

December 7, 2005

Mr. Terry Fogarty
1830 River Ridge Road
Hudson, WI 54016

Re: Wastewater Treatment and Dispersal Feasibility Assessment
Fogarty Property Subdivision, Pine Island of Lake Vermilion, St. Louis Co., Minnesota

Dear Mr. Fogarty:

You retained MATRIX Soils & Systems to assess feasibility of on-site treatment and dispersal of wastewater to be generated at lots within the planned subdivision of your land on Pine Island of Lake Vermilion in St. Louis County, Minnesota. This letter presents assessment results and conclusions, including that each lot has sufficient area for initial and replacement onsite wastewater systems sized to accommodate three-bedroom or larger single family dwellings.

The Fogarty Property Subdivision is a proposed residential development on Pine Island of Lake Vermilion. The property is located in part of the east $\frac{1}{2}$ of the southwest $\frac{1}{4}$ and part of the west $\frac{1}{2}$ of the southeast $\frac{1}{4}$ of Section 27, and part of the northeast $\frac{1}{4}$ of the northwest $\frac{1}{4}$ and the northwest $\frac{1}{4}$ of the northeast $\frac{1}{4}$ of Section 34, Township 63 North, Range 16 West, Greenwood Township in St. Louis County northwest of Tower, Minnesota. Eastern border of the property is Lake Vermilion; other developed and undeveloped, rural, residential, lakeshore properties border the other sides. Currently, the property is for the most part undeveloped. Its only improvement is a small shelter constructed in its southern portion. Plan for development of the property consists of 10 lots for construction of single family dwellings. Because the development will be in a rural location, water and wastewater systems will have to be provided on site. MATRIX Soils & Systems was retained to assess feasibility of on-site treatment and dispersal within each of the planned lots.

Assessment of site and soil conditions occurred during visits on August 6th and October 17th and 28th, 2005. Potential wastewater treatment and dispersal sites were identified via visual observation of vegetation and ground surface conditions. Soil test pits were excavated by backhoe and borings by hand auger in the treatment and dispersal sites to evaluate suitable system type and project treatment and dispersal capability. A total of 20 test pits and 5 borings were excavated. The observed soil profiles were described using U.S. Department of Agriculture (USDA) nomenclature. Approximate test pit and boring locations are shown in the attached figure.

All lots are wooded. Topographically, a ridge with a northwestern-southeastern axis dominates northern half of the property. A large knoll dominates the southern half. A wetland surrounds the northern, eastern, and southern sides of the knoll, and separates the two portions of the property. Potential treatment and dispersal sites were evaluated within all of the proposed lots. Slopes of the sites range from 2 percent to 21 percent with 11 percent being typical. Site soil conditions varied consisting of loamy sand or sandy loam topsoils above loamy sand or sandy loam subsoils over sand and fine sand substrates. A dense, fine textured - silty clay loam material - underlies surface horizons of soil at lower elevations. Mottling, an

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indication of periodic saturation, was observed at various depths. That, which reflects the current soil moisture regimes, was observed no shallower than 14 inches below ground surface. Mottling, which appears to not reflect current soil moisture conditions, i.e. is relict, was observed in test pit TP2. Topography in vicinity of the pit and sandy nature of the material preclude periodic saturation at the depths the redoximorphic features were observed. In addition, these features were not observed in the other test pit of this site, TP 1, which is located at a lower elevation and closer to the lake. Groundwater and bedrock were not observed in any of the test pits. Detailed soil profile descriptions are attached.

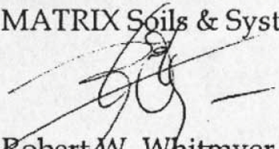
Soil conditions within all identified sites are suitable for treatment and dispersal of residential strength septic tank effluent via standard onsite wastewater systems. For those sites with consistently unsaturated permeable - suitable - soil depths four feet or greater - within lots 1, 4, and 5 - subsurface treatment and dispersal of septic tank effluent using trench-type systems would be possible. For sites - within lots 2 and 3 - with less than four feet but three feet or more of suitable soil, at-grade-type systems could be used for treatment and dispersal. For those with sites less than three feet of suitable soil - within lots 6 through 10, additional treatment - via mound-type systems for example - with or prior to dispersal would be necessary. Subsurface movement of soil water from the sites with greater than four feet of suitable soil would be primarily vertical, whereas, movement from those with less than four feet would be primarily horizontal because of the underlying conditions - dense, fine-textured soil and/or periodic saturation - that limit vertical movement.

Site loading rates are dependent on soil conditions and type of wastewater discharged to the soil. For sites with greater than four feet of suitable soil, standard septic tank effluent infiltrative surface loading rates would be the factor determining site capability; for the other sites, linear loading rate would be the factor limiting site capability. Projected acceptable infiltrative surface and linear loading rates along with approximate site dimensions are indicated in the attached table. On these bases, treatment and dispersal capability of each lot exceeds that necessary to accommodate code flow projected for a three-bedroom single family dwelling (450 gpd).

If you or anyone else has questions regarding the information in this letter, please call me at (218)390-2869.

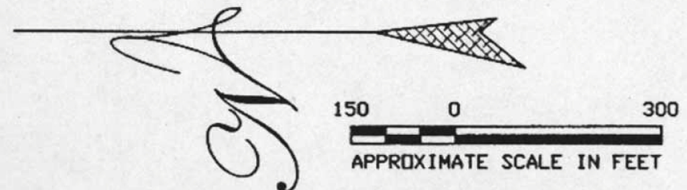
Sincerely,

MATRIX Soils & Systems, Inc.

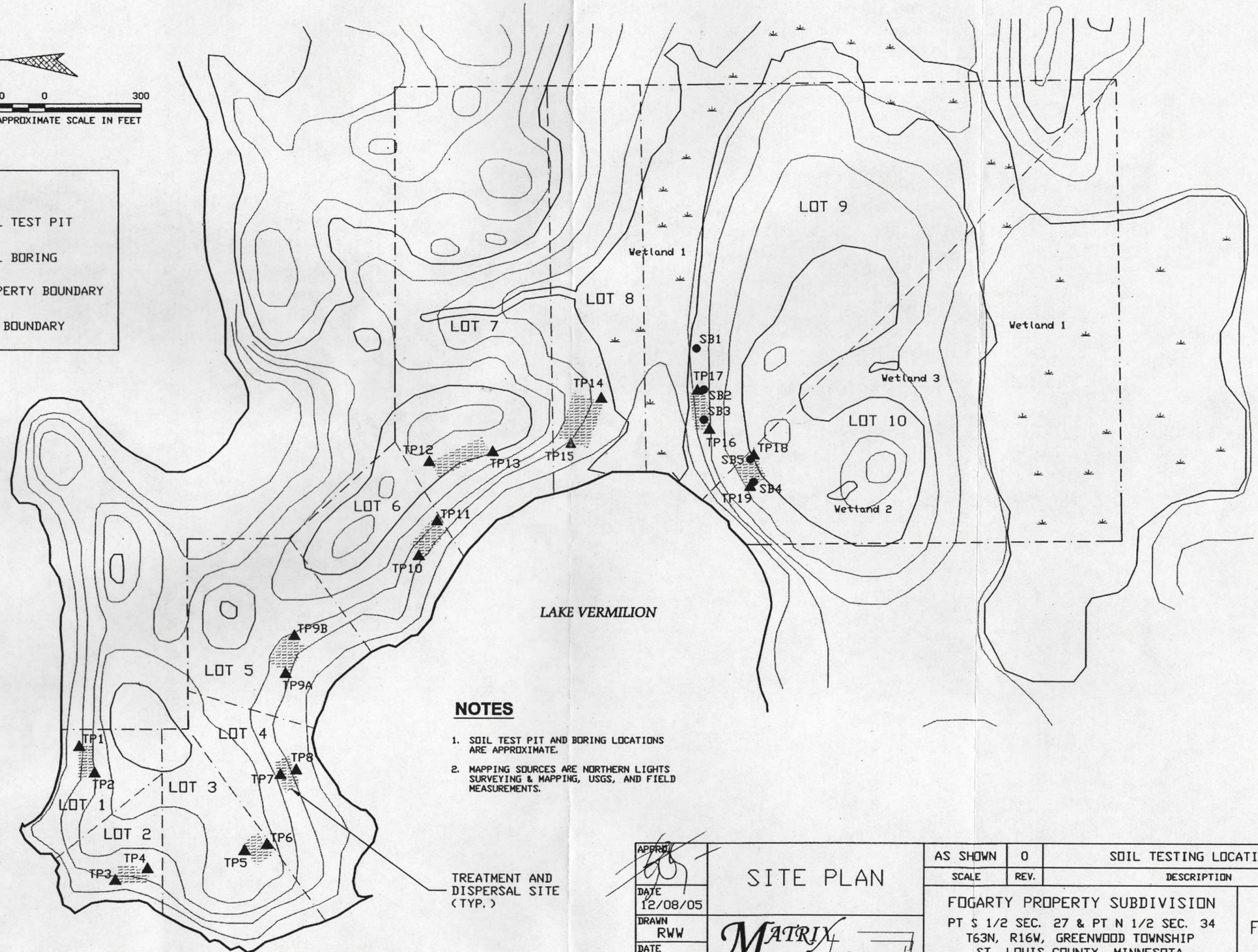


Robert W. Whitmyer, CPSS, MnPSS, Designer I
President

Attachments



LEGEND	
TP3 ▲	SOIL TEST PIT
SB2 ●	SOIL BORING
---	PROPERTY BOUNDARY
---	LOT BOUNDARY



NOTES

1. SOIL TEST PIT AND BORING LOCATIONS ARE APPROXIMATE.
2. MAPPING SOURCES ARE NORTHERN LIGHTS SURVEYING & MAPPING, USGS, AND FIELD MEASUREMENTS.

TREATMENT AND DISPERSAL SITE (TYP.)

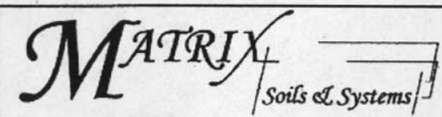
APPROVED
[Signature]

DATE
12/08/05

DRAWN
RW

DATE
12/07/05

SITE PLAN



AS SHOWN	0	SOIL TESTING LOCATIONS
SCALE	REV.	

FOGARTY PROPERTY SUBDIVISION
PT S 1/2 SEC. 27 & PT N 1/2 SEC. 34
T63N, R16W, GREENWOOD TOWNSHIP
ST. LOUIS COUNTY, MINNESOTA

FIGURE 1

**SUMMARY OF
WASTEWATER TREATMENT AND DISPERSAL SITE CONDITIONS
FOGARTY PROPERTY SUBDIVISION**

Greenwood Township, St. Louis County, Minnesota

LOT	CUPS* DEPTH (in.)	EFFLUENT LOADING RATES†	AREA DIMENSIONS			POTENTIAL SUITABLE SYSTEM TYPE	SITE CAPABILITY# (bedrooms)
			SLOPE (%)	CROSS-SLOPE† (ft)	WIDTH† (ft)		
1	> 60	0.8 gpd/ft ^{2†}	17	100	45	Trenches	> 3
2	37	6 gpd/ft	10	100	50	At-Grade	> 3
3	> 37	10 gpd/ft	3	80	60	At-Grade	3
4	> 48	0.6 gpd/ft ^{2§}	17	100	50	Trenches	> 3
5	> 47	0.5 gpd/ft ^{2§}	12	100	70	Trenches	> 3
6	14	8 gpd/ft	14	100	60	Mound	> 3
7	29	9 gpd/ft	6	175	60	Mound	> 3
8	31	10 gpd/ft	14	150	100	Mound	> 3
9	20	8 gpd/ft	12	120	50	Mound	> 3
10	22	10 gpd/ft	16	80	70	Mound	> 3

* Consistently Unsaturated Permeable Soil. Depth indicated is the minimum observed within the treatment and dispersal site.

† For peak flows of 150 gallons per day per bedroom. Units of gpd/ft² and gpd/ft are infiltrative surface loading rates in gallons per day per square foot and linear loading rates in gallons per day per foot, respectively.

‡ For infiltrative surfaces installed at 24 inches below existing ground surface.

§ For infiltrative surfaces installed at 12 inches below existing ground surface.

|| Geometric average.

† Approximate.

Capabilities represent size of dwellings that can be served by the treatment and dispersal sites, all of which have sufficient area for initial and replacement systems of the size indicated.

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PROFESSIONAL SOIL SCIENTIST

I hereby certify that this plan, document, or report was prepared by me or under my supervision and that I am a duly Licensed Professional Soil Scientist under the laws of the State of Minnesota.

Robert W. Whitmyer

Robert W. Whitmyer License No. 30355