



ST. LOUIS COUNTY BOARD OF ADJUSTMENT STAFF REPORT

INSPECTION DATE: 4/17/2024

REPORT DATE: 4/17/2024

MEETING DATE: 05/09/2024

APPLICANT INFORMATION

APPLICANT NAME: Steven and Kathy Johnson

APPLICANT ADDRESS: 1301 Nappa Rd, Two Harbors, MN 55616

OWNER NAME:
(IF DIFFERENT THAN ABOVE)

SITE ADDRESS: 1301 Nappa Rd, Two Harbors, MN 55616

LEGAL DESCRIPTION: WLY 313 FT OF NLY 417 FT OF SW 1/4 OF NW 1/4, S25, T53N, R12W (Alden)

PARCEL IDENTIFICATION NUMBER (PIN): 210-0010-04520

VARIANCE REQUEST: The applicant is requesting relief from St. Louis County SSTS Ordinance 61 adopted Technical Standards 7080.2150, Subpart 2 (F), to allow a subsurface sewage treatment system installation at a reduced shoreline setback.

PROPOSAL DETAILS: The applicant is proposing to install a new septic tank, as part of a full replacement system, at a reduced shoreline setback of 70 feet where 150 feet on a Trout Stream is required.

PARCEL AND SITE INFORMATION

ROAD ACCESS NAME/NUMBER: Nappa Road

ROAD FUNCTIONAL CLASS: Public

LAKE NAME: N/A

LAKE CLASSIFICATION: N/A

RIVER NAME: Knife River

RIVER CLASSIFICATION: Trout Stream (TRO)

DESCRIPTION OF DEVELOPMENT ON PARCEL: There is a principal dwelling, multiple accessory structures which include a detached garage, lean-to style wood shed, barn, workshop, existing septic, and well.

ZONE DISTRICT: RES 3

PARCEL ACREAGE: 3.00 ACRES

LOT WIDTH: 313 FEET

FEET OF ROAD FRONTAGE: 0 FEET

FEET OF SHORELINE FRONTAGE: 349 FEET

PARCEL AND SITE INFORMATION

VEGETATIVE COVER/SCREENING: The property has good vegetative screening from the shoreline, roadway, and neighboring properties.

TOPOGRAPHY: Property has a descending slope eastward toward Knife River.

FLOODPLAIN ISSUES: There is floodplain on the property but will not be impacted by the replacement SSTS.

WETLAND ISSUES: There appears to be wetland on the property but it will not be impacted by the replacement SSTS.

ADDITIONAL COMMENTS ON PARCEL: N/A

FACTS AND FINDINGS

A. Official Controls:

1. Ordinance 61 states that all SSTS components must be setback in accordance with Table VII of the SSTS Technical standards. The required setback for a trout stream is 150 feet. The applicant is proposing to install the tank at a reduced setback of 70 feet.

B. Practical Difficulty:

1. The location of the principal dwelling, plumbing, and landscape require the replacement septic tank to be installed within the setback.

C. Essential Character of the Locality:

1. The parcel is located within Alden Township and is listed as zoned RES-3.
2. There have been no other similar variances within the surrounding area.

BOARD OF ADJUSTMENT CRITERIA FOR APPROVAL OF A VARIANCE

1. Is the variance request in harmony with the general purpose and intent of official controls?
2. Has a practical difficulty been demonstrated in complying with the official controls?
3. Will the variance alter the essential character of the locality?
4. What, if any, other factors should be taken into consideration on this case?

CONDITIONS

Conditions that may mitigate the variance for relief from St. Louis County SSTS Ordinance 61 adopted Technical Standards 7080.2150 Subpart 2 (F) to allow a septic tank installation at a reduced shoreline setback as proposed include, but are not limited to:

1. All other Onsite Wastewater SSTS standards shall be met.
2. Following system installation, an inspection shall be performed by a qualified inspector to ensure setbacks are met prior to issuing Certificate of Compliance.
3. All other local, county, state and federal regulations shall be met.

**ST. LOUIS COUNTY, MN
PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT
(On-Site Wastewater Division)**

Duluth

Government Services Center

320 West 2nd Street, Suite 301

Duluth, MN 55802

Phone (218) 725-5200

Toll Free (800) 450-9278

VirginiaGovernment Services
Center

201 South 3rd Avenue West

Virginia, MN 55792

Phone (218) 749-0625

Toll Free (800) 450-9278

Permit Construction Application Subsurface Sewage Treatment System

General

- This permit application form is used to apply for a Permit to Construct. Additional information:

www.stlouiscountymn.gov/septic

Enter the Primary PIN and Associated PIN (if applicable) of the property to be reviewed.

PIN is found on your Property Tax Statement. For example, 123-1234-12345. Primary PIN: Parcel where Structure/SSTS are located. Associated PIN: Additional and/or adjacent property that you own or that is related to the project.

County Land Explorer: <https://www.stlouiscountymn.gov/explorer>

Property Lookup: <http://apps.stlouiscountymn.gov/auditor/parcelInfo2005Iframe>

Primary PIN **210-0010-04520**

Associated PINs

Enter Applicant Information

I am a: **Landowner**

Are you an LLC
Business? **No**

Applicant Name: **JOHNSON S R & PETERSEN K**

Address: **1301 NAPPA ROAD**

--

City: **TWO HARBORS**

State: **MN**

Zip: **55616**

Primary Phone: **(218)348-2931**

Mobile Phone: **--**

Email: **--**

Preferred Contact **Any**

Method:

Contact Person Name: **--**

Contact Person Phone: **--**

Property Owner Name and Contact Information.

If the property owner information we have on file is not correct, please enter the current owner information.

Property Owner Name: **JOHNSON S R & PETERSEN K**

Site Address: **1301 NAPPA ROAD**
--
City: **TWO HARBORS**
State/Province: **MN**
Zip: **55616**
Primary Phone: --
Mobile Phone: --
Email: --
Preferred Contact Method: **Any**
Contact Person Name --
Contact Person Phone --

Mailing Address Information

This address can default from the address you selected. If the values defaulted are not correct, please enter the correct information.

Same as Property address? ☐ Yes

Same as Applicant address? ☐ Yes

Name: **JOHNSON S R & PETERSEN K**
Address: **1301 NAPPA ROAD**

--
City: **TWO HARBORS**
State/Province: **MN**
Zip: **55616**
Primary Phone: --
Mobile Phone: --
Email: --

Provide additional email recipients ☐ Yes

SITE INFORMATION

Enter Site information

Do you need to request a 911 address number and sign? **No**

Is this a leased property? **No**

Is this for Residential or Commercial?
Residential

Is the property used year round or used seasonally?
Year round

Is this project within 300 feet of a river/stream or 1,000 feet of a lake?

Yes

River/Lake Name

TRIBUTARY KNIFE RIVER**Is this property connected to a Common Interest Community?****No****Is this serving multiple dwellings sharing a SSTS component?****No****Is this related to a Point of Sale Requirement?****No****Is the SSTS located in a floodplain?****No**

APPLICATION REASON

What are you applying for?

Replacing the existing SSTS

Explain why:

UPDATING

Permit Number (being replaced, if known):

--

WORKSHEET

Select the System Type

Type I System

"Type I System" means an ISTS that follows a standard trench, bed, at-grade, mound, or graywater system design in accordance with MPCA rules, Minnesota Rules, Chapter 7080.2200 through 7080.2240.

Yes

System Type

Mound

Type II System

"Type II System" means an ISTS with acceptable modifications or sewage containment system that may be permitted for use on a site not meeting the conditions acceptable for a standard Type I system. These include systems on lots with rapidly permeable soils or lots in floodplains and privies or holding tanks.

No

Type III System

"Type III System" means a custom designed ISTS having acceptable flow restriction devices to allow its use on a lot that cannot accommodate a standard Type I soil treatment and dispersal system.

No

Type IV System

"Type IV System" means an ISTS, having an MPCA registered pretreatment device and incorporating pressure distribution and dosing, that is capable of providing suitable treatment for use where the separation distance to a shallow saturated zone is less than the minimum allowed.

No

Type V System

"Type V System" means an ISTS, which is a custom engineered design to accommodate the site taking into account pretreatment effluent quality, loading rates, loading methods, groundwater mounding, and other soil and other relevant soil, site, and wastewater characteristics such that groundwater contamination by viable fecal coliforms is prevented.

No

Select the gallons per day (GPD) for the system.

Gallons per Day **Less than 2,500 GPD**

WELL INFORMATION

Enter information about the well.

Do you have a proposed water source?

No

Enter # of existing water sources on the property

1

After completing the following information for the 1st water source, please use the Add Another Water Source button to add the additional water source(s) information.

Water Source Type **Well**

Well # --

Well Depth (Feet) --

Case Depth (Feet) --

Well Type --

DESIGNER & INSTALLER INFORMATION

Select the Designer

Licensed Business **Peterson Excavating, Warren Peterson**

Name or Designer

Name

License # **1315**

Certification # --

Designer's Comments --

(To On-Site Wastewater Staff)

Select the Installer (if known)

Licensed Business --

Name or Installer Name

License # --

Certification # --

Installer's Comments --

(To On-Site Wastewater Staff)

STRUCTURE - RESIDENTIAL

Enter Building Type and Water Uses

Home, mobile home, hunting shack, cabin, RV

Dwelling **Yes**

Dwelling

of Bedrooms **3**

Plumbing ☒ **Yes**

Basement Plumbing ☐ **Yes**

Garbage Disposal ☐ **Yes**

Clothes Washer ☒ **Yes**

Dishwasher ☐ **Yes**

Water Conditioning Unit ☐ **Yes**

Furnace w/Humidifier ☐ **Yes**

Bathtub > 40 gal. ☐ **Yes**

Sewer Grinder Pump ☐ **Yes**

Multi-Family **No**

Accessory Dwelling **No**

Accessory Structure
w/water **--**

Other **No**

Other information to be considered for this application

--

Will this project require a Septic Variance?

Yes

VARIANCE WORKSHEET

Enter Variance information. About SSTS Variances Pursuant to Ordinance 61, Article V, Section 3.0 A property owner may request a variance from the standards specified in the Ordinance pursuant to county policies and procedures. Variances shall only be permitted when they are in harmony with the general purposes and intent of this Ordinance where there are practical difficulties or particular hardship in meeting the strict letter of this Ordinance, excluding the technical standards. Certain deviations may require the approval of the MPCA or the MN Department of Health.

Describe the specific provision(s) in the ordinance from which the variance is requested.

The requirement for the new tank to be 150 feet from the stream is very difficult to achieve.

Describe the practical difficulty that prevents compliance with the rule.

It would mean extending the existing sewer line 80 feet further from the house. Given the slope of the pipe and the natural rise of the land toward the new mound results in the tank being at a prohibitive depth.

Describe the alternative measures that will be taken to achieve a comparable degree of compliance with the purposes and intent of the applicable provisions.

We will remove the old tank and located the new septic/pump tank in the same general vicinity, abandon the existing drain field and build a new mound system that meets the required 150 ft setback from the stream as show in the design sketch.

Identify cost considerations preventing reasonable use of the property under the terms of this ordinance

Locating the tank to meet the setback requires a considerable amount of additional excavating and/or incorporating other components to the system.

OFFICE USE ONLY

ES Area	JO
Office	Duluth
Section	25
Township	53
Range	12
Variance Department	--
Recommendation	

Specify reasons for recommendation:

Hint: (Reference pertinent sections of the Ordinance and ISTS Construction Standards)

	--
Hearing Info. and Outcome	--
Board of Adjustment	--
Hearing Date	
Permit #	--
Variance Granted	--
Case #	--

VARIANCE AGREEMENT

By submitting this request for variance from the Ordinance and the Construction Standards, I certify and agree that no substantial health hazard is likely to occur therefrom and an unnecessary hardship might result in strict compliance with the Ordinance and Standards.

I further agree to install a sewage treatment system in accordance with the permit application, plans, and specification that are made as part of this variance request, in addition to paying the Variance Fee associated with this request.

Peterson Excavating

1778 Clover Valley Dr.
Duluth, Minnesota
(218) 390-0217

MAR 07 2024

March 6, 2024

John Otterbein
Planning and Zoning – Onsite Wastewater Division
320 W. 2nd St., Suite 301
Duluth, MN 55802

Re: Variance for Septic / Pump Tank for a Replacement Mound for Steven and Kathy Johnson at 1301 Nappa Rd., Two Harbors (Alden Twp).

Dear Mr. Otterbein:

I am Warren Peterson, Peterson Excavating, and I have designed and will install a replacement mound SSTS for Steven and Kathy Johnson at 1301 Nappa Rd., Two Harbors, 55616 in Alden Twp – St. Louis County. The design, management plan, application, fee, and request for a tank location variance is included.

A variance is needed to locate the septic / pump tank in proximity to the existing tank (see design). The new tank needs to be placed in this location to maintain 4 feet or less to the top of the tank. This is required by code and because locally available tanks are not permitted for deeper burial. Placing the replacement tank with a 150 ft setback from the Branch of the Knife River would require burial of the top of the tank at 7 ft. It would be dangerous to bury a 4 ft. rated tank at 7 feet, which would be necessary to accommodate drain back from the mound to the pump chamber.

The mound meets the 150 feet setback from a cold water Branch of the Knife River. The elevation of the network elevation in the mound is 7 ft. higher than the force main elevation coming out of pump chamber at a 150 ft setback to the River. To meet the tank code and drainage requirements, the replacement tank should be 70 ft to the Branch of the Knife River.

In summary the existing site topography, tank burial limitations, drain back limitations, and tank safety conditions necessitates the request for the variance of the tank setback to the Branch to the Knife River. Thank you for your consideration.

Sincerely

Warren Peterson

Warren Peterson
Peterson Excavating

Peterson Excavating

1778 Clover Valley Dr.
Duluth, Minnesota
(218) 390-0217

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Sincerely

Warren Peterson

Warren Peterson
Peterson Excavating



St. Louis County, MN

PERMIT

Residential Construction Application

Subsurface Sewage Treatment System

MAR 07 2024

Form

3000

Rev. 101-02-2024

This permit application form is used to apply for a Permit to Construct. Additional Information: www.stlouiscountymn.gov/septic.**PROPERTY IDENTIFICATION NUMBER (PIN) and SITE**

Primary PIN 210-0010-04520 Associated PIN 210-0010-04505

PIN is found on your Property Tax Statement (E.g. 123-1234-12345), searching the County Land Explorer at <https://gis.stlouiscountymn.gov/landexplorer/>, or searching the Property Lookup at <http://apps.stlouiscountymn.gov/auditor/parcelInfo20051frame/>.

Site Address 1301 Nappa Rd City Two Harbors Zip 55616

☐ Check to request a 911 address number and sign. Visit <https://www.stlouiscountymn.gov/departments-a-z/sheriff/emergency/911-emergency#5143571-obtaining-a-911-address> for addressing information.**APPLICANT (Property Owner)**

Name Steven & Kathy Johnson Date 3/6/24

Address 1301 Nappa Rd City Two Harbors State MN Zip 55616

Email Phone 218 348 2931 Phone

CONTACT (If Different than Applicant Above)

Name

Email Phone Phone

MAILING INFORMATION (If Different than Site Address)☒ US Mail Address City State Zip☐ Email Email**REASON FOR APPLICATION**☐ New SSTS ☒ Replacing the Existing SSTS Why Up Dating ☐ Point of Sale Requirement**SYSTEM TYPE (refer to design summary) and PERMIT FEES**

Type I	Type II	Type III	Type IV	Type V
<input type="checkbox"/> Non-Shoreland \$325	<input type="checkbox"/> Holding Tank \$270	<input type="checkbox"/> System \$365	<input type="checkbox"/> System \$420	<input type="checkbox"/> System \$525
<input checked="" type="checkbox"/> Shoreland \$445	<input type="checkbox"/> Privy/Outhouse \$110	<input type="checkbox"/> Component Add/Replace \$215	<input type="checkbox"/> Component Add/Replace \$215	<input type="checkbox"/> Component Add/Replace \$215
<input type="checkbox"/> Component Add/Replace \$215	<input type="checkbox"/> Floodplain-Shoreland \$330			
	<input type="checkbox"/> Component Add/Replace \$215			

Please make checks payable to: St. Louis County Auditor

SITE INFORMATION (Check all that apply)☒ Yes ☐ No Is the SSTS within 1,000 feet of a lake or 300 feet of a river? Lake/River Name☒ Yes ☐ No Is the property used year round?☐ Yes ☒ No Is the property part of a CIC (Common Interest Community)? If yes, include the Associated PIN on this Application.☐ Yes ☒ No Is this property serving multiple dwellings sharing a SSTS component?☐ Yes ☒ No Is the leased property? If yes, you must obtain & attach the Lessor's written authorization for this project.Leased From ☐ MN Power ☐ St. Louis County ☐ MN DNR ☐ US Forest Service ☐ Other**WELL INFORMATION (Check all that apply)**

Water Source	<input type="checkbox"/> Proposed Well	<input checked="" type="checkbox"/> Existing Well	<input type="checkbox"/> Hand Carried	<input type="checkbox"/> Surface/Lake Water	<input type="checkbox"/> Municipal
Well Type	<input checked="" type="checkbox"/> Drilled	<input type="checkbox"/> Sandpoint	<input type="checkbox"/> Dug	More than one well?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Well #	Well Depth Feet			Case Depth Feet	



St. Louis County, MN

PERMIT

Residential Construction Application

Subsurface Sewage Treatment System

Form

3000

Rev. 01-02-2024

DESIGNERLicensed Business Name: Peterson ExcLicense # 1315Certification # 2041

Designer's Comments (To Onsite Wastewater Staff)

STRUCTURE

Building Type and Water Uses Check all that apply		# of Bedrooms	Seasonal Use Only	Plumbing	Basement Plumbing	Garbage Disposal	Clothes Washer	Dishwasher	Water Conditioning Unit	Furnace w/Humidifier	Bathtub > 40 gal	Sewer Grinder Pump
<input checked="" type="checkbox"/> Dwelling	Home, mobile home, hunting shack, cabin, RV	<u>3</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Multi-Family	Multiple units		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Accessory Dwelling	Guest cottage, bunk house		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Accessory Structure	Garage, pole building, shed, sauna, gazebo screen-house	<u>0</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other information to be considered for this application

AGREEMENT

By submitting this application, the entire contents of which are considered to be public data, I certify and agree that I am the owner or the authorized agent of the owner of the above property, and that all uses will conform to the provisions of St. Louis County. I further certify and agree that I will comply with all conditions imposed in connection with the approval of the application. Applicants may be required to submit additional property descriptions, property surveys, site plans, building plans and other information before the application is accepted or approved. **Intentional or unintentional falsification of this application or any attachments thereto will make the application, any approval of the application and any resulting permit invalid.** I authorize St. Louis County staff to inspect the property to review the application and for compliance inspections. Furthermore, by submitting this application, I release St. Louis County and its employees from any and all liability and claims for damages to person or property in any manner or form that may arise from the approval of the application or any related plans, the issuance of any resulting permit or the subsequent location, construction, alteration, repair, extension, operation or maintenance of the subject matter of the application.

CONTACT Planning and Zoning (Onsite Wastewater Division)

Duluth Office		Virginia Office	
Government Services Center 320 W 2nd Street, Suite 301 Duluth, MN 55802	Phone (218) 725-5200 Toll Free (800) 450-9777 www.stlouiscountymn.gov/septic	Government Services Center 201 South 3rd Avenue West Virginia, MN 55792	Phone (218) 749-0625 Toll Free (800) 450-9777 www.stlouiscountymn.gov/septic

OFFICE USE ONLY

Amount Paid	Paid by	Cash	Check #	Permit #
Revenue Code	Received By	<input type="checkbox"/> Mail <input type="checkbox"/> IP	Date RIO	



St. Louis County, MN

PERMIT

SSTS Design Summary
Subsurface Sewage Treatment System

Form

3002

Rev. 01-02-2024

This form is used to complete a SSTS Design. Additional Information: www.stlouiscountymn.gov/septic**SITE INFORMATION**Site Address 1301 Nappa Rd City Two Harbors Zip 55616 Parcel ID 210-0610-4520**DESIGNER**Name Walter Peterson Date 3/8/24Email grove/taeth@yhae.com Phone 218 390 0217 Phone**SYSTEM INFORMATION**MPCA Type ☒ Type I ☐ Type II ☐ Type III ☐ Type IV ☐ Type V Dwelling Classification ☐ I ☒ II ☐ III ☐ IV☒ Residential ☐ Commercial ☐ Seasonal ☐ Other Well Casing Depth# Bedrooms 3 # Water using devices 2 Total Finished Sq ft 1500 Sq ft / Bedroom 500Design Flow 360 Water Meter No Pressure Test No Grinder or Disposal NoCLR 6 SLR 0.6 Limiting Soil Type Redox Limiting Layer Depth (in) 19

SSTS Flow Description

House Tank Pump Tank Mound**TANK INFORMATION**

Type (Septic, Pump, Holding etc.)	Size (gallons)	Status (New, Existing)	Material (Precast, Plastic)	Alarm (Yes, No)	Insulated (Yes, No)	Bedded (Yes, No)	Building Sewer (Gravity, Pressure, Both)
<u>Septic Pump</u>	<u>1600 / 500</u>	<u>New</u>	<u>Precast</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u>	<u>Gravity</u>

Gallons per inch of pump tank 12.03

Tank Installation & Pumping comments

DISTRIBUTION INFORMATION☐ Gravity ☐ Drop Box ☐ Distribution Box☒ Pressure Gal/Min 60 Ft Head 33 Pump Model ME 40☒ Event Counter ☐ ETM Time Dose Panel No Timer On Timer OffMax Dose 94.5 Min. Dose 56 Drainback 32.5 Dose + Drainback 88 Float Tether (in) 9.5

Manifold

Laterals

Location ☐ Center ☒ End Number 2 Length (ft) 49Size (in) 2" Size (in) 1.50Insulated Yes Orifices 20Size (in) 3/16 # Per lateral 13Spacing (in) 4 FT Shields Yes



St. Louis County, MN

PERMIT

SSTS Design Summary

Subsurface Sewage Treatment System

Form

3002

Rev. 01-02-2024

DRAINFIELD INFORMATION

Trench

Number	Width (ft)	Length (ft)	Media Type
Max Depth (in)	Rock (in)	Cover (in)	Sand Liner (in)

Bed

Number	Width (ft)	Length (ft)	Media Type
Max Depth (in)	Rock (in)	Cover (in)	Sand Liner (in)

At-Grade

Width (ft)	Length (ft)	Number	Up Berm (ft)	Down Berm (ft)
------------	-------------	--------	--------------	----------------

Mound

Number <i>ONE</i>	Bed Width (ft) <i>C</i>	Bed Length (ft) <i>50</i>	Media Type <i>Sand</i>
Sand (in) <i>17 to 21</i>	Rock (in) <i>4</i>	Cover (in) <i>12</i>	Total Width (ft) <i>35</i>
Up Berm (ft) <i>11</i>	Down Berm (ft) <i>18</i>	Sand (yd ³) <i>173</i>	Total Length (ft) <i>78</i>

Registered Filter Product

Filter Class	<input type="checkbox"/> Intermittent/Single Pass	<input type="checkbox"/> Recirculating	<input type="checkbox"/> Subsurface Flow	<input type="checkbox"/> Other
Media Type	<input type="checkbox"/> Sand	<input type="checkbox"/> Peat	<input type="checkbox"/> Textile/Synthetic	<input type="checkbox"/> Constructed Wetlands
No. of Filters	Rock Bed Dimensions (ft)	x	Bed Media Depth (in)	

Manufacturer

Registered Aerobic Treatment System

Type	<input type="checkbox"/> Suspended Growth	<input type="checkbox"/> Fixed Film	<input type="checkbox"/> Sequencing Batch	<input type="checkbox"/> Other
Gallons/day	No. of Units	Disinfection (yes or no)	If yes, chemical or UV	

Manufacturer

Designer Comments

CONTACT Planning and Zoning (Onsite Wastewater Division)

Duluth Office

Government Services Center
320 W 2nd Street, Suite 301
Duluth, MN 55802

Phone (218) 725-5200
Toll Free (800) 450-9777
www.stlouiscountymn.gov/septic

Virginia Office

Government Services Center
201 South 3rd Avenue West
Virginia, MN 55792

Phone (218) 749-0625
Toll Free (800) 450-9777
www.stlouiscountymn.gov/septic

Soil and Site Evaluation Report

Page 1 of 4

Prepared by: Spectrum Research, Inc. (#2215), James C. Balogh, Ph.D., PSS (#5885)

County: St. Louis

Parcel I.D. 210-0010-04520 and 210-0010-04505

Reviewed by: _____ Date: _____

Date of Soil Evaluations: August 21, 2023

Property Owner: Steven and Kathy Johnson

Property Location: 1301 Nappa Rd., Two Harbors, MN 55616

Legal Description: Alden Twp, MN, W'ly 313' of N'ly 417' of SW 1/4 of NW 1/4 of Section 25 in T. 53N, R. 12W (~3.0 acres)) (210-0010-04520) and Alden Twp, MN, Part of SW 1/4 of NW 1/4 commencing 417' S of W corner on W line to point of beginning thence continuing S 347.9' thence E'ly to W bank of stream thence N'ly along bank to a point 334' E and 361' S of NW corner thence W 21' thence W to point of beginning of Section 25 in T. 53N, R. 12W (~3.29 acres)) (210-0010-04505)

Nearest Road: Nappa Rd.

System Designer: Warren Peterson

System Installer: Peterson Excavating

☐ New Construction

☒ Use: Residential/Number of bedrooms: 3 (Class II flow residence)

☒ Replacement

☐ Public or commercial Describe: _____

Code derived design flow rate 300 gal/d Average design flow rate 201 gal/d

Parent Material: Loamy material over dense loamy till Evidence of Cut/Fill: None

Landscape feature & Landform: Moderately sloping – Till plain

Observed depth to bedrock: >3 feet Landform: Ground moraine (till plain)

Flood Plain elevation Not applicable Flooding Potential: None Ponding Potential: None

Run-on/off Potential Low Depth to water table: 18 in.

NRCS System Ratings: Trench – Extremely limited; Mound – Moderately limited; At-grade – Very limited

Mapped USDA NRCS Mapping Unit: F137B—Normanna-Canosia-Hermantown complex, 0 to 8 percent slopes

Observed: USDA NRCS Mapping Unit: F137B—Normanna-Canosia-Hermantown complex, 0 to 8 percent slopes

General Comments: Rural residential, shoreland lot in Alden Township (6.29 acres). The proposed site is approximately 180 feet from a cold water tributary of the Knife River. Soil report is for construction of a replacement system for an existing Class II - 3 bedroom residence. Hand dug soil pits were used for describing soil features in the field. The area is dominated by Normanna (upland soil and vegetation). This is a Class II flow residence. (Class II residence – 1500 ft² / 3 bedrooms = 500 & two water using appliances). SJ-1, SJ-2, and SJ-3 are moderately well drained, soils with upland vegetation.

USDA NRCS Mapping unit interpretations were downloaded from the USDA NRCS Web Soil Survey for the Duluth Part of St. Louis County. Model series descriptions were downloaded from the USDA NRCS OSD Soil Descriptions web site.

The periodically saturated soil layer, contour loading rate, and soil loading rate in the general area of each soil pit are:

Soil Pit	Slope (%)	Depth to limiting layer (in)	Contour Loading Rate (gal. ft ⁻¹ d ⁻¹)	Limiting Soil Application Rate (gpd ft ⁻²)
SJ-1	5	19*	6.0	0.6
SJ-2	5	20	6.0	0.6
SJ-3	5	21	6.0	0.6

***Base design for a limiting layer at 19 inches below grade and contour loading rate of 6.0 in the replacement treatment area. Mound dispersal bed size: 6.0' x 50'.**

Soil and Site Evaluation Report

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-1 Excavation Method: ☐ Backho, Pit ☒ Hand Dug ☐ Hand or Aug. Boring
 Date of Description: 08/21/2023 Time of Description: 8:00 am

Slope: 5 % Aspect: E Vegetation: Pasture grasses surrounded by quaking aspen, balsam fir, large leaf aspen
 Slope Shape: Linear Linear Comments: See designer site map for soil pit location. Located on the south end of the proposed replacement treatment area.
 Depth to Limiting Factor: 19 in

Ground Surface Elevation: -1228 ft*

Landscape position: Moderately sloping, side slope Location:

Mapped NRCS Soil Series: Normanna
 Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer Well head protection zone: >500 ft

Contour Loading Rate: 6.0 gallon per lineal foot Soil type: ☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric
☐ Wetland-Hydric

Horizon	Depth (in)	Matrix Color (Munsell)	Redox Features	Texture	Structure	Consistence	Boundary	Coarse Fragments	Roots	Soil Application Rate (gpd ft ⁻²)	
										Eff#1*	Eff#2*
Ap	0-9	5YR 3/3	-	Sandy loam	Moderate, medium granular	Friable	Clear, wavy	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	Common, fine; Very few, medium	0.6	
Bw1	9-19	5YR 4/4	-	Sandy loam	Moderate, fine subangular blocky	Friable	Gradual, wavy	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	Few, fine	0.6	
Bw2	19-25	5YR 4/4	Common, fine, round, distinct, 5YR 4/6, iron concentrations	Sandy loam	Moderate, medium subangular blocky	Friable	-	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	-	0.0	

Other Comments: Contour loading rate is 6.0 gallons per foot per day because of soil texture, structure, and consistence in the A and Bw1 horizons, depth to redoximorphic features (Bw2), and topography. * Effluent #1 = 30<BOD<220 mg/L 30 and 30<TSS<150 mg/L Effluent #2 = BOD<30 mg/L and TSS<30 mg/L (Pre-treatment)

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 and that I am a duly Licensed Soil Scientist under the laws of the state of Minnesota.

Print Name: James C. Balogh, Ph.D., PSS

Signature: James C. Balogh

Date: August 22, 2023 License No. 30001

Soil and Site Evaluation Report

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-2 Excavation Method: ☐ Backhoe Pit ☒ Hand Dug ☐ Hand or Auger Boring
 Date of Description: 08/21/2023 Time of Description: 8:17 am
 Slope: 5 % Aspect: E Vegetation: Pasture grasses surrounded by quaking aspen, balsam fir, large leaf aster
 Slope Shape: Linear Linear Comments: See designer site map for soil pit location. Located on the north end of the proposed replacement treatment area.
 Depth to Limiting Factor: 20 in
 Ground Surface Elevation: ~1228 ft*

Landscape position: Moderately sloping, side slope Location:

Mapped NRCS Soil Series: Normanna
 Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer Well head protection zone: >500 ft

Contour Loading Rate: 6.0 gallon per lineal foot Soil type: ☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric
☐ Wetland-Hydric

Horizon	Depth (in)	Matrix Color (Munsell)	Redox Features	Texture	Structure	Consistence	Boundary	Coarse Fragments	Roots	Soil Application Rate (gpd ft ⁻²)	
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Other Comments: Contour loading rate is 6.0 gallons per foot per day because of soil texture, structure, and consistence in the A and Bw1 horizons, depth to redoximorphic features (Bw2), and topography. * Effluent #1 = 30<BOD<220 mg/L 30 and 30<TSS<150 mg/L Effluent #2 = BOD<30 mg/L and TSS<30 mg/L (Pre-treatment)

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Soil and Site Evaluation Report

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-2 Excavation Method: ☐ Backhoe Pit ☒ Hand Dug ☐ Hand or Auger Boring

Date of Description: 08/21/2023 Time of Description: 8:41 am

Slope: 5 % Aspect: E

Slope Shape: Linear Linear

Depth to Limiting Factor: 21 in

Ground Surface Elevation: -1228 ft*

Vegetation: Pasture grasses surrounded by quaking aspen, balsam fir, large leaf aspen

Comments: See designer site map for soil pit location. Located on the center of the proposed replacement treatment area.

Landscape position: Moderately sloping, side slope Location:

Mapped NRCS Soil Series: Normanna

Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer

Well head protection zone: >500 ft

Contour Loading Rate: 6.0 gallon per lineal foot

Soil type:

☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric☐ Wetland-Hydric

Horizon	Depth (in)	Matrix Color (Munsell)	Redox Features	Texture	Structure	Consistence	Boundary	Coarse Fragments	Roots	Soil Application Rate (gpd ft ⁻²)	
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Ap	0-8	5YR 3/3	-	Sandy loam	Moderate, fine granular	Friable	Clear, wavy	5% fine gravel; 5% medium gravel; 10% coarse gravel	Common, fine	0.6	
Bw1	8-21	5YR 4/4	-	Sandy loam	Moderate, fine subangular blocky	Friable	Gradual, wavy	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	Few, fine	0.6	
Bw2	21-30	5YR 4/4	Common, fine to medium, round, distinct, 5YR 4/6, iron concentrations	Sandy loam	Moderate, medium subangular blocky	Friable	-	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	-	0.0	

Other Comments: Contour loading rate is 6.0 gallons per foot per day because of soil texture, structure, and consistence in the A and Bw1 horizons, depth to redoximorphic features (Bw2), and topography. * Effluent #1 = 30<BOD<220 mg/L 30 and 30<TSS<150 mg/L Effluent #2 = BOD<30 mg/L and TSS<30 mg/L (Pre-treatment)

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James C. Balogh

Date: August 22, 2022 License No. 30001

Soil and Site Evaluation Report

Page 1 of 4

Prepared by: Spectrum Research, Inc. (#2215), James C. Balogh, Ph.D., PSS (#5885)

County: St. Louis

Parcel I.D. 210-0010-04520 and 210-0010-04505

Reviewed by: _____ Date: _____

Date of Soil Evaluations: August 21, 2023

Property Owner: Steven and Kathy Johnson

Property Location: 1301 Nappa Rd., Two Harbors, MN 55616

Legal Description: Alden Twp, MN, W¹/₄ of N¹/₄ of SW¹/₄ of NW¹/₄ of Section 25 in T. 53N, R. 12W (~3.0 acres) (210-0010-04520) and Alden Twp, MN, Part of SW¹/₄ of NW¹/₄ commencing 417' S of W corner on W line to point of beginning thence continuing S 347.9' thence E¹/₂ly to W bank of stream thence N¹/₂ly along bank to a point 334' E and 361' S of NW corner thence W21' thence W to point of beginning of Section 25 in T. 53N, R. 12W (~3.29 acres) (210-0010-04505)

Nearest Road: Nappa Rd.

System Designer: Warren Peterson

System Installer: Peterson Excavating

☐ New Construction

☒ Use: Residential/Number of bedrooms: 3 (Class II flow residence)

☒ Replacement

☐ Public or commercial Describe:

Code derived design flow rate 300 gal/d Average design flow rate 201 gal/d

Parent Material: Loamy material over dense loamy till Evidence of Cut/Fill: None

Landscape feature & Landform: Moderately sloping – Till plain

Observed depth to bedrock: >3 feet Landform: Ground moraine (till plain)

Flood Plain elevation Not applicable Flooding Potential: None Ponding Potential: None

Run-on/off Potential Low Depth to water table: 18 in.

NRCS System Ratings: Trench – Extremely limited; Mound – Moderately limited; At-grade – Very limited

Mapped USDA NRCS Mapping Unit: F137B—Normanna-Canosia-Hermantown complex, 0 to 8 percent slopes

Observed: USDA NRCS Mapping Unit: F137B—Normanna-Canosia-Hermantown complex, 0 to 8 percent slopes

General Comments: Rural residential, shoreland lot in Alden Township (6.29 acres). The proposed site is approximately 180 feet from a cold water tributary of the Knife River. Soil report is for construction of a replacement system for an existing Class II 3 bedroom residence. Hand dug soil pits were used for describing soil features in the field. The area is dominated by Normanna (upland soil and vegetation). This is a Class II flow residence. (Class II residence – 1500 ft² / 3 bedrooms = 500 & two water using appliances). SJ-1, SJ-2, and SJ-3 are moderately well drained, soils with upland vegetation.

USDA NRCS mapping unit interpretations were downloaded from the USDA NRCS Web Soil Survey for the Duluth Part of St. Louis County. Model series descriptions were downloaded from the USDA NRCS OSD Soil Descriptions web site.

The periodically saturated soil layer, contour loading rate, and soil loading rate in the general area of each soil pit are:

Soil Pit	Slope (%)	Depth to limiting layer (in)	Contour Loading Rate (gal. ft ⁻¹ d ⁻¹)	Limiting Soil Application Rate (gpd ft ⁻²)
SJ-1	5	19*	6.0	0.6
SJ-2	5	20	6.0	0.6
SJ-3	5	21	6.0	0.6

***Base design for a limiting layer at 19 inches below grade and contour loading rate of 6.0 in the replacement treatment area. Mound dispersal bed size: 6.0' x 50'.**

Soil and Site Evaluation Report

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-1 Excavation Method: ☐ Backhoe Pit ☒ Hand Dug ☐ Hand or Auger Boring
 Date of Description: 08/21/2023 Time of Description: 8:00 am
 Slope: 5 % Aspect: E
 Slope Shape: Linear
 Depth to Limiting Factor: 19 in
 Ground Surface Elevation: ~1228 ft*

Landscape position: Moderately sloping, side slope Location: _____

Mapped NRCS Soil Series: Normanna
 Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer Well head protection zone: >500 ft
 Soil type: ☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric
☐ Wetland-Hydric

Contour Loading Rate: 6.0 gallon per lineal foot

Horizon	Depth (in)	Matrix Color (Munsell)	Redox Features	Texture	Structure	Consistence	Boundary	Coarse Fragments	Roots	Soil Application Rate (gpd ft ⁻²)	
										Eff#1*	Eff#2*
Ap	0-9	5YR 3/3	-	Sandy loam	Moderate, medium granular	Friable	Clear, wavy	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	Common, fine; Very few, medium	0.6	
Bw1	9-19	5YR 4/4	-	Sandy loam	Moderate, fine subangular blocky	Friable	Gradual, wavy	5% fine gravel; 5% medium gravel; 5% coarse gravel; 5% cobble	Few, fine	0.6	
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Other Comments: Contour loading rate is 6.0 gallons per foot per day because of soil texture, structure, and consistence in the A and Bw1 horizons, depth to redoximorphic features (Bw2), and topography. * Effluent #1 = 30<BOD<220 mg/L 30 and 30<TSS<150 mg/L Effluent #2 = BOD<30 mg/L and TSS<30 mg/L (Pre-treatment)

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 Date: August 22, 2023 License No. 30001

Soil and Site Evaluation Report

Page 3 of 4

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-2 Excavation Method: ☐ Backhoe Pit ☒ Hand Dug ☐ Hand or Auger Boring
 Date of Description: 08/21/2023 Time of Description: 8:17 am
 Slope: 5 % Aspect: E Vegetation: Pasture grasses surrounded by quaking aspen, balsam fir, large leaf aspen
 Slope Shape: Linear Linear Slope Factor: 20 in Depth to Limiting Factor: 20 in
 Ground Surface Elevation: ~1228 ft*

Landscape position: Moderately sloping, side slope Location: _____

Mapped NRCS Soil Series: Normanna
 Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer

Well head protection zone: >500 ft

Contour Loading Rate: 6.0 gallon per lineal foot

Soil type: ☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric

☐ Wetland-Hydric

Horizon	Depth (in)	Matrix Color (Munsell)	Redox Features	Texture	Structure	Consistence	Boundary	Coarse Fragments	Roots	Soil Application Rate (gpd ft ⁻²)	
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Soil and Site Evaluation Report

Soil Profile Morphology: Replacement Treatment Area

Soil Profile ID: SJ-2 Excavation Method: ☐ Backhoe Pit ☒ Hand Dug ☐ Hand or Auger Boring
 Date of Description: 08/21/2023 Time of Description: 8:41 am

Slope: 5 % Aspect: E
 Slope Shape: Linear
 Depth to Limiting Factor: 21 in
 Ground Surface Elevation: ~1228 ft*

Landscape position: Moderately sloping, side slope Location: _____

Mapped NRCS Soil Series: Normanna
 Observed NRCS Soil Series: Normanna

Well locations: To be provided by designer

Well head protection zone: >500 ft

Contour Loading Rate: 6.0 gallon per lineal foot Soil type: ☒ Upland ☐ Transition-Upland Soil ☐ Upland Vegetation-Hydric Soil ☐ Transition-Hydric
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Mound Calculations (Spreadsheet)

Adjusted for Ordinance 61

Updated: 5/1/2023

Name of Applicant: Steve and Cathy JOHNSON

A. SITE CONDITIONS

Evaluate the site and soils report for the following:

- >Type and occupancy of facility.
- >Quality of wastewater distributed.
- >Dimensions and configuration of suitable on site area.
- >Treatment and hydraulic limitation of the soil
- >Surface water movement.

(Note: shaded boxes to be filled in by designer)



Slope %

Occupancy: One or two family dwelling # of bedrooms = Integer only

Public facility (i.e. non-residential). Daily wastewater flow: gpd
(Provide details on flow estimate on separate sheet)

Wastewater: Typical residential BOD₅ Y/N =
Or other BOD₅ = mg/L

Suitable area: Cross slope distance = Feet
Width = Feet

Soil limiting factor: Depth to limiting factor = inches

Contour loading rate = gpd / linear foot Soil Loading Rate:

Berm Slope = to

B. DESIGN WASTEWATER FLOW (DWF)

One or two family dwelling (7080 Flow by Class)

DWF = gal/day/bedroom (SEE CHART I) x # of bedrooms
 gal/day/bedroom x # of bedrooms
DWF = gal/day (use integer)

OR:

Non-residential flow (Residential strength wastewater)

ATTACH flow analysis.

DWF GPD

OR:

Average Daily Flow (For Class I residences only)

ADWF = Average daily waste water flow (Generally 100 GPD)

ADWF = gal/day x bdrms # of bedrooms
ADWF = Standard daily flow gpd

C. DESIGN OF THE DISTRIBUTION CELL (ROCK BED)

1. Size of the Distribution Cell

a. Infiltration rate of fill material = (generally < 1.0 gal/sf/day)

b. Bottom area of distribution cell = Design wastewater flow divided by infiltration rate
(1.0 gal/sf/day)

Area = gal/day divided by gal/sf/day sq. ft.

2. Standard Distribution Cell Configuration

a. Distribution cell length (B) = Design wastewater flow (DWF)
divided by Contour Loading Rate (CLR)

Length = DWF gals divided by CLR gals/ft = ft = B

b. Distribution cell width (A) = Bottom area of distribution cell
divided by Distribution cell length (B)

Width = Bottom area sf divided by length (B) ft = ft = A

(Note: A will generally be the same as the contour loading rate)

Length = Width = Feet (Do Not exceed 10 feet)

Cell dimensions when width exceeds 10 feet

Length = Width = Feet

Distribution Cell final size Standard Design

Length Feet

Width = Feet

Width and length adjusted not to **EXCEED** 10 foot width

DISTRIBUTION CELL FOR AVERAGE FLOW DESIGN

a. Distribution cell length (B) = Average design wastewater flow (ADWF)
divided by contour loading rate (CLR)

Length = ADWF gals divided by CLR gals/ft = ft = B

b. Distribution cell width (A) = Bottom area of distribution cell
divided by Distribution cell length (B)

Length = Feet Width = Feet (Do Not exceed 10 feet)

Cell dimensions when width exceeds 10 feet

Length = Feet Width = Feet

Distribution cell final size for Average Flow Design

Length = Feet

Width = Feet

Width and length adjusted not to **EXCEED** 10 foot width

D. SAND FILL DESIGN

1. Fill depth

a. Fill depth below distribution cell (at least 6 inches)

1) Minimum depth at up slope edge of distribution cell (D) = inches
(minimum 36 inches for treatment and 12 inches for dispersal) minus distance
in inches to limiting factor.

Required separation distance (36 inches or 12 inches minimum)
minus inches to saturated soil depth (from soils worksheet) =

sand depth requirement D = inches

2) Depth at down slope edge of distribution cell (E)

E = depth at up slope edge of distribution cell (D) + (% natural slope expressed as a decimal x distribution cell width (A)

E = D + (% natural slope expresses as a decimal x A)

$$E = \boxed{17} \text{ inches} + (\boxed{0.05} \times \boxed{6.0} \text{ feet} \times 12 \text{ inches/foot})$$

$$E = \boxed{21} \text{ inches}$$

b. Distribution Cell Depth of Aggregate (Rock Bed Depth)

Distribution cell depth (F) for aggregate distribution cell = amount of aggregate below distribution laterals (6 inches min.) + nominal outside diameter of largest lateral + amount of aggregate over distribution laterals (2 inches min.)

$$F = \boxed{6} \text{ 6" min.} + \boxed{2} \text{ inches} + \boxed{2} (>2) \text{ inches}$$

$$F = \boxed{10} \text{ inches}$$

Aggregate under laterals: minimum 6 inches to 12 inches

c. Cover Material

1) Depth at distribution cell center (H) = $\boxed{13}$ inches (crown)

2) Depth at distribution cell edges (G) = $\boxed{12}$ inches

2. Mound Dimensions, fill length and width

a. End berm width (K) = Total fill at center of distribution cell x horizontal gradient of side slope.

$$K = \{[(D+E) \text{ divided by } 2] + F + H\} \times \text{horizontal gradient of side slope} \text{ divided by } 12 \text{ inches/foot}$$

$$K = \boxed{18.80} + \boxed{23} \times \boxed{4.0} \text{ divided by } \boxed{12}$$

$$K = \boxed{14} \text{ feet}$$

b. Mound Length (L) = Distribution cell length + (2 x end berm width)

$$L = B + 2K$$

$$L = \boxed{50.0} \text{ feet} + 2 \times \boxed{14} \text{ feet}$$

$$L = \boxed{78}$$

c. Up slope berm width (J) = Fill depth at upslope edge of distribution cell (D + F + G) x horizontal gradient of side slope x slope correction factor

$$\{100/[100 + (\text{gradient of side slope} \times \% \text{ of slope})]\}$$

$$J = (\boxed{17} \text{ inches} + \boxed{10} \text{ inches} + \boxed{12} \text{ inches}) \text{ divided by } \boxed{12} \text{ inches/ft} \times \boxed{4.0} \times \boxed{100} \text{ divided by } \boxed{100} + (\boxed{4.0} \times \boxed{5.0})$$

$$J = \boxed{11} \text{ feet}$$

d. Down slope berm width (I) = Fill depth at downslope edge of distribution cell

(E + F + G) x Horizontal gradient of side slope x downslope correction factor
100/[100 - (gradient of side slope x % of slope)]

I = (E + F + G) x Horizontal gradient of side slope x downslope correction factor
100 divided by [100 - (gradient of side slope x % of slope)]

$$I = \boxed{20.60} \text{ inches} + \boxed{10} \text{ inches} + \boxed{12} \text{ inches} \text{ divided by } \boxed{4.0} \times 100 \text{ divided by } [100 - (\boxed{4.0} \times \boxed{5.0})]$$

$$I = \boxed{18} \text{ feet}$$

e. Mound width (W) = Up slope width (J) + Distribution cell width (A) + Downslope width (I)

$$W = J + A + I$$

$$W = \boxed{11} \text{ ft} + \boxed{6.0} \text{ ft} + \boxed{18} \text{ ft}$$

$$W = \boxed{35} \text{ feet}$$

3. Check the basal area

a. Basal area required = Daily wastewater flow divided by infiltration rate of in-situ soil

$$\frac{\boxed{300} \text{ gal/day}}{\boxed{\#DIV/0!} \text{ gal/sf/day}} = \boxed{\#DIV/0!} \text{ square feet required}$$

b. Basal area available

1) **Sloping site** = Cell length x (Distribution cell width + Down slope width)

$$\text{Basal area} = B (A + I)$$

$$\text{Basal area} = \boxed{50} \text{ ft} \times (\boxed{6.0} \text{ ft} + \boxed{18} \text{ ft})$$

$$\text{Basal area} = \boxed{1200.0} \text{ sf}$$

2) **Level site** = Distribution cell length x Fill width

$$\text{Level site} = B \times W$$

$$\text{Level site} = \boxed{50} \text{ ft} \times \boxed{35} \text{ ft}$$

$$\text{Level site} = \boxed{1750.0} \text{ sf}$$

c. Is available basal area sufficient? ☐ yes or ☐ no

Basal area required < Basal area available

$$\boxed{\#DIV/0!} \text{ sf} < \boxed{\#DIV/0!} \text{ sf}$$

4. Determine the location of observation pipes along the length of distribution cell.

Distance from end of distribution cell to end observation pipes = B divided by 6

$$\text{Distance} = \boxed{8.0} \text{ ft from ends of distribution cell.}$$

E. SAND VOLUME CALCULATIONS

1. **Estimated Sand** = [sand beneath rock bed] + [sand in downhill berm] + [sand in uphill berm] + [sand in end berms] x (1 cubic yard/27 cubic feet)

2. **Estimated Sand** = $(D + E \div 12 \times B \times A \div 2) + (E + 12 \div 12 \times L \times I) + (D \div 12 \times J \times L \div 2) + (D \div 12 \times A \times K) \div 27$

3. **Estimated Sand** = $\boxed{138}$ cubic yards

4. **Adjusted Sand Volume** = Estimated sand x correction factor.

5. **Adjusted Sand Volume** = $\boxed{138} \times 1.25 = \boxed{173}$ cubic yards

MOUND ABSORPTION

Mound Absorption Ratio = Mound Design Loading Rate ÷ Soil Loading Rate

$$\boxed{1.00} \div \boxed{0.60} = \boxed{1.67}$$

Mound Absorption Width = (bed width or contour loading rate) x Mound Absorption Ratio

$$\boxed{6.0} \times \boxed{1.67} = \boxed{10.00} \text{ Feet}$$

<1% Slope absorption length on both sides of bed width = $\boxed{2.00}$ Feet

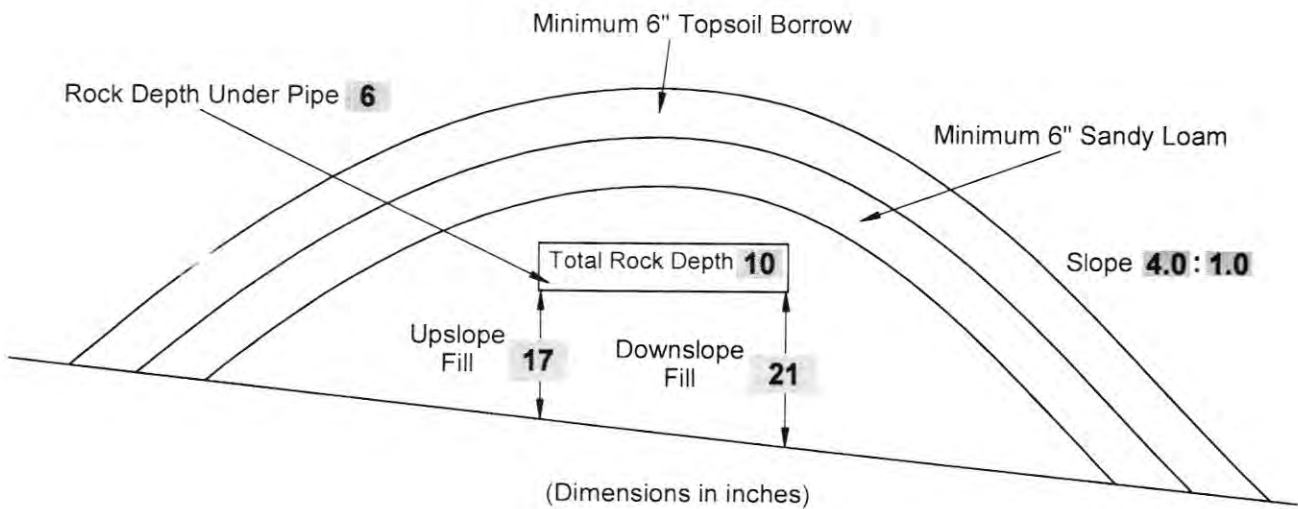
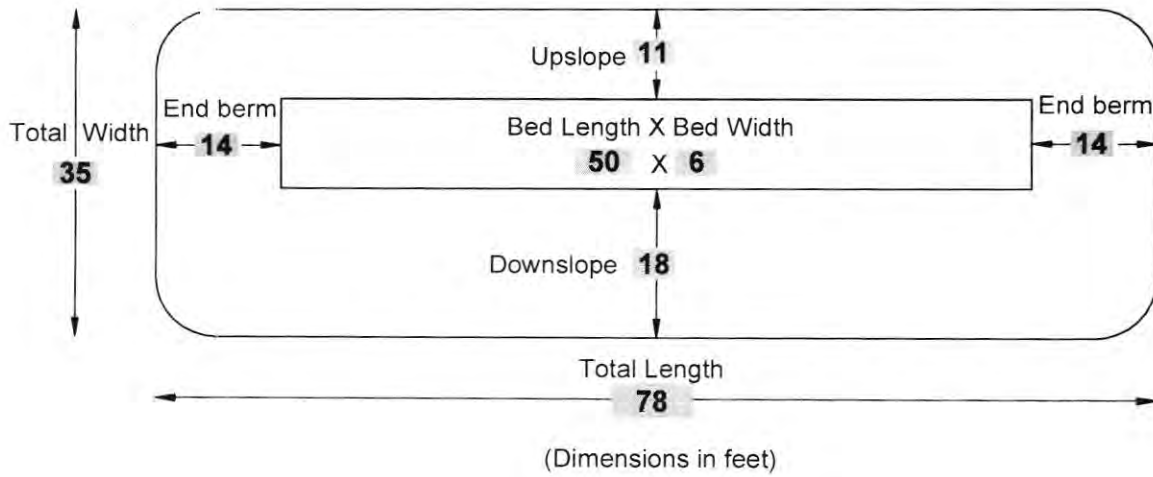
>1% Slope absorption length on downslope = $\boxed{4.00}$ Feet



Mound Dimensions



Name of Applicant: **Steve and Cathy JOHNSON**



Estimated Sand Volume: **173** Cubic Yards

Pump Selection for a Pressurized System - Single Family Residence Project

Parameters

Discharge Assembly Size	2.00	inches
Transport Length	206	feet
Transport Pipe Class	40	
Transport Line Size	2.00	inches
Distributing Valve Model	None	
Max Elevation Lift	7	feet
Manifold Length	3	feet
Manifold Pipe Class	40	
Manifold Pipe Size	2.00	inches
Number of Laterals per Cell	2	
Lateral Length	49	feet
Lateral Pipe Class	40	
Lateral Pipe Size	1.50	inches
Orifice Size	3/16	inches
Orifice Spacing	4	feet
Residual Head	4	feet
Flow Meter	None	inches
'Add-on' Friction Losses	5	feet

Calculations

Minimum Flow Rate per Orifice	0.87	gpm
Number of Orifices per Zone	26	
Total Flow Rate per Zone	22.7	gpm
Number of Laterals per Zone	2	
% Flow Differential 1st/Last Orifice	1.7	%
Transport Velocity	2.2	fps

Frictional Head Losses

Loss through Discharge	1.0	feet
Loss in Transport	1.9	feet
Loss through Valve	0.0	feet
Loss in Manifold	0.0	feet
Loss in Laterals	0.2	feet
Loss through Flowmeter	0.0	feet
'Add-on' Friction Losses	5.0	feet

Pipe Volumes

Vol of Transport Line	35.9	gals
Vol of Manifold	0.5	gals
Vol of Laterals per Zone	10.4	gals
Total Volume	46.8	gals

Minimum Pump Requirements

Design Flow Rate	22.7	gpm
Total Dynamic Head	19.1	feet

Total Dynamic Head, TDH (Feet)

Net Discharge (gpm)

PumpData 80 gpm 32 ft head

Legend

System Curve:	—
Pump Curve:	—
Pump Optimal Range:	—
Operating Point:	○
Design Point:	●





Septic System Management Plan for Above Grade Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic maintainer or service provider. However, it is **YOUR** responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

Proper septic system design, installation, operation and maintenance means safe and clean water!

Property Owner	STeen, Kathy Johnson	Email	
Property Address	1361 Nappa Rd	Property ID	210 6010 04520 210 6010 04505
System Designer	Warren Peterson	Contact Info	218 390 0217
System Installer	11 11	Contact Info	11 11 11
Service Provider/Maintainer	Home Owner	Contact Info	218 348 2931
Permitting Authority	ST Louis County	Contact Info	218 725 5200
Permit #		Date Inspected	

Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

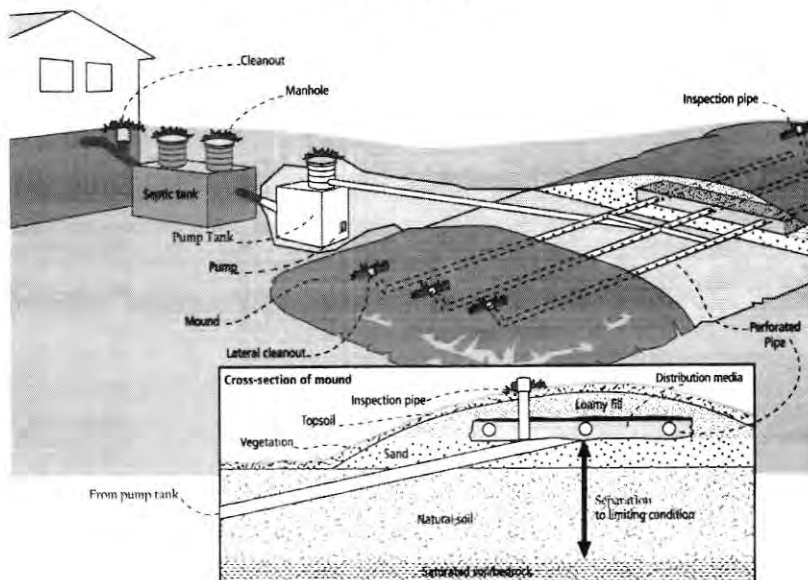
- Attach permit information, designer drawings and as-built of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

For more information see <http://septic.umn.edu>



Your Septic System



Septic System Specifics

System Type: ☒ I ☐ II ☐ III ☐ IV* ☐ V*

(Based on MN Rules Chapter 7080.2200 – 2400)

*Additional Management Plan required

☐ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

Dwelling Type

Number of bedrooms: 3

System capacity/ design flow (gpd): 300

Anticipated average daily flow (gpd): 200

Comments _____

Business? : ☐ Y ☒ N What type? _____

Well Construction

Well depth (ft): _____

☒ Cased well Casing depth: _____

☐ Other (specify): _____

Distance from septic (ft): _____

Is the well on the design drawing? ☐ Y ☐ N

Septic Tank

☒ First tank Tank volume: 1000 gallons

Does tank have two compartments? ☒ Y ☐ N

☐ Second tank Tank volume: 500 gallons

☐ Tank is constructed of Precast

☐ Effluent screen: ☒ Y ☐ N Alarm ☒ Y ☐ N

☒ Pump Tank 500 gallons

☐ Effluent Pump make/model: ME 40

Pump capacity 80 GPM

TDH 32 Feet of head

☐ Alarm location Pump Tank

Soil Treatment Area (STA)

Mound/At-Grade area (width x length): 35 ft x 78 ft

Rock bed size (width x length): 8 ft x 50 ft

Location of additional STA: yes

Type of distribution media: _____

☒ Inspection ports ☒ Cleanouts

☒ Surface water diversions

☐ Additional STA not available



Homeowner Management Tasks

These operation and maintenance activities are your responsibility. Chart on page 6 can help track your activities.

Your toilet is not a garbage can. Do not flush anything besides human waste and toilet paper. No wet wipes, cigarette butts, disposal diapers, used medicine, feminine products or other trash!

The system and septic tanks needs to be
checked every 12 months

Your service provider or pumper/maintainer should evaluate if your tank needs to be pumped more or less often.

Seasonally or several times per year

- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- *Soil treatment area.* Regularly check for wet or spongy soil around your soil treatment area. If surfaced sewage or strong odors are not corrected by pumping the tank or fixing broken caps and leaks, call your service professional. *Untreated sewage may make humans and animals sick.* Keep bikes, snowmobiles and other traffic off and control borrowing animals.
- *Alarms.* Alarms signal when there is a problem; contact your service professional any time the alarm signals.
- *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. If you do not have one, consider adding one after washing machine.
- *Effluent screen.* If you do not have one, consider having one installed the next time the tank is cleaned along with an alarm.

Annually

- *Water usage rate.* A water meter or another device can be used to monitor your average daily water use. Compare your water usage rate to the design flow of your system (listed on the next page). Contact your septic professional if your average daily flow over the course of a month exceeds 70% of the design flow for your system.
- *Caps.* Make sure that all caps and lids are intact and in place. Inspect for damaged caps at least every fall. Fix or replace damaged caps before winter to help prevent freezing issues.
- *Water conditioning devices.* See Page 5 for a list of devices. When possible, program the recharge frequency based on *water demand (gallons)* rather than *time (days)*. Recharging too frequently may negatively impact your septic system. Consider updating to demand operation if your system currently uses time.
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your service provider or pumper/maintainer.

During each visit by a service provider or pumper/maintainer

- Make sure that your service professional services the tank through the manhole. (NOT through a 4" or 6" diameter inspection port.)
- Ask how full your tank was with sludge and scum to determine if your service interval is appropriate.
- Ask your pumper/maintainer to accomplish the tasks listed on the Professional Tasks on Page 4.



Professional Management Tasks

These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system. At each visit a written report/record must be provided to homeowner.

Plumbing/Source of Wastewater

- Review the Water Use Appliance Chart on Page 5 with homeowner.
Discuss any changes in water use and the impact those changes may have on the septic system.
- Review water usage rates (if available) with homeowner.

Septic Tank/Pump Tanks

- *Manhole lid.* A riser is recommended if the lid is not accessible from the ground surface. Insulate the riser cover for frost protection.
- *Liquid level.* Check to make sure the tank is not leaking. The liquid level should be level with the bottom of the outlet pipe. (If the water level is below the bottom of the outlet pipe, the tank may not be watertight. If the water level is higher than the bottom of the outlet pipe of the tank, the effluent screen may need cleaning, or there may be ponding in the soil treatment area.)
- *Inspection pipes.* Replace damaged or missing pipes and caps.
- *Baffles.* Check to make sure they are in place and attached, and that inlet/outlet baffles are clear of buildup or obstructions.
- *Effluent screen.* Check to make sure it is in place; clean per manufacturer recommendation. Recommend retrofitted installation if one is not present.
- *Alarm.* Verify that the alarm works.
- *Scum and sludge.* Measure scum and sludge in each compartment of each septic and pump tank, pump if needed.

Pump

- *Pump and controls.* Check to make sure the pump and controls are operating correctly.
- *Pump vault.* Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm.* Verify that the alarm works.
- *Drainback.* Check to make sure it is draining properly.
- *Event counter or elapsed time meter.* Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: _____ gallons: Pump run time: _____ Minutes

Soil Treatment Area

- *Inspection pipes.* Check to make sure they are properly capped. Replace caps and pipes that are damaged.
- *Surfacing of effluent.* Check for surfacing effluent or other signs of problems.
- *Lateral flushing.* Check lateral distribution; if cleanouts exist, flush and clean at recommended frequency.
- *Vegetation* - Check to see that a good growth of vegetation is covering the system.

All other components – evaluate as listed here:



Water-Use Appliances and Equipment in the Home

Appliance	Impacts on System	Management Tips
Garbage disposal	<ul style="list-style-type: none"> • Uses additional water. • Adds solids to the tank. • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Use of a garbage disposal is not recommended. • Minimize garbage disposal use. Compost instead. • To prevent solids from exiting the tank, have your tank pumped more frequently. • Add an effluent screen to your tank.
Washing machine	<ul style="list-style-type: none"> • Washing several loads on one day uses a lot of water and may overload your system. • Overloading your system may prevent solids from settling out in the tank. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Choose a front-loader or water-saving top-loader, these units use less water than older models. • Limit the addition of extra solids to your tank by using liquid or easily biodegradable detergents. Limit use of bleach-based detergents and fabric softeners. • Install a lint filter after the washer and an effluent screen to your tank • Wash only full loads and think even – spread your laundry loads throughout the week.
Dishwasher	<ul style="list-style-type: none"> • Powdered and/or high-phosphorus detergents can negatively impact the performance of your tank and soil treatment area. • New models promote “no scraping”. They have a garbage disposal inside. 	<ul style="list-style-type: none"> • Use gel detergents. Powdered detergents may add solids to the tank. • Use detergents that are low or no-phosphorus. • Wash only full loads. • Scrape your dishes anyways to keep undigested solids out of your septic system.
Grinder pump (in home)	<ul style="list-style-type: none"> • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Expand septic tank capacity by a factor of 1.5. • Include pump monitoring in your maintenance schedule to ensure that it is working properly. • Add an effluent screen.
Large bathtub (whirlpool)	<ul style="list-style-type: none"> • Large volume of water may overload your system. • Heavy use of bath oils and soaps can impact biological activity in your tank and soil treatment area. 	<ul style="list-style-type: none"> • Avoid using other water-use appliances at the same time. For example, don’t wash clothes and take a bath at the same time. • Use oils, soaps, and cleaners in the bath or shower sparingly.
Clean Water Uses	Impacts on System	Management Tips
High-efficiency furnace	<ul style="list-style-type: none"> • Drip may result in frozen pipes during cold weather. 	<ul style="list-style-type: none"> • Re-route water directly out of the house. Do not route furnace discharge to your septic system.
Water softener Iron filter Reverse osmosis	<ul style="list-style-type: none"> • Salt in recharge water may affect system performance. • Recharge water may hydraulically overload the system. 	<ul style="list-style-type: none"> • These sources produce water that is not sewage and should not go into your septic system. • Reroute water from these sources to another outlet, such as a dry well, drain tile or old drainfield.
Surface drainage Footings drains	<ul style="list-style-type: none"> • Water from these sources will overload the system and is prohibited from entering septic system. 	<ul style="list-style-type: none"> • When replacing, consider using a demand-based recharge vs. a time-based recharge. • Check valves to ensure proper operation; have unit serviced per manufacturer directions



Homeowner Maintenance Log

Track maintenance activities here for easy reference. See list of management tasks on pages 3 and 4.

Activity	Date accomplished									
Check frequently:										
Leaks: check for plumbing leaks*										
Soil treatment area check for surfacing**										
Lint filter: check, clean if needed*										
Effluent screen (if owner-maintained)***										
Alarm**										
Check annually:										
Water usage rate (maximum gpd _____)										
Caps: inspect, replace if needed										
Water use appliances – review use										
Other:										

*Monthly

**Quarterly

***Bi-Annually

Notes:

"As the owner of this SSTS, I understand it is my responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements in this Management Plan are not met, I will promptly notify the permitting authority and take necessary corrective actions. If I have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."

Property Owner Signature: _____

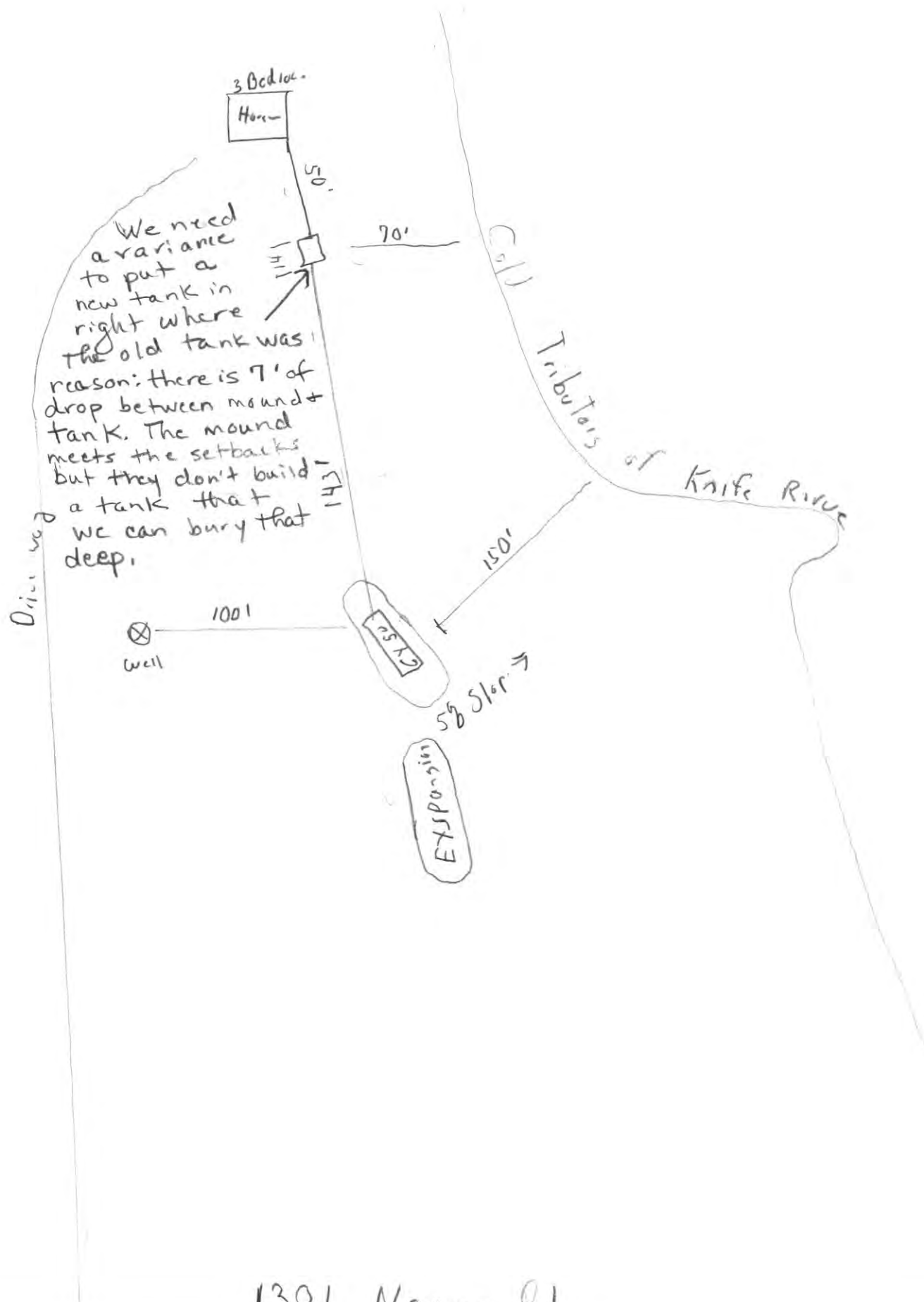
Date _____

Management Plan Prepared By: Warr, P. C. S. K.

Certification # 2041

Permitting Authority: _____

N





St. Louis County, MN

VARIANCE

Variance Worksheet

Subsurface Sewage Treatment System

Form

3090

Rev. 03-2021

About SSTS Variances Pursuant to Ordinance 61, Article V, Section 3.0

A property owner may request a variance from the standards specified in the Ordinance pursuant to county policies and procedures. Variances shall only be permitted when they are in harmony with the general purposes and intent of this Ordinance where there are practical difficulties or particular hardship in meeting the strict letter of this Ordinance, excluding the technical standards. Certain deviations may require the approval of the MPCA or the MN Department of Health.

Please Complete the Following Sections

Describe the specific provision or provisions in the ordinance from which the variance is requested.

The requirement for the new tank to be 150 Feet from the stream is very difficult to achieve.

Describe the practical difficulty that prevents compliance with the rule.

It would mean extending the existing sewer line 80 Feet further from the house. Given the slope of the pipe and the natural rise of the land toward the new mound results in the tank being at a prohibitive depth.

Describe the alternative measures that will be taken to achieve a comparable degree of compliance with the purposes and intent of the applicable provisions.

We will remove the old tank and locate the new septic/pump tank in the same general vicinity, abandon the existing drain field, and build a new mound system that meets the required 150 Ft setback from the stream as shown in design sketch.

Identify cost considerations preventing reasonable use of the property under the terms of this ordinance.

Locating the tank to meet the setback requires a considerable amount of additional excavating and/or incorporating other components to the system.

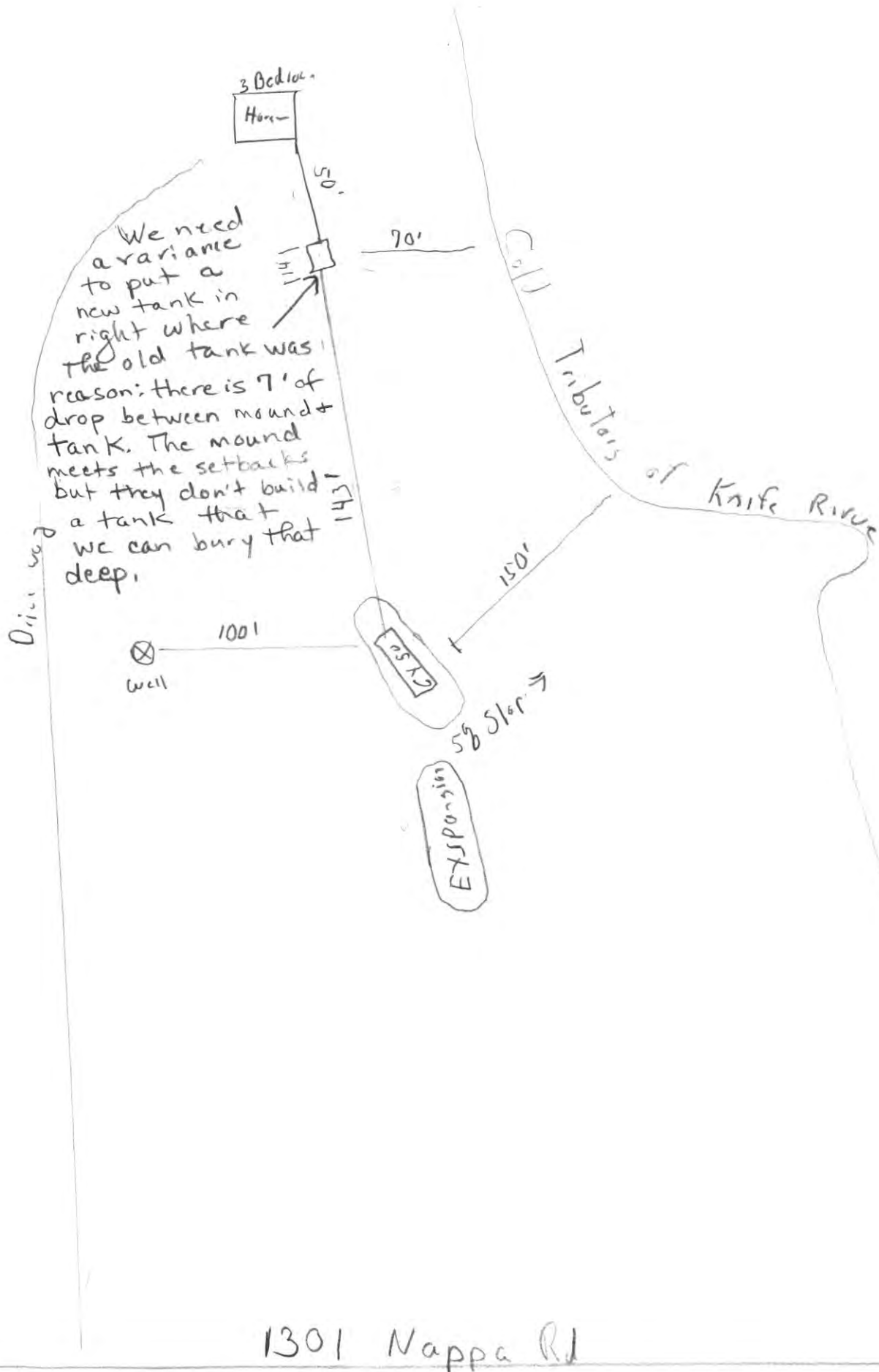
AGREEMENT

By submitting this request for variance from the Ordinance and the Construction Standards, I certify and agree that no substantial health hazard is likely to occur therefrom and an unnecessary hardship might result in strict compliance with the Ordinance and Standards. I further agree to install a sewage treatment system in accordance with the permit application, plans, and specification that are made as part of this variance request, in addition to paying the Variance Fee associated with this request.

Variance worksheet for septic/pump tank
for replacement mound for Steven & Kathy
Johnson at 1301 Nappa Rd, Two Harbors Mn

Submitted by Warren Peterson, Peterson Excavating
Please Forward to Teresa Harvey

N





Land Information Portal

St. Louis County, Minnesota



Steven Johnson Location Map

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Land Information Portal

St. Louis County

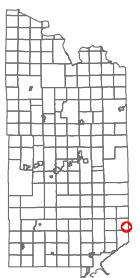
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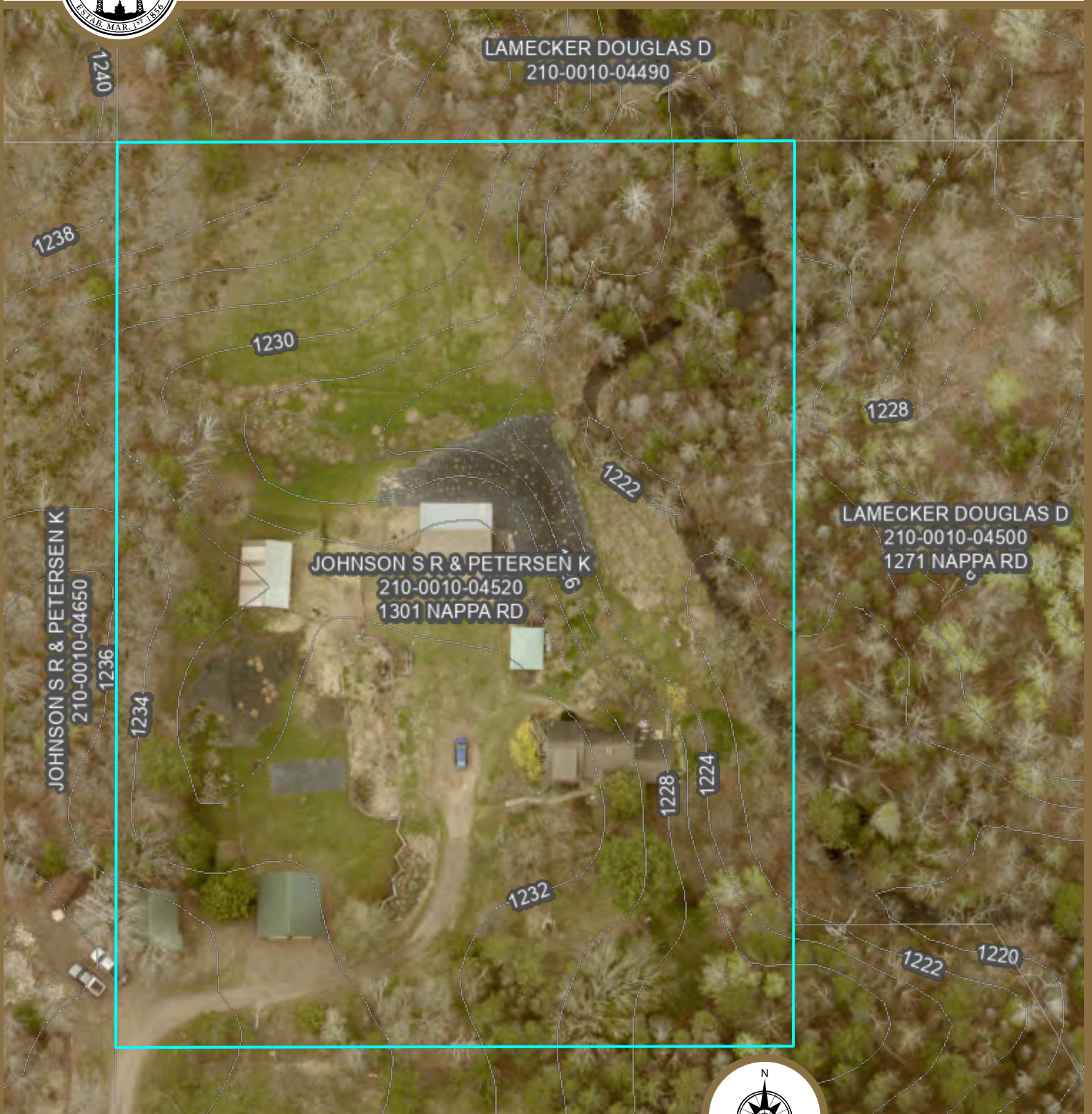
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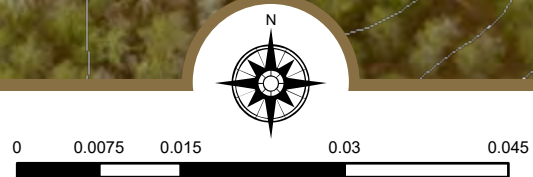


Land Information Portal

St. Louis County, Minnesota



Steven Johnson Elevation Map



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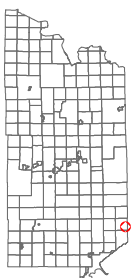
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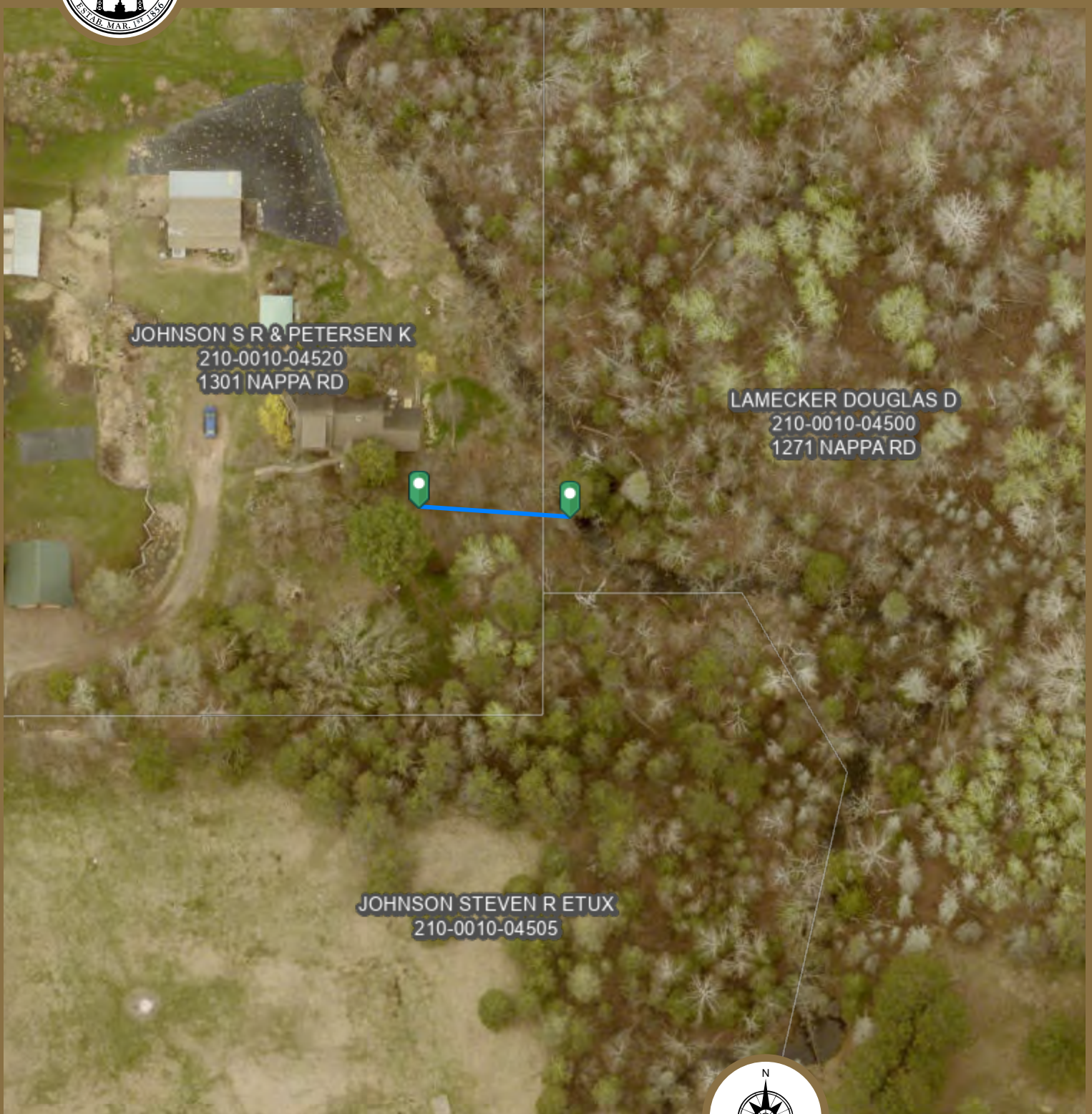
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Land Information Portal

St. Louis County, Minnesota



Steven Johnson Setback Map

Map created using Land Information Portal | St. Louis County, Minnesota



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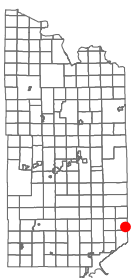
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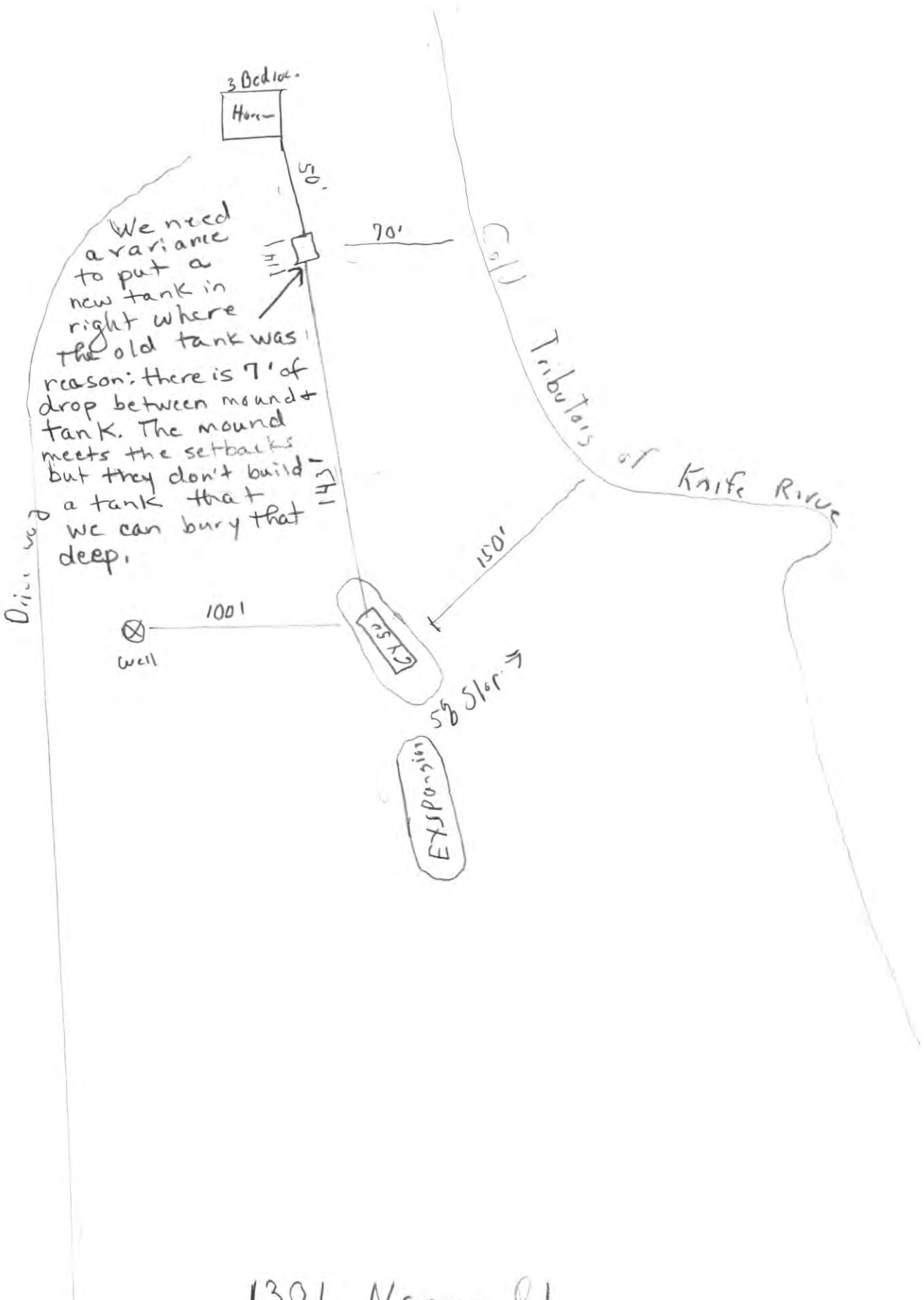
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