Environment and Natural Resources Trust Fund
2015 Request for Proposals (RFP)

Project Title: **ENRTF ID:** **032-A**

Silica Sand Mining and the Minnesota Economy

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 132,543

Proposed Project Time Period for the Funding Requested: August 2017

Summary:

Assess the economic impacts of silica sand mining on Minnesota. Examine the benefits of the formation of a natural resource sovereign wealth fund, to be funded via a severance tax.

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Sponsoring Organization: U of MN - Duluth

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Web Address

Location

Region: Metro, SE

County Name: Anoka, Blue Earth, Carver, Dakota, Goodhue, Hennepin, Le Sueur, Nicollet, Ramsey, Scott, Wabasha, Washington, Winona

City / Township:

Alternate Text for Visual:

Southern Minnesota Frac Sand Facilities from the Minnesota Department of Transportation

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage		_____ TOTAL

PROJECT TITLE: Silica Sand Mining and the Minnesota Economy

I. PROJECT STATEMENT

Southern Minnesota is home to an abundant, high quality natural resource – silica sand – that is a critical for the extraction of crude oil and natural gas through a process known as hydraulic fracturing ("Fracing"). Currently there are 12 active silica sand minding facilities in Minnesota with approximately 20 more in the planning stages. Since this industry is relatively new to Minnesota, the economic impacts of silica sand mining are not well understood. Therefore, this project will provide a first step in the assessment of the economic impacts, providing necessary information for policy-makers.

Located in southern Minnesota, the Karst geological formation contains what is considered to be the 'gold' standard of silica sand. The sand, also known as frac sand, is used as an injection fluid in the production of oil and gas from shale formations. According to the Energy Information Administration, shale oil and gas resources are responsible for the recent and on-going revolution in U.S. oil and natural gas production, providing 29% of the total US crude oil production and 40% of the total U.S. natural gas production in 2012. The rapid increase in the amount of hydraulic fracturing occurring in the US has producing a corresponding increase in the demand for silica sand. The reactions to this rapid influx of proposed mines has troubled Minnesota residents and lead some counties to impose (temporary) moratoriums on new 'frac' sand mines. (i.e. Goodhue County, Sept 2011). Mining has been and will continue to be an important pillar of the state economy. The extraction activities related to silica sand is expected to have increasing economic significance in the southern region of the state, as evidenced by the large number of frac sand mines currently in the planning stages.

Our *broad aim* is to assess the socio-economic impacts of frac sand mining on the economy of Minnesota. In particular, the team will address several key questions.

1. What is the economic impact, measured via value added, output, and employment, of the frac sand industry on the state of Minnesota? What is the expected demand for future silica sand from Minnesota?
2. What impact does frac sand mining have on local property values?
3. Should Minnesota create a sovereign wealth fund, which derives its revenue from the extraction of Minnesota resources, including but not limited to silica sand. Such a fund would operate alongside the current Environment and Natural Resource Trust fund, but allow future generations to benefit from current extraction activities.

Many states use severance taxes on extractive industries to provide a source of funds for the future of the state. Given the prospective rapid increase in frac sand mining, it has the potential to provide a viable stream of revenues to the state's natural resource trust fund.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Measuring the employment, value added and output impacts of frac sand mining to the state of Minnesota **Budget: $20,931**

The IMPLAN input/output model describes the frac sand mining economic base in the state. To estimate the economic impact of frac sand mining operations IMPLAN calculates the direct, indirect, and induced effects on a 440 industrial sector economy. The results are shown as employment (jobs), output ($ sales), and value added (wages).

Outcome	Completion Date
1. Analyze how the economy is effected by this mining activity using INPLAN software	*June 2016*
2. Economic impact effects (direct, indirect, induced)	*June 2016*
3. Examine how demand for the silica sand is related to crude oil and natural gas production from hydraulic fracturing to estimate the future demand for Minnesota Silica sand	*August 2016*

Activity 2: Investigate the viability of a sovereign wealth fund which would be funded through a severance tax of the extractive industries in Minnesota, including frac sand mining. **Budget: $58,554**

Many states, such as Alaska, Wyoming, and Alabama have developed trust funds so that the benefits from the extraction of natural resources can be shared across citizens and generations. Typically, the source of revenue for such funds is through severance taxes. We look to assess the benefit to the state of Minnesota, and its trust fund of revenue which could be generated from the mining of frac sand.

Outcome	Completion Date
1. Develop a comprehensive database of the established environment and natural resource trust funds, sovereign funds and the mechanisms used to generate revenue.	May 2016
2. Identify the appropriate mechanism to the frac sand industry, and determine the potential for generating revenue for the Minnesota trust fund.	June 2016
3. Publish the results of the trust fund analysis.	November 2016

Activity 3: Examine the potential impact of frac sand mining on local real estate values. **Budget: $53,058**

Much of the local concern with frac sand mining has to do with the perceived negative impact on property valuations near active mines. We will assess this claim by utilizing spatial econometric techniques designed to estimate the effect location (geographic proximity) to a mine has on the value residential property. This will require data on the price of real estate as well as geographic coordination. The real estate data will be purchased, and a GIS consultant will be retained for the spatial dimensions.

Outcome	Completion Date
1. Develop a time series of frac sand mining in the state of Minnesota	February 2017
2. Obtain the geographic information from the GIS consultant	June 2017
3. Assess the impact of mining activities on property values	August 2017

III. PROJECT STRATEGY

A. Project Team/Partners

The project team will be led by economists from the University of Minnesota Duluth (Dr. Neil A. Wilmot, Dr. Christopher R. McIntosh), in collaboration with the Bureau of Business and Economic Research (Jim Skurla). The principle investigator, Dr. Wilmot, will investigate the potential effects of frac sand mining on property values and assess the potential future demand for frac sand from Minnesota. The potential for frac sand mining to be used as a source of revenue for the state trust fund will be a collaborative project between Dr. McIntosh and Dr. Wilmot. The economic impact of frac sand mining in Minnesota will be performed by J. Skurla.

B. Project Impact and Long-Term Strategy

The proposed project will aid policy-makers in their assessment of the impacts of allowing (or preventing) additional silica sand mining facilities in Southern Minnesota. To make such decisions, the true economic benefits and costs from such facilities must be made available to stake-holders. Additionally, the potential to generate revenue for the state's trust fund, or the creation of a new sovereign wealth fund, could fundamentally alter the budget landscape in Minnesota, providing benefits to all Minnesotans. This project corresponds with current work which derives from an Institute on the Environment grant (Dr. Wilmot) and a UMD Chancellor's Small grant (Dr. Wilmot and Dr. McIntosh).

C. Timeline Requirements

The timeline for this project will be 26 months. This time is required to obtain the necessary data, have the student input the geographic data, and finally perform the various analyses that are required.

2014 Detailed Project Budget

Project Title: Silica Sand Mining and the Minnesota Economy

IV. TOTAL ENRTF REQUEST BUDGET 2.17 years

BUDGET ITEM	AMOUNT
Personnel	
Principle Investigator: Neil A. Wilmot 18.9% FTE ($32,492) plus 34.9% fringe ($11,339.99)	$ 43,833
Chris R. McIntosh 18.9% FTE ($35,788) plus 34.9% fringe ($12,490)	$ 48,279
Jim Skurla 9.5% FTE ($11,715) plus 34.9% fringe ($4,088)	$ 15,804
Gina Grensing 3.5% FTE ($2,956) plus 34.9% fringe ($1,170)	$ 4,128
Undergraduate Student Researcher ~ 40h/wk, 10 wks @ $10.00 an hr	$ 4,000
Contracts:	$ -
Consultant: GIS laboratory	$ 2,000
Equipment/Tools/Supplies: Data Acquisition	$ 12,500
Travel: In-state travel for research on current frac sand facilities, presentations and meetings with stakeholders	$ 2,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 132,543

V. OTHER FUNDS

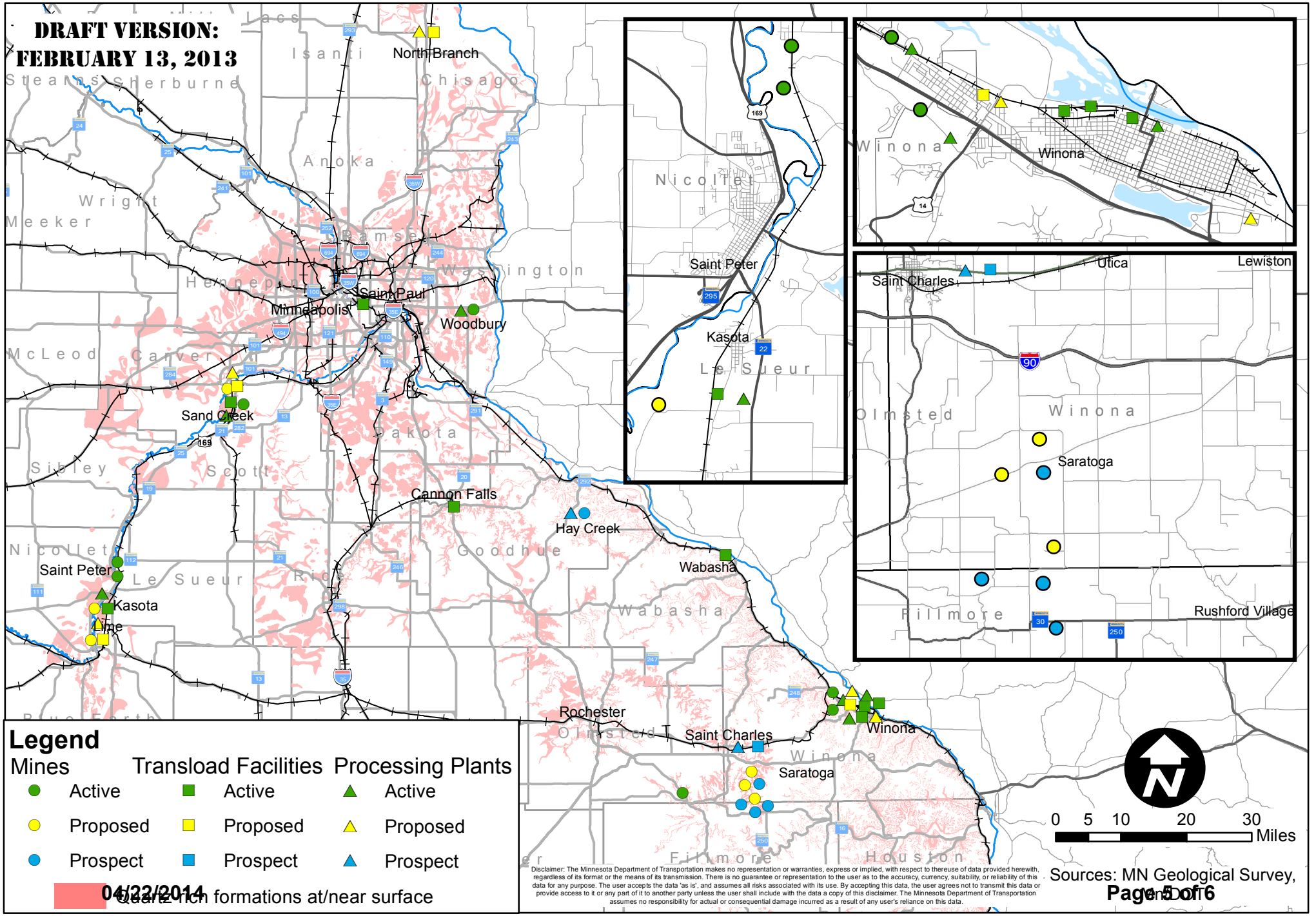
SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ Being Applied to Project During Project Period: University of Minnesota Institute on the Environment grant - Interdisciplinary Expoloration of Minnesota Frac Sand Mining	$ 2,300	Secured
Other Non-State $ Being Applied to Project During Project Period: University of Minnesota Duluth School of Business Chancellor Small Grant: Comparative Analysis of Natural Resource Based Soverigen Trust Funds	$ 1,500	Secured
Other State $ Being Applied to Project During Project Period:		
In-kind Services During Project Period:	none	
Remaining $ from Current ENRTF Appropriation (if applicable):	none	
Funding History:	none	

SOUTHEASTERN MINNESOTA FRAC SAND FACILITIES

MINNESOTA DEPARTMENT OF TRANSPORTATION

OFFICE OF FREIGHT AND COMMERCIAL VEHICLE OPERATIONS

DRAFT VERSION:
FEBRUARY 13, 2013



Legend

Mines	Transload Facilities	Processing Plants
Active	Active	Active
Proposed	Proposed	Proposed
Prospect	Prospect	Prospect

Quartz rich formations at/near surface

Sources: MN Geological Survey,

Silica Sand Mining and the Minnesota Economy

Project Manager Qualifications

Neil A. Wilmot

1. QUALIFICATIONS

Professional Preparation

Lakehead University	Economics	H.B.A., 1999
Lakehead University	Economics	M.A., 2002
University of Wyoming	Economics	Ph.D., 2010

Professional Appointments

Assistant Professor, Department of Economics, University of Minnesota Duluth 2011 – present

Expertise Related to the Proposed Research

Dr. N. A. Wilmot is an Assistant Professor in the Department of Economics at the University of Minnesota Duluth. He received his Ph.D. from the University of Wyoming in December 2010. He received his Honors B.A. in Economics in 1999 and an M.A. in Economics in 2002, both from Lakehead University. Dr. Wilmot's research interests include Energy Economics, Environmental Economics and Applied Econometrics. His research has been published in several peer-reviewed economic journals, including the *Energy Journal, the International Journal of Energy Economics and Policy* and *Tourism Economics*.

II. RESPONSIBILITIES

Dr. Wilmot will coordinate and manage the overall project, supervise the undergraduate student worker, and work directly with all those involved in the project, ensuring its success. Dr. Wilmot will be responsible for the modelling and analysis of the impact of frac sand mining on real estate values, and for assess the future demand for frac sand from the hydraulic fracturing industry. In cooperation with Dr. McIntosh, he will assess the benefits and potential to create the sovereign wealth fund for Minnesota. To coordinate across the various researchers and ensure a timely completion, both formal meetings (quarterly), as well as informal meetings (email, discussions), will be scheduled.

III ORGANIZATIONAL DESCRIPTION

The Department of Economics is located in the Labovitz School of Business and Economics on the University of Minnesota Duluth Campus. The university itself is a part of the University of Minnesota system, which is recognized as one of the largest public research universities in the United States.