

**Environment and Natural Resources Trust Fund  
2011-2012 Request for Proposals (RFP)**

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**Subd: 05a**

**Project Title:** Groundwater Sustainability Assessment in the I-94 Growth Corridor

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**Category:** B. Water Resources

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**Total Project Budget: \$** \$450,000

**Proposed Project Time Period for the Funding Requested:** 3 yrs, July 2011 - June 2014

**Other Non-State Funds (secured): \$** 276,000

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**Summary:**

This project builds understanding of how the corridors groundwater responds to land and water use, and helps communities understand their part in the broader community of corridor water interests.

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**Location:**

**Region:** Metro

**Ecological Section:** Minnesota and NE Iowa Morainal (222M)

**County Name:** Sherburne

**City / Township:** Twin Cities to St. Cloud

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## 2011-2012 MAIN PROPOSAL

### PROJECT TITLE: Understanding Groundwater Sustainability in the I-94 Growth Corridor

#### I. PROJECT STATEMENT

This project will assess groundwater sustainability in the I-94 growth corridor between the Twin Cities and St. Cloud and inform local agency partners and communities of the implications for land and water use. Building on the Sherburne and Wright county atlases, groundwater sustainability-hydrologic budget information will be assessed by measuring flows in the surficial groundwater system and by estimating hydrogeologic properties of the aquifers and confining beds through which these flows take place. Assessment of groundwater resources from the Twin Cities to St. Cloud is considered a priority because of the corridor's expected growth, the inherent natural limits of ground water in the area, and the vulnerability of that resource to contamination due to its sandy soils and proximity to the land surface. Further, at some point in the not-too-distant future, some corridor cities will need to invest in costly regional water supply treatment and distribution systems using a combination of surface water and groundwater supplies. Given these factors, local governments must carefully consider their plans for the corridor and water managers must incorporate a new understanding of the system and its limits into their management framework. The information developed by the project will build a foundation to ensure that corridor communities meet the needs of the growing population in a sustainably.

#### II. DESCRIPTION OF PROJECT ACTIVITIES

##### Activity 1: Assess flows through surficial aquifers in the corridor

**Budget:** \$246,000

Just as appropriations from the Mississippi River are limited by the river's flow, flow through aquifers determines the amount of water that people can safely appropriate over time. Under this activity, groundwater recharge and discharge to the Mississippi will be measured and estimates of water use, evapotranspiration, and irrigation and septic-system return flow in the growth corridor will be made. This will help water managers understand the effect of increasing groundwater withdrawals on other parts of the overall hydrologic system, a key step in determining the sustainability of current or future groundwater withdrawals. If sustained river low flows do not occur in the first year of the project, measurements will be made in the second year. Work elements include:

- Conduct high-precision Mississippi River groundwater discharge measurement along a 6-mile reach from Clearwater to Becker
- Collect continuous groundwater recharge hydrographs and precipitation data during the non-freezing part of the year using existing sites and installations
- Compile water use information and determine variability of corridor groundwater use
- Analyze data to produce a groundwater mass balance for the surficial aquifer, including seepage run data

Outcome	Completion Date
1. Flows through surficial aquifers (recharge and discharge) are quantified	10/31/13
2. Effects of water withdrawals on hydrologic budgets are described	6/30/14

##### Activity 2: Characterize hydraulic properties in the corridor

**Budget:** \$ 114,000

Sustainable groundwater management requires information about the properties of buried aquifers and the confining layers through which water flows. Flow in and from buried aquifers will be estimated as part of this activity. Increased pumping from buried aquifers induces flow from the overlying hydrologic system. This water is no longer available to sustain surface waters. Understanding these flows will enable water managers to estimate the effect of increased withdrawals from buried aquifers on other parts of the overall hydrologic system--a key step in determining the sustainability of current or future groundwater withdrawals.

This activity will leverage and capitalize on work done through the Minnesota Geological Survey county atlas program. One aquifer test will be conducted in a buried aquifer to measure the aquifer's hydrologic properties and those of its overlying confining layer. Properties from this and other aquifer tests will be extrapolated to other buried aquifers in the study area. In cooperation with the Minnesota Department of Health, vertical flow will be assessed from overlying glacial confining layers to the Mt. Simon aquifer.

<b>Outcome</b>	<b>Completion Date</b>
1. Estimate groundwater flow through glacial confining layers and compile aquifer hydraulic properties	11/30/13
2. Understand groundwater withdrawals on overlying hydrologic system	6/30/14

**Activity 3:** Develop decision-making tool for sustainable water use

**Budget:** \$90,000

Develop a decision-making tool for defining land and water interactions in the corridor. The findings of the USGS relative to water flows will be merged with other characteristics of the system (e.g. water quality, protected features, planned growth, etc.). The outcome is critical to giving local governments and other corridor water users an explicit understanding of how the groundwater system works, what its limits may be, and how future local plans and activities throughout the corridor collectively will affect the resource. In year two EQB will work to accurately characterize current and future land use plans, current and future water use and drinking water quality. In year three, EQB will develop the first phase of a model to represent corridor land and water use demands and expected groundwater system responses. This tool will help communities understand the model's implications for, and its role in, sustainable land and water management throughout the corridor.

<b>Outcome</b>	<b>Completion Date</b>
1. Characterize land use plans, water use, and drinking water quality	7/31/13
2. Develop first phase model to inform sustainable land and water decisions	6/30/14

### **III. PROJECT STRATEGY**

#### **A. Project Team/Partners**

Environmental Quality Board: Princesa VanBuren Hansen and John Wells; model development and project management (Activity 3). U.S. Geological Survey: Tim Cowdery, Erich Kessler, James Fallon, and Dave Lorenz; data collection and technical analysis (Activities 1 and 2). The Department of Natural Resources and the Minnesota Geological Survey (MGS) will be particularly important non-funded project collaborators, along with other EQB member agencies and the University of Minnesota.

#### **B. Timeline Requirements**

This project will take three years to complete. The first two are required to collect and analyze river and groundwater flow data as well as regional water quality and land use information. The third is required to assess groundwater sustainability and integrate the information to build a comprehensive understanding of how the system works, and how communities may need to adapt to achieve groundwater sustainability.

#### **C. Long-Term Strategy and Future Funding Needs**

This project is designed as the second of three needed to develop the science and tools required to manage the corridor's water resources sustainably. In the first, the MGS is providing geologic data under the Environmental and Natural Resources Trust Fund-supported county atlas program. This proposal characterizes groundwater sustainability in the corridor. Both sets of information would be combined with surface water, ecological and economic data in a third project to be proposed in 2015 to produce the full set of tools and understanding needed to sustainably manage the corridor's water and land resources, to be incorporated in an expanded modeling tool. Also in the third phase local governments and other interests would be engaged in demonstrating applications to resource decision making.

## 2011-2012 Detailed Project Budget

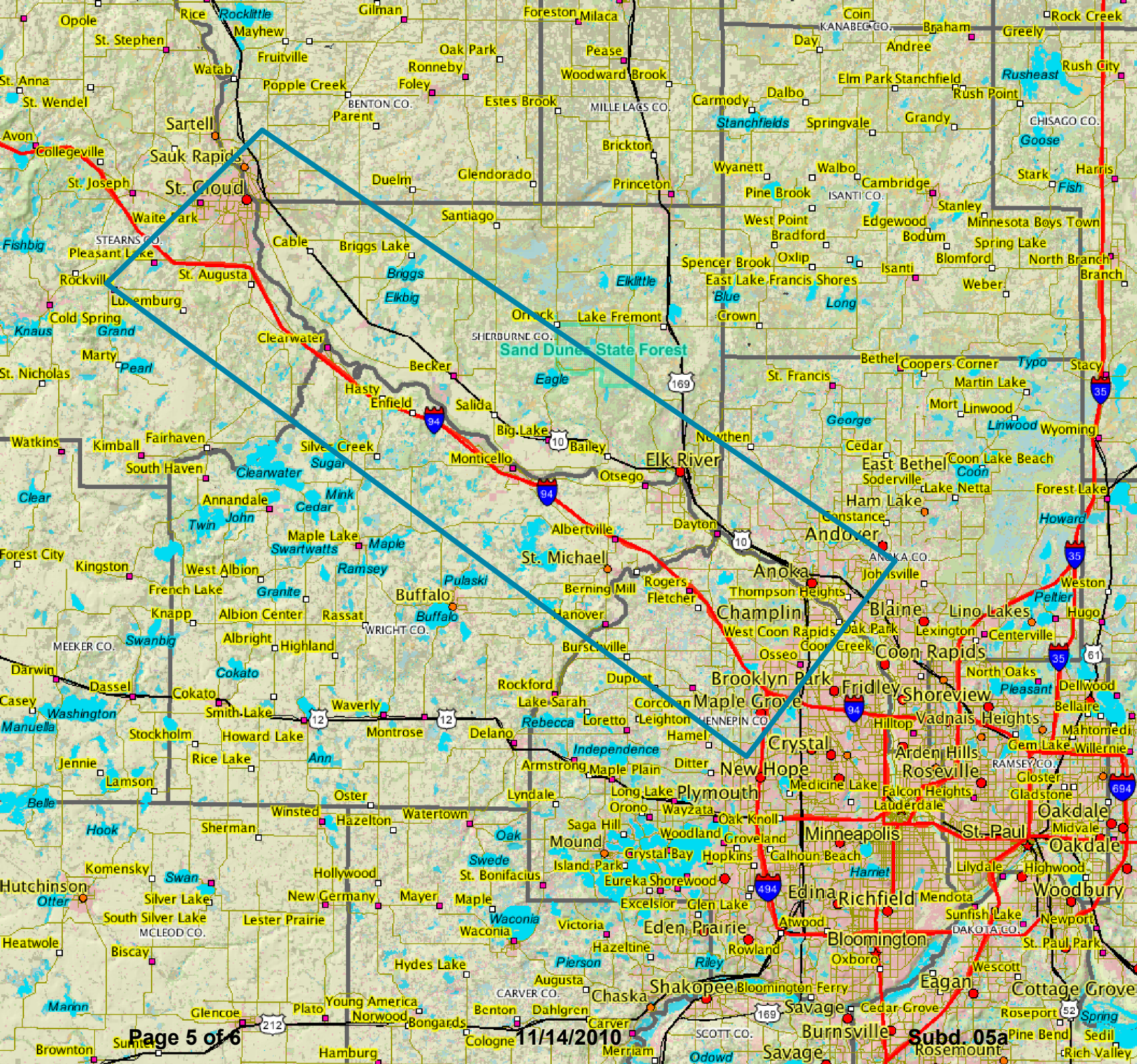
### IV. TOTAL TRUST FUND REQUEST BUDGET 3 years

<b><u>BUDGET ITEM</u></b>	<b><u>AMOUNT</u></b>
<b>Personnel:</b> EQB personnel - Graduate research assistant (0.5 FTE) to support elements of Activity 3 (beginning in year 2) and communicate project findings with local, state and federal partners under the activity.	\$ 50,000
<b>Contracts:</b> The Environmental Quality Board will contract with the U.S. Geological Survey for work under activities 1 and 2 to determine groundwater characteristics and sustainability of the I-94 Growth Corridor.	\$ 360,000
<b>Contracts:</b> EQB also will contract with the Minnesota Geospatial Information Office, or a contractor, for the development of a model to represent the corridor's land and water activities and to communicate the project's groundwater sustainability findings. This item will focus on creating a robust prototype tool to facilitate stakeholder and local engagement	\$ 38,000
<b>Equipment/Tools/Supplies:</b> N.A.	\$ -
<b>Acquisition (Fee Title or Permanent Easements):</b> NA	\$ -
<b>Travel:</b> This project will require travel by EQB staff throughout the Twin Cities to St. Cloud corridor to meet with local agency staff, conduct stakeholder meetings and interact with USGS field staff. This is based on mileage and minimal lodging of approximately \$660 annually.	\$ 2,000
<b>Additional Budget Items:</b> N.A.	\$ -
<b>TOTAL ENVIRONMENT &amp; NATURAL RESOURCES TRUST FUND \$ REQUEST</b>	<b>\$ 450,000</b>

### V. OTHER FUNDS

<b><u>SOURCE OF FUNDS</u></b>	<b><u>AMOUNT</u></b>	<b><u>Status</u></b>
<b>Other Non-State \$ Being Applied to Project During Project Period:</b> USGS will contribute \$240,000 to the project	\$240,000	Secured
<b>Other State \$ Being Applied to Project During Project Period:</b> N.A.	\$ -	
<b>In-kind Services During Project Period:</b> EQB will provide project management and guidance throughout the project's life. A number of other state agencies will participate in the project and donate in-kind services.	\$75,000/25,000	Secured/ Pending
<b>Remaining \$ from Current ENRTF Appropriation (if applicable):</b> N.A.	\$ -	
<b>Funding History:</b> N.A.	\$ -	







## **Project Manager Qualifications – Princesa VanBuren Hansen**

Princesa VanBuren Hansen is a Principal Planner with the Environmental Quality Board. Her background is in Biosystems and Agricultural Engineering, and she has recently been working on projects that integrate her technical expertise with planning and interdisciplinary coordination functions. Her work activities demand a strong ability to lead interagency coordination specific to water quantity and quality, as well as integrate considerations for land use and the potential impacts of climate change. She is leading the 2010 EQB State Water Plan effort, is active in the University of Minnesota sustainable water framework development, and provides leadership to a number of interagency technical and policy work teams.

In 2008 she led development of a novel GIS prototype tool to provide context for relative intensity of water use in Minnesota<sup>i</sup> in support of the EQB effort to construct a policy and data framework for evaluating the impacts of high water-using industries as described in the report, *"Managing for Water Sustainability"*, released December 2008. Prior to that she was involved in the development of *"Protecting Minnesota's Waters: Priorities for the 2008-2009 Biennium,"* the Clean Water Cabinet and EQB's report on state water priorities. In 2007 she led the technical assessment effort that contributed the foundation to the EQB 2007 study, *"Use of Minnesota's Renewable Water Resources: Moving toward Sustainability,"* an interagency assessment of the availability of water to meet the state's future demands. This was the state's first regional-scale assessment of ground and surface water sustainability.

Prior to joining the EQB, Princesa was staff member of the University of Minnesota's Department of Bioproducts and Biosystems Engineering. She was brought on in 2005 to coordinate and oversee a large team of researchers working on Total Maximum Daily Load activities for the Minnesota Pollution Control Agency and the Environmental Protection Agency. She was also an instructor for the University's Erosion and Sediment Control Certification Program, providing education to those working with the MPCA and the Minnesota Department of Transportation on construction sites.

She also has experience working in the private sector with Delta Environmental Consultants and for the federal government through the U.S. Department of Agriculture, Agricultural Research Service. In the ten years before the USDA assignment, she worked on projects ranging from water quality in watersheds of Karst geology, evaluation of surface tile inlet designs and effectiveness, depression-focused recharge, erosion control stabilization for MN/DOT, wetland delineation, TMDL development for southeastern Minnesota, septic system installation certification, mine land tailing stabilization, mobilization of heavy metals in plant materials, supercomputer modeling, and nitrogen cycling in alfalfa.

## **Organization Description – Minnesota Environmental Quality Board**

The Environmental Quality Board consists of a Governor's representative (by law the board chair), nine state agency heads and five citizen members. Minnesota Statutes, Chapters 103A, 103B, 116C, 116D and 116G (Statutes and Rules of the EQB), direct EQB to:

- Ensure compliance with state environmental policy
- Coordinate agencies and programs that affect the environment
- Study environmental issues
- Develop biennial water priorities, policy reports and the state water plan
- Develop the state water plan
- Administer critical areas designation and management
- Advise the Governor and the Legislature

<sup>i</sup> [http://www.eqb.state.mn.us/eqb\\_w/](http://www.eqb.state.mn.us/eqb_w/)