public about DWSMAs by including them on the County’s website	New	Educate
3A1H	Develop and distribute educational information in multiple languages and accessible formats.	New	Educate

10-Year Outcome Measures

- ✓ Established groundwater education program with information available in multiple languages and in accessible formats; public participation with learning opportunities results in an increased knowledge of groundwater.
- ✓ Water education program actively engages TCMA, specifically Dakota County, K-12 students.
- ✓ Public participation with hands-on learning opportunities results in an increased knowledge of groundwater.
- ✓ Real-time well data is available through the County website that informs the public of current water levels and suggests actions to take when levels are low.
- ✓ All DWSMAs in the county have been identified by signs placed on County roads.
- ✓ Education materials and programs avoid duplication of existing resources and reach broader audiences.
- ✓ DWSMA maps are included on County website.

Strategy 3B-Provide training and education to targeted audiences, such as well owners, well drillers, real estate professionals, and people who maintain roads and sidewalks (“Smart Salt” practices).

Tactic	Description	Activity	Role
3B1A	Develop and distribute information pieces about geology, contaminants and their health risks, water testing and treatment, septic system maintenance, etc., for private well owners.	Expand	Educate
3B1B	Provide information about well construction, protecting wells from contamination, recommended water testing, and appropriate well water treatment to well contractors to pass along to private well owners.	Expand	Educate
3B1C	Make non-private water quality data more readily available to homeowners and other stakeholders to help them make informed decisions about property and water supply options.	Expand	Educate
3B1D	Provide "Smart Salt" training and certification for road maintenance; parking lots and sidewalks; and property owners and managers.	Continue	Educate
3B1E	Educate public officials about groundwater and drinking water issues.	Continue	Educate
3B1F	Conduct stakeholder workshops introducing partner agency staff and interested parties to the County Geologic Atlas and how to use it, once it has been updated.	New	Educate
3B1G	Conduct the annual Wetland Health Evaluation Program to engage citizen volunteers to monitor plants and invertebrates in community wetlands throughout the county.	Continue	Educate
3B1H	Ensure information for targeted audiences is available in multiple languages and accessible formats.	New	Educate

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10-Year Outcome Measures

- ✓ Private well and septic system owners are knowledgeable about drinking water contaminants, and well and septic system maintenance.
- ✓ Well contractors educate private well owners during well construction, re-construction, and sealing.
- ✓ County-wide groundwater quality data is accurate and easily accessible on the County website; stakeholders are able to make informed decisions based on information provided.
- ✓ Road maintenance staff, property owners, businesses, and other entities that use de-icing salt are educated in “smart salt” use resulting in a reduction in chloride contamination.
- ✓ Public officials are knowledgeable regarding Dakota County and their local government unit drinking water issues and take appropriate action to address concerns.
- ✓ County has provided learning opportunities on how to use the County Geologic Atlas.
- ✓ Information for targeted audiences is available in multiple languages and accessible formats.

4. Governance Goal:

Groundwater programs and services are efficient and effective.

Governance Issues Identified During Planning Process

- The County could be more of an advocate at the State level for water infrastructure funding and other issues that impact cities and townships in the county.
- Communications and collaboration between the County, public water suppliers, State agencies, and other water stakeholders can be improved.
- County and State regulatory processes for well and water appropriations permits should be reviewed and streamlined.
- The County can do more to make information readily available about groundwater contamination and groundwater levels.

GOVERNANCE STRATEGIES

4A-Collaborate with other levels of government.

4B-Review, streamline, and improve County and State regulatory processes.

GOVERNANCE TACTICS

Strategy 4A-Collaborate with other levels of government

Tactic	Description	Activity	Role
4A1A	Advocate for State and federal funding for County, city, and township water infrastructure improvement projects; advocate for improvements to State regulations where needs are identified.	Continue	Advocate
4A1B	Establish a County Groundwater/Source Water Collaborative comprising public water suppliers, State, regional, watershed, County, and SWCD staff to meet regularly and facilitate benchmarking, data-sharing, idea-sharing, and collaboration between the County and drinking water stakeholders. (Broader than 2A2A)	New	Partner
4A1C	Fund a competitive grant program for innovative municipal projects to improve water quality, water quantity, program efficiency, or other issues related to groundwater protection.	New	Fund
4A1D	As part of the Delegated Well Program, work with DNR to manage conflicts between surface water resource protection and groundwater quality (deep irrigation well/shallow irrigation well problem).	Modify	Advocate
4A1E	Participate on the Metropolitan Council Water Supply Advisory Committee (MAWSAC) and related Southeast and Southwest Metro Groundwater Working Groups.	Continue	Partner

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10-Year Outcome Measures

- ✓ County, city, townships needs are addressed through State/federal funding and judicious regulations.
- ✓ Established Groundwater Collaborative with participation from partners that share ideas and develop innovative solutions.
- ✓ County has shared results from private well testing (summarized) with public water suppliers.
- ✓ County has included public water supply wells, when the public water supplier wants it, in sampling for contaminants of emerging concern.
- ✓ Increase in municipal projects that improve drinking water quality, decreased groundwater usage, or improve other program issues.
- ✓ Updated Dakota County groundwater model is completed with focus on surface water – groundwater interaction; the updated model allows for a more accurate review of groundwater withdrawal conflicts; shallow irrigation wells are recommended where possible.
- ✓ County’s interests are represented in metropolitan water supply planning decisions.

Strategy 4B-Review, streamline, and improve County and State regulatory processes

Tactic	Description	Activity	Role
4B1A	Collaborate with the DNR, municipal water suppliers, agricultural irrigators and other large water users to streamline the groundwater appropriations permitting process to make the process more efficient and understandable.	Expand	Advocate
4B1B	Review the County's Well Program Delegation Agreement with MDH and amend to allow the County to regulate any well or boring allowed by State law.	Expand	Regulate

10-Year Outcome Measures

- ✓ Large water users are more knowledgeable about the water permitting process and reporting requirements resulting in decreased permit application review times.
- ✓ Dakota County is delegated authority for all wells and borings allowed per Mn Statute 103I.111.

CHAPTER 2. PLAN IMPLEMENTATION

A. Implementation

This chapter describes the implementation of the strategies and tactics listed in the preceding chapter. Although all strategies and tactics are important to the ongoing protection of groundwater, not all will be implemented concurrently. Once the Plan is adopted by the Dakota County Board of Commissioners, the Environmental Resources Department (ERD) will develop annual workplans detailing the activities for the following year.

The implementation framework identified in the Tables below will guide Dakota County and its partners for the next 10 years. The framework identifies **prioritized, targeted, and measurable** activities necessary to achieve the identified Plan goals. Initial priorities (High, Medium, Low) were established at the strategy level based on stakeholder engagement feedback and Technical Advisory Group guidance. This will help guide Dakota County on which strategies and tactics should be given resource prioritization. The total High, Medium, and Low priority strategies are listed in the table to the right.

Table 3 Implementation Plan – High, Medium, Low Priority Strategies

Goal	No. High Priority	No. Medium Priority	No. Low Priority
Water Quality Goal	3	5	4
Water Quantity Goal	4	1	1
Education Goal	2	0	0
Governance Goal	1	1	0
TOTAL	10	7	5

The target is identified as the audience, area, or activity the tactic will address. Annual measures are identified for each tactic to help quantify success. In addition, implementation timeframes and partners were identified for each tactic. Implementation timeframes estimate the start and end date of each tactic. Several tactics identified as “Ongoing” are activities that are expected to last throughout the duration of the Plan; in most cases, these are activities the County or its partners are already doing. Those tactics identified as “Opportunity-based” are activities that are not necessarily dependent upon other activities, and don’t have a required start or end date; instead they will be implemented based on funding or availability of resources.

The framework and timelines below provide an overall direction and expectation; however, **individual implementation and prioritization of strategies and tactics are subject to County Board approval during the annual budgeting and the Department work planning processes.**

The intent is to provide an annual Groundwater Plan Implementation report, accessible to all stakeholders, that will identify the priorities for the given year, report on annual measures, and track changes of measures and outcomes over time. Baseline measures will be developed as part of the first annual report.

B. Water Quality

1. Priorities for Water Quality Goal:

Groundwater and drinking water are free from unhealthy levels of contamination

Priorities to address groundwater quality issues are identified in Tables below. High priority strategies include:

- **1A3: Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment** since private well owners are responsible for protecting, maintaining and testing their own wells after the well is constructed. While public water systems are required to meet MDH health standards, residents with contaminated private wells are usually responsible for their own water treatment. Assistance will include education, communication, convenient testing services, and equitable access to water treatment systems for those that need them. Current water testing options are described in Chapter 4.
- **1B1: Reduction of agriculture chemical contamination** such as nitrate and pesticides through promoting and providing cost share funding for water quality BMPs and AMTs identified in the Nitrogen Fertilizer Management Plan (NFMP); and developing a Dakota County Groundwater Agricultural Chemical Reduction Effort (ACRE) that will provide targeted nitrate reduction goals. The ACRE Plan will be developed with extensive consultation with county farmers, other members of the agricultural community, SWCD, UMN, State agencies, and nongovernmental organizations.



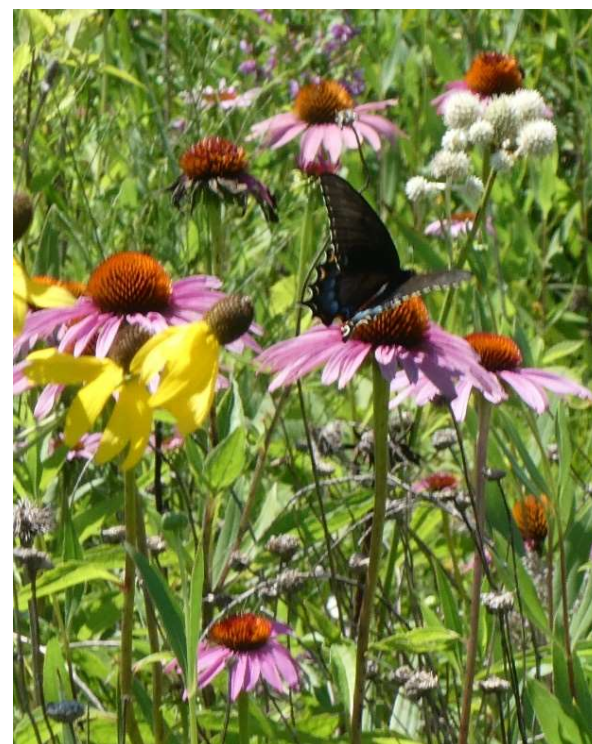
Figure 2 Water Testing Reminder Magnet for Well Owners

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Examples of BMP and AMT practices and tools include those listed below (nitrogen (N) loss reduction estimates from MPCA, 2013).

Reduction estimates are for the treatment area of the applied practice, i.e. a saturated buffer provides treatment only for the upgradient field, or portion of a field, that contributes flow to the buffer. Although these efforts are focused on nitrate reduction, many of these changes in practices will also be helpful in reducing pesticide and chloride leaching to groundwater and reducing soil losses. These are also noted below, without quantitative estimates.

- Follow recommended fertilizer practices (source, rate, timing, credits, placement, etc.) (15% N loss reduction).
- Use nitrogen fertilizer inhibitors (9% N loss reduction).
- Preserve or restore wetlands in agricultural areas (50% N loss reduction) (should also reduce pesticide and chloride leaching).
- Install saturated buffers or other controlled drainage (91% N loss reduction) (should also reduce pesticide and chloride leaching).
- Transition from annual to perennial crops (food, forage, biomass)(72%-95% N loss reduction) (should also reduce pesticide leaching) .
- Install water and sediment control basins (not known) (should also reduce pesticide leaching).
- Install conservation buffers (95% N loss reduction) (should also reduce pesticide and chloride leaching).
- Establish cover crops (50% N loss reduction) (should also reduce pesticide leaching).
- Install grassed waterways, filter strips, or harvestable filter strips (not known) (should also reduce pesticide and chloride leaching) .
- Install bioreactors (13% N loss reduction) (should also reduce pesticide leaching).
- Utilize new technologies (including precision irrigation).
- Improve genetic diversity of crops (should also reduce pesticide leaching).
- Increase continuous cover (including crop rotation, perennial crops, and cover crops) (should also reduce pesticide and chloride leaching).
- Retire crop land (including conservation easements) (95% N loss reduction) (should also reduce pesticide and chloride leaching) .
- Implement other practices that are demonstrated to reduce leaching of agricultural chemicals to the groundwater.



*Prairie restoration, Sciota Township,
courtesy of Jill Trescott*

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This is a list of examples, is not comprehensive, and does not preclude other practices. Other nitrogen BMPs and AMTs are listed at <https://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/nitrogenmgmt> and in the Groundwater Plan's References.

Activities will be prioritized within vulnerable and highly vulnerable DWSMAs (Figure 3), in those cities and townships with the highest nitrate concentrations (Figure 4), and within MDA identified vulnerable groundwater areas (Figure 5).

Figure 4 below is a county-wide nitrate concentration map interpolated from shallow private well data results collected by Dakota County from 2013-2019. The reason for focusing on shallow groundwater is because that is where changes in practices on the surface will show up in water quality improvements in the relatively near term. The higher the current shallow groundwater average nitrate results, the higher the priority of the area shown.

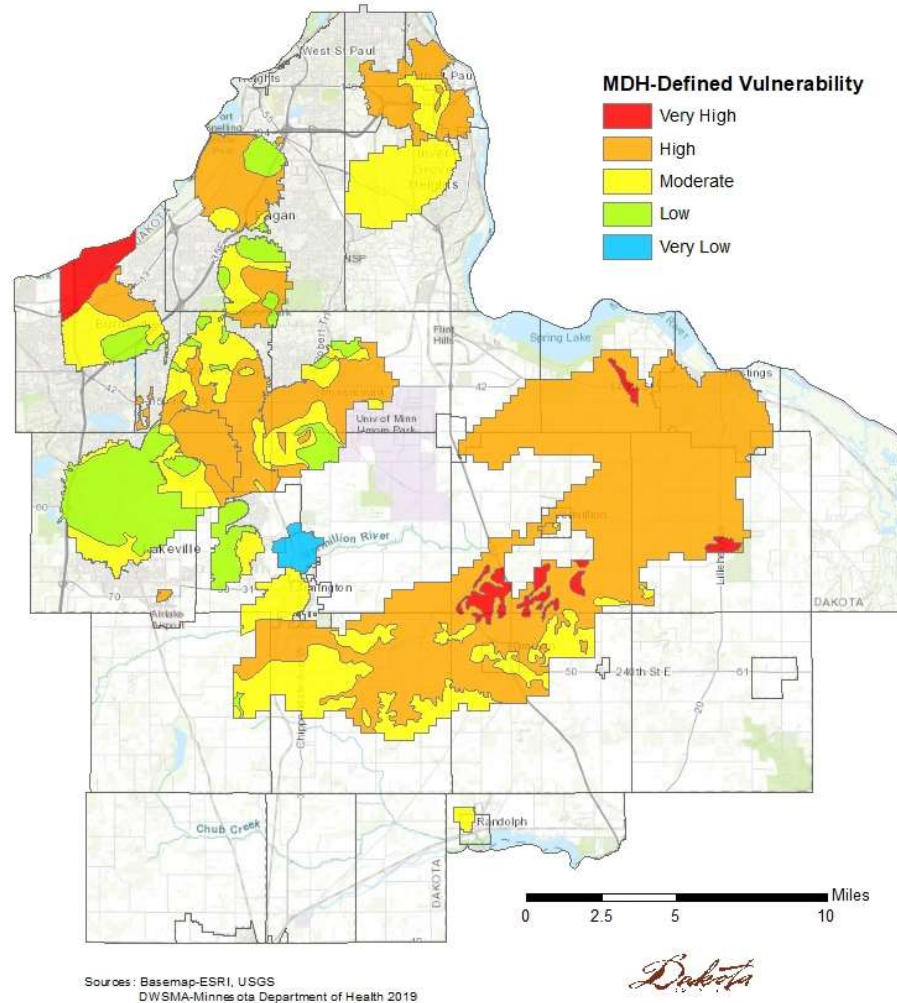


Figure 3 MDH – Defined DWSMA Vulnerability

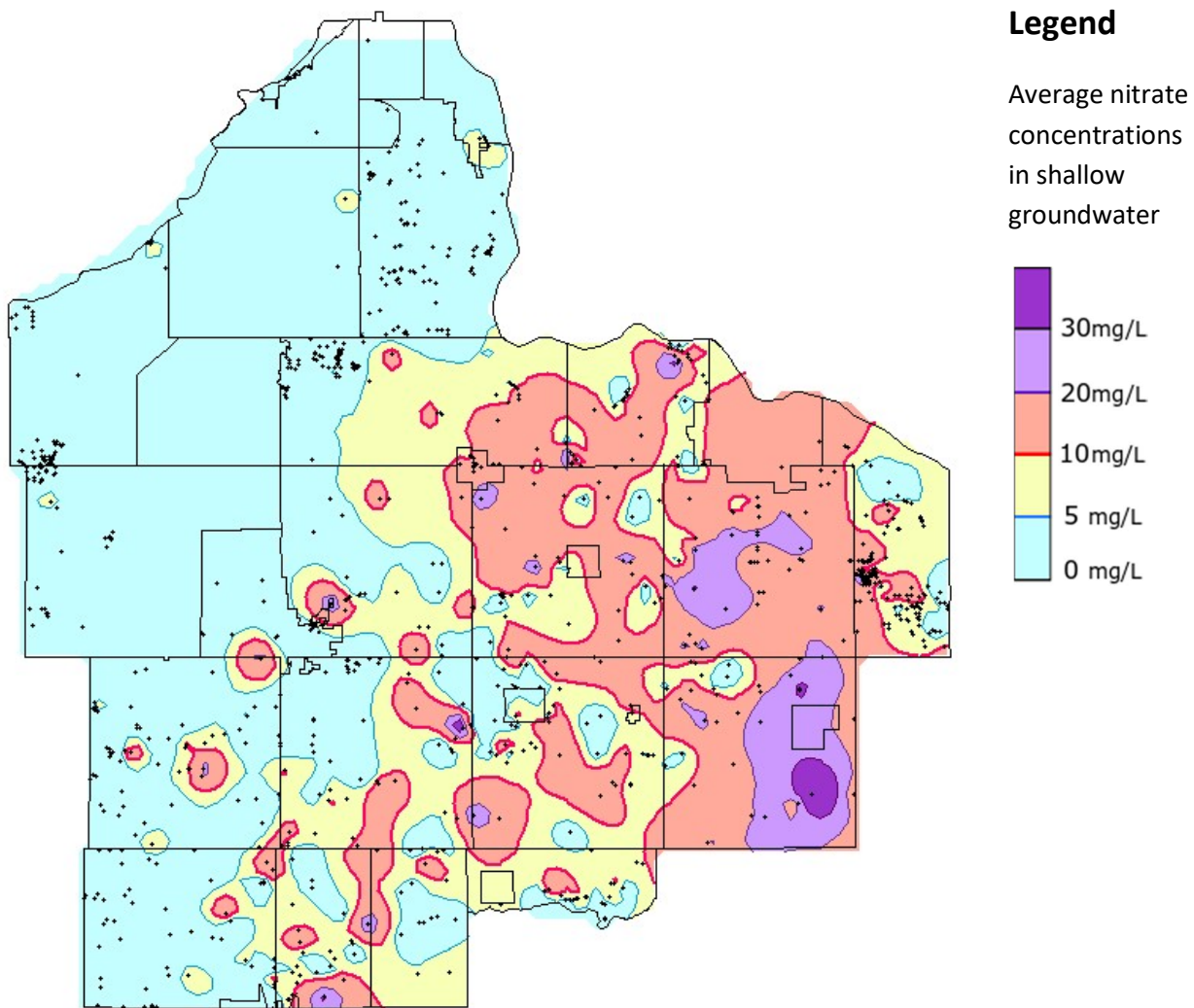
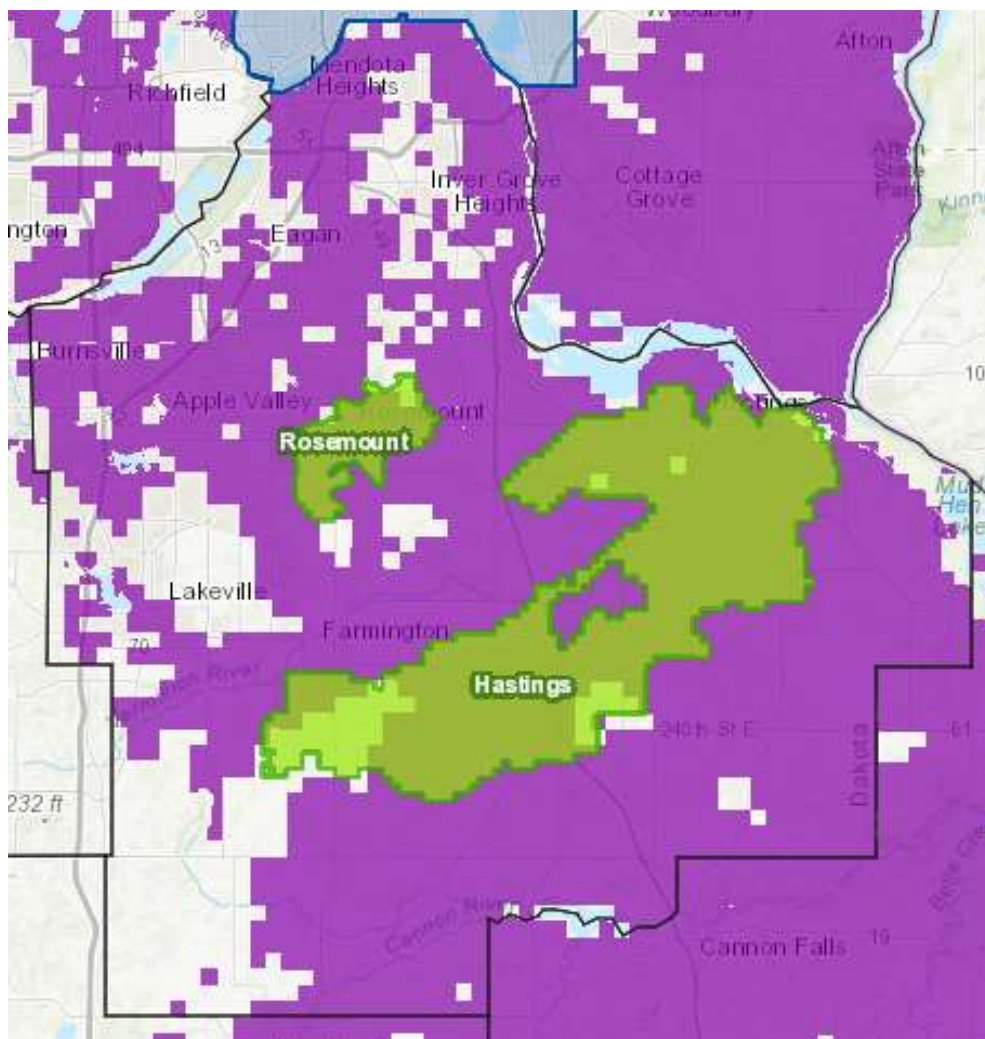


Figure 4 Priority agricultural chemical reduction areas based on 2013-2019 nitrate observations at 0-20 ft below the water table (897 samples).



Legend

Restrictions by DWSMA (2020)

Drinking Water Supply Management Areas (DWSMAs) with Nitrate-N ≥ 5.4 mg/L (2020)



Restrictions By Quarter Section (2020)

Statewide Fall Restriction



“Restrictions” refer to MDA restrictions on the use of chemical nitrogen fertilizer in the fall and on frozen soil.

Figure 5 Priority agricultural chemical reduction areas based on Dakota County MDA Vulnerable Groundwater Areas
 (Source: <https://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/mitigation/wrpr/wrprpart1/vulnerableareamap>)

- **1B4: Prevent groundwater contamination from chloride** by targeting the top sources of chloride pollution. These include (1) road and pavement maintenance practices that spread salt on roads, sidewalks, driveways, and parking lots to control ice in winter and suppress dust

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on gravel roads in the summer; and (2) water softeners in homes and businesses that contribute chloride to wastewater treatment plants and septic systems. Regarding agricultural sources: potassium chloride (potash) fertilizer is identified as a major source of chloride in Minnesota waters (23%), but at this time practical alternatives are not available. County staff do expect that Alternative Management Tools (AMTs) adopted by farmers to reduce nitrate contamination (Strategy 1B1) will also reduce other groundwater and surface water contaminants, including chloride. Also, when alternatives are available, the County will work with the SWCD, watershed organizations, MDA, and UM Extension to promote the use of those alternatives to farmers.

2. Water Quality Goal – Implementation Table

Strategy 1A1-Assist public water suppliers in protecting the water supply. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1A1A	Offer public water suppliers technical assistance in preparing, updating, and implementing effective and practical Wellhead Protection Plans and Water Supply Plans.	<ul style="list-style-type: none"> Public water suppliers, as updates are required per Mn Statute § 103G and Mn Rule 4720. 	Ongoing	DNR MDH Met Council Cities/ Townships	<ul style="list-style-type: none"> # of Wellhead Protection Plans reviewed # of Water Supply Plans reviewed # of unused, unsealed wells identified within DWSMAs and sealed.
1A1B	Conduct a feasibility study for establishment of a rural water supply and/or wastewater system to provide healthy water to residents who currently rely on private wells and septic systems.	<ul style="list-style-type: none"> Areas with highest average nitrate concentrations per Figure 4; High density of private wells; AND/OR areas near existing public water connections 	Opportunity-based	DNR MDH Met Council Minnesota Rural Water Association (MRWA) Cities/ Townships	<ul style="list-style-type: none"> # of studies completed # of private well residents in area of study(s)

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Strategy 1A2-Assist water users in protecting their drinking water quality by regulating well construction and sealing. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1A2A	Continue administering the Delegated Well Program. Enforce County Ordinance 114, Well and Water Supply Management, to ensure that new wells are constructed and unused wells are sealed to meet health standards and protect aquifers, in accordance with Dakota County and State of Minnesota requirements.	<ul style="list-style-type: none"> Private and non-community water-supply wells; environmental wells; dewatering wells; or other wells as identified in the Delegation Agreement Well Drillers 	Ongoing	MDH	<ul style="list-style-type: none"> # of wells constructed, reconstruction, or sealed # of annual registered environmental well permits % of wells inspected # of enforcement issues resolved.

Strategy 1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1A3A	Assist private well owners by offering fee-for-service water testing (Water Supply Testing Service) through a certified laboratory: <ul style="list-style-type: none"> advise well owners regarding appropriate water tests based on legal requirements such as property transfer requirements, at-home daycare centers, or others, facilitate the water testing, explain their water test results, and educate them regarding appropriate water treatment so their drinking water meets health guidelines. 	<ul style="list-style-type: none"> All Dakota County private well owners 	Ongoing	MDA MDH	<ul style="list-style-type: none"> # of residents using water supply testing service # of chemicals tested risk reduction for residents that had contaminated drinking water (> standard)
1A3B	Research home water treatment options to reduce contaminants found in Dakota County groundwater to healthy drinking water levels and communicate the information to well owners.	<ul style="list-style-type: none"> All Dakota County private well owners 	Ongoing	MDH	<ul style="list-style-type: none"> # of available factsheets for residents Updates to home water treatment options based on research
1A3C	Facilitate the installation of appropriate, effective drinking water treatment systems for low-income households that use a private well and have contaminated groundwater.	<ul style="list-style-type: none"> Low-income, private well owners with contaminants above drinking water guidelines 	2021-Ongoing	MDH	<ul style="list-style-type: none"> # of low-income grants awarded \$ of low-income grants awarded

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Strategy 1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1A3D	Advocate with MDH to identify point-of-use treatment systems that effectively remove or reduce manganese, cyanazine breakdown products, PFAS, and, as needed, contaminants of emerging concern.	<ul style="list-style-type: none"> All Dakota County private well owners 	Ongoing	MDH	<ul style="list-style-type: none"> Identification of effective point-of-use systems for emerging contaminants
1A3E	<p>Provide private well owners with the opportunity to have their water tested for free for pollutants that present health concerns, such as nitrate, arsenic, manganese, lead, or newly identified contaminants of emerging concern.</p> <ul style="list-style-type: none"> Facilitate the water testing with a certified laboratory, Communicate water test results to private well owners, city and township leaders, and other interested parties, and Educate private well owners regarding appropriate water treatment so their drinking water meets health guidelines. 	<ul style="list-style-type: none"> All Dakota County private well owners - will be given the opportunity for a free outdoor and indoor water test once every five years. 	2020-Ongoing	MDH Cities\ Townships	<ul style="list-style-type: none"> # of free private well tests provided # of residents that complete free test (response rate) # of chemicals tested
1A3F	Conduct “before and after” free testing (in conjunction with 1A3E), comparing the results from private well owners’ outdoor faucets with their treated, indoor water.	<ul style="list-style-type: none"> Dakota County private well owners whose well water exceeds a health risk standard. 	2020-Ongoing	MDH Cities\ Townships	<ul style="list-style-type: none"> # of free private well tests provided # of residents that complete free test (response rate) # of chemicals tested Identification of effective treatment devices
1A3G	<p>Hold free nitrate testing clinics, in cooperation with MDA.</p> <ul style="list-style-type: none"> Communicate water test results in person with private well owners and other interested parties, and Educate private well owners regarding appropriate water treatment so their drinking water meets health guidelines. 	<ul style="list-style-type: none"> All Dakota County private well owners, priority focus will be in the highest nitrate areas per Figure 4. 	Ongoing	MDA SWCD	<ul style="list-style-type: none"> # of clinics held # of participants

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Strategy 1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1A3H	To the extent appropriate and possible, collect demographic data to evaluate if water quality problems disproportionately impact specific populations and to address those inequities.	<ul style="list-style-type: none"> Underserved populations 	2021-Ongoing	DC Public Health Office of Performance & Analysis	<ul style="list-style-type: none"> # data collected and analyzed # of trends identified Actions taken to address inequities

Strategy 1B1-Reduce agricultural chemical contamination. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B1A	Partner with farmers, other farming interests, SWCD, UMN, and State agencies to promote water quality BMPs and AMTs.	<ul style="list-style-type: none"> Agriculture community, priority focus will be in the highest nitrate areas per Figure 4 and highly vulnerable DWSMAs 	Ongoing	MDA SWCD UMN Watershed Management Organization (WMOs)	<ul style="list-style-type: none"> #, acres, and type of BMPs/AMTs implemented lbs. of nitrate losses reduced
1B1B	In consultation with farmers, the SWCD, UMN, State agencies, and non-governmental organizations, develop, adopt, and implement a Dakota County Groundwater Agricultural Chemical Reduction Effort (ACRE) with prioritized, targeted, and measurable strategies that are more protective of the health of private drinking water wells than the objectives of the MDA Nitrogen Fertilizer Management Plan and Groundwater Protection Rule.	<ul style="list-style-type: none"> Agriculture community Nitrate reduction targets will be identified for each city/township Priority focus will be in the highest nitrate areas per Figure 4, areas with elevated pesticide levels per Figure 17 and highly vulnerable DWSMAs 	2020-Ongoing	Ag industry/ organizations MDA SWCD UMN WMOs	<ul style="list-style-type: none"> Year 1-2: development and adoption of ACRE Plan, amend Groundwater Plan. Outyears: Reduction in rolling five-year shallow groundwater nitrate and pesticide concentrations (measured by monitoring wells and private well data)
1B1C	Provide cost-share funding through SWCD for agricultural water quality BMPs and AMTs.	<ul style="list-style-type: none"> Agriculture community, priority focus will be in the highest nitrate areas per Figure 4, areas with elevated pesticide levels per Figure 17, and highly vulnerable DWSMAs 	2021-Ongoing	MDA SWCD WMOs	<ul style="list-style-type: none"> \$ of cost-share funding provided \$ of grants received by County or SWCD # of programs # of participants in programs lbs. of nitrate input reduced

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Strategy 1B1-Reduce agricultural chemical contamination. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
		<ul style="list-style-type: none"> Practices and tools discussed above (Nitrogen and other BMPs and AMTs). 			
1B1D	Partner with State agencies and SWCD to install monitoring wells to collect long-term water quality and water level data in high nitrate groundwater areas of the county.	<ul style="list-style-type: none"> Agriculture community, priority focus will be in the highest nitrate areas per Figure 4 , areas with elevated pesticide levels per Figure 17 and highly vulnerable DWSMAs. MDA identified vulnerable groundwater areas per Figure 5 	2021-2022	DNR MDA MDH MPCA SWCD	<ul style="list-style-type: none"> # of monitoring wells established # of wells actively monitored Observed nitrate reduction through nitrate sampling and modeling
1B1E	Partner with SWCD to facilitate, promote, and potentially provide cost-share funding for irrigation practices and technologies that reduce groundwater contamination and conserve water.	<ul style="list-style-type: none"> Agriculture community, priority focus will be in the highest nitrate areas per Figure 4, areas with elevated pesticide levels per Figure 17 and highly vulnerable DWSMAs. Areas with the largest drawdown per Figure 21. Targeted practices may include soil moisture gauges, precision irrigation upgrades, variable rate pumps for fertigation and chemigation, low pressure conversions, irrigation water management, irrigation nitrate crediting, irrigation well check- 	2022-Ongoing	Ag industry/ organizations Irrigation- organizations MDA SWCD UMN WMOs	<ul style="list-style-type: none"> # of projects implemented Gallons of water saved Reduction in nitrate, fertilizer, or pesticide loading

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Strategy 1B1-Reduce agricultural chemical contamination. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
		valves, and other practices as agronomy research progresses			
1B1F	Partner with UMN, USDA, or other research institutions to ensure long-term nitrogen fertilizer and other agricultural water quality research is being conducted in Dakota County on fields that have coarse-textured soils and crop irrigation, similar to the Rosholt Research Farm in Pope County or the Olmsted County Soil Health Farm.	<ul style="list-style-type: none"> • Area with coarse-textured soils suitable for agricultural research • Priority focus within vulnerable DWSMAs and in areas with elevated pesticide levels per Figure 17 	Opportunity-based	MDA SWCD UMN USDA	<ul style="list-style-type: none"> • # of research projects supported • Major research findings to support reduction of agricultural chemicals
1B1G	Leverage County Land Conservation, State, and federal funds and County and SWCD staff expertise to acquire easements on private lands that promote practices that improve water quality.	<ul style="list-style-type: none"> • Priority focus will be in the highest nitrate areas per Figure 4, areas with elevated pesticide levels per Figure 17 and highly vulnerable DWSMAs • Land owners in rural Dakota County 	Opportunity-based	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of easements • Acres converted to easements • lbs. of chemicals (e.g., nitrate) reduced

Strategy 1B2-Reduce contamination from turf and landscape maintenance. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B2A	Partner with SWCD, cities and townships, watershed organizations, and others to provide turf and landscape maintenance training to home owners and property managers to protect water quality.	<ul style="list-style-type: none"> • Homeowners • Property Managers • Areas within highly vulnerable DWSMAs 	Ongoing	MPCA SWCD UMN WMOs	<ul style="list-style-type: none"> • # of people trained • Estimated reduction in fertilizer-use

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Strategy 1B2-Reduce contamination from turf and landscape maintenance. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B2B	Partner with SWCD, cities and townships, watershed organizations, and others to promote conversion of turf grass and annual vegetation to perennial vegetation with an emphasis on native species using native plantings, raingardens, shoreline restorations or other practices through “Landscaping for Clean Water,” “Lawns to Legumes,” or other similar programs.	<ul style="list-style-type: none"> • Homeowners • Property Managers • Land Owners • School Districts Areas within highly vulnerable DWSMAs	Ongoing	Non-profits SWCD WMOs Cities Townships	<ul style="list-style-type: none"> • Acres converted to native landscape, raingardens, etc. • # participants • Gallons water saved • lbs. of chemicals (e.g., nitrate) reduced
1B2C	Partner with SWCD, cities and townships, watershed organizations, and others to provide cost-share funding for conversion of turf grass and annual vegetation to perennial vegetation with an emphasis on native species using native plantings, raingardens, shoreline restorations or other practices through “Landscaping for Clean Water,” “Lawns to Legumes,” or other similar programs.	<ul style="list-style-type: none"> • Homeowners • Property Managers • Land Owners • School Districts Areas within highly vulnerable DWSMAs	Ongoing	Non-profits SWCD WMOs Cities Townships	<ul style="list-style-type: none"> • Acres converted to native landscape, raingardens, etc. • # participants • Gallons water saved • lbs. of chemicals (e.g., nitrate) reduced •
1B2D	Leverage County Land Conservation, State, and federal funds and County and SWCD staff expertise to acquire easements on private lands to restore and preserve natural areas in place of turf grass. (Similar to 1B1G)	<ul style="list-style-type: none"> • Homeowners • Land Owners in urban areas Areas within highly vulnerable DWSMAs	Opportunity-based	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of easements • Acres converted to easements • lbs. of chemicals (e.g., nitrate) reduced

Strategy 1B3- Manage stormwater and water retention to prevent groundwater pollution. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B3A	Manage stormwater to maximize clean groundwater recharge.	<ul style="list-style-type: none"> • Municipalities with stormwater permitting jurisdiction, developers Prioritize areas within highly vulnerable DWSMAs	Ongoing	Cities\ Townships SWCD WMOs	<ul style="list-style-type: none"> • # of infiltration BMPs installed using Plan recommendations • Risk assessment of existing stormwater features impact to groundwater supply

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Strategy 1B3- Manage stormwater and water retention to prevent groundwater pollution. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B3B	Administer the County Stormwater Program to prevent pollution by sweeping streets, reducing road salt applications, and constructing and maintaining infiltration/ recharge/ runoff practices (County facilities and projects only).	County Transportation and Facilities Management Departments – County roads, parking lots, and sidewalks	Ongoing	MPCA WMOs Cities/ Townships	<ul style="list-style-type: none"> • Salt use on County Highways per snow event • Salt use by other permitted MS4s per snow event • Number of trainings and attendees at Smart Salt trainings
1B3C	Advocate that local units of government implement topsoil organic matter requirements for new development to reduce compaction, promote soil health, and reduce runoff and potential impacts to groundwater.	<ul style="list-style-type: none"> • Municipalities with stormwater permitting jurisdiction, developers • Prioritize areas within highly vulnerable DWSMAs 	Ongoing	WMOs Cities/ Townships	<ul style="list-style-type: none"> • # of municipalities with topsoil organic matter requirements incorporated into stormwater regulatory mechanism
1B3D	Encourage the use of existing natural stormwater retention and detention areas to maintain or improve existing water quality.	<ul style="list-style-type: none"> • Municipalities with stormwater permitting jurisdiction, developers • Prioritize areas within highly vulnerable DWSMAs 	Ongoing	<ul style="list-style-type: none"> • SWCD • WMOs • Cities • Townships 	<ul style="list-style-type: none"> • lbs. of chemical input (e.g., nitrate) reduced • Number of existing recharge and detention areas identified • Ranking/prioritization of recharge areas

Strategy 1B4-Prevent groundwater contamination from chloride. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B4A	Work with County Transportation and Facilities Management Departments to minimize salt use on County roads, sidewalks, and parking lots while protecting public safety, including summer dust suppression as well as winter snow and ice control.	<ul style="list-style-type: none"> • County Transportation and Facilities Management – County roads, parking lots, and sidewalks 	2020-Ongoing	MPCA	<ul style="list-style-type: none"> • Road-salt reduction measures included in County Transportation Plan • Reduction in salt-use (per snow\ice event)
1B4B	Partner with cities and townships to develop and implement a chloride reduction plan and policies in accordance with the MPCA Statewide Chloride Management Plan and Twin Cities Metropolitan Area Chloride Management Plan.	<ul style="list-style-type: none"> • City\Townships transportation departments • Prioritize areas within highly vulnerable DWSMAs 	2021-Ongoing	MPCA SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of cities\townships that develop a road-salt reduction plan • Reduction in salt-use (per snow\ice event)

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Strategy 1B4-Prevent groundwater contamination from chloride. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1B4C	Promote chloride reduction by advocating and incentivizing the replacement of outdated water softeners with new, efficient on-demand water softeners, in accordance with the MPCA's "Guide to Developing a Local Water Softener Rebate Program" (MPCA, 2019) and other guides.	<ul style="list-style-type: none"> County-wide Residents with water softeners Prioritize areas within highly vulnerable DWSMAs 	Opportunity-based	MPCA Cities\ Townships	<ul style="list-style-type: none"> # of water softeners replaced Reduction in salt discharged to environment
1B4D	Participate in and share county data with chloride-related efforts like the Minnesota Groundwater Association White Paper: Stormwater infiltration and chloride in Minnesota groundwater.	<ul style="list-style-type: none"> County and State-wide 	Ongoing	MPCA Non-profit, professional, educational organizations	<ul style="list-style-type: none"> # of efforts supported or participated in (reports, data-sharing, etc.)

Strategy 1C1-Address industrial pollution and historically contaminated sites. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C1A	<p>Review and revise the Environmental Assessment and Remediation Program.</p> <ul style="list-style-type: none"> Conduct Environmental Reviews and respond to requests for information/FOIA requests relating to Environmental Due Diligence/AAI/Environmental Assessments. Investigate and remediate contamination that poses a risk to public health and the environment. Investigate, remediate, and mitigate contamination on County-owned or managed lands. Provide technical assistance and expertise to external entities relating to investigation, mitigation, remediation and redevelopment of contaminated sites and brownfields. 	Sites will be prioritized based on contaminated media, risk to public health and the environment, and economic opportunities.	Ongoing	MPCA	<ul style="list-style-type: none"> # of Environmental Reviews and other information requests completed. # of properties investigated or remediated; change in taxable value of properties remediated.

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Strategy 1C1-Address industrial pollution and historically contaminated sites. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C1B	Provide cost-share funding for investigation, remediation, and mitigation of contamination relating to brownfield redevelopment.	<ul style="list-style-type: none"> Sites will be prioritized based on contaminated media, risk to public health and the environment, and economic opportunities. 	Ongoing	MPCA	<ul style="list-style-type: none"> EA&R Grants awarded each year: \$ awarded per year; # of properties investigated or remediated; \$ awarded over term of grant; how grants were used; additional \$ brought in, in response to grant
1C1C	Administer County Ordinance 110, Solid Waste Management, and County Ordinance 111, Hazardous Waste Regulation, to regulate landfills and other solid and hazardous waste.	<ul style="list-style-type: none"> Solid waste and hazardous waste facilities, generators, haulers, collection sites, etc. 	Ongoing	MPCA	<ul style="list-style-type: none"> # of inspections # violations prevented # violations identified and addressed Lbs. of waste/Haz waste managed
1C1D	Administer Registered Well Program to regulate environmental and product recovery wells, observe remediation activities, evaluate monitoring data, and ensure compliance with well codes.	<ul style="list-style-type: none"> Property owners with environmental/ remediation wells 	Ongoing	DNR MPCA Property-Owners	<ul style="list-style-type: none"> # of registered environmental wells \$ fees of registered environmental wells Water quality data received
1C1E	Monitor groundwater contamination in the Pine Bend Area Special Well and Boring Construction Area.	<ul style="list-style-type: none"> Pine Bend Area Special Well and Boring Construction Area 	Ongoing	Industry MPCA	<ul style="list-style-type: none"> # of meetings # of participants Reduction in groundwater plume area
1C1F	Expand County household hazardous waste collection efforts.	<ul style="list-style-type: none"> All Dakota County residents (general public) 	Ongoing	Cites\ Townships	<ul style="list-style-type: none"> # of events # of residents that participated # of waste collected

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Strategy 1C2-Prevent groundwater contamination by getting unused, unsealed wells sealed. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C2A	Facilitate the sealing of unsealed wells and assist people buying and developing real estate. <ul style="list-style-type: none"> • Review historical land use information about parcel. • Evaluate the likelihood and probable location of old, unused wells. • Communicate the information to property owners. • Maintain the information for future reference. 	<ul style="list-style-type: none"> • Unused, unsealed wells with priority focus within DWSMAs • Well inventories within DWSMAs, and within cities/townships with limited information 	Ongoing	MDH Cities\ Townships	<ul style="list-style-type: none"> • # of unused wells sealed, in and outside of DWSMAs. • # of unused wells identified through well inventory • # of well audits completed
1C2B	Promote sealing of unused wells by funding well-sealing cost-share grants.	<ul style="list-style-type: none"> • Unused, unsealed wells • Prioritize areas within DWSMAs 	Ongoing	MDH Cities\ Townships	<ul style="list-style-type: none"> • # of well seal grants provided, in and outside of DWSMAs. well seal grant \$ provided

Strategy 1C3-Prevent pollution by minimizing wastewater impacts on groundwater quality. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C3A	Ensure that subsurface sewage treatment systems in Dakota County will be constructed, operated, and maintained in conformance with Minnesota statutes and rules and County Ordinances No. 50 (Shoreland and Floodplain Management) and No. 113 (Subsurface Sewage Treatment Systems).	<ul style="list-style-type: none"> • All Dakota County septic-system owners • Septic-system contractors and inspectors 	Ongoing	MPCA Cities\ Townships	<ul style="list-style-type: none"> • Reduction in failing septic systems in areas where Dakota County regulates septic systems
1C3B	Promote replacement of failing septic systems by funding septic system cost-share grants and loans.	<ul style="list-style-type: none"> • All Dakota County septic-system owners 	Ongoing	MPCA Cities\ Townships	<ul style="list-style-type: none"> • # of failing septic systems replaced • \$ of grants or loans provided
1C3C	Provide technical assistance to township officials to support effective septic system regulation. Support cities and townships in getting failing sewage systems replaced with systems that comply with State rules and their local ordinance.	<ul style="list-style-type: none"> • All Dakota County septic-system owners 	Ongoing	MPCA Cities\ Townships	<ul style="list-style-type: none"> • # of technical assistance visits provided • Reduction in failing septic-systems
1C3D	Provide available septic pumping information to local units of government, consistent with the guideline to implement a 3-year maintenance schedule for individual sewage treatment systems.	<ul style="list-style-type: none"> • All Dakota County septic-system owners 	Ongoing	MPCA Cities\ Townships	<ul style="list-style-type: none"> • # of septic records provided per City\Township

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Strategy 1C3-Prevent pollution by minimizing wastewater impacts on groundwater quality. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C3E	Provide training for realtors regarding the property transfer requirements for wells and septic systems.	<ul style="list-style-type: none"> Dakota County realtors – provide training at least once every 2-years 	2022, 2024, 2026, 2028, 2030	MDH MPCA Cities\ Townships	<ul style="list-style-type: none"> # of training events provided # of participants
1C3F	Review and track proposed sites for land application of wastewater treatment plant biosolids to reduce risk of direct human exposure to waste or contamination of groundwater. Advocate that the MPCA effectively regulate this form of disposal to avoid surface waters, ditches or drainageways, shorelands, floodplains, sinkholes, drain tiles, steep slopes, or other locations or circumstances with the potential to adversely affect public health.	<ul style="list-style-type: none"> All Dakota County rural residents, whose drinking water is potentially being degraded by nearby land application of WWTP biosolids or septage 	2020-Ongoing	MDH MPCA Cities\ Townships	<ul style="list-style-type: none"> Increase in inspections and regulation enforcement

Strategy 1C4-Prevent pollution by minimizing impacts of aggregate mining on groundwater quality. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1C4A	Amend Ordinance No. 50, Shoreland and Floodplain Management, to require additional information from applicants seeking mining permits in County-administered shoreland or floodplain.	<ul style="list-style-type: none"> Mining operations within Shoreland and Floodplains 	2021-2022	DNR Cities\ Townships	<ul style="list-style-type: none"> Adoption of Ordinance Amendment
1C4B	Review the County's model Mining Ordinance, update as appropriate, and distribute to cities and townships.	<ul style="list-style-type: none"> Mining operations that may impact groundwater quality in Dakota County 	2022-2023	Cities\ Townships	<ul style="list-style-type: none"> Completion of model Mining Ordinance update # of cities\townships that implement model ordinance

Strategy 1D-Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the County. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
1D1A	Research groundwater conditions, including contaminants of emerging concern, on an ongoing	Dependent on contamination concerns:	Ongoing	DNR MDH	<ul style="list-style-type: none"> # of private wells tested # of chemicals tested

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Strategy 1D-Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the County. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
	basis to develop, implement, and evaluate strategies for reducing groundwater contamination and protecting public health in the county.	<ul style="list-style-type: none"> • Programs to capture contaminant prevalence, risks, and trends. • Sampling of private wells that represent drinking water conditions and contaminants county-wide. • Participating well owners, County Board, and the public. • Prioritize within DWSMAs and within areas of suspected or known concerns 		MDA MPCA Cities\ Townships	<ul style="list-style-type: none"> • Identification of previously unidentified or emerging issues

C. Water Quantity

1. Priorities for Water Quantity Goal:

Groundwater is sufficient to meet human needs and sustain groundwater-dependent ecosystems.

Priorities to address groundwater quantity issues are identified in Tables, below. High priority strategies include:

- 2A1: Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports.** from Dakota County to other regions of the state or out of the state. In 2019, a commercial enterprise proposed to pump 500 million gallons per year of groundwater from Dakota County and ship it by rail to sell in the southwestern United States. The DNR reviewed the request for a preliminary well construction assessment and the DNR Commissioner notified the applicant: “We have determined that it is unlikely we would issue a permit to appropriate water, and we do not recommend that you proceed further with this proposed project.” Nonetheless, there are significant concerns from the community and the Dakota County Board of Commissioners that a similar proposal could be submitted and potentially approved in the future. Exporting millions of gallons of groundwater could deplete the county’s future water supply for human uses and damage its natural ecosystems. The focus of this strategy will be working with DNR to ensure any future water export requests do not negatively impact the county’s residents, businesses, and natural resources.

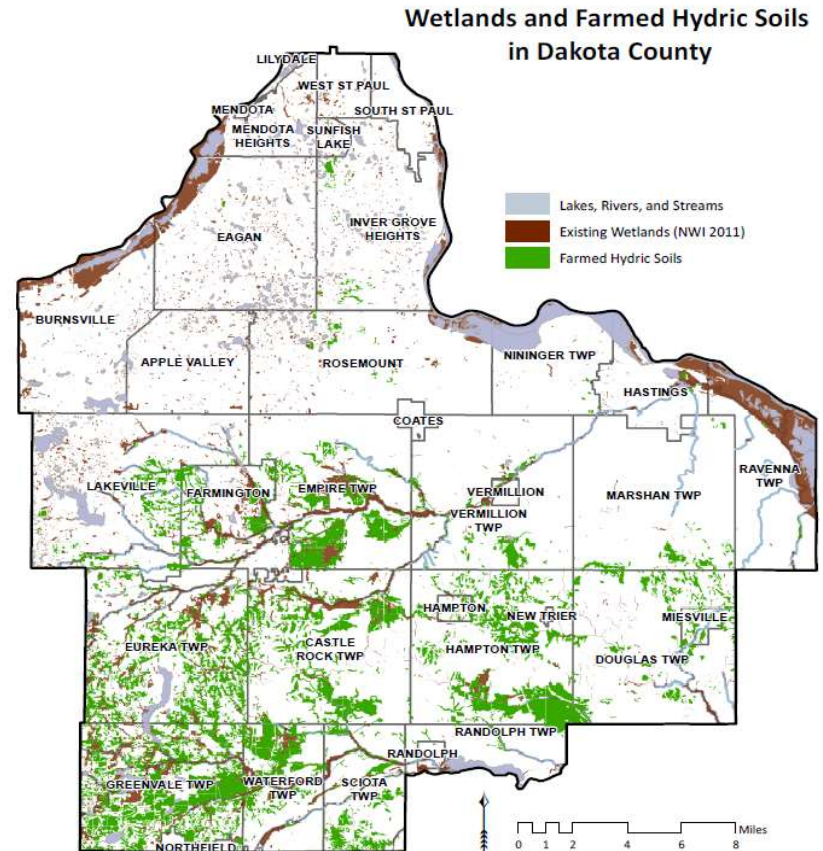


Figure 6 Priority Wetland Restoration Areas

- 2A2: Promote Water Conservation / 2A3: Support Alternative Water Supplies** through encouraging and potentially providing cost-share funding to assist cities and townships reduce overall water usage through water saving appliances and fixtures, smart irrigation

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practices, and water re-use projects. The overall objective is to assist all communities in meeting the Met Council’s water usage goals of achieving less than 75 residential GPCD, less than 90 total GPCD, and reducing the summer-to-winter water usage ratio (peak day demand ratio).

According to the cities’ Water Supply Plans submitted to the DNR, the current average for all Dakota County cities is 71 residential GPCD, 103 total GPCD, and the peak day demand ratio is 2.7. However, the cities range from 49 to 87 residential GPCD, 60 to 129 total GPCD, and 1.6 to 4.0 for the peak day demand ratio. Water re-use projects may also provide benefits of reducing stormwater pollution loads for suspended solids, phosphorus, nitrogen, and other contaminants (project dependent).

Implementation of water conservation and water reuse tactics could reduce annual groundwater usage as much as 8-16% (2-4 billion gallons a year). Since land use and development is controlled by the cities and townships, the county would encourage them to pursue additional water conservation efforts through the County-wide conservation initiative.

- **2B3: Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams.** Wetland restoration is important to promote on-land water storage potential and flood prevention, as well as to improve surface and groundwater quality. Wetlands act as a natural filtering system, removing sediments, nutrients, and pollutants from water. Wetland restoration activities will be

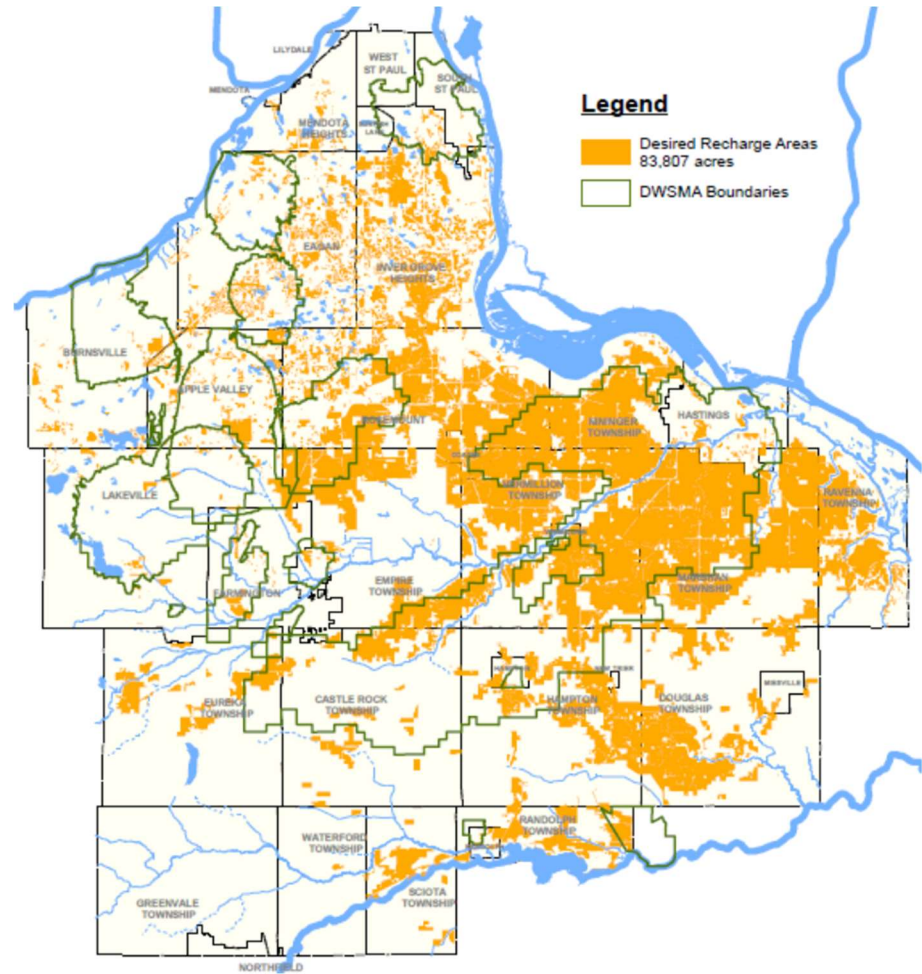


Figure 7 Priority Recharge Opportunity Areas

targeted in the “Farmed Hydric Soil” locations identified in Figure 6. These locations are identified as having hydric soils with the potential to be restored to wetlands (i.e., land is agriculture or undeveloped). From a water quality perspective, wetland restoration prioritization will be in those areas where there is an expected positive impact to groundwater quality. This would include land near surface water bodies that have a direct impact on groundwater (such as along the Vermillion River west of Hastings and east of Empire Township). This would also include areas of the County that have the highest nitrate concentrations per Figure 4, where there is a high water quality benefit for conversion from existing land uses to wetland or perennial native vegetation.



Virginia Waterleaf, Cannon River riverine wetland, courtesy of Jill Trescott

- Although identified as a Medium priority, **2B1: Protect and improve high-quality recharge areas** is still important since large capacity water supply wells are typically hundreds of feet below the surface. Water at the surface needs to infiltrate through the top vegetation and soil to reach groundwater aquifers, in some cases taking years to decades to reach the aquifer. Land development and related increases in pervious surfaces (e.g., roads, driveways, buildings, etc.) can limit the quantity of water that can reach recharge areas. Desired areas for groundwater recharge opportunities are identified in Figure 7. Figure 7 shows there are over 80,000 acres that meet relevant infiltration criteria (geology, hydrogeology) per the Metropolitan Council Regional Feasibility Assessment¹, and current land use is natural/open or undeveloped areas (i.e., greater than 90 percent pervious surfaces).
 - Natural recharge generally comes from snowmelt, precipitation, or storm runoff, infiltrating through a landscape with permanent vegetative cover (grasses, perennial plants, shrubs, or trees). Natural recharge areas are generally low maintenance, although noxious weeds may require control.

¹ Metropolitan Council. 2014. Regional Feasibility Assessments (Southeast Metro Study Area) – Draft Report. Prepared by HDR, Inc. Metropolitan Council: Saint Paul.

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- Preferred enhanced recharge areas are identified in Figures 21-22 in the 2014 Metropolitan Council Report¹. Enhanced recharge areas focus on water infiltration using engineered structures such as recharge basins or infiltration basin. Re-engineering of existing stormwater infiltration basins within the identified preferred enhanced recharge areas may present an opportunity to increase groundwater recharge without requiring funding for land preservation.

2. Water Quantity Goal Implementation Table

Strategy 2A1-Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2A1A	Work with DNR to ensure that large groundwater appropriation requests are sustainable.	<ul style="list-style-type: none"> • Well permit requests exceeding 1M gal/year or 10K gal/day • Priority within DWSMAs and within areas with the largest drawdown per Figure 21 	2020-Ongoing	DNR	<ul style="list-style-type: none"> • # of DNR water appropriation permit reviews • DNR permit application response reflects Dakota County recommendations
2A1B	Seek authority to issue and regulate water appropriations permits instead of the DNR. (Greater than 3.6 million gal/year would require a change in State law.)	<ul style="list-style-type: none"> • Well permit requests exceeding 1M gal/year or 10K gal/day 	Opportunity-based	DNR	<ul style="list-style-type: none"> • Change in authority to issues and regulate water appropriations
2A1C	Revise County Ordinance 114, Well and Water Supply Management to protect long-term water supplies, such as restricting construction of large-capacity wells	<ul style="list-style-type: none"> • Well permit requests exceeding 1M gal/year or 10K gal/day 	2021-2022	DNR	<ul style="list-style-type: none"> • Completion of Ordinance update

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Strategy 2A2-Promote water conservation. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2A2A	Develop and implement a County-wide water supply/conservation initiative, in cooperation with cities, townships, watershed organizations, and large users of water.	<ul style="list-style-type: none"> City/Township public water systems Other large industrial and agricultural groundwater users identified in Figure 24. 	2022-Ongoing	Agriculture DNR Met Council Industry UMN WMOs Cities\ Townships	<ul style="list-style-type: none"> # of participants # of meetings Ideas that lead to changes in water conservation approaches Signing of MOU
2A2B	Provide cost-share funding for water conservation projects, including water conservation audits, crop and non-crop irrigation efficiency projects and projects to replace low-water-efficiency appliances with high-efficiency ones, partnering with potential funding sources such as Metropolitan Council or State agencies.	<ul style="list-style-type: none"> Areas projected to have the largest drawdown per Figure 21 Top water users per Figure 24; Public water suppliers with the largest per capita water demands based on the City's Water Supply Plan. 	Opportunity-based	Met Council SWCD UMN WMOs Cities\ Townships	<ul style="list-style-type: none"> \$ of cost-share grants # of projects funded # of entities supported Gallons of water saved
2A2C	Conduct water use/efficiency/conservation audits for all County facilities.	<ul style="list-style-type: none"> Dakota County Facilities 	Opportunity-based	SWCD City water suppliers	<ul style="list-style-type: none"> # of audits Identified gallons of water that can be saved

Strategy 2A3-Support alternative water supplies (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2A3A	Advocate with the State on behalf of the cities and townships to clarify the rules and guidelines regarding water reuse.	<ul style="list-style-type: none"> State and regional agencies (MDH, DNR, MPCA, Met Council) 	2021-until no longer needed	DNR MDH Met Council	<ul style="list-style-type: none"> Change in rules or guidelines regarding water reuse

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Strategy 2A3-Support alternative water supplies (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2A3B	Provide cost-share funding for water reuse projects.	<ul style="list-style-type: none"> • Areas projected to have the largest drawdown per Figure 21; Top water users per Figure 24; Municipal water suppliers with the largest per capita water demands based on the City's Water Supply Plan. • Projects such as rainwater reuse, stormwater capture and reuse, or reuse of treated municipal wastewater. 	2022-Ongoing	Met Council MPCA SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of projects subsidized • \$ of funding provided • Gallons of water reused
2A3C	Support efforts of local water suppliers and Metropolitan Council to investigate and develop sources other than groundwater to meet future water demands.	<ul style="list-style-type: none"> • Public water suppliers 	Opportunity-based	DNR Met Council MDH Cities\ Townships	<ul style="list-style-type: none"> • # of collaborative projects

Strategy 2B1-Protect and improve high-quality groundwater recharge areas. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2B1A	Partner with the MGS and the DNR to update the Dakota County Geologic Atlas and identify groundwater recharge areas.	<ul style="list-style-type: none"> • County-wide 	2020-2023	DNR MGS	<ul style="list-style-type: none"> • Updated Dakota County Geologic Atlas • Identification of priority recharge areas
2B1B	Partner with SWCD, cities, townships, and watershed organizations to improve groundwater recharge by promoting and providing cost-share funding for water quality improvement practices such as low impact development; wetland restoration; and permanent vegetation.	<ul style="list-style-type: none"> • Areas projected to have the largest drawdown Figure 21; • Areas within the Desired Recharge Areas identified by Met Council in Figure 7 	Opportunity-based	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of practices implemented • Gallons of water preserved

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Strategy 2B1-Protect and improve high-quality groundwater recharge areas. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2B1C	Partner with SWCD, the County Land Conservation Program, cities, and townships to acquire, restore, and preserve open space suitable for natural or enhanced groundwater recharge, based on the Met Council's Regional Feasibility Assessment of suitable recharge areas (Met Council, 2014) or other resource inventories.	<ul style="list-style-type: none"> • Areas projected to have the largest drawdown per Figure 21 • Areas within the Desired Recharge Areas identified by Met Council in Figure 7 	Opportunity-based	Cities\ Townships	<ul style="list-style-type: none"> • # of acres preserved for groundwater recharge • \$ provided for preservation • Gallons of water preserved
2B1D	Review MPCA permitting requirements for infiltration in areas that require a "higher level of engineering review" to develop recommendations for the cities and townships for designs, land use restrictions, and practices to maximize clean recharge, to the extent possible.	<ul style="list-style-type: none"> • MPCA identified emergency response areas • Municipalities with stormwater permitting jurisdiction, developers 	2020-2021	WMOs Cities\ Townships	<ul style="list-style-type: none"> • Number of city/township stormwater regulatory mechanisms that incorporate DC Groundwater Plan guidance for infiltration/groundwater recharge

Strategy 2B2-Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2B2A	Encourage communities to complete or update wetland protection and management plans, assessments, and update, and incorporate these documents into ordinance.	<ul style="list-style-type: none"> • County-wide 	2022-Ongoing	WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of management plans completed • Acres of protected area
2B2B	Administer wetland rules and regulations through the appropriate city, township, the SWCD or the DNR.	<ul style="list-style-type: none"> • County-wide 	Ongoing	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of enforcement actions
2B2C	Develop, monitor, protect, restore, and manage wetlands for water retention and habitat. (Includes wetland restoration initiatives like Wetland Banking)	<ul style="list-style-type: none"> • Areas identified in Figure 6 prioritization based on impact to groundwater quality or on-land water storage capacity 	2021-Ongoing	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • Acres of wetland restored • Gallons of water stored on-land • lbs. of sediments, nutrients, or chemicals (e.g., nitrate) reduced

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Strategy 2B2-Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2B2D	Review groundwater appropriations permit applications and advocate with DNR to ensure withdrawals will not compromise wetlands, fens, or trout streams. (Complementary with 2A1A)	<ul style="list-style-type: none"> Wetlands, fens, trout streams; priority based on areas with the largest groundwater drawdown or under development pressure 	Ongoing	DNR	<ul style="list-style-type: none"> # of DNR water appropriation permit reviews DNR permit application response reflects Dakota County recommendations
2B2E	Partner with watershed organizations to protect and improve groundwater quality, temperature and quantity, in areas that provide groundwater to wetlands, fens or trout streams.	<ul style="list-style-type: none"> Wetlands, fens, trout streams; priority based on groundwater quality concerns such as nitrate map Figure 4 	Opportunity-based	DNR SWCD WMOs	<ul style="list-style-type: none"> # of collaborative projects

Strategy 2C-Quantify changes in groundwater levels and flow patterns in response to weather and groundwater pumping. (PRIORITY: LOW)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
2C1A	Partner with public water suppliers to encourage adoption and coordination of advanced technologies, such as “Smart Wellfield” technologies, to monitor groundwater levels and chemistry to optimize well usage and pumping rates.	<ul style="list-style-type: none"> Public water suppliers, County-wide 	2022-Ongoing	DNR Cities\ Townships	<ul style="list-style-type: none"> # of wells updated with smart technology
2C1B	Model groundwater flow patterns and water levels to facilitate decision making.	<ul style="list-style-type: none"> County-wide 	Ongoing	DNR Met Council MGS	<ul style="list-style-type: none"> Updated Dakota County groundwater model that assists in decision making

D. Education

1. Priorities for Education Goal:

People who live and work in Dakota County are knowledgeable about water issues, conserve water, and prevent pollution.

Education for both the general public and targeted audiences is a high priority. An annual Environmental Resources Department water education workplan will be developed detailing the activities for the following year. General public education will focus on bringing the water discussion to the “kitchen sink” with a structured, consistent, and constant approach. Targeted audience training will focus on specific topics to communicate risks and water quality practices to sub-groups such as well owners, well contractors, road maintenance workers, property managers, public officials, etc. The County will work with State, regional and local partners and will develop a media and communication plan to help encourage participation and ensure a consistent message across all education platforms.

Dakota
COUNTY

Private well owner responsibilities

<p>Test your water. Contaminants, both naturally occurring and from human activity, can be a health concern. Often they are not visible and do not have any taste or smell. Request a water test kit from Dakota County at 952-891-7000.</p>	<p>Inspect your well regularly. Look for damage to the well casing or well cap such as cracks, holes, a loose cap or wires.</p>	<p>Protect your well. The top of the well should be 12 inches above the ground. Don't allow water to pond around your well. Keep chemicals and animal waste away from your well.</p>	<p>Seal unused wells. Unused, unsealed wells can allow contaminants to flow from the surface down to the aquifer and are required to be sealed. Only a licensed well contractor can seal a well. Dakota County has grants to help with the cost. Receive an application by calling 952-891-7000 or by visiting www.dakotacounty.us, search <i>well seal grant</i>.</p>
			

Figure 8 Example education postcard to private well owners

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2. Education Goal Implementation Table

Strategy 3A- Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
3A1A	Expand groundwater conservation and pollution prevention education and outreach efforts.	<ul style="list-style-type: none"> County-wide 	2021- Ongoing	SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> # of new education programs Media plan developed and implemented every year. Groundwater information on the County website reviewed and updated every year or when new information is available.
3A1B	Assist with the production of the annual Metro Area Children's Water Festival and pursue other K-12 educational opportunities.	<ul style="list-style-type: none"> Metro Area 4th Grade Students K-12 Dakota County students SWCD's Outdoor Education Days 	2021- Ongoing	School Districts SWCD TCMA Counties, State, Regional agencies WMOs	<ul style="list-style-type: none"> # of students engaged # of schools participated
3A1C	Apply to host the Minnesota Humanities Center's traveling "We are Water" or other exhibits or displays.	<ul style="list-style-type: none"> County-wide 	Opportunity- based	DNR Met Council MDH MPCA Cities/ Townships	<ul style="list-style-type: none"> # of exhibits or displays hosted by the County # of attendees/participants
3A1D	Inform the public about groundwater levels by putting DNR observation well data on the County website.	<ul style="list-style-type: none"> County-wide 	2022- Ongoing	DNR WMOs Cities\ Townships	<ul style="list-style-type: none"> # of areas/public water supply data available to public # of residents accessing information
3A1E	Work with municipal water suppliers to place signs on County roads indicating where people are entering a DWSMA.	<ul style="list-style-type: none"> County roads crossing DWSMAs, where DWSMA expands outside city jurisdiction Priority focus will be in highly vulnerable DWSMAs and DWSMAs with nitrate > 5 mg/L 	Opportunity- based	Cities\ Townships	<ul style="list-style-type: none"> # of signs installed

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Strategy 3A-Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
3A1F	Leverage existing educational materials and programs (e.g., State and regional agencies, watershed organizations, non-profit organizations) wherever appropriate.	<ul style="list-style-type: none"> County-wide 	2021-Ongoing	Educational-Institutions Non-profits State/Regional agencies Cities\ Townships	<ul style="list-style-type: none"> # of materials or programs leveraged # of new audience reached # of new partners
3A1G	Inform the public about DWSMAs by including them on the County's website	<ul style="list-style-type: none"> County-wide Priority focus will be in highly vulnerable DWSMAs and DWSMAs with nitrate > 5 mg/L 	2021-Ongoing	MDH Cities\ Townships	<ul style="list-style-type: none"> DWSMA information accessible to public # of residents accessing information
3A1H	Develop and distribute educational information in multiple languages and accessible formats.	<ul style="list-style-type: none"> Non-English-speaking Dakota County residents Underserved populations 	2021-Ongoing	MDH DC Public Health State/Regional agencies SWCD	<ul style="list-style-type: none"> # of educational information pieces developed # of languages or formats

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Strategy 3B-Provide training and education to targeted audiences, such as well owners, well drillers, real estate professionals, and people who maintain roads and sidewalks (“Smart Salt” practices). (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
3B1A	Develop and distribute information pieces about geology, contaminants and their health risks, water testing and treatment, septic system maintenance, etc., for private well owners.	<ul style="list-style-type: none"> • Dakota County private well and septic system owners • Well Drillers 	Ongoing	DNR MDH MPCA WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of private well and septic system owners reached • # of education outreach efforts/events
3B1B	Provide information to well contractors to pass along to private well owners.	<ul style="list-style-type: none"> • Dakota County private well owners • Well Drillers 	Ongoing	MDH	<ul style="list-style-type: none"> • Well Drillers reached • Updated information/education materials for distribution
3B1C	Make non-private water quality data more readily available to homeowners and other stakeholders to help them make informed decisions about property and water supply options.	<ul style="list-style-type: none"> • County-wide, property owners and decision makers • Water quality data is available at the City, Township, or land parcel level 	2021- Ongoing	DNR MDH	<ul style="list-style-type: none"> • Accuracy and accessibility of information on the County Website • # of website hits/visits
3B1D	Provide "Smart Salt" training and certification for road maintenance; parking lots and sidewalks; and property owners and managers.	<ul style="list-style-type: none"> • Property Managers • Road Maintenance personnel 	Ongoing	MPCA SWCD WMOs	<ul style="list-style-type: none"> • # of people trained • # of organizations/groups reached (e.g., road maintenance workers, property managers, business owners, etc.) • Estimated reduction in salt-use/chloride input
3B1E	Educate public officials about groundwater and drinking water issues.	<ul style="list-style-type: none"> • Public Officials (State, County, City, and Township officials, and other local government unit board members) 	Ongoing	State &Regional Agencies SWCD WMOs Cities\ Townships	<ul style="list-style-type: none"> • # of public officials reached • # of presentations, conferences, meetings supported • Impact to decision making (actions taken as a result of education)

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Strategy 3B-Provide training and education to targeted audiences, such as well owners, well drillers, real estate professionals, and people who maintain roads and sidewalks (“Smart Salt” practices). (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
3B1F	Conduct stakeholder workshops introducing partner agency staff and interested parties to the County Geologic Atlas and how to use it, once it has been updated.	<ul style="list-style-type: none"> County-wide, with focus on organizations that would benefit from the Geo Atlas information (e.g., well drillers, aggregate companies, SWCD, WMOs, public water suppliers) 	2023-2025	DNR MGS	<ul style="list-style-type: none"> # of workshops # of participants
3B1G	Conduct the annual Wetland Health Evaluation Program to engage citizen volunteers to monitor plants and invertebrates in community wetlands throughout the county.	<ul style="list-style-type: none"> County-wide 	Ongoing	WMOs Cities\ Townships	<ul style="list-style-type: none"> # of volunteers # of wetlands evaluated
3B1H	Ensure information for targeted audiences is available in multiple languages and accessible formats.	<ul style="list-style-type: none"> Non-English-speaking private well owners, septic system owners, contractors Underserved populations 	2021- Ongoing	MDH DC Public Health State/Regional agencies SWCD	<ul style="list-style-type: none"> # of educational information pieces developed # of languages or formats

E. Governance

1. Priorities for Governance Goal:

Groundwater programs and services are efficient and effective.

Strategy 4A: Collaborate with other levels of government is a high priority since working together is critical to ensure the success of the Groundwater Plan and to protect the county’s groundwater resources. Dakota County will advocate on behalf of cities and townships, as needed, to ensure needed resources or guidance are provided. Groundwater moves across community boundaries; with that in mind, the County will establish a County Groundwater-Source Water Collaborative to share information and ideas and to develop solutions to issues that are important to multiple communities.

2. Governance Goal Implementation Table

Strategy 4A-Collaborate with other levels of government. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
4A1A	Advocate for State and federal funding for County, city, and township water infrastructure improvement projects; advocate for improvements to State regulations where needs are identified.	<ul style="list-style-type: none"> Public water suppliers Municipal infrastructure and water conservation activities 	Ongoing	Cities\ Townships	<ul style="list-style-type: none"> \$ Funding for infrastructure projects Changes in regulations or guidance as a result of advocacy
4A1B	Establish a County Groundwater/Source Water Collaborative comprising public water suppliers, State, regional, watershed, County, and SWCD staff to meet regularly and facilitate benchmarking, data-sharing, idea-sharing, and collaboration between the County and drinking water stakeholders. (Broader than 2A2A)	<ul style="list-style-type: none"> All Dakota County groundwater stakeholders 	2021- Ongoing	State, Regional, and SWCD Cities\ Townships	<ul style="list-style-type: none"> # of entities in Collaborative # of meetings Changes in process and procedures based on information sharing
4A1C	Fund a competitive grant program for innovative municipal projects to improve water quality, water quantity, program efficiency, or other issues related to groundwater protection.	<ul style="list-style-type: none"> Public water suppliers Cities\ Townships with groundwater quality or quantity issues 	Opportunity- based	Cities\ Townships	<ul style="list-style-type: none"> # of projects funded \$ of grants awarded Gallons of water saved Lbs. of pollutants reduced (sediments, nutrients, chloride, nitrate, pesticides, etc.)

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Strategy 4A-Collaborate with other levels of government. (PRIORITY: HIGH)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
4A1D	As part of the Delegated Well Program, work with DNR to manage conflicts between surface water resource protection and groundwater quality (deep irrigation well/shallow irrigation well problem).	<ul style="list-style-type: none"> • Irrigation wells where there is a benefit (environmental and agricultural) to use shallow, nitrate-laden water • Private wells near surface water bodies. 	Ongoing	DNR MDA	<ul style="list-style-type: none"> • Completion of updated County groundwater model • Change in water appropriation review process • Allowance of more shallow irrigation wells
4A1E	Participate on the Metropolitan Council Water Supply Advisory Committee (MAWSAC) and related Southeast and Southwest Metro Groundwater Working Groups.	<ul style="list-style-type: none"> • County-wide 	Ongoing	Met Council	<ul style="list-style-type: none"> • # of meetings attended • # of projects impacted

Strategy 4B-Review, streamline, and improve County and State regulatory processes. (PRIORITY: MEDIUM)					
Tactic	Description	Target	Timeframe	Partners	Annual Measure
4B1A	Collaborate with the DNR, municipal water suppliers, agricultural irrigators and other large water users to streamline the groundwater appropriations permitting process to make the process more efficient and understandable.	<ul style="list-style-type: none"> • Water appropriation permit requests 	2021- Ongoing	DNR	<ul style="list-style-type: none"> • Change in process and procedures for appropriation permit requests • Decreased time from permit application to approval/denial
4B1B	Review the County's Well Program Delegation Agreement with MDH and amend to allow the County to regulate any well or boring allowed by State law.	<ul style="list-style-type: none"> • Delegated Well Program, well construction permits 	2020-2025	MDH	<ul style="list-style-type: none"> • Updated Delegation Agreement • Increase in delegated well authority

F. Implementation Costs

The implementation framework was developed with the purpose to allow flexibility in executing the different strategies and tactics, and to provide a myriad of options for the Dakota County Board of Commissions to choose from when developing annual budgets and workplans. Those tactics identified as “Opportunity-based” would only be implemented if the funding and staff were available to execute. Non-county funds will be leveraged as much as possible through grants, fees, or other funding sources to support implementation. Some tactics may require additional

staff to execute. Qualified staff would be required to support water appropriation permits if delegated to the County (tactic 2A1B), but this position would likely be supported by permit fees. Also, implementation of ACRE (tactic 1B1B) may require additional staff support depending upon the strategies developed as part of the effort.

Although there are costs associated with implementing this Plan, the costs of failing to address groundwater quality and quantity concerns now can be even higher in the years to come. Treating contaminated water is expensive for both public and private water supplies. The City of Hastings Public Works Division has already invested more than \$3 million in a nitrate removal system and may need to build another one in the near future. For residents who rely on private wells—an estimated 8,000 households—effective drinking water treatment systems cost \$800 to \$1,000 to install, plus ongoing maintenance. If groundwater supplies run low, an alternative is to use water from the Minnesota or Mississippi Rivers, which is more expensive to transport and treat. Switching to surface water supplies could require as much as \$1.2 billion dollars. There are also intangible costs associated with the potential loss of county groundwater-dependent resources such as trout streams, springs, and calcareous fens.

G. Funding and Resources

1. County Funding:

County Fees: The Delegated Well Program is currently self-supporting through fees; 2018 and 2019 revenues were approximately \$156,000 and \$151,000, respectively. The Drinking Water Testing Program is also self-supporting since residents pay for their own water test with a small administration fee. Additional fees may be used to help support staff time, specifically if there is an increase in delegated authority for well and water appropriation permit responsibilities.

County Environmental Legacy Fund (ELF): ELF was established by County Board Resolution 15-663 for the protection, preservation or enhancement of the environment. In accordance with the resolution, ELF is used for “activities related to Brownfield Redevelopment, Environmental Capital Projects, Environmental Resources Operations, Gravel Pit remediation, Natural Area and Shoreland Conservation, Parks/Greenway Master Plan improvements, and implementation of the Natural Resources Management Plan and Solid Waste Master Plan.” In 2019, ELF supported approximately \$5M in Dakota County environmental programs. Of which, approximately \$301,500 was allocated to groundwater and drinking water protection.

Gravel Tax Revenues: Minnesota law authorizes counties to impose taxes on aggregate mined in the county, commonly referred to as gravel taxes. Allowable expenditures of gravel tax revenues are defined in Minnesota Statute § 298.75. In general, gravel tax proceeds are used for transportation infrastructure and restoration of abandoned mine sites². However, if there are no abandoned mine sites (e.g., abandoned pits, quarries or deposits), Minnesota Statute § 298.75 states that 15 percent of the gravel tax revenue “shall be used for any other unmet reclamation need or for conservation or other environmental needs.” For Dakota County, the portion of the gravel tax revenue available for “conservation or other environmental needs” is within ELF; in 2018, that portion was \$181,272 and in 2019 that portion was \$180,583. Gravel tax revenues may be a source of funding for future groundwater protection programs, especially if they relate to groundwater protection from mining operations.

2. External Funding Sources:

There are several grant opportunities available through State and regional agencies for environmental research, protection, and restoration projects and community assistance. Current and potential future funding options are identified below:

Dakota County Community Development Agency (CDA): The CDA is a local government agency whose mission is to improve the lives of Dakota County residents and enhance the economic vitality of communities through housing and community development. In 2018 and 2019, the CDA provided approximately \$35,000 per year to support the Well Seal Grant Program and \$35,000 to support the Septic System Low-Income Grant Program. Requesting additional CDA funds may be a possibility if the well seal grant program is expanded, if there is an increased need for well sealings, or other groundwater related blight needs are identified.

Legislative-Citizen Commission on Minnesota Resources (LCCMR), Environmental and Natural Resources Trust Fund (ENRTF): The LCCMR is made up of 17 members: 5 Senators, 5 Representatives, 5 citizens appointed by the governor, 1 citizen appointed by the Senate, and 1 citizen appointed by the House. The function of the LCCMR is to make funding recommendations to the legislature for special environment and natural resource projects, primarily from the ENRTF. These projects help maintain and enhance Minnesota's environment and natural resources. The purpose of the ENRTF is to provide a long-term, consistent, and stable source of funding for activities that protect, conserve, preserve, and enhance Minnesota's "air, water, land, fish, wildlife, and other natural resources" for the benefit of current citizens and future generations. Dakota County has been able to leverage millions of dollars from the ENRTF Grant for land conservation over the last several years. Over \$50M is projected to be awarded for 2020 grants.

² House Research, Aggregate Tax, November 2018: <https://www.house.leg.state.mn.us/hrd/pubs/ss/ssaggtax.pdf>

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BWSR, Clean Water Fund: The Clean Water Fund was established in Minnesota Statute § 114D.50 to implement part of Article XI, Section 15, of the Minnesota Constitution, with the purpose of protecting, enhancing, and restoring water quality in lakes, rivers, and streams in addition to protecting groundwater and drinking water sources from degradation. Counties in the TCMA are eligible if they have adopted a county groundwater plan or county comprehensive plan that has been approved by the Metropolitan Council under Minn. Stat. Chapter 473. The purpose of the grant makes an investment in on-the-ground projects and practices that will protect or restore water quality in lakes, rivers or streams, or will protect groundwater or drinking water. Dakota County has been awarded Clean Water Fund Grants in the past, to include \$200,000 in FY2019 to improve surface water quality. Over \$14M is projected to be awarded in 2020 grants.

Metropolitan Council, Water Efficiency Grant Program and Stormwater Grant Program: The Metropolitan Council is implementing a water efficiency grant program effective September 2019 to June 2022. The goal of the water efficiency grant program is to support technical and behavioral changes that improve municipal water use efficiency in the TCMA. The grant is only eligible to water suppliers; however, the County can partner with municipalities on the grant. The County has not participated in this program before but is partnering with the City of Apple Valley to administer the grants in 2020-2022. Grants up to \$50,000 per applicant were awarded in 2020.

The stormwater grant program goal is to help fund practices to treat and manage stormwater for redevelopment projects or retrofit fully developed areas with stormwater management practices to reduce pollution of receiving waters. The grant program is eligible to cities, counties, townships, WMOs, and SWCDs in the TCMA. The County has not participated in this program.

MDA, Clean Water Research and Other Grant Programs: MDA's Clean Water Research grant is focused on clean water in agricultural areas of the state. The goal is to fund research that improves water quality in Minnesota by evaluating and promoting agricultural practices and technologies. In 2011-2015, MDA provided the County with two Agricultural Water Quality grants totaling \$134,084, for nitrogen fertilizer research. MDA also provided the County with two grants, totaling \$107,958, for the Township Testing program in 2013-2015. Additional grant programs may be available during the Groundwater Plan implementation timeframe.

MPCA, Minnesota GreenCorps Program: Minnesota GreenCorps program is a statewide initiative, to preserve and protect Minnesota's environment while training a new generation of environmental professionals. The program places AmeriCorps members with host organizations around the state to assist communities and local governments in addressing a variety of statewide needs. This includes groundwater related protection needs such as reducing water runoff and improving water quality, assisting community members to take eco-friendly actions, and increasing community resilience and build local capacity to respond to the threats of climate change. While the County has not utilized GreenCorps program from a water protection perspective, currently GreenCorps members help support County recycling initiatives.

The County has previously been able to leverage \$684,000 from the **Environmental Protection Agency (EPA) 319 Grant** program and the **MPCA Clean Water Partnership** program, for control of nonpoint sources of pollution, specifically addressing nitrate contamination. The current eligibility criteria for these programs are focused on surface water protection, but could be potential sources of funding depending upon future eligibility requirements. In addition, MDA, MDH, DNR, and MPCA occasionally have one-time grants that relate to groundwater protection that are a potential source for future projects.

H. Performance and Accountability

Dakota County is committed to performance management and continuous improvement in its environmental programs and services. The County uses Outcomes Based Accountability (OBA) annual reporting to evaluate and make informed decisions about its programs: the programs' impacts; success in achieving their goals; how they can or have been implemented; and how they can be improved. OBA reporting will be used as strategies are implemented, on a project-by-project basis, which will be dependent upon Department-approved annual workplans. Below are examples of possible reporting measures:

OBA Key Questions

1. *How much did we do?*
2. *How well did we do it?*
3. *Is anyone better off?*

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Table 4 Examples of Outcomes Based Accountability (OBA) Reporting

Goal	How much did we do?	How well did we do it?	Is anyone better off?
Goal 1: Water Quality	<ul style="list-style-type: none"> # customers served (private well owners, organizations, cities, townships, etc.) # participants # meetings, events, studies, or projects # grants, \$ awarded # of water sample tests conducted, analytes, locations Quantity (lbs.) of contaminant input reduced 	<ul style="list-style-type: none"> % of population served, % Increase in grants awarded % increase in samples, analytes, locations % decrease in contaminant inputs or concentration % decrease in wells exceeding guidelines % decrease in plume size 	<ul style="list-style-type: none"> Estimated ecological and public health impact Estimate impact of water quality practices implemented <p><i>Is the water healthier? Was quality of life improved?</i></p>
Goal 2: Water Quantity	<ul style="list-style-type: none"> # customers served (private well owners, organizations, cities, townships, etc.) # participants, meetings, events, or projects # grants, \$ awarded Gallons water saved Acres of wetlands created, gallons of water stored Acres of recharge areas, land preserved 	<ul style="list-style-type: none"> % of population served, organizations represented % Increase in grants awarded % water usage reduced % increase in wetlands, water storage % increase in recharge areas, land preserved 	<ul style="list-style-type: none"> Estimated ecological and public health impact Estimate impact of water quality practices implemented. <p><i>Is the water more plentiful? Was quality of life improved?</i></p>
Goal 3: Education	<ul style="list-style-type: none"> # participants/ audience # education events, types of educational focus 	<ul style="list-style-type: none"> % increase in participation % increase in events 	<ul style="list-style-type: none"> Estimate changes in behavior Estimate changes in engagement in environmental protection activities <p><i>Was there a change in decision making?</i></p>
Goal 4: Governance	<ul style="list-style-type: none"> # participants, organizations, collaborative partners # meetings, events, or projects # of changes in regulatory processes 	<ul style="list-style-type: none"> % participation % decrease in process time 	<ul style="list-style-type: none"> Estimate impact of collaboration Estimated impact of process changes <p><i>Were processes simplified, was time or money saved?</i></p>

In addition to the county-wide Program and Service Inventory annual reports, County Environmental Resources staff intend to publish a report each year on their Groundwater Plan implementation activities for the coming year and metrics for the prior year.

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CHAPTER 3. PLANNING OVERVIEW

A. Planning Authority

Minn. Stat. §103B.255, Metropolitan Groundwater Management, states that a metropolitan county, like Dakota County, may prepare and adopt groundwater plans in accordance with the statute. Dakota County adopted its first Groundwater Plan in 1993; most recently, a Groundwater Plan was adopted by the County Board in May 2009 as part of the Dakota County Comprehensive Plan, DC 2030.

The Groundwater Plan's framework and goals are influenced by Minnesota Statute §103H, Groundwater Protection; §103G, Waters of the State; §103I, Wells, Borings, and Underground Uses; and §115.55, Subsurface Sewage Treatment Systems. The Groundwater Plan will support the goals of the State expressed in these statutes: that groundwater be maintained in its natural condition, free from any degradation caused by human activities, to the extent practicable (MN Statute §103H.001); and to protect health and general welfare by providing a means for the development and protection of the natural resource of groundwater in an orderly, healthful, and reasonable manner (MN Statute §103I.001). Groundwater use is sustainable if it will supply the needs of future generations and will not harm ecosystems, degrade water, or reduce water levels beyond the reach of public water supply and private domestic wells (MN Statute §103G.287).

B. Groundwater Plan Alignment with Other Dakota County Plans

This Groundwater Plan was developed using the Dakota County 2017 Strategic Plan and 2019 Comprehensive Plan as the foundation. In August 2017, the Dakota County Board of Commissioners adopted Strategic Plan Goals that include:

A great place to live

- Dakota County strives to be a welcoming place where all people are safe, have opportunities to thrive, and enjoy a high lifelong quality of life.

A healthy environment with quality natural areas

- Dakota County protects and maintains natural resources for the health and enjoyment of current and future residents.

A successful place for business and jobs

- Dakota County fosters business and employment success through modern infrastructure, low taxes, and a prepared, connected workforce.

Excellence in public service

- Dakota County demonstrates sound stewardship of human and financial resources, communicates and engages with the public, and innovates and collaborates to provide excellent service.

In June 2019, the County Board adopted DC 2040, the County’s 2019 Comprehensive Plan. The DC 2040 Natural Resources Goals include:

- 5.3 Preserve vital functions of natural systems by strategically and collaboratively improving Dakota County’s green infrastructure.
- 5.4 Conserve and protect natural resources in Dakota County, including air quality, water, soil, productive farmland, minerals (bedrock, sand and gravel aggregates), vegetation, and wildlife.
- 5.5 Sufficient and sustainable high-quality water resources.
- 5.6 Sufficient and sustainable high-quality water supplies.
- 5.7 Ensure that residents have adequate wastewater disposal where no municipal system is available.

C. Scope

The Groundwater Plan addresses groundwater conditions throughout the entirety of Dakota County.

D. Plan period

Following adoption by BWSR (on behalf of the State of Minnesota) and the Dakota County Board, this Groundwater Plan covers a ten-year period from the date of adoption.

E. Planning process and local coordination

Before final adoption by the County Board, the County submitted the draft Plan for a 60-day review and comment period to the adjoining counties, the Metropolitan Council, the State review agencies, (BWSR), the Dakota County Soil and Water Conservation District (SWCD), the cities, townships, and watershed organizations within the county, and other interested parties. The County held a public hearing on the draft Groundwater Plan, which was no sooner than 30 days and no later than 45 days after the 60-day public review period. After completion of the review and revisions, the draft Groundwater Plan, all written comments received on the Groundwater Plan, a record of the public hearing, and a

summary of changes incorporated as part of the review process were submitted to the Metropolitan Council, the state review agencies, and BWSR for final review and approval.

F. Stakeholder and public engagement

The Groundwater Plan strategies apply to all stakeholders in Dakota County, so stakeholder input was vital to crafting the revised plan. The primary stakeholder engagement objectives were to:

1. Learn more about the current perception of the Groundwater Plan and Groundwater Plan strategies.
2. Learn more about stakeholders' perceptions of groundwater issues and their level of concern.
3. Collect data to best inform the County throughout the Groundwater Plan revision process.
4. Describe and explain the necessity for prospective Groundwater Plan strategies to the relevant stakeholder groups.
5. Request feedback, ideas, and opinions from the stakeholder groups to:
 - a. Assess groundwater and drinking water challenges and determine strategies for addressing those challenges.
 - b. Identify opportunities for and barriers to implementing or following prospective Groundwater Plan strategies.
 - c. Understand the level of support for prospective Groundwater Plan strategies.
6. Provide accurate, relevant, and timely information to help all of those involved understand the Groundwater Plan revision process and make informed comments and recommendations.

The County's Groundwater Plan stakeholder engagement approach integrated into the overall plan development process to solicit ideas, responses, feedback, and opinions from a varied group of stakeholders at key points. The stakeholder engagement process brought together multiple viewpoints to inform Groundwater Plan decisions, establish legitimacy to the Groundwater Plan revision process, identify potential problems and generate solutions, and articulate and clarify key Groundwater Plan strategies. The Groundwater Plan process has helped connect County staff with new collaborators and foster relationships with existing partners to encourage change and raise awareness of the Groundwater Plan revision. The County's engagement process emphasized visibility, transparency of the process, appreciation of points-of-view, and multiple communication methods to engage stakeholders.

Mn. Statute 103B.255 (Groundwater Plans) requires an Advisory Committee to include:

“Representatives of various interests, including construction, agriculture, hydrogeology, and well drilling. At least four members of the committee must be from the public at large with no direct pecuniary interest in any project involving groundwater protection. At least seven members must be appointed from watershed management organizations, statutory and home rule charter cities, and towns, and

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these local government representatives must be geographically distributed so that at least one is appointed from each county commissioner district.”

Following discussions with BWSR staff, Dakota County worked with two advisory committees. The Dakota County Planning Commission serves as the County’s policy advisory body. The County Board appoints two members from each county commissioner district, thereby satisfying the statutory requirement for geographic representation. In addition, a Technical Advisory Group (TAG) was convened to represent the additional groundwater stakeholder interests. The TAG included one representative from a construction company; two representatives from agricultural organizations; one hydrogeologist from the DNR; one well driller; seven municipal representatives (with at least one from each county commissioner district); three representatives from watershed organizations (one of whom also represented the SWCD), and representatives from the Metropolitan Council, MDH, MDA, and BWSR. Staff met with the County Planning Commission three times to inform development of the draft Plan (January 24, 2019; September 26, 2019; and 4/23/20) and the TAG five times (April 15, 2019; May 28, 2019; June 25, 2019; August 19, 2019; and November 13, 2019) to receive their ideas, opinions, guidance, and priorities for the plan. A TAG meeting was scheduled for March 16, 2020 but was postponed because of Covid-19; instead of the meeting, members were asked to send their comments to County staff. To aid discussion between the two advisory groups, several TAG members attended the Planning Commission meetings and several Planning Commission members attended at least one TAG meeting.

1. Round One Engagement

Engagement during the spring and early summer of 2019 focused on identification of issues, concerns, and potential opportunities. Activities included:

Public Open Houses with water testing opportunities at a northern and southern location in the county, *115 participants*

West St. Paul, April 30, 2019

Farmington, May 2, 2019

Workshops held twice each during the day and evening at several locations, *36 participants*

West St. Paul, May 9, 2019

Hastings, May 22, 2019

Eagan, May 9, 2019

Farmington, May 29, 2019

Nitrate Clinics with nitrate testing opportunities (in cooperation with MDA) held twice in different locations, *100+ participants*

Hampton, May 16, 2019

Hastings, June 5, 2019

Groundwater Survey administered online and in paper form at open houses, *228 responses*

2. Round Two Stakeholder and Public Engagement

Round Two engagement activities focused on testing potential strategic approaches and identifying additional solutions for groundwater issues.

Public Open Houses with water test kit opportunities at a northern and southern location in the county, *50+ participants*

Farmington, January 9, 2020

Egan, February 5, 2020

Workshop, *30+ participants*

Apple Valley, January 30, 2020

Intercept Boards rotated through selected County Libraries, *311 participants*

Groundwater Survey administered online and in paper form at open houses, *81 responses*

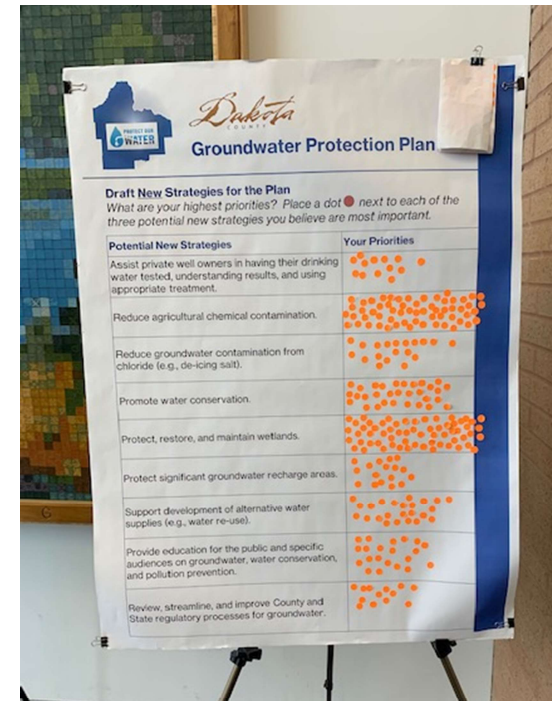
Information on the Groundwater Plan project and public events was distributed through media releases, social media, websites, and targeted mailings.

Concerns, preferences, and comments received during the two rounds of engagement are provided in greater detail in Appendix B.

G. What's new in this plan

Groundwater management role and responsibility suggestions that were identified during stakeholder engagement include inspiring behavior change through:

- Regulation –evaluate making current regulatory processes more effective and efficient, where authority allows and regulation is desired.



Library Intercept Board

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- Funding and Promotion – create changes by directly funding or operating activities where authority to regulate does not exist or is not desired.
- Education – increase education role through community, decision-maker, and professional education.
- Advocacy and Support – convene other agencies and local governments; facilitate; conduct research, monitoring and data collection; and advocate for local communities.

The 2009 Groundwater Plan outlined numerous near-, mid-, and long-term strategies to meet County and State groundwater protection goals. Significant changes have occurred since the County Board approved the 2009 Groundwater Plan, including:

Groundwater Quality

- Dakota County revised Ordinance 113, Subsurface Sewage Treatment Systems (Septic Systems), in 2009, 2016, and 2018.
- In 2015, the Minnesota Department of Agriculture (MDA) revised its Nitrogen Fertilizer Management Plan (NFMP). The NFMP is the State’s plan for preventing and minimizing adverse impacts of nitrogen fertilizer on groundwater. The NFMP emphasizes involving local farmers and agronomists in minimizing nitrate losses from farm fields in areas vulnerable to groundwater contamination and in problem-solving in areas with elevated nitrate in groundwater, such as Dakota County. Voluntary nitrogen fertilizer best management practices (BMPs) and other practices protective of groundwater, called alternative management tools (AMTs), are the foundations of the NFMP.
- In 2019, MDA drafted the Groundwater Protection Rule to address nitrate groundwater contamination statewide, effective in January 2020. The rule contains two parts and focuses on vulnerable groundwater areas and those areas surrounding public water supply wells, called Drinking Water Supply Management Areas (DWSMAs).
 - Part 1 of the rule restricts the use of nitrogen fertilizer in the fall and on frozen soils in areas of the state with vulnerable groundwater, such as most of Dakota County – areas with coarse textured soil, shallow bedrock, or karst geology; and in DWSMAs with elevated nitrate levels such as the Hastings’ DWSMA.
 - Part 2 of the rule addresses DWSMAs which already have high nitrate concentrations. The Rule calls for assigning DWSMAs with high nitrate to Mitigation Levels; Mitigation Levels 1 and 2 are subject to voluntary nitrate reduction efforts, while Mitigation Levels 3 and 4 will include regulatory actions. All areas will begin at a voluntary level and move to regulation only if BMPs are not adopted or if nitrate contamination in the groundwater increases.
 - In January 2020, MDA designated the City of Hastings DWSMA as a Level 2 mitigation area and the City of Rosemount DWSMA as a Level 1 mitigation area.
- In 2019, Dakota County revised Ordinance 114, Well and Water Supply Management. Changes included:
 - Addition of manganese testing requirement for newly constructed wells and reconstructed wells and at time of property transfer;

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- Addition of water treatment system option to meet nitrate-nitrite standard (rather than requiring deeper wells);
- Addition of requirement to meet arsenic water quality standard through water treatment if the level exceeds the State standard;
- Requires water treatment for nitrate or arsenic exceedances at the time of sale.

Groundwater Quantity

- In 2013, the Minnesota Legislature revised the laws governing water appropriations permits. Changes to the regulatory processes for the construction and use of large-capacity wells impacts both municipal water suppliers and agricultural irrigators in Dakota County. The Minnesota Department of Natural Resources (DNR) conducted a Groundwater Thresholds study as a result of this change in the law, which evaluated the potential impacts of groundwater appropriations on designated trout stream reaches of the Vermillion River and Trout Brook (a Cannon River tributary).
- In 2019, a Dakota County-based company requested a preliminary well construction assessment from the DNR for two wells in southern Dakota County to extract up to 500 million gallons of groundwater per year, to be shipped by rail to the western United States and sold. The DNR responded that this particular project would be unlikely to be approved under State law, but the proposal raises concerns about the possibility of future projects to export unsustainable quantities of groundwater from the county.

Governance

- In 2014, the Metropolitan Council adopted its long-term *Thrive MSP 2040* plan for the TCMA. In accordance with Thrive MSP 2040 policy direction, the Metropolitan Council adopted its 2040 Water Resources Policy Plan in 2018 (amended) and Master Water Supply Plan in 2015. Thrive MSP 2040 provides a framework for a shared vision for the region over the next 25 years. In response to Thrive MSP 2040 policy directions, Dakota County adopted *DC 2040* in June 2019. DC2040 is the County's 10-year Comprehensive Plan update to guide County transportation systems, parks and open space, natural resources, and land use planning over the next 20 years.
- In 2017, the Minnesota Legislature changed the definitions of environmental wells (monitoring wells, environmental bore holes, or remedial wells). This shifted specific regulatory responsibilities and authority for environmental bore holes from Minnesota Department of Health (MDH) to the Dakota County Delegated Well Program.

H. Plan amendment process and timeframes

The Dakota County Groundwater Plan (Plan) is designed to cover a ten-year period beginning with its date of adoption by the State of Minnesota. The County intends to review the Plan every five years and revise the Plan prior to the ten-year expiration to ensure the County

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continues to have a state-approved Groundwater Plan. The County may also review the Plan after any significant State, Regional, or County Plan updates to ensure consistency with guiding documents and address changing circumstances, as needed. The County may prepare proposed amendments to the Plan at any time during this period. Amendments may be a result of changed conditions, completion of other complementary plans that were identified in this Plan (e.g., Agriculture Chemical Reduction Effort), or other possible circumstances.

The County will propose amendments to the Plan in accordance with Minn. Stat. §103B.255. The following process will be used:

- Dakota County will submit the draft Plan amendments to adjoining counties, the Metropolitan Council, the state review agencies, BWSR, soil and water conservation districts, watershed organizations, and towns and cities within the county for review in accordance with the provisions of Minn. Stat. §103B.255 subdivisions 8 through 10.
- Notice of the public hearing on the proposed Plan amendments and a summary of changes shall be published by the County in at least one legal newspaper in the County at least ten days before the hearing. At the hearing the County will solicit comments on the proposed Plan amendments.
- After the public hearing, Dakota County will submit the Plan amendment for approval under Minn. Stat. 103B.255 subdivisions 9 and 10.
- The County will not adopt any proposed Plan amendments before BWSR has decided whether the amendments are in accordance with the provisions found in section 103B.255, subdivisions 8 through 10. If BWSR has not made a decision within 45 days of the close of the hearing, unless the County agrees to a time extension, review in accordance with provisions found in Minnesota Statute section 103B.255, subdivisions 8 through 10, shall not be required.
- If BWSR does not approve the proposed Plan amendment, it will be revised by the County Board of Commissioners and resubmitted for approval to BWSR within 120 days after receiving notice of disapproval.
- Dakota County will adopt and implement Plan amendments within 120 days after approval by BWSR.

CHAPTER 4. GROUNDWATER MANAGEMENT ROLES, RESPONSIBILITIES, AND OFFICIAL CONTROLS

A. Dakota County Roles

The Dakota County Environmental Resources Department manages its programs with the mission statement to “protect, preserve, and enhance the environment for the health, enjoyment and benefit of current and future generations.” The Department accomplishes this through a combination of regulatory and non-regulatory programs that address groundwater and surface water quality, solid waste management, hazardous waste management, brownfield and contaminated site assessment and redevelopment, and land conservation. The following summarizes the current Environmental Resources programs that relate to groundwater protection.

1. Drinking Water Protection Program

Delegated Well Program. Dakota County is one of ten local boards of health that administers a Delegated Well Program under the direction of the MDH. Two cities (Bloomington and Minneapolis) and seven other counties (Blue Earth, Goodhue, Le Sueur, Olmsted, Wabasha, Waseca, and Winona) also have delegated well programs. There has been a Delegation Agreement between Dakota County and MDH since 1989; the most recent agreement has been in effect since July 1, 2010. As part of the agreement, the County is responsible for regulating the construction, repair, and sealing of water-supply wells to protect public health and groundwater. The agreement applies to any water-supply well used for private water supply; non-community public water systems; irrigation; agricultural, commercial, or industrial purposes; heating or cooling; environmental monitoring; and dewatering. The Groundwater Plan proposes to expand the County’s well construction delegation authority based on what is allowed within Minnesota Statute § 103I, as well as potential groundwater appropriation delegated authority based on what is allowed within Minnesota Statute 103G or Rule 6115.

Official Controls

Wells are regulated through **Minnesota Statute § 103I – Wells and Borings, Minnesota Rules Chapter 4725 – Wells and Borings and Dakota County Ordinance 114 – Well and Water Supply Management.** County Ordinance 114 specifies water quality standards in the county for new or reconstructed wells and existing wells that are part of property transactions; addresses proper location and construction of wells; necessary modifications and reconstruction; operation, maintenance, and repair; permanent sealing; and annual maintenance permitting, including registered environmental use wells and unused wells.

The DNR regulates water appropriations in accordance with **Minnesota Statute § 103G.287 – Groundwater Appropriations.**

Well Sealing. Unused or abandoned wells are a potential threat to health, safety, and the environment since they provide a direct conduit to the groundwater aquifer. To help County property owners pay for the cost of sealing unused wells and protect the drinking water aquifers from potential contamination, the Environmental Resources Department administers a well sealing grant program in collaboration with the Dakota County Community Development Agency (CDA). The program reimburses the well owner for 50 percent of the cost to seal the well, currently as much as \$3,000. In 2018 and 2019, approximately \$77,000 and \$85,000, respectively, was awarded to County residents and businesses to assist with well sealing using a combination of County funds and CDA grant funding.

Official Controls

Minnesota Statute §1031.301 requires that all abandoned or unused wells be sealed by a State of Minnesota licensed well contractor.

Drinking Water Testing, Education and Outreach. The numerous options that private well owners in Dakota County have to have their water tested, either as part of a research project or to address their personal concerns are outlined in the table below. County private well owners can participate in the County’s low-cost drinking water testing service by requesting a water sample kit in the mail or picking up a sample kit at one of three County buildings. To ensure safe drinking water, the County encourages private well owners to test their well water for coliform bacteria every year; nitrate at least every other year; and arsenic, lead, and manganese at least once. Costs to well owners are roughly \$18 per tested contaminant. County staff help communicate lab results and provide recommendations and resources to residents based on the results. The Groundwater Plan proposes to expand the County’s role in private well owner’s drinking water testing, education, and outreach to include offering free water sampling for all private wells owner’s at least once every five years and facilitating the installation of appropriate drinking water treatment systems for low-income households that have contaminated water. The Plan also proposes to expand educational and outreach efforts throughout the county to not only focus on private well owners, but also educate the general public on water science, conservation, and pollution prevention measures.

Groundwater Quality Research and Outreach. Over the last 20 years, Dakota County has conducted some of the most thorough research into the groundwater quality in private wells in the state. The Ambient Groundwater Quality Study (Ambient Study) has studied the same 77 private wells over the last 20 years to determine water quality trends and risks to county residents from various contaminants. Dakota County served as the pilot area for the MDA Township Testing program in 2013-15, which quantified the risks related to elevated levels of nitrate contamination in rural parts of the county. The Wells and Increased Infant Sensitivity Exposure (WIISE) study, in collaboration with MDH, studied the risk of elevated levels of naturally-occurring manganese in Inver Grove Heights private wells. County staff consulted with MDH regarding health impacts; discussed the problems the County had identified with MDH and MDA; and reported results to all participants and the general public. Results from the water quality research are further discussed in “Groundwater Issues: Quality and Drinking Water Health,” below.

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Table 5 Water Testing Options for Private Well Owners				
Dakota County Program	Reason for Testing	Mandatory or Voluntary for Well Owner?	Contaminants	Fee-based or no cost to Well Owner?
Delegated Well Program	New well construction	Testing is mandatory but using County service not required.	Nitrate, coliform bacteria, arsenic and manganese	Fee
Water Supply Testing Service	Change in property ownership	Testing is mandatory but using County service not required.	Nitrate, coliform bacteria, arsenic and manganese	Fee
Water Supply Testing Service	Licensing for in-home daycare facility or group home	Testing is mandatory but using County service not required.	Nitrate and coliform bacteria	Fee
Water Supply Testing Service	Well owner drinking water health	Voluntary (at well owner's convenience)	MDH recommends testing for coliform bacteria, nitrate, arsenic, lead, and manganese. Other tests (e.g., fluoride) available on request.	Fee
Community-focused Well Sampling	Well owner drinking water health and County monitoring	Voluntary (when offered by County)	Nitrate, arsenic, manganese, chloride, and lead. Includes comparison of outdoor and indoor faucet water quality.	No cost to well owner
MDA/County Nitrate Testing Clinics	Well owner drinking water health and State and County monitoring	Voluntary (when clinics are offered)	Nitrate, with in-person explanation of results and water treatment options.	No cost to well owner
<i>Past Programs and Projects Listed Below</i>				
Ambient Groundwater Quality Study (1999-2019)	Well owner drinking water health and County monitoring	Voluntary (representative wells selected by County; owners invited to participate)	Nitrate, arsenic, manganese, chloride, pesticides, PFAS, organic wastewater compounds, other contaminants of concern. Included comparison of outdoor and indoor faucet water quality.	No cost to well owner

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Table 5 Water Testing Options for Private Well Owners

Dakota County Program	Reason for Testing	Mandatory or Voluntary for Well Owner?	Contaminants	Fee-based or no cost to Well Owner?
MDH/County WIISE Study (2015-2017)	Well owner drinking water health and State and County monitoring	Voluntary (when offered)	Arsenic, chloride, fluoride, iron, lead, manganese, nitrate, sulfate, and coliform bacteria. Included comparison of outdoor and indoor faucet water quality.	No cost to well owner
MDA/County Township Testing Program (2013-2015)	Well owner drinking water health and State and County monitoring	Voluntary (when offered)	Nitrate; manganese in 2014.	No cost to well owner
Other past projects (e.g., Hastings Area Nitrate Studies, 1999-2016)	Well owner drinking water health and County monitoring	Voluntary (when offered)	Nitrate, pesticides, helium-tritium isotopes	No cost to well owner

Wellhead Protection and Water Supply Planning. The County assists all Dakota County cities and townships with preparing, updating, and implementing Water Supply Plans (WSP) and Wellhead Protection Plans (WHPP). Environmental Resources Department staff review and provide comments on all Plans submitted to DNR, MDH, or the Metropolitan Council. Requirements of the Plans are further discussed under “City and Township Roles,” below. The Groundwater Plan proposes to expand the County’s role in leading collaboration efforts between the different groundwater stakeholders and entities to include state, regional, and local levels of government to help improve existing processes and facilitate data and idea sharing, as well as evaluating the feasibility of rural water supply systems.

Agriculture Education and Outreach. The County monitors private drinking water wells and environmental monitoring wells for agricultural chemicals, including nitrate and herbicides, to evaluate their occurrence, sources, and trends. Environmental Resources Department staff consult with MDH on the health concerns associated with the contaminants found in drinking water and with MDA regarding strategies for reducing agricultural chemicals in groundwater. County staff communicate the results of their monitoring to participating well owners, the farming community, State agencies, and other interested parties. Staff participate in MDA’s Local Advisory Team to assist in the implementation of MDA’s Nitrogen Fertilizer Management Plan and the Groundwater Protection Rule, and also participate in the Natural Resources Conservation Service (NRCS) Local Workgroup. Because of the County’s leadership on the issue of agricultural chemicals in groundwater, a staff member has been appointed by the Commissioner of Agriculture to serve on the MDA Pesticide Management Plan Advisory Committee and, previously, on

the Nitrogen Fertilizer Management Plan Advisory Committee. The Groundwater Plan proposes to expand the County's role in reducing agricultural chemicals by developing and implementing a Groundwater Agricultural Chemical Reduction Effort (ACRE). This expanded role may include measures to regulate how nitrogen fertilizer is used in the county.

Water Conservation. The County assists the City of Apple Valley in administering its water efficiency rebate program for customer installation of WaterSense toilets and irrigation controllers, and Energy Star certified washing machines. The Groundwater Plan proposes to expand the County's role in promoting water conservation and water reuse, improving groundwater recharge areas, preserving wetlands, monitoring groundwater levels throughout the county, and taking appropriate measures to limit the exportation of groundwater from Dakota County.

2. Septic System Program

The County is responsible for directly regulating septic systems for the cities of Randolph and New Trier, Randolph and Waterford townships, and the shoreland/floodplain areas in unincorporated portions of the county, a total of approximately 980 households. Cities and townships regulate septic systems in most of the county; their ordinances are required to be consistent with the County's septic system ordinance and with State law.

Septic systems provide wastewater treatment for many homeowners who often also have private drinking water wells. If a septic system is not working properly, contaminants from wastewater (e.g., disease causing bacteria and viruses, nitrogen, medicines, cleaning products, and other potentially harmful chemicals) can end up in the groundwater and local drinking water wells.

From 2014 to 2016, the County conducted a comprehensive evaluation of septic systems in the City of Randolph and determined that 29 percent (43 of 149 assessed systems) of them were failing and an additional 20 percent (30 systems) were considered marginal. Because of the scope of the problem, the County is allowing residents of Randolph additional time while the City of Randolph explores its options for wastewater treatment. County staff work with local units of government to ensure septic systems are properly maintained, inspected, and replaced where necessary.

To address failing septic systems, the County administers a septic system low income grant program and a tax assessment program. The low-income grant program will reimburse eligible homeowners up to 50 percent of the cost to replace or repair failing septic systems, not to exceed \$10,000. The tax assessment loan program was established to ease the financial burden to any residential property owners upgrading a failing septic system; the loan is an assessment on the property taxes. Approximately \$9,000 was awarded during the 2018-2019 low-income grant program; and \$103,000 and \$76,000 were issued as part of the 2018 and 2019 tax assessment loan program, respectively.

Official Controls

Minnesota Statute §115.55 and §115.56, Subsurface Sewage Treatment Systems, Minnesota Rule Chapter 7080-7083 – Individual Subsurface Sewage Treatment Systems, and Dakota County Ordinance 113 – Subsurface Sewage Treatment Systems regulate septic systems. County Ordinance 113 provides standards, guidelines, and regulations for the compliance and enforcement of the proper siting, design, construction, installation, operation, maintenance, repair, reconstruction, inspection, and permanent abandonment of individual sewage treatment systems. Each city and township administer its own sewage system ordinance with the exception of those regulated by the County; however, all municipalities are encouraged to adopt Dakota County Ordinance 113.

3. Shoreland and Floodplain Program

The County is responsible for regulating shoreland and floodplains in the 13 unincorporated townships. County permits are required for construction activities; grading and filling; septic system installations; and removal of vegetation within 300 feet from rivers, 1,000 feet from lakes and the Cannon River, and on any land located in floodplain areas. Preserving and enhancing surface water quality is important to protecting groundwater since in most watersheds' surface water and groundwater are closely linked. As water moves across the land surface, water will seep through the soils and become groundwater.

Official Controls

Dakota County Ordinance 50 – Shoreland and Floodplain Management regulates land subdivision, use, and development of shoreland and floodplain areas to preserve and enhance the quality of surface waters, to protect and preserve the outstanding values of rivers and streams, to conserve the economic and natural environmental values of shorelands, and to provide for the wise use of waters and related land resources.

The County has also chosen the authority to enforce the State's buffer law county-wide. The law is enforced through Ordinance 50, requiring 50-foot wide permanent buffers on all DNR Public Waters and 16.5-foot wide permanent buffers on all public ditches located throughout the entire county (includes the 21 incorporated cities and 13 unincorporated townships). The buffer compliance rate can vary from year to year. County staff review aerial photography annually and conduct on-site reviews as necessary to determine compliance with buffer standards. If issues are found, staff work with the landowner to reach compliance. There are no current pending buffer violations as of April 2020.

4. Stormwater Pollution Prevention Program

The Environmental Resources Department ensures compliance with Minnesota Pollution Control Agency (MPCA) regulations for County-owned or operated municipal separate storm sewer systems (MS4s). Stormwater is a source of both surface water and groundwater degradation. In undeveloped areas, a large percentage of precipitation infiltrates through the ground, recharging the groundwater, while the remaining runoff flows to nearby water bodies or evaporates. Uncontrolled stormwater can collect pollutants such as sediments, pathogens, fertilizer and nutrients, metals, and other contaminants, thereby impacting the quality of the water recharging the drinking water aquifers.

MPCA regulations authorize stormwater discharge by Dakota County through a permit updated every five years. The permit requires a Stormwater Pollution Prevention Program (SWPPP), which outlines actions and becomes an enforceable part of the permit.

Official Controls

Minnesota Statutes §115, §116, §145A, and §375 and Dakota County Ordinance 132 – Storm Sewer System protect the quality of waterbodies in Dakota County through regulation of stormwater and non-stormwater discharges via County-owned or operated storm sewers. It establishes methods for controlling the introduction of pollutants into the County's MS4, as required for compliance with the requirements of the County's National Pollutant Discharge Elimination System (NPDES) permit.

5. Hazardous and Solid Waste Programs

The **Dakota County 2018-2038 Solid Waste Master Plan** emphasizes the reduction of toxic and hazardous waste materials. The Master Plan identifies strategies to improve household hazardous waste reduction, separation, and management through increased opportunities and community education. County programs such as *The Recycling Zone*, free medication drop off locations, and broad-based education to the community on proper handling of waste and how to decrease the use of toxic chemicals are critical to reducing potential groundwater pollution. Giving environmentally responsible alternatives to residents decreases the risk of hazardous waste disposal down sinks, storm drains, septic systems, or on lawns.

Solid Waste Program: As part of the Solid Waste Program, the County conducts inspections, licensing, and enforcement for demolition landfills, scrap yards, licensed solid waste facilities, transfer facilities, and hauling vehicles; provides waste tire management; regulates waste haulers; and administers the Burn Barrel Program. The County's Solid Waste Master Plan is updated every six years and provides strategic approaches for waste reduction, recycling, and reuse to promote landfill abatement. The plan, last updated and adopted in 2018, also addresses hazardous waste reduction and proper disposal.

Hazardous Waste Program: The Hazardous Waste Program provides hazardous waste training and technical assistance; and conducts hazardous waste inspections, licensing, and enforcement for the county's 1,200+ hazardous waste generators. County staff inspects businesses to assure proper management of the hazardous wastes on the site. In addition, the County collaborates on the Pharmaceuticals Collection Program; conducts Very Small Quantity Generator (VSQG) waste collections; develops waste-related policy, planning, and reporting; oversees operations at The Recycling Zone; provides business hazardous waste collection services; provides environmental education, outreach, and communications to target audiences; and provides household hazardous waste management services.

Responsible waste practices help prevent groundwater pollution by preventing hazardous contaminants from leaching in the groundwater from landfills or from spills from improper storage methods. Groundwater monitoring is required at nearly all municipal solid waste landfills, and may be required at hazardous waste treatment, storage, and disposal facilities depending on permit requirements. The purpose of monitoring is to detect if there is a release of any substances to the underlying groundwater. Groundwater monitoring wells are regulated as part of the County's Delegated Well Program; monitoring data are reported to the County as part of annual well permit renewal requirements.

Dakota County also administers **The Recycling Zone**, which is a household hazardous waste (HHW) collection program that provides a year-round location for residents and businesses to drop off recyclables, household and business hazardous waste and problem materials. In addition to providing a permanent facility, satellite collection events are offered throughout the county several times each year.

Official Controls

Dakota County Ordinance 110 – Solid Waste Management includes standards for regulating solid waste and the operation of solid waste facilities (including infectious waste facilities) in order to protect the health, safety, and welfare of the public, prevent the spread of disease, prevent the creation of nuisances, conserve our natural resources, and maintain the beauty and quality of our natural environment.

Dakota County Ordinance 111 – Hazardous Waste Regulation requires that all hazardous waste generators and facilities be licensed by the County.

6. Environmental Assessment Program/Brownfields and Contaminated Sites Program (EA)

Dakota County's goal in redeveloping brownfields and cleaning up contaminated sites is to eliminate concerns to public health, improve local economic development potential, and protect water quality. Historically contaminated sites may have underlying groundwater that's contaminated with hazardous chemicals because of improper past environmental management practices, or the site may have an existing contaminant source (e.g., contaminated soil) with the potential to impact groundwater.

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The County Environmental Assessment Program has three main components including environmental review, brownfield redevelopment, and contaminated site cleanup. The EA Program provides environmental services to local cities and townships through funding, technical assistance, and regulatory guidance.

7. Land Conservation Programs

The Land Conservation Program works with willing landowners and partners to protect, connect, and improve natural areas throughout the county to enhance water quality and wildlife habitat. Since 2003, the County has completed 121 farmland and natural area easement and acquisition projects totaling more than 11,000 acres and including 95 miles of shoreland. Dakota County is updating its Land Conservation Plan concurrently with the Groundwater Plan update, with emphasis on land conservation projects that benefit water quality and quantity through wetland restoration and retaining water on the land.

Table 6 Current Dakota County Groundwater Protection Roles and Responsibilities

Program	Regulate	Fund	Operate	Demonstrate	Educate -Inform	Partner	Facilitate	Advocate	Research
Drinking Water Protection									
- Well Program	X				X	X			
- Well Sealing	X	X			X	X	X		
- Water Quality Research		X	X		X	X		X	X
- Water Testing Service					X		X		X
- Wellhead Protection						X		X	
- Water Supply Planning						X		X	
Septic Systems	X	X			X	X			
Shoreland/Floodplain	X				X	X			
Stormwater	X	X		X	X	X			
Hazardous Waste	X				X				
Solid Waste	X	X			X	X		X	
Brownfields		X	X			X	X		
Land Conservation		X				X	X	X	

B. State and Regional Roles

Multiple agencies regulate different aspects of groundwater and surface water in Minnesota. Both groundwater and surface water are managed, monitored, and regulated by State agencies, watershed organizations (WMOs), and local governments units (LGUs).

Several agencies and institutions play a role in managing groundwater and surface water. A breakdown of responsibilities by agency is shown in the figure below. Key State agencies that manage groundwater and surface water include BWSR, MDA, MDH, DNR, and the MPCA.

In particular, MDH oversees the health of drinking water and DNR oversees water quantity. MDH regulates public water suppliers, who must regularly test their water to meet Minnesota Rules and federal Safe Drinking Water Act standards for more than 100 contaminants. The list includes bacteria, nitrate, pesticides, solvents, and metals. MDH regulates the statutes (103H, 103I) and rules (4720) governing well construction and sealing; Dakota County's Well Program is delegated by MDH. DNR is responsible for reviewing and issuing water appropriations permits for quantities of more than 1 million gallons per year or 10,000 gallons per day (both groundwater and surface water).

The seven-county Twin Cities Metropolitan Area (TCMA) comprises Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington counties. Within the TCMA, the Metropolitan (Met) Council shares water planning responsibility with the State. The Met Council also operates the wastewater treatment facilities that serve most of the metropolitan area's residents, within an area defined as the Metropolitan Urban Service Area (MUSA).

The Minnesota Environmental Quality Board (EQB) is a forum for leadership and coordination across Minnesota State agencies on complex, priority environmental issues. The EQB strives to engage Minnesotans and provide greater access to conversations regarding the future of our environment.

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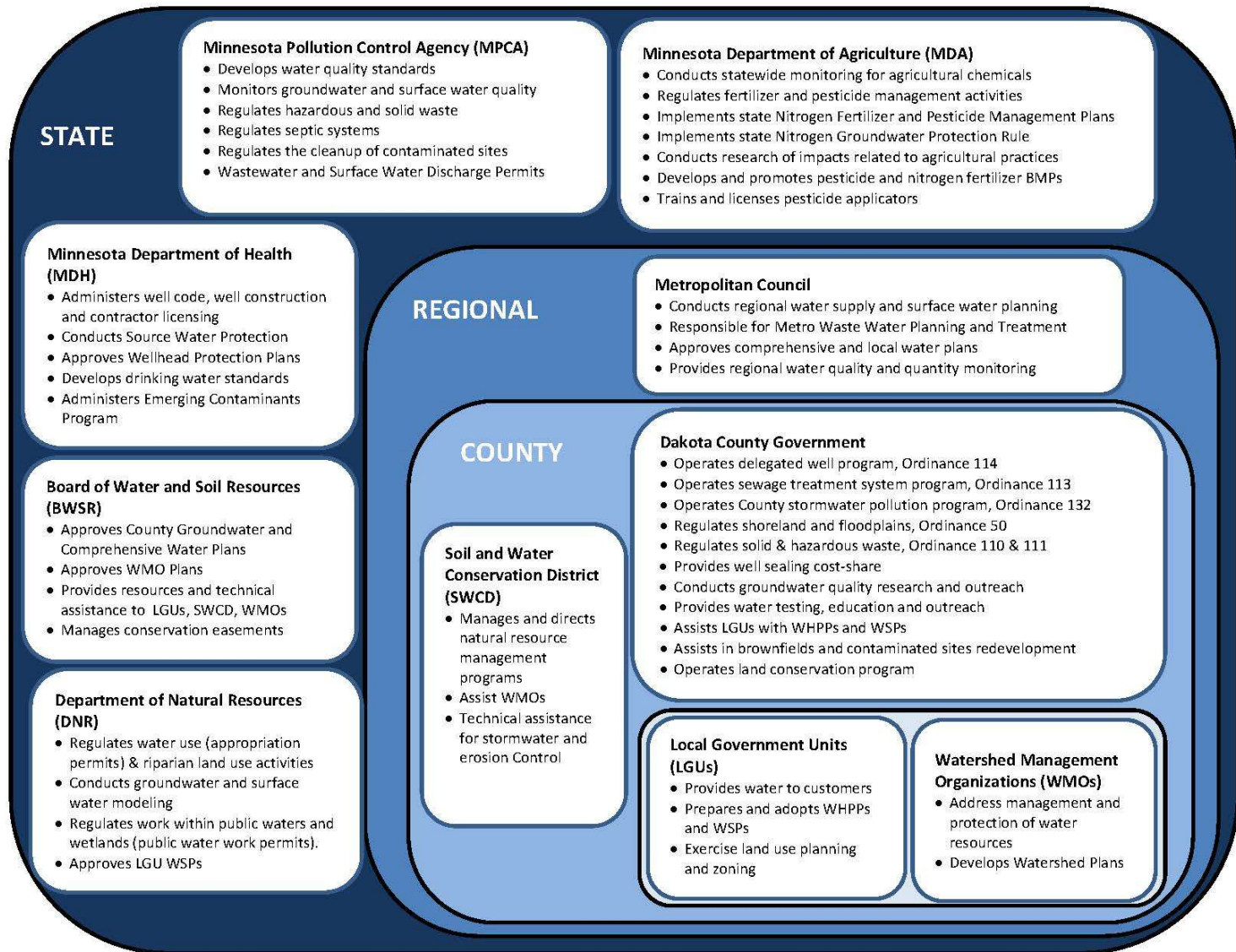


Figure 9 Minnesota Water Roles and Responsibilities

C. Local Government Units in Dakota County

To a great extent, the responsibilities associated with safe drinking water and groundwater protection lie with local units of government (LGUs) within the county. Cities and townships provide healthy public water supplies (where applicable), regulate septic systems, and manage stormwater and surface water resources. The Dakota County SWCD provides technical assistance, education, and cost-share funding for water quality improvement practices. Watershed organizations manage surface water resources and set standards for their protection.

To meet Minnesota Statute § 103B.255 requirements, County staff reviewed and synthesized applicable and available LGU plans related to groundwater. This included reviewing Comprehensive Plans, Water Supply Plans, Wellhead Protection Plans, Watershed Management Plans, and Dakota County's All Hazards Mitigation Plan to determine the goals and policies identified by LGUs, and to identify any potential conflicts.

1. Cities and Townships

a. City and Township Roles

Dakota County has 21 incorporated cities and 13 townships and is unique in Minnesota in that townships as well as cities are responsible for comprehensive land use planning, zoning, and land use regulation within their boundaries. In Dakota County, cities' and townships' local land use responsibilities include the regulation of septic systems (in most cases) and aggregate mining.

An estimated 90 percent of the county's residents rely on groundwater for their water supply. The exceptions are residents of Lilydale, Mendota, Mendota Heights, and West St. Paul, who receive water from St. Paul Regional Water Supply, which uses surface water. In addition, the City of Burnsville uses treated dewatering water from Kraemer Quarry, which is considered a surface water source, for a portion of its municipal supply. Otherwise, public water suppliers and private well users rely on groundwater. Most Dakota County residents receive their water from public water suppliers. The municipal water suppliers in the county are Empire Township and the cities of: Apple Valley

- Burnsville
- Eagan
- Farmington
- Hampton
- Hastings
- Inver Grove Heights
- Lakeville
- New Trier (public water supply, individual septic systems)
- Northfield
- Randolph (public water supply, individual septic systems)
- Rosemount
- South St. Paul
- Vermillion

With the exception of Empire Township, all the townships in the county rely on domestic wells and septic systems. The City of Sunfish Lake also relies on domestic wells and septic systems. In addition, every city in the county has some number of households that are not connected to the municipal water supply and wastewater system.

b. City and Township Plans

City and Township Comprehensive Plans/ Water Supply Plans

Under Minnesota Statute § 462.3535, municipalities are encouraged to complete comprehensive plans to determine long-range community goals, including goals related to groundwater protection and drinking water supply. Minnesota Statute § 103G.291 requires all communities in the metropolitan area with a municipal water supply system to complete a water supply plan which identifies long-term water sustainability and conservation measures and helps communities to develop water emergency preparedness measures. Communities that are not public water suppliers typically address water supply goals and strategies within the comprehensive plan.

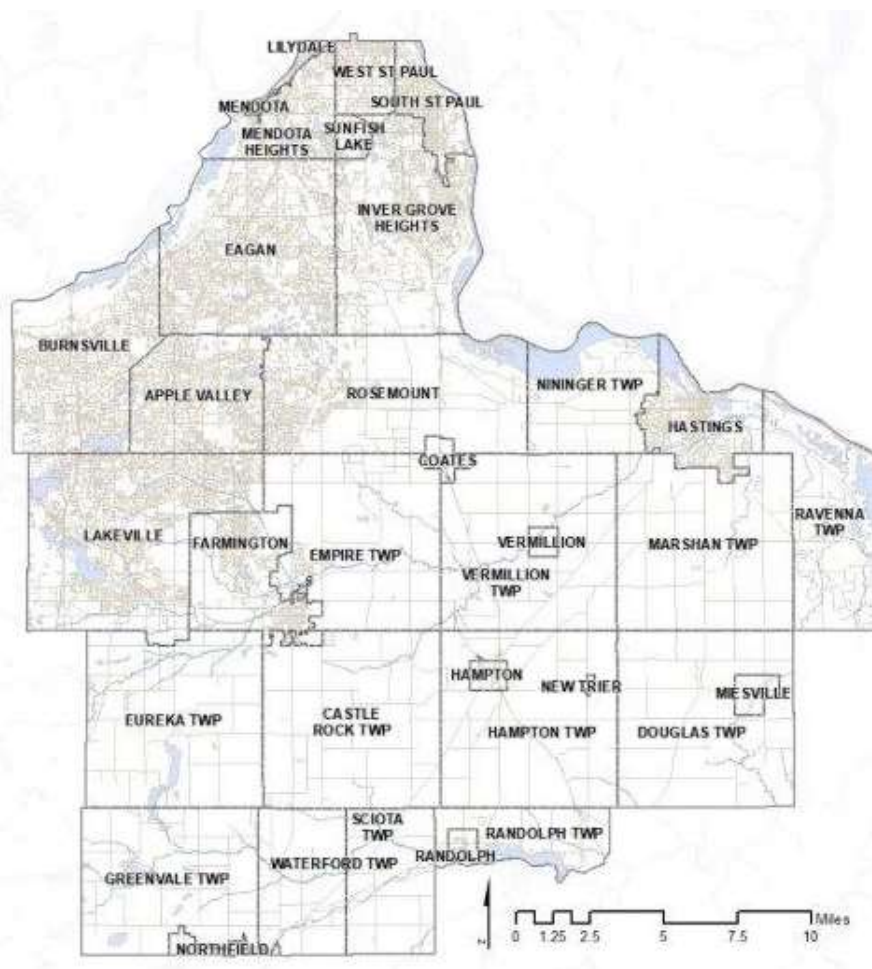


Figure 10 Dakota County Cities and Townships

Because these plans address water supply concerns, the most common policies address augmenting water conservation through conservation rate structures, implementing time of day and odd/even day lawn watering ordinances, requiring rainfall sensors on landscape irrigation systems and water-efficient appliances for new construction or remodeling projects, and utilizing critical water deficiency ordinances in emergency situations. Many communities also stated goals of continuing to collect and utilize water use data to ensure future supply; provide water conservation education and outreach to the community and staff; and to repair, replace, and expand current water supply systems.

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All public water suppliers within the county are required to develop a Water Supply Plan (WSP) per Minnesota Statute § 103G.291. The goal of the WSP is to help water suppliers: 1) implement long term water sustainability and conservation measures; and 2) develop critical emergency preparedness measures. The purpose of the Wellhead Protection Program is to prevent contamination of public drinking water supplies by identifying water supply recharge areas and implementing management practices for potential pollution sources.

City Wellhead Protection Plans

Public water suppliers that rely on groundwater are responsible for developing a Wellhead Protection Plan (WHPP) for each well in accordance with Minnesota Rules Chapter 4720, and in cooperation with MDH. Public water suppliers must delineate the drinking water supply management area (DWSMA), conduct a vulnerability assessment, identify goals, objectives, and management strategies to protect drinking water, inventory potential contamination sources, and develop a plan for alternative supply in case of contamination or system failure.

Common goals identified by municipalities in the county included maintaining and improving current levels of water quality through the promotion of water quality protection, public education, and collection of data to support future wellhead protection. The policies identified shared themes, including data collection and analysis to ensure wellhead protection; education and outreach through distribution of wellhead protection materials; actively addressing water quality threats located in the wellhead protection areas; and development of other plans and documents related to wellhead protection such as Transportation Corridor Spill Response Plans or Wellhead Protection Overlay Zoning Districts.

2. Dakota County Soil and Water Conservation District (SWCD)

The Dakota County SWCD is a political subdivision of the State of Minnesota located wholly within the boundaries of Dakota County. The SWCD is governed by five locally elected supervisors and staffed for the purpose of providing technical, financial, and educational assistance to landowners seeking to protect land and water resources. SWCDs receive their statutory authority to carry out conservation programs from Chapter 103C of Minnesota Statutes. These Statutes do not provide independent taxing or land use authorities to the elected Board of Supervisors. However, various State laws have been delegated to the SWCD to administer locally. The SWCD also assists with implementing local ordinances and conservation easements executed by both the State of Minnesota and Dakota County.

Due to the connected relationship between Dakota County and the SWCD, a joint powers agreement has been established to further identify common goals and efficiencies that encourage landowners to protect soil and water resources. Soil and water conservation is the core mission of the SWCD and the overall purpose of the joint powers agreement is to provide a method by which the County and SWCD cooperate in a way

that best uses public funds, resources and technical capacity. To this end, and to provide consistency for the residents of Dakota County, it is the intent of the SWCD to adopt this State approved Groundwater Plan by reference as part of their comprehensive planning requirements under Minnesota Statute 103C or any subsequent watershed-based requirements under Minnesota Statute 103B.

The SWCD works in partnership with many federal, State, and local units of governments to conserve and manage land and water resources within urban, suburban, and rural land uses. Through these partnerships, the SWCD protects and enhances water quality and watershed health by working with landowners to install conservation practices such as structural erosion control practices, as well as management practices such as cover crops. SWCD staff also implement programs that help to restore wetlands, establish native plant communities or vegetated buffers, develop conservation plans, collect water monitoring data, and provide education opportunities to the public.

3. Watershed Management Organizations

a. Watershed Organization Roles

Watersheds in Dakota County are managed in accordance with the Metropolitan Area Surface Water Management Act (Minn. Stat. 103B.201 to 255), which requires local units of government in the TCMA to prepare and implement comprehensive surface water management plans through membership in a watershed management organization (WMO), or through formation of a watershed district or joint powers organization. Most WMO boundaries are hydrologically defined and are at the 10 or 12-digit hydrologic unit code (HUC) sub-watershed level. Some WMO boundaries are politically determined rather than hydrologically determined. Six organizations manage watersheds in the county:

- Black Dog Watershed Management Organization (BDWMO)
- Eagan-Inver Grove Heights Watershed Management Organization (EIGHWMO)
- Lower Minnesota River Watershed District (LMRWD)
- Lower Mississippi River Watershed Management Organization (LMRWMO)
- North Cannon River Watershed Management Organization (NCRWMO)
- Vermillion River Watershed Joint Powers Organization (VRWJPO)

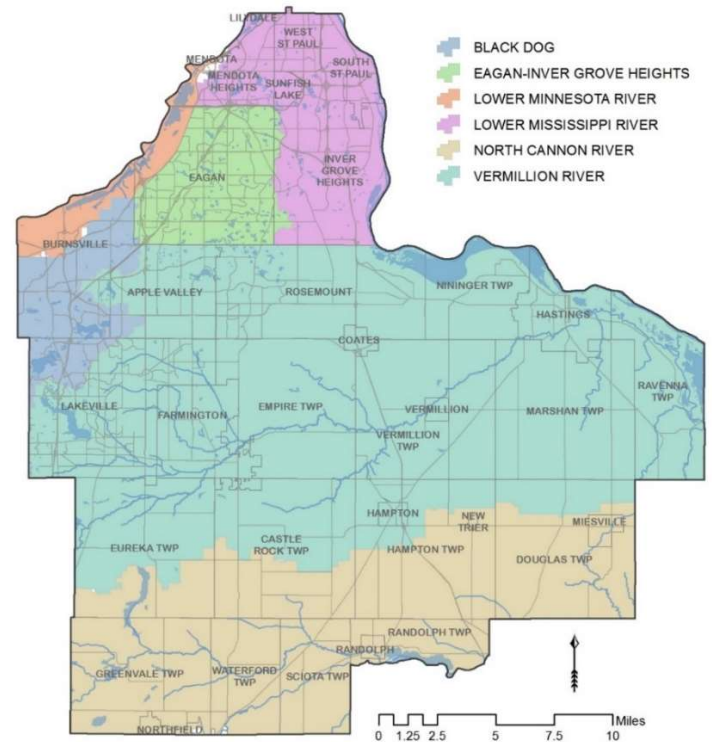


Figure 11 Watershed Management Organizations

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The Black Dog, Eagan-Inver Grove Heights, and Lower Minnesota watersheds flow to the Minnesota River. The Lower Mississippi River, North Cannon River and Vermillion River watersheds flow to the Mississippi River.

b. Watershed Plans and One Watershed, One Plan

Metropolitan WMOs are required to update their watershed management plans every five to ten years to protect surface water resources, which affect groundwater through surface water-groundwater interactions. Watershed management plan goals are required for water quality, water quantity, public drainage systems, wetlands, groundwater, and others to address the organization's identified plan priority issues. Watershed plans within Dakota County discuss concerns related to impaired waters, wastewater, stormwater, wetlands, and monitoring, all of which relate to mitigating impacts to groundwater-dependent resources.

Common goals identified by watershed management plans within the county include protection of surface water quality and quantity through education and outreach; data collection and analysis for continued surface water preservation; interagency cooperation and delegation of management; and protection and restoration of wetlands and riparian zones. The policies presented in these plans aim to protect surface water and groundwater-dependent ecosystems from the impacts of wastewater and stormwater through interagency cooperation, establishment of uniform standards for water resource protection and management, and public information and outreach efforts.

The State is in the process of implementing "One Watershed, One Plan." However, watersheds within the TCMA are not required to participate in the "One Watershed, One Plan" process since they already have watershed plans developed under the Metropolitan Surface Water Management Act described above. Consequently, many watersheds in Dakota County are not expected to participate in "One Watershed, One Plan."

The goals, strategies, and tactics presented in the Dakota County Groundwater Plan are consistent with those in the State-approved watershed management plans in effect within the county. No conflicts with "One Watershed, One Plan" initiatives are expected.

4. Other Local Plans

Research for the Dakota County Groundwater Plan included an analysis of the Dakota County All-Hazard Mitigation Plan, which identifies the different types of potential natural and manmade hazards, ranks hazards by severity and likelihood, and determines strategies to minimize future risk. While this plan primarily focuses on non-groundwater topics, it does identify general goals and strategies to protect water resources through contamination prevention, data collection of potential contamination sources, and supply of safe water and wastewater services.

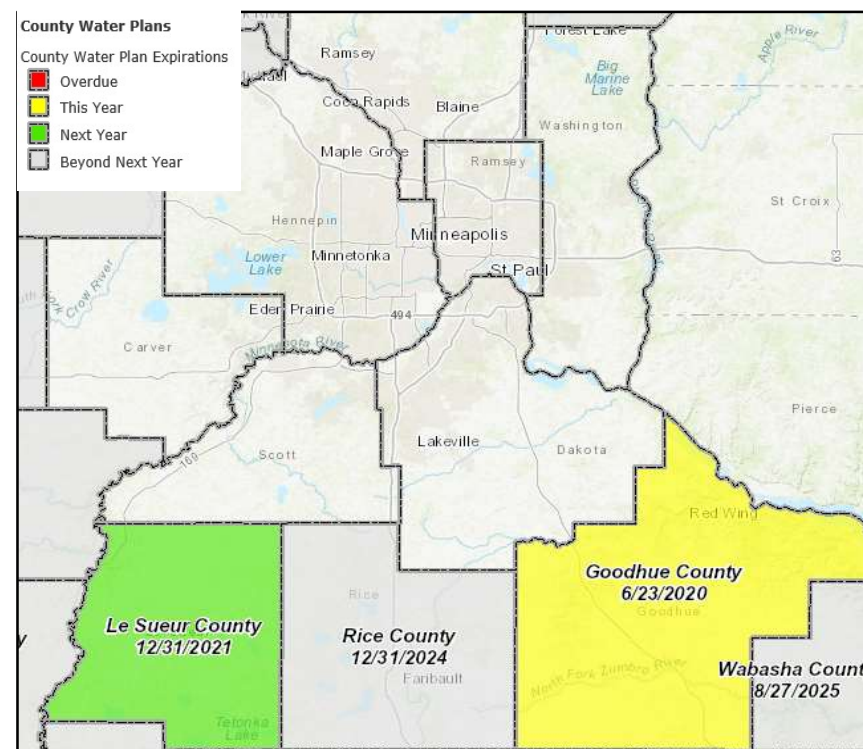
5. Adjacent Counties' Plans

Of the seven metropolitan counties, only Carver County and Washington County have an approved Groundwater Plan as of April 2020. The State approved the Washington County Groundwater Plan in 2014, and the Carver County Groundwater Plan in 2016. Although Ramsey County and Hennepin County do not have Groundwater Plans, they address groundwater and water resources as part of their respective 2040 Comprehensive Plans; Scott County has a Comprehensive Water Resources Management Plan. Goodhue County and Rice County address all water resources as part of their Comprehensive Local Water Management Plans (County Water Plans) as required by The Local Water Management Act of Minnesota (Minn. Stat. 103B.301 and 103B.355).

The county plans in general address common concerns to include surface water and groundwater quality and quantity issues related to ecosystem and public health. Issues addressed include source water protection, stormwater management, erosion and sediment control, nutrients/pesticides/road salt, emerging contaminants, septic systems, land spreading, hazardous waste, mining, landfills and industrial contaminants.

6. No Conflicts between Groundwater Plan and Other Local Plans

Review of LGU groundwater-related plans did not identify any potential conflicts between LGU plans and this Dakota County Groundwater Plan. Common goals and policies exist throughout the different types of plans. LGUs are interested in protecting and improving water quality and quantity by utilizing goals and policies that will enhance public education and outreach; continually collect, analyze, and share data related to groundwater resources; develop ordinances that increase water conservation and protect current groundwater resources; and augment groundwater quality through interagency collaboration.



BWSR County Water Plans Tracker
 (source: <https://bwsr.state.mn.us/county-water-plan>)

D. Non-Governmental Roles

1. University of Minnesota

The University of Minnesota (UMN) plays multiple roles related to groundwater and drinking water, some of which are as follows.

- The Minnesota Geological Survey (MGS), a research and service unit of the University, investigates and provides basic public information on the geology of Minnesota. The MGS works with State, county, and regional offices to set up geologic data bases, creates and updates County Geologic Atlases with the DNR, and helps develop and maintain the Minnesota Well Index with MDH. MGS is currently updating the Dakota County Geologic Atlas, in cooperation with Dakota County.
- The Water Resources Center conducts research, provides educational opportunities for students and professionals, and offers community outreach.
- The College of Food, Agricultural, and Natural Resources Sciences (CFANS) conducts agricultural water quality research, including the studies that support the Best Management Practices for fertilizer and pesticides that MDA promotes. In 2011-2015, in cooperation with Dakota County and with Clean Water, Land and Legacy Amendment (Legacy Amendment) funding from MDA, UMN conducted research into nitrogen fertilizer practices on irrigated corn on coarse textured soils, near Hastings. Current BMPs are based in part on this research.
- UMN Extension provides specialized training and outreach throughout Minnesota for groups such as farmers, turf and landscape professionals, and licensed septic system contractors.

2. Other Organizations

In addition to the State, regional, County, and local government agencies, there are other organizations that also play a role in groundwater and drinking water protection and education. The Minnesota Rural Water Association (MRWA) provides on-site technical assistance to small municipal and non-municipal systems, rural water and wastewater districts with populations less than 10,000.

Numerous non-profit agencies also support education, preservation, and protection of water resources in the county. These include Minnesota Agricultural Water Resources Coalition, Southeast Irrigators Association, Environmental Initiative, Freshwater (formerly Freshwater Society), Friends of Mississippi River, Cannon River Watershed Partnership, Hastings Environmental Partners, the Minnesota Well Owners Association, and many others.

E. Changes to Official Controls

As required by Minn. Stat. §103B.255, Metropolitan Groundwater Management, this section outlines the changes needed to State laws and rules, County ordinances, and city or township ordinances to implement this plan fully. The changes include those needed to standards, criteria, and guidelines for the protection of groundwater from pollution and for various types of land uses in environmentally sensitive areas, critical areas, or previously contaminated areas. These changes also include those needed to standards, guidelines, and official controls for implementation of the plan by watershed management organizations and local units of government.

1. State Laws and Rules

- ✓ To implement Water Quantity Goal, Strategy 2A1, “Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports,” changes to Minnesota Statute § 103G or Rule 6115 may be needed to allow the County to regulate groundwater appropriations to protect wetlands, fens, trout streams, and existing well users from unsustainable groundwater appropriations.
- ✓ To implement Water Quantity Goal, Strategy 2A3, “Support alternative water supplies,” changes to the Minnesota Statutes § 115, Minnesota Rules Chapters 4714, 4720, 7001, 7050, 7090, the MPCA Stormwater Manual or other regulations, may be needed to allow cities and townships to implement water reuse projects.
- ✓ To implement Governance Goal, Strategy 4B, “Review, streamline, and improve County and State regulatory processes,” changes to Minnesota Statute § 103G or Rule Chapter 6115 may be needed to streamline the groundwater appropriations permitting process to make the process more protective of groundwater resources, efficient, and understandable. Also, changes to Minnesota Statute 103I and the 2010 Delegation Agreement with MDH would be needed to allow the County the authority to regulate additional types of wells or borings.

2. County Ordinances

- ✓ To implement Water Quality Goal, Strategy 1B1, “Reduce agricultural chemical contamination,” development and adoption of a new County Ordinance may be needed to implement the Agricultural Chemical Reduction Effort.
- ✓ To implement Water Quality Goal, Strategy 1C4, “Prevent pollution by minimizing impacts of aggregate mining on groundwater quality,” changes to County Ordinance No. 50, Shoreland and Floodplain Management, may be needed to require additional information from applicants seeking mining permits in County-administered shoreland or floodplain. Also, changes to the County’s model Mining Ordinance may also be needed.
- ✓ To implement Water Quantity Goal, Strategy 2A1B, “Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports,” changes to County Ordinance 114, Well and Water Management, may be needed to take on the responsibility for groundwater appropriations or to regulate construction of large-capacity wells for specific industrial processes.

3. City or Township Ordinances

- ✓ To implement Water Quality Goal, Strategy 1B3, “Prevent groundwater pollution from stormwater,” changes to city and township ordinances or policies may be needed that include topsoil organic matter requirements for new developments to reduce compaction, promote soil health, and reduce runoff and potential impacts to groundwater, if they have not already done so.
- ✓ To implement Water Quality Goal, Strategy 1C4, “Prevent pollution by minimizing impacts of aggregate mining on groundwater quality,” changes to city and township ordinance or policies may be needed to align with the updated County’s model Mining Ordinance and ensure adequate protection from mining operations.
- ✓ To implement Water Quantity Goal, Strategy 2A2, “Promote water conservation,” changes to city and township ordinances, policies, or other regulatory mechanisms may be needed for summer lawn watering restrictions.
- ✓ To implement Water Quantity Goal, Strategy 2B1, “Protect and improve high-quality groundwater recharge areas,” changes to city and township ordinances, policies, or other regulatory mechanisms may be needed that that require low impact development, especially in recharge areas.
- ✓ To implement Water Quantity Goal, Strategy 2B2, “Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams,” changes to city and townships land management plans, ordinances, or other regulatory mechanisms may needed updated to adequately protect wetlands.

4. Watershed Management Organization Plans, Standards or Policies

- ✓ To implement Water Quality Goal, Strategy 1B1, “Reduce agricultural chemical contamination,” changes to WMO plans, standards or policies may be needed to support implementation of the Agricultural Chemical Reduction Effort and any associated County Ordinances.
- ✓ To implement Water Quality Goal, Strategy 1B3, “Prevent groundwater pollution from stormwater,” changes to WMO plans, standards or policies may be needed that include topsoil organic matter requirements for new developments to reduce compaction, promote soil health, and reduce runoff and potential impacts to groundwater.
- ✓ To implement Water Quality Goal, Strategy 1C4, “Prevent pollution by minimizing impacts of aggregate mining on groundwater quality,” changes to WMO plans, standards or policies may be needed to align with the updated County’s model Mining Ordinance and ensure adequate protection from mining operations.
- ✓ To implement Water Quantity Goal, Strategy 2A3, “Support alternative water supplies,” changes to WMO plans, standards or policies may be needed to support the development and implementation of water reuse projects

CHAPTER 5. GROUNDWATER ISSUES: QUALITY AND DRINKING WATER HEALTH

A. Major Issues

Through the Groundwater Plan Stakeholder engagement process and the long-term monitoring conducted by County staff, the following issues have been identified.

- Private well owners are at much greater risk of having unhealthy drinking water than are people who use a public water supply. Well construction is regulated, but after that, well owners are responsible for testing and treating their own drinking water. (Strategy group: *assist water users*.)
- For low-income households that use private wells, water treatment systems may be cost-prohibitive. (Strategy group: *assist water users*.)
- Water treatment systems may not be certified to remove some contaminants found in Dakota County groundwater – they may be effective, but they are not independently certified. (Strategy group: *assist water users*.)
- Nitrate and herbicides (especially cyanazine breakdown products) associated with row-crop agriculture are long-standing problems in the Hastings DWSMA and rural Dakota County. (Strategy group: *address non-point source groundwater contamination*.)
- Naturally-occurring manganese and arsenic are newly-identified problems in the county’s drinking water aquifers. (Strategy group: *address non-point source groundwater contamination*.)
- Stormwater can be a source of groundwater recharge but also has the potential to contaminate groundwater. (Strategy group: *address non-point source groundwater contamination*.)
- Chloride – from road salt, water softeners, fertilizers, or other sources – is rising in the county’s groundwater and surface water supplies. (Strategy group: *address non-point source groundwater contamination*.)
- Residents are concerned about potential contamination from industrial pollution, historically contaminated sites, unsealed wells, septic systems, and aggregate mining. (Strategy group: *address point source groundwater contamination*.)
- Residents and other stakeholders are not aware of County groundwater monitoring results. (Strategy group: *monitor groundwater quality*.)

B. Vulnerable Groundwater

Groundwater contamination in Dakota County comes from both human-made (anthropogenic) and natural (geologic) sources. Contamination from single sources can be described as “point source” pollution. Examples include wastewater (effluent) discharged by an industry, wastewater treatment facility, or landfill, as well as contamination from leaking septic systems, chemical and oil spills, and illegal dumping. Contamination

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from diffuse sources is described as “nonpoint source” pollution. This includes stormwater runoff and agricultural, lawn and road maintenance chemicals that leach into the groundwater.

Much of Dakota County is particularly vulnerable (sensitive) to groundwater contamination from the surface, as this figure shows. Groundwater vulnerability or sensitivity is expressed in how long it would take a soluble contaminant to flow from the surface into the groundwater.

The county’s combination of porous, coarse-textured soils and shallow, fractured bedrock (karst) means that any contamination that occurs on the ground can seep quickly down to the drinking water aquifers below. Karst includes fissures, caves, and underground channels that create direct conduits for surface contamination to rapidly reach groundwater sources. This vulnerable geology is prevalent throughout the south/southeastern portion of the county.

Dakota County has conducted some of the most thorough research on private drinking water wells in the state. In recent years, the Ambient Groundwater Quality Study (AGQS or Ambient Study), MDA/Dakota County Township Testing Nitrate Studies, and the MDH/Dakota County Wells and Increased Infant Sensitivity and Exposure (WIISE) study show the groundwater is contaminated from both naturally occurring and anthropogenic sources.

Although public water suppliers provide their customers with water that meets health standards, the groundwater poses health risks that water suppliers and private well owners must address. Dakota County’s research has found that 60 percent of sampled private wells

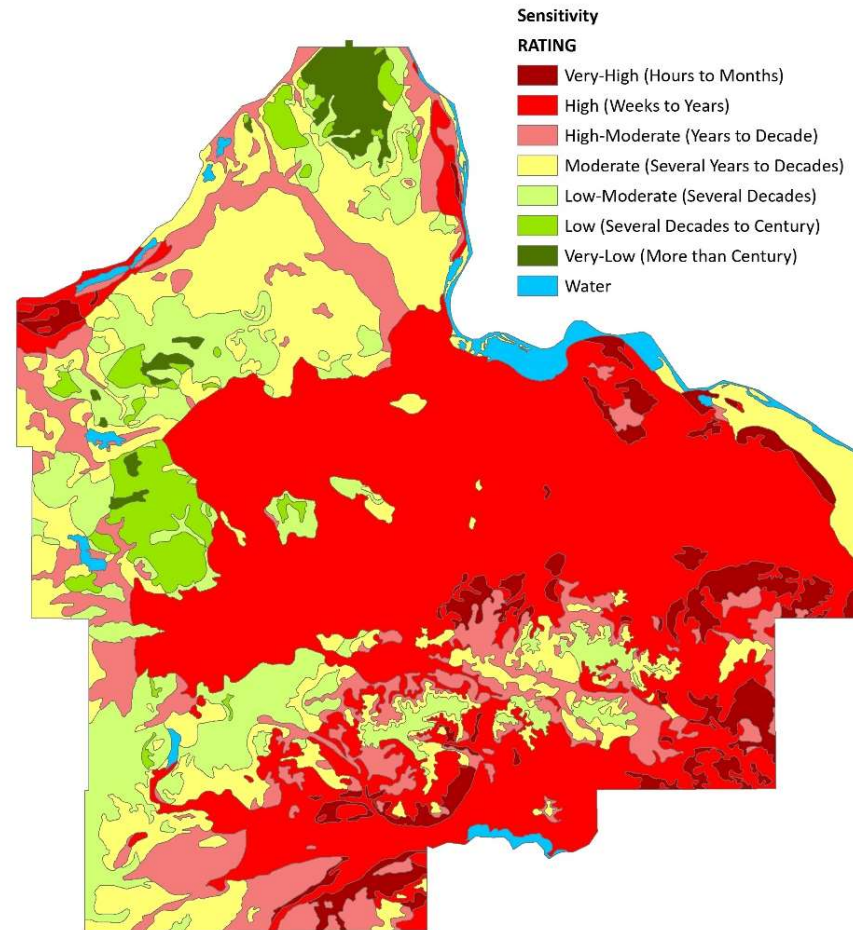


Figure 12 Sensitivity of the Prairie du Chien and Jordan Aquifers to Pollution (MGS, 1990 Dakota County Geologic Atlas, Plate 7)

contain concentrations of at least one chemical contaminant that exceeds current MDH drinking water guidelines. Nitrate and pesticides are prevalent in the rural south/southeast where land use is predominantly agricultural. Naturally occurring manganese tends to be above MDH drinking water guidelines in the north/northwestern part of the county.

C. Major contaminants of health concern

Contaminants of health concern in Dakota County drinking water are described in detail below. For each one, the sources, health concerns, and prevalence in the county are discussed.

1. Agricultural Chemicals

a. Nitrate

Sources: Nitrate is the most commonly detected groundwater contaminant in both the United States and in Dakota County. Nitrate is a naturally-occurring chemical in water, but high levels of nitrate in groundwater usually comes from human activities, including septic systems and feedlots. In the Upper Midwest, the major source is nitrogen fertilizer used on agricultural crops.

Health Concerns: Although a necessary nutrient for plants, high nitrate levels in people can harm the respiratory and reproductive system, kidney, spleen, and thyroid in children and adults. In particular, consumption of drinking water exceeding 10 mg/L nitrate (the EPA and MDH standard) can lead to a health problem called methemoglobinemia or “blue baby syndrome” in infants younger than 6 months. The condition is characterized by a reduced ability of the infant’s blood to deliver oxygen and can lead to death if untreated. Numerous studies suggest that the guideline of 10 mg/L may not be protective of health for people of all ages and it fails to address the chronic, low level exposure of nitrate’s effect on health (Ward et al, 2018).

Dakota County Results: The Ambient Study wells have been systematically sampled since 1999, with some of the seventy-seven wells sampled every sampling event (16 times) and others only a few events (two to five times). The average number of samples per well is 10 (some well owners have come and gone from the study over time). Thirty-one percent of wells have exceeded the drinking water guideline of 10 mg/L at least once; 23 percent of wells have an average (mean) nitrate level that exceeded 10 mg/L. Thirteen Ambient Study wells (Seventeen percent) show statistically significant increasing trends and three Ambient Study wells (four percent) show significant decreasing nitrate trends. Levels. The remaining sixty-one wells either had no nitrate trend or insufficient sampling events to establish a significant trend.

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As shown in the figure below, County staff assembled a data set of 10,700 untreated nitrate samples from wells (mostly private wells), of which more than 8,000 were from wells with known depths, and interpolated the results at different depth intervals for separate years, from 1991 to 2016. This large data set shows the changes in nitrate contamination over time throughout the county. The figure shows nitrate concentrations for selected years over time (left to right) and depths (top to bottom) throughout the county. (Contact county staff for a video version of the results from 1991-2016.)

These interpolated results are for wells that were constructed after the State Well Code (Minnesota Rules Chapter 4725) first went into effect in 1974 and for which the Minnesota Well Index has construction records. Among the wells in the county that have construction records, the median total depth is 176 feet below the ground surface. However, about 40 percent of the estimated 8,000 households in the county that use private wells have drinking water wells that predate the Well Code and are therefore shallower and more vulnerable to contamination than the wells modeled here. Municipal wells in the county have a median total depth of 441 feet below the ground surface.

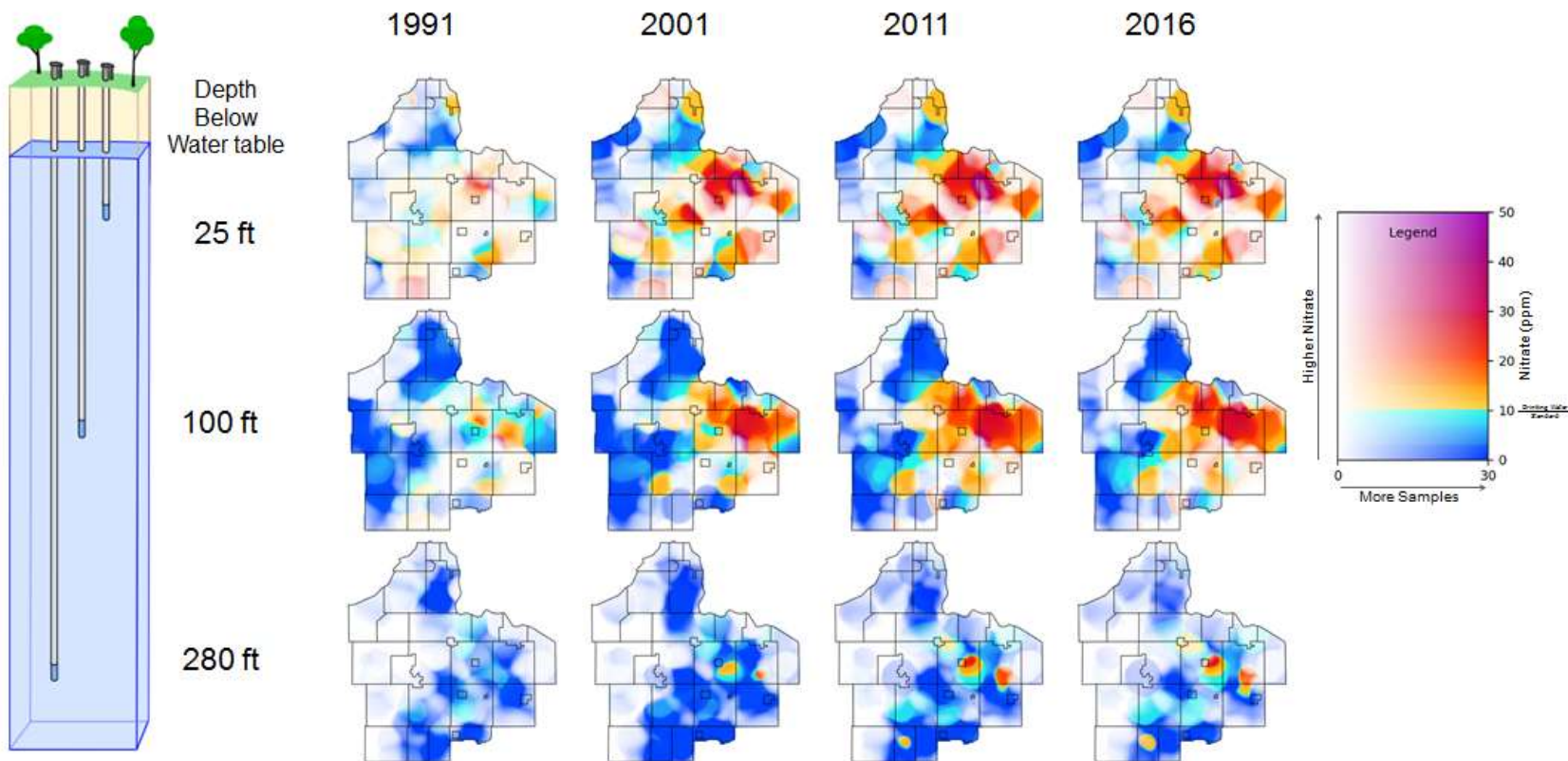


Figure 13 Nitrate concentrations over time and depth (yellow-red are nitrate levels > 10 mg/L)



Nitrogen Fertilizer Management Plan

The MDA revised its Nitrogen Fertilizer Management Plan (NFMP) in 2015. The NFMP is the State’s plan for preventing and minimizing impacts of nitrogen fertilizer on groundwater. It emphasizes involving local farmers and agronomists in minimizing nitrate losses in areas vulnerable to groundwater contamination and in problem-solving in areas with elevated nitrate in groundwater, such as Dakota County. Voluntary nitrogen fertilizer best management practices (BMPs) and other practices protective of groundwater, called alternative management tools (AMTs), are the foundations of the NFMP.

Dakota County partnered with MDA to serve as the pilot region for the Township Testing Program in 2013 and 2014 as part of the MDA Nitrogen Fertilizer Management Plan implementation. More than 5,000 private well owners in 18 Dakota County communities had the opportunity to have their wells tested for nitrate for free. Nearly 1,400 residents participated. In the initial results, twenty-six percent of the wells tested exceeded the drinking water standard for nitrate. MDA determined 10 percent or more of the wells exceeded 10 mg/L in eight townships.

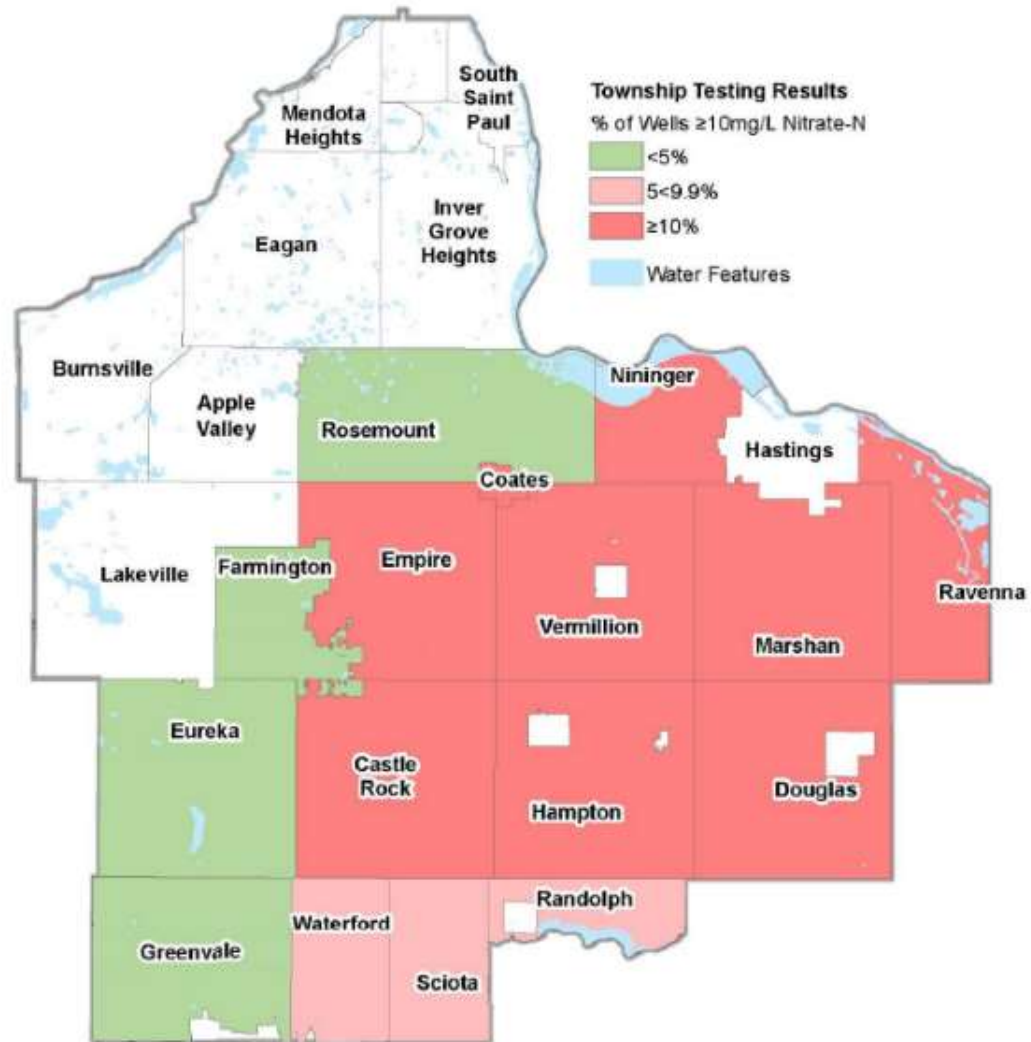


Figure 14 MDA/Dakota County Township Testing Results
 (www.mda.state.mn.us/sites/default/files/inline-files/dakotafinal201315_1.pdf)

Nitrate is also affecting municipal water supplies. Hastings and Rosemount municipal water supplies have elevated levels of nitrate (figure below). In addition, the trends lines in the next figure show that both the Hastings and Rosemount municipal supply wells' nitrate concentrations have almost doubled in the last 20 years.

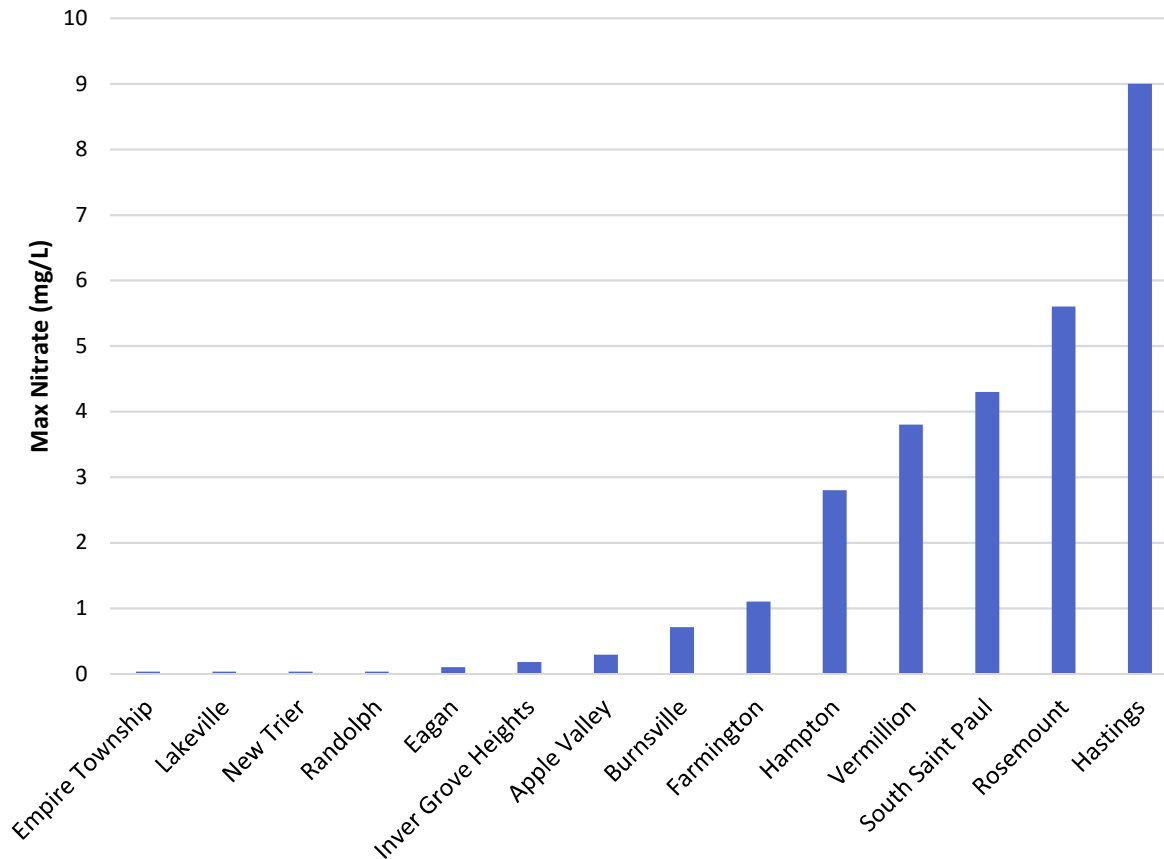


Figure 15 Maximum Reported Nitrate Detection for Public Water Suppliers from 1998-2017
 (source: <https://data.web.health.state.mn.us/drinkingwater>)



Groundwater Protection Rule

In 2019, MDA adopted the Groundwater Protection Rule, effective January 2020, to address nitrate contamination statewide. Part 1 of the rule restricts the use of nitrogen fertilizer in the fall and on frozen soils in areas of the state with vulnerable groundwater and in DWSMAs with elevated nitrate levels.

Part 2 of the rule addresses DWSMAs which already have high nitrate concentrations. The Rule calls for assigning DWSMAs with high nitrate to Mitigation Levels; Mitigation Levels 1 and 2 are subject to voluntary nitrate reduction efforts, while Mitigation Levels 3 and 4 will include regulatory actions. All areas will begin at a voluntary level and move to regulation only if BMPs are not adopted or if nitrate contamination in the groundwater increases.

MDA has designated the City of Hastings DWSMA as a Level 2 mitigation area (high priority) and the City of Rosemount DWSMA as a Level 1 mitigation area.

For more information, see the MDA website:
<https://www.mda.state.mn.us/nfr>

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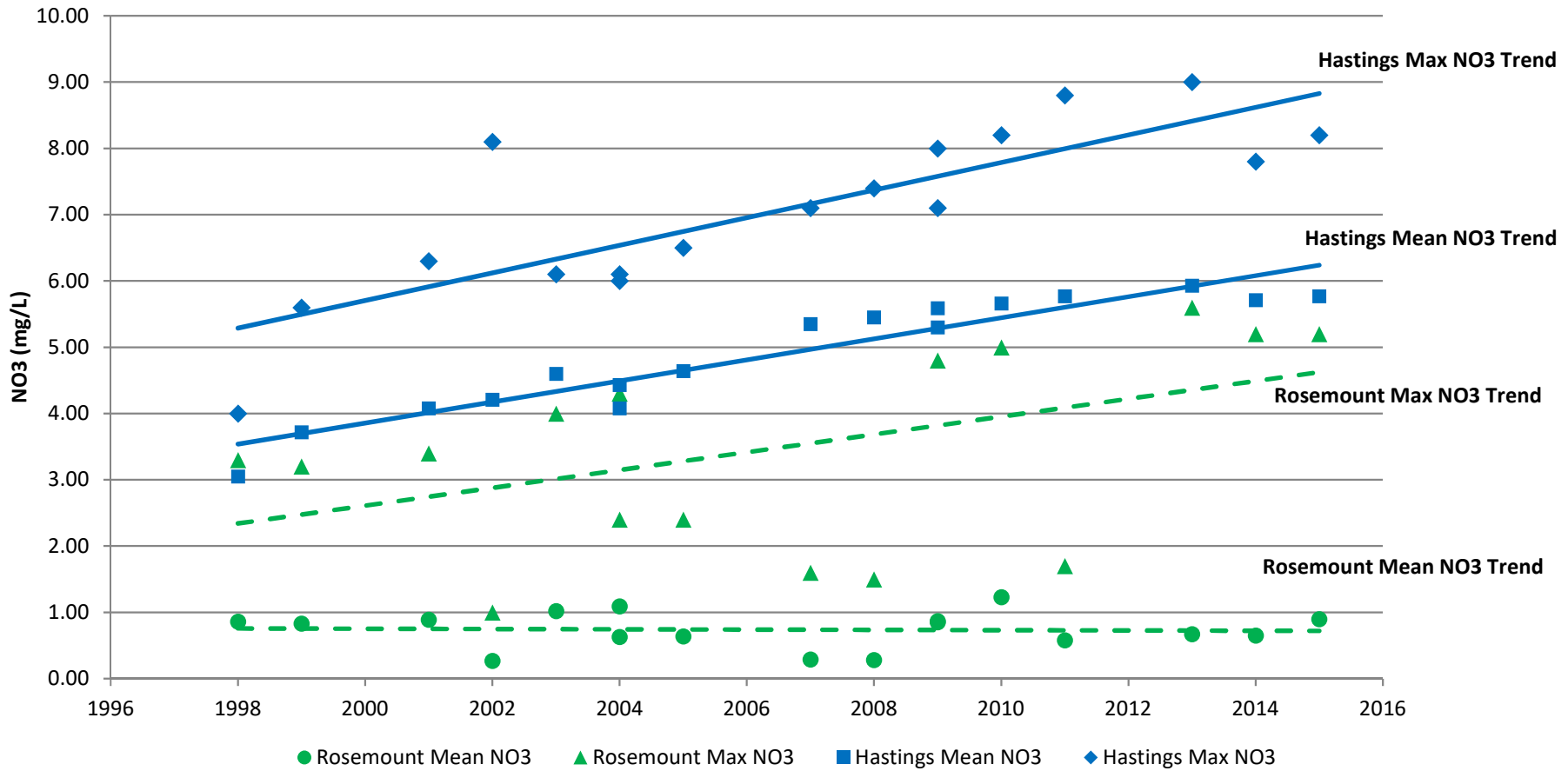


Figure 16 Hastings and Rosemount Nitrate Trends 1998-2015
 (source https://data.web.health.state.mn.us/drinkingwater_query)



Pesticide Management Plan

The MDA's Pesticide Management Plan (PMP) is designed to guide the MDA in its efforts to coordinate activities necessary to protect Minnesota's groundwater and surface water resources from pesticide contamination. Many of the steps outlined in the PMP are directly linked to the statutory requirements and guidance in the Pesticide Control Law (Minn. Stat. Chapter 18B) and the Groundwater Protection Act (Minn. Stat. Chapter 103H). The PMP is based on MDA conducting statewide monitoring for pesticides in groundwater and surface water and responding to pesticides that become widespread in the state's water resources. In accordance with State law, the responses generally rely on voluntary Best Management Practices. The current PMP was adopted in 2007 and is being revised in 2020.

b. Pesticides (herbicides)

Sources: Pesticides are a group of chemicals developed and used to kill or control pest species. Pesticides are often classified by the type of pest they control, such as herbicides (plants), fungicides (fungi or mold) and insecticides (insects). Pesticides are intentionally introduced into the environment to manage different types of pests (i.e., weeds, mold, insects, rodents) and are toxic by nature. After entering the environment, the toxic effects of pesticides may extend beyond the target organisms, potentially degrading soil or surface and groundwater resources and posing risks to humans, animals, and plants in the broader environment.

Health Concerns: In drinking water, different pesticides and their breakdown products can be health risks to different endpoints in the human body, at different concentrations. Dakota County's monitoring of pesticides in private wells has focused on herbicides used on crops, for two reasons: 1) the County has monitored for the pesticides that MDA has most commonly detected in its statewide monitoring program, which are crop herbicides and 2) the County's monitoring program has found breakdown products of cyanazine, a crop herbicide no longer in use, persistently above cyanazine's health risk guidance values.

Herbicide breakdown products are generally less toxic than their parent compound; however, the health effects of mixtures of pesticides and their breakdown products, such as the County's monitoring has found, have not been evaluated. Some of the most common breakdown products, such as acetochlor ESA, alachlor ESA, or metolachlor ESA, have their own health guidance values. When these chemicals are found, they are compared to the breakdown product guideline. For many herbicide breakdown products, such as those of cyanazine, no separate health risk standards have been established. In those cases, based on MDH guidance, the health risk is evaluated by comparing the concentration of the breakdown product(s) to the drinking water standard for the parent compound.

Dakota County Environmental Resources staff consult with MDH on the health concerns associated with specific herbicides or herbicide breakdown products when the contaminants are found in the

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groundwater. Environmental Resources staff also consult with MDA regarding strategies for reducing agricultural chemicals in groundwater. The County is precluded from regulating pesticides, including herbicides, and phosphorus fertilizer, but could regulate nitrogen fertilizer if the County Board chooses. County staff communicate the results of their monitoring, including health risks and appropriate water treatment options, to participating well owners, the farming community, other State agencies, and other interested parties.

Dakota County Results: The pesticides that the Dakota County long-term Ambient Study (1999-2019) has focused on are corn and soybean herbicides because 1) they are the pesticides most commonly detected in the MDA state-wide monitoring program and 2) cyanazine degradates above the drinking water guideline have been very persistent in Dakota County groundwater. (The County has sampled for other pesticides in cooperation with the U.S.G.S. National Water Quality Laboratory; many of these pesticides and pesticide breakdown products have been detected, but at levels far below their respective drinking water guidelines.)

From 2001 through 2019, the county had 77 private wells, selected to be representative of drinking water conditions county-wide, sampled and analyzed for pesticides repeatedly. Most of the laboratory analysis for herbicides and herbicide breakdown products was conducted by the U.S.G.S. Organic Geochemistry Research Laboratory. (Details in the soon-to-be-published Ambient Study report.) A total of 67 wells have been tested at least five times for triazine herbicides, which include atrazine and cyanazine, and their breakdown products -- sufficient sampling for statistically valid trend analysis. A total of 65 wells have been tested at least five times for acetanilide herbicides, which include alachlor, acetochlor, and metolachlor, and their breakdown products.

Results from the Ambient Study:

- Herbicides compounds were detected in 57 of the 77 wells sampled (73 percent)
- 51 different herbicides or herbicide breakdown products were detected out of the 72 analytes.
- As many as 25 different pesticide compounds were detected in a single well.
- The herbicides associated with corn and soybean production are the most heavily used in the County and were detected most frequently and at the highest concentrations in water samples particularly where row crop agriculture is the dominant land use.
- The number of herbicide compounds, the frequency of occurrence and concentrations of herbicides detected is correlated with nitrate levels and the percent of row crop agriculture adjacent to sampled wells.
- Based on the frequency of detection, the most commonly detected herbicides were:
 - alachlor and alachlor breakdown products (71 percent);
 - metolachlor and metolachlor breakdown products (65 percent);

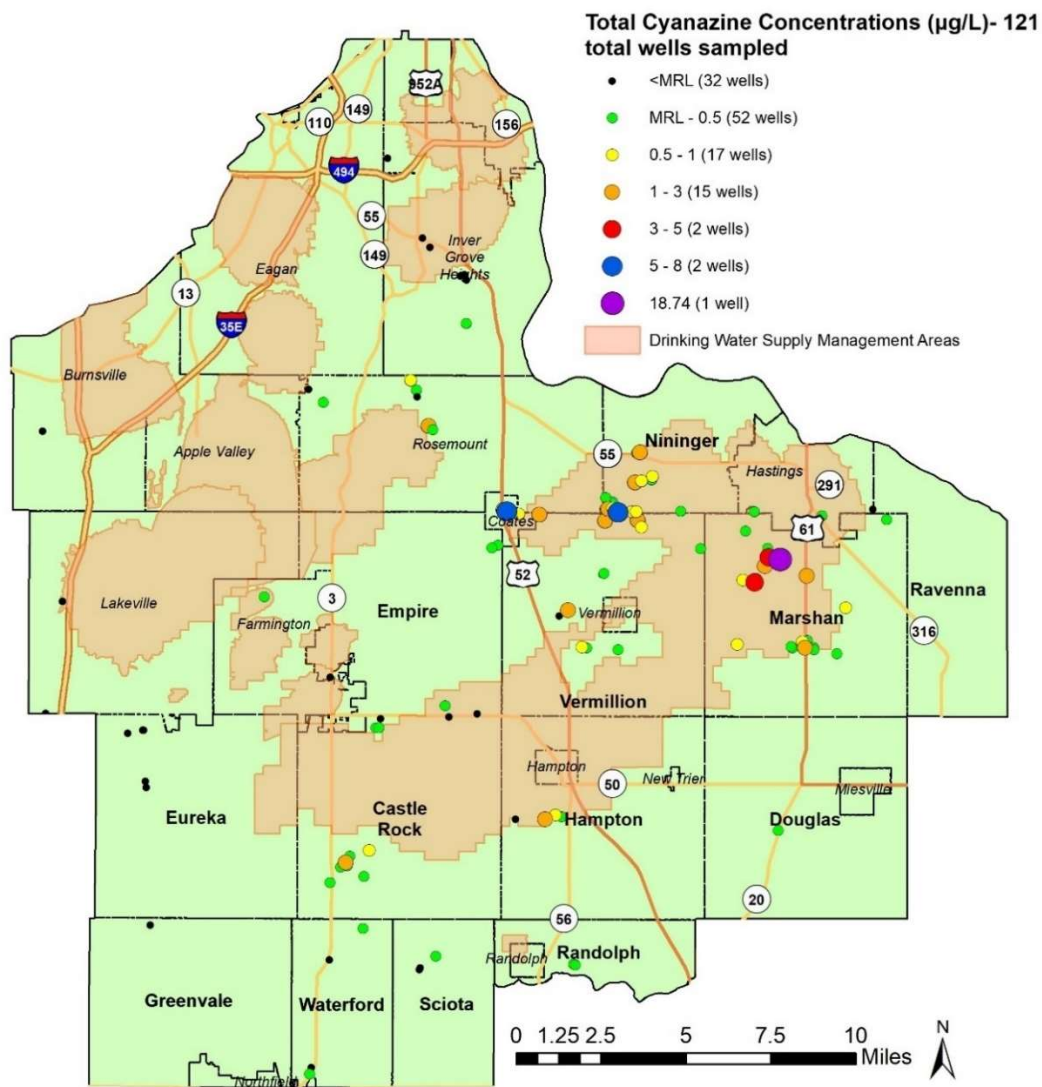


Figure 17 2018-19 Cyanazine Detections in Private Wells (MDA)

- atrazine and atrazine breakdown products (64 percent);
- cyanazine breakdown products (64 percent);
- acetochlor breakdown products (56 percent).
- Of the 16 most frequently detected herbicide compounds in the study, atrazine, introduced in 1957, is the only parent compound
- The most commonly detected herbicide compound was alachlor ESA (73 percent) followed by metolachlor ESA (66 percent).

Most of the herbicides occurred at concentrations below health risk standards with the exception of cyanazine and its breakdown products, which exceeded the MDH drinking water standard of 1.0 µg/L in 22 percent of the wells sampled. The United States Environmental Protection Agency (USEPA) lists cyanazine as “a probable human carcinogen” and ended its registration in 2002 because of health concerns. It has not been used since that date.

In the county’s sampling, herbicide compounds are detected in mixtures that include parent compounds, degradates of the same and different parent compounds, nitrate, and other contaminants such as PFAS. In the Ambient Study wells, 71 percent contained two or more herbicides compounds while over half (54 percent) of the wells had nine or more compounds present. In 27 percent of the wells, 15 or more compounds were detected; and in 10 percent of the wells, 20 or more compounds were detected.

2. Human-Caused Contaminants (excluding ag chemicals)

a. Chloride

Sources: In Minnesota, natural sources of chloride in groundwater are limited; most is from anthropogenic sources. The biggest sources of chloride are shown in the table below (Overbo et al, 2019).

Environmental concerns: At high levels, chloride is a pollutant for both drinking and surface waters. The drinking water guideline for chloride is 250 mg/L; the US EPA does not consider chloride a threat to health, and this guideline helps to reduce the foul taste of drinking water. Chloride in surface water can be toxic to fish, aquatic bugs, amphibians, and plants. Chloride corrodes road surfaces and bridges and damages reinforcing rods, increasing maintenance and repair costs. Since nearly all surface water features in the county interact with groundwater; pollution of groundwater can degrade surface water quality and pollution of surface water can degrade groundwater quality.

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Table 7 Statewide annual chloride contributions from major point and nonpoint sources

Source	Chloride mass (tons)	Per cent of total
Road salt use	403,600	42%
Fertilizer use	221,300	23%
WWTPs	209,900	22%
Livestock waste	62,600	6%
Residential septic systems	33,100	3%
Permitted industries	14,200	1%
Atmospheric deposition	14,200	1%
Dust suppressant use	9,400	1%
<i>Total</i>	968,300	100%

Dakota County results: All but two of the 77 private wells sampled for chloride in the Ambient Study from 1999 through 2019 had concentrations above the background level of 0.3 mg/L. The highest detection was 292 mg/L. Although most of the wells (60 percent) showed no significant chloride trend, 38 percent of the wells showed increasing trends; only two wells showed a decreasing trend. Elevated chloride levels in all three principal aquifers indicate the susceptibility of the groundwater to surface contamination.

Table 8 Chloride Results and Trends by Depth Interval (Dakota County Ambient Groundwater Quality Study)

Average Chloride (mg/L)	Average Casing Depth (feet below ground surface)	Upward Trend # of wells	Downward Trend # of wells	No Trend # of wells	Total # of wells
Over 20.0	60	3	2	12	17
10.1 to 20.0	165	17	0	8	25
3.1 to 10.0	179	7	0	3	10
0.3 to 3.0	272	2	0	23	25
Total		29	2	46	77

b. Lead

Sources: Lead in drinking water is usually not from a contaminated aquifer, but from a problem with the plumbing system or well. Homes built before 1940 may have lead service lines that connect them to public water. Plumbing systems built before 1986 may have lead parts. Private wells drilled more than 20 years ago may also contain lead “packers” above the well screen. Some brands of submersible pumps manufactured before 1995 may contain leaded-brass components. When water stands idle in the plumbing pipes for more than a few hours, it can absorb lead if the plumbing has old lead pipes, lead-soldered copper pipes, or older brass plumbing components.

Health Concerns: Exposure to lead in drinking water can cause delays in physical and mental development in babies and children. Adults who drink water with elevated levels of lead over many years could develop kidney problems or high blood pressure. There is no safe level of lead.

c. PFAS and other contaminants of emerging concern

Dakota County also sampled other man-made contaminants as part of the Ambient Study from 1999-2019. The County had private wells that represent aquifer conditions County-wide sampled for common wastewater effluent compounds (detected in 29 percent of wells tested), volatile organic compounds (VOCs, not detected), pharmaceuticals (detected in 20 percent of wells tested), and per- and polyfluoroalkyl substances (PFAS, detected in 79 percent of wells tested). None were found above existing MDH drinking water guidance.

d. Industrial Pollutants and Contaminated Sites

When a property has been found to have a release or potential release of a hazardous substance that is a substantial risk to human health and the environment, the MPCA Superfund Program is responsible for identifying, investigating, and remediating the site. The U.S. Congress enacted the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) in 1980 in response to historical pollution that was significantly affecting public health and the environment. The Federal Superfund program, as CERCLA became known, created a fund for investigating and remediating high priority contaminated sites.

Dakota County currently has four sites on the Federal Superfund National Priorities List:

- Dakhue Sanitary Landfill
- Freeway Sanitary Landfill
- North Star Chemical (reportedly now Continental Nitrogen), and St. Paul Ammonia (also Continental Nitrogen)
- Pine Bend Sanitary Landfill

The Minnesota Legislature passed the Minnesota Environmental Response and Liability Act (MERLA) in 1983 to supplement the federal superfund program and address sites in Minnesota that weren't enrolled in CERCLA. CERCLA and MERLA are "polluter pays" laws; under Superfund, the responsible parties are identified and held legally responsible for investigation and cleanup of sites. MN Superfund has 35 sites located in the county on the Permanent List of Priorities (PLP). Information on Superfund and other sites can be found on the MPCA [What's in My Neighborhood \(WIMN\)](#) website.

The MPCA collects groundwater data on sites conducting investigations and remediation. The MPCA initiated a Groundwater Contamination Mapping Project in 2018; some of the mapped projects are located in Dakota County ([Groundwater Contamination Mapping Project webpage](#)).

Not all contaminated sites end up in the Superfund Program; MPCA has voluntary programs that responsible parties can enter that provide guidance and regulatory assistance to investigate and remediate contamination while reducing legal costs and streamlining the process.

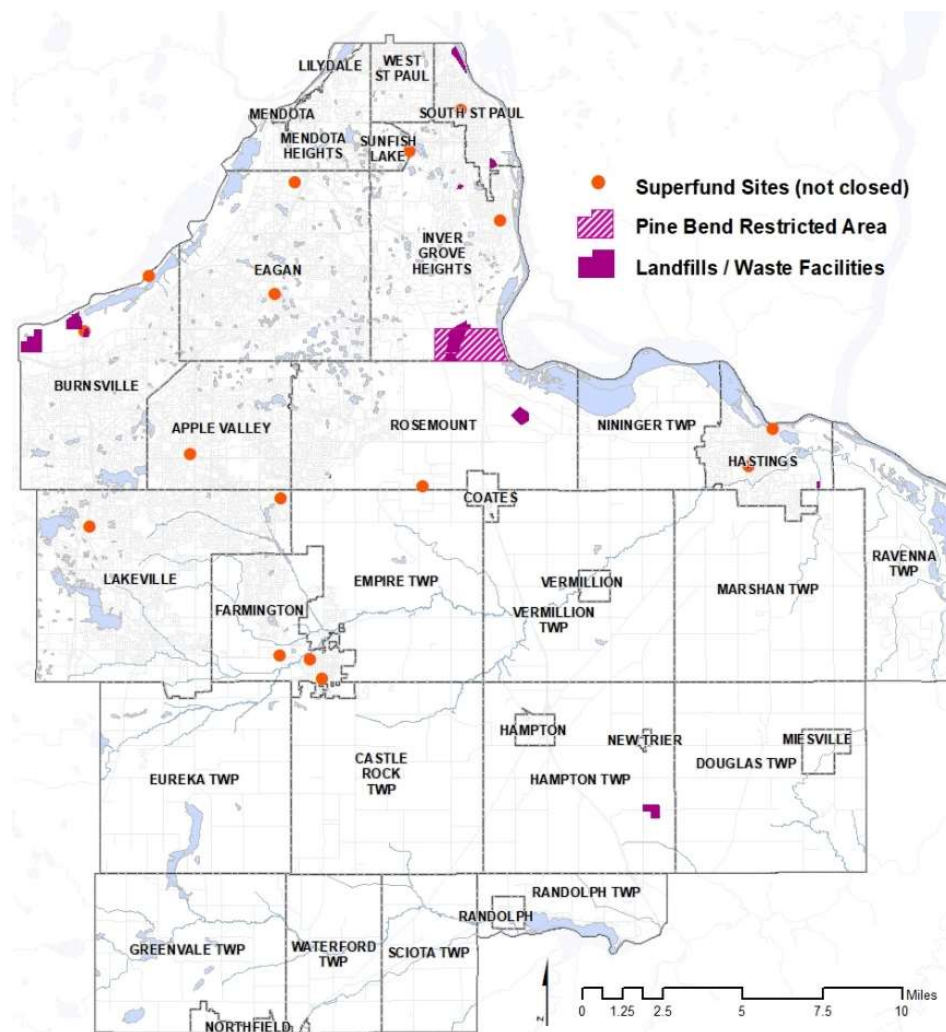


Figure 18 Landfills, Superfund Sites, and Pine Bend Area Special Well and Boring Construction Area

Inver Grove Heights Special Well Construction Area (MDH Well Management Program)

The Inver Grove Heights (Pine Bend Area) Special Well and Boring Construction Area (SWBCA) went into effect April 19, 1973. Construction, repair, and sealing of regulated wells and borings within the SWBCA may only take place in accordance with the conditions and requirements set forth in the SWBCA as stated below.

Koch Refinery (now Flint Hills Resources Pine Bend LLC Refinery, FHR), North Star Chemical (reportedly now Continental Nitrogen), St. Paul Ammonia (also Continental Nitrogen), Pine Bend Sanitary Landfill, and Crosby-American Landfill (now in the MPCA Closed Landfill program) are located in Pine Bend, approximately 10 miles south of St. Paul and one-half to one mile west of the Mississippi River. The former Koch Refining (now FHR) was constructed in the 1950s to refine high-sulfur crude oil imported by pipeline from the oil fields of the Province of Alberta, Canada. Numerous petrochemical industries associated with the refinery were built in the area. Pine Bend Sanitary Landfill and Crosby-American Landfill began operation in the early 1970s, accepting mixed municipal solid waste and demolition wastes.

A series of hydrologic investigations have been conducted. The FHR, North Star, and St. Paul Ammonia sites have been combined into a single Permanent List of Priorities (PLP) site, as described above. The Pine Bend and Crosby-American Sites have been combined into a single PLP site. Recent groundwater monitoring has detected the presence of Volatile Organic Chemicals (VOCs) which are associated with both PLP sites. Solvents have been detected near the landfills, and petroleum products near the industrial sites. Thirty-one different VOCs have been detected in monitoring wells at the landfill. The refinery has purchased all downgradient properties where water supply wells have been affected by the groundwater plumes.

(Minnesota Department of Health, *Inver Grove Heights (Pine Bend Area) Special Well and Boring Construction Area*, <https://www.health.state.mn.us/communities/environment/water/wells/swbca/inver.html>)

 e. Solid and Hazardous Waste

Table 9 Solid and Hazardous Waste Facility and Generator Licenses

License Type	2019 No. of Licenses
Sanitary Landfill	2
Demolition landfill	4
Special Waste Landfill	1
Transfer Stations	5
Yard Waste Processing/Wood Waste Processing Facility	7
Solid Waste Composting Facility	2
Infectious Waste Facility	1
Waste Processing Facility	9
Industrial Waste Facility	1
Hazardous Waste Generator	1,133
Hazardous Waste Facility	14
Waste Hauler	35
TOTAL	1,214

Improperly handled waste can pose a potential threat to groundwater quality. However, since the implementation of Federal and State regulations in the 1980s that require proper handling of waste streams, the threat to groundwater has greatly decreased. State, local governments, and the private sector all play a role in implementing waste policies. The MPCA sets solid and hazardous waste policies, but within the Metropolitan area, county governments are responsible for implementing and regulating waste programs.

As described above, all solid waste facilities, hazardous waste facilities, and hazardous waste generators must obtain a license from Dakota County. The Dakota County Environmental Resource Department licenses numerous facilities and generators, as identified in Table 9. County staff regularly inspects landfills, material

recovery facilities, and transfer stations to ensure compliance with Federal, State and local requirements.

Dakota County contains two active Municipal Solid Waste (MSW) landfills that serve the TCMA. Both operate methane gas-to-energy systems. The Pine Bend Sanitary Landfill is located in the southeast corner of Inver Grove Heights, and the Burnsville Sanitary Landfill is located in the northwest corner of Burnsville (see figure above). Although there is known groundwater contamination at the MSW landfills, the groundwater is routinely monitored and results reported to the MPCA. Groundwater monitoring results are also reported to Dakota County annually as part of the registered environmental well permit registration process.

3. Naturally-occurring Inorganic Chemicals

a. Arsenic

Sources: Arsenic is a naturally occurring element found in rocks and soil across Minnesota. From these sources, arsenic can enter our groundwater and drinking water wells.

Health Concerns: Too much arsenic in drinking water has been linked to cancer and to problems with blood circulation, changes in skin pigmentation, and with the respiratory, nervous, immune, and endocrine systems. Arsenic can be removed or reduced from well water by using a reverse-osmosis treatment system that is specifically labeled for arsenic.

Dakota County Results: MDH routinely tests public water supply wells for arsenic and it has not been an issue for public water suppliers in the county. For private drinking water wells, the State of Minnesota requires that all new wells be tested for arsenic; as of 2019, Dakota County additionally requires arsenic testing at the time of property transfer. As shown in the figure to the right, the results from new well construction tests, the Ambient Study, the Inver Grover Heights WIISE study, and locally focused sampling in Burnsville, Lakeville, and Greenvale Township found arsenic in 32 percent of 1,227 water samples. Twelve wells exceeded the EPA drinking water guidance of 10 µg/L; however, no amount of arsenic is considered safe.

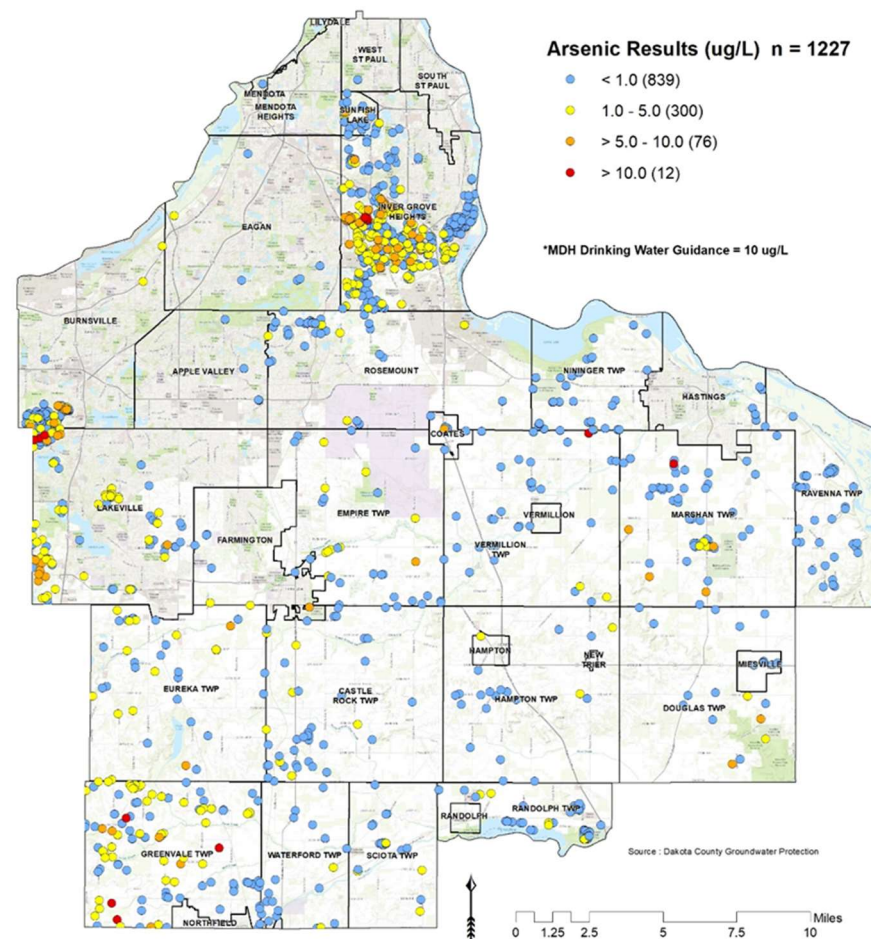


Figure 19 Private Well Arsenic Results to Date

b. Manganese

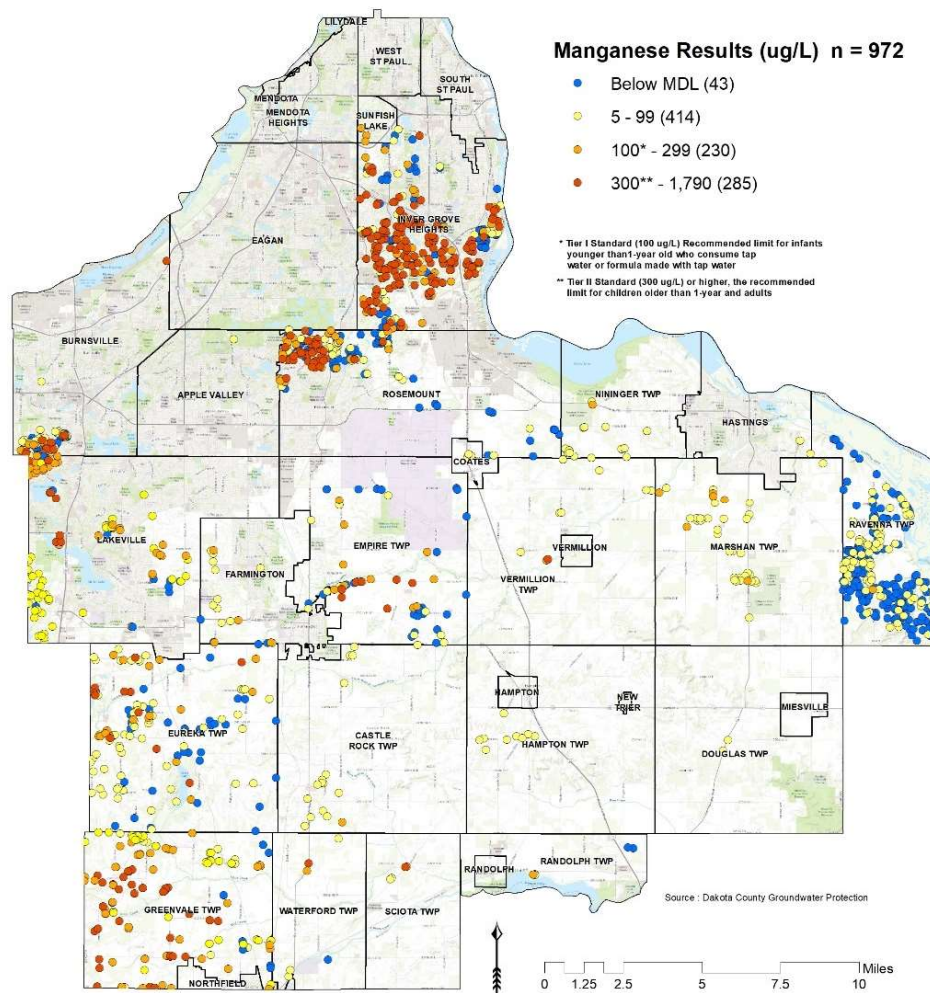


Figure 20 Private Well Manganese Results to Date

Sources: Manganese is a naturally occurring element found in rocks and soil across Minnesota. From these natural sources, manganese can enter our groundwater and our drinking water wells.

Health Concerns: Our bodies need a small amount of manganese to maintain health. We get this manganese from the foods we eat. Too much manganese in drinking water may cause neurological problems. Infants are more sensitive than children or adults to the effects. The current guidance value for manganese in drinking water is 100 µg/L for formula-fed infants and infants that drink tap water. The manganese guidance value for children and adults (including nursing mothers) is 300 µg/L. Manganese in drinking water can be removed or reduced by using a water softener, especially in combination with a reverse-osmosis treatment system.

Dakota County Results: MDH recommends that every private drinking water well be tested for manganese at least once. As of 2019, Dakota County requires that wells be tested for manganese when they are newly-constructed and at the time of property transfer.

Dakota County partnered with MDH in 2015 to conduct the WIISE study for private wells in Inver Grove Heights, where Ambient Study results indicated a high risk of manganese in well water. Of the 274 water samples collected in Inver Grove Heights, 194 (71 percent) exceeded the MDH’s drinking water guidance of 100 µg/L for infants 12 months and younger; of those, 153 of the samples (56 percent) exceeded the MDH’s

drinking water guidance of 300 µg/L for everyone older than 12 months. As shown in the figure above, the combined results from the Ambient Study, the Inver Grover Heights WIISE study, the Township Testing Program, and locally focused sampling in Burnsville, Lakeville, and Greenvale Township found manganese in 96 percent of 972 water samples, with 285 (29 percent) over 300 µg/L and 515 (53 percent) over 100 µg/L. The County continues to evaluate risk factors for manganese in private wells; it appears that wells in western and northern Dakota County are at particular risk for manganese contamination because of the underlying geology.

c. Radionuclides

Sources: Radioactive decay occurs in unstable atoms called radionuclides. Elements such as radium, polonium, radon, and uranium are radionuclides that are present in natural geologic materials in Minnesota. These elements release small amounts of radiation into the groundwater. MDH studies found that the highest levels of radionuclides in source water occur in the Mount Simon-Hinckley and Jordan Aquifers in southeastern Minnesota.

Radium 226 emits alpha rays and radium 228 emits beta rays. “Gross alpha” is a test performed to measure the overall radioactivity of drinking water. The presence of gross alpha in water is an indication that there is radioactivity related to radium 226, an alpha emitter.

Health Concerns: Ionizing radiation has sufficient energy to affect the atoms in living cells and thereby damage their genetic material (DNA). Fortunately, the cells in our bodies are extremely efficient at repairing this damage. However, if the damage is not repaired correctly, a cell may die or eventually become cancerous. (<https://www.epa.gov/radiation/radiation-health-effects>)

Alpha particles (α) are very energetic, but they are so heavy that they use up their energy over short distances and are unable to travel very far from the atom. The health effect from exposure to alpha particles depends greatly on how a person is exposed. Alpha particles lack the energy to penetrate even the outer layer of skin, so exposure to the outside of the body is not a major concern. Inside the body, however, they can be very harmful. If alpha-emitters are inhaled, swallowed (such as in drinking water), or get into the body through a cut, the alpha particles can damage sensitive living tissue. The way these large, heavy particles cause damage makes them more dangerous than other types of radiation.

Beta particles (β) are more penetrating than alpha particles but are less damaging to living tissue and DNA because the ionizations they produce are more widely spaced. They travel farther in air than alpha particles but can be stopped by a layer of clothing or by a thin layer of a substance such as aluminum. Some beta particles are capable of penetrating the skin and causing damage such as skin burns. However, as with alpha-emitters, beta-emitters are most hazardous when they are inhaled or swallowed.

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(Environmental Protection Agency, “Radiation Basics,” <https://www.epa.gov/radiation/radiation-basics>)

Consuming drinking water containing these contaminants every day for many years increases the risk of cancer. Furthermore, radium behaves like calcium and will replace calcium in bones. The EPA goal (MCLG -- the level where there is no known or expected risk to health) for all radioactive contaminants is zero. The EPA’s working standards for drinking water (MCLs) are:

- Alpha particles (“gross alpha”): 15 picocuries per liter of water (pCi/L) or less
- Combined radium 226/228: 5 pCi/L or less
- Uranium: 20 pCi/L or less
- Beta particles/photon emitters: 4 millirem per year (mrem/yr) or less (MDH, August 2019R)

Water softeners, which reduce calcium in water, are also recommended for removing radium. Well owners and city water users concerned about consuming radium and relying on a water softener to reduce radioactivity should verify that the water tap used for drinking and cooking is receiving softened water. Other water treatment options include reverse osmosis, distillation, oxidizing and filtration (MDH, Home Water Treatment Factsheet 4/4/2019). All homes should also be tested for airborne radon, especially in basements.

Dakota County Results:

Municipal Wells

Municipalities are required to test for the following radioactive contaminants: alpha emitters, combined radium (226 and 228), uranium, and beta/photon emitters. These particles are detected in municipal water wells in the county and are required to be reported to consumers in the Consumer Confidence Report. Combined radium is above the MCL of 5 pCi/L in untreated water in Inver Grove Heights and Rosemount. Inver Grove Heights’ treatment plant reduces the radium to below the MCL. The MDH approved Rosemount’s blending of their well water to reduce the radium level to below the MCL.

Private Drinking Water Wells

Very few of Minnesota's private wells have been tested for radionuclides. In 2018, Dakota County had 65 private drinking water wells tested for gross alpha. In 2019, Dakota County had 60 of those same wells tested for radium 226 and radium 228.

Of the private wells tested in 2018, eighty-nine percent had gross alpha detected; two wells exceeded the EPA drinking water standard of 15 pCi/L. These two wells have nothing apparent in common: they are not located geographically close to each other, they differ in total well depth by 184 feet, and they are completed in different aquifers: one, Jordan; the other, Prairie du Chien.

Table 10 Summary of Radionuclides in 60 Ambient Study Wells

Chemical (picocurie per liter)	# of wells	Mean	Median	Maximum
Gross Alpha	60	2.695	1.525	16.2
Radium 226	60	0.582	0.257	3.36
Radium 228	60	0.6929	0.5685	1.95

Laboratory results for radioactivity report both activity and uncertainty. Of the 60 wells retested in 2019, 59 (ninety-seven percent) had either radium 226 or radium 228 activity detected. When the results were interpreted according to MDH advice, no wells exceeded 5 pCi/L for combined radium activity, but when the uncertainty factor was included, four wells exceeded 5 pCi/L. A summary of the 60 wells tested for gross alpha, radium 226, and radium 228 is in the table above.

In Dakota County’s results, there was a significant correlation between radium 226 and gross alpha. This is useful because it means well owners can test their water just for gross alpha, which is available at local commercial labs and is more affordable than testing for radium 226 and radium 228.

4. Infectious Agents and Land-spreading of Wastes

a. Infectious Agents

Sources: Bacteria, viruses, or other infectious agents are widely distributed in surface water and on the surface of the ground, although microorganisms that need oxygen are rare deep in the soil. Levels of infectious agents that pose a serious risk to human health may pollute groundwater from failing septic systems, improper disposal of manure or other animal wastes, or improper disposal of wastewater treatment plant biosolids or septage.

“Total coliform bacteria” is used as a screening test of the sanitary quality of private wells, because it can indicate the susceptibility of the well to surface contamination. MDH recommends that private wells be tested for coliform bacteria every year, or when the well or water system have been worked on, or if the water changes in taste, smell, or appearance. Not all coliform bacteria cause illness, but Escherichia (E.) coli is a

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coliform bacterium that can. If a water test comes back positive for coliform, it is then tested further to determine if there are E. coli in the sample. E. coli is tested because it is a potentially harmful organism.

Health Concerns: This surface contamination may include infectious disease bacteria that cause stomach and intestinal illness. For example, some strains of E. coli pose a health risk. No level of bacterial contamination is considered safe.

Dakota County Results:

In MDH’s testing for total coliform and E. coli, Dakota County is somewhat below average in the number of detections, as shown in the table below.

<i>Table 11 Total Coliform and E. coli Detections, MDH Testing of Noncommunity and Community Water Supplies*</i>							
Twin Cities Metropolitan County	Total Noncommunity Distribution Systems	Total Community Distribution Systems	Total Distribution Systems	Systems Positive for Total Coliform	Systems Positive for E. coli	% of Systems Positive for Total Coliform	% of Systems Positive for E. coli
Anoka	262	32	294	82	1	28%	0.30%
Carver	62	12	74	22	2	30%	2.70%
Dakota	119	21	140	43	6	31%	4.30%
Hennepin	178	45	223	86	1	39%	0.40%
Ramsey	31	17	48	30	2	63%	4.20%
Scott	108	18	126	47	3	37%	2.40%
Washington	208	30	238	82	2	34%	0.80%

*A “public water supply” is defined in Minnesota Rules Chapter 4720.0100, Subpart 16, as a system providing piped water for human consumption, and either containing a minimum of 15 service connections or 15 living units or serving at least 25 persons daily for 60 days of the year. The term includes:

- Any collection, treatment, storage, and distribution facilities under control of the operator of the supply and used primarily in connection with the supply.
- Any collection or pretreatment storage facilities used primarily in connection with the supply but not under control of the operator. A public water supply is either a community or noncommunity water supply.

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- “Community water supply” means a public water supply or system which serves at least 15 service connections or living units used by year-round (defined as six months or longer) residents, or regularly serves at least 25 year-round residents. Examples of community systems include cities, mobile home parks, and extended health care facilities.
- “Noncommunity water supply” means any public water supply that is not a community water supply. The following is given as examples of noncommunity water supplies and is in no way meant to be an exhaustive list: seasonal facilities such as children's camps, recreational camping areas, resorts or year-round facilities which serve at least 25 persons who are not residents thereof, such as churches, entertainment facilities, factories, gasoline service stations, marinas, migrant labor camps, office buildings, parks, restaurants, or schools.

In private well samples through Dakota County’s fee-based Water Supply Testing Service, an average of 15 percent of total coliform tests are positive each year. If a well repeatedly tests positive, County well inspectors will investigate, if the property owner desires. Typical issues are related to casing height or damaged well caps.

b. Land Spreading of Wastes

Wastewater Treatment Plant Biosolids and Septage

At most of the Metropolitan Council’s wastewater treatment plants (WWTPs), the treatment process separates solids (“biosolids”) from the water and the biosolids are incinerated. However, at the Empire WWTP in central Dakota County, the biosolids are heated to remove pathogens and later spread on nearby farm fields. The biosolids are a humus-like organic matter, dry powder, pellets, slurry, or liquid that bear little resemblance to the untreated solids from which they were derived. Biosolid recycling reduces both the amount of waste going to landfills and incinerators and the total use of petroleum-based chemical fertilizers. The Metropolitan Council applies the material to about 600 acres of farmland each year, generally in the fall and spring to farms in the surrounding area.

Biosolids are an inexpensive, soil-enhancing fertilizer, and biosolids that will be applied to land must meet strict regulations and quality standards. State and federal rules govern the use and disposal of biosolids, set limits for contaminants such as metals, and require pathogen and vector attraction reduction, site and crop harvesting restrictions, and record keeping and reporting. For the type produced by the Empire plant, State rules dictate how much time must elapse between spreading them on fields and growing crops. That ranges from 30 days for animal-feed crops to more than 20 months for human food that grows in the ground, like carrots and potatoes. Septage – the material pumped from septic tanks – is also applied to some Dakota County farms fields and is subject to similar regulation.

The practice is not free from concerns. Despite MPCA oversight, sometimes biosolids are spread on land with a greater slope than appropriate or it rains too soon after the application, in which case the biosolids may flow to areas or properties where they were not intended. In addition, Dakota County studies have found PFAS chemicals and organic wastewater breakdown compounds, such as antibiotics, other pharmaceuticals, and personal care products in private wells. (These chemicals have been below drinking water standards and are no higher in Dakota County groundwater than in other Minnesota counties.) The land spreading of WWTP biosolids is a possible source of these groundwater contaminants, as are septic systems.

Animal Waste

Dakota County has relatively few large-scale animal operations and has returned its authority to regulate feedlots to the MPCA. The MPCA reports that, as of 2017, Dakota County had 183 operations of 50 Animal Units (AUs) or more, but only one with 1000 AUs or more. (By comparison, neighboring Goodhue County had 769 operations of 50 AUs or more.) The manure generated in the county is land-applied to adjacent crop land. In Dakota County, manure has not been found to be significant source of nitrate or pathogen contamination of groundwater. (Hastings Area Nitrate Study, 2003)

D. Aggregate Mining

In 2019, there were 39 sand, gravel, or limestone (“aggregate”) mining operations in thirteen cities or townships around the county. The number, scope, and location of aggregate mining operations vary from year to year, based on the size and location of large construction projects in the metropolitan area. Dakota County does not have a direct regulatory role with mining; mining is regulated by cities and townships as part of their local control over land use. In addition, the MPCA regulates potential mining-related water pollution and the DNR regulates water appropriations and potential impacts to groundwater-dependent ecosystems.

Properly managed aggregate mining operations do not intrinsically damage groundwater resources. The groundwater concerns about mining are from dewatering, the increase in groundwater vulnerability that results from removing the protective layers of soil and rock from above the aquifer, and potential releases during mining operations. Mine dewatering has the potential to deplete groundwater, interfering with nearby shallow wells and damaging nearby trout streams, fens, or wetlands. Mining removes material (soil and aggregate) from above the water table, and sometimes is conducted below the water table, making the groundwater more exposed to pollutants. During mining operations, these pollutants can come in the form of dissolved solids or from leaks or spills of fuels or hazardous materials. The mine operators must take care that fuels, oils, lubricants, antifreeze, paint, solvents, vehicle cleaning wastes, asbestos, PCBs, and shop wastes are properly contained, stored, and recycled or disposed of in compliance with MPCA requirements.

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In addition, removing material above the water table, or into the water table, makes the temperature of the shallow groundwater more responsive to summer heating and winter cooling. This in turn has the potential to make sensitive downgradient ecosystems, like trout streams, fens, or wetlands, have greater seasonal temperature fluctuations than they would otherwise. In addition, shallow groundwater downgradient from a mine will have a higher proportion of “meteoric water” than otherwise. Meteoric water is the water derived from relatively recent precipitation; the word comes from the same root as meteorology. This changes the chemistry of the groundwater, also potentially impacting downgradient ecosystems. The “plume” of groundwater with thermal and biogeochemical changes is estimated to extend about 750 feet from the mine. Local units of government should consider establishing separation distances of at least 750 feet between a proposed mine and any downgradient groundwater-dependent ecosystems. (Freshwater, 2018)

When mining operations cease permanently, the local unit of government should ensure that the long-term land use protects the former mine from contaminated runoff and from illegal dumping.

CHAPTER 6. GROUNDWATER QUANTITY ISSUES: USE, DRAWDOWN, AND RECHARGE

A. Major Issues

A sustainable groundwater supply is important for Dakota County. The Dakota County Environmental Resources Department currently does not have any programs that specifically address groundwater availability, but this is a potential future program opportunity.

Through the Groundwater Plan Stakeholder engagement process and County staff research, the following issues have been identified.

- Public opposition to exporting large quantities of Dakota County groundwater is nearly universal. (Strategy group: *water conservation and alternative water supplies.*)
- In coming years, the county's growing population could use up groundwater faster than it is replenished. (Strategy group: *water conservation and alternative water supplies.*)
- State regulations or guidance on water reuse technologies or practices are limited. (Strategy group: *water conservation and alternative water supplies.*)
- An increase in land development and extreme weather events may diminish groundwater recharge. (Strategy group: *surface water retention and treatment and clean groundwater recharge.*)
- Large groundwater withdrawals could interfere with existing wells and damage fragile trout streams, wetlands, or fens. (Strategy group: *surface water retention and treatment and clean groundwater recharge.*)

B. Population Growth and Aquifer Drawdown

Dakota County is the third most populous county in Minnesota, with 422,580 people in 2017, and growing. The Metropolitan Council projects an increase of roughly 100,000 new residents in the county between 2016 and 2040. The total population is projected to be 516,480 in 2040. Population and land use are discussed in more detail in the "Population, Land Use, and Development" chapter.

The county's groundwater reservoirs – aquifers -- can be thought of as a giant sponge or a bathtub filled with the porous types of rocks that are below the county. The very thin top layer of water flows out in the form of rivers, streams, and springs. In addition to these surface water flows, "drawdown" is when a large quantity of water is pumped out of the aquifer and lowers the level of the groundwater. Drawdown can be local and temporary when an individual well is pumping heavily. It can become a regional, long-term problem if demand for groundwater is consistently higher than the amount of rainfall or snowmelt that seeps from the surface down into the underlying aquifers ("recharge"). In a

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drought, groundwater drawdown may cause wells to go dry; deeper (and costlier) wells with more powerful pumps will have to be installed. In an extended dry period, when more than half of the drinking water aquifers' capacity may be depleted, water shortages could become a severe challenge to all water users, requiring water use restrictions, major infrastructure investments, and technological adaptations. Even though, in 2020, the county is experiencing a period of wet weather, extreme weather patterns are becoming more common and alternating multi-year dry and wet periods are probable, making eventual water shortages more likely.

The Metropolitan Council's projections for population growth and increased groundwater support these concerns about the county's long-term supply. Figure 21 (b) shows the Metropolitan Council estimates that portions of the county may experience 20 to 30 feet of drawdown in the Prairie du Chien and Jordan aquifers. These two aquifers provide most of the county's municipal water supplies and agricultural irrigation water. The largest groundwater drawdowns are predicted to occur in areas with large municipal water usage and cities with the highest projected population increases (Figure 21(a)) such as Apple Valley, Eagan, Inver Grove Heights, and Lakeville. Also, drawdown is predicted to occur in heavily irrigated agricultural areas in the southeastern part of the county where the soil is predominantly sand. Significant development is not expected in most of rural Dakota County over the next ten years. However, if an increase in crop prices happens in combination with a drought, agricultural irrigation could intensify, leading to drawdowns in additional areas in rural Dakota County.

It should be noted that these Metropolitan Council projections may depict a worst-case drawdown; the groundwater model on which these projections are based, Metro Model 3, used municipal pumping data available through 2012 from the DNR. Since 2012, annual municipal pumping has decreased, presumably due to increased indoor and outdoor efficiencies and a multi-year wet weather pattern.

What does this mean? It's difficult to predict groundwater recharge rates and availability due to weather variability and changes in water use patterns. Future periods of drought are highly likely to result in local shortages where parts of the county may see a much as 50% depletion of drinking water aquifers by 2040. This could lead to water rationing or required water conservation measures and development of alternative water supplies. An alternative to groundwater to meet the County's water supply demand is to use water from the Minnesota or Mississippi Rivers, which is significantly more expensive to transport and treat resulting in potential cost impacts to County residents and businesses.

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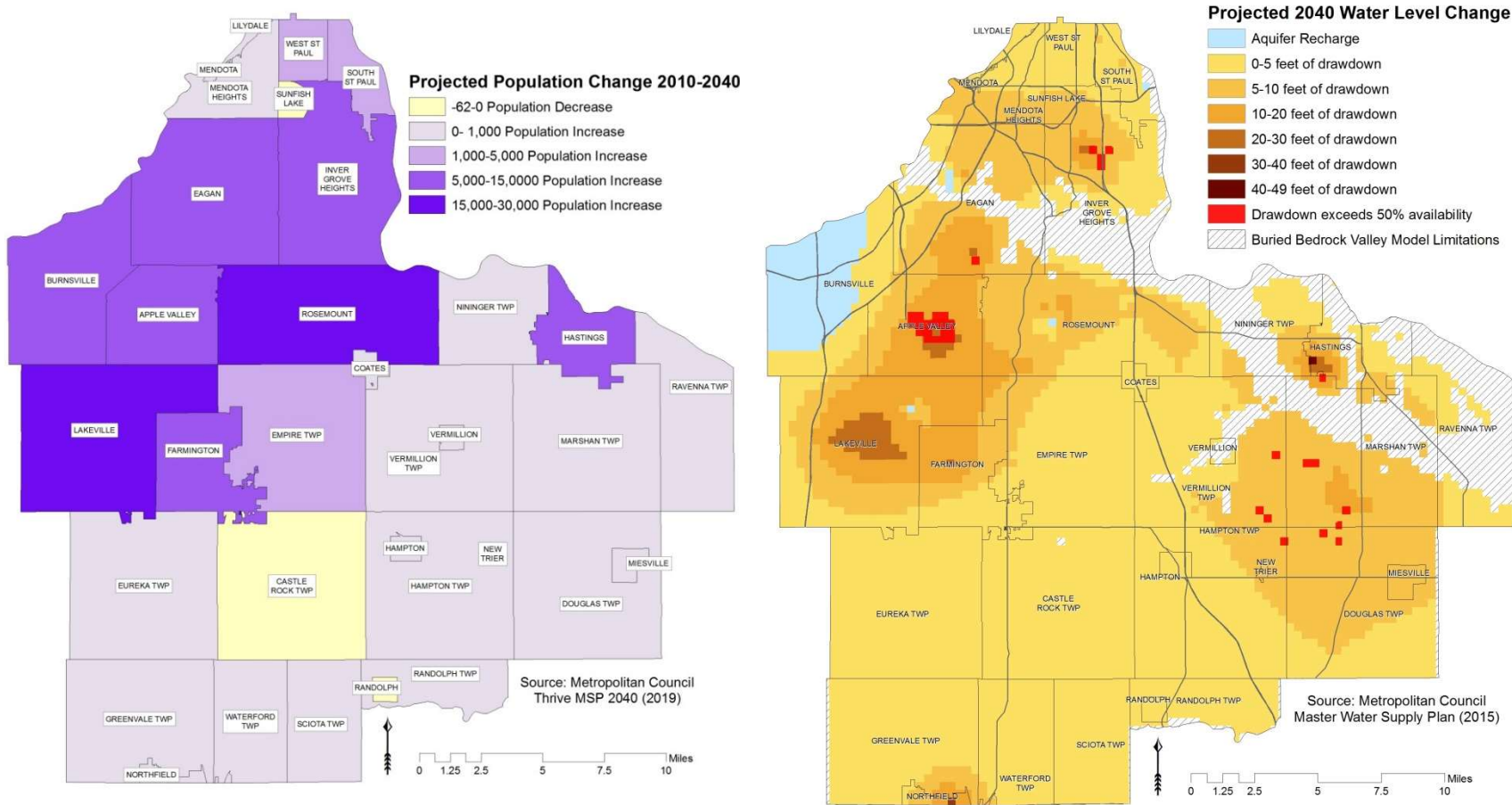


Figure 21 (a) 2040 Projected Population Change; (b) 2040 Groundwater Aquifer Projected Drawdown.

C. Water Use

1. Large Users of Water

The City of St. Paul supplies surface water to Lilydale, Mendota, Mendota Heights, and West St. Paul. In addition, the City of Burnsville uses treated dewatering water from Kraemer Quarry, which is considered a surface water source, for a portion of its municipal supply. The remaining 90 percent of the county’s residents rely on groundwater for their water supply.

Because of the county’s reliance on groundwater for its municipal supplies, its large number of agricultural irrigation permits, and its large industrial water users, Dakota County has the highest per capita use of groundwater for any TCMA county.

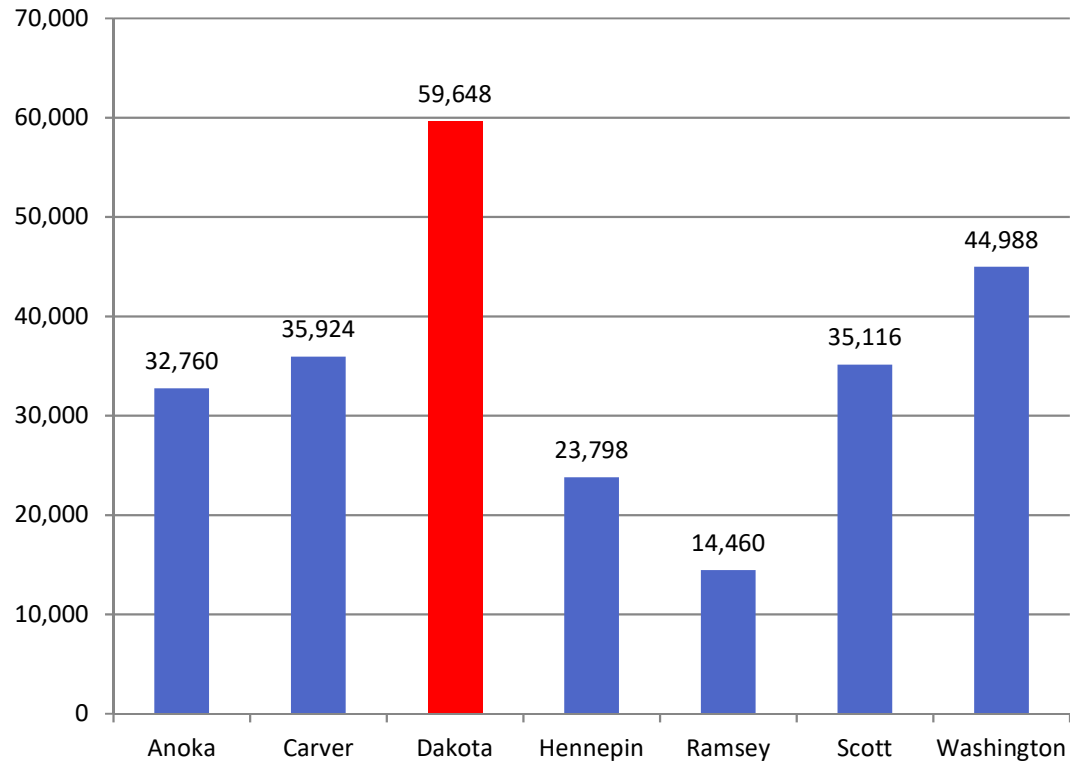


Figure 22 2017 TCMA Counties Groundwater Use (Gal/Capita/Year)
 (Source: MN Department of Natural Resources, MN State Demographic Center)

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State law requires appropriation permits from the DNR for wells that use more than 1 million gallons per year or 10,000 gallons per day. Dakota County has more large quantity water users that require an appropriation permit from the DNR than the other TCMA counties. In 2017, Dakota County had 725 active groundwater appropriation permits; all other TCMA counties had fewer than 550 permits each.

The DNR defines groundwater usages by the following categories:

- Agricultural Irrigation - crops, nurseries (64 percent of Dakota County permits; 28 percent of volume)
- Water Supply - municipal, public, or private community well supply (55 percent of volume)
- Industrial Processing - petroleum-chemical, food processing, mine processing, sand/gravel washing, wood products processing (12 percent of volume)
- Non-crop Irrigation - golf courses, landscaping, athletic fields, cemeteries
- Special Categories - snow/ice making, pollution containment, aquaculture, dust control, sewage treatment
- Water Level Maintenance - lake level maintenance, dewatering, pumped sumps

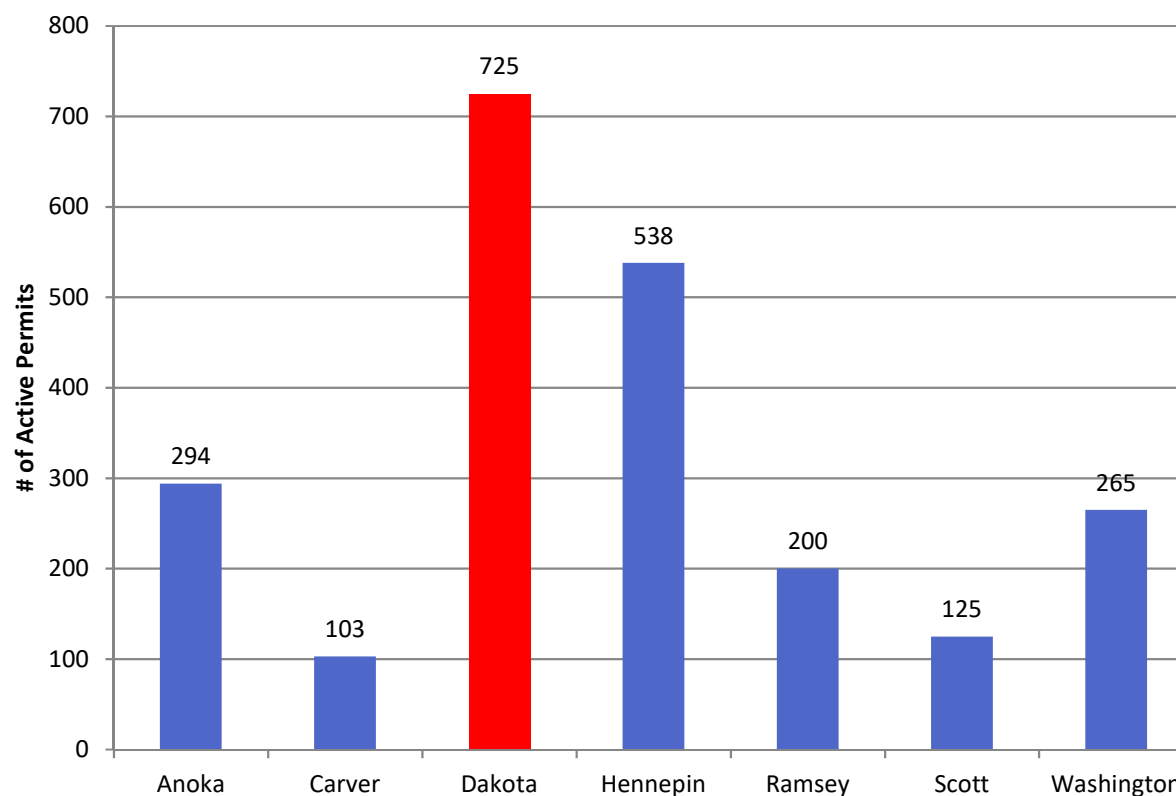


Figure 23 2017 TCMA Counties Active Groundwater Appropriation Permits
(source: MN Department of Natural Resources, MN State Demographic Center)

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	Water User	Category	2013-2017 Avg. (MG/Year)	2017 (MG/Year)
1.	City of Eagan	Water Supply	2,930	3,050
2.	Flint Hills Resources	Industrial Processing	2,554	2,656
3.	City of Lakeville	Water Supply	2,228	2,337
4.	Burnsville	Water Supply	2,197	1,923
5.	City of Apple Valley	Water Supply	2,101	2,184
6.	Inver Grove Heights	Water Supply	989	1,026
7.	South St Paul	Water Supply	935	735
8.	Hastings	Water Supply	875	838
9.	Rosemount	Water Supply	872	925
10.	Farmington	Water Supply	684	699
11.	Molitor Brothers Farm	Agriculture Irrigation	568	600
12.	Metropolitan Council	Water Level Maintenance	379	391
13.	US Federal Aviation Administration	Water Level Maintenance	244	193
14.	Bailey Nurseries Inc.	Agriculture Irrigation	230	174
15.	Almquist	Agriculture Irrigation	182	191

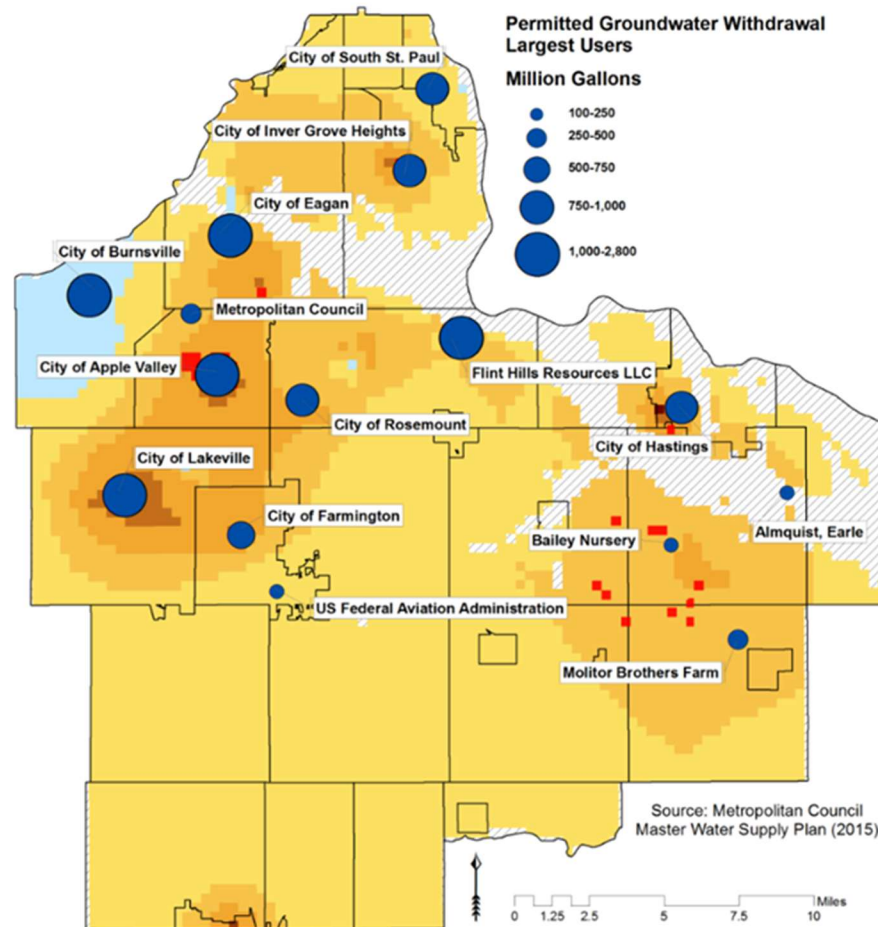
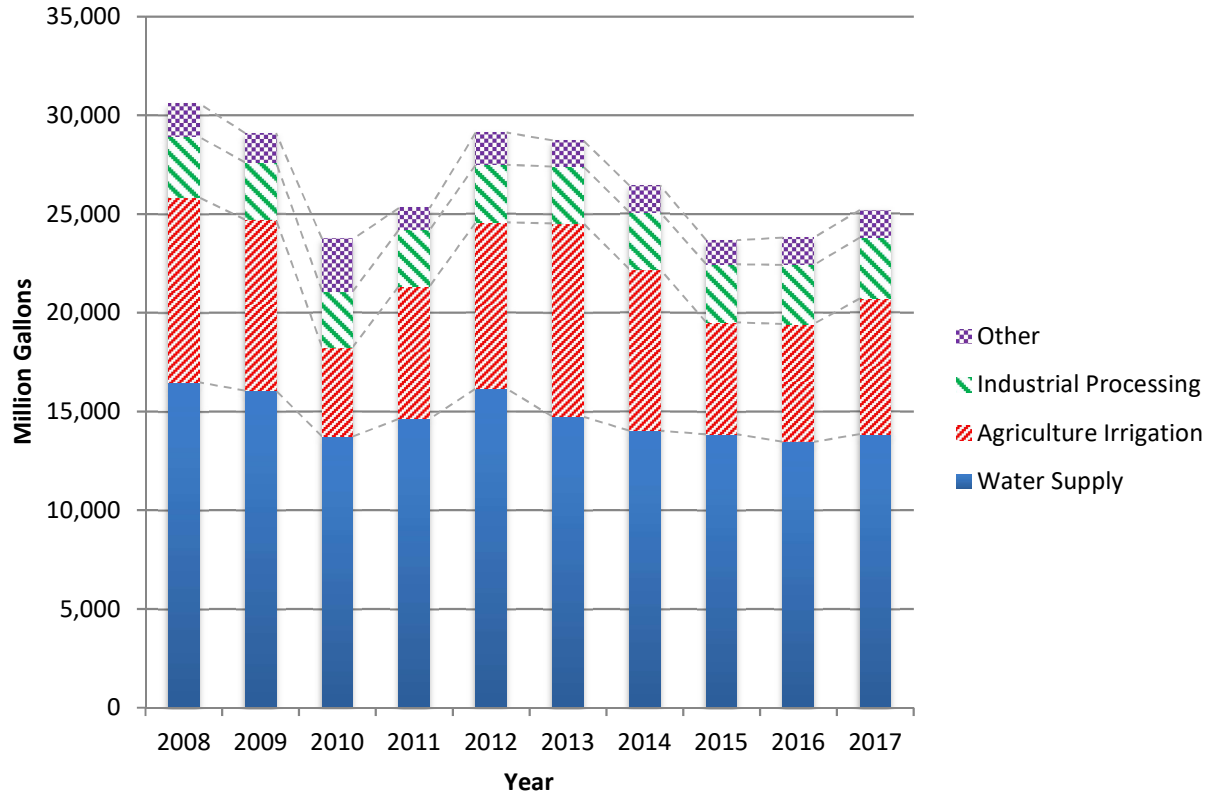


Figure 24 Dakota County Top 15 Water Users (a) by the five-year (2013-2017) average; and (b) by location with the 2040 Groundwater Aquifer Projected Drawdown

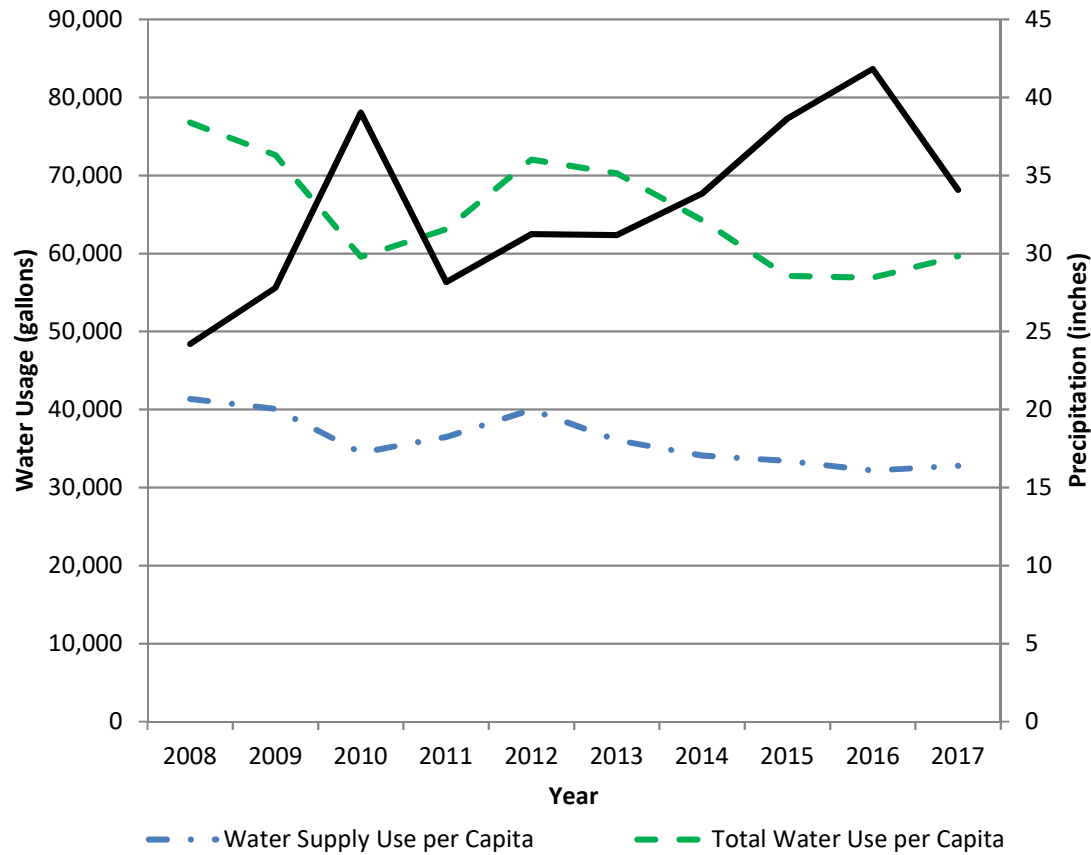
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Dakota County water usage per year is shown in the figure below. Water supply demand has slightly decreased over the last 10 years due to water conservation practices, water smart appliances, and plentiful precipitation. However, water usage does vary year to year depending upon weather and precipitation, which is most notable in agricultural irrigation water usage. For example, 2012 and 2013 had less precipitation compared to other recent years, which directly correlates to an increase in water usage.



*Figure 25 Dakota County Groundwater Use (MG) per Year by Category
(source: MN DNR MPARs)*

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This can also be seen in the figure on this page, which shows the water usage per capita, based on the MN Demographic Center estimate of Dakota County’s yearly population. Both water supply usage (i.e., municipal/public water) per capita and total water usage per capita (all water usage types to include public water supplies, irrigation, industrial, etc.) have decreased over the last 10 years, but show increases during years of drought.

Figure 26 Dakota County Groundwater Use (gal/capita) per year broken out by municipal/public water supply and total water usage in comparison to precipitation (sources: MN DNR and MN State Demographic Center)

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2. Private Well Water Usage

The DNR reported approximately 25 billion gallons of water were used in Dakota County in 2017. This does not account for the 8,000+ households that use private wells in the county. Private well water usage is estimated at 745 million gallons per year in the county. Almost all rural households use private wells, but the urban and suburban part of the county also has thousands of households that rely on private wells. The DNR reported approximately 25 billion gallons of water were used in Dakota County in 2017. This does not account for the 8,000+ households that use private wells in the county. Private well water usage is estimated at 745 million gallons per year in the county. Almost all rural households use private wells, but the urban and suburban part of the county also has thousands of households that rely on private wells.

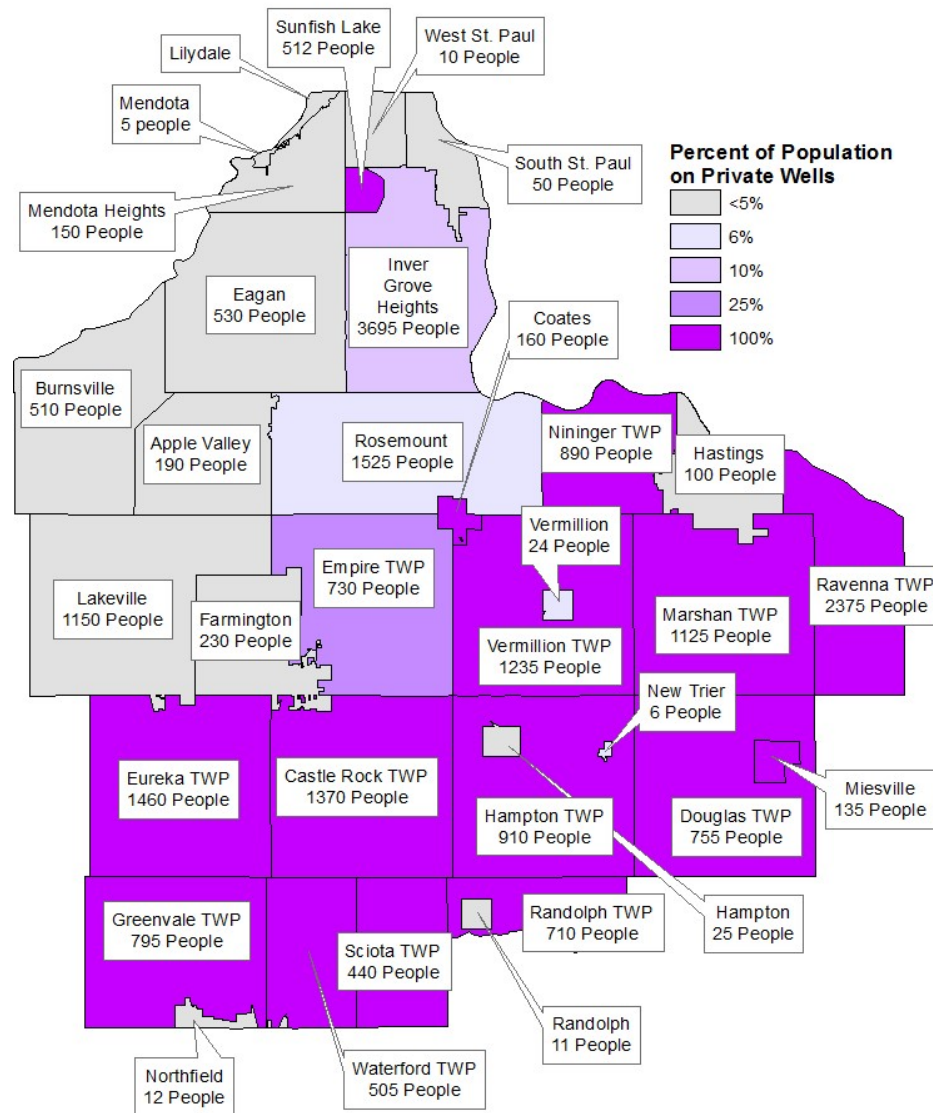


Figure 27 Estimated Dakota County Private Well Population (source: County well index and 2017 estimated population data)

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CHAPTER 7. POPULATION, LAND USE, AND DEVELOPMENT

A. History

From as early as 1000 C. E., the area that is now Dakota County has supported human settlements. The Oneota lived in large villages on the river terraces of the Cannon River, cleared and cultivated land in the river bottoms, and hunted and fished in the river valley (DNR, 1979). Further north, the confluence of the Mississippi and Minnesota Rivers at Mendota (Oñéyawahe, “the hill much visited,” now known as Pilot Knob) has long been significant to the Dakota people. Oral history identifies it as the origin of the Dakota people themselves and the center of the universe. Mendota, Mdo-te or Bdote, meaning the confluence of two rivers, was an important site for the Dakota, French fur traders, and American soldiers, including those who built Fort Snelling (Mendota Mdewakanton Dakota Tribal Community; also Peterson and Labatte). When settlers of European descent arrived, the Dakota had communities at Mendota (as mentioned above), Black Dog, and Kaposia (in what is now South St. Paul) (Pond, 1908). The Dakota also had communities along the Cannon River, which they called “Inyan Bosndata,” or Standing Rock River, referring to the formation now known as Castle Rock in central Dakota County.



“View of Mendota,” c. 1848, Seth Eastman. Minnesota Historical Society

The first permanent pioneer settlement in Minnesota is believed to have been at a site where the City of Mendota is now located. In 1812, Henry Sibley, who later became the first Governor of Minnesota, established a fur trading post at this location. In 1822, this site grew to become

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the first United States settlement in Minnesota. The settlement was first called St. Peter after the settlers' early name for the river, the St. Peter, that the Dakota called Mini-so-tah Wahk-pah, "cloudy waters" (Peterson and LaBatte). The river was later officially renamed the Minnesota. Under the Congressional Act of 1844, the site became the Village of Mendota and served as the Dakota County seat from 1854 through 1857.

When Minnesota became a territory in 1849, "Dakotah" County was one of its first nine counties. By the time Minnesota became a state in 1858, "Dakotah" County was renamed Dakota County. Seventeen townships were established, and Hastings, the first incorporated city in the county, was designated as the County Seat.

The first United States Census that included Dakota County was compiled in 1860, when the county consisted of 20 townships and one city (Hastings). By 1900, the county contained 20 townships, seven incorporated villages, and three cities.

In the 1940s, the percentage of rural and urban populations was split evenly. Since then, the urban sector has grown dramatically, whereas the rural population has remained relatively constant. In 1974, the Minnesota Legislature enacted legislation that reclassified all incorporated villages as cities, based on population size. Currently, there are 13 townships and 20 cities in the county.

B. Population and Land Use

As discussed in the “Water Use” chapter, Dakota County is the third most populous county in Minnesota, with an estimated 428,558 people in 2018.³ (Hennepin County, which includes Minneapolis, has the largest population in the state; Ramsey County, which includes St. Paul, is second.)

Between 2010 and 2018, the county added 72,654 residents, a 20 percent increase. The population of suburban metropolitan area counties continues to increase, although at a slower rate than the previous decade. The Metropolitan Council projects that the county’s population will reach 516,480 in 2040.

In 2018, Dakota County had an estimated 164,174 households. Changes in household composition continued to follow trends of recent decades: single-person households (both under and over 65) increased, as did households headed by single females with children, while married couple households with children decreased. Household growth does not always track parallel to total population growth because average household size has continued to decline, from 2.71 people per household in 2000 to 2.59 in 2018.

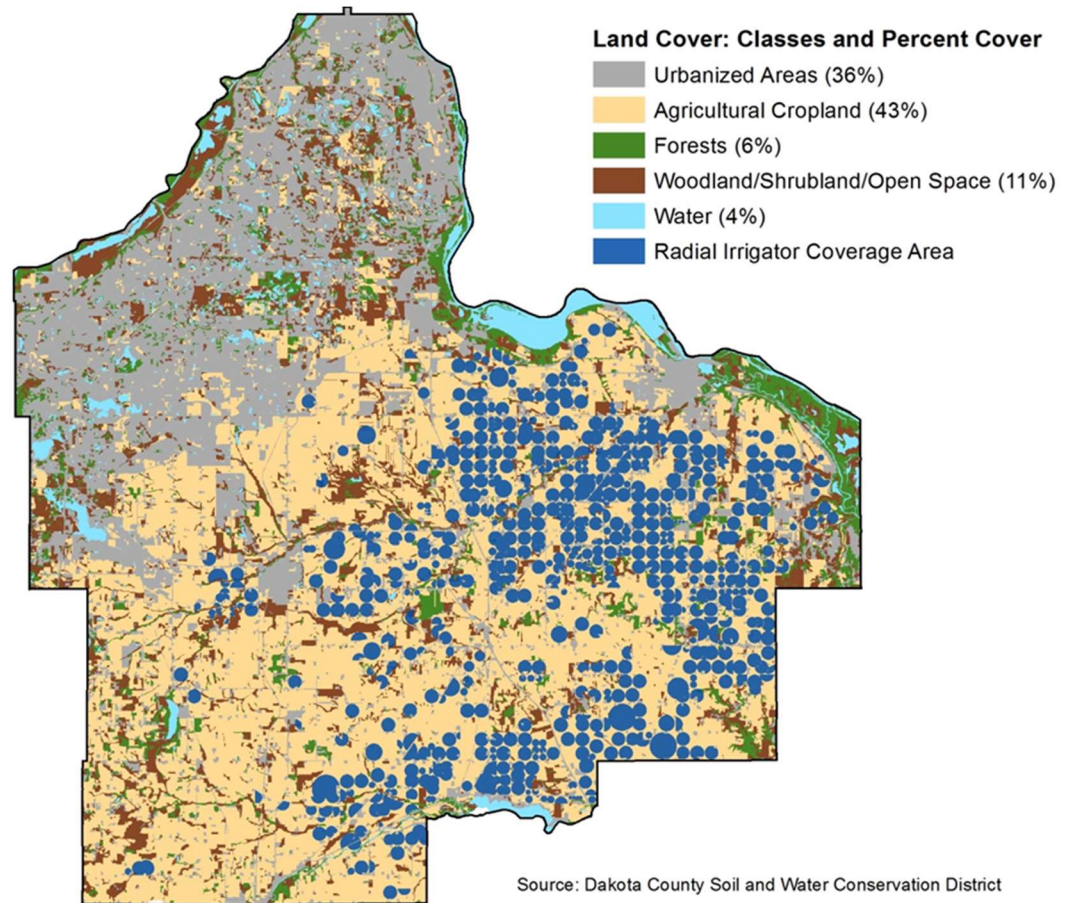


Figure 28 Dakota County Land Cover

³ Source: Metropolitan Council Population Estimates 2018. www.metrocouncil.org

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Land use in the county is relatively stable, with an average annual change of agricultural land use to residential land use of one percent. Land use in the county is shown on Figure 28. In general, about four-tenths of the land area is urbanized (18 percent residential, 12 percent exempt – parks, schools, churches, etc. -- 3.5 percent commercial, and 3.5 percent industrial) and the remainder is agricultural land and other open space. If current land use trends continue, approximately 9,500 acres of farmland and natural areas will be converted to residential, commercial, or industrial uses in the next ten years. As the population grows and the county becomes more developed, the demand for water will increase, potentially depleting groundwater supplies and threatening groundwater-dependent natural resources.

The land use map also shows the extent of irrigated croplands in the county. Dakota County is one of Minnesota’s counties with the largest percentage of its cropland that is irrigated.

Most of Dakota County’s population (90 percent) uses public water supplies. With the exception of Empire Township, all the townships in the county rely on domestic wells and septic systems. The City of Sunfish Lake also relies on domestic wells and septic systems. In addition, every city in the county has some number of households that are not connected to the municipal water supply and wastewater system.

*Table 12 City and Township Population and Estimated Private Well Information
(source: U.S. Census and Dakota County Environmental Resources Well and Septic System Records)*

Municipality	1990 Census	2000 Census (pop.)	2017 Census (pop.)	Change 2000-17	% Change	Households on Private Wells (Est.)	Households on Septic Systems (Est.)
Apple Valley	34,598	45,527	52,361	6,834	15%	71	88
Burnsville	51,288	60,220	62,239	2,019	3%	201	201
Castle Rock Twp	1,480	1,495	1,372	-123	-8%	473	467
Coates	186	163	159	-4	-2%	55	60
Douglas Twp	670	760	755	-5	-1%	250	245
Eagan	47,409	63,557	68,488	4,931	8%	205	158
Empire Twp	1,340	1,638	3,010	1,372	84%	220	208
Eureka Twp	1,405	1,490	1,458	-32	-2%	525	493
Farmington	5,940	12,365	22,421	10,056	81%	80	83
Greenvale Twp	685	684	792	108	16%	283	237
Hampton	363	434	693	259	60%	Not Known	13
Hampton Twp	866	986	907	-79	-8%	326	321
Hastings	15,473	18,201	22,637	4,436	24%	40	27

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*Table 12 City and Township Population and Estimated Private Well Information
(source: U.S. Census and Dakota County Environmental Resources Well and Septic System Records)*

Municipality	1990 Census	2000 Census (pop.)	2017 Census (pop.)	Change 2000-17	% Change	Households on Private Wells (Est.)	Households on Septic Systems (Est.)
Inver Grove Heights	22,477	29,751	35,106	5,355	18%	1469	1507
Lakeville	24,854	43,128	61,993	18,865	44%	385	358
Lilydale	506	552	869	317	57%	1	1
Marshan Twp	1,286	1,263	1,124	-139	-11%	401	412
Mendota	164	197	213	16	8%	3	3
Mendota Heights	9,431	11,434	11,352	-82	-1%	62	59
Miesville	135	135	134	-1	-1%	55	57
New Trier	96	116	113	-3	-3%	37	38
Nininger Twp	805	865	892	27	3%	301	293
Northfield (in Dakota County)	170	557	1,167	610	110%	Not Known	2
Randolph	331	318	476	158	50%	Not Known	149
Randolph Twp	448	536	708	172	32%	231	239
Ravenna Twp	1,926	2,355	2,373	18	1%	804	786
Rosemount	8,622	14,619	23,965	9,346	64%	528	555
Sciota Twp	252	285	441	156	55%	121	123
South St. Paul	20,197	20,167	20,598	431	2%	20	13
Sunfish Lake	413	504	512	8	2%	175	183
Vermillion	510	437	428	-9	-2%	10	6
Vermillion Twp	1,201	1,243	1,233	-10	-1%	417	427
Waterford Twp	485	517	506	-11	-2%	202	194
West St. Paul	19,248	19,405	21,085	1,680	9%	Not Known	25
TOTAL		355,904	422,580	66,676	19%	7951	8031

Future Development

Land use decisions in Dakota County are made by cities and townships, which independently administer zoning and comprehensive planning land use controls. The figure on this page shows major initiatives for new development and redevelopment projects identified by cities in 2018, during the 2040 comprehensive planning process. Individual city comprehensive plans should be consulted for further information on all planned land use changes

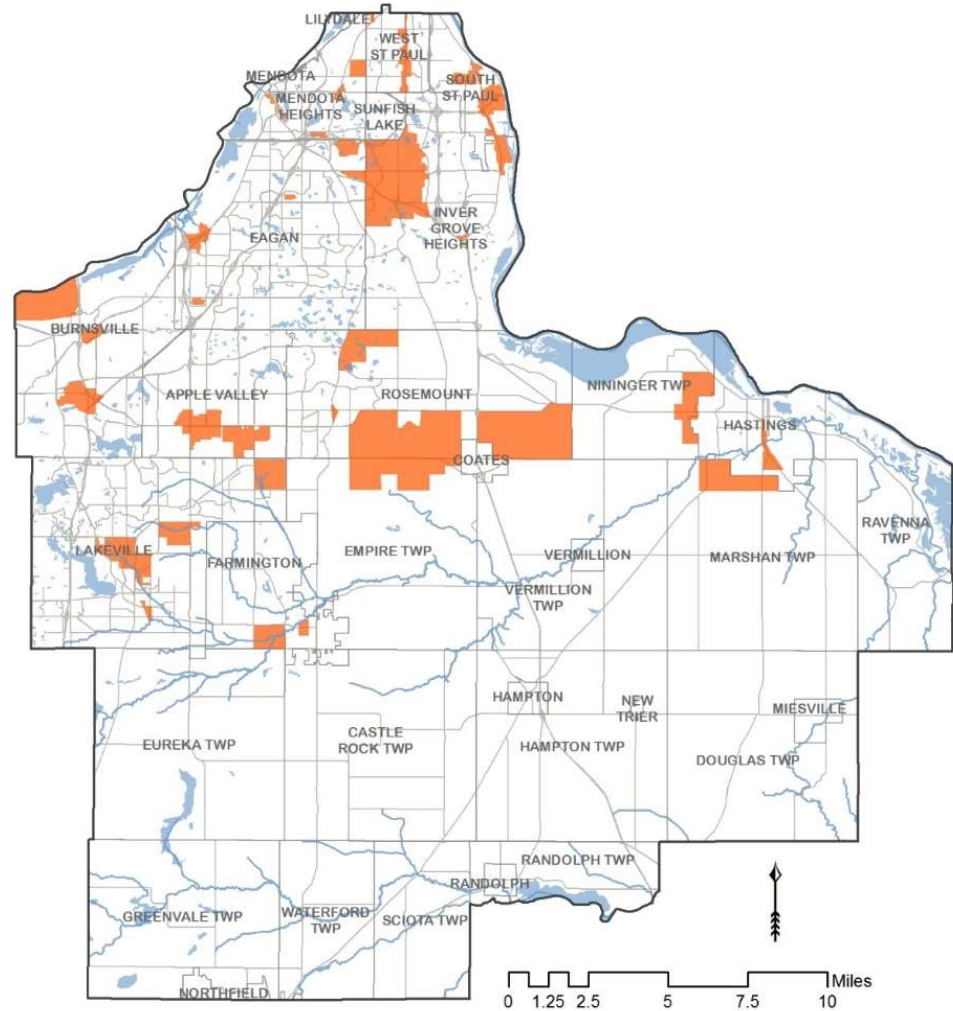


Figure 29 Dakota County Planned Development

CHAPTER 8. PHYSICAL ENVIRONMENT

A. Climate and Groundwater Recharge

Dakota County is a temperate region, dominated by various species of trees and grasses. Historically, various species of pine, fir, birch, maple, and other varieties covered the area. Natural prairie has all but disappeared from the area due to human impact. Much of the county is agricultural, predominantly corn and soybean crops, with minor cattle grazing and turkey, hog, and dairy production.

Average precipitation in the region ranges between 29 and 32 inches. Average monthly temperature ranges from around 16°F in January to around 74°F in July. Most rainfall occurs during the months from May to September with mean annual surface evaporation of 34 to 36 inches. Snow usually accumulates and covers much of the ground during the months from December to March.

The quantity of groundwater available in an area is determined by the quantity of water that seeps from the surface down into the underlying aquifers, or recharge. Recharge cannot be measured directly. Recharge varies according to precipitation and to a wide array of complex factors. As a result, professional estimates of regional recharge can vary widely. A recent report by the U.S. Geological Survey reviewed a number of estimation methods used in the Twin Cities area, including the Vermillion River watershed among its focus areas. Based on this report (Ruhl et al, 2002), recharge in the county ranges from three inches to 13 inches per year, depending on precipitation. County staff conservatively estimate that the county receives five inches per year on average.

Water levels in surface or near surface aquifers generally drop quickly during dry periods and rebound quickly when water is available for recharge. Water levels in deeper bedrock aquifers are also impacted during periods of drought. Unlike surface or near surface aquifers, deeper bedrock aquifers may take a much longer time to recharge to pre-drought conditions. The impact of drought is compounded because of increased water demand. During the drought of 1987-1989, water use by irrigation, municipal and other high capacity wells more than doubled from 1986 amounts.

1. Extreme Weather Events, Water Availability, and Water Quality

In recent years, Minnesota's already-variable weather patterns have become even more extreme, especially producing erratic precipitation patterns: generally higher annual precipitation, but



Shelf Cloud over Sciota Township

also more extreme weather events such as drought and torrential storms. These changing weather patterns make groundwater recharge rates very difficult to estimate.

- **The state is getting warmer.** 2018 was the fourth-hottest year on record for the planet. In Minnesota, the standout trend is that the low temperatures of winter aren't getting very low anymore. Between 1895 and 2015, average daily low temperatures in winter have increased. In the northern part of the state, they're up 4.8 degrees over that period and 3.4 degrees in the south. And a recent study says Minneapolis and Mankato are the second- and third-fastest-warming cities in the country.

According to the DNR's Climate Office, the weather for Dakota County shows the same pattern. Seven of the ten warmest years in the county's recorded history have been 1998 or later.

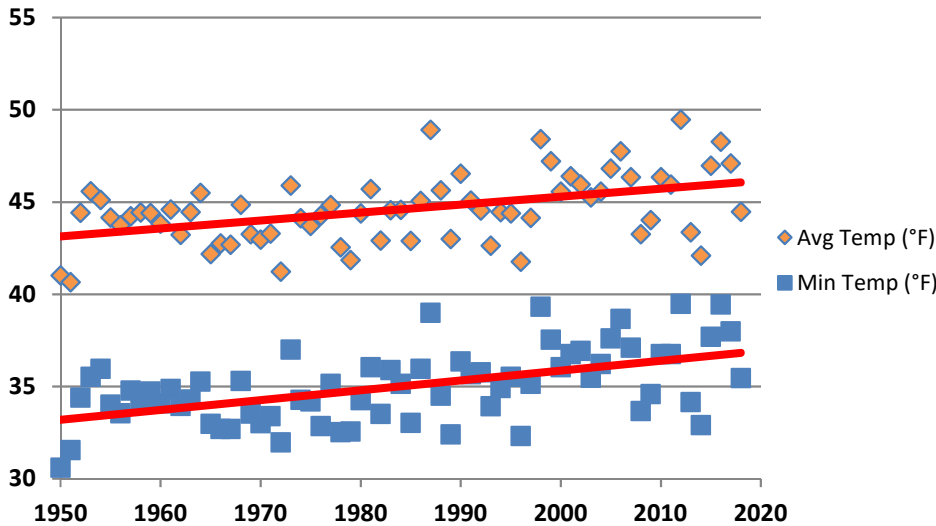


Figure 30 Dakota County – Annual Temperatures
(source: <https://arcgis.dnr.state.mn.us/ewr/climatetrends/>)

Table 13 Dakota County Warmest Years: 1895-2018		
Record Warmest	Year	Avg Temp (°F)
1	1931	49.79
2	2012	49.46
3	1987	48.91
4	1998	48.41
5	2016	48.27
6	2006	47.75
7	1999	47.22
8	2017	47.09
9	2015	46.97
10	1921	46.89

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- **The state is getting wetter.** Statewide, annual precipitation is up 12 percent (3 inches a year) since 1895. The state record for annual precipitation recorded in a municipality was broken in 2016 (in Waseca) and has since been eclipsed by 2018 totals in the southeastern Minnesota towns of Caledonia and Harmony.

According to the DNR's Climate Office, Dakota County is also receiving more annual precipitation over time. 2019 was the wettest year on record for Dakota County, with 42.99 inches of precipitation.

- **And yet, droughts are an increasing problem.** Models suggest that June precipitation will rise through the end of the 21st century, while August precipitation will drop significantly over most of the state. "Although the annual quantity of precipitation will be similar or greater, we project similar or fewer days of precipitation and longer maximum dry spells. This results in more intense events that stress infrastructure and crop production. (Noe et al, 2019) Recently, some areas have experienced flooding and drought in the same year. In fact, 2012 marked the first time that particular Minnesota counties sought both U.S. Department of Agriculture drought assistance and Federal Emergency Management Agency flood disaster assistance in the same year, with 11 counties dealing with previously rare double crises.

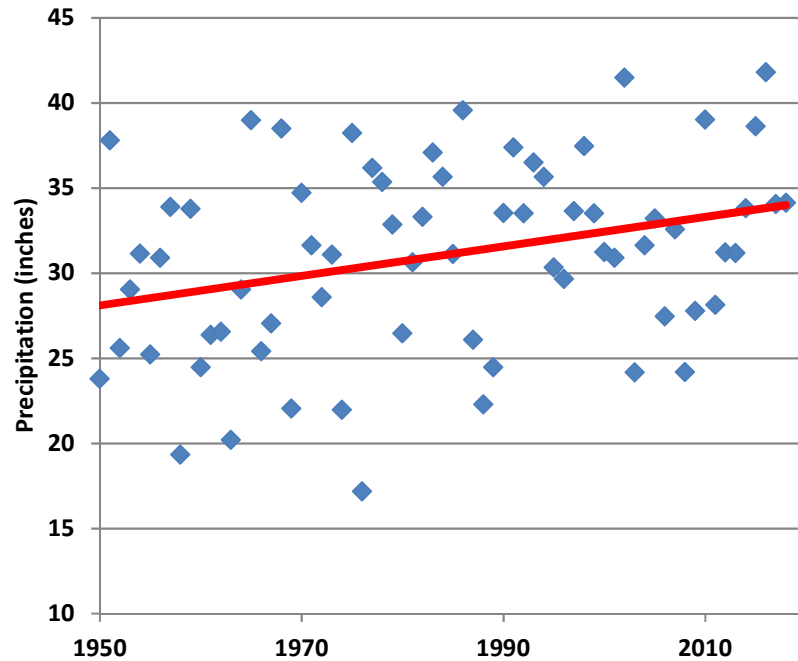


Figure 31 Dakota County Average Annual Precipitation (inches)

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Dakota County was one of the counties that applied for federal disaster relief for both drought and for flood in 2012. The image below shows the 24-hour rainfall for June 14, 2012 in southern Dakota County, when the Miesville Ravine area received more than a foot of rain. The area reported as much as 17 inches of rain in a three-day period.

Climatologist Mark Seeley has also reported that the state has shifted to less frequent, but more intense precipitation events. Even if the total amount of precipitation stays the same, or even increases, the amount that soaks into the groundwater may be less.

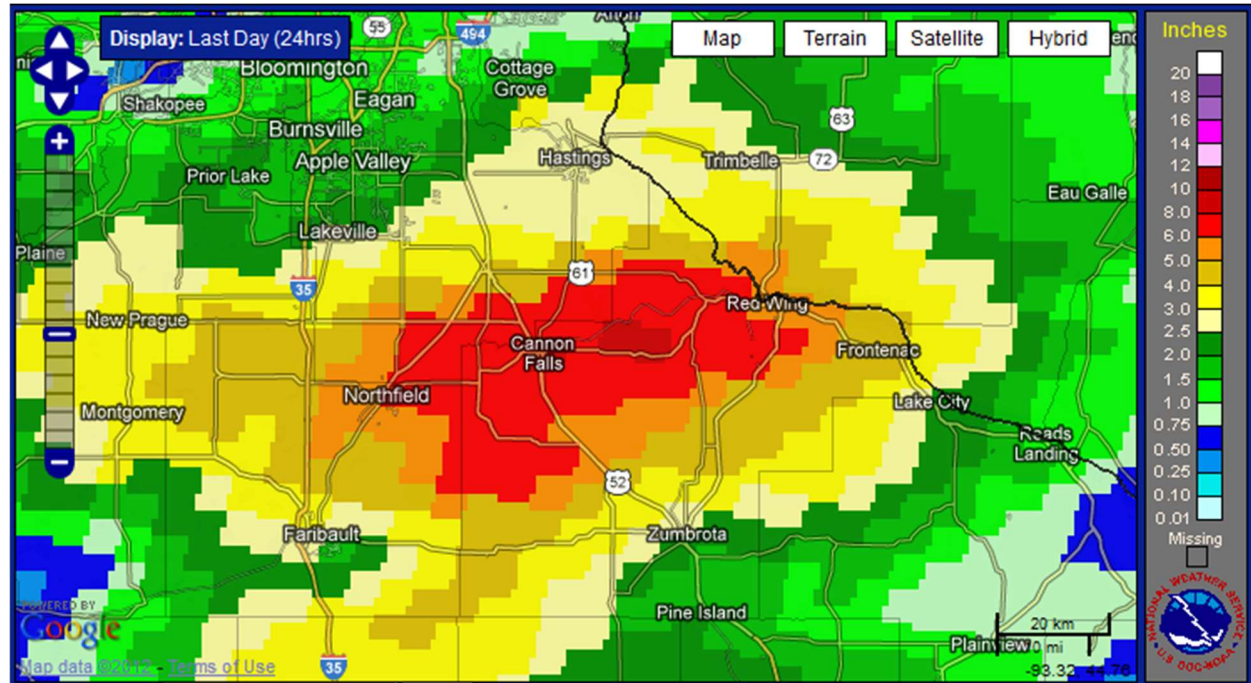


Figure 32 Rainfall Intensity on June 14, 2012

2. Relationship between Weather Variability, Drought, and Impacts

The increase in extreme weather events is also expected to impact water quality. Intense precipitation events can increase the quantity of contaminants that get flushed from road surfaces and farm fields down into the groundwater. Floods carry hazardous materials, wastewater, septage, and animal waste that can leach into the groundwater. In winter, more frequent freeze-thaw cycles and more frequent ice events lead to greater use of road salt and other road chemicals, increasing the pollutant loading in meltwater.

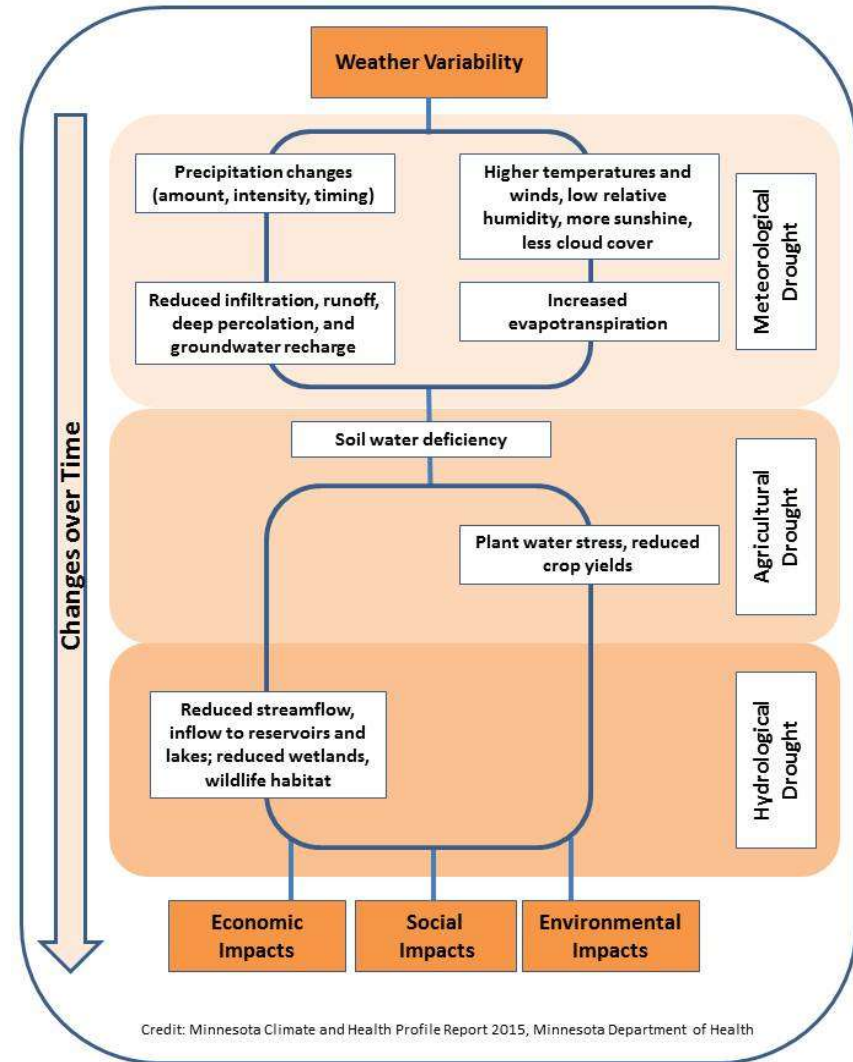


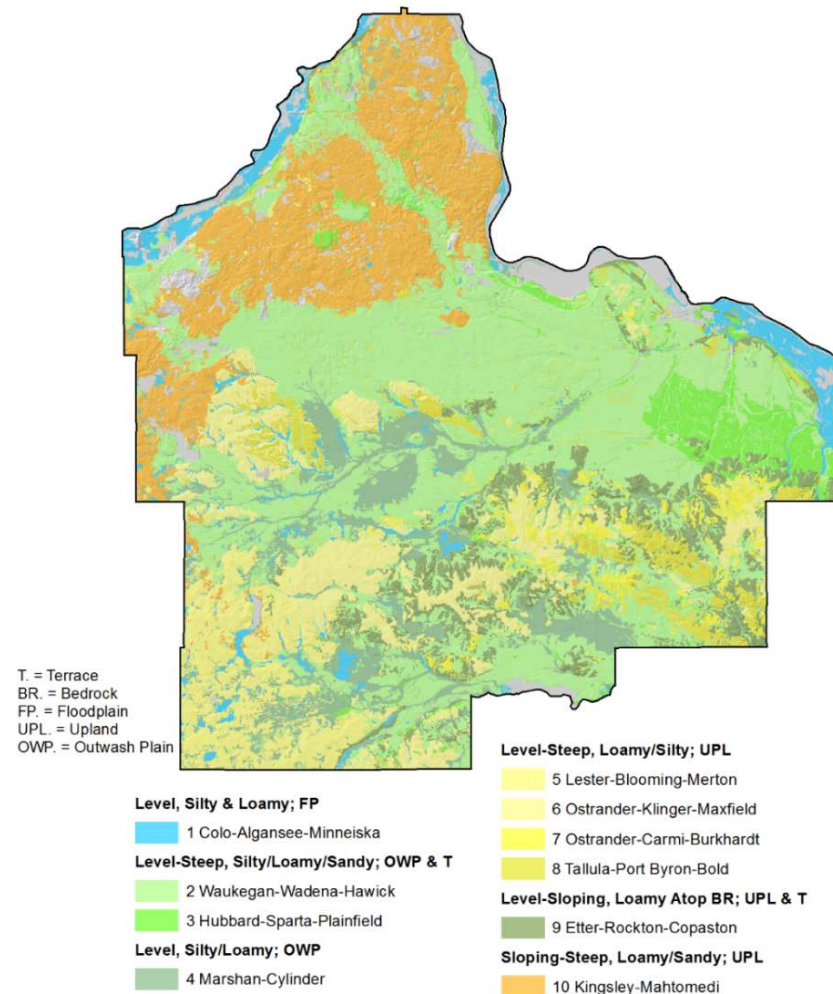
Figure 33 Impacts of Weather Variability over Time

B. Soils

The generalized soil map for Dakota County, Figure 34, shows the 10 major soil mapping units in Dakota County. Each map unit defines a unique natural landscape and consists of several minor units. These minor units have been described and mapped by the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) and are published in the "Soil Survey of Dakota County." This information is also available in digital form from the Dakota County Office of Planning.

The characteristics of a particular soil are functions of the physical and mineralogical composition of its parent material, the climate under which the soil accumulated and existed since accumulation, the plant and animal life on the soil, local topography, and time. In Dakota County, most soils were formed from glacial till, glacial outwash, loess, river sediments, and bedrock materials. Soils formed in glacial till tend to be fine-to-coarse-textured silty to sandy loams; soils formed in glacial outwash commonly have moderate-to-coarse- textures and have a sandy to gravelly substratum; soils formed in loess deposits are fine textured silty loams; soil formed in river deposits range in particle size from clays and silts to sands and cobbles; and soils from bedrock tend to be thin, loamy to sandy loams.

Clays, loams, and organic soils -- fine textured soils -- tend to hold water and help slow the rate that contaminants can enter the groundwater. Compared to fine-textured soils, coarse soils hold less water and contaminants travel through them faster. Soils along the Mississippi and Minnesota Rivers and in flood plains along the Vermillion River and Chub and Pine Creeks tend to be loamy, silty, and



Source: Minnesota Geologic Survey, Dakota County Environmental Resource Department

Figure 34 Dakota County Soils

clayey. These soils are fairly level and are poorly drained. Soils in the remainder of the county are well drained to excessively well drained and occur on gentle to steep slopes.

C. Landforms and Topography

Landforms in the county can be divided into four generalized categories:

- Glacial moraines,
- Outwash plains,
- Bedrock areas, and
- Fluvial landforms.

In the last two million years, Dakota County has been covered several times by continental glaciation. The most recent glaciation took place about 12,000 years ago during the Pleistocene Epoch of the Quaternary Era. These glaciers originated in northern and northeastern Canada. As the glaciers moved across the continent, they cut and moved large amounts of material, in some cases carrying this material hundreds of miles. As the glaciers retreated, this material (or glacial drift) was left behind and reworked by the resulting meltwater.

The topography of the county is largely a result of these various glacial advances and retreats. The hilly areas in the northern and western parts of the county are glacial moraines, that is, they indicate the terminus of a glacial advance. The flat, sandy portions in the central and south-central areas of the county are outwash plains. These areas were created as water from the melting glaciers reworked the debris carried by these glaciers. The deep valleys and terraces of the Minnesota and Mississippi Rivers appear to be the result of flooding associated with the release of water from the Glacial Lake Agassiz. Soils, lakes, and most other surface features in the county can be also attributed to these glacial advances.



*Mississippi River Valley facing east from Rosemount,
courtesy of Vanessa Demuth*

The highest elevations in the county are located on the moraines in the northern and western areas. The highest point in the county is Buck Hill with an elevation of over 1,195 feet and the lowest point is about 675 feet where the Mississippi leaves the county. Although there are abrupt and frequent elevation changes along the Mississippi and Minnesota River Valley, the overall slope of the county is towards the southeast with an average elevation change of about 200 feet.

1. Glacial moraines

The most recent glacial advance, the Wisconsin Glaciation, consisted of several lobes of ice that ebbed and flowed across the county beginning about 75,000 years ago and ending about 12,000 years ago. The glacial moraines found in the northern and western parts of the county mark the furthest advance of the two most recent lobes to advance across the county, the Superior Lobe and the Des Moines Lobe. An earlier glacial advance, possibly the Wadena Lobe created the moraine found in Hampton and Douglas Townships in the south-central portion of the county.

The topography of the moraine areas in the county is hilly and irregular and includes many deep, poorly drained depressions. As a result, most of the palustrine wetlands (non-river or lake-wetlands) and natural lakes in the county are found in these areas. Because glacial moraines consist of a heterogeneous mixture of sand, gravel, boulders, and clay, perched water tables are also found in these areas. The

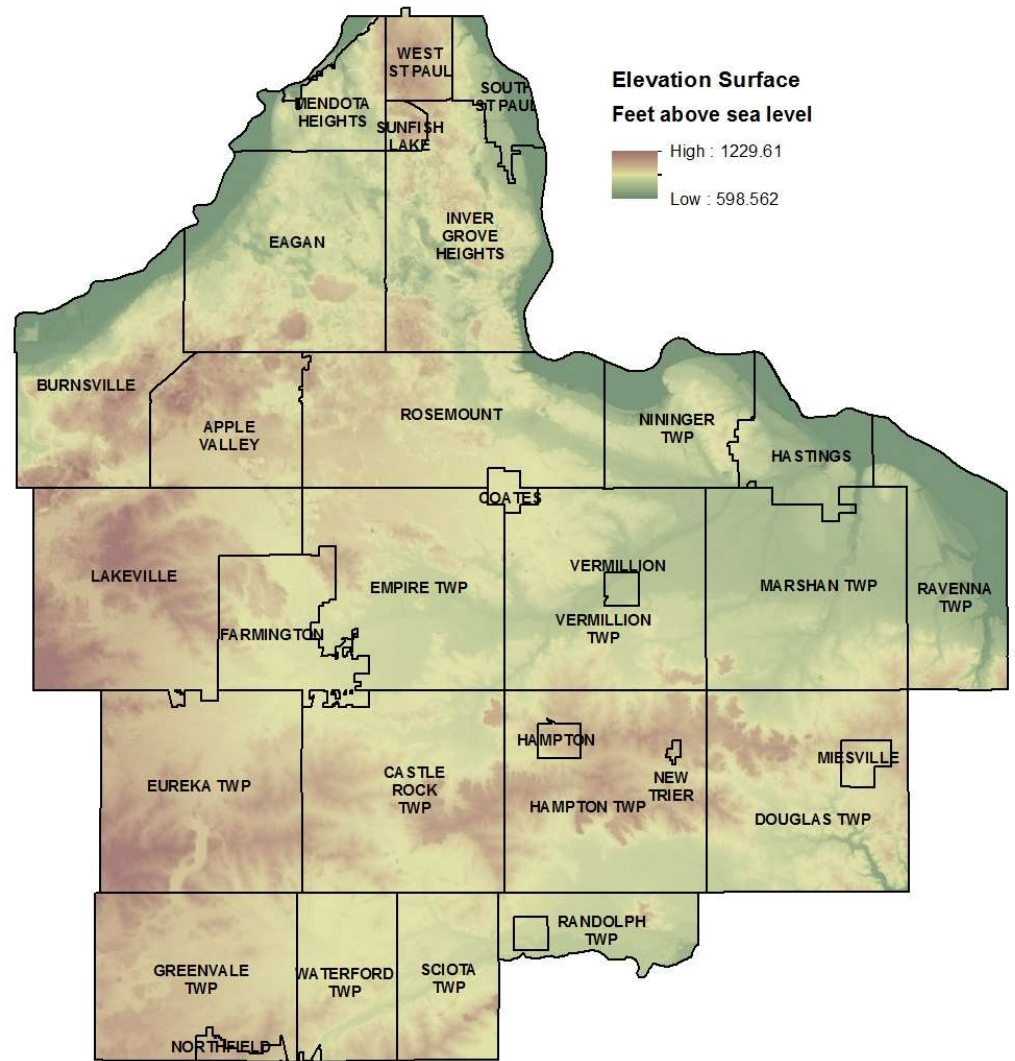


Figure 35 Dakota County Topography



*Rolling Hills in Castle Rock Township,
courtesy of Vanessa Demuth*

relief of the glacial moraines ranges from five to 200 feet from hill base to hilltop. The range of slopes varies a great deal from one to six percent in gently rolling areas, to 12-18 percent or more in parts of the cities of Eagan, Apple Valley, Burnsville, and Inver Grove Heights, and Hampton and Douglas Townships.

The rolling topography and the presence of surface water features within the moraine areas create desirable locations for residential development. Conversely, the rolling topography, poorer soils, presence wetlands, and poor soils make these areas less desirable for cropland. As a result, these areas are under increasing development pressure.

2. Outwash plains

Outwash plains are located adjacent to most of the moraine areas in the county. Outwash plains were formed by the deposition of materials from glacial meltwater created as glaciers from the Wisconsin glaciation retreated. These areas are found though out most of the central portion of the county and contain some of the richest gravel deposits in the metropolitan area. Most of the soils in the outwash plains tend to be droughty. However, with irrigation these soils can become some of the most productive cropland in the state.

3. Bedrock areas

In the south central and southeastern parts of the county, bedrock outcrops are interspersed among the glacial deposits, colluvium, and other surface deposits. Where bedrock is visible at the surface it is generally part of the St. Peter Sandstone or Platteville Formation. The Prairie du

Chien Formation is generally covered by a thin layer of overburden, however, it is visible in some ravines and road cuts. Chimney Rock near Hastings, and Castle Rock, in Castle Rock Township are erosional remnants of the St. Peter Sandstone. All of the karst topography located in the County is found in the bedrock area. Karst topography includes features such as sinkholes, disappearing streams, and underground drainage. Karst areas provide conduits that directly connect surface water to the groundwater and, as such, are particularly susceptible to groundwater contamination.

The predominant land use in the bedrock areas of the county is agriculture. Although soils in these areas are not considered “prime agricultural,” appropriate farming practices have produced good crops and pastureland.

4. Fluvial landforms

As rivers and streams flow, they mold their geologic settings into discernable landforms. Floodplains are the most common fluvial landform and are found in all river valleys in the county. The Mississippi and Minnesota rivers contain the most expansive floodplains in the county. These floodplains contain a complex network of lakes, wetlands, sandbars, chutes, and sloughs. Smaller floodplains are located along the Cannon and Vermillion Rivers. Although some riverine wetlands are found along these rivers, their floodplains consist mostly of floodplain forests, shrubland, cropland or pastureland. Floodplain material consists mostly of channel fill deposits such as fine silts and clays. However, some large peat deposits are located within the Minnesota River floodplain. Other than for crop and pastureland, most floodplains exist in a natural state or a somewhat altered natural state. In the past, some development was allowed to occur within floodplains; however, current state law and local ordinances prohibit any new development.



Chimney Rock in Marshan Township, courtesy of Vanessa Demuth

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








Well-developed terraces are located along the sides of the Minnesota and Mississippi River valleys in the county. Terraces are abandoned floodplains that were formed when the river flowed at a higher level than the present. They represent periods of stability separated by periods of down cutting by a river that carved the valley now occupied by the Minnesota and Mississippi Rivers. In many places, terrace materials overlay outwash and the boundary is not well defined. However, there are three distinct terraces along the river valleys, an upper, middle and lower terrace. Of the three, the middle terrace is the most extensive and the best defined. Terraces support a wide range of land uses. All or large parts of the cities of Burnsville, Eagan, Hastings, Mendota, Mendota Heights, and South St. Paul, as well as portions of Nininger and Ravenna Townships are located on river terraces.

D. Geology

The geology of Dakota County can be described by three major units: Quaternary or surface geology, Paleozoic or bedrock geology, and Proterozoic or basement geology. Quaternary geology, in this discussion, will include all those deposits above the bedrock formations. These Quaternary deposits are primarily glacial tills and outwash, alluvium (river deposits), and lacustrine (lake) deposits. Bedrock geology in the county consists of several layers of limestone, dolomite, sands, and shales associated with regressions and advances of ancient seas. Basement geology in the county is made up of basalts and crystalline igneous rocks.

1. Quaternary (Surficial) Geology

Quaternary geology in the county consists of surface and near surface materials that have been deposited within the last two million years. Quaternary deposits consist of glacially derived or reworked materials and non-glacial deposits. The non-glacial deposits include floodplain alluvium, colluvium, and organic deposits. Since much of the geologic record was erased during the last major glaciation, most of the Quaternary deposits in the county were laid down less than 75,000 years ago. The figure below shows the surficial geology of the county.

Table 14 Dakota County Geology		
Geologic Formation	General Lithology	Presence and Use of Water
Quaternary deposits: Surface deposits of sand and gravel; erodes easily		May contain water used for domestic, commercial, and irrigation purposes; Easily contaminated
Decorah Shale: Clay-like shale with thin fossil-bearing limestone		Helps protect underlying aquifers from contamination
Platteville and Glenwood: Fossil-bearing limestone and sandy shale		Supplies very limited amounts of water to northern Dakota County
St. Peter Sandstone: Poorly-cemented, granular sandstone		Supplies limited amounts of water to Dakota County; Easily contaminated in central and southern Dakota County
Prairie du Chien: Limestone		Primary source for domestic, municipal, industrial and high capacity irrigation wells
Jordan Sandstone: Poorly-cemented, granular sandstone		
St. Lawrence-Tunnel City: Shaley sandstone or siltstone		Produces small amounts of water in eastern Dakota County
Wonewoc Sandstone: Silty to coarse-grained sandstone		Seldom used aquifer
Eau Claire: Siltstone, fine sandstone, and shale		Helps protect underlying aquifers from contamination
Mt. Simon-Hinkley: Fine to coarse-grained sandstone		The deepest high-yielding aquifer in Dakota County; Protected for future use with new well drilling restrictions

Glacial deposits in Dakota County consist of sands and gravels, till, and loess. Sand and gravel deposits are generally associated with glacial outwash. Glacial outwash refers to materials deposited beyond the terminal margin of the ice. Outwash is usually well sorted and normally consists of rounded sand and gravels carried and reworked by streams and channels formed from glacial melt water. Finer silts and clays generally settle out in glacial lakes or are carried completely out of the system. The well-sorted gravel deposits mined in the county are, for the most part, found in glacial outwash deposits. The coarse texture of these deposits allows for the formation of surface aquifers. Where the outwash is close to the surface; these aquifers are particularly susceptible to contamination.

The glaciers caused other changes, not visible on the land surface. For example, a large buried river valley that cuts deeply into the bedrock, transverses the county in a path from the Minneapolis - St. Paul Airport to Ravenna Township. This valley was filled with fine sands during early periods of glaciation and is of special concern because the buried valley creates a hydrologic connection between the surface and all of the bedrock aquifers used for drinking water supplies in the county.

Other deposits associated with glaciation include loess and terrace deposits. Loess is usually classified as homogeneous, fine wind-blown silt winnowed from glacial outwash and laid down in blanket-like deposits. Loess is generally highly porous and contains significant amounts of sand (5-10 percent) and clay (5-30 percent). Loess deposits are found in portions of Lakeville and Farmington, as well as, throughout much of Douglas Township. The non-glacial surface

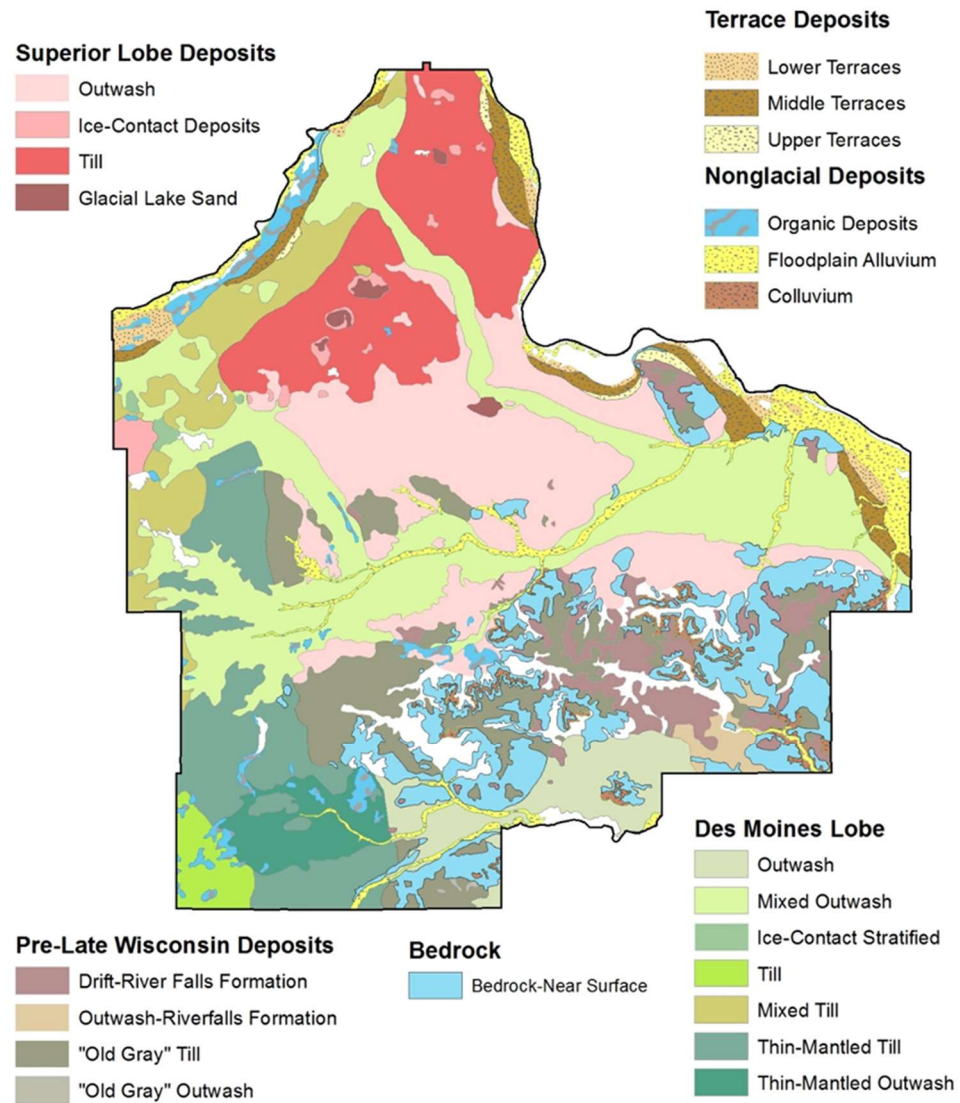


Figure 36 Surficial (Quaternary) Geology (1990 Dakota County Geologic Atlas, Plate 3)

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deposits found in the county are floodplain alluvium, colluvium, and organic deposits that associated with events that occurred in the relatively recent geologic history (less than 12,000 years ago). In many cases the physical processes that created these deposits continue to work today. Floodplain alluviums are generally poorly bedded, moderately well sorted sediments deposited by modern streams during flood stage. This consists mostly of sand in the valleys of the Mississippi, Vermillion, and Cannon Rivers and clayey silt in the Minnesota River Valley. The thickest deposits of alluvium are associated with the Minnesota and Mississippi Rivers. Minor deposits of well-sorted sands have also been recorded in the Miesville Ravine along Trout Brook. Organic deposits, mostly peat and mucky soils are found along the Minnesota River and in parts of Castle Rock Township. Peat and muck have a high capacity to absorb and hold water. Where they have not been ditched or tiled, wetlands are usually found in these areas. Colluvium is found in small deposits scattered throughout the south central and southeastern parts of the county. Colluvium deposits are poorly sorted localized deposits derived from eroding hill slopes. In Dakota County, these deposits generally consist of native rock topped with loess.



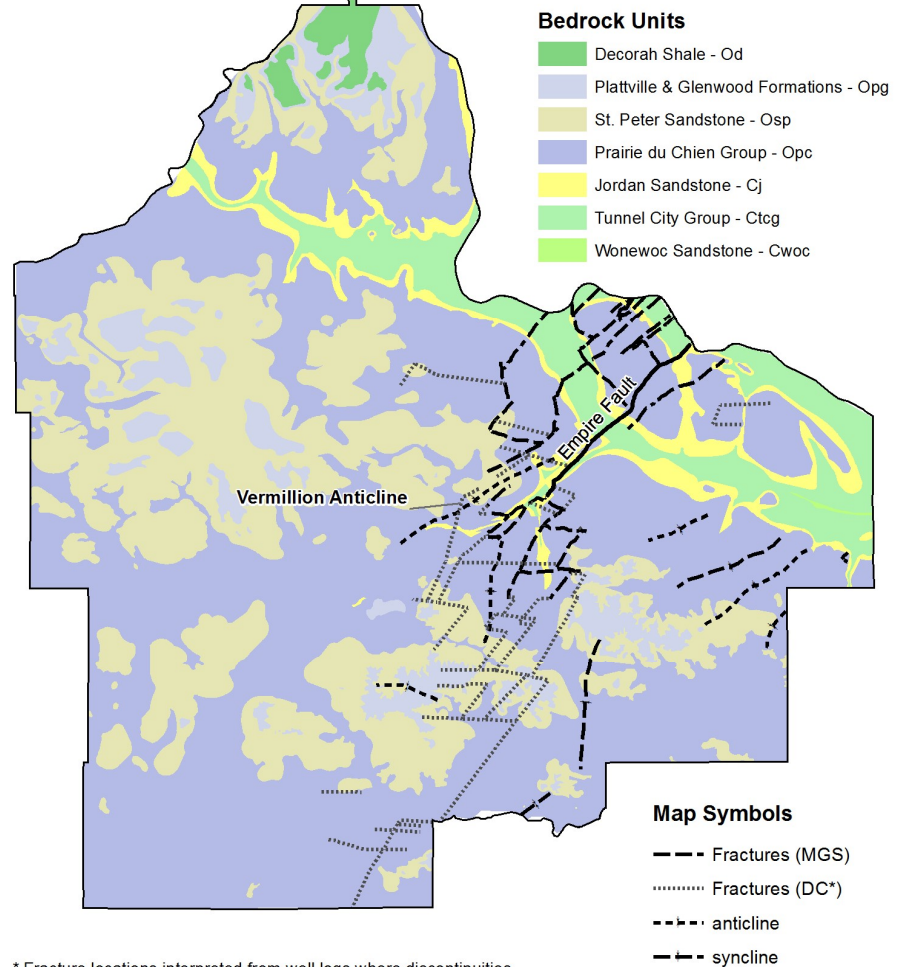
Vermillion River in Farmington, courtesy of Vanessa Demuth

2. Paleozoic (Bedrock) Geology

The bedrock below Dakota County is part of the Twin Cities Basin that was formed during the Paleozoic Era (225-600 million years ago). All the bedrock formations in Dakota County are marine sedimentary rock consisting of dolomite, limestone, sands, and shales associated with the regression and transgression of ancient seas in the area. Sand accumulated in near-shore bars, on beaches, and in sand dunes; silt and clay formed mud flats or settled out in quiet waters farther from shore; and carbonate derived from remains of invertebrate shells and algae accumulated in small banks and reefs and as tabulate layers on the sea floor. Over time, these sediments were compressed and hardened to form sandstone, shale, and dolomitic limestone of today.

After these formations were laid down, tectonic forces acted upon them creating a series of small folds and faults. Individually these folds and faults have displacements of about 100 feet for folds and between 50 and 150 feet for faults. The Empire Fault and the Vermillion Anticline (an upward fold) are the two largest structures known to occur in the county. Several other smaller structures known to exist in the bedrock formations occur in the eastern part of the county.

Figure 37 shows the surface of the bedrock in the county. The youngest and uppermost bedrock formation found in Dakota County is the Decorah Shale. This formation occurs in the extreme northern portions of the county and underlies portions of Mendota, Mendota Heights, and West St. Paul. Outcrops can be seen



* Fracture locations interpreted from well logs where discontinuities in bedrock elevation occur across neighboring wells

Figure 37 Bedrock Geology (1990 Dakota County Geologic Atlas, Plate 2), with additional fracture interpretations from Dakota County staff.

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along the Minnesota River bluffs below Mendota Heights. The Decorah Shale ranges up to 90 feet in thickness and is a green, calcareous shale interbedded with thin beds of limestone that was deposited in a quiet offshore marine environment. The Platteville and Glenwood Formations are located below the Decorah Shale and are distributed throughout much of the county. The Platteville Formation varies in thickness between 18 to 28 feet and made up of a fine-grained dolostone and limestone. The Glenwood Formation varies between 2.5 to 10 feet thick and consists of a green, sandy shale. Many of the flat-topped mesas in the southeastern part of the county are capped with the relatively resilient Platteville Formation. The St. Peter Sandstone is a widely distributed formation located below the Glenwood formation. The upper half to two-thirds of this formation is a poorly cemented homogenous quartzose sandstone. The lower parts of this formation contain multicolored beds of sandstone, siltstone, and shale interbedded with coarse-grained sandstone. This formation varies in thickness from about 160 feet in the north to about 128 feet in the southern part of the county. The Prairie du Chien Group is a geologic unit made up of the Shakopee Dolomite, New Richmond Sandstone, and the Oneota Dolomite. The dolostone of the Shakopee formation forms the upper half to two-thirds of this unit. It is commonly thin bedded and sandy or oolitic (rounded pebbles generally with a nucleus of sand created in near-shore environments) and contains thin beds of sandstone and chert. The lower part of this unit, the Oneota Dolomite is commonly massive to thick bedded and is generally not oolitic or sandy; except in the transition zone between just above the Jordan Sandstone. Dolostone in both formations is karstic, and the upper part, where the overlying formation may have been eroded, is rubbly.

The Prairie du Chien Group underlies almost all of Dakota County and ranges in thickness from 160 feet in the north to 128 feet in the south. Formations in this unit outcrop along the Vermillion River in and near Hastings and in low bluffs, road cuts, and ravines by the Mississippi River from near Nininger to west of Sedil and from Inver Grove Heights and south. Numerous small outcrops occur in the southeastern part of the county.

After the deposition of the Prairie du Chien Group (478 million years before present (B.P)) the marine waters withdrew from the area long enough for dry land to form and significant erosion to occur. There are no bedrock formations younger than the Decorah Shale (458 million years B.P.) in the county.

The Jordan Sandstone occurs below the Prairie du Chien Group. This formation is a poorly cemented, cross-bedded, quartzose sandstone that ranges in thickness from 70 to 125 feet. The underlying St. Lawrence and Tunnel City (formerly Franconia) Formations are between 187 to 240 feet thick and consist of dolomitic shale and sandstone, respectively. The St. Lawrence Formation is the oldest formation that outcrops in the county. The Wonewoc (Ironton and Galesville) Sandstones are poorly sorted, silty to coarse grained, fossiliferous sandstone. These formations are between 21 to 63 feet thick and grade into the Eau Claire Formation. The Eau Claire Formation is between 78 to 188 feet thick and is made up of siltstone, fine sandstone, and shale. The Mt. Simon Formation is chiefly a fine to coarse-grained quartzose sandstone ranging in thickness

between 155 to 275 feet. The upper third of this formation consists of well-defined layers of very fine-grained sandstone and siltstone and is quite fossiliferous. The lower two thirds consist mostly of medium to coarse-grained sandstone.

3. Aggregate Resources

Dakota County has a large share of readily accessible, significant deposits of aggregate resources (sand, gravel, and limestone) for which there is high demand in the metropolitan area, which relies on supplies mined in Dakota County for roads and residential, commercial, and industrial development. In 2019, more than 7.6 million tons of aggregate was mined from Dakota County.

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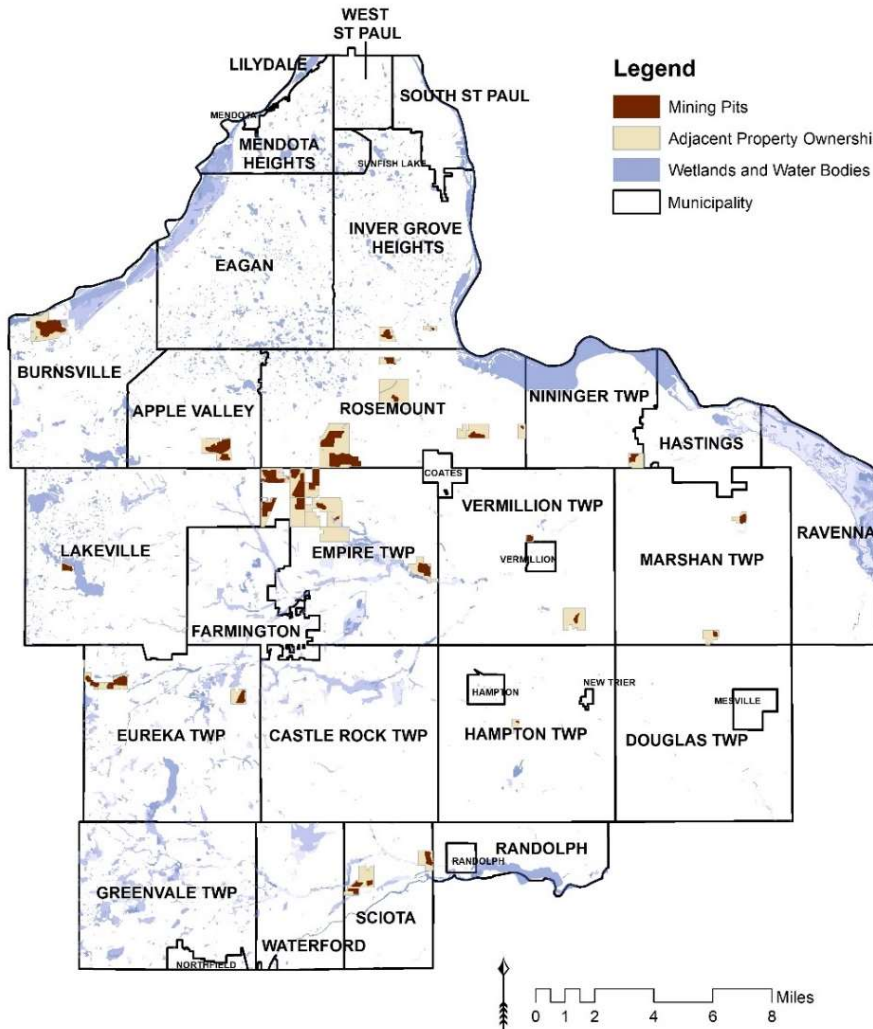


Figure 38 Dakota County Aggregate Mining

Table 15 2019 Aggregate Production

City or Township	Production (metric tons)*	Cubic Yards*
Empire Township	2,558,783	
City of Rosemount	1,761,544	449,427
City of Burnsville	1,187,379	
City of Apple Valley	598,454	
Eureka Township	515,258	1,717
Sciota Township	377,144	67,242
City of Inver Grove Heights	242,747	
Nininger Township	169,677	
City of Lakeville	82,049	54,548
Marshan Township	81,775	
Vermillion Township	48,621	200
City of Hastings	504	
Hampton Township		2,041
TOTAL	7,623,931**	575,175

*Operator has their choice of reporting method.

**Totals reflect rounding differences.

E. Groundwater

In Dakota County, groundwater comes from two major sources, aquifers in the glacial drift or “Quaternary aquifers” and aquifers in the underlying formations or “bedrock aquifers.”

1. Quaternary Aquifers

Quaternary deposits may behave as aquifers or as confining layers. Confining layers serve to separate aquifers from each other and may offer some protection to aquifers from surface infiltration. Most glacial drift aquifers are highly variable in composition. Many contain significant fractions of gravel or coarse sand, and are of particular concern where contamination occurs because they transmit water and contaminants quickly.

Glacial drift aquifers that are in physical contact with bedrock aquifers are also hydrologically connected; they behave as a single aquifer unit. Where glacial drift aquifers have filled ancient valleys cut deeply into the bedrock, they provide vertical connection between bedrock aquifers that are otherwise separated from each other by bedrock confining layers. In these cases, contaminated water from the drift aquifer or from another aquifer can enter lower bedrock aquifers.

Quaternary aquifers provide a source of water for domestic supplies and some irrigation wells in the county. Because of their susceptibility to pollution they are not used for municipal or public water supply wells. However, their moderate-yield capacity in the northern suburbs is adequate for some nonpotable industrial purposes.

The highest yielding Quaternary deposits are generally located in buried bedrock valleys. In these areas, Quaternary deposits may yield enough water to meet municipal well demands. However, the Minnesota Well Index indicates that no municipal wells have been completed in them. In part, this is because the deeper, high yielding Quaternary deposits were located outside of developing areas when municipal systems were established. Even though more recent development is situated where it can take advantage of these deposits, it is unlikely that they will be used for municipal supplies. Concerns about contamination, impact from drought, and siltation have rendered these aquifers unreliable and unusable.

2. Bedrock Aquifers

There are six regional bedrock aquifers in Dakota County: Platteville, St. Peter, Prairie du Chien-Jordan St, Lawrence-Tunnel City, Wonewoc, and the Mt. Simon-Hinckley.

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The *Platteville aquifer* is a limestone aquifer used for some domestic supplies in Mendota Heights, South St. Paul, and Inver Grove Heights. Most of the wells completed in this area were drilled before well records were required so little is known about the hydrologic properties of this aquifer. The static water level in this aquifer is about 985 feet in elevation near the northern border of the county in West St. Paul and is 855 feet north of Sunfish Lake in Mendota Heights. The generalized direction of flow is southerly; however, localized flow conditions may be in almost any direction.

The *St. Peter aquifer* consists of a poorly cemented sandstone aquifer used for domestic water supplies in the northern part of the county. The MGS reports that water from this aquifer is also used in combination with water from the Prairie du Chien aquifer in some older municipal wells and other high capacity wells. The St. Peter Formation occurs discontinuously throughout most of the county. Where it is not overlain by the Platteville and Glenwood Formations, the St. Peter lies directly below surface deposits. In parts of Randolph and Castle Rock Townships, the water table is in the St. Peter Formation. Local recharge to this formation is greatest where it is laid below sandy surface deposits and not covered by the Glenwood formation or thick layers of glacial till. Lakes overlying the St. Peter may also serve to recharge this aquifer. Flow direction is closely related to that of the Prairie du Chien.



St. Peter Sandstone Formation in Castle Rock Township, courtesy of Vanessa Demuth

The *Prairie du Chien-Jordan aquifer* is continuous throughout the county except in the deep buried bedrock valleys. The Prairie du Chien - Jordan aquifer consists of four geologic units: the Shakopee Dolomite, the New Richmond Sandstone, Oneota Dolomite, and the Jordan Sandstone. The Prairie du Chien and the Jordan are generally treated as a single aquifer, however, in some areas of the county there is evidence that the two Formations are hydrologically separated and act as independent aquifers.

The potential yield of the Prairie du Chien-Jordan aquifer indicates that yields of greater than 2,500 gallons per minute are found throughout most of the county (10 gallons per minute is the minimum required for domestic wells). Lowest yields in the formation occur where the aquifer thins along the flanks of buried bedrock valleys. Conversely, in these areas the potential yields of the glacial drift deposits found in the buried valleys are the greatest. The city of Lakeville reports yields of approximately 1,200-1,400 gallons per minute.

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The *St. Lawrence-Tunnel City aquifer* is located directly below the Jordan Sandstone. The St. Lawrence Formation is a shaley dolomite and forms a leaky confining layer between the Jordan Sandstone and the Tunnel City Formation. The St. Lawrence Formation grades into fine sands and silts in the Tunnel City Formation. In many areas the two formations are indistinguishable and are considered to be a single aquifer. This aquifer is believed to extend throughout the entire County, except at the east end of the buried bedrock valley in Ravenna and Marshan Townships.

The St. Lawrence-Tunnel City aquifer is used primarily for domestic supplies; however, the MGS reports that some multi-aquifer wells use this aquifer to supplement flow from the overlying Prairie du Chien or underlying Wonewoc Formations. This aquifer is used primarily in the northeast portion of the county, although some multi-aquifer wells may be located elsewhere in the county. Yield in this aquifer is low to moderate and varies from less than 50 gpm to less than 200 gpm. Lower yields are generally associated with wells completed in the St. Lawrence Formation.

The *Wonewoc-Galesville aquifer* is a relatively thin (50 foot) sandstone aquifer that lies directly below the St. Lawrence-Tunnel City aquifer. It is likely the two aquifers are hydrologically connected, but the degree of this connection is not known. The MGS's Minnesota Well Index contain no record of wells being completed in this aquifer, however, data indicates that this aquifer is used to supplement flow in some high capacity wells.

The *Mt. Simon-Hinckley aquifer* is the deepest, high-yielding aquifer in Dakota County. The MGS has calculated yields of between 650 and 1,800 gpm from this aquifer. It occurs throughout the entire County with a saturated thickness varying from 215 feet in South St. Paul to about 255 feet in Burnsville. The static water level is about 650 feet in elevation in Eagan and about 708 feet in Vermillion. Generalized flow in this aquifer is to the north and northwest.

Because of its depth and the availability of water from other aquifers the Mt. Simon - Hinckley aquifer is not used for domestic supplies. High capacity industrial, municipal, and multi-aquifer wells have been reported as completed into this aquifer; however, the DNR now prohibits any new wells from being drilled into this aquifer unless no other feasible or practical alternatives exist.

3. Hydrogeologic Setting

Groundwater is affected by a number of factors as it falls to the ground as rain, infiltrates through the surface and soil, and is transported through an aquifer. Thus, air quality, soil composition, and aquifer properties have a major impact on the water yielded by wells. Air quality is relatively good in Dakota County. The EPA has determined the TCMA is minimally impacted by air pollution. In general, the average precipitation has a pH between 6 and 7, or, slightly acidic.

As water enters the aquifer from the soil, it seeps through pore spaces and voids in the geologic material. The level below which the geologic material is saturated is the water table. Below the water table, water moves from high to low head pressure; head pressure is often thought of in terms of elevation. In general, groundwater moves from a recharge area at higher elevation to a lower elevation.

The overriding drainage system of the county is from west to east. Figure 39 shows contours of head in the Prairie du Chien and Jordan Aquifers as calculated by the Dakota County Groundwater Model. The heads in the Prairie du Chien and Jordan Aquifers are similar. The direction of water movement is always from higher to lower head; the figure shows that groundwater flows from the center of the county toward the Minnesota and Mississippi Rivers to the north, and the Cannon River to the South.

The Vermillion River bisects the county from southwest to northeast. The Vermillion River receives local recharge from surficial and shallow bedrock aquifers in the upper portion of its drainage which delivers cool water to its flow and designated trout stream reaches. The Vermillion

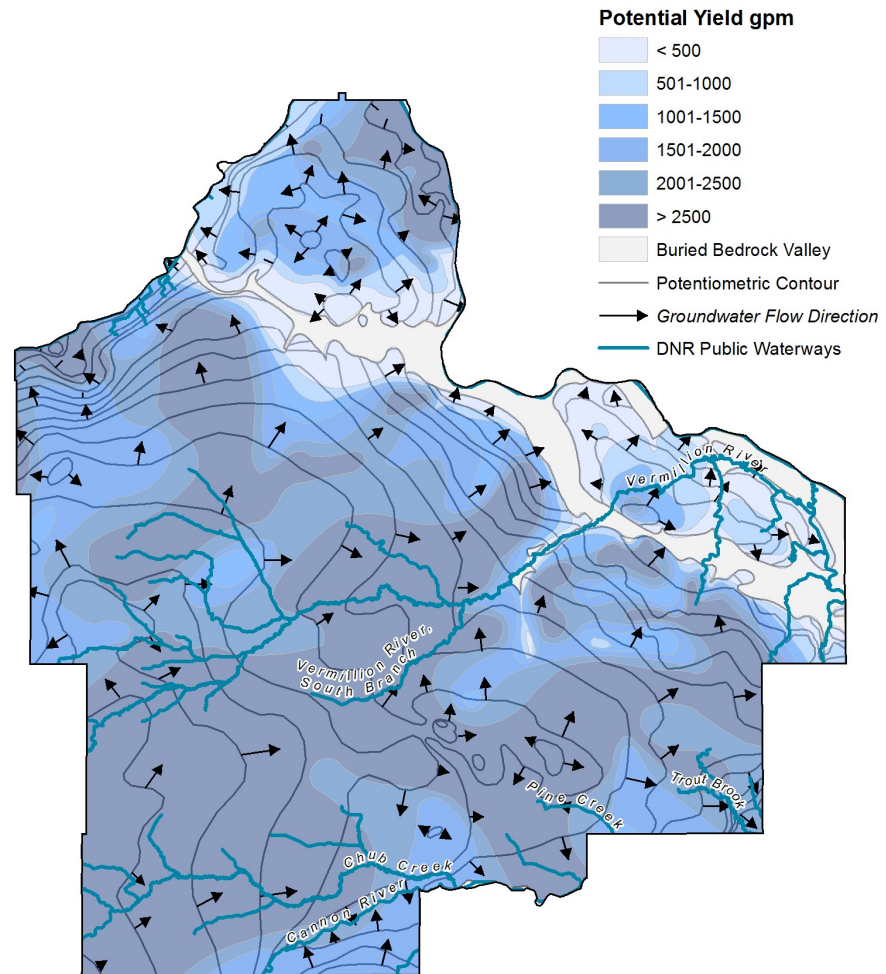


Figure 39 Bedrock Hydrogeology: Prairie du Chien-Jordan Aquifers, Potentiometric Surface, Flow Direction and Yield (gallons per minute) (1990 Dakota County Geologic Atlas, Plate 6)

River becomes a losing stream in a portion of its lower reaches which provides recharge to underlying aquifers. The rate and direction of groundwater flow is controlled by recharge (primarily rainfall), discharge (primarily into these rivers), and by the characteristics of the aquifers. The deeper aquifers receive their water from the shallower aquifers through downward movement, and they give up their water to wells or to shallower aquifers through upward movement. In Dakota County, most downward movement occurs in the central and southeastern regions, while upward movement is typical where the groundwater discharges into the major river systems.

4. Prairie du Chien Wells Not Permitted

The Minnesota Well Code, Minnesota Rules Chapter 4725, restricts the areas where limestone or dolomite water supply wells can be constructed, because of those formations' sensitivity to contamination from the surface.

“A water-supply well used to provide potable water must not be completed in limestone or dolomite bedrock unless the limestone or dolomite bedrock is overlain by at least 50 feet of unconsolidated material, sandstone, or shale that extends in all directions around the well for a minimum one-mile radius. ...”

Affected aquifers in Dakota County are the Platteville and Prairie du Chien aquifers. No potable water supply well has been drilled in the Platteville aquifer since 1969, but the Prairie du Chien aquifer remains in common use. County staff maintain an on-line map titled “Wells Permitted & Not Permitted, Prairie du Chien Aquifer” that shows which areas are permitted and which are not. The map, shown below, is updated approximately annually, based on information derived from new well construction records.

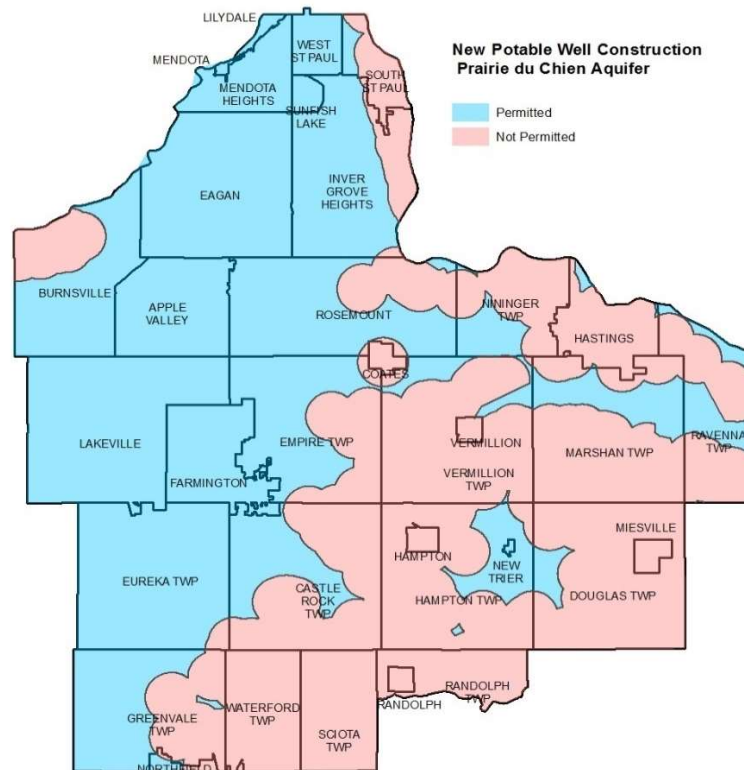


Figure 40 Prairie du Chien Wells Not Permitted

Dakota County has several buried bedrock valleys that cut entirely through the Prairie du Chien limestone. County staff interpret the one-mile radius to be measured through a limestone formation, and measures it around buried valleys where the limestone is absent, not directly across them.

F. Groundwater and Surface Water

Groundwater and surface water are interconnected throughout Dakota County. One dramatic example of this is the Vermillion River: the upstream reaches are groundwater-fed, but below the City of Vermillion, the Vermillion loses water to the underlying aquifers. Because the South Branch subwatershed of the Vermillion is high in nitrate, the downstream losing reach is believed to be one of the mechanisms that elevates the nitrate levels in the City of Hastings' municipals wells. Other interactions are discussed below.

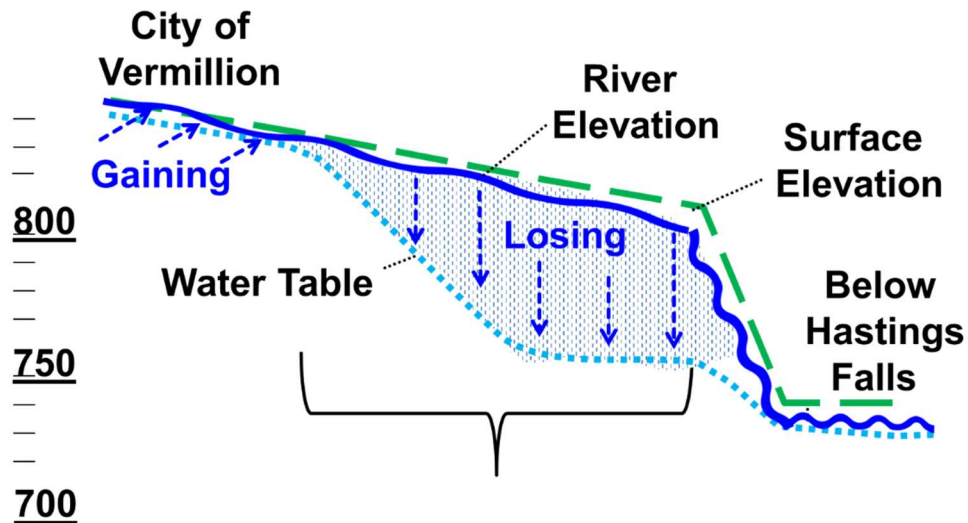


Figure 41 Gaining and Losing Reaches of the Vermillion River – Conceptual Image

1. Groundwater-Dependent Ecosystems

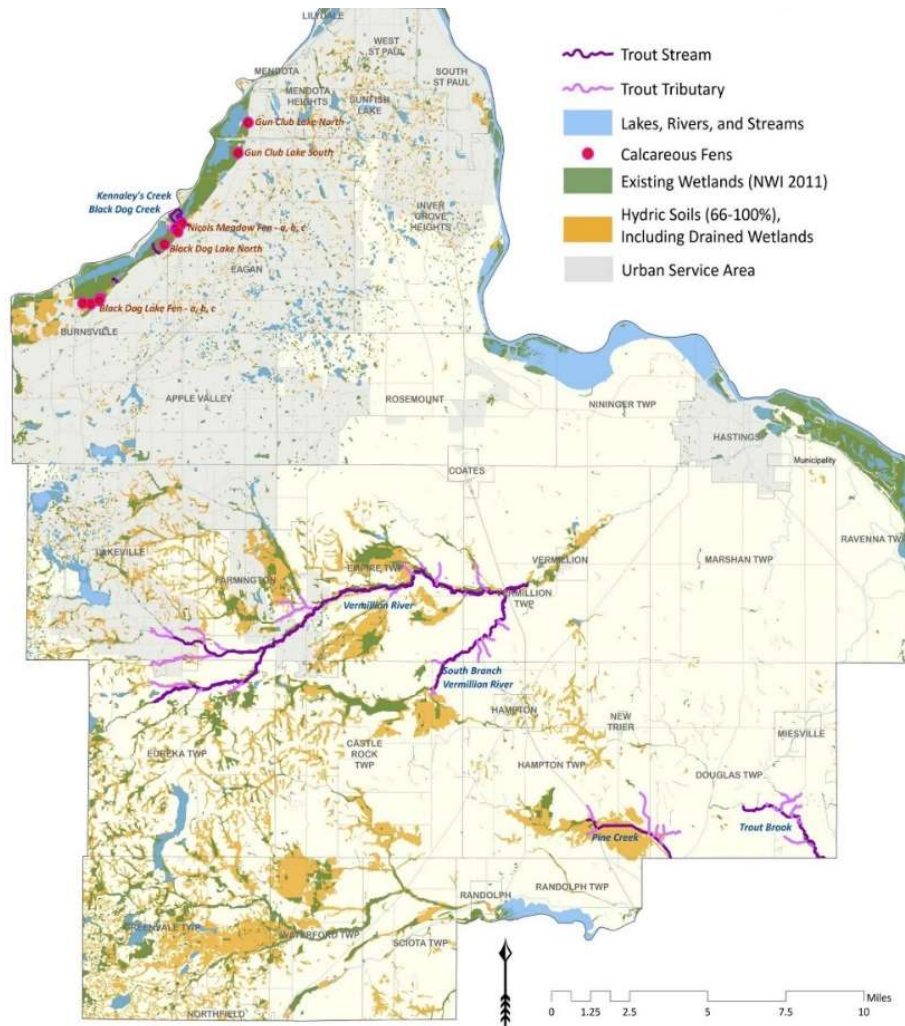


Figure 42 Wetlands, Fens, and Trout Streams in Dakota County

a. Wetlands

Wetlands are formed when hydric soils, hydrophytes (water-loving vegetation), and wetland hydrology are present.

Wetland benefits include:

- Storage for excess water during flooding;
- Filtering sediments and nutrients such as nitrate and phosphorus before they enter lakes, rivers, streams or groundwater;
- Fish and wildlife habitat; and
- Public recreation.

An estimated 85 percent of the county’s original wetlands have been drained or filled. The presence of hydric soils often indicates where wetlands used to exist, as shown on the adjacent map. Many areas with hydric soils no longer support wetlands. According to the Minnesota Wetlands Conservation Plan, restoration in Dakota County should be the primary wetland management strategy.

The following table summarizes wetland types in Dakota County, with acreages from the 2011 National Wetlands Inventory.

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Table 16 Dakota County Wetlands by Type

Class	Acres	Description
1	8,047	Seasonally flooded basins or flats. Soil seasonally covered with water or waterlogged, usually well drained during the growing season. Vegetation varies with season and flooding.
2	6	Fresh meadows. Soil without standing water during most of growing season but waterlogged near the surface. Vegetation includes grasses, sedges, rushes, and broad-leaved plants.
3	6,127	Shallow fresh marshes. 6" + of water in early growing season. Vegetation includes grasses, bulrushes, spike rushes, cattails, arrowheads, pickerelweed, and smartweeds.
4	1,060	Deep fresh marshes. 6" to 3' of water during growing season, with cattails, reeds, bulrushes, spike rushes, wild rice. Open water has pondweeds, naiads, coontail, water milfoils, waterweeds, duckweeds, water lilies, or spatterdocks.
5	8,365	Open fresh water. Shallow ponds and reservoirs. Water is usually less than 10' deep and fringed by a border of emergent vegetation similar to open areas of deep fresh marshes.
6	1,249	Shrub swamps. Waterlogged during growing season with 6' + of water. Vegetation includes alders, willow, buttonbush, dogwoods, and swamp-privet.
7	7,966	Wooded swamps. Waterlogged near surface in growing season, often up to 1' of water. Trees include tamarack, arborvitae, black spruce, balsam, red maple, and black ash.
1/6-7	2,344	Various combinations of types 1 through 7.
Riverine	-----	Riverine. Wetlands within a channel, bounded landward by uplands, by channel bank (including levees), or by wetland dominated by trees, shrubs, emergents, emergent mosses, or lichens.

Source: National Wetlands Inventory 2011 data

b. Trout Streams

Minnesota Rules Chapter 6264 identifies waters classified as designated trout streams and trout stream tributaries. Dakota County has the designated trout streams listed in the table below.

The Vermillion River includes a highly valued trout fishery and supports a self-sustaining brown trout population. Trout streams are particularly reliant on groundwater flow because the temperature of this source water is cool in the summer (and relatively high in winter). Potential issues facing the present nature of trout within the watershed are changes in groundwater transport rates or supply to the river. Shifts that increase

impervious surface runoff and/or groundwater withdrawals will reduce the quantity and quality of trout habitat. The Vermillion River can benefit from projects that include wise groundwater use and development that encourages infiltration over runoff.

Table 17 Designated Trout Streams

Designated Trout Stream/River	General Location
Unnamed Stream #4	Burnsville
Unnamed Stream #7	Burnsville
Black Dog Creek	Eagan
Kennaley’s Creek	Eagan
Unnamed Stream #1	Eagan
Pine Creek and Unnamed Tributaries	Douglas and Hampton townships
Trout Brook and Unnamed Tributaries	Douglas Township
Vermillion River	Farmington and Eureka, Empire, and Vermillion townships
Vermillion River South Branch	Castle Rock, Empire, and Vermillion townships
Vermillion River North Creek and Middle	Farmington
Vermillion River South Creek	Lakeville, Farmington, and Eureka Township

Agencies and groups have worked to protect or enhance trout habitat in the county. Kennaley’s Creek and the unnamed creeks are cold, spring-fed streams primarily within the Minnesota Valley National Wildlife Refuge. Designated trout segments of the Vermillion River are stocked with rainbow trout and also support a naturally reproducing brown trout population.

Trout Brook and Pine Creek feed into the Cannon River in Goodhue County and are managed by DNR’s Central Region. Both streams were stocked with trout at one time and now support naturally reproducing trout populations.

c. Calcareous Fens

Calcareous fens, one of the rarest natural communities in the United States, are wetlands fed by groundwater with large quantities of dissolved calcium carbonate (CaCO₃, or lime). Calcareous fens often have rare plant species adapted to the unique environment and receive protection under the Minnesota Wetland Conservation Act. Indicator plant species, soil characteristics, and groundwater relationships are used in fen identification. Calcareous fens are a special resource because their unique characteristics are difficult to restore if degraded and essentially impossible to re-create.

Calcareous fens are highly susceptible to disturbance. Reduction in the normal supply of groundwater results in oxidation of the surface peat, releasing nutrients and fostering the growth of shrubs and tall, coarse vegetation that displaces the fen plants. Nitrogen-rich surface water runoff into fens promotes the invasion of aggressive exotic plants, especially reed canary grass, that also outcompete the fen plants. Flooding drowns

the fen plants. The soft, saturated character of the peat makes almost any level of activity within them, by humans or domestic livestock, highly disruptive.

In Dakota County, the DNR identifies the Black Dog Lake Fens, Gun Club Lake Fens, and the Nicols Meadows Fens, all located within the Minnesota River Valley.

G. Groundwater Recharge Areas and Opportunities

1. Groundwater Recharge

Groundwater recharge describes the replenishment of water in an aquifer. This replenishment may occur through natural or artificial (enhanced) recharge.

Natural recharge generally comes from snowmelt, precipitation, or storm runoff, infiltrating throughout a landscape with permanent vegetative cover (grasses, perennial plants, shrubs, or trees). The water generally has little to no contamination to begin with. Most pathogens, nutrients (especially nitrogen and phosphorus), and organic chemicals will be removed or reduced by natural biochemical processes as water moves through the soil and plant roots. (The MPCA and UMN estimate that, in agricultural areas, transitioning from annual crops to perennial vegetation -- food, forage, biomass -- can reduce nitrate loading to the underlying groundwater by 70 to 95 percent.)

Natural recharge areas are generally low maintenance, although noxious weeds may require control.

Wetlands, from a groundwater recharge perspective, occur in areas with dense, absorptive soils (high in clay and/or organic muck) and a shallow water table. Wetlands are generally poor in terms of the amount of water they infiltrate to underlying aquifers, but can be very effective in improving water surface quality – some of which will infiltrate to the groundwater -- in addition to providing wildlife and ecological benefits. The MPCA and UMN estimate that preserving or restoring wetlands in agricultural areas can reduce nitrate loading to the underlying groundwater by approximately 50 percent.

Artificial or enhanced recharge describes engineered systems that are designed to spread or impound water on the land to increase infiltration through the soil and percolation to the aquifer, or that inject water by wells directly into the aquifer. These can be relatively small retrofit projects that are constructed to mimic natural recharge in built environments, such as amending compacted soils with organic matter, constructing and maintaining raingardens and tree trenches, and using pervious pavements. They can also be large, sometimes quite technical

projects that are engineered and constructed to replenish aquifers with a larger volume of water than the overlying land area would naturally receive. Examples of artificial recharge include infiltration or spreading basins, injection wells, or in-stream projects.

Artificial recharge projects can help control and replace the volume of water displaced by impervious surfaces, however, the quality of the recharged water must be protected and monitored. Artificial recharge water may need pretreatment before being allowed to infiltrate into the soil. In geologically vulnerable areas (i.e., highly permeable soils, fractured bedrock, or shallow aquifers), the soils themselves may not be sufficient to provide the biochemical treatment they could provide to smaller volumes of infiltration. Artificial recharge projects are not appropriate in areas with existing plumes of groundwater contamination when the increased water volume may cause the plume to expand or migrate in unpredictable ways.

In addition to water quality concerns, artificial recharge projects may not be appropriate in areas of karst. Sinkholes or other collapse features may develop at places where runoff or recharge is focused.

Artificial recharge projects require regular maintenance to remove silt and contaminated sediments. Water quality of the recharge should be monitored.

2. Regional Feasibility Assessments

The Metropolitan Council conducted a series of regional feasibility assessments to evaluate regional drinking water supply, groundwater recharge and stormwater capture and reuse. The objective of the Southeast Metro Regional Feasibility Assessment (Southeast Metro Study) was to evaluate the potential to enhance groundwater recharge to drinking water aquifers in Dakota County. The study used hydrogeological criteria to identify areas where water could infiltrate and potentially reach a bedrock drinking water aquifer. Figures 21-22 in the Southeast Metro Study report identify potential areas for enhanced recharge with- and without- consideration for the current land use or other human or environmental influences.

The Southeast Metro Study also included identification and analysis of drinking water supplies, including the continued development of groundwater sources, effects of water conservation on groundwater resources, and evaluation of surface water supplies to meet future demands. The study evaluated the feasibility of using the Minnesota River and Mississippi River to help meet municipal water demands through 2040. The estimated capital and project costs to develop a surface water supply could be as high as \$1.2 billion, depending upon the scenario, due to water distribution (piping) and water treatment requirements. Therefore, it may be less expensive to employ groundwater conservation efforts now versus try to develop surface water source supplies in the future

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APPENDIX A. REFERENCES

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APPENDIX B. STAKEHOLDER ENGAGEMENT FINDINGS AND DIRECTION

This appendix summarizes efforts to engage the general public, key stakeholders, partners, and officials and presents selected findings from these efforts. Discussion is organized by the following groups:

1. **General Public and Stakeholders**, engaged through various methods to: 1) review research findings and identify issues, and 2) review potential strategies and identify priorities. County staff performed an initial stakeholder and project evaluation to develop a preliminary public engagement plan, and contracted with *Freshwater*, an environmental advocacy and consulting organization, to design and implement the two phases of engagement.
2. **Groundwater Plan Technical Advisory Group**, a 19-member ad hoc body selected by County staff to represent a variety of groundwater stakeholder perspectives, review findings from public engagement, and provide technical recommendations for the Plan, in accordance with Minn. Stat. § 103B.255. The Group met five times throughout the planning process, and its members were invited to attend and participate in selected meetings of the County Planning Commission.
3. **Dakota County Planning Commission**, a 14-member permanent resident advisory group appointed by the Dakota County Board of Commissioners to provide recommendations on County planning initiatives. Its primary role in the Groundwater Plan was to provide policy-level recommendations while representing the perspectives of County residents, in accordance with Minn. Stat. § 103B.255 . The Commission received updates at three of their regular meetings and were also invited to participate in selected Technical Advisory Group meetings. Presentations to the Commission included findings from public engagement and recommendations from the Technical Advisory Group.

A. General Public and Stakeholders – First Round: Issues Identification

Content from the report prepared by *Freshwater*.

1. Introduction

Dakota County gets 90 percent of its drinking water from groundwater sources; a clean and reliable supply of water is critical for the future of Dakota County’s residents, businesses, and the environment. Over the course of six weeks from April to June, 2019, stakeholders in Dakota County had the opportunity to provide input for the Dakota County Groundwater Plan update through two kickoff open houses, four workshops, two additional nitrate testing clinics, and an online survey. More than 300 people shared their input on the challenges facing groundwater and

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opportunities to protect it for today and generations to come. Across each of the four methods (open houses, workshops, nitrate testing clinics, and online survey), participants were asked versions of the following questions:

1. What do you hope this plan will be able to accomplish for you and your community?
2. What do you think are the major issues or concerns facing groundwater in Dakota County?
3. What future actions, steps, or strategies make sense to secure safe and reliable groundwater in Dakota County?

By using open-ended questions, a wide range of comments could be received. Comments included in the analysis for this report were written by participants themselves and maintained verbatim throughout the analysis. Several of those comments are included in blue text boxes throughout the report as well. For clarity, this report is organized by the themes which emerged across the three questions.

2. Participant Expectations for Groundwater

On the whole, participants want a future that ensures there will be enough water for human uses and groundwater-dependent natural resources, and that the water will be safe for human consumption. They want everyone in the County, from residents to staff to elected officials, to be empowered to play a role, and they want to know that the data and science support actions they take. They view this plan as a necessary step for delivering that desired outcome, with results that will last for generations to come. Some overarching themes that participants suggested fit with all of the content:

- **The need for prioritization:** While participants recognize that it is important to have strategies to address each groundwater issue across the county, they also noted the needs for prioritization and targeted implementation actions, with one participant asking if the County plans to “*do everything or [do] everything well.*” Clear goals with specific actions should also be developed so that it is easy for everyone to work towards those priorities.
- **The importance of data and science:** Once clear issues and goals have been identified, participants want to see Dakota County use data to identify priority locations for quality and quantity management. Participants want action, but they want the actions the County chooses to take to be informed by science, whether modeling and projecting future impacts or monitoring for current conditions and evaluating past actions.
- **The importance of addressing high costs:** Funding is called for across all the strategies. Participants understand there will be costs associated with efforts to protect groundwater quality and quantity, from infrastructure investments to maintenance to staff capacity. However, they are concerned that costs will serve as a deterrent for participation and that residents, low-income families, and rural communities will bear the brunt of the financial load unless strategies to offset those costs are identified.

- **The need to authentically include everyone:** Participants are looking for “peace of mind” when it comes to the quality and quantity of their water supply. As such, they want this plan to be easily understood and accessible to all through the use of plain language, ease of navigation, and active distribution to those who will need to be involved in implementation. All strategies should be grounded in buy-in and trust, which are essential to the success of this effort.

3. Balancing the Groundwater “Checkbook”

Desired outcome: a future that ensures there will be enough water for human uses and groundwater-dependent natural resources

Water quantity concerns

Across the three questions (page 1), the vast majority of the comments from in-person participants focused on the importance of a sustainable supply of groundwater—now and for future generations. In the survey as well, 70 percent of respondents noted moderate to strong concern about water supply. In order to ensure that future supply, the topics they focused on included both the rate of use as well as the rate at which groundwater is being replenished, with a hope that the County will be able to balance the groundwater “checkbook” through their chosen strategies.

By far, the biggest concern is simply the rate at which water is being used, as that leads in to the other major issues of concern for participants, including:

- Competing interests between different types of user groups
- Recharge not keeping up with pumping and loss of natural recharge areas
- Continued growth and development, and balancing land uses and economic drivers with quantity
- Impacts on groundwater resulting from climate change
- Practices in urban and rural settings that interfere with infiltration

Strategies to address quantity concerns

Participants feel that this plan should provide specific actions and strategies appropriate to different major user groups. Included in this list of strategies are efforts to better monitor groundwater levels, promote and allow for water reuse to reduce demand on groundwater, increase infiltration where it is safe to do so, and promote behavior change through policies, regulations, and incentives.

As far as water soaking into the ground, participants want to see an increase in infiltration and recharge but also shared concerns about where it is safe to do so, and the level of resilience in the face of extreme weather events. Given karst topography and highly vulnerable soils, there is high risk for pollution. Yet, not infiltrating isn’t an option, as pumping is outpacing recharge in much of the County and drinking water as well as groundwater-dependent natural resources are threatened.

Participants are concerned that there is no backup plan for public water supply if groundwater is depleted and know that action is needed to better steward the water available. They identified the following approaches for addressing quantity concerns:

Conservation: In addressing current water use, regulating and enforcing use of water for urban lawn irrigation was offered several times, along with the use of conservation technologies for urban and rural irrigation and appliances. Incentives to decrease use for individuals as well as major water users were also suggested. Sustainable development is encouraged for addressing conservation going forward while still allowing for more growth.

Reuse: The safe reuse of water (including stormwater, greywater, and wastewater) is clearly desired as a strategy to reduce demand as well as increase stewardship of the water that’s already been pumped and treated, especially for major water users and for those uses that don’t necessarily need the highest level of treatment (lawn irrigation, vehicle washing, etc.). Requiring reuse in new housing developments is also suggested as a way to manage demand without further impacting groundwater levels.

Recharge: As development occurs, protecting key recharge areas will also be important. Here, overlay districts, wellhead protection implementation for public supply systems, regional infiltration, and other ways of incorporating safe infiltration into land use planning was mentioned several times. High quality areas for infiltration and those that would support groundwater-dependent natural resources should be identified, and opportunities to restore wetlands and add ponding should be considered where appropriate.

“Take a good look at water use by monitoring the water use by municipalities and industry. The groundwater levels should be monitored at all times so the public can see how much water is being used.”

“Broad groundwater recharge area protection. More, more, more.”

Where these three strategies are not able to help balance the groundwater “checkbook,” alternative supply from the Mississippi River or another surface water source was also suggested by participants.

4. Ensuring a Safe Supply

Desired outcome: *water is safe for human consumption*

Water quality concerns

An overwhelmingly clear takeaway from across all engagement methods was the value participants place on clean, safe drinking water—for their health, the health of future generations, and for a satisfactory quality of life. While there were more *comments* regarding water quantity as mentioned above, respondents to the survey were strongly concerned about water quality threats, with more than 90 percent indicating that they were either somewhat or very concerned about water quality. People want to know that their water is safe.

Participants are predominantly concerned about the impact of agricultural practices on groundwater, and the way nitrate persists over time, going deeper. There is also noted concern about septic system, road salt, lawn chemical, spill, landfill, and industry impacts, as well as a call to

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identify specific sources of contamination. Regardless of the source, and whether the contaminant is naturally occurring or not, participants want to know that there are efforts to mitigate existing pollution, address vulnerability to future contamination and extreme weather events, and support cost-effective strategies to treat and prevent future contamination. As contaminants of emerging concern are better understood, participants want to see standards set and guidance provided to address them. Lastly, in source water and drinking water protection, there is concern that those with the fewest resources will be saddled with the cost. In addition to cost-effective solutions, equity in implementation will be important.

Strategies and approaches for securing a safe supply

Participants want to clean up past pollution, identify and address current problems, and address vulnerability and exposure to future contamination. They want this plan to lay out clear and achievable goals with action items and funding that can protect and secure a safe water supply. They also want to see this plan lead to education and support for individuals to act on their own to prevent and treat contamination, including increased opportunities for private well water testing to help people understand if they have issues to address.

While all of the above is important to consider in developing the plan, it should be noted that participants seemed to be most focused on these four primary recommendations as they relate to groundwater quality:

- Address agricultural sources of contamination and promote regenerative agriculture,
- Protect wellhead and supply management areas from contamination and reduce their vulnerability,
- Continue to collect data to understand the issues and monitor progress, and
- Support the development and adoption of technology that can identify, mitigate, and reduce new contaminants.

“In the state of Minnesota in general, you can jam a pipe in the ground anywhere and get limitless quantities of fresh water. In fact, we have so much fresh water that we donate billions of gallons to our Southern neighbors (it’s called the Mississippi River)...The greater concern is that groundwater is protected from pollution.”

“Incentivize planting cover crops, long-rooted perennial crops and other conservation farming practices”

“I hope this plan will be robust enough to tackle damage done and mitigate future contamination.”

To accomplish these, participants called for the actions listed under the “Inspiring Behavior Change” and “Using Science to Support Policy and Action” sections below.

5. Inspiring Behavior Change

Desired outcome: everyone in the County is empowered to play a role and engage in solutions

In order to accomplish the work on the previous pages, changes are necessary in how all people (government, residents, businesses, and industry) interact with water and the landscape. A significant portion of the comments received cited not just the importance of this behavior change but also stressed the need to inspire action and set up a framework which facilitates the ability for others to address groundwater quality and quantity concerns.

Challenges with motivating change

In making change happen, inertia in the existing systems, cost of change, and social pressures can all serve as barriers to protecting groundwater quantity and quality. Additionally, there is concern as to whether there is enough buy-in at staff, elected official, and community levels to accept tradeoffs that come with groundwater stewardship. Recognizing the entrenched or significant nature of these barriers, participants placed a heavy emphasis on various regulations (and enforcement of those new and existing regulations) as well as different incentives that would encourage behavior change to take place. In other words, participants ask for stronger efforts to require or encourage needed changes. That's not to say there isn't a place for education or the County serving as a convener. In addition to these stronger policies, participants want to see guidance which leads to behavior change as well as collaborations that can attract funding and leverage resources for regional impact.

“Water quality, wetlands protection, and sustainability should be key considerations in any future development in Dakota County.”

Strategies and approaches to inspire behavior change

Above all, participants want to see clear, prioritized goals with specific actions, all within a plan that is ready to be implemented upon adoption. They want to see continued engagement that seeks to build local buy-in and leadership among different stakeholder groups. Across these efforts, they see the building of trust between the County and others as an important outcome and something needed for that continued engagement.

While participants were not prompted to consider a variety of roles the County could play to pave the way for action, their responses all coalesced around the following four roles, characterized by the level of authority and control over behavior change that exists or is desired:

- **Regulate:** where authority allows, and regulation is desired
- **Fund and Promote:** where authority to regulate does not exist or is not desired, and major change is needed
- **Educate:** including community, decision-maker, and professional education
- **Support:** including facilitation; research; monitoring and data collection; advocacy

Suggested strategies or efforts for each type of approach are described in more detail below.

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Regulate: For many, voluntary action will not suffice; straightforward, strong regulations based on science may be needed to achieve the scale of action necessary. This largely relates to policies regarding water use, irrigation and farming practices, and wellhead protection areas. Updating policies to encourage or require sustainable development, water conservation, and water reuse is also suggested as a way to regulate the desired behavior changes and practices. Participants also want to see a streamlining of regulations and the regulatory process through efforts to integrate with existing plans, limit regulatory overlap, and clarify roles for the different agencies and jurisdictions. Lastly, a recurring theme regarding regulation was the importance of making sure that existing regulations are enforced, and that there is a plan for enforcement for any new regulation.

*“Regulate in-ground watering systems—
I often see them running while it is
raining!! (Especially at businesses)”*

*“It’s important that clean
and sufficient water
becomes economical”*

Fund and Promote: Participants clearly appreciate that there is a high cost to addressing groundwater quality and quantity challenges at the scale necessary, even for cost-effective practices they want to see adopted. Whether through securing funding to offset costs, offering incentives, or increasing access to information that can lead to behavior change, Dakota County can play a role in promoting actions to protect groundwater quality and quantity. This is especially true for those changes which require upfront costs (especially in rural and low-income communities), such as water reuse, technology upgrades for irrigation systems, septic system maintenance and replacement, agricultural changes such as switching to perennial crops and other conservation practices, testing of private wells, increased staff capacity, landscaping changes, and subsidizing appliance upgrades. Participants see some of this money coming from revenue generated through “environmental fees” on fertilizers or through tiered water rates for those irrigating their lawns, but also are calling for the leveraging of other funding sources to help offset these high costs.

As a different way to provide incentives for behavior change, one suggestion was to tap into the community’s competitive nature and inspire desired behavior changes through competition. City-to-city, county-to-county, or other competitions for water use may be able to creatively build momentum more so than other actions. Likewise, recognizing early adopters and sharing success stories may encourage others to adopt new practices.

Support: Others are working on this same challenge, and instead of reinventing the wheel, Dakota County staff can convene the other agencies, cities, potential funders, etc. to develop or tap into programs to support behavior change. Likewise, the County can convene others for the purpose of exploring challenges and identifying ways to collaborate on solutions. The County can also help to collect the data that are needed to understand what actions or strategies are most appropriate moving forward. In addition to the interagency coordination mentioned under “Regulate” above, participants also support increased collaboration between the County and its community members, involving all in a partnership to protect groundwater and align efforts to achieve mutual goals.

Educate: Lastly, where gaps in knowledge or awareness are the biggest challenge, being able to “cut through the noise” to provide guidance and suggestions for practices to undertake may be all that is needed for some people to act. That will help with the uncertainty about WHAT to do that is experienced by some—uncertainty that is compounded by conflicting guidance from different agencies and gaps in current

understanding. Here, in addition to resources to address challenges and opportunities, neighbor to neighbor or business to business education may help people respond to the information being provided more strongly. Participants want to know that this plan will lead to education that will reach people throughout the County with ways that everyone can participate in making a difference, complete with specific strategies for different types of efforts in both urban and rural parts of the County.

In “facilitating progress” as one participant put it, Dakota County will need to consider each of these roles and work to establish trust and buy-in with the community and partnering entities. Frequent and transparent communication will be an important component to that success. However the County does it, the overarching call is still to ensure that action is, in fact, being taken, and the plan is being implemented. It is clear that stakeholders want to make sure that this plan will effectively be used and result in benefits for groundwater quality and quantity.

6. Using Science to Support Policy and Action

Desired outcome: data and science support the strategies and actions taken to improve quantity and quality

Data and information concerns

There are gaps in information which result in challenges for both planning and implementation.

Participants want to see the County use modeling to understand projected impacts to groundwater quantity and quality (from population growth, increased urbanization, extreme weather events, and changes in precipitation patterns), and then use that understanding to support the proposed actions and policies. Good data (pertinent and representative) can help County staff to prioritize activities and locations during the planning phase, then inform plan adjustments during the implementation phase. However, data collection activities should be planned thoughtfully and in a cost-conscious manner, so the results are meaningful and actionable without creating unfunded mandates. While there was a desire for strong data, there is also a concern about the cost of data collection. Once collected, though, data need to be shared across agencies and with the public in an efficient and easily understood manner.

“Policy based on science”

Strategies for data collection and use

Participants want to see the use of multiple kinds of monitoring to:

- **Identify problems and sources of those problems:** Participants identified challenges of the County not having enough information to determine vulnerable areas, as well as not knowing the location of failing septic systems and unsealed wells. Identifying problems and sources will help the County target strategies for increased impact.
- **Provide awareness of current conditions:** Continuing to collect data—whether through private well testing, existing or new monitoring efforts, the deployment of new technology that can help monitor for emerging concerns and medications, or otherwise—will be important for identifying changes in quantity and quality.

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- **Evaluate for impacts of actions taken:** Participants are calling for actions that are cost-effective, and they want to know what is working as much as can be measured in a rapid timescale.

In communicating the results of these monitoring efforts, participants want the information to be widely available and written in plain language to help empower stakeholders to take the appropriate actions.

“Continue to collect data and trends on groundwater quality and quantity and adapt plan accordingly.”

County Residential Survey

In addition to engagement events discussed above, the County conducted a statistically-representative County Residential Survey in early 2019. A new question evaluating support for several potential programs or regulations for the Groundwater Plan was included. Results are below:

Question: Dakota County is working on a long-range Groundwater Plan to protect and improve groundwater resources, the source of our drinking water. Please indicate which, if any, of these programs/regulators you would support:	Percent Indicating Support
1. Using County funds to keep cities’ drinking water sources free of contaminants (which lowers consumer costs)	79%
2. Using County funds to protect land to limit contamination of groundwater supplies	55%
3. Stretching groundwater supplies by restricting use of irrigation systems (on farms, on suburban lawns, at sports fields, at commercial buildings)	36%
4. Using County funds to reduce the cost of in-home drinking water systems for private well owners	14%
5. I don’t support any of these	6%

In addition, one of the questions related to the land conservation program asked how important it is to continue to use County funds to preserve land for “protecting and improving water quality.” Water quality benefits of land conservation rated the highest among its potential environmental benefits, with 63 percent of survey respondents stating it was “essential” and 29 percent of respondents stating it was “very Important”.

Methods

To gather initial public input for the plan, Dakota County utilized three different methods designed to engage community members and other stakeholders in the process. This was done to reach people where they were most comfortable and able to participate, and to include those who have not necessarily engaged with Dakota County groundwater planning efforts in the past:

- **Open Houses:** Two Open Houses were held to gather input from residents in a casual setting. One was held in the northern, more urban part of the County (West Saint Paul) and featured free lead testing kits; the other was held in the southern, more rural part of the County

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(Farmington) and featured free nitrate testing. Both had information available regarding the current context for groundwater in the County and opportunities to provide input for the plan. Anyone who participated in the testing component of the workshops was required to fill out the survey, and those results were integrated with the rest of the survey results. Approximately 115 residents attended the open houses.

- **Nitrate testing clinics:** Two additional nitrate clinics (Hampton and Hastings) were held for residents not able to participate in the southern Open House. Here as well, surveys were required for completion of the testing service, and the results integrated into the survey analysis. More than 100 residents attended the nitrate clinics.
- **Workshops:** Four workshops were held for water professionals and interested residents to engage in more focused small table discussions to address challenges and opportunities around groundwater management in Dakota County. The workshops all followed an identical process, but were held in various locations (West St. Paul, Eagan, Hastings, and Farmington) and times to accommodate different schedules and people's availability. A total of 36 people attended the workshops, which included state agencies, local government unit representatives (county, cities, and townships), watershed management organizations, farmers and agricultural interest groups, mining organizations, well drillers, non-profit organizations, and interested residents.
- **Online Survey:** Anyone living or working in the County who wanted their input to be considered but was not able to attend any of the in-person offerings could complete an online survey, provided to increase access to the opportunity to provide input at this stage. The web address for the survey was advertised in conjunction with the in-person offerings, and participants were encouraged to share the link with others to ensure that a wide net for participation would be cast. 228 online survey responses were received. Note, most of the online survey responses are from those residents that attended the open houses and nitrate testing clinic events.

Comments included in the analysis were written by participants themselves through each of these four methods and were maintained verbatim throughout the analysis. Roughly, 1,000 comments were received in total across these methods. In addition to different quantitative and demographic questions, all participants were asked a version of the same three open-ended, solution-oriented questions:

1. ***What do you hope this plan will be able to accomplish for you and your community?***
2. ***What do you think are the major issues or concerns facing groundwater in Dakota County?***
3. ***What future actions, steps, or strategies make sense to secure safe and reliable groundwater in Dakota County?***

Analysis of those responses was done using qualitative research methods, where comments were grouped by similar themes and then summarized to develop a single narrative of all comments from all participants. The analysis of those qualitative comments was informed by the quantitative responses, to ensure that the narrative was accurately displaying the input received. The following process was used to generate the narrative included in this report:

Step 1: Participant response coding

The project team coded all participant responses into general groupings related to an overarching theme. For example, the comments “*Easy ed materials for use at water festivals and fair*” and “*Bring public on board with plan*” both relate to and received the code (or category) of “Education and Awareness,” whereas “*Water conservation strategies*” and “*Reuse opportunities*” were both coded as “Consumption and Conservation.” Individual comments had already been categorized by the participants as part of stakeholder engagement sessions, and their categories informed the project team’s assignment of codes to comments.

Step 2: Sorting the data

Responses from all engagement sessions were combined by question into a spreadsheet with participant categories and the assigned codes and sorted on the assigned codes. This is the first time the responses from all sessions were combined and showed the range of ideas across all stakeholder sessions. Coded groupings were reviewed for cohesiveness within codes and distinctiveness across all codes.

Step 3: Summarizing and reporting the data

Sorted responses were summarized for each code and compiled in the report to provide a full picture of the input received through the different methods, across the questions.

B. Second Round: Potential Strategies and Priorities

Content from report prepared by *Freshwater*.

1. Introduction

In the spring and summer of 2019, Dakota County engaged in a robust effort to learn about the goals, concerns, and ideas stakeholders have regarding groundwater in the county. Input from those engagement efforts (summarized in a previous report) informed the development of draft goals, strategies, and tactics for the draft Dakota County Groundwater Plan.

From December 2019-February 2020, the County offered a variety of opportunities for stakeholders to review the draft goals, strategies, and tactics, weighing in on what they liked, disliked, and thought might be missing. Stakeholders were also given the opportunity to express their own priorities at different scales.

Specifically, the following outreach and engagement methods were used:

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- **Pop-up engagement intercept boards** stationed at public libraries and Dakota County Service Centers throughout the month of December and January to reach people where they already are and ask for feedback on a limited amount of content (311 estimated participants)
- **Online general survey** that was distributed via online communications and postcards, available for response December-January (81 responses submitted)
- **Two Open Houses** where attendees could learn more about the plan and submit a paper version of the online survey in order to receive a lead-testing kit
 - o January 9, 4:00-7:00pm, Dakota County Extension and Conservation Center (20 attendees)
 - o February 5, 4:30-7:30pm, Lebanon Hills (40 attendees)
- **Stakeholder Feedback Workshop** held at the Western Service Center on January 30 to provide in-depth feedback through a series of exercises and small group conversations (37 attendees)
- **Workshop Non-attendance Survey** for people who wanted to provide more in-depth feedback but were unable to attend the workshop (42 responses submitted)
- **Coalition of Northern Dakota County Cities (CONDAC) City Engineers Workshop** held as a part of their regular monthly meeting to receive feedback specific to their roles and responsibilities

The outcomes from those activities, based on written and oral comments, are included in this report. While each method utilized a slightly different approach, they all addressed each goal, and the report is organized accordingly. As priorities were requested across the goals, they are addressed in their own section at the end of this report. A full summary of the surveys is included.

2. Overarching Themes

- **Participants are concerned about groundwater as it relates to health.** People want to know more about health risks, what's being done, and any updates as more information is understood. They also want to see the County prioritize certain areas first, primarily areas that are most vulnerable and affect the greatest number of people.
- **They are also concerned about groundwater quantity.** Participants expressed concerns about increasing groundwater use, citing excessive irrigation and lawn watering. They also shared a strong negative reaction to shipping Dakota County groundwater out of state. Conservation was discussed at length, and several participants note that increasing recharge is a valuable strategy as well.

- **Participants want to see the government involved in protecting groundwater.** Whether it is not allowing for development in high-value recharge and infiltration areas, engaging in more frequent monitoring, providing consistent education and communication, or continuing to plan for long-term safety and availability of groundwater, participants understand that the County has a role to play.
- **Participants also acknowledge that *they* have a role to play.**
In addition to efforts by the County, participants know that there is work that is needed at the personal, organizational, and non-County governmental levels. However, they cannot operate on their own entirely, and guidance and support from the County is needed to be successful. Strategic education and communication plans, incentives, and other efforts still generated from the County can help to this end.

3. Summary of Feedback for Each Goal

Water Quality Goal: Groundwater and drinking water are free from unhealthy levels of contamination

People tend to associate water quality with the water their family is drinking; healthy water quality is important for their immediate wellbeing. This is likely why ensuring the best water quality for Dakota County communities, businesses, and industries was identified by participants as a top priority for the County’s groundwater plan. Within that overarching understanding, their comments largely fell into the three categories explored below.

Monitoring for and reducing contamination

In addressing water quality, participants want to know and feel confident that the County is consistently monitoring areas of contamination concern and regularly informing citizens of the results. While this is addressed in Strategy 1D of the proposed plan (“Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the county”), participants stressed this as a priority in the surveys and workshops. Additionally, many participants recognize that pesticides and fertilizer from agricultural practices degrade water quality. As such, they would like to see the County prioritize reducing impacts from agricultural inputs as a way to protect private wells and other supply areas. Additional contaminants such as chlorides, microplastics, and those that are naturally-occurring were also noted.

***“Should a plan be developed to evaluate where monitoring occurs and whether sites are appropriate and if more are needed”
(Workshop 1.30.2020)***

“Testing should be low cost and convenient for private wells.”

(Public Survey)

Accessible water testing for individual households

In addition to knowing the County is doing its part to ensure healthy groundwater quality, people want to feel empowered to be a part of the monitoring process. Residents want the resources to test their own water quality at their own convenience, whether as it comes from a private well or straight from the kitchen sink. Since private well owners are responsible for testing their own water, making sure there is ample support and assistance from the County is something important to participants.

Cost effectiveness

Participants understand that monitoring water quality can be costly, and they value the use of cost-effective approaches as appropriate. They suggest that the County maximize return on investment by focusing on priority areas first. Whether this be focusing on the most hazardous chemicals, areas with the largest concentration of chemicals, or the most vulnerable locations, being conscious of where the County is getting the most bang for their buck is an important part of the equation.

***“Reduce cost by mapping most important regions to test”
(Workshop 1.30.2020)***

Water Quantity Goal: Sufficient groundwater to meet human needs and sustain groundwater-dependent ecosystems

Participants want to be assured that the County plan provides for long-term groundwater sustainability. Their comments address both sides of the coin—withdrawals and recharge—with significant discussion regarding the emerging issue of shipping groundwater out of state.

Reducing water use

As population starts to increase in Dakota County, more people in the area will mean more demand for groundwater resources. Many comments voiced specific concern about overuse of residential and commercial irrigation in the County for the purposes of keeping lawns green. Specific suggestions for strategies include template ordinances that cities could use to address non-crop irrigation on properties larger than a certain size.

“Concern about excessive use of groundwater for irrigation and other industrial uses” (Public Survey)

Participants are also concerned about high groundwater use for agricultural irrigation as well as for industrial purposes. Participants support the County in providing incentives or rebates, coordinating interested parties, or otherwise supporting efforts that could aid in groundwater conservation for high-volume users.

New Development Impact on Groundwater Infiltration and Recharge

Land must allow for infiltration of water in order to recharge aquifers below the surface. Participants are concerned that current land use policies do not sufficiently restrict new development from building on valuable infiltration and recharge areas. As noted in the previous paragraph on reducing use, participants hope the County addresses these concerns by working with constituent communities on their land use policies. (In this regard, County cooperation with cities and townships would be especially important, since the County’s land use authority is very limited.) For recharge, this includes encouraging cities to be more stringent with their regulations and requiring infiltration practices for any proposed new development. While infiltration and recharge issues are addressed in the Groundwater Plan draft, some participants felt they were not sufficiently emphasized.

*“Partially touched on with the second goal, but should consider a stronger emphasis on aquifer recharge - stressing the importance of maintaining storage capacity.”
(Public Survey)*

Groundwater shipment

The recent Dakota County “Water Train” episode has left many in shock and fearful about the county’s future groundwater supply. A majority of comments related to exporting groundwater fervently oppose Dakota County groundwater shipment to other states. The strategy addressing Dakota County groundwater shipment was the second most supported out of all 23 new strategies in the draft plan, across all Phase 3 workshops and surveys.

*“I am strongly concerned about the issue of withdrawing Dakota County groundwater. I say NO!”
(Public Survey)*

Education Goal: People who live and work in Dakota County are knowledgeable about water issues, conserve water, and prevent pollution.

Participants noted that there is a need to connect with community members in a way that makes groundwater resonate with them personally. Without that connection, they feel it will be hard to convince people to change habits and behaviors, especially if social pressures (political, neighbor-to-neighbor, or otherwise), lack of understanding, or apathy increase the difficulty of making change in the first place. For this goal, participants largely focused on providing ideas for strategies or approaches that will cut through the noise and reach individuals throughout the county.

The need for varied and frequent opportunities to learn

Participants believe it is important for the County to use a varied approach in its education and outreach efforts regarding groundwater, as well as increasing the frequency and accessibility of opportunities to learn more. The strategy “Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention” was the most highly prioritized strategy in the workshops, and qualitative comments indicate that participants feel that consistent exposure to groundwater topics across audiences is important to prompt people to care about their actions. Finding ways to incorporate consistent groundwater messaging to come *from* different sources is also encouraged so that people learn from a number of trusted community leaders, whether that is a teacher in a classroom, neighbors, a church, a doctor, or someone else.

***“Developing a comprehensive education plan with marketing; messaging - not just sporadic events & messages, but a consistent, frequent approach”
(Workshop 1.30.2020)***

Health-focused messaging

Given the extent to which people care about groundwater quality as it relates to their health, participants believe educating from a health-oriented perspective would be a reliable strategy to reach a large amount of people and get them to care about groundwater quality issues if they don’t already. Encouraging medical professionals to talk to residents about their water quality, as well as communicating the health risks of various water contaminants could be a good educational tactic to get people engaged and coalesce around an issue everyone cares about: promoting a healthy community.

“Engage medical community to talk to patients about water quality” (Workshop 1.30.2020)

Educate at the point-of-use scale

People can have a hard time wrapping their head around something they can’t see or have direct access to. That’s why one strategic approach that participants offered was to focus water *quality* education on the water coming directly out of a homeowner’s tap rather than focus on aquifer education. This could be a smart educational strategy as it brings the lessons of water health to an individualized scale, and clear connections can be made to quality of life.

Governance Goal: Efficient and effective groundwater programs and services

The most prominent concern within the Governance goal is that of financing—participants understand that endless funds are not available to achieve all of the goals and strategies in this plan, but that financing is needed to support actions.

Providing the financial resources needed

A recurrent theme in the comments is a desire for residents to be empowered to take some responsibility for groundwater health and sustainability into their own hands. They recognize this can be difficult to do, however, if they are not provided with the necessary funds or incentives from the government.

***“Costs related to reuse as concern”
(Workshop 1.30.2020)***

Specifically, participants also noted the high costs associated with water reuse, as well as connecting to or treating alternative water supplies. Whether it be through tax incentives or funding to cover the costs, participants would like to see the County provide financial assistance to encourage behavior and technology change—for individuals, businesses, and cities. Specific comments were also made that any new asks of cities be accompanied by financial support so as to avoid the creation of new unfunded mandates.

Collaborate with more than just other levels of government

While participants believe it is important for the County to collaborate with other branches of government, they want to see the County expand their collaborative efforts further. Working with community groups, and those who are working on the front lines to advance the messaging of everything portrayed in the county plan is going to be necessary in order to get educational messaging across and reach the greatest number of people for the long haul.

***“Need to work with PARTNERS
i.e. cities, organized groups,
churches, etc.”
(Workshop 1.30.2020)***

4. Prioritization Outcomes

Workshop & Open Houses

Attendees reviewed groundwater plan draft strategies on posters and placed dots next to the strategies they wish to be prioritized by the County. Below are the results split up into high, medium and low priorities based on how many dots each strategy received. For the purposes of this report, the CONDAC workshop data (held on February 6, 2020), the January 30, 2020 Workshop data, and the Open House data have been combined. Across all three events, 501 dots were used to reflect people’s highest priorities. The priorities were divided equally into the following three levels: high, medium, and lower. It should be noted that something included in the “lower” grouping does not mean the strategy is not important, just that other strategies received more dots in the prioritization exercises.

High Priorities

- Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention
- Protect groundwater from being withdrawn from Dakota County and sent to places outside of Minnesota (Limit groundwater exports)
- Reduce agricultural contamination
- Provide training and education to targeted audiences, such as well owners, well drillers, real estate professionals, people who maintain roads and sidewalks ("Smart Salt" practices), and turf and landscaping professionals

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- Protect, preserve, and restore wetlands (Protect, preserve, and restore resources that support groundwater-dependent ecosystems such as wetlands, fens, and trout streams.)
- Promote water conservation
- Assist private well owners in having their drinking water tested, understanding results, and using appropriate treatment

Medium Priorities

- Review, streamline, and improve County and State regulatory processes
- Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the County.
- Protect and improve high-quality groundwater recharge areas
- Support development of alternative water supplies
- Reduce groundwater contamination from chloride (e.g., de-icing salt)
- Hold and treat water on the land to improve groundwater recharge
- Collaborate with other levels of government
- Assist public water suppliers in protecting the water supply

Lower Priorities

- Mitigate existing contamination of groundwater from point sources of pollution including unsealed wells and historically contaminated sites (Prevent groundwater contamination by getting unused, unsealed wells sealed.)
- Quantify changes in groundwater levels and flow patterns in response to weather and groundwater withdrawals
- Prevent groundwater pollution from stormwater
- Prevent pollution by minimizing wastewater impacts on groundwater quality
- Address industrial pollution and historically contaminated sites
- Prevent pollution by minimizing impacts of aggregate mining on groundwater quality
- Reduce contamination from turf and landscape maintenance
- Assist water users in protecting their drinking water quality by regulating well construction and sealing

Surveys

People who weren't able to attend a workshop or an open house had the opportunity to give their feedback about the draft plan through an online survey. One of the questions asked respondents to rank potential new draft strategies as very important, somewhat important, or not

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important. Below is the ranking of the “very important” strategy from highest to lowest percentage. For the purposes of this report, both the online and in-person survey responses have been combined.

Strategy	% “very important”
Reduce agricultural chemical contamination	95.56%
Protect groundwater from being withdrawn from Dakota County and sent to places outside of Minnesota	87.64%
Reduce groundwater contamination from chloride (e.g., de-icing salt)	80.90%
Protect significant groundwater recharge areas to put more water back into the ground	78.89%
Protect, restore, and maintain wetlands	77.53%
Provide education for the public and specific audiences on groundwater, water conservation, and pollution prevention	76.40%
Promote water conservation	73.86%
Assist private well owners in having their drinking water tested, understanding results, and using appropriate treatment	70.00%
Review, streamline, and improve County and state regulatory processes for groundwater	60.92%
Support development of alternative water supplies (e.g., water reuse)	46.07%

Intercept Activities

Another outreach effort used by the County to obtain feedback was through pop-up “intercept boards.” These boards were stationed at various sites across the County to engage people in providing feedback as a part of their regular activities, rather than having to attend an open house or workshop. Similar to the survey, the board listed just nine new draft strategies and asked participants to place a dot next to the three strategies they believe should be prioritized by the County plan. Below are combined results of these pop-up activities ranked from strategy with the highest number of dots overall to the least.

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Strategy	# Dots
Protect, restore, and maintain wetlands	211
Reduce agricultural chemical contamination	199
Reduce groundwater contamination from chloride (e.g., de-icing salt)	114
Promote water conservation	84
Support development of alternative water supplies (e.g., water reuse)	84
Provide education for the public and specific audiences on groundwater, water conservation, and pollution prevention	83
Protect significant groundwater recharge areas	69
Assist private well owners in having their drinking water tested, understanding results, and using appropriate treatment	48
Review, streamline, and improve County and state regulatory processes for groundwater	43

C. Technical Advisory Group

The Technical Advisory Group (TAG) was formed with the following members.

Statutory Requirement	Representative
Construction	Patrick Mason, Ames Construction
Agriculture	Bryce Kimmes, SE Irrigators Association
Hydrogeology	Joe Richter, DNR
Well Drilling	Debbie Carlson, Carlson Well Drilling
4-Members from Public At Large	County Planning Commission (PLANC)
District 1 Local Government (LGU) or Watershed Mgmt. Organization (WMO), (South, Southeast)	Mark Peine, Hastings Public Works Supt John Caven, Hastings Asst. City Engineer
District 2 LGU/WMO (South St. Paul, West St. Paul)	Joe Barten, Lower Mississippi River WMO Administrator Krista Spreiter, City of Mendota Heights and LMRWMO
District 3 LGU/WMO (Eagan)	Jon Eaton, Eagan Superintendent of Utilities
District 4 LGU/WMO (Rosemount, Inver Grove Hts.)	Scott Thureen, Inver Grove Public Works Director
District 5 LGU/WMO (Burnsville)	Linda Mullen, Burnsville Sewer and Water Superintendent
District 6 LGU/WMO(Lakeville)	Paul Oehme, Lakeville Public Works Director
District 7 LGU/WMO (Apple Valley)	Matt Saam, Apple Valley Public Works Director
Additional	Ashley Gallagher, Soil and Water Conservation District Mark Zabel, Vermillion River Watershed JPO Lanya Ross and John Clark, Metropolitan Council John Freitag, MN Department of Health Jeff Berg, MN Department of Agriculture Warren Formo, MN Agricultural Water Resources Coalition Melissa King, MN Board of Water and Soil Resources

The TAG convened five times throughout the plan development process and members attended selected meetings of the Planning Commission. A summary of meeting topics and Group recommendations follows.

April 22, 2019, Meeting 1 - Introduction

After introductions and a planning project overview, Group members identified issues that the plan should address:

- Water reuse and current limitations
- Plan requirements of cities, their roles
- Infiltration ability varies by community
- City control of new wells
- City restrictions on use for irrigation and landscape watering
- Other contaminants such as chloride and lead
- Public education
- Lead testing in coordination with city water suppliers
- Drinking Water Supply Management Area coordination, County role
- Comprehensive Plan review
- Greater agricultural representation needed in Group

May 28, 2019, Meeting 2 – Water Quantity (Supply)

The focus of the meeting was on sustaining the county's groundwater supply, organized by the following discussion questions:

- 1. What areas of concern exist?** Group responses included:
 - Use of water for agriculture irrigation and lawn/turf irrigation
 - Impacts to lakes, streams, natural resources
 - Impacts of extreme weather events
 - Demand needs due to population growth
 - Infiltration/recharge
 - How to implement other conservation efforts (e.g. low flow fixtures)
 - How to implement Water Re-use
- 2. What do you think the role of the County should be?** The Group identified the following roles for the County in protecting water quantity and supply:
 - **Processes:** improve and streamline while avoiding redundancy with the roles of other agencies.

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- **Policies & regulations:** clarify overlapping roles, reduce associated burdens with reporting, use science to inform regulations and policies, strengthen infiltration requirements, advocate for re-use guidelines, and consider appropriations permitting options.
 - **Research:** more research into aquifer conditions, groundwater-dependent ecosystems, modeling for different use scenarios, contaminants including emerging issues of concern (e.g., PFAS, chloride).
 - **Education and outreach:** education for policy makers and officials, education on agency roles, climate change topics, shared education staffing, target audiences including well owners, focus on most important behavior changes, and conservation and reuse as key topics.
 - **Collaboration and partnerships:** improve interagency coordination, develop model ordinances for communities, partner with drillers on education, share more water quality data with communities, and share staffing for enforcement.
3. What are (or should be) the roles and responsibilities of other organizations (state or local agencies, cities\municipalities, etc.)?
 4. What are your ideas for possible goals and objectives for the Plan that will also support the County (DC2040) Comprehensive Plan goals and objectives?

June 25, 2019, Meeting 3 – Water Quality

The meeting focus was on water quality and strategies to protect health by reducing and avoiding contamination. The Group identified the following roles for the County in protecting quality:

- **Processes:** evaluate current regulatory programs for effectiveness, evaluate and ensure that County, city, and township septic programs and enforcement are consistent, build from existing state and federal programs rather than starting new ones, evaluate ways to provide and standardize incentives for water protective-practice adoption, encourage multiple regulators to not replicate efforts, evaluate progress on all efforts.
- **Policies & regulations:** evaluate and develop incentives for adoption of groundwater protective practices, require manganese testing for new private wells, develop incentive program for water reuse, consider regulation of agricultural chemicals, identify requirements for potentially contaminated parcels (e.g., gas stations, dry cleaners, automotive shops) when parcels are sold or transferred to another owner, provided water treatment assistance to well owners where contamination is a concern, and develop countywide infiltration requirements.

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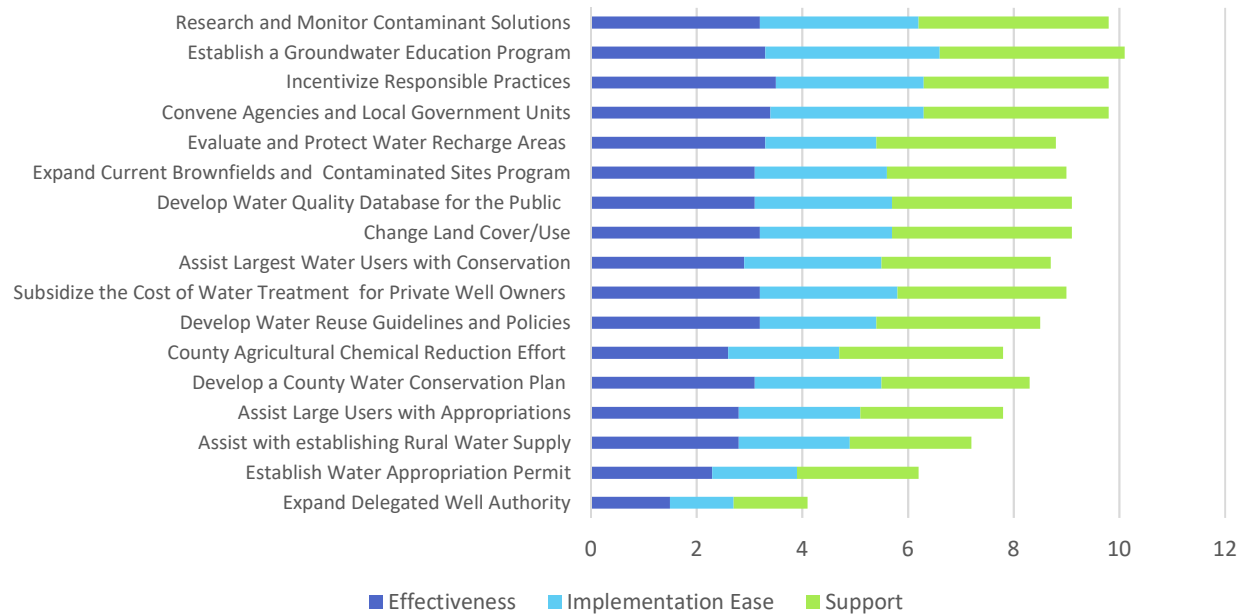
- **Research:** facilitate testing for new contaminants of concern, become a clearinghouse to share more county groundwater data with other agencies and the public, identify priority areas for contaminant monitoring, and conduct more research on naturally occurring contaminants (e.g., manganese and arsenic).
- **Education and outreach:** target highly vulnerable areas for additional education and support, target audiences for specific groundwater education efforts and identify behavioral changes the program seeks to achieve, design education information to reach all learning types, have county as primary point of contact for all well owners, provide more household hazardous waste collection events, partner with local papers to run groundwater educational articles, message education efforts as “We’re all in this together,” and provide more information on conservation programs to farmers and other landowners.
- **Collaboration and partnerships:** form a countywide source water protection group, work with the MN Pollution Control Agency on contaminant plume monitoring, partner with the U of Mn Stormwater Research Lab on stormwater facilities that protect groundwater quality, support city efforts to reuse stormwater, provide more support to cities and townships for the next round of comprehensive and water supply planning, and cost share with cities and townships to identify and protect recharge areas.

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August 19, 2019, Meeting 4 – Draft Goals and Potential Program Opportunities

The Group reviewed draft goals and potential new strategies to address the concerns and realize opportunities identified at earlier meetings. Group members participated in an APS exercise that asked them to rate three aspects of each potential strategy: 1) effectiveness, 2) difficulty, and 3) their level of support for pursuing the strategy. Weighted scores were developed for the potential strategy ratings and are provided below, in decreasing order of support.

Effectiveness, Implementation Ease, and Support Ratings



November 13, 2019, Meeting 5 – Prioritization of Strategies

Group members participated in an exercise to rate the priority level of potential plan strategies using Audience Participation System (APS) technology. Potential tactics for implementing each strategy were provided as context, for the Group to consider as they assigned priority levels. The following table presents the results of the exercise, sorted by weighted scores. Highlighted strategies were deemed urgent by more than 25 percent of participants.

Under the weighting scheme (urgent=3 to 4, high=2 to 3, medium=1 to 2, and low=0 to 1), no strategies scored as low priorities. Two score as medium – preventing pollution from aggregate mining and preventing pollution from stormwater. The remaining priorities scored as high priorities. Reducing agricultural chemical contamination scored the highest, based on concerns for health.

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Technical Advisory Group Meeting 5, Strategy Prioritization					
Strategy	Urgent	High	Medium	Low	Score
1B1-Reduce agricultural chemical contamination of groundwater.	36.4%	63.6%	-	-	3.4
2A-Promote water conservation.	9.1%	81.2%	9.1%	-	3.0
4A-Collaborate with other levels of government.	27.3%	45.5%	27.3%	-	
1D-Monitor groundwater quality to develop, implement, and evaluate strategies for reducing groundwater contamination in the County.	9.1%	72.7%	18.2%	-	2.9
3B-Provide training to targeted audiences on pollution prevention and water conservation	18.2%	54.6%	27.3%	-	
1A1-Assist public water suppliers in protecting the water supply.	18.2%	54.6%	18.2%	9.1%	2.8
1A3-Assist private well owners in having their drinking water tested, understanding their results, and using appropriate water treatment.	27.3%	18.2%	54.6%	-	2.7
2B-Hold and treat water on the land to improve water quality.	-	63.6%	36.4%	-	2.6
1B2-Mitigate existing contamination of groundwater from point sources of pollution, including unsealed wells and historically contaminated sites.	-	63.6%	36.4%	-	
2B'-Protect recharge areas.	10.0%	70.0%	20.0%	-	
1C4-Prevent groundwater contamination from chloride.	27.3%	36.4%	9.1%	27.3%	
1A2-Assist water users in protecting their drinking water quality by regulating well construction and sealing.	-	54.6%	36.4%	9.1%	2.5
4B-Review, streamline, and improve County and State regulatory processes.	18.2%	18.2%	54.6%	9.1%	
3A-Inform and educate the general public on groundwater resources and science, water conservation, and pollution prevention.	9.1%	45.5%	36.4%	9.1%	
2C-Support development of alternative water supplies.	18.2%	36.4%	27.3%	18.2%	
2D-Quantify changes in groundwater levels and flow patterns in response to weather and groundwater pumping.	-	36.4%	45.5%	18.2%	2.2
1C1-Prevent pollution by minimizing wastewater impacts on groundwater quality.	-	36.4%	45.5%	18.2%	
1C3-Prevent pollution by minimizing impacts of aggregate mining on groundwater quality.	-	9.1%	63.6%	27.3%	1.8
1C2-Prevent groundwater pollution from stormwater.	-	18.2%	45.5%	36.4%	

D. Dakota County Planning Commission

The Planning Commission received several presentations on the Groundwater Plan project and were informed of all public engagement events. Several Commission members attended workshops and open houses. In addition, Planning Commissioner members were invited to participate in the Technical Advisory Group meetings held on August 19, 2019 and November 13, 2019.

January 24, 2019 – Introduction

Staff presented an overview of the Groundwater Plan development process and reviewed the current status of Dakota County groundwater. Commissioners asked questions about groundwater quality and quantity and discussed their role in the planning process, including fulfilling aspects of the statutorily-required advisory committee. Commission recommendations included:

- Receiving information on open houses and other meetings that Commissioners can attend, so information from the meetings can be shared with the group
- Provide more information on why Dakota County uses more groundwater per capita than other counties.
- Compare the County's expenditures on providing drinking water to residents to other counties
- Provide more information on the impact of aggregate mining on groundwater in the county.
- Gather more information on the agencies involved with water and how residents can get direct answers on questions. Consider greater collaboration with other agencies on streamlining information provision to the public.

September 26, 2019 – Draft Goals, Strategies, and Tactics

Staff provided an overview of the Groundwater Planning process; described the groundwater issues facing Dakota County; and presented draft goals, strategies, and tactics being considered in the draft Groundwater Plan. Staff also provided an update on formation of a Technical Advisory Group (TAG) and explained their overlapping role with the Commission in developing the Plan. The following members of the Tag attended the meeting: Ashley Gallagher (Dakota County Soil and Water Conservation District), Bryce Kimmes (Southeast Irrigators Association), and Melissa King (Minnesota Board of Water and Soil Resources).

Questions and comments by Commissioners along with responses from staff (*italics*):

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- The time and depth graphic don't seem to show dramatic worsening. How much of the effect is because of better sampling now than in 1991? *Statistical analysis of the nitrate data makes it clear that quality is getting worse, and at greater groundwater depths.*
- Is Dakota County especially dependent on groundwater? If so, is it because it's more economical and higher quality than surface water? It seems to make it even more urgent to protect groundwater if we want to stay on groundwater supplies. *Yes, to all. Minneapolis and St. Paul withdraw from the Mississippi River, which requires more treatment to meet drinking quality standards. Although some Dakota County cities are close to the Mississippi, all our communities have groundwater close by everywhere.*
- One of the recommendations is to consider new legislation to protect groundwater. It may be difficult to get this legislation passed state-wide, but it may be possible to have a law written specifically for Dakota County given Dakota County's somewhat unique circumstances.
- Will strategies that streamline the groundwater permitting process through Dakota County do a better job at protecting the groundwater resource? *This strategy may improve protection because of the County's local expertise and detailed information about surface water aquifers and geology. For instance, permitting shallower irrigation wells in high nitrate areas would recycle excess nutrients back to the crop root zone. The shallow groundwater is "pre-fertilized."*
- The outreach strategies should include a tactic to alert future home builders and/or home buyers of contaminants they may encounter when they drill a new well in high risk areas. *Dakota County's property transfer requirements address disclosure about some well contaminants and Manganese is being added to the list. The current draft plan recommends that information be disclosed about existing wells at the time of property transfer. The County's role could be expanded to include information for people that desire to drill a new well but that would be more difficult to implement.*
- Are large livestock operations a threat to groundwater? *There are a few feedlots in Dakota County but the primary threat to groundwater in agricultural areas is fertilizer application on corn fields.*
- In general, the proposed tactics appear reasonable. Residents expect that they should be able to drink safe water. The cost of piping water from the Mississippi River would be prohibitive. Dakota County has benefited from relatively low-cost groundwater and we should protect that resource to retain that benefit. Protecting the quality of life in Dakota County is a county role.

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- Most of the proposed strategies and tactics involve Dakota County working in partnership with other agencies. Dakota County has an important contributing role to play, securing grants, providing outreach, and working with other agencies which have primary responsibilities.
- Other polluters (e.g., point-source pollution from industries) in Dakota County should also bear a responsibility for keeping the County's groundwater safe. Landfills also have a role to play in protecting groundwater. These industries should pay their fair share and help protect groundwater or mitigate pollution if they are responsible. *State and federal systems require point-source polluters to provide clean drinking water where they are responsible for contamination of an existing water source. The plan draft tactics would address non-point source pollution from agricultural chemicals, for which there are no systems to ensure clean water is available to affected households.*
- Planning Commissioners expressed support for the draft goals, strategies, and policies that were reviewed in the draft plan.

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APPENDIX C. PUBLIC COMMENTS AND COUNTY RESPONSES

By Resolution No. 20-246 (May 19, 2020), the County Board authorized release of the draft Plan for a 60-day public review period from May 20 to July 20, 2020. The draft Plan was posted online during the review period and submitted for review to adjoining counties, the Metropolitan Council, the state review agencies, the Board of Water and Soil Resources, soil and water conservation districts, cities, townships, and watershed management organizations in accordance with Minnesota Statute § 103B.255 subd. 8. Extensive electronic communications through social media, news releases, and emails to partners; stakeholders; state, regional, and local agencies and officials; and others were undertaken due to limited in-person opportunities for Plan distribution and review due to COVID-19.

Comments were received from County residents and the following organizations:

Black Dog Watershed Management Organization (WMO)

Board of Water and Soil Resources (BWSR)

Cannon River Watershed Partnership

City of Apple Valley

City of Sunfish Lake

Flint Hills Resources Pine Bend LLC Refinery

Hastings Environmental Partners

Metropolitan Council

Minnesota Department of Agriculture (MDA)

Minnesota Department of Health (MDH)

Minnesota Department of Natural Resources (DNR)

Dakota County Soil and Water Conservation District (SWCD)

Executive Director, Legislative Subcommittee on Minnesota Water Policy

University of Minnesota

Vermillion River Watershed Joint Powers Organization

Washington County

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
General Comments					
General	Metropolitan Council	J. Clark	7/15/2020	<p>Since I was sitting on the TAG and provided comments previously that we've discussed, I don't have anything to add. The plan was circulated among water supply planning staff as well as the Dakota Co. sector representative back in May, and we have no additional comments.</p> <p>The plan is done very well and the process you all have gone through should serve as an example to the rest of the region when creating these plans. We appreciate your current and previous efforts to collaborate with us and thank you for including that collaboration as part of the plan.</p>	Thank you.
General	Black Dog WMO	D. Jacobsen	7/20/2020	<p>Thank you for providing the Black Dog WMO with the opportunity to review the Draft 2020-2030 Dakota County Groundwater Plan. The county is to be commended for developing a comprehensive plan that is based on extensive stakeholder engagement. At their July 15, 2020 meeting, the Black Dog WMO Commission approved sending this letter of support for the draft Groundwater Plan.</p> <p>The draft Groundwater Plan calls for watershed management organizations (WMOs) to partner in a number of new and existing activities. The Black Dog WMO will begin their watershed management plan update process soon. As part of that process, the Black Dog WMO will engage with county groundwater staff and consider the draft Groundwater Plan's requested WMO actions that apply to the Black Dog WMO.</p> <p>The Commission looks forward to working with Dakota County as they implement their Groundwater Plan.</p>	Thank you. We look forward to collaborating with Black Dog WMO.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
General	BWSR	S. Christopher	7/13/2020	<p>BWSR Staff have completed the 60-day review of the Dakota County Groundwater Plan (plan). This review and comment is based upon the submittal received May 20, 2020. The County should be commended for an inclusive planning process. The plan is an excellent example of sound justification for County programs and projects and we feel the proposed activities will benefit the resources of the County greatly.</p> <p>BWSR staff would be willing to assist with the ongoing development of interim goals as identified in the annual report and we feel the Plan's direction would benefit from the identification of target outputs or outcomes on a ten-year scale.</p> <p>I would like to recognize the excellent work that the County has done. We appreciate the opportunity to provide comments and your thoroughness in addressing those from the informal draft. We look forward to continuing to work with you through the rest of the plan development process.</p>	<p>Thank you. As the Groundwater Plan is being refined and implemented, County staff appreciate BWSR's assistance and will work with BWSR and other stakeholders to refine the metrics we use to evaluate how effective we have been in carrying out the activities described in the Plan and if those activities are achieving the desired results over time. We will consult with BWSR and others in making "mid-course corrections" if needed.</p>
General	MDH	J. Freitag	7/16/2020	<p>The Minnesota Department of Health (MDH) Source Water Protection Unit appreciates the opportunity to review the draft Dakota County Groundwater Plan. MDH commends the plan partners for including drinking water as a priority concern. Thank you for allowing MDH the opportunity to be part of the Technical Advisory Committee and for incorporating our ideas and suggestions into the draft plan. Throughout the process MDH's input was well received and we do not have any further comments. We applaud the planning team for their work in developing the plan.</p>	<p>Thank you!</p>
General	SMWP	J. Stark	7/27/2020	<p>Have you seen the UM, MDH "Future of drinking water" report? I think it addresses some things or concern to the Dakota plan.</p>	<p>Thank you for the suggestion. We are familiar with the report.</p>

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
General	County Resident	M. Duval	6/29/2020	I just want to thank those responsible for planning ahead for Dakota County's future. The current proposed plan takes a reasonable, data-driven approach to safeguarding our water. I especially admire the plans to conserve, restore & protect wetlands and the caution our county officials have taken towards exporting water away from Dakota county. I am really happy to see our county doing all this!	Thank you.
Groundwa ter quantity	County Resident	D. Gaetke	6/29/2020	I am a resident of Inver Grove Heights who has been concerned about water quality for a number of years. I believe the proposed Groundwater Plan is sound and I urge the Commissioners to approve it. I have just a few comments. First, I would like to commend the authors of the document. Massive government documents can be very frustrating, but I found the proposed groundwater plan to be easily understood and well presented. It held my attention and taught me some things about my county in the process. Well done, county staff.	Thank you for your kind remarks.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
				<p>I think the seriousness of our potential drawdown issues might gain a heightened sense of urgency with a more explicit statement about how we presently measure up. According to a statement on page 133 of the document, county staff conservatively estimate that the county receives five inches of recharge per year on average. Earlier in the document (page 120) we learn that Dakota County has the highest per capita use of groundwater for any TCMA county at 59,648 gallons per year. What would that figure have to be to keep us within the five inches of recharge per year? What will that figure have to be in 2040 given our projected population growth? I would like to see an explicit statement such as: To stay within conservative estimate of recharge rates, the per capita use of groundwater should be closer to XX,XXX gallons per year.</p>	<p>County staff are interested in the idea of using a groundwater "budget" to communicate groundwater conservation messages. However, the groundwater "budget" varies a lot from one place to the next within the County because some places absorb more recharge and some places already use more water than others. Therefore it's difficult do a one-to-one balance of recharge and water usage at the County level. Instead, the County intends to be consistent with the Metropolitan Council per capita use goals of 75 gallons per person per day for residential usage and 90 gallons per person per day for total usage. The County plans to help local water suppliers meet this goal, as mentioned in Chapter 2, Section C1 (pages 43-44), Implementation.</p>
				<p>Extending this notion, I would like to see a statement about what impact the County's planned actions will have on this figure. For Instance: <i>It is estimated that achieving all of the high priority goals of this plan will lower annual per capita groundwater use by 10%. Since land use and development is controlled by local authorities, the county would encourage cities and townships to pursue additional water conservation efforts.</i> I believe inclusion of such explicit statements within the plan would highlight the need for action and point readers to the appropriate actors. Thank you for this opportunity to comment and participate.</p>	<p>Statement added under Chapter 2, Section C1 (page 44), as it applies to priority strategies 2A2 and 2A3. Implementation of water conservation and water reuse tactics could reduce annual groundwater usage as much as 8-16% (2-4 billion gallons a year); estimates are highly variable depending upon the project and location.</p>

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
General	County Resident	D. Riggs	7/16/2020	<p>To Whom It May Concern: I have been a resident of Dakota County for 40 years, 30 in Lakeville at my present address. The need to safeguard our water supply from industrial diversion is critical. This should also include farmers drilling private wells for irrigation. We must have limits on the number of gallons a user can extract, and none should be exported from Dakota County to other users. Dakota County also needs to address how to make private wells safe after contamination or have a method to get safe drinking water to those whose wells become contaminated. The situation in places such as Coates needs to be rectified. Prevention is always cheaper than the fix afterwards. Guidelines to prevent unsafe wells need to be created and followed.</p>	<p>Thank you. The purpose of the Groundwater Plan is to address these concerns effectively. Your concerns are addressed under strategy 2A1 regarding water supply diversion, and strategy 1A3 regarding assisting to make private well drinking water safe.</p>
General	Hastings Environmental Partners	A. Hildebrand	7/17/2020	<p>The Hastings Environmental Protectors (HEP) Board of Directors are commenting on the draft groundwater plan on behalf of our 49 members. Thank you for working to update this plan to reflect current and future groundwater needs. HEP would like to see the Dakota County Groundwater Plan be a strong and all-encompassing plan that puts the safety and health of people first.</p> <p>We are very concerned about the amount of contaminated private wells in the county and specifically most concerned about pesticide and nitrate contamination. We would like to see more protection and help from the county for private well owners who face human caused chemical contamination.</p> <p>We would like to see more collaboration and planning between cities, county, and state agencies to address the rising risk to municipal wells in Hastings and Rosemount from nitrate pollution. We</p>	<p>Thank you. The Groundwater Plan addresses the identified concerns through strategies 1A3 & 1B1 (protecting private wells and addressing agriculture chemical contamination); 1A1 & 4A (assisting municipalities and collaborating with other levels of government); and 2A1 (addressing groundwater exportation).</p>

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
				<p>would also like to see more focus on wellhead protection and groundwater recharge areas in collaboration with county land management departments.</p> <p>Lastly, we have deep concerns about the threat of groundwater being shipped out West for industrial purposes. Our own water resources are under enough pressure as is and we would like to see strong guidance in this plan to address the threat of pumping and shipping mass quantities of groundwater out of the county. We hope that this is helpful and that Dakota County ends up with a plan that truly protects our precious groundwater resources for future generations from further contamination and depletion.</p>	
General	SWCD	B. Watson	7/17/2020	<p>Thank you for the opportunity to comment on the Draft Dakota County Groundwater Plan (Plan). The Soil and Water Conservation District (SWCD) has been part of the stakeholder team during Plan development. We have provided input and comments throughout the Plan development process and appreciate you involving our organization. The SWCD has no additional comments on the final draft of the Plan. Groundwater quality and quantity is an important component to the conservation work we jointly pursue with land occupiers, residents, communities and businesses. We look forward to working together during Plan implementation.</p>	<p>Thank you. SWCD's participation on the technical workgroup has been extremely helpful and is greatly appreciated.</p>
General	Washington County	J. Collin-Pilarski	7/20/2020	<p>Washington County Department of Public Health and Environment is submitting comments to Dakota County Environmental Resources in response to the Draft Groundwater Plan (Plan). The county commends Dakota County for developing a planning framework to provide direction for managing groundwater. Washington County also has a county</p>	<p>Thank you. We look forward to collaborative efforts on our shared concerns.</p>

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				<p>groundwater plan that was adopted in 2014. While our departments do have some varying governing authorities (for example Dakota County is a delegated well authority and Washington County is not) most of the concerns and issues we face in our efforts to protect groundwater quantity and quality are the same. Additionally many of our strategies or tactics to address these issues are similar. As we know groundwater doesn't follow county borders so as we both work to implement our plans I hope we can find ways to share ideas and work together as we strive to protect groundwater for future generations.</p>	
General	City of Sunfish Lake	J. Sandberg	7/20/2020	<p>Thank you for the opportunity to review the Dakota County Draft Groundwater Plan. I did attend one of the workshops you held for stakeholders and found it to be very informational and allowed stakeholder input as the draft plan was developed.</p> <p>I have read through the draft plan and noted the emphasis on protection of groundwater quantity and quality. The City of Sunfish Lake does not have a public water supply or distribution system; citizens of Sunfish Lake rely wholly on private wells. Moreover, Sunfish Lake residents rely on the County to protect and manage groundwater supplies to ensure adequate clean water is available into perpetuity. This type of planning document with initiatives, goals, and implementation strategies is very important to create, but more important to follow and execute (and not just sit on a shelf).</p>	<p>Thank you. The intent is to develop annual workplans to implement the Groundwater Plan and report to stakeholders on annual measures based on these workplans to help ensure success.</p>

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page Es ii and others	Legislative Subcommittee on Minnesota Water Policy (SMWP)	J. Stark	7/27/2020	You mention that in several areas pumping is exceeding recharge. Can you really document this, and are streamflow and groundwater levels in decline in these areas? Is it possible that declines are in the shallow aquifers but not also in the deeper aquifers. I didn't see references for these conditions.	This reference and the figure illustrating it are from the Met Council 2014 Regional Feasibility Assessment and 2015 Master Water Supply Plan. References have been added.
Page ES iii, "herbicides"	MDA	J. Berg	7/17/2020	There are a number of places where the generic term "pesticide" seems more appropriate than the more specific term herbicide. This includes pages iii; 3; 7; 73; 93, and perhaps others. Also, the term herbicides can also be deleted from the section title on page 100.	County Groundwater staff have found that many members of the general public are under the impression that the word "pesticide" only refers to insecticides. Because most of Dakota County's groundwater pesticide concerns are with herbicides and herbicide breakdown products, we use "herbicides" to avoid confusion on the part of non-technical audiences.
Page ES iii and others	CRWP	K. Pursell	7/20/2020	Water quantity is a concern, and we support limiting or banning the export of groundwater from the county.	Thank you.
Page ES iii and others	County Resident	J. Steffel	7/6/2020	My question is, what is the status of our groundwater. It said the plan is to LIMIT exporting of our Dakota County groundwater. We are experiencing difficulty with managing and conserving our water. Why are we exporting ANY?	At this time, the County has limited authority over groundwater appropriations, your area of concern -- this is the responsibility of the state Department of Natural Resources. The Groundwater Plan's Strategy 2A1 outlines the County's plans to be more involved in regulating water supply diversion.
Page ES iv and others	CRWP	K. Pursell	7/20/2020	We support the proposed new activities in this plan such as implementing MDA's Nitrogen Fertilizer Management Plan and Groundwater Rule, addressing chloride contamination from de-icing practices and ineffective water softeners, and we support land protection of high-quality groundwater recharge areas that impact public DWSMAs and private wells as the top priority. (These are areas CRWP has been working with other groups and growers and municipalities around the Cannon River Watershed and we'd be happy to expand where we do some of that work to include	Thank you. We agree community engagement and outreach will be important for Plan implementation and look forward to collaborating with the CRWP.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
				Dakota County.) We also see increased authentic community engagement and outreach to community members regarding water reuse, pollution prevention, groundwater, and conservation to be a crucial link in executing this plan as a whole and have 30 years of experience as a local non-profit building relationships and taking action for clean water.	
Page ES iv, Proposed new activities, 1 st bullet	VRWJPO	M. Zabel	6/26/2020	“Assist private well owners with testing, understanding results, and treating drinking water through low-income grant programs.” Comment: This should be three separate activities. As written it may be interpreted as assistance for testing, results, and treatment only available through low-income grant programs. Instead there should be an initiative for assistance with 1) testing, 2) results interpretation/ risk communication, 3) treatment; with financial assistance made available to those qualifying for a low-income loan or grant program (i.e. Ag BMP loan program?)	Edited for clarification. Testing and result communication activities were kept together since those activities go hand in hand.
Page ES iv, Proposed new activities, 3 rd bullet	VRWJPO	M. Zabel	6/26/2020	Change to - ... by targeting those practices leading to contamination of groundwater; including de-icing ...	Edited text.
Page ES iv, Proposed new activities, 4 th bullet	VRWJPO	M. Zabel	6/26/2020	Work with the Minnesota Department of Natural Resources (DNR) and other agencies on regulatory controls and other measures to limit...	Edited text.
Page 3, 5 th bullet	VRWJPO	M. Zabel	6/26/2020	Change to – Chloride content is rising in groundwater and surface water in Dakota County.	Edited text.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
	VRWJPO	M. Zabel	6/26/2020	Comment: Chloride contamination is a water quality issue related to several potential source types of anthropogenic origin not limited to road salt or water softeners effluents only.	Edited text.
Page 6, 1A3C	City of Apple Valley	M. Saam	7/20/2020	The City is supportive of these efforts; we recognize the importance of clean water for everyone.	Thank you.
Page 7 and other places	MDA	J. Berg	7/17/2020	In a couple of instances, the term “water quality best management practices” is used which may mean nitrogen fertilizer best management practice, conservation practices, or AMTs (Ex. Page 7, 1B1A).	Edited text.
Page 8 and other places	MDA	J. Berg	7/17/2020	It is recognized and appreciated that the plan adopts nomenclature from the NFMP; specifically, “BMPs and AMTs”. These terms are clear to us; best management practices (BMPs) means nitrogen fertilizer BMPs adopted by the MDA and developed by the University of Minnesota, and alternative management tools (AMTs) are practices and activities that go beyond traditional nitrogen fertilizer BMPs that are protective of groundwater. The plan would benefit from defining and discussing (nitrogen fertilizer) BMPs and AMTs and other BMPs/conservation (water quality) practices early in the document to help distinguish these terms. It should be clear that when BMP(s) is noted in the plan that this specifically means nitrogen fertilizer BMPs, since to many plan readers this may mean any conservation practice including AMTs.	Added note to text.
Page 8 and other places	MDA	J. Berg	7/17/2020	Some of the tactics specify individual examples of AMTs (Ex. 1B1E technologies that reduce contamination) and 10-year outcomes (increase perennial cover) while in other locations the tactic and outcomes are AMTs in general. Perhaps this is intentional, but further review should be done to make sure broader AMTs versus specific AMTs as tactics and outcomes is intended.	Identification of specific AMTs is intentional, but does not preclude the County from promoting other AMTs as well.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 8 and other places	MDA	J. Berg	7/17/2020	We understand that one of the plan’s tactics is to develop, adopt, and implement a Dakota County Groundwater Agricultural Chemical Reduction Effort (ACRE), and the measure is development of ACRE with stakeholder input and adoption by the Dakota County Board (i.e. the implementation of ACRE will occur following the adoption of this plan). We believe the plan would benefit by: • Including more details about this concept; Providing an outline of the ACRE development process including a draft or expected timeline; Clarifying what “go beyond the NFMP and GPR” means. Some of our initial questions were whether the ACRE will only apply in areas not subject to the GPR and if/how education and incentive efforts may fit into the ACRE. In order to minimize and avoid confusion for farmers and agronomists, consider providing additional details; especially since the GPR is being implemented now and ACRE is planned for the future.	County staff would be happy to discuss the ACRE concepts with MDA staff or others, but publication of more detailed proposals would be premature because of the current scheduling and funding uncertainties the Covid-19 crisis has created. Development of the ACRE Plan is expected to involve in-depth, in-person discussions with the County's farming community; those are not possible at this time and it is unclear when they can be realistically scheduled. Tactic 1B1B has been edited to clarify that the ACRE Plan will be developed with extensive stakeholder engagement. The ACRE Plan is expected to apply to the Hastings and Rosemount DWSMAs (i.e., Mitigation Areas under the Groundwater Protection Rule) and any other township or city with 500 or more tillable acres (as identified by the Dakota County Assessing Services Department). In terms of "going beyond the NFMP and GPR," the objective of the NFMP and GPR is for nitrate levels in public water supply wells not to increase. The draft objectives of the ACRE Plan are more protective of residents' health: for median groundwater nitrate levels county-wide to decrease to below the nitrate drinking water standard and for no township or city to have more than 5% of its private drinking water wells exceed the nitrate drinking water standard.
Page 8, 1B2	City of Apple Valley	M. Saam	7/20/2020	Currently, the City operates a Rainwater Rewards program for landowners interested in installing raingardens, shoreline buffers, and native gardens. We look forward to viewing the expansion of these programs in the County.	Thank you.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 9, 1B3B	City of Apple Valley	M. Sam	7/20/2020	<p>a. The City appreciates any additional resources the County can provide towards additional streetsweeping on major roads including County Road 42.</p> <p>b. Through existing Joint Powers Agreements the City has collaborated with County staff to construct several infiltration and runoff practices with the maintenance responsibility coming to the City following final stabilization. Dakota County does share in the costs according to the JPA. In future planning for County projects the City would appreciate the County maintaining these practices in perpetuity.</p>	This comment will be forwarded to the County Transportation Department.
Page 9, 1B4	DNR	M. Collins	7/20/2020	Chloride contamination is increasingly a concern for Minnesota’s surface waters and groundwater because it does not break down, and instead accumulates in the environment. The DNR is pleased to see this issue addressed in Dakota County’s Groundwater Plan through participation in the MPCA’s Smart Salt Program to reduce road salt application, and through incentives to optimize salt use in home water softeners.	Thank you.
Page 9, 1B4	VRWJPO	M. Zabel	6/26/2020	Comment: There is no mention among the tactics under this strategy for addressing agricultural sources or seeking alternatives to chloride compounds used for dust management on rural gravel roads.	The Groundwater Plan's strategies to address chloride contamination follow the guidance of the MPCA Statewide Chloride Management Plan and the Twin Cities Metropolitan Area Chloride Management Plan. Tactics 1B4A and 1B4B were edited to refer to the Statewide Chloride Management Plan and to address dust suppression. Regarding agricultural sources: potassium chloride (potash) fertilizer is identified as a major source of chloride in Minnesota waters (23%), but at this time practical alternatives are not available. However, County staff expect that Alternative Management Tools (AMTs) adopted by farmers to reduce nitrate contamination (Strategy 1B1) will also reduce other groundwater and surface water contaminants, including chloride. When

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
					alternatives to KCI are practical, the County will work with the SWCD, watershed organizations, MDA, and UM Extension to promote the use of those alternatives to farmers. Regarding dust suppression, County Transportation staff have indicated that there is a trade-off, in that county gravel roads that receive chloride treatments for dust suppression are not salted for ice and snow management. County Transportation staff indicate they will include chloride management in the Transportation Plan currently being drafted.
Page 10, 1B4A	City of Apple Valley	M. Saam	7/20/2020	While the City has taken steps to reduce chloride use, we are eager to see the partnership opportunities available and what sort of technology and resources can be provided on a county-wide basis.	Thank you.
Page 11, 1C4, Outcome Measure	DNR	M. Collins	7/20/2020	The plan states "County staff have worked with cities, townships, and WMOs to develop and adopt recommendations for mining ordinances that protect groundwater from contamination or excessive withdrawals and protect groundwater-dependent surface water and ecosystems such as trout streams, wetlands, and fens from damaging changes to water levels and water quality (including temperature)." The DNR is willing to assist with this effort.	Thank you.
Page 14, 2A1	DNR	M. Collins	7/20/2020	DNR Comment: Not all tactics under Strategy 2A1 fit under the name "Limit groundwater exports." Consider revising strategy name.	Strategy 2A1 was renamed to "Ensure that large groundwater appropriation requests are sustainable and limit groundwater exports".

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 14, 2A1	City of Sunfish Lake	J. Sandberg	7/20/2020	The only comment I have is related to the County plan to assume responsibility of groundwater appropriations from the DNR. As stated in the stakeholder meeting, I believe this is a function best handled by the DNR, as aquifers do not stop at County boundaries, and appropriations need to be managed on a regional level. Changes in the management of appropriations may be a better solution (which would require changes in State Statutes). I would propose that the 10,000 gpd threshold for permitting and regulation be reduced, considering that it has been acknowledged that groundwater supplies continue to diminish. A concerted effort by Dakota County along with other metro Counties may be a good way to push for that change.	Thank you for your input and suggestions. This will be kept in mind as an option as we proceed.
Page 14, 2A1A	DNR	M. Collins	7/20/2020	The plan states “Work with DNR to ensure that large groundwater appropriation requests are sustainable.” DNR Comment: The DNR encourages Dakota County to submit comments on each water use permit application that is distributed to local governments for review and comment. The DNR reviews and evaluates each comment submitted that pertains to the appropriate permit application. Based on comments, the DNR may consider changes to the application materials submitted by the applicant or terms on the individual water use permit.	Thank you. We appreciate the DNR's communication and collaboration with Dakota County on permit applications.
Page 14, 2A1B	DNR	M. Collins	7/20/2020	The plan states “Seek authority to issue and regulate water appropriations permits instead of the DNR. (Greater than 1 million gal/year or 10K gal/day would require a change in State law.)DNR Comment: The tactic proposes Dakota County have authority to issue and regulate water appropriations permits instead of the DNR. Without appropriation information, DNR would be concerned that it may reduce the ability of Fisheries	Thank you for the clarification, tactic 2A1B was updated to reflect a change in State law is required for greater than 3.6M gal/year. We will keep your recommendations in mind as we proceed with this tactic.

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				<p>to work with permittees during planning, implementation, location, or tracking of projects. This has been an instrumental process providing past resource protections. The opportunity to review appropriations and permit applications to protect groundwater quality and quantity measures are welcomed from the County. Minn. Rule 6115.0760 states that the commissioner shall delegate to municipal, county, or regional level of government the authority to process and approve permit applications for the appropriation and use of waters of the state in amounts of more than 10,000 gallons per day and more than 1 million gallons per year, but less than 3,600,000 gallons per year. The delegation shall be subject to the following requirements: • The authorized unit of government has established an administrative process which includes provisions for establishing a water appropriation management planning process consistent with Minn. Rule 6115.0810. • The review and approval of applications are consistent with the applicable provisions of these parts. • A formalized agreement is made and signed by the commissioner and the appropriate municipal, county, or regional level authority involved. • Copies of all applications and records of local actions on applications are provided to the commissioner upon receipt and action. • Records of water appropriation amounts and the processing fee shall be submitted by the permittee to the commissioner as required by Minn. Rule 6115.0750, subparts 3 and 4, and Minn. Stat., sections 103G.271, subdivision 6, and 103G.281, subdivision 3.</p>	

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Page 14, 2A1C	DNR	M. Collins	7/20/2020	The plan states “Revise County Ordinance 114, Well and Water Supply Management, to regulate construction of large-capacity wells for specific purposes.” DNR Comment: Please clarify what the County intends to do with this item. Is this item only addressing regulating the construction of large-capacity wells or is it also to regulate the use of water from large-capacity wells?	Tactic 2A1C updated for clarification. The County intends to evaluate ways to protect groundwater resources as allowed through well construction regulatory authority delegated to it by MDH.
Page 15, 2A2B	City of Apple Valley	M. Saam	7/20/2020	The City was pleased to partner with the County in the administration of its water efficiency rebate program for customer installation of WaterSense toilets, WaterSense irrigation controllers, WaterSense irrigation audits, and Energy Star washing machines. We would welcome additional opportunities in the future.	Thank you. We look forward to continued collaboration on water conservation projects.
Page 15, 2A3A and 2A3B	City of Apple Valley	M. Saam	7/20/2020	The City supports projects that utilize water reuse and would be eager to have more support from the State.	Agreed.
Page 15, 2A3	DNR	M. Collins	7/20/2020	DNR Comment: Water reuse guidelines within Minnesota are unclear and even contradictory at times; however, this issue is getting broader attention. The University of Minnesota recently investigated the feasibility of wastewater reuse at MnDOT facilities, and their findings related to both the regulatory and technical aspects of wastewater reuse could be applicable to county and city facilities. The study can be found at https://septic.umn.edu/sites/septic.umn.edu/files/mndot2019-22_ada_compliant.pdf .	Thank you for the information.
Page 16, 2B1A	City of Apple Valley	M. Saam	7/20/2020	The City would be interested in impacts to these areas and how we may alter management strategies.	Noted.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 16, 2B1, Outcome Measures	DNR	M. Collins	7/20/2020	<p>The plan states, “County staff have worked with cities, townships, SWCD, and WMOs to develop and adopt local infiltration recommendations to be incorporated in County/City/Township stormwater ordinances governing stormwater infiltration requirements.”</p> <p>DNR Comment: Stormwater infiltration basin failure is a well-documented issue within Minnesota, and the DNR commends the County’s goal of finding ways to improve infiltration outcomes. MnDOT studied the issue and released these 2018 Standards and Procedures in an effort to improve infiltration basin performance. Some strategies to increase the likelihood of success are:</p> <ul style="list-style-type: none"> • Performing an infiltration test at each site to verify infiltration design rates • Following construction BMP’s and excavating in a manner that maintains soil structure in an un-smearred and un-compacted condition, rather than relying on decompaction mitigation techniques • Not performing any grading activities within infiltration basins when the soil moisture content at the depth of excavation is below the plastic limit 	Thank you for the information.
Page 16, 2B2	DNR	M. Collins	7/20/2020	<p>The DNR works with project proposers to avoid impacts to Public Waters through the permitting process. Calcareous fens have special protection under Minnesota Statutes 103G.223 and any activity that could impact them requires a Calcareous Fen Management Plan as well as sequencing and avoidance through Minnesota’s Wetland Conservation Act. In addition, any state-threatened or endangered plants occurring in a calcareous fen are protected under Minnesota’s endangered species law Minnesota Statutes 84.0895. The DNR applauds any effort to preserve, protect, and restore Minnesota’s water resources and supports these initiatives.</p>	Thank you.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 16, 2B2D (also page 48)	VRWJPO	M. Zabel	6/26/2020	Comment: The Wetland Health Evaluation Program (WHEP) is an educational and outreach program, it does not directly implement protection, preservation, or restoration of natural resources. It would appear to be a better fit as a tactic under strategy 3A – pages 17 and 18.	Moved it to Tactic 3B1G, renumbered other tactics.
Page 17, 2C1A	City of Apple Valley	M. Saam	7/20/2020	The City would be eager to learn about these technologies.	County staff have been researching options and look forward to discussing them with our partners.
Page 18, 3A1D	DNR	M. Collins	7/20/2020	The plan states “Inform the public about groundwater levels by putting DNR observation well data on the County website.” DNR Comment: Consider including water level data from water appropriation permit holders observation wells.	Will consider; this would make water level information more representative county-wide.
Page 19, 3A1E	City of Apple Valley	M. Saam	7/20/2020	When placing these signs, we recommend identifying the source of the drinking water and to use plain language -- DWSMA may not be a household term to residents.	County staff will use generally familiar terminology in the signage and will coordinate with cities and municipalities.
Page 19, 3B1A	DNR	M. Collins	7/20/2020	Consider promoting homeowner education on the proper use and maintenance of septic systems to preserve their function. The University of Minnesota’s Onsite Sewage Treatment Program designed a homeowner tool that allows users to create a custom guide for their septic system. The tool can be found at https://h2oandm.com/ .	Thank you for the information.
Page 20, 4A1B	DNR	M. Collins	7/20/2020	The DNR welcomes this initiative.	Thank you.
Page 20, 4A1D	DNR	M. Collins	7/20/2020	The DNR is willing to continue to discuss decision-making related to shallow and deep irrigation wells as they relate to nitrates and surface water interactions.	County staff look forward to constructive discussions regarding these situations.
Page 21, 4A1C	City of Apple Valley	M. Saam	7/20/2020	The City would be eager to participate in these types of programs.	Thanks for your interest.

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Page 21, 4B1A	DNR	M. Collins	7/20/2020	The DNR looks forward to these types of discussions to learn how water users are experiencing our regulatory processes for water appropriation permitting and reporting. The DNR is willing to hear if there are opportunities to improve the way we conduct our water use permitting and reporting functions. DNR is willing to offer to help teach the public how to use the Minnesota Permitting and Reporting System (MPARS) so that applying for DNR Water Appropriation Permits is easier.	Thank you.
Page 23, Implementa tion	Legislative Subcommit tee on Minnesota Water Policy (SMWP)	J. Stark	7/27/2020	You mention that there will not be sufficient funding to implement many aspects of the plan. I may have missed this. However, I didn't see enough prioritization of what should be addressed first.	Funding and implementation of some tactics (especially those identified as "opportunity-based") will depend on the ability to apply for and win grants. However, completion of the Groundwater Plan does allow us to compete for funding not previously available. Priorities are identified in Chapter 2, Plan Implementation. Those identified as high priority are anticipated to receive resources first. The Implementation Plan also identifies projected timeframes for each tactic, identifying which are anticipated to be addressed first.
Page 24	MDA	J. Berg	7/17/2020	The phrase "Groundwater and drinking water are free from unhealthy levels of contamination" may benefit from some clarifying wording or additional narrative. Does "unhealthy levels of contamination" mean health risk limits, aquatic life standard, or something else?	Unhealthy for humans and other living organisms.
Page 25	VRWJPO	M. Zabel	6/26/2020	Comment: Please include a narrative description for N loss reduction estimates that identifies these estimates as limited to the treatment area of the applied practice, i.e. a saturated buffer provides treatment only for the limited area of an upgradient field, or portion of a field, contributing flow to the buffer.	Added explanation.

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Page 25	MDA	J. Berg	7/17/2020	Page 25 adequately captures examples of nitrogen fertilizer BMPs and AMTs, but it should be noted that this is not a comprehensive list. There is a large list of AMTs that could be categorized and/or itemized here. MDA has compiled AMT information at: https://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/nitrogenmgmt/amts and this could be included in the references.	Added explanation and link to MDA website
Page 25	MDA	J. Berg	7/17/2020	It would be beneficial for the plan to discuss, or at a minimum, provide a link to and include in the references the University of Minnesota nitrogen fertilizer BMP publications applicable to Dakota County. See: https://www.mda.state.mn.us/pesticide-fertilizer/nitrogen-fertilizer-best-management-practices-agricultural-lands) Turf grass is also discussed in the plan and a turfgrass BMP publication is also available to include. This information would be a good addition on page 25 as well as in the references.	Added references for agricultural and turf grass BMPs.
Page 25	MDA	J. Berg	7/17/2020	Note that the estimated nitrogen reductions shown are from the Nitrogen in Minnesota Surface Waters report which may be more applicable for surface water. Though these are likely practices that will protect groundwater, the percent (%) reduction may not be accurate for groundwater. Also, it would be helpful to provide more detailed discussion (in addition to the last sentence) on how nitrate reduction practices would help with pesticide leaching and soil loss.	These estimates will be improved when empirical data are available from MDA and UMN.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 28	MDA	J. Berg	7/17/2020	Thank you for including the vulnerable area map on page 28. Since this map illustrates fall and frozen soil nitrogen fertilizer restrictions, we suggest the narrative in the legend simply state that "Restrictions refer to MDA restrictions on the use of chemical nitrogen fertilizer in the fall and on frozen soil". You could delete the remainder of the sentence as well as the word "chemical" in the sentence.	Edited text but left reference to chemical nitrogen fertilizer because the use of manure as fertilizer is less restricted.
Page 29, 1B4, last sentence	VRWJPO	M. Zabel	6/26/2020	Comment: Is manure a top contributor of chloride contamination? It doesn't appear on the list on page 102. Suggest striking the phrase "including manure spread on fields" from the sentence.	Changed for clarification (potash vs manure).
Page 29, 1A2A, Annual Measure	VRWJPO	M. Zabel	6/26/2020	Comment: Shouldn't percentage of wells inspected instead be the number of wells inspected given that the calculation of the percentage is the ratio of number of permitted wells constructed to the number of those whose construction was physically inspected. If in a given year there is a small number of wells constructed it would follow that a small number were inspected, and vice-versa for a year with a large number of wells constructed. The workload effort is better conveyed by the actual number inspected.	MDH, through the County's Well Program Delegation Agreement, requires well inspections based on percentage. The Plan is consistent with the reporting requirement to MDH. (The current Delegation Agreement requires inspection of 25% of new water supply wells and 10% of well sealings each year.)
Page 30, 1A3C	VRWJPO	M. Zabel	6/26/2020	Comment: How do services identified here compare with the services provided through the septic program? Especially in regard to financial assistance.	County septic system programs are discussed in Chapter 4, Section A(2) of the Plan. The County administers a septic low-income grant program and a tax assessment program to assist homeowners with the cost to replace or repair failing septic systems. The low-income septic grant program provides up to 50% cost-share. The proposed low-income drinking water treatment system grant program (tactic 1A3C) will be designed with similar parameters to the septic low-income grant program for consistency; however, depending upon partnerships and external grants, cost

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					assistance may be greater than 50%. Note, cost for a drinking water treatment system is much lower than septic system repair/replacement costs in most situations.
Page 30, 1A3E	VRWJPO	M. Zabel	6/26/2020	Comment: How will information gathered through these efforts be shared with the public?	Each well owner's well testing results identified under tactics 1A3E and 1A3F are summarized and communicated directly to them, along with drinking water health risks and recommendations for water treatment, if applicable. A fact sheet summarizing results for each community (i.e., city or township) will be sent to applicable city/township staff and other interested parties as well as posted online at the Dakota County website. Past fact sheet examples for community private well sampling can be found at: https://www.co.dakota.mn.us/Environment/WaterResources/WellsDrinkingWater/Pages/drinking-water-studies.aspx
Page 31, 1A3G	VRWJPO	M. Zabel	6/26/2020	Comment: What is the relationship between testing offered through these clinics and efforts identified in 1A3E? Are they the same customer market? There are sampling/ testing programs that may be identified separately and sometimes seem confused, e.g. 1) free testing, 2) fee for service testing, 3) contamination response treatment testing (indoor/ outdoor sampling to determine treatment effectiveness), 4) mitigation testing (assessment areas). Perhaps a table, flowchart, or graphic description would be helpful to illustrate how and when testing should occur and when financial assistance for testing will be provided.	Table of "Water Testing Options for Private Well Owners" added to Chapter 4.
Page 32, 1B1C	MDA	J. Berg	7/17/2020	Under the Target heading, in 1B1C, the second bullet point states "practices listed above". Is this in reference to page 25?	Yes. Added note.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 32, 1B1D	MDA	J. Berg	7/17/2020	MDA appreciates past and continued discussion on development and implementation of monitoring network(s) in Dakota County. MDA and Dakota County Environmental Resources Staff met on Monday, February 24, 2020 to discuss groundwater monitoring networks. The MDA remains interested in collaborating on network design, installation, monitoring and the evaluation of water quality data. MDA is particularly interested in a planned groundwater monitoring network in the Hastings Drinking Water Supply Management Area.	County staff value this collaborative project and have had a number of conference calls and emails with MDA staff to help get it launched. MDA is currently on track to have some of the monitoring wells within the Hastings DWSMA installed before the end of 2020. County staff are identifying resources to install a similar network of monitoring wells outside of the Hastings DWSMA.
Page 33, 1B1E	MDA	J. Berg	7/17/2020	“UMN” is included as a partner, which is likely referring to the University of Minnesota Irrigation Specialist. The plan could include additional narrative on this position and activities or include that information in the references. See: https://www.mda.state.mn.us/node/1313	"Partners" in the Plan refer to organizations, not specific job descriptions.
Page 33, 1B1F	MDA	J. Berg	7/17/2020	MDA looks forward to our continued collaboration on long-term nitrogen fertilizer and water quality sites. MDA may be able to provide assistance for these sites to provide sound scientific data to help promote and adopt the nitrogen fertilizer BMPs. This could complement existing MDA funded research activities (https://www.mda.state.mn.us/clean-water-research-program-research-priorities), technical assistance, and could include on-farm demonstrations such as the Nutrient Management Initiative program (https://www.mda.state.mn.us/protecting/cleanwaterfund/onfarmprojects/nmi).	Thank you, this is much appreciated.
Pages 34 and 35, 1B1G and 1B2D	VRWJPO	M. Zabel	6/26/2020	Comment: List partners, state and federal, identified in the description in the partners list as well.	Noted.
	VRWJPO	M. Zabel	6/26/2020	Comment: Tactic 2B2A (page 47) does not appear similar, please strike the reference.	Corrected to 1B1G

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 45, 2A2C	VRWJPO	M. Zabel	6/26/2020	Comment: Perhaps water conservation audits could be a County/ SWCD program supported, in part, by public water suppliers or private entities (i.e. corporate campuses that use their own water supplies) for evaluating water use efficiencies and improvements.	This tactic specifically refers to County facilities, in accordance with "leading by example." Tactic 2A2B has been changed to include cost-share funding for water audits. City water suppliers were added as partners to 2A2C.
Page 47, 2B1B	VRWJPO	M. Zabel	6/26/2020	Comment: There are regulatory programs addressing stream and ditch buffers. The phrase referencing these buffers should be stricken from this tactic as it will potentially confuse buffer areas acquired via voluntary easement and those required through regulatory controls.	Change made.
Page 53, 3B1E, Annual measure, 3 rd bullet	VRWJPO	M. Zabel	6/26/2020	Comment: What is the metric for measurement under this planned annual measure? It would be difficult to attribute cause and effect.	The metric for measuring impact in decision making could include a public official's change in course of action or generation of action as a direct result of education or presentation. This annual measure relates more to possible outcome of one-on-one meetings and direct communication/education with public officials vs group education sessions.
Page 57, Performance and Accountability	CRWP	K. Pursell	7/20/2020	"OBA reported will be used as strategies are implemented, on a project-by-project basis, which will be dependent on Department-approved annual workplans." This statement feels like it could be an "out" for the County potentially not doing proper evaluation. If budget issues are a concern, is there an opportunity to do a deeper dive into evaluation of progress on a lesser frequency?	Drinking Water Protection is a high priority for Dakota County residents and, by extension, the Dakota County Board, which establishes the County's operating budget every year. However, Covid-19 has created considerable financial uncertainty for the county and for State agencies that fund water projects. Many of the strategies in the Groundwater Plan are already being implemented, but some new initiatives may be delayed for financial or logistical reasons. In any case, the evaluation of program efficiency and effectiveness has always been important to Dakota County administrations.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 59, Planning Overview	CRWP	K. Pursell	7/20/2020	We recommend you include language regarding the frequency and manner in which assessment results will be communicated with citizens, stakeholders, and partners. (This is an area CRWP might be poised to assist with also.)	County staff intend to publish a report each year on their Groundwater Plan implementation activities for the coming year and metrics for the prior year. The Delegated Well Program already submits a mandatory annual report to MDH and this would be an expansion on that report. Please see the last paragraph under Chapter 2, Section A.
Page 59, Planning Overview	CRWP	K. Pursell	7/20/2020	The statutory language is not very robust when it comes to groundwater planning, plan content requirements, and evaluation of plan progress. What has been included for certain metrics makes sense but some of them would benefit by including information compared to a current baseline (if there is data on that?) to see if the needle can be moved towards achieving the plan goals. e.g. % of population served: what are the demographic targets to reach to address inequality (i.e. people of color, historically underserved populations)? Will all grant programs take greater equity into consideration (cost-share policies with required landowner match, citizens served, etc)? Metropolitan Council has a dataset available on 'areas of racially concentrated poverty'. Is this available for Dakota County? Could this or other similar information be utilized to ensure historically disadvantaged folks are also engaged.	Private well owners themselves are an underserved population, because the health of private water supplies are not regulated the way public water supplies are. That said, there is little demographic information available about private well owners (who are in all Dakota County cities and townships). Added Tactics 1A3H, 3A1H, and 3B1H to address these and related gaps. In addition, groundwater information in general suffers from a lack of measurable outcomes compared to surface water protection activities. The first several years of the implementation of this Groundwater Plan will include collection of baseline data wherever possible. For example, after five years, Tactic 1A3E (free private well testing), which is already being implemented, will result in the County having representative county-wide baseline information about the prevalence of nitrate, arsenic, manganese, and lead in private wells.)
Page 65, 2nd bullet, and other places	MDA	J. Berg	7/17/2020	In most places in the plan, "Groundwater Rule" is used. For consistency, you may want to use the official title of the Rule 'Groundwater Protection Rule' which is noted correctly on page 98 of the plan.	Changes made.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 66, Plan amendment process and timeframes.	CRWP	K. Pursell	7/20/2020	We recommend that language be included in the plan regarding Dakota County's commitment to amend this plan at the expiration of this 10 year plan. The last State-approved GW plan lapsed before the County began developing this plan and it would be nice to see the commitment and follow-through on behalf of county government in full support of this plan and its continued use into the future, beyond 10 years.	Noted. See added language to Chapter 3, Section H.
Page 67	MDA	J. Berg	7/17/2020	Remove from the second bullet: "and the Minnesota legislature approved". The MN legislature was provided the draft Rule, but (like other Rules) legislative approval was not required.	Change made.
Page 68 and 97	MDA	J. Berg	7/17/2020	In the 'callout box' on page 97 it states that "Voluntary nitrogen best management practices (BMPs) are the cornerstone of the NFMP, which are voluntary practices that are defined in Minnesota Statute § 103H.005". To provide clarity that the NFMP addresses going beyond the nitrogen fertilizer BMPs, perhaps this sentence can be revised to read: "Voluntary nitrogen fertilizer best management practices (BMPs) and other practices protective of groundwater, called alternative management tools (AMTs), are the cornerstone of the NFMP."	Edited text.
Page 84, Watershed Plans and One Watershed, One Plan	CRWP	K. Pursell	7/20/2020	It is exciting news that BWSR recently approved the Cannon River One Watershed, One Plan. CRWP had been a driving force beginning this process four years ago and we continue in the capacity of a willing and able partner. Additionally, if a county Groundwater Collaborative is formed please keep CRWP in mind to join.	Thank you, will do so.

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Page 86, b., 2 nd paragraph , last sentence	VRWJPO	M. Zabel	6/26/2020	Comment, suggest revising to: The policies presented in these plans aim to protect surface and groundwater-dependent ecosystems from the impacts of wastewater and stormwater through interagency cooperation, revision of ordinances related to surface water protection <u>setting uniform standards for water resource protection and management, requirement of project specific codes and public information and outreach efforts.</u>	Change made.
Page 86, b., 4 th paragraph	VRWJPO	M. Zabel	6/26/2020	Comment: Currently choices in regard to participation in 1W1P planning for major watersheds that intersect with the areas where watershed management plans have been developed and implemented in the seven county Metropolitan Area are in development. It unknown as to whether Watershed Management Organizations and the Watershed District in Dakota County will be participating (beyond the development already in place in the Cannon River). This paragraph should be stricken due to the broad uncertainty associated with this development.	Text edited to clarify.
Page 87, Changes to Official Controls	Legislative Subcommittee on Minnesota Water Policy (SMWP)	J. Stark	7/27/2020	Finally, what suggestions might you offer for legislation that would be helpful in addressing the priorities in the plan. Are you comfortable addressing this in the plan?	Some suggestions for legislation are offered in Chapter 4, Section E (Changes to Official Controls). Continued State funding for cost-share grants for practices to improve water quality will be important to the success of Dakota County's Groundwater Plan and water quality improvements statewide. The Dakota County Board prepares a Legislative Platform every year. The 2020 Legislative Platform included "Support efforts to actively address groundwater contamination due to nitrate" and "Strengthen the regulatory oversight of groundwater appropriations to be exported out of Minnesota." County staff anticipate the 2021 Platform will include similar items.

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 100, Pesticides (herbicides)	MDA	J. Berg	7/17/2020	Perhaps a sentence should be added that pesticides include herbicides, insecticides, fungicides and others, since this may not be clear to all readers.	Included in "Sources" paragraph.
Page 100, Pesticides (herbicides)	MDA	J. Berg	7/17/2020	The wording in the sources paragraph on page 100 seems unclear and could use some updated language; for example "control some type of life." Possible rewording such as: Pesticides are intentionally introduced in the environment to manage different types of pests and are toxic by nature. After entering the environment, the toxic effects of pesticides may extend beyond the target organisms degrading surface and groundwater resources and posing risks to humans, animals, and plants in the broader environment.	Edited text.
Page 100, Pesticides (herbicides)	MDA	J. Berg	7/17/2020	Similar to the nitrogen fertilizer BMPs, information on pesticide BMPs would be beneficial to reference and discuss in the plan. See: https://www.mda.state.mn.us/pesticide-fertilizer/pesticide-best-management-practices	Pesticide BMPs can be discussed further in the ACRE Plan.
Page 100, Health Concerns, 2)	VRWJPO	M. Zabel	6/26/2020	Comment: This statement begs for risk communication and mitigation direction. What is the County going to do about it?	Added additional information
Page 100, Health Concerns	MDA	J. Berg	7/17/2020	On page 100, the last sentence of the second paragraph it states: "... cyanazine, a crop herbicide, persistently above cyanazine's health risk guidance values." It would be helpful to tell the reader cyanazine is cancelled/ no longer used at the first mention of this herbicide. For example, "... cyanazine, a crop herbicide no longer in use, is persistently above cyanazine's health risk guidance values."	Change made.

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Page 102	MDA	J. Berg	7/17/2020	<p>Page 102, second paragraph states: “Most of the herbicides occurred at concentrations below health risk standards with the exception of cyanazine and its breakdown products, which exceeded the MDH drinking water standard of 1.0 µg/L in 19 percent of the wells sampled. Cyanazine is an herbicide banned in 2002 because of health concerns. The United States Environmental Protection Agency (USEPA) lists cyanazine as “a probable human carcinogen.”</p> <ul style="list-style-type: none"> • Cyanazine was not “banned”, registration was voluntarily cancelled. 	Text edited to clarify.
Page 102	MDA	J. Berg	7/17/2020	<p>The “19% of the wells sampled” seems to be reflective of a targeted sampling of wells in areas with known cyanazine concerns. It does not represent the County as a whole, nor is it reflective of the Dakota County long-term Ambient Study data as presented below which indicated declining cyanazine breakdown product concentrations in recent years and never exceeded 13%. Greater context is required as to what exactly 19% represents (time period and region represented) and what information is being conveyed. This is based on information presented by Dakota County staff at the March 16, 2016, Crop Day. MDA is interested in continuing to partner with Dakota County in monitoring cyanazine degradates and other pesticides in groundwater and looks forward to continued discussion.</p>	<p>As described in the first two paragraphs of the "Dakota County Results" section on herbicides, the private wells in the Dakota County Ambient Groundwater Quality Study (Ambient Study), the source of the "19%" exceedance reference (which is now 22% based on the most recent sampling results), were selected to be representative of groundwater conditions throughout the county, not just in rural Dakota County. Because wells with construction records were selected wherever possible, the conditions reflected in Ambient Study wells are generally cleaner than private wells in the county overall. County Groundwater staff have shared its complete herbicide dataset with MDA monitoring staff. The Ambient Study final report will be available around September, 2020. MDA added cyanazine breakdown products to its statewide monitoring program starting in 2019, in response to Dakota County staff's urging and after resolving technical challenges. MDA's water testing not only confirmed what Dakota County had found, MDA found cyanazine breakdown products in numerous municipal and private wells in other agricultural areas of the state. Some of their results also exceeded drinking water guidelines. In addition to</p>

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Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
					what was found in private wells, cyanazine degradates were found in Hastings and Farmington municipal wells, but at levels below the drinking water guidelines. MDA and MDH will continue to monitor the municipal wells where the chemicals were detected. MDA and MDH staff are now in the process of assembling a work group, including Dakota County staff, to address the cyanazine issue wherever it is found in drinking water around the state, following the "contaminants of emerging concern" framework. (The effort is somewhat slowed by challenges presented by the Covid-19 crisis.) At this time, neither Dakota County nor the state have sufficient data to determine what percentage of private wells in agricultural areas have cyanazine breakdown product detections or exceedances.
Page 104	University of Minnesota	L. Henkels	7/21/2020	The report incorrectly states that the UMN Outreach, Research and Education (UMore) Park/Rosemount Research Center/Former Gopher Ordnance Works Site is currently listed on the Federal Superfund National Priorities List (NPL). The Site was delisted from the NPL in 2001.	Change made.
Page 104	Flint Hills Resources Pine Bend LLC	S. Dahl	7/20/2020	On page 104 the "Koch Refinery" is listed as being on the Federal Superfund National Priorities List. The refinery the report is referring to is NOT on the National Priorities List. Please remove the name from the listing. Note that the legal name of the Refinery is not "Koch Refinery" but rather the refinery is owned and operated by Flint Hills Resources Pine Bend, LLC.	Change made.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 106	Flint Hills Resources Pine Bend LLC	S. Dahl	7/20/2020	Koch Refinery (now Flint Hills Resources Pine Bend LLC Refinery (FHR), North Star Chemical (reportedly now Continental Nitrogen), St. Paul Ammonia (also Continental Nitrogen), Pine Bend Sanitary Landfill, and Crosby-American Landfill (now in the MPCA Closed Landfill program) are located in Pine Bend, approximately 10 miles south of St. Paul and one-half to one mile west of the Mississippi River. Koch Refining (Flint Hills Resources Pine Bend) The FHR Refinery was constructed in the 1950s to refine high sulfur crude oil imported by pipeline from the oil fields of the Province of Alberta, Canada. Numerous petrochemical industries associated with the refinery were built in the area. Pine Bend Sanitary Landfill and Crosby-American Landfill began operation in the early 1970s, accepting mixed municipal solid waste and demolition wastes. A series of hydrologic investigations have been conducted. The FHR Koch, North Star, and St. Paul Ammonia sites have been combined into a single	The text has been edited, however, the reference to the historic name of the property, Koch Refinery, remains because that is how the MDH Well Management Program describes the property on the Special Well and Boring Construction Area website, the source for this information. Reference added to text. (Minnesota Department of Health, Inver Grove Heights (Pine Bend Area) Special Well and Boring Construction Area, https://www.health.state.mn.us/communities/environment/water/wells/swbca/inver.html)
Page 115, D. 2 nd paragraph, 2 nd sentence	VRWJPO	M. Zabel	6/26/2020	Comment: Include impacts to vulnerable resources due to thermal or biogeochemical changes.	Added paragraph with this information.
Page 125	CRWP	K. Pursell	7/20/2020	Thank you for including the history of the county, including original Dakota names for the Cannon River and Castle Rock, inside the county's plan.	Thank you.
Appendix A. References	MDA	J. Berg	7/17/2020	Consider including a reference to the NFMP and GPR in the appendix.	GPR added to references. NFMP was already in references.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 155, 1 st paragraph	VRWJPO	M. Zabel	6/26/2020	Comment: suggest inserting as second and third sentences: The Vermillion River receives local recharge from surficial and shallow bedrock aquifers in the upper portion of its drainage which delivers cool water to its flow and designated trout stream reaches. The Vermillion River becomes a losing stream in a portion of its lower reaches which provides recharge to underlying aquifers.	Change made.
Septic systems	County Resident	B. Rohrenbach	7/10/2020	Hello Jill, I live in Oakwood estates in Rosemount! There are 23 homes on 18 acres, all well and septic! The area was developed in the late 60's and early 70's! Shouldn't this area be considered for update to municipal services! If so I will comment on the groundwater plan!	<p>The expansion of centralized wastewater services is a city and Metropolitan Council decision. However, the Groundwater Plan's Tactic 1A1B proposes the County conduct feasibility studies to evaluate the expansion of centralized water supply and/or wastewater services.</p> <p>In summer 2020, Dakota County is providing free water testing to households that use private wells in Rosemount and other communities (implementing Tactic 1A3B). The City of Rosemount has indicated the results of the County's private well testing will inform their decision-making process regarding the expansion of municipal services.</p>
Page 185, County Residential Survey	County Resident	E. Anderson	7/20/2020	As a private well drinking water user among myself and my 3 children, I am concerned with the "residential survey" concerning county fund expenditures to improve/protect groundwater resources. A high percentage wanted to use county funds to protect "city" drinking water but a low percentage would allow funding of "private well" owners. We all use the same groundwater. I do not support city residents receiving county funds to lower their costs while leaving well owners bearing the high cost of onsite contamination removal, from that same water source. Also, in view of the expanding nitrate contamination levels and only volunteer agricultural user compliance of MDA fertilizer applications, we as household users of	The County's periodic Residential Surveys are designed to be statistically valid representations of residents' opinions; this particular question was added as part of the background research for the Groundwater Plan. The survey results by themselves do not necessarily determine County funding priorities. County staff are working to identify sources for cost-share funding to provide low-income households that use private wells with effective and appropriate water treatment systems. (Tactic 1A3C)

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 185, County Residential Survey	County Resident	J. Boldt	7/20/2020	<p>groundwater need better controls implemented for agricultural chemical uses.</p> <p>As a private well user for drinking water I am greatly concerned with the "residential survey" concerning County fund expenditures to improve/ protect ground water resources. A high percentage wanted to use County funds to protect "city" drinking water but a low percentage would allow funding of "private well" owners. We all use the same ground water, I DO NOT SUPPORT city residents receiving County funds to lower their costs while leaving well owners bearing the high cost of onsite contamination removal, from the same water source. Also in view of the expanding nitrate contamination levels and only volunteer agricultural user compliance of MDA fertilizer applications, we as household users of ground water need better controls implemented for ag chemical uses.</p>	<p>The County's periodic Residential Surveys are designed to be statistically valid representations of residents' opinions; this particular question was added as part of the background research for the Groundwater Plan. The survey results by themselves do not necessarily determine County funding priorities.</p> <p>County staff are working to identify sources for cost-share funding to provide low-income households that use private wells with effective and appropriate water treatment systems. (Tactic 1A3C)</p>

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Comment er	Date Comment Received	Comment	County Response
Text Edit Comments (Spelling/Grammar)					
Page ES i and 34 and others	MDA	J. Berg	7/17/2020	Page i and 34 (and other pages) – Check the plan for the use of the word ‘Nitrate’, it should be a singular word (in most cases) so consider using nitrate not nitrates.	Change made.
Page ES iii, 1 st paragraph, 2 nd sentence.	VRWJPO	M. Zabel	6/26/2020	Freshwater – change to Freshwater Society	"Freshwater" is now the organization's formal name.
Page 8, 1B2, 1 st bullet.	VRWJPO	M. Zabel	6/26/2020	Reduction – change to reduced.	Change made.
Page 8, 1B3, 2 nd bullet.	VRWJPO	M. Zabel	6/26/2020	Mechanism – change to mechanisms	Change made.
Page 19, 3B, 3 rd bullet (top of page 19)	VRWJPO	M. Zabel	6/26/2020	Decision – change to decisions	Change made.
Page 21, 4A, 2 nd bullet	VRWJPO	M. Zabel	6/26/2020	Innovated – change to innovative	Change made.
Page 21, 4B 2 nd (last) bullet	VRWJPO	M. Zabel	6/26/2020	Should this be referencing Minnesota Statutes 103I? Specifically M.S. 103I.111?	Change made.
Page 24, 1A3, 2 nd sentence.	VRWJPO	M. Zabel	6/26/2020	“Residents with contaminated wells are “sometimes” responsible for their own water treatment.” Begs an explanation of when they are or are not.	Changed to "usually."
Page 27, Figure 4	MDA	J. Berg	7/17/2020	Page 27: Provide a heading for the legend.	Change made.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Comment er	Date Comment Received	Comment	County Response
Page 29, 1B4, last sentence.	VRWJPO	M. Zabel	6/26/2020	Are also are - one of the two are(s) should be deleted.	Change made.
Page 31, 1B1A description.	VRWJPO	M. Zabel	6/26/2020	BBMPs – change to BMPs.	Change made.
Page 31, 1B1A description.	MDA	J. Berg	7/17/2020	Under 1B1A there is a typo: BBMP	Change made.
Page 34, 1B2A description.	VRWJPO	M. Zabel	6/26/2020	Insert a preposition: “Partner with Dakota SWCD, cities and townships, watershed management organizations, and others to provide turf and landscape maintenance trainings to home owners and property managers <u>to</u> protect water quality.”	Change made.
Page 34 (Page 7), 1B2B description.	VRWJPO	M. Zabel	6/26/2020	Restructure the sentence - (suggestion): Partner with Dakota SWCD, cities and townships, watershed management organizations, and others to promote conversion of turf grass and annual vegetation to perennial vegetation with an emphasis on native species using native plantings, raingardens, shoreline restorations or other practices through “Landscaping for Clean Water”, “Lawns to Legumes” or other similar programs.	Change made.
Page 34 (Page 7), 1B2C description.	VRWJPO	M. Zabel	6/26/2020	Similar to 1B2B above (cost-share vs promote)	Change made.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Commenter	Date Comment Received	Comment	County Response
Page 43, 2B3, last sentence.	VRWJPO	M. Zabel	6/26/2020	Restructure the sentence – (suggestion): This would include land near surface water bodies that have a direct impact on groundwater (such as along the Vermillion River west of Hastings and east of Empire), and areas of the County that have the highest nitrate concentrations per Figure 4, where there is a high water quality benefit for conversion from existing land uses to wetland or perennial native vegetation.	Change made.
Page 44, 1 st paragraph, 3 rd sentence.	VRWJPO	M. Zabel	6/26/2020	Pervious – change to impervious.	Change made.
Page 44, 2 nd bullet	VRWJPO	M. Zabel	6/26/2020	Infiltration basis – change to infiltration basins.	Change made.
Page 52-53, 3A1F compared to tactics under 3B	VRWJPO	M. Zabel	6/26/2020	How does this differ?	3A1F refers to broad-based educational items for the general public. 3B are items for narrow, specific audiences.
Page 85, 3.a., 1 st sentence	VRWJPO	M. Zabel	6/26/2020	Add – or through formation of a watershed district (WD) or joint powers organization (JPO).	Change made.
Page 93, A., 4 th bullet	VRWJPO	M. Zabel	6/26/2020	Nitrate and herbicides pesticides (especially cyanazine breakdown products) associated	Original language is correct.
Page 93, A., 7 th bullet	VRWJPO	M. Zabel	6/26/2020	Chloride – from road salt or water softener salt – is...	Edited text.
Page 127, A., 3 rd sentence	VRWJPO	M. Zabel	6/26/2020	Pilot Knob is O-HE-YA-WA-HE in the Dakota language, Mendota or MDO-TE is the confluence of the waters. Mdo Te was conveyed as Mendota through the French. (Visit the Mendota Mdewakanton Dakota website).	Edited text.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Comment er	Date Comment Received	Comment	County Response
Page 98	MDA	J. Berg	7/17/2020	In the GPR callout box, please remove “drafted” in the first sentence.	Change made.
Page 133, A., 1 st paragraph , 2 nd sentence	VRWJPO	M. Zabel	6/26/2020	Pine and fir are coniferous, others listed are deciduous.	Change made.
Page 133, A., 2 nd paragraph	VRWJPO	M. Zabel	6/26/2020	1 st sentence: Average rainfall – change to Average precipitation.	Change made.
	VRWJPO	M. Zabel	6/26/2020	2 nd sentence: average monthly temperatures – January 16 degrees F, July 74 degrees F.	Change made.
	VRWJPO	M. Zabel	6/26/2020	Also; the average annual temperature is approximately 45 degrees F which would also be the expected temperature of groundwater in the area.	Noted.
Page 135, First bullet, First sentence.	VRWJPO	M. Zabel	6/26/2020	Strike – With rising temperatures, what once was falling to the ground as snow is now rain. (Snow counts as precipitated water the same as rain. In the explanation of the state getting wetter this has no relevance. If this was in explanation of the effects of rising temperatures it would be relevant.)	Change made.
Page 136, 2 nd paragraph , 2 nd (last) sentence.	VRWJPO	M. Zabel	6/26/2020	Change to – the amount that soaks into the drinking water aquifers <u>groundwater</u> maybe less.	Change made.
Page 148, 1 st paragraph , last sentence.	VRWJPO	M. Zabel	6/26/2020	Change to – Dolostone in both formations is karst <u>karstic</u> .	Change made.

2020-2030 Dakota County Groundwater Plan

Page #, Chapter & Section	Source/ Agency	Comment er	Date Comment Received	Comment	County Response
Page 148, 3 rd paragraph , 1 st sentence.	VRWJPO	M. Zabel	6/26/2020	This sentence should be moved to be the last sentence of the previous paragraph as it is describing the Prairie du Chien group (Lower Ordovician). Begin the 3 rd paragraph with the description of the Jordan sandstone (Upper Cambrian).	Change made.
Page 150, Figure 37	VRWJPO	M. Zabel	6/26/2020	Depicts active aggregate mines (pits) and should be labeled accordingly. Aggregate resources of varying quality and economic value, as well as their feasibility for mining, range widely within Dakota County.	Change made.
Page 158, b., 2 nd paragraph , 1 st sentence.	VRWJPO	M. Zabel	6/26/2020	Change to – The Vermillion River includes a highly valued public trout fishery and supports a self-sustaining wild brown trout population.	Change made.

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APPENDIX D. PLAN APPROVAL DOCUMENTS

**BOARD OF COUNTY COMMISSIONERS
DAKOTA COUNTY, MINNESOTA**

January 19, 2021
Motion by Commissioner Joe Atkins

Resolution No. 21-042
Second by Commissioner Liz Workman

Authorization To Adopt 2020-2030 Dakota County Groundwater Plan

WHEREAS, updating the Dakota County Groundwater Plan (Plan) was a 2020 Board Priority, continuing its priority status from 2018; and

WHEREAS, the purpose of the Plan is to provide strategic direction for the County's involvement in groundwater issues and provide access to funding opportunities to support these efforts; and

WHEREAS, the Plan was developed through research on groundwater quality and quantity, a review of existing and potential strategies, stakeholder response during two rounds of public engagement, and guidance from the technical workgroup, the County Planning Commission, and the Board of Commissioners; and

WHEREAS, by Resolution No. 20-246 (May 19, 2020), the County Board authorized release of the draft Plan for a 60-day public review period from May 20 to July 20, 2020, and comments were received from county residents and 16 organizations during the public review period; and

WHEREAS, on September 1, 2020, the County Board of Commissioners held a public hearing to receive comments on the draft Plan, at which time no comments were received; and

WHEREAS, by Resolution No. 20-417 (September 1, 2020), the County Board approved release of the revised draft Plan to the Metropolitan Council, the state review agencies, and the Board of Water and Soil Resources (BWSR) for a final 45-day review period in accordance with Minn. Stat. § 103B.256; and

WHEREAS, the BWSR received no comments during the 45-day final review period; and

WHEREAS, the BWSR Board approved the 2020-2030 Dakota County Groundwater Plan on December 17, 2020; and

WHEREAS, the County has 120 days as of the Order to adopt and implement the Plan, in accordance with Minn. Stat. § 103B.256, Subd. 11.

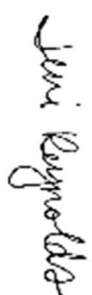
NOW, THEREFORE, BE IT RESOLVED, That the Dakota County Board of Commissioners hereby adopts the Board of Water and Soil Resources-approved 2020-2030 Dakota County Groundwater Plan.

STATE OF MINNESOTA
County of Dakota

	YES		NO
Slavik	<u> X </u>	Slavik	<u> </u>
Gaylord	<u> X </u>	Gaylord	<u> </u>
Halverson	<u> X </u>	Halverson	<u> </u>
Albina	<u> X </u>	Albina	<u> </u>
Workman	<u> X </u>	Workman	<u> </u>
Hoberg	<u> X </u>	Hoberg	<u> </u>
Hamann-Roland	<u> X </u>	Hamann-Roland	<u> </u>

I, Jenn Reynolds, Clerk to the Board of the County of Dakota, State of Minnesota, do hereby certify that I have compared the foregoing copy of a resolution with the original minutes of the proceedings of the Board of County Commissioners, Dakota County, Minnesota, at their session held on the 19th day of January 2021, now on file in the County Administration Department, and have found the same to be a true and correct copy thereof.

Witness my hand and official seal of Dakota County this 19th day of January 2021.



Clerk to the Board



December 17, 2020

Board of Commissioners
Dakota County Western Service Center
C/o Georg Fischer, Environmental Resources Director
14955 Galaxie Avenue
Apple Valley, MN 55124

Dear Chair and Commissioners:

I am pleased to inform you that the Minnesota Board of Water and Soil Resources (Board) has approved the Dakota County, Minnesota Groundwater Plan 2020-2030 (Plan) at its regular meeting held on December 17, 2020. For your records I have enclosed a copy of the signed Board Order that documents approval of the Plan. Please be advised that the County must adopt and implement the Plan within 120 days of the date of the Order, in accordance with MN Statutes 103B.255, Subd. 11.

Members of the County Board and Planning Commission, county staff, advisory committee members, and all others involved in the planning process are to be commended for developing a plan that clearly presents groundwater management goals, priorities for addressing these goals and establishing outcomes for partners to annually evaluate collaboration and success of the implementation of the Plan. The Plan is well organized and inclusive of groundwater resources issues of the County. The Board looks forward to working with you as you implement this Plan and document its outcomes.

Please contact Melissa King of our staff at 651-350-8845, or at the central office address for further assistance in this matter.

Sincerely,


Gerald Van Amburg
Chair

Enclosure

CC: Listed on next page

Bemidji Brainerd Detroit Lakes Duluth Menato Marshall Rochester St. Cloud St. Paul
St. Paul HQ 520 Lafayette Road North St. Paul, MN 55155 Phone: (651) 296-3767
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BOARD DECISION #20-61

Minnesota Board of Water and Soil Resources
520 Lafayette Road North
Saint Paul, Minnesota 55155

In the Matter of the review of the Groundwater
Plan for Dakota County, pursuant to Minnesota
Statutes Section 103B.255. ORDER
APPROVING
GROUNDWATER PLAN

Whereas, the Dakota County Board of Commissioners submitted a Groundwater Plan (Plan) dated September 2020 to the Minnesota Board of Water and Soil Resources (Board) pursuant to Minnesota Statutes Section 103B.255, and;

Whereas, the Board has completed its review of the Plan;

Now Therefore, the Board hereby makes the following Findings of Fact, Conclusions and Order:

FINDINGS OF FACT

- 1. Authority of Plan.** The Metropolitan Surface Water Management Act in Minnesota Statutes section 103B.255 authorized counties in the seven-county metropolitan area to develop and implement groundwater plans, however, development of county groundwater plans is voluntary.
 - 2. Background and Nature of Groundwater in the County.** Dakota County (County) is part of the seven-county Twin Cities Metropolitan Area. The County is the third most populous in Minnesota, with an estimated 2018 population of 428,558. Between 2010 and 2018 the population of the County increased 20%, and the Metropolitan Council projects that population will reach nearly 514,000 by 2040. Approximately 36% of the County is urbanized, 43% is agricultural land, and 21% some type of open space (forests, shrubland, water, etc.). Groundwater provides 90% of the water supply in the County, with the majority of the County served by 14 public water suppliers. Contaminants and increasing groundwater demands threaten the drinking water supply. Hastings and Rosemount municipal water supplies have elevated levels of nitrate, with the nitrate concentrations almost doubling in the last 20 years. County research has found that nitrate and pesticides are prevalent in groundwater wells the rural south/southeast portion area of the County where land use is predominantly agricultural, and naturally occurring manganese tends to be above Minnesota Department of Health (MDH) drinking water guidelines in the north/northwestern part of the County. Although public waters suppliers provide water that meets health standards, the groundwater poses health risks that water suppliers and private well owners must address.
- The Metropolitan Council estimates that portions of the County may experience 20-30 feet of drawdown in the Prairie du Chien and Jordan aquifers; the two aquifers that provide most of the County's municipal water supplies and agricultural irrigation water. The largest drawdowns are predicted to occur in areas with high municipal water use and in cities with the highest projected population increases – Apple Valley, Eagan, Inver Grove Heights, and Lakeville. Aquifer drawdown is also predicted to occur in heavily irrigated agricultural areas in the southeastern portion of the County.

3. **Plan Development and Review.** The County began the planning process in early 2019. Throughout 2019 the County completed a substantial outreach effort to engage the public and stakeholders in plan developments. This included activities and events for the general public, meetings with an ad hoc technical advisory group consisting of representatives of various government partners and construction, agriculture, hydrogeology and well drilling interests; and meetings with the County Planning Commission.

The draft Plan was received by the Board for the initial 60-day review on May 20, 2020 per MS §103B.255, subdivision 8. The initial 60-day review period concluded on July 20, 2020. The County prepared a written response to the 60-day comments and then held a public hearing on September 1, 2020. The Board received the revised draft Plan for the final 45-day review and Board approval on September 17, 2020. Comments received during the 45-day review period indicated that the reviewers had no further comments.
4. **Local Review.** Dakota County circulated a copy of the draft Plan to state review agencies, local government units, and adjacent counties on May 20, 2020 for their review. The draft Plan was also distributed to other stakeholders and was made available to the general public for review. The initial 60-day comment period ended on July 20, 2020. Written comments were received from: Black Dog Watershed Management Organization, Vermilion River Watershed Joint Powers Organization, City of Apple Valley, City of Sunfish Lake, Washington County, Dakota County Soil and Water Conservation District, Metropolitan Council, Minnesota Department of Agriculture, Minnesota Department of Health, Minnesota Department of Natural Resources, the University of Minnesota, the Cannon River Watershed Partnership, Flint Hills Resources Pine Bend LLC Refinery, the Hastings Environmental Partners, the Legislative Subcommittee on Minnesota Water Policy, and seven individuals. The County addressed the comments received. The County held a public hearing on September 1, 2020. No comments were received at the public hearing.
5. **Metropolitan Council Review.** During the 60-day review the Council commended the County on their efforts. The Council also noted that agency comments were considered during the planning process as part of the Council's participation on the technical advisory group. No additional comments were provided during the final 45-day review.
6. **Department of Agriculture (MDA) Review.** Comments were submitted to the County during the 60-day review. MDA thanked the County for referencing the Minnesota Nitrogen Fertilizer Management Plan (NFMFP), Groundwater Protection Rule, and use of nomenclature from the NFMFP. The agency recommended consistency in and provided recommendations on terminology used in the Plan. MDA requested clarity and further discussion on nitrogen fertilizer best management practices (BMPs) and alternative management tools (AMTs) and other BMP/water quality conservation practices. MDA provided comments on specific cooperative efforts identified in the Plan and expressed support for continued dialog on implementation of a monitoring networks and collaboration on long-term nitrogen fertilizer and water quality sites. Additional detail and clarity on specific Plan tactics were also requested. Comments were also suggested for typographical and grammar corrections. The County revised the Plan to satisfactorily incorporate suggested changes and additions as a result of these comments. MDA had no additional comment during the final 45-day review.
7. **Department of Health (MDH) Review.** MDH provided commendations on including drinking water as a priority concern and thanked the County for allowing the agency the opportunity to participate on the technical advisory group during the 60-day review. It was noted that input from the agency was well received during the planning process and MDH had no further comments. MDH also indicated the agency had no further comment during the final 45-day review.
8. **Department of Natural Resources (DNR) Review.** During the 60-day review, DNR commended the County's efforts to protect groundwater. DNR provided comment on and requested clarification of specific strategies, tactics, and outcome measures identified in the Plan. The agency expressed support for inclusion of strategies to address chloride contamination, for establishment of a County Groundwater/Source Water Collaborative, and efforts to protect calcareous fens. DNR provided additional references on wastewater reuse and suggested

strategies to improve the success of stormwater infiltration. Additional comment and clarification were provided regarding water appropriation permit review and delegation of authority. The County provided responses to all comments and revised the Plan to satisfactorily incorporate revisions as a result. During the 45-day review, DNR stated that the previous (60-day) comments have been acknowledged by the County and that the DNR had no further comment.

9. **Pollution Control Agency (PCA) Review.** The PCA did not provide formal comment.
10. **Department of Transportation (DOT) Review.** The DOT did not provide formal comment.

11. **Board Review.** Comments were submitted to the County during the 60-day review. Board staff commended the County on the inclusive planning process and suggested that the Plan incorporate target outputs or outcomes on a ten-year scale. The availability of BWSR staff to assist with on-going development of the interim goals identified in the annual report was also noted. BWSR staff had no additional comment during the final review period.

12. **Plan Summary.** The Dakota County Groundwater Plan defines Dakota County’s role in groundwater resource management for the next ten years by identifying goals, strategies and tactics the County will complete over the life of the Plan to address groundwater quality and availability issues facing the County. The Plan was developed with significant early involvement from State and local government units, private partners, and the general public and builds off existing resource conservation and improvement efforts.

There are four overarching Plan goals which include:

- **Water Quality:** Groundwater and drinking water are free from unhealthy levels of contaminants.
- **Water Quantity:** Groundwater is sufficient to meet human needs and sustain groundwater-dependent ecosystems.
- **Education:** People who live and work in Dakota County are knowledgeable about water issues, conserve water, and prevent pollution.
- **Governance:** Groundwater programs and services are efficient and effective.

The Plan includes specific strategies (framework to achieve Plan goals) and tactics (actions to achieve strategies) developed to address specific issues identified through research and by stakeholders, for each goal. Implementation of strategies are prioritized into three classifications (high, medium and low priority) and include annual measures of progress for each tactic, as well as identified outcomes anticipated at the end of the 10-year period. The Plan is well organized and focuses on what the County can realistically accomplish to address the growing needs within Dakota County.

13. **Central Region Committee Meeting.** On December 2, 2020, the Board’s Central Region Committee and staff met in St. Paul and via teleconference to review and discuss the final Plan. Those in attendance from the Board’s committee were Joe Collins (chair), Nicole Blasing, Jill Crafton, Andrea Date, Jayne Hager Dee, Joel Larson, Kathryn Kelly, Steve Robertson, Paige Winebarger, and Grant Wilson. Board staff in attendance were Assistant Director Kevin Bigalke, Board Conservationist Steve Christopher, and Board Conservationist Melissa King. Dakota County staff including Valerie Grover, Groundwater Protection Unit Supervisor, and Jill Trescott, Senior Groundwater Advisor, were in attendance. Jill Trescott and Valerie Grover provided highlights of the Plan and process to the committee. Board staff recommended approval of the Plan. After presentation and discussion, the committee unanimously voted to recommend the approval of the Plan to the full board.

CONCLUSIONS

1. All relevant substantive and procedural requirements of law and rule have been fulfilled.
2. The Board has proper jurisdiction in the matter of approving the Groundwater Plan for Dakota County pursuant to Minnesota Statutes Section 103B.255, Subd. 10.
3. Dakota County, Minnesota Groundwater Plan 2020-2030, attached to this Order, defines the groundwater and groundwater-related problems within the County, possible solutions thereto, and an implementation program through 2030.
4. The Dakota County Groundwater Plan will be effective December 17, 2020 through December 17, 2030.
5. The attached Plan is in conformance with the requirements of Minnesota Statutes Sections 103B.255.

ORDER

The Board hereby approves the attached Dakota County Groundwater Plan dated September 2020.

Dated at Saint Paul, Minnesota this 17th day of December 2020.

MINNESOTA BOARD OF WATER AND SOIL RESOURCES



Gerald Van Amburg, Chair
Board of Water and Soil Resources

Date: December 17, 2020