Facility Plan

Ash River Collection and Treatment System

Ash River Sanitary Sewer District, Minnesota

STLES 146794 | March 6, 2020

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March 6, 2020

RE: Ash River Collection and Treatment System
Facility Plan
Ash River Sanitary Sewer District, Minnesota
SEH No. STLES 146794 4.00

Ms. Debra Sanders, Board Chair
Ash River Sanitary Sewer District
10141 Ash River Trail
Orr, MN 55771

Dear Ms. Sanders:

We are pleased to submit to you a Wastewater Facility Plan for the Ash River Sanitary Sewer District. The Facility Plan is used to evaluate the wastewater treatment needs of the community for a planning period of 20 years. Currently, the community is unsewered. Homes, cabins, and resorts have individual sewage treatment systems, but many of them are not compliant with State or County standards. As such, untreated or partially treated wastewater is surfacing or being discharged to Ash River.

In order to improve water quality in the community, responsible treatment of wastewater is needed. The Facility Plan includes evaluation of alternatives for wastewater collection and treatment. The document also serves as a planning document, and is required by several agencies to apply for project funding.

We would like to thank you for the opportunity to work in cooperation with your community to provide this evaluation and recommendation for future improvements.

Sincerely,

Colin Marcusen

Colin Marcusen, PE
Project Manager
(Lic. MN, ND, SD, IA)

cmm/mrb
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Facility Plan

Ash River Collection and Treatment System
Ash River Sanitary Sewer District, Minnesota

SEH No. STLES 146794

March 6, 2020

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

Colin Marcusen, PE

Date: March 6, 2020 License No.: 46273

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Ash River Collection and Treatment System

Prepared for Ash River Sanitary Sewer District, Minnesota

1 Introduction

This Facility Plan has been prepared for Ash River Sanitary Sewer District to evaluate the current needs of the Ash River Community and provide a proposed solution to fulfill the current and future needs. This plan discusses the existing sanitary system conditions, the proposed treatment system, projected current and future wastewater needs, and the cost and effectiveness of alternatives to meet those needs.

This plan contains information required by the Minnesota Pollution Control Agency (MPCA) as part of their consideration for a wastewater project for grant and loan participation. The public will be given the opportunity to comment on the facility plan at a formal public hearing. The plan will then become the framework upon which future improvements to the wastewater systems are based.

1.1 Location and Background

The Ash River Community is located in the northwest corner of St. Louis County, Minnesota, on the southeast side of Kabetogama Lake. The community is located on Ash River, which flows north into Kabetogama Lake's Sullivan Bay. Land use in this area consists of residential lots mixed with commercial resorts, and Department of Natural Resources (DNR) campgrounds.

The planning area is linear and runs along Ash River and Ash River Trail, the main access road to the cabins and resorts in the community. The project area is approximately 2.5 miles long and is shown on Map Nos. 1 and 2 in Appendix C.

The project planning area consist of 171 individual properties. The majority of the flow for this community is residential/municipal, though there are some commercial properties, such as bars and restaurants. There are also several empty lots, which leaves some room for expansion of the collection and treatment systems in the future. Most properties have individual sewage treatment systems. However, it is estimated that approximately 78% of these systems are non-compliant or failing.

1.2 Historical, Archaeological, Cultural, and Environmental Elements

An Environmental Information Worksheet (EIW) is required by the MPCA as part of a Facility Plan. The completed EIW can be found in Appendix A. As part of this planning step, the State requires information related to the presence of rare, endangered, or historic resources and/or landmarks.

The National Register for Historic Places was searched for the planning area. The results can be found as part of the EIW in Appendix A. There are no historical, archaeological, or cultural areas within the project boundaries. Adjacent properties are not anticipated to be adversely affected. Letters explaining the proposed project were also sent to the MN State Historic Preservation Office and Native American Tribes as part of the Section 106 Review process. Responses received will be added to this Facility Plan as an Amendment when they are received.

The Minnesota Department of Natural Resources was also contacted to determine if rare plant or animal species or other significant natural features exist near the project area. The National Heritage and Nongame Research Program database was also searched and the results can be found as part of the EIW in Appendix A. Any potential projects in the area should have no impact on any natural features.

2 Regulatory Requirements

The Minnesota Pollution Control Agency (MPCA) has responsibility for determining the best use of the State's waters and quality of effluent from treatment facilities necessary to meet these uses. In accordance with this responsibility, they have defined seven water use "classes" and grouped all of the State's waters into one or more of these classes. Each contains a list of substances or characteristics that must be met before that water is suitable for its designated use. This list of substances and their permissible concentrations are referred to as "water quality standards". These standards have been established after appropriate public hearings, have been approved by the United States Environmental Protection Agency (EPA), and carry the weight of State and Federal law.

Treated wastewater from the Ash River Wastewater Treatment Facility (WWTF) will be discharged to one of three places: Subsurface discharge using mounds or other means, surface discharge to Ash River, or Surface discharge to Kabetogama Lake. Groundwater is not classified as noted above, but other requirements will still need to be met.

Ash River is classified as a Class 1B, 2A, and 3B waterway. Kabetogama Lake is a Class 1B, 2Bd, and 3A waterway. The definitions of these classifications are as follows:

- Ash River:
  - Class 1B: The quality of class 1 B waters of the state shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency. These standards will ordinarily be restricted to surface and underground waters with a moderately high degree of natural protection and apply to these waters in an untreated state.
  - Class 2A: The quality of class 2A surface waters shall be such as to permit the propagation and maintenance of a healthy community of cold water aquatic biota, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water.
  - Class 3B: The quality of class 3B waters of the state shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment.

- Kabetogama Lake:
  - Class 1B: The quality of class 1 B waters of the state shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency. These standards will ordinarily be restricted to surface and underground waters with a moderately high degree of natural protection and apply to these waters in an untreated state.
  - Class 2Bd: The quality of class 2Bd surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water aquatic biota and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water.
  - Class 3A: The quality of class 3A waters of the state shall be such as to permit their use without chemical treatment, except softening for groundwater, for most industrial purposes, except food processing and related uses, for which a high quality of water is required.

2.1 Effluent Standards

Since the wastewater treatment facility at Ash River will be a new facility, there have not been treatment standards set for the facility. Effluent limits will vary based on discharge location. As required by MPCA as part of the Facility Plan process, a Preliminary Effluent Limit request has been sent to MPCA. The request is included in Appendix B. MPCA's response will be included in an Amendment to this Facility Plan once received.

For the purposes of this report, we can make assumptions of effluent limitations based on experience with similar facilities and secondary treatment standards. Table 1 includes major treatment parameters that are anticipated for each discharge location.

Table 1 – Anticipated Effluent Limits (Assumed)

Discharge Location	Parameter	Limit	Limit Type
Ash River	5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	25 mg/L 40 mg/L	Calendar Month Average Maximum Calendar Week Average
	Total Suspended Solids (TSS)	45 mg/L 65 mg/L	Calendar Month Average Maximum Calendar Week Average
	Phosphorus, Total (as P)	Mass Limit, based on 1 mg/L	Calendar year to date total
Kabetogama Lake	5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	25 mg/L 40 mg/L	Calendar Month Average Maximum Calendar Week Average
	Total Suspended Solids (TSS)	45 mg/L 65 mg/L	Calendar Month Average Maximum Calendar Week Average
	Phosphorus, Total (as P)	Mass Limit, based on less than 1 mg/L	Calendar Year to Date Total
Subsurface Discharge	5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Monitor Only	Calendar Month Average Maximum Calendar Week Average
	Total Suspended Solids (TSS)	Monitor Only	Calendar Month Average Maximum Calendar Week Average
	Nitrogen, Total (as N)	10 mg/L	Calendar Month Average

Prior to construction, design documents and a discharge permit application will need to be submitted to MPCA for review and approval. Once the design documents are approved, a discharge and operating permit will be issued to the District for operation of the new WWTF.

2.1.1 Antidegradation

Federal antidegradation regulations require states to adopt antidegradation policies and identify implementation procedures that maintain and protect existing uses, prevent unnecessary degradation of existing high water quality, and maintain and protect the quality of water identified for their outstanding value. The MPCA adopted new antidegradation rules that became effective November 21, 2016 and permit applications received after this date will need to comply with the new rules.

According to the rules, high water quality (quality above that which is required to support aquatic life and recreation) may be lowered, but only under the following specific conditions:

- The degradation is necessary.
- The degradation is important to accommodate important economic and social development.
- There is an opportunity for public participation and intergovernmental cooperation.
- All applicable state and federal water pollution control statutes and rules are followed.

If required by MPCA, an antidegradation review would need to be prepared by the District and its engineers and would need to be reviewed and approved by MPCA. The review will take place after submittal of this facility plan and may need to be approved by MPCA prior to determination of the final discharge limits for the selected option evaluated in the facility plan. The rules and review for surface discharges are often times more laborious than for subsurface discharge. For this reason, the subsurface discharge may be a more attractive option for the District.

3 Flows and Loading

3.1 Design Flows

There is no measured or metered historical flow or sampling data for the District because this will be a newly sewered area. It is likely that the District will be served by one or more Large Subsurface Wastewater Treatment Systems. For this reason, the MPCA's Design Guidance for *Large Subsurface Wastewater Treatment Systems* was used for determination of design flow for the treatment system. These design flows will be used for sizing of pipes and pumps in the collection system as well.

Part 2 of the guidance document refers to Minnesota Rules, Chapter 7080.1860, which estimates design flows for dwellings, according to number of bedrooms. Chapter 7081.0130 is to be used for determining flow for other establishments. A property owner questionnaire was sent to owners of each property in the Sanitary District in order to determine what types of facilities are on each property and how many bedrooms are in each dwelling. The information returned from property owners was used to create the table in Appendix C. A map, assigning an arbitrary property/lot number is also included in Appendix C. Lot numbers in the table correspond to those on the map. The table assigns a design flow to each property and is also used to assign a number of Equivalent Dwelling Units (EDUs) to each property. EDU assignments will be used for financial calculations and will be used in future billings.

As noted in the table, Ash River Sanitary District is comprised of a total of 231.6 EDUs, producing a design flow of approximately 43,000 gallons per day when all cabins, resorts, and other establishments are being used. Analysis of how this wastewater will be collected and treated will be discussed in later sections of this report. If the total volume is treated at a central location, this WWTF will require a State Disposal System permit for a subsurface discharge since the design flow for the LSTS is over 10,000 gallons per day.

The guidance document explains that Average Wet Weather (AWW) flow should be calculated by the following equation:

> Permit Flow = Total Flow from the ten highest flow dwellings + total flow from the remaining dwellings * 0.45 + Infiltration and Inflow

Per the Table in Appendix C, flow from the ten highest flow dwellings is as follows:

Table 2 – Flow from highest flow dwellings

Bedrooms	Classification of Dwelling	Design Flow
4	II	375
4	II	375
4	II	375
3	II	300
3	II	300
3	II	300
3	II	300
3	II	300
3	II	300
3	II	300
Total		**3,225**

This flow is for single family homes/cabins only. It does not include properties that have multiple buildings on the same lot and does not include other establishments such as resorts, restaurants, or RV connections. Flow from the remaining cabins and other establishments is 39,650 gpd. Per the formula list above:

39,650 gpd x 0.45 = 17,843 gpd

The last part of the equation is infiltration and inflow (I/I). The guidance document instructs I/I to be calculated based on average diameter of sewer lines to be installed and total length of those lines. Design of the collection pipes has not yet been developed, however, the mainline low pressure forcemain is likely to be 2-inch to 4-inch pipe. Services will likely be 1.5 inch pipe. To be conservative for the purposes of this report, we'll assume that all pipe is 3-inch. Preliminary estimates include approximately 32,000 feet of pipe. Therefore:

3 inches x 6.1 miles x 200 gallons/inch/mile = 3,660 gpd

All component of the equation have been determined as noted above. Therefore the permitted flow is:

Flow from the highest flow dwellings:	3,225 gpd
Flow from remaining establishments x 0.45:	17,843 gpd
Infiltration and Inflow:	3,660 gpd
Total Permit Flow:	24,728 gpd

No matter the treatment system selected, it will be sized to treat the total flow and will also include equalization to account for peak flows and allow for future growth.

3.2 Design Loads

As noted above, there has been no sampling of wastewater for the Ash River Sanitary Sewer District. Most of the flow is domestic, though there are some restaurants and bars. Given that the commercial flows make up a small portion of the total flow, medium strength domestic waste concentrations can be used for planning purposes. From Wastewater Engineering Treatment and Reuse by Metcalf and Eddy:

Table 3 – Design Loadings

Contaminants	Concentration
Total Suspended Solids (TSS)	210 mg/L
5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	190 mg/L
Nitrogen (Total as N)	40 mg/L
Phosphorus (Total as P)	7 mg/L

4 Alternative System Evaluations

4.1 Do Nothing

The do nothing alternative is considered infeasible. The Sanitary Sewer District has made it a priority to improve water quality in the area. As noted above, 78% of existing individual sewage treatment systems are non-compliant or failing. This report details ways to address these systems and improve water quality in the area.

4.2 Individual Sewage Treatment Systems

The second alternative is to serve all existing properties with individual sewage treatment systems. A small number of the properties in the Sanitary Sewer District are compliant with State and County standards. For those remaining that are non-compliant, new septic systems would need to be constructed on each property or smaller collection systems would be installed to several treatment system locations.

78 percent of existing systems are non-compliant. To build new systems to address each one of these properties, approximately 133 new systems would need to be constructed. Not only is this inefficient but leads to a large amount of operation and maintenance costs for the Sanitary Sewer District.

High groundwater and high bedrock make construction of individual treatment systems difficult as well. Because of this it is assumed that the new systems would be mostly mounds. The average home would have a design flow of around 300 gallons per day. Only 67 properties in the District area could fit a septic tank and mound necessary to treat this design flow. Only 46 properties also have space for a backup mound as required by the MN Rules for new septic systems. This is only about 20% of properties. The remaining properties would need to be served by another type of system.

There are lots on the south side of Ash River that are part of the Sanitary Sewer District. 17 of the 24 have structures on them. However, nearly all of these haul water in to use in their cabins and have composting toilets. There are no roads to these properties, which makes construction difficult. Options for treatment of sewage on these lots includes: construction of individual systems, construction of a system or two to serve only these properties, or installation of sanitary sewer force main across the river to serve these properties with the main collection and treatment system. These options are explored below.

4.3 Collection System Options

4.3.1 Gravity Sanitary Sewer and Pump Stations

A gravity sanitary sewer system was considered that would have a centralized mainline with services to each of the lots. This system would convey sewage from each lot to a new wastewater treatment plant instead of having individual treatment systems. This would in turn cut down on operation and maintenance costs and would allow a majority of the sanitary sewer district to be serviced by this system.

High groundwater and bedrock make construction of this system very difficult and costly. This gravity system would most likely be at depths greater than 10 feet which would call for rock drilling/trenching and dewatering which can become expensive in a linear project like this. Due to the depth of the gravity system, several pump stations would need to be installed to make this system work which would add to the cost. An engineer's opinion of probable cost for this alternative is included in Appendix F.

High cost and difficulty of construction of the gravity sanitary system make this alternative unappealing and possibly infeasible to construct in some locations.

4.3.2 Low Pressure Sanitary Sewer with Grinder Stations

The next alternative that was considered was a low pressure system with grinder stations for each developed lot. Each lot would have a grinder station and low pressure service pipe. Resorts or properties with more than one building may have more than one grinder station installed. The service pipe would connect to a larger, common forcemain that would collect wastewater from each of these grinder stations and convey it to one wastewater treatment plant where it will be treated and discharged.

This system is much more cost effective and feasible than the other alternatives that were considered. Since the system is pressurized, a frost depth of 9 feet can be maintained for the entire force main, therefore eliminating some of the rock drilling and dewatering. This will bring down cost and help with the ease of construction.

The individual grinder stations have the potential of utilizing a greater portion of the existing land than the individual treatment systems. This gives the property owner more freedom with the lot. Exhibits showing the preliminary grinder system and low pressure sewer layout are included in Appendix D. An engineer's opinion of probable cost for this alternative is included in Appendix F.

4.3.3 South Side of River Properties

In addition to the sanitary system on the north side of the river there were several options to construct a system for the south side of the river. As stated above these improvements may be difficult to construct as there is no road access. Materials and equipment will need to be moved by boat from one side of the river to the other. As such, costs for construction of these systems are high and options for serving these properties or including these properties in the Sanitary District will need to be discussed with stakeholders.

4.3.3.1 Individual Systems

The first option that was reviewed was construction of individual treatment systems for each of the lots. Like the north lots, a portion of the south lots are small and as such, it may be difficult to construct an individual treatment system on these properties. High groundwater and bedrock levels in this area may even make construction infeasible. The lack of road access to these properties will not only increase capital construction cost but will also increase operation and maintenance costs.

Rather than serving the properties on the south side of the river with the community collection and treatment system on the north side, the District may decide to model the service after other similar Sanitary Districts where the property Owner pays a portion of the construction cost for a new system. The Sanitary District then takes over operation and maintenance of the system and pays for any replacement cost. The home Owner would pay sewer use fees just as if they were connected to the larger system. This option will need to be discussed with the stakeholders and will have impact on the costs associated with construction. The Facility Plan will be amended to reflect the decisions made in these meetings.

4.3.3.2 Sanitary Sewer River Crossing(s)

The next alternative that was considered is to serve the south properties with the larger collection system by installing piping across the river. These river crossing locations can be seen in Exhibit 4 and 5 in Appendix D. An individual grinder system would be installed at each property and a service pipe would feed into a main line sewer. This main line would cross Ash River and join the larger collection system, to eventually convey flow to the wastewater treatment system.

Two options were considered for river crossings. One scenario involves just one river crossing and another involves two crossings. A bedrock shelf/cliff between properties on the south side may make it difficult to serve the properties with one collection system, which is the reason for considering multiple river crossings.

A pipe that crosses the river would have to go over or under. The option of going under the river would require being well under the river bed. The maximum depth of the river appears to be approximately 20 feet. Many of the properties on the south side of the river have bedrock outcroppings. Given the pipe would need to be installed very deep and the majority of the installation would require rock excavation in order to directional drill through the rock under the river, the costs for going under the river may be exorbitant.

The engineer's opinion of probable cost for the one and two pipe options are displayed in Appendix F. These estimates consider installation of piping over the river, leaving enough room for boat traffic. The installation would require a small bridge to be constructed to carry the pipe. Again, this is an option that will need to be discussed with stakeholders. If the pipe is to be installed over the river, the Sanitary District may elect to install a pedestrian or light traffic bridge on which the pipe can be mounted. This would allow foot and/or atv traffic over the river.

4.3.3.3 Community Treatment System(s)

The last alternative that was considered is a highbred of the options discussed above. It involves the construction of small collection systems and two community treatment systems. This alternative would include individual grinder stations for each of the lots. The grinder stations would then discharge to a common force main and treatment system. This layout can be seen in Exhibit 6 in Appendix D. A community treatment system would eliminate the need for a river crossing. Like the other options for treatment south of the river this may be difficult to construct due to high bedrock and no road access. The engineer's opinion of probable cost for this alternative is included in Appendix F.

4.4 Treatment System Alternatives

4.4.1 Mechanical Treatment System with Subsurface Discharge

4.4.1.1 Soil Exploration and Dispersal Design

Preliminary soil exploration has been completed by a certified on-site sewage treatment system designer and soil scientist, Matrix Soils & Systems. Soils were explored on three parcels that are currently owned by the State of Minnesota. An exhibit showing these three areas in relation to the project area is included in Appendix G. A viable treatment area was found on one of the parcels and the District/County will work on completing a land exchange such that construction on this parcel is possible.

Matrix excavated a total of 19 test pits in two areas on the parcel found to be practical for a treatment and dispersal system. Six were hand excavated in the western area and 13 were machine excavated in the eastern area. Soil profiles were then observed and described using USDA nomenclature and saturated hydraulic conductivity tests were conducted to estimate the ability of the soils to take on water. The letter report from Matrix Soils & Systems dated February 25, 2016 is included in Appendix G.

Based on the findings of the soil exploration by Matrix, subsurface infiltration of treated wastewater in the areas is feasible. Drip or spray irrigation in these areas is likely not feasible based on the amount and types of soil available, types of vegetation in these areas, and environmental factors such as precipitation and temperatures that would cause evaporation to occur more slowly. Therefore, this report will focus on subsurface infiltration for dispersal of treated effluent.

In the western area of the roughly 71 acre parcel, dispersal capability is limited because there is less than three feet of consistently unsaturated permeable soil. Due to the underlying bedrock being fractured, subsurface water movement will be primarily horizontal. Therefore, dispersal capability will be limited by contour loading rate. The estimated acceptable rate is 15.3 gallons per day per foot (gpd/ft) for this area based on current observations and measurements. There is approximately 700 feet of cross-slope distance available for a system, producing a capable design flow of 10,700 gpd. This is less than the design flow rate during the summer months for the new collection system. Therefore this area would be considered only a portion of the necessary dispersal area.

In the eastern area, mapping unit A1, as shown in the Matrix report, flow of soil water would be primarily vertical, with soil depths being four feet or greater. For MPCA treatment level B effluent, the loading rate for this area would 1.6 gallons per day per square foot (gpd/ft^2) for infiltrative surfaces installed as deep as 36 inches below existing grade. Trenches or modified at-grade dispersal systems would likely be constructed in this area. Construction of this type would yield dispersal capability of 41,200 to 51,500 gpd, which would be sufficient to accommodate the entire design flow for the collection system in the summer months.

Also in the eastern area, mapping unit A2, as shown in the Matrix report, flow of soil water would be vertical and horizontal due to soil depths above bedrock being nominally three feet. In these conditions, contour loading rate may be the factor limiting treatment and dispersal capability. At-grade systems constructed in this area, with contour loading rate of 59 gpd/ft, and a cross slope of approximately 600 feet, would yield dispersal capability of approximately 35,400 gpd. Though this is greater than the design flow rate, the maximum flow rate, as described above, would require more area.

4.4.1.2 Pretreatment

Subsurface discharge of treated wastewater in Minnesota for systems that treat over 10,000 gallons per day, requires that a Total Nitrogen limit of 10 mg/L is met. The limit can be met either prior to discharge to the drainage/dispersal system or by use of treatment in the soil. Treatment in the soil requires modelling and to prove treatment, sampling from groundwater monitoring wells is required. Because of the variability in soil conditions and the presence of bedrock outcroppings in this area, it is more conservative to meet the limit prior to dispersal.

Treatment to this level, MPCA Treatment Level A, requires mechanical treatment. Proven systems used for similar designs have included a series of tanks with varying types of treatment and components. The Biomicrobics FAST systems are fixed film aerobic treatment systems that are proven for meeting the limits expected for the Ash River System. The treatment components are as follows:

- Septic/Settling tank.
- Pre-aeration tank.
- Equalization tank.
- Multiple Treatment Tanks with fixed film media and aeration where nitrification occurs.
- A tank called the ABCN Dosing tank feeds nitrified mixed liquor and return activated sludge to a Denitrification Tank. A carbon source is added to allow the bacteria to feed on the carbon and the oxygen in the Nitrate to allow for denitrification (off-gassing of nitrogen gas).
- The nitrification tank is followed by an aerated polishing tank to consume the remaining carbon from the chemical feed.
- A clarification and dosing tank then feeds treated effluent to a UV system inside a small building.
- The building also houses the blowers and controls necessary to operate the system.
- Disinfected effluent is then discharged to the dispersal system.

A schematic and general layout of the proposed treatment site are included in Appendix E. Capital and operation and maintenance costs for this option are included in Appendix F.

4.4.2 Mechanical Treatment System with Surface Discharge

4.4.2.1 Discharge to Ash River

A mechanical treatment system with surface discharge would have components that are similar to the mechanical treatment components for subsurface discharge. However, discharge limits would be different. As noted previously in the report the Preliminary Effluent Limits Request was submitted to MPCA but at the time of submittal of this report we did not receive response. However, we can assume that for a surface discharge, the system would likely not have to meet a Total Nitrogen limit. However, it is likely that the system would have to meet limits for BOD, TSS, Phosphorus, and Fecal Coliform. The subsurface dispersal treatment system described above could be modified for meeting the limits for surface discharge; the denitrification tanks would be removed; carbon addition would be eliminated; a settling tank/clarifier would be added; and chemical phosphorus removal systems would be installed.

There are other options for these types of systems that are pre-engineered to be easily assembled on site. Aero-Mod is one system of this type. A concrete tank would need to be constructed to house the treatment processes per the Aero-Mod specifications. The prepackaged equipment to be installed in this tank would include:

- Mixing equipment for a selector tank at the influent box of the tank.
- Aeration equipment for first, second, and third stage aeration (blowers would be mounted on a concrete pad next to the tank).
- Clarifier equipment for a clarifier tank.
- Coarse bubble aeration equipment for an aerobic digester tank.

The system does not include the following items that would need to be installed to make this a complete treatment system:

- Preliminary treatment. However, as with the subsurface system a septic tank and equalization tank would likely be installed upstream of the process. Septic tank effluent would then be pumped up to the Aero-mod treatment tank.
- Chemical feed system for phosphorus removal.
- Disinfection would be installed in a building just as with the subsurface system.
- Influent and effluent sampling stations to create composite samples.

Discharge from the system would be routed to Ash River. An easement through private property would be required for installation of the pipe. The outfall itself would require riprap or other bank protection.

These systems are very efficient for installation and treatment, however, because there is such a decline in sewage flow in winter months, there will likely be operational issues with an open tank design. In order to maintain a better temperature in the system it is recommended that a building be constructed over the tank. The tank will be approximately 25 feet wide and 50 feet long. The building should house the treatment tank, blowers, UV system, samplers, and in a separate room, the chemical storage tank and feed system. The building will be approximately 50 feet wide and 90 feet long in order to house this equipment. The building will require heat and ventilation due to the nature of the wastewater being treated. The sidewall height of the building will be approximately 22 feet, to house the 14-foot deep tank with room for operator walkways on top.

A schematic and general layout on the proposed treatment site is included in Appendix E. Capital and operation and maintenance costs for this option are included in Appendix F.

4.4.2.2 Discharge to Lake Kabetogama

A treatment system with surface discharge to Lake Kabetogama would be identical to that of the Ash River discharge system. However, because the phosphorus limit for a lake discharge will likely be less than 1 mg/L, a larger chemical tank will be necessary. The Aero-Mod system has a selector tank such that the system could achieve some biological phosphorus removal. However there will only be enough food for biological nutrient removal during the summer months. Also, a backup chemical feed system is required in the event that the biological system does not work.

Capital and operation and maintenance costs for this option are very similar to that of the Ash River discharge. The differences are negligible and are covered in the contingency in these estimates. This Facility Plan will be amended after receiving preliminary effluent limits from MPCA which could drastically change the required treatment equipment for the surface discharge options.

5 Summary of Selected System

5.1 Alternative Analysis

Meetings with the stakeholders in this project have not yet been held. Meetings will be held in the spring and summer months when involvement can be maximized by people who are at their cabins and resorts and therefore more easily able to attend meetings. Because input has not yet been received, for the purposes of this report, we will assumed that the collection system will serve all areas in the Sanitary Sewer District, including those on the south side of Ash River.

A low pressure sewer system has a lower capital cost than that of a gravity collection system. Alternatives for serving properties on the south side of the river need to be discussed with stakeholders but for the purposes of this report we will assume that these properties are served by the larger lower pressure sewer system rather than constructing treatment systems on individual properties or installing a community treatment system to serve these properties.

Two alternatives were reviewed for construction of a treatment system to serve the entire district. Alternative analysis is shown in Table 4. For each alternative, the preliminary engineer's opinion of probable capital cost, annual operation and maintenance costs, and a 20-year present value are shown. The 20-year present value calculation assumes a 20-year life of equipment at a discount rate of 3.0%.

Table 4 – Treatment System Alternative Analysis

Alternative	Capital Cost	Annual Operation & Maintenance Costs	20-Year Present Value
Mechanical Pretreatment with Biomicrobics System and Subsurface Dispersal	$5,108,000	$103,400	$6,646,300
Mechanical Pretreatment with AeroMod System and Surface Discharge	$4,635,000	$152,500	$6,921,800

Both treatment alternatives are capable of producing high quality effluent to be discharged to surface or groundwater. As can be seen in the table, although the surface discharge option has a lower capital cost, the operation and maintenance costs are higher, making the 20-year present value higher. Operation and maintenance costs for the surface discharge option are higher because of larger blowers, and a larger building leading to more electricity usage for HVAC and heating. There is also more chemical usage expected with the surface discharge option to remove phosphorus and meet the permit limit.

5.2 Selected System

The mechanical treatment with subsurface discharge alternative is the most cost effective solution. Total Project costs, including collection system costs are displayed in the table below. These costs will be updated after input from stakeholders but are conservatively including all possible project costs to serve all members of the District at this time.

Table 5 – Total Project Costs

Alternative	Capital Cost
Mechanical Pretreatment with Biomicrobics System and Subsurface Dispersal	$5,108,000
Low Pressure Collection System	$9,717,000
Additional Collection System Costs for Serving Properties on the South Side of the River	$2,162,500
Total Project Costs	**$16,987,500**

5.3 Comments Received from the Public

As noted above, input from stakeholders has not yet been received given the timing of the preparation of the facility plan. Several meetings, including a public hearing to discuss the recommended alternative will be held and the Facility Plan will be amended to reflect comments received at these meetings.

5.4 Ordinances

The Sanitary District was established late in 2019. They have elected a Board but have not enacted any ordinances or held public meetings as of yet. They will be working with an attorney to establish sewer use ordinances once decisions are made as to the type of systems to be installed. The sewer use ordinances will also set guidelines for billing, such as connection fees and EDU calculations.

6 Cost and Effectiveness

6.1 Asset Management Plan

As noted above, the Sanitary District was only recently established and has no assets and therefore no asset management plan. The asset management plan will be developed as part of the project, with assistance from the system operator.

6.2 Energy Conservation

The collection system will use a low pressure sewer fed by grinder stations. Most grinder stations will have pumps that are 1 hp or less. The pumps will only run when called to by the floats in the grinder stations. This is a very energy efficient system.

Three alternatives were evaluated for treatment. The recommended alternative, mechanical pretreatment with subsurface discharge, has the lowest energy usage and Operation and Maintenance costs and therefore the lowest 20-year present worth. The surface discharge alternatives reviewed would require larger blowers, more HVAC equipment, and more

mechanical equipment overall. This alternative therefore has a higher energy requirement, leading to a higher 20-year present value.

6.3 Renewable Energy Opportunities

Renewable energy options were not considered for the alternatives reviewed. The treatment facility requires a relatively small amount of power. Wind and solar energy would not be cost efficient means of providing this energy and would have a long-term payback on investment.

6.4 Water Reuse Options

The quality of water leaving the proposed treatment facilities is not adequate for reuse. However, the subsurface dispersal system does discharge into sands that eventually recharge ground or surface water. The groundwater is used by residents of the area in their cabins and resorts. The river water is used for lawn irrigation and non-potable needs.

6.5 Water Efficient Devices

This project does not involve the installation or replacement of water fixtures. Most residents in the area either have wells or haul in drinking water for use in their cabins and resorts. Water usage, therefore, is already quite minimal compared to larger communities with watermain systems.

6.6 Water Meter Analysis

The Sanitary District may choose to install water meters at a future date in order to track usage and use this information for future sewer billing.

6.7 Water Audits and/or Conservation Plans

No water supply or water conservation plans have been developed for this project or for the Sanitary Sewer District.

7 Implementation Schedule

7.1 Schedule

A tentative schedule is proposed in the table below. The dates indicated are subject to change.

Table 6 – Proposed Project Schedule

Action	Tentative Date
Submit Facility Plan	March 6, 2020
Hold Public Hearings and other Meetings for Stakeholder Input	May – July 2020
Request Placement on IUP	June 2020
Probable Facility Plan Approval by MPCA	Fall 2020
Preparation of Plans and Specifications	June – October 2020
Submit Plans and Specifications to MPCA	October 2020
Receive MPCA Project Certification	January 2021
Advertise and Bid Project	February 2021
Begin Construction	Summer 2021
Improvements Operational	Fall 2022

The dates in the table above are aggressive. Furthermore, in order for the project to move forward, additional project funding will need to be secured in order to make the project affordable for the residents and resort owners.

8 Estimated Sewer Service Charges

Understanding the impact the new capital project will have on user rates requires knowledge of the annual operation and maintenance costs and how the loan repayment of the capital costs will affect those rates. The evaluation below provides estimated user rates based on capital and projected future costs. The evaluation assumes no project funding and emphasizes the need to secure additional funding. It should be noted that the evaluation should be reviewed again by a qualified financial analyst or accountant after project funding is secured.

Table 7 – Loan Payment for Capital Project

Parameter	Scenario 1	Scenario 2
Amount to Finance	$16,987,500	$16,987,500
Loan Term	20 years	30 years
Interest Rate	1.5%	1.5%
Loan Payments, Semi Annual	40	60
Semi Annual Payment	$567,843	$431,371
Annual Payment	$1,135,686	$862,742

The user rates should be set at a rate to cover the annual payments noted above as well as annual O & M costs. The resulting annual payments are identified in the table below.

Table 8 – Annual Payments

Parameter	Scenario 1	Scenario 2
Annual O & M	$103,400	$103,400
Annual Financing Payment	$1,135,686	$862,742
Total Annual Cost	$1,239,086	$966,142

Assuming 231.6 EDUs as described above, the initial user rate would be $446 per month for Scenario 1 and $348 per month for Scenario 2. In order to for the project to get to an affordable level, which is assumed to be approximately $100 per EDU per month, the District would need to secure approximately $14.5 million in additional funding for Scenario 1 and approximately $13.5 million in additional grant funding for Scenario 2.

8.1 Rate Analysis

The estimated user rates shown above are based on preliminary operation and maintenance and capital cost estimates. As noted above, these estimates should be revisited after stakeholder input and continually during the design, bidding, and award of the project when the project costs can be better defined.

Appendix A

Environmental Information Worksheet

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Environmental Information Worksheet (EIW) form

Clean Water State Revolving Fund Program

Minnesota Rule Chapter 7077.0272, subp. 2.a.F.
Minnesota Rule Chapter 7077.0277, subp. 3.E.

Doc Type: Wastewater Point Source

Eligible applicants seeking funds for clean water (stormwater and wastewater) projects through the Clean Water State Revolving Fund (commonly referred to as the CWSRF Program) are required by Minn. R. ch. 7077.0272, subp. 2.a. F. and Minn. R. ch. 7077.0277, subp. 3.E., to complete an Environmental Information Worksheet (EIW). This information will be used to assess environmental impacts, if any, caused by the project.

Questions: Contact Review Engineer or Bill Dunn at 651-757-2324 or bill.dunn@state.mn.us.

1. Project title: Ash River Facility Plan

2. Proposer: Ash River Sanitary Sewer District

Contact person: Debra Sanders

Title: Board Chair

Address: 10141 Ash River Trail

Orr, MN 55771

Phone:

Fax:

3. Project location: County: Saint Louis City/Twp: Ash River

\- 1/4 - 1/4 Section: 4 and 5 Township: 68 N Range: 19 W

Tables, Figures, and Appendices attached to the EIW:

- County map showing the general location of the project;
- United States Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable);
- Site plan showing all significant project and natural features.

4. Description:

a. Provide a project summary of 50 words or less.

A sanitary sewer collection and treatment system will be constructed to serve the homes, cabins, and resorts in the Ash River area. The collection system will likely consist of grinder stations at each property with a low pressure forcemain collector to convey wastewater to a common treatment site where it will be treated and disposed of properly.

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

The Ash River community consists of approximately 171 individual properties with individual sewage treament systems. Approximately 78% of these systems are either non-compliant or are failing. In order to remedy this issue and improve water quality at Ash River and Lake Kabetogama, a new collection system would be installed to serve each property. A wastewater treatment facility will then treat the wastewater to acceptable standards according to the MPCA/NPDES discharge permit. Treated wastewater will be released to either Ash River or to a mound sytsem

Existing septic systems will be removed or abandoned and a grinder station will be added in their place. The project will be ready for bidding and construction as early as spring, 2021, but is contingent on acquiring project funding.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of the project is to improve water quality and wastewater treatment in the area by eliminating non-compliant individual treatment systems. The project will benefit the residents and businesses along Ash River but will also improve water quality of Ash River, Lake Kabetogama (part of Voyageurs National Park), and the Lake of the Woods watershed.

d. Are future stages of this development including development on any outlots planned or likely to happen? ☐ Yes ☒ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

N/A

e. Is this project a subsequent stage of an earlier project? ☐ Yes ☒ No
If yes, briefly describe the past development, timeline and any past environmental review.

N/A

5. Project magnitude data

Total Project Area (acres) _____ or Length (miles) 4.0 miles of Forcemain
Number of Residential Units: Unattached 231.6 Attached - maximum units per building -
Commercial/Industrial/Institutional Building Area (gross floor space): total square feet 1,500
Indicate area of specific uses (in square feet): Wastewater Treatment Facility

Office	0	Manufacturing	0
Retail	0	Other Industrial	0
Warehouse	0	Institutional	0
Light Industrial	Wastewater Treatment	Agricultural	0
Other Commercial (specify)			

Building height Does Not Exceed 2 Stories If over 2 stories, compare to heights of nearby buildings -

6. Permits and approvals required. List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans, and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

Unit of government	Type of application	Status
MPCA	NPDES Stormwater Permit	
MPCA	SDS/NPDES WWTF Permit	
MPCA	Plans and Specifications Approval	
MnDNR	River Crossing (Ash River)	
St. Louis County	Building Permit	

7. Land use. Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

The area is currently a mix of private residences, resorts, and Department of Natural Resources (DNR) land with a campground. The proposed forcemain will primarily be constructed in the existing street with portions of it going through forest/woodland areas and a river crossing. The proposed treatment facility will be constructed on DNR land that is currently forested. The project is located near the Ash River so significant erosion control measures will be taken to avoid sediment runoff to the river. Forest clearing and grubbing will be required for the treatment facility. All disturbed areas will be reseeded to sustain the same quality as pre-construction.

8. Cover types. Estimate the acreage of the site with each of the following cover types before and after development:

	Before	After		Before	After
Types 1-8 wetlands			Lawn/landscaping		
Wooded/forest	3 Acres	2 Acres	Impervious Surfaces	1 Acre	1 Acre
Brush/grassland			Other (describe)	0 Acre	1 Acre (Building)
Cropland					

		Total			

9. Fish, wildlife, and ecologically sensitive resources.

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

The proposed forcemain will be constructed near the Ash River and will also cross the river, but no disturbance to river habitate is anticipated.. A SWPPP and additional BMPs will be implemented to control sediment runoff and erosion along the river banks minimizing habitat disturances. It is anticipated that a small bridge would be constructed to bring the forcemain over the river at the river crossings to minimize disturbed areas near the water. Cleaing and grubbing will be required for a small area for the new wastewater facility. Some short term affects may occur during construction but it is anticipated that there will be no long term affects to the fish and wildlife habitats.

b. Are any state (endangered or threatened) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site? ☒ Yes ☐ No
If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the Minnesota Department of Natural Resources (DNR) Natural Heritage and Nongame Research program has been contacted give the correspondence reference number: -
Describe measures to minimize or avoid adverse impacts.

There are currently no endangered or threatened species, rare plants, or other sensitive ecological resources on the proposed site. It was found that there is one bald eagle nest approximately 0.6 miles and another bald eagle nest 0.8 miles from the project site. Patches of "Brown-eyed Camouflage Lichen" are also located approximately 1.4 miles from the project area. It is anticipated that neither of these species will be impacted as they are not on the project site.

10. Physical impacts on water resources. Will the project involve the physical or hydrologic alteration (dredging, filling, stream diversion, outfall structure, diking, and impoundment) of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☐ Yes ☒ No
If yes, identify water resource affected. Describe alternatives considered and proposed mitigation measures to minimize impacts. Give the DNR Protected Waters Inventory (PWI) number(s) if the water resources affected are on the PWI.

N/A

11. Water use. Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)? ☒ Yes ☐ No
If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

It is anticipated that dewatering will be required for the drilling/receiving pits for the forcemain installation.

12. Water-related land use management districts. Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? ☒ Yes ☐ No
If yes, identify the district and discuss project compatibility with district land use restrictions.

Portions of the proposed forcemain lie in the Ash River 100 year flood plain. Once the forcemain is constructed the land will be returned to its existing conditions.

13. Water surface use. Will the project change the number or type of watercraft on any water body? ☒ Yes ☐ No
If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

The Ash River is currently used often by personal watercrafts. The proposed project may require some barge movement to get supplies to the southeast side of the river. This impact to the watercraft population would only be temporary and limited to the construction schedule.

14. Erosion and sedimentation. Give the acreage to be graded or excavated and the cubic yards of soil to be moved: **4.0** Acres: **20,000** cubic yards. Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

The forcemain mainly follows Ash River Trail with slopes ranging from 0%-5%. The selected river crossing location has gently sloping banks which will ease sediment and erosion control. Slopes on the southeast side of the river are more extreme ranging from 0%-25%, however the surface here consists of mainly rock so erosion is unlikely.

15. Water quality – surface-water runoff.

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any storm water pollution prevention plans.

Areas where the proposed forcemain are constructed will not have an increase or decrease in runoff and the water quality will be unchanged once the project is completed. Disturbed pavement areas will be repaved and pervoius areas will be reseeded. The addition of the sanitary treatment facility will have very little effects on the stormwater quantity and no effects on the overall stormwater quality. A stormwater pollution prevention plan (SWPPP) will be designed for the construction of this project. It will comply with the MPCA and NPDES rules and regulations to control erosion and sediment runoff. No permanent devices are needed once the project is completed as post-construction areas will remain the same as they were pre-construction.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

The immediate receiving water body for the project is the Ash River. This then flows into Kabetogama Lake. There is no anticipated long term impacts to runoff quality to receiving water bodies as a result from the proposed improvements.

16. Water quality – wastewater.

a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

Sources of wastewater being treated at the site include residential houses, resorts, and campgrounds. The proposed sanitary treatment system would treat approximately 232 EDUs. Typical municipal strength wastewater is anticipated.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

Treated effluent will be discharged either subsurface or surface. For subsurface discharge, the treatment facility will need to meet a permit limit of 10 mg/L for Total Nitrogen. For a surface discharge it is anticipated that the facility will need to meet typical secondary treatment limits, plus a lower limit for Total Phosphorus. A preliminary effluent limit request has been sent to the MPCA but no response had been received at the time of original submittal of this EIW and Facility Plan. The Facility Plan will be amended with this information once the response is received.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

This will be a new facility, constructed as part of this project. The facility will have a series of equalization tanks, aerated tanks, and settling tanks to complete treatment of the waste stream.

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

N/A

17. Geologic hazards and soil conditions.

a. Approximate depth (in feet) to Groundwater 6 ft minimum; *more than 10'* average.
Bedrock: *2 ft* minimum; *9 ft* average.

Describe any of the following geologic site hazards to groundwater and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

No known sinkholes, shallow limestone formations, or karst conditions are present on the site.

b. Describe the soils on the site, giving U.S. Soil Conservation Service (SCS) classifications, if known. Discuss soil granularity and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

41 soil borings were taken along the proposed forcemain route. Most borings showed a poorly graded sand with silt fill (SP-SM) in the top 2 feet, followed by a sandy silty clay (CL-ML) below that. If bed rock was not hit below 6 feet a lean clay (CL) was often found. The sandy soils in the first few feet may allow for quicker infiltration which may have some potential for groundwater contamination, however the clay layers and shallow bedrock stop most of this from happening. Construction crews will be equiped with spill cleanup kits to immedietely clean any onsite spills. Secondary containment will be provided for any onsite equipement with the potential for leaks. No potential leaks or contamination are anticipated after construction.

18. Solid wastes, hazardous wastes, storage tanks.

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating

municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

The project will create minor amounts of solid waste and waste materials during construction. No hazardous wastes will be generated.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

There will be no toxic or hazardous materials used or present for the construction of the facility.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

None anticipated.

19. Traffic. Parking spaces added: *Less than 5* Existing spaces (if project involves expansion): *0*
Estimated total average daily traffic generated: *0* Estimated maximum peak hour traffic generated (if known) and its timing: *0* Provide an estimate of the impact on traffic congestion affected roads and describe any traffic improvements necessary. If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system.

The road currently sees very low traffic volumes. The proposed facility will not add a noticable increase in traffic volume. The road may have to be shut down to a single lane during forcemain installation but only minor impacts are anticipated.

20. Vehicle-related air emissions. Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult *Environmental Assessment Worksheet (EAW) Guidelines* about whether a detailed air quality analysis is needed.

No significant changes in traffic are anticipated as a result of the project.

21. Stationary source air emissions. Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing), any greenhouse gases (such as carbon dioxide, methane, and nitrous oxides), and ozone-depleting chemicals (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

None anticipated.

22. Odors, noise, and dust. Will the project generate odors, noise or dust during construction or during operation? ☒ Yes ☐ No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

Noise and dust are expected from the construction process. Dust will be controlled during dry periods with a water truck. Noise impacts to residents will be mitigated through controlled working hours for construction crews. There will be no odors, noise, or dust as a result from the finalized facility.

23a. Nearby resources. Are any of the following resources on or in proximity to the site? Projects should search the Minnesota State Historic Preservation Office's (SHPO) National Register of Historic Places database.

***Note:** Project proposers must contact the SHPO at datarequestshpo@mnhs.org to request a database review to obtain information on any known historical or archaeological sites in the project area. Include a copy of correspondence with SHPO with the submittal of this EIW form.

a. Archaeological, historical, or architectural resources? ☐ Yes ☐ No
b. Prime or unique farmlands or land within an agricultural preserve? ☐ Yes ☐ No
c. Designated parks, recreation areas, or trails? ☐ Yes ☐ No
d. Scenic views and vistas? ☐ Yes ☐ No
e. Other unique resources? ☐ Yes ☐ No

If yes, describe the resource and identify any project-related impacts on the resources. Describe any measures to minimize or avoid adverse impacts.

SHPO has been contacted but no response has been received. EIW will be ammended when a response is received.

23b. **Section 106 Review** (36 CFR 800) is required for all CWRF projects. The following forms can be found on the MPCA Wastewater and Stormwater Financial Assistance website at https://www.pca.state.mn.us/ppl. Select Clean Water Revolving Fund tab; then scroll to Facilities Plan and Facilities Plan Supplement for Wastewater Treatment Systems heading.

a. Project is exempt from review (attach completed *Exemption Checklist*) ☐ Yes ☒ No

b. Project is required to complete further Section 106 Review: ☐ Yes ☒ No
   a. SHPO
   b. Tribal consultation
   c. Other Consulting parties

24. **Visual impacts**. Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☐ Yes ☒ No

If yes, explain.

N/A

25. **Compatibility with plans and land use regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☐ Yes ☒ No

If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

The area is an unincorporated area in St. Louis County.

26. **Impact on infrastructure and public services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☒ Yes ☐ No

If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)

New grinder stations will be installed at each of the residence. A forcemain will be installed to bring waste to the proposed treatment facility. An access road will be constructed to the new wastewater treatment facility.

27. **Cumulative impacts.** Minn. R. 4410.1700, subp. 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts (or discuss each cumulative impact under appropriate item(s) elsewhere on this form).

This project was separate from all other construction in this area and no forseeable improvements are planned as of now.

28. **Other potential environmental impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

No significant negative impacts are anticipated to this project.

29. **Summary of issues.** List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

No additional impacts are forseeable which have not already been discussed.

March 4, 2020

RE: St. Louis County Environmental Services
Ash River Treatment Facility
SEH No. STLES 146794 14.00

Ms. Tara Geshick
Commissioner of Natural Resources
Bois Forte Tribal Government
5344 Lakeshore Drive
Orr Lake, MN 55771

Dear Ms. Geshick:

We are initiating consultation on this project under Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR Part 800 and pursuant to the 2016 Memorandum of Understanding between the Minnesota Pollution Control Agency and federally recognized tribes in Minnesota. This project is being funded under the Clean Water State Revolving Fund administered by the Minnesota Public Facilities Authority and the Minnesota Pollution Control Agency. Below is the information about this project:

- Project Title:
  - Ash River Wastewater Treatment Facility Plan
- Project Description:
  - A sanitary sewer collection and treatment system will be constructed to serve the homes, cabins, and resorts in the Ash River area. The collection system will likely consist of grinder stations at each property with a low pressure force main collector to convey wastewater to a common treatment site where it will be treated and disposed of properly.
- Project Location:
  - Township 68 N. Range 19 W. Section 4 and 5. St. Louis County
  - Township 69 N. Range 19 W. Section 32 and 33. St. Louis County
- Area of Potential Effects (APE) discussion:
  - The Area of Potential Effects can be seen on the attached maps. A majority of the area has previously been disturbed by the construction of residential lots or Ash River Trail.
- Identification of historic properties within the APE:
  - A project review request has been sent to SHPO. No response has been received.
- Preliminary determination of effect on historic properties:
  - Will update when SHPO response has been received.

We look forward to your response regarding this review under Section 106 of the National Historic Preservation Act. If you should have questions or need additional information to complete your review, please contact me at cmarcusen@sehinc.com or 320.229.4359.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Colin Marcusen, PE
Project Manager
(Lic. MN, ND, SD, IA)

cmm/mrb
Enclosures
c: Bill Dunn, MPCA
p:\pt\s\stles\146794\4-prelim-dsgn-rpts\section 106\2020.03.04 l bois forte band of chippewa section 106 review.docx

March 4, 2020

RE: St. Louis County Environmental Services
Ash River Treatment Facility
SEH No. STLES 146794 14.00

Mr. Wayne Dupuis
Environmental Program Manager
Fond du Lac Band of Lake Superior Chippewa
1720 Big Lake Road
Cloquet, MN 55720

Dear Mr. Dupuis:

We are initiating consultation on this project under Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR Part 800 and pursuant to the 2016 Memorandum of Understanding between the Minnesota Pollution Control Agency and federally recognized tribes in Minnesota. This project is being funded under the Clean Water State Revolving Fund administered by the Minnesota Public Facilities Authority and the Minnesota Pollution Control Agency. Below is the information about this project:

- Project Title:
  - Ash River Wastewater Treatment Facility Plan.
- Project Description:
  - A sanitary sewer collection and treatment system will be constructed to serve the homes, cabins, and resorts in the Ash River area. The collection system will likely consist of grinder stations at each property with a low pressure force main collector to convey wastewater to a treatment facility where it will be treated and disposed of properly.
- Project Location:
  - Township 68 N. Range 19 W. Section 4 and 5. St. Louis County.
  - Township 69 N. Range 19 W. Section 32 and 33. St. Louis County.
- Area of Potential Effects (APE) discussion:
  - The Area of Potential Effects can be seen on the attached maps. A majority of the area has previously been disturbed by the construction of residential lots or Ash River Trail. Approximately 1 acre of undisturbed DNR land will be cleared and grubbed to provide room for the new wastewater treatment plant. No existing buildings will be demolished as a part of this project.
- Identification of historic properties within the APE:
  - A project review request has been sent to SHPO. No response has been received.
- Preliminary determination of effect on historic properties:
  - Will update when SHPO response has been received.

We look forward to your response regarding this review under Section 106 of the National Historic Preservation Act. If you should have questions or need additional information to complete your review, please contact me at cmarcusen@sehinc.com or 320.229.4359.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Colin Marcusen, PE
Project Manager
(Lic. MN, ND, SD, IA)

cmm/mrb
Enclosures
c: Bill Dunn, MPCA
p:\pt\s\stles\146794\4-prelim-dsgn-rpts\section 106\2020.03.04 l fond du lac section 106 review.docx

Building a Better World for All of Us®

March 4, 2020

RE: St. Louis County Environmental Services
Ash River Treatment Facility
SEH No. STLES 146794 14.00

Ms. Margaret Watkins
Water Quality Specialist
Grand Portage Band of Ojibwe
27 Store Road
PO Box 428
Grand Portage, MN 55605-0428

Dear Ms. Watkins:

We are initiating consultation on this project under Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR Part 800 and pursuant to the 2016 Memorandum of Understanding between the Minnesota Pollution Control Agency and federally recognized tribes in Minnesota. This project is being funded under the Clean Water State Revolving Fund administered by the Minnesota Public Facilities Authority and the Minnesota Pollution Control Agency. Below is the information about this project:

- Project Title:
  - Ash River Wastewater Treatment Facility Plan.
- Project Description:
  - A sanitary sewer collection and treatment system will be constructed to serve the homes, cabins, and resorts in the Ash River area. The collection system will likely consist of grinder stations at each property with a low pressure force main collector to convey wastewater to a treatment facility where it will be treated and disposed of properly.
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Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Colin Marcusen, PE
Project Manager
(Lic. MN, ND, SD, IA)

cmm/mrb
Enclosures
c: Bill Dunn, MPCA
p:\pt\s\stles\146794\4-prelim-dsgn-rpts\section 106\2020.03.04 l grand portage band of ojibwe section 106 review.docx

March 4, 2020

RE: St. Louis County Environmental Services
Ash River Treatment Facility
SEH No. STLES 146794 14.00

Ms. Sarah J. Beimers
Manager
Minnesota Historical Society – Government Programs and Compliance
345 Kellogg Boulevard West
St. Paul, MN 55102

Dear Ms. Beimers:

We are initiating consultation on this project under Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800and pursuant to the 2016 Memorandum of Understanding between the Minnesota Pollution Control Agency and the Minnesota Historic Preservation Office (MnHPO). This project is being funded under the Clean Water State Revolving Fund administered by the Minnesota Public Facilities Authority and the Minnesota Pollution Control Agency. Below is the information about this project:

- Project Title:
  - Ash River Wastewater Treatment Facility Plan.
- Project Description:
  - A sanitary sewer collection and treatment system will be constructed to serve the homes, cabins, and resorts in the Ash River area. The collection system will likely consist of grinder stations at each property with a low pressure force main collector to convey wastewater to a treatment facility where it will be treated and disposed of properly.
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- Preliminary determination of effect on historic properties:
  - Will update when SHPO response has been received.

We look forward to your response regarding this review under Section 106 of the National Historic Preservation Act. If you should have questions or need additional information to complete your review, please contact me at cmarcusen@sehinc.com or 320.229.4359.

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

Colin Marcusen, PE
Project Manager
(Lic. MN, ND, SD, IA)

cmm/mrb
Enclosures
c: Bill Dunn, MPCA
p:\pt\s\stles\146794\4-prelim-dsgn-rpts\section 106\2020.03.04 l shpo section 106 review.docx

PROPOSED TREATMENT FACILITY

4" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

RIVER CROSSING

2" DRILLED HDPE FM

2" DRILLED HDPE FM

2" DRILLED HDPE FM

3" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

2" DRILLED HDPE FM

ASH RIVER TRAIL

2" DRILLED HDPE FM

ASH RIVER TRAIL S

N

400 0 400 800

scale 200 feet

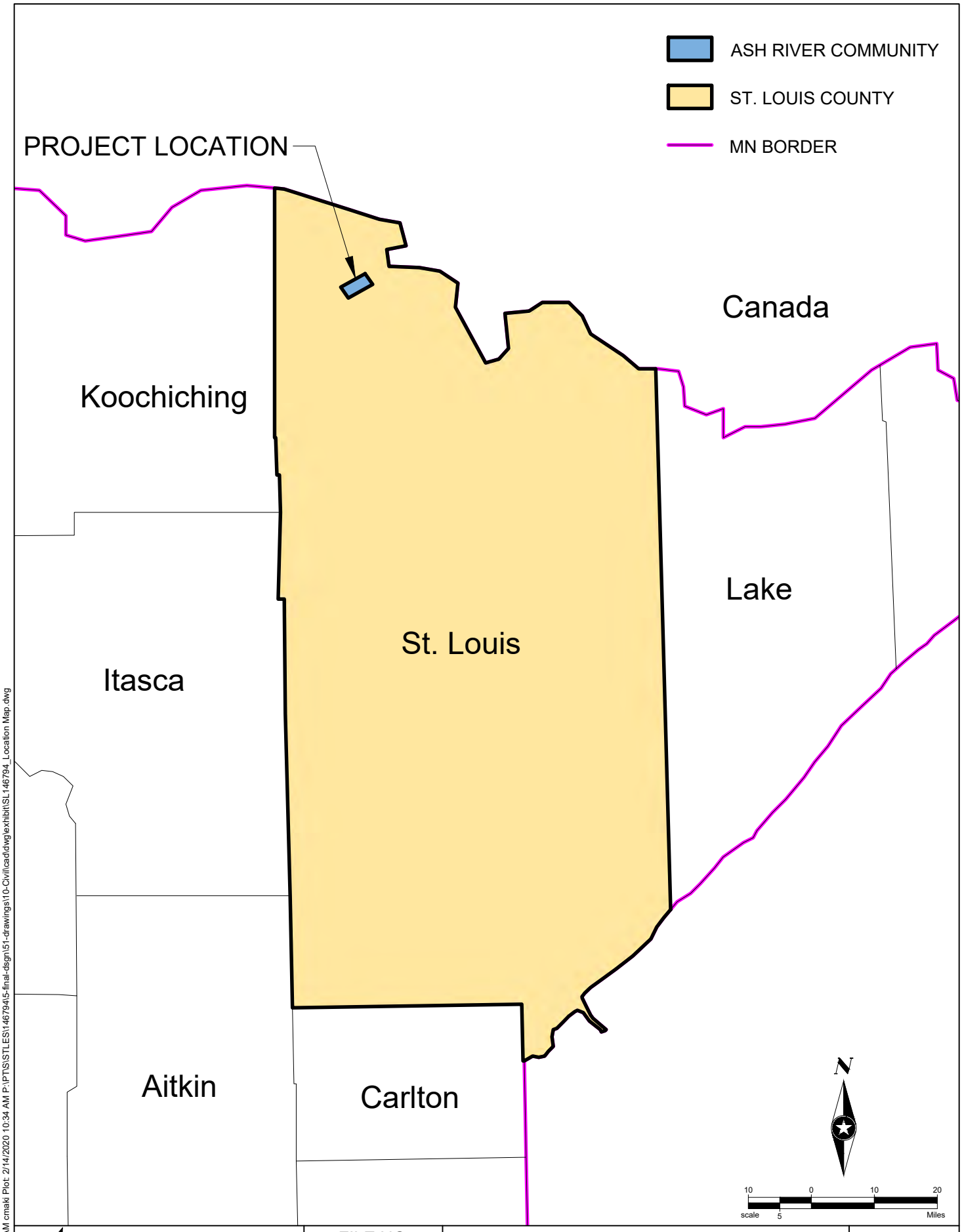
SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT NO. 1



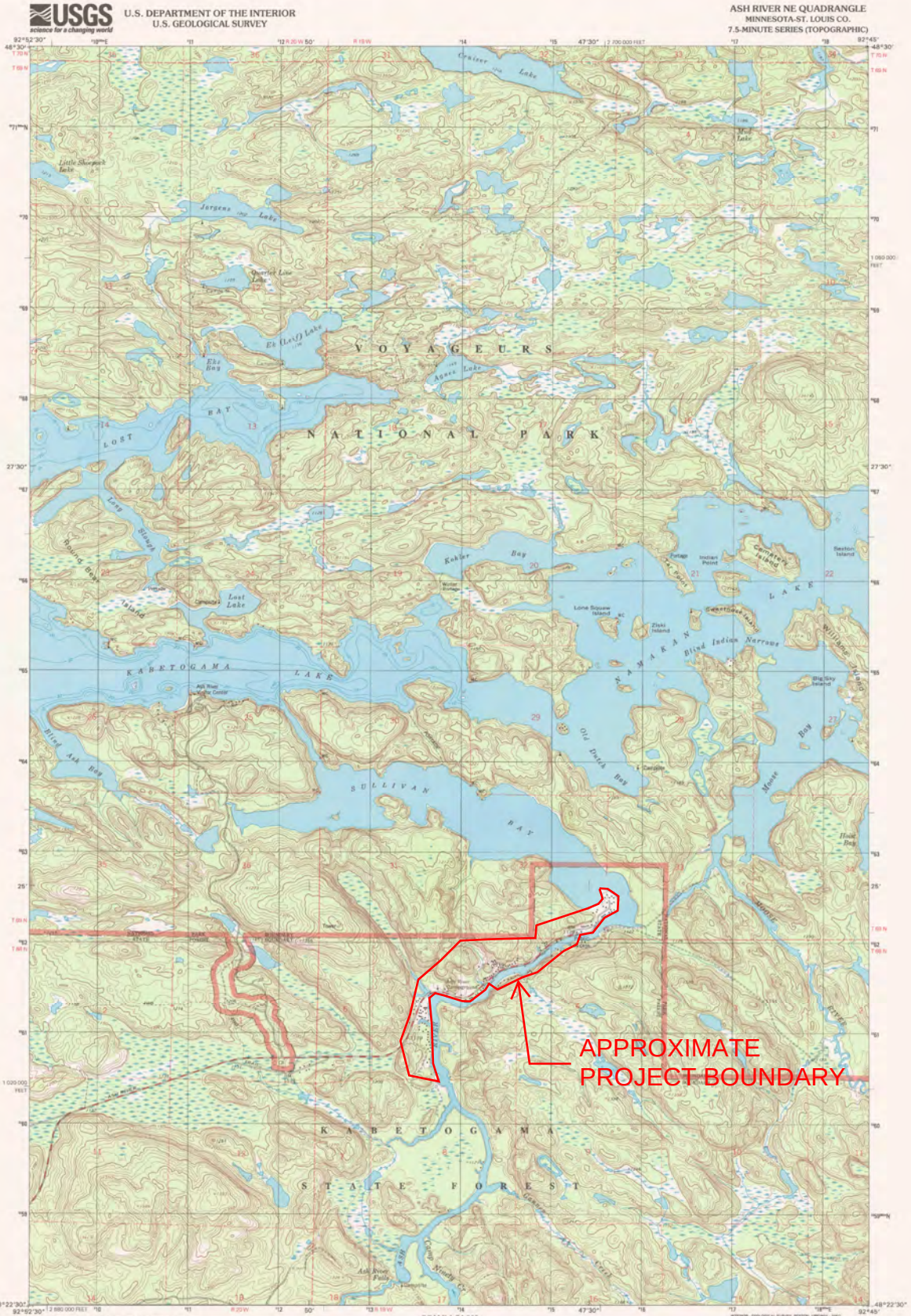
SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

COUNTY MAP
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 7


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
ASH RIVER NE QUADRANGLE
MINNESOTA-ST. LOUIS CO.
7.5-MINUTE SERIES (TOPOGRAPHIC)
VOYAGEURS
NATIONAL PARK
KABETOGAMA
LAKE
SULLIVAN
BAY
KABETOGAMA
STATE FOREST
APPROXIMATE
PROJECT BOUNDARY
SCALE 1:24 000
Produced by the United States Geological Survey
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
ASH RIVER NE, MN
1999

Appendix B

Preliminary Effluent Request

Building a Better World for All of Us®

TRANSMITTAL

To: Minnesota Pollution Control Agency
Fiscal Services - 6th Floor
520 Lafayette Road North
St. Paul, MN 55155-4194

Date: February 26, 2020
SEH File No.: STLES 146794 14.00
Client No.:

RE: Ash River Facility Plan, St. Louis County, MN

We are:

☒ Enclosing ☐ Sending under separate cover ☐ Sending as requested

Prelminary Effluent Limit Review Request
Check #390332 for $1,550
Location Map
Discharge Map

For your:

☐ Information/Records ☐ Review and comment ☐ Approval
☒ Action ☐ Distribution ☐ Revision and resubmittal

Remarks:

By: Colin Marcusen

c:

mrb

p:\pt\s\stles\146794\1-genl\14-corr\2020.02.26 t mpca preliminary effluent limit review request.docx

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Preliminary Effluent Limit Review Request

EAO Effluent Limits Unit

Doc Type: Effluent Limit Standards Review

Purpose: This form is required for all preliminary effluent limit requests for: 1) new facilities with a surface water discharge; 2) where the design flow, outfall location, or quality of the effluent is changing for an existing facility with a surface water discharge; or 3) changes to treatment type that would impact quality of the effluent.

Complete application by typing or printing in black ink.
Instructions on page 3.

MPCA Use Only
MN
Application number
Date received

Contact Information

1. **Engineer or consultant or requester** Employer/Company: SEH, Inc.
   Name: Colin Marcusen, PE Title: Project Manager
   Mailing address: 1200 25th Avenue S, PO Box 1717
   City: St. Cloud State: MN Zip code: 56302-1717
   Phone: 320.229.4359 Fax: E-mail: cmarcusen@sehinc.com
2. **Permittee or Facility**
   Name: Ash River Sanitary Sewer District County: St. Louis
   City: NA State: MN Zip code:
   NPDES/SDS Permit #: *(complete only for existing permitted facilities)*
   Address of facility *(if known)*:

Facility Information (If more space is needed, attach additional page(s) to the request.)

3. **Reason for request:** *(Describe in detail: design flow, outfall locations, and/or changes to treatment type impacting the quality of the effluent.)*
   New collection and treatment sytem for homes, cabins, and resorts along the Ash River. We would like to explore options for subsurface discharge, or surface discharge into Ash River.
4. **Identify design flows and waste flow type for the proposed facility:**
   See the Minnesota Pollution Control Agency (MPCA) website regarding Design Flow and Loading Determination Guidelines for Wastewater Treatment Plants at: http://www.pca.state.mn.us/0agxb2d.

   For domestic wastewater facilities only
   Average Wet Weather Design Flow: .042 mgd (million gallons/day)
   Average Dry Weather Design Flow: mgd (million gallons/day)
   Waste Flow Type: ☒ Continuous ☐ Controlled

   For industrial and other wastewater facilities only
   Maximum Daily Design Flow: mgd (million gallons/day)
   Average Daily Design Flow: mgd (million gallons/day)
   Waste Flow Type: ☐ Continuous ☐ Controlled ☐ Periodic/Seasonal ☐ Intermittent

Waste flow type: A description of the discharge type

Continuous: *Continuous, year-round discharge where flows occur without interruption throughout operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or other similar activities (40 CFR 122.2). Most domestic mechanical facilities are considered to have continuous discharges.*

Controlled: *Discharge permitted during pre-defined periods or windows which are generally during periods of higher receiving water flow and lower temperatures. For northern MN [MPCA regions I, II, III] these periods are 3/1-6/30 and 9/1-12/31. For southern MN [MPCA regions IV, V, Metro] these periods are 3/1-6/15 and 9/15-12/31. These discharges are almost exclusively stabilization ponds with controlled discharges in spring and fall.*

Intermittent: *Discharge that occurs sometimes, but not regularly (40CFR pt.122). Intermittent discharges occur infrequently and/or for short durations. Examples include water treatment plants with backwash discharge such as once every ten days or a few hours every week, and stormwater detention ponds with discharges that are precipitation dependent.*

Periodic/Seasonal: *Discharge that occurs regularly, but is not continuous all year, where discharge is intentional at specified times following treatment (e.g., monthly or seasonally) and of longer duration, as opposed to the short duration of intermittent discharges (40CFR 122). Examples include canning facilities that discharge process wastewater continuously during packing season (May-Sep or other months) and quarries and gravel mining operations. This excludes stabilization ponds with pre-defined discharge periods or windows.*

5. **Facility description:** *(Provide a description of the proposed wastewater treatment facility, including the type of treatment units.)*
Facility will be designed after preliminary effluent limits received.

6. **Wetland impacts:** *(For new or expanded discharges, will construction or operation of the proposed facility result in wetland filling, drainage, excavation, or permanent inundation?)* ☐ Yes ☒ No If yes, please provide the following information:
   a. Location of impacted wetland:
   b. Acreage of impacted wetland:
   c. Wetland type/classification:

   (See U.S. Fish and Wildlife Service National Wetlands Inventory at http://www.fws.gov/wetlands/index.html.)

7. **Is the facility located on tribal land?** ☐ Yes ☒ No
If yes, also contact U.S. Environmental Protection Agency (EPA) Region V, John Coletti 312-886-6106.

8. **Identify all wastewater facility locations for which preliminary effluent limits are requested:**

County: St. Louis		City/Township:		
Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T69 N	R19 ☐E ☒W	32	SE	SE

County: St. Louis		City/Township:		
Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T69 N	R19 ☐E ☒W	32	SE	NE

County:		City/Township:		
Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T N	R ☐E ☐W			

Existing/Proposed Surface Water Discharge

9. **Identify all surface water discharge locations for which preliminary effluent limits are requested:**

Complete the table for each surface water discharge point. If this is an existing facility, refer to the current National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit for Station ID. For new facilities, enter as much information as available. If more space is needed for additional stations, attach additional pages.

The location of a surface water discharge is defined as the location where a wastewater discharge enters a surface water (not where the pipe leaves the wastewater facility structure). If a pipe extends out into a river or lake, the location is identified where the pipe leaves the shore and enters the body of water. If the discharge is to a tile line or storm sewer the location is identified where the tile line or storm sewer enters a surface water. If the discharge is into an open ditch or ravine, the location is identified as the point where the discharge leaves the pipe and enters the open ditch.

Station ID: SD

Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T69N	R19 ☐E ☒W	32	SE	SE
Latitude	Longitude	Datum	Coordinate Collection Method	
48.419465	-92.802154		Google Maps	

Receiving Water Name: Kabetogama Lake - Sullivan Bay

Station ID: SD

Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T69N	R19 ☐E ☒W	32	SE	NE
Latitude	Longitude	Datum	Coordinate Collection Method	
48.411489	-92.794879		Google Maps	

Receiving Water Name: Ash River

Surface water discharge locations for which preliminary effluent limits are requested - *continued*:

Station ID: SD

Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T N	R ☐E ☐W			
Latitude	Longitude	Datum	Coordinate Collection Method	

Receiving Water Name:

Attachments

☒ Did you attach a map?

Attach a map, U.S. Geological Survey topographic map (7.5 minute series) or other map of comparable detail that shows surface water bodies, roads, and other pertinent landmarks. The map should show and label the exact location of the existing or proposed facility, and the location of all existing and proposed wastewater discharge points into receiving waters. Mark and label all surface water discharge locations at the point where the wastewater enters the receiving water. If the discharge is to a tile line or storm sewer, label the tile line or storm sewer and show its flow path to the receiving water.

Note: Please ensure this form and all applicable attachments are complete. **Please make a copy for your records.**

Application Fee

An application fee is required under Minn. Stat. § 116.07, subd. 4d (1990) and Minn. R. ch. 7002 (Permit Fee Rules). This application fee must be submitted with the application. The current application fee is $1,550 with the dollar amount determined by point assignments contained in the Permit Fee Rules. Please refer to the application fee table located at: http://www.pca.state.mn.us/index.php/water/water-permits-and-rules/water-permits-and-forms/mpca-water-quality-permit-fees.html.

Submittal

Requests that are submitted without the required fee and attachments will be returned. Please make your check payable to the Minnesota Pollution Control Agency. Send the completed request, attachments, and check to:

Attn: Fiscal Services – 6th floor
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Contact Information

If you have questions or need further assistance, contact Steven Weiss at 651-757-2814 or Carol Sinden at 651-757-2727 Effluent Limits Unit, Environmental Analysis and Outcomes Division.

Instructions

Surface water discharge location example:

Station ID: SD *1*

Township (26-71 or 101-168)	Range (1-51)	Section (1-36)	¼ Section (NW, NE, SW, SE)	¼ of ¼ Section (NW, NE, SW, SE)
T 109 N	*R 28 ☐E ☐W*	*5*	*NW*	*NW*
Latitude	Longitude	Datum	Coordinate Collection Method	
44.271062	*-94.180317*	*NAD83*	*DOQ (aerial photo)*	

Receiving Water: *County Ditch 4*

A datum for latitude/longitude should be specified. For latitude/longitude coordinates, this will either be NAD83 or WGS84 (the default on most GPS units). NAD83 is preferred.

For latitude/longitude indicate the method of collection and the date of collection. Methods of collection include:

GPS – Survey Quality
GPS – Recreational Receiver WAAS enabled (Real Time Differential Corrected)
GPS – Recreational Receiver Uncorrected
GPS – Unknown
Digitized – Web Map Google / Yahoo / Microsoft
Digitized – Digital Raster Graph (DRG) (USGS 7.5 min topographic map 1:24,000 scale)
Digitized – Digital Ortho Quad (DOQ) (USGS aerial photo 1:24,000 scale)

Short Elliott Hendrickson Inc

CHECK DATE 02-19-2020

390332

VENDOR 10598

INVOICE	INVOICE DATE	DESCRIPTION	
146794.220	12-Feb-20	Permit fee	1,550.00
			$1,550.00

Bremer Bank,
Bremer.com
75-1041-960

390332

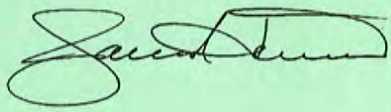
Short Elliott Hendrickson Inc,
3535 Vadnais Ctr Dr
Saint Paul, MN 55110-5196

DATE 02-19-2020

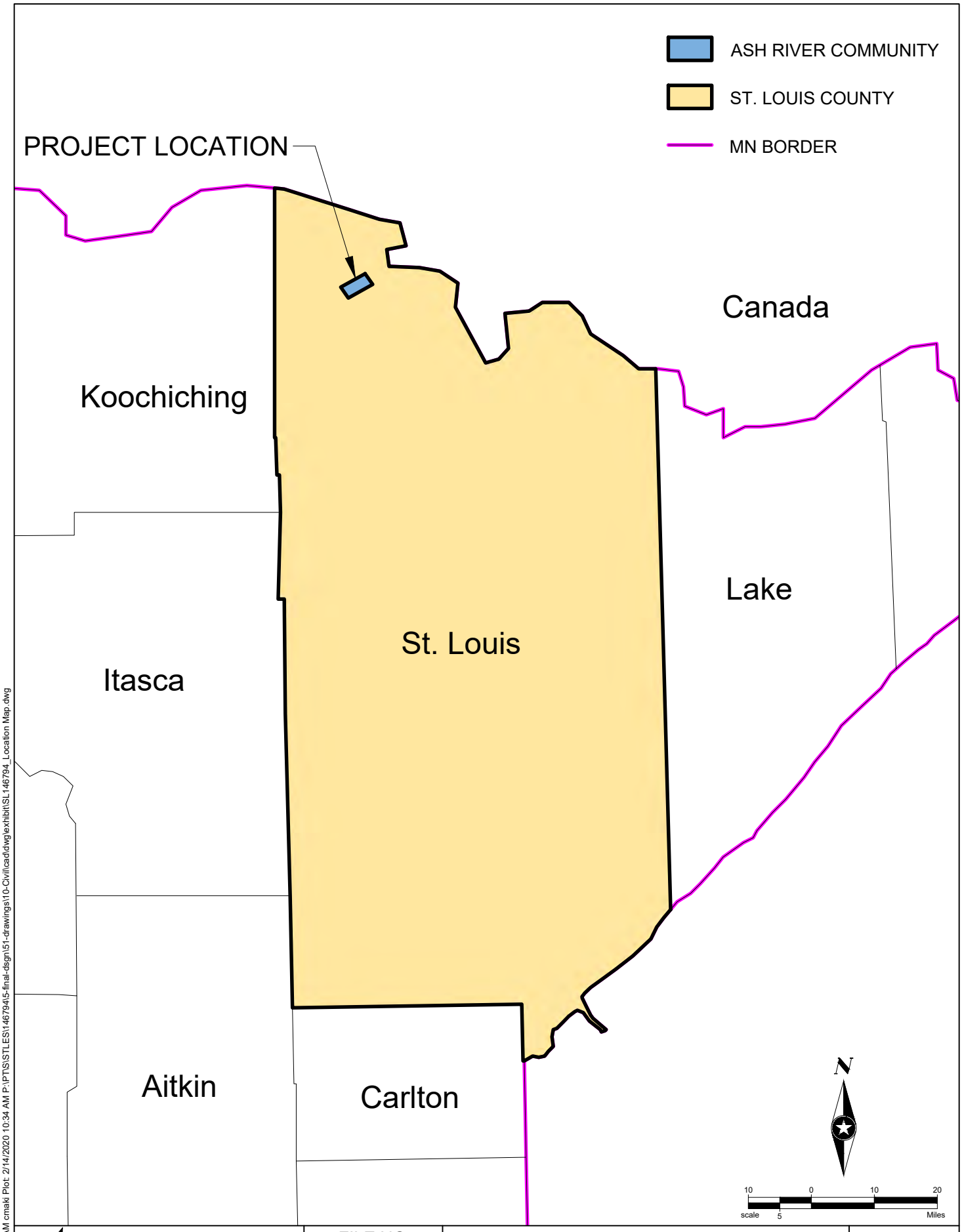
AMOUNT $1,550.00

AMOUNT One Thousand Five Hundred Fifty Dollars And Zero Cents ****

PAY TO THE ORDER OF
Minnesota Pollution Control Agency
520 Lafayette Rd N
St Paul, MN 55155-4194



⑈390332⑈ ⑆096010415⑆ 024104330⑈



SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

COUNTY MAP
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 7

SULLIVAN BAY
(KABETOGAMA LAKE)

SURFACE DISCHARGE LOCATION 1

APPROXIMATE PROPOSED
TREATMENT AREA

SUBSURFACE DISCHARGE
LOCATION 2

SURFACE DISCHARGE
LOCATION 3

ASH RIVER

FM

N

200 0 200 400
scale 100 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES - 146794

DATE:
2/24/2020

DISCHARGE MAP
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 8

Save: 2/24/2020 1:57 PM cmaki Plot: 2/24/2020 2:16 PM P:\PT\S\STLES\146794\5-final-dsgn\51-drawings\10-Civil\cad\dwg\exhibit\SL146794_Discharge Map.dwg

Appendix C

Property Owner Questionnaire

EDU and Flow Assignments
Facility Plan - Appendix C
Ash River Sanitary Sewer District

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS								
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD"L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
1	731-0020-00130	NORDLUM ROGER W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
2	731-0020-00120	LARSON JEFFERY FOSTER	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
3	731-0020-00110	SPENCER ELDON J JR	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
4	731-0020-00100	SPENCER ELDON J JR ETAL	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
5	731-0020-00090	DUFRESNE ROBERT L	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
6	731-0020-00080	DUFRESNE ROBERT L	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
7	731-0020-00070	SPENCER CARLYLE W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
8	731-0020-00050	BODAS MARY C	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
9	731-0020-00040	MAJG LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
10	731-0020-00030	NORDLUM ROGER W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
11	731-0020-00020	SCHMIDT DANIEL	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
12	731-0020-00010	ABRAMSON KERRY FORREST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	FUTURE GARAGE	3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
13	731-0020-00140	BARKER TERRY B	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
14	731-0200-00010	BARKER TERRY B	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
15	731-0020-00141	KOLODZIEJCZYK CASEY J	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
16	731-0200-00158	KOLODZIEJCZYK CASEY J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
17	731-0200-00159	SKIBA, DAVID ALLEN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	1	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
18	731-0200-00154	SKIBA, DAVID ALLEN	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
19	731-0200-00020	DEKOCK WALTER E REVOC TRUST	1.6	1	1	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	GARAGE WITH WATER, SINK & LAUNDRY, AND BEDROOM	2	1		180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0	0	0	0	0	0	0	0	0	0	0										
20	731-0200-00030	MCDONNELL JOEL K	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
21	731-0200-00156	MCDONNELL JOEL K	1.7	1	0	1	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2	2		180	218	256	100	100	380
		TOTAL EDU FOR EACH CATEGORY		1	0	0.7	0	0	0	0	0	0	0	0	0	0	0										
22	731-0200-00040	TROUNCE TIMOTHY D	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
23	731-0200-00152	TROUNCE TIMOTHY D	1.7	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	1	0	0	0	0	0	0	0		2		1	180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0.7	0	0	0	0	0	0	0	ADDITIONAL RV SPACE W SEWER HOOKUP									

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS							
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
24	731-0200-00153	CAPPY JAMES A	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
25	731-0200-00157	WIEBER & ASSOCIATES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
26	731-0200-00150	WIEBER & ASSOCIATES INC	13.9	1	0	0	0	0	0	4	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	2	5	4	1	0	0	0	0	0	0	1	1	0			26		180	218	256	100	100	2600
		TOTAL EDU FOR EACH CATEGORY		1	1.2	3.5	3.2	1	0	2.8	0	0	0	0	1	0.2	0	ASH TRAIL LODGE									
27	731-0200-00151	WIEBER & ASSOCIATES INC		1	0	0	0	0	0	1	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	1	0	1	0	0	0	0	0	0	0	0	0	0			4	5	180	218	256	100	100	900
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0.8	0	0	0.7	0	0	0	0	0	0	0										
29	731-0200-00050	VOYAGEUR ENTERPRISES LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
30	731-0200-00060	FULLER LUCE SURVIVORS TRUST	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	SEPTIC?	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
31	731-0200-00070	YE OLDE MARINA LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		4			225	300	375	100	100	375
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
32	731-0200-00155	PAUL BUNYAN TELEPHONE COOPERATIVE	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
33	731-0200-00140	ARVIG COMMUNICATIONS & TECH LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
34	731-0200-00130	HAJEK TERI E	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		0			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
35	731-0200-00120	MULVIHILL KAREN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		4			225	300	375	100	100	375
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
36	731-0200-00110	SWANSON DENNIS D	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
37	731-0200-00100	DURUSHIA RANDALL & ANN M	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
38	731-0200-00090	BRONK JOHN B REVOC TRUST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
39	731-0200-00080	ROTHER THOMAS JOSEPH	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
40	731-0019-00010	DUFFY BRIAN JAMES	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
41	731-0019-00020	ZALLAR FRANK M	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
42	731-0019-00030	RINK LINDA C	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
43	731-0010-00780	STATE OF MINNESOTA	6.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	9	0	0	0	0	0	0	0	CAMPGROUND			9	180	218	256	100	100	900
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	6.3	0	0	0	0	0	0	0										
44	731-0010-00738	SCHMITZ AMY J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
45	731-0010-00735	ROD DAVID M ETUX	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
46	731-0010-00722	ROD DAVID M ETUX	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
47	731-0010-00729	WUORINEN ARNE D	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
48	731-0022-00010	KUCERA CHRIS	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS							
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
49	731-0023-00001	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		0			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
50	731-0022-00030	EBEL KATHERINE J	12.4	1	0	0	0	0	0	0	0	0	0	0	0	19		2			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	11.4										
51	731-0022-00040	EBEL KATHERINE J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
52	731-0022-00050	EBEL KATHERINE J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		0			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
53	731-0022-00056	MCGHEE DOC	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
54	731-0022-00055	MCGHEE DOC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
55	731-0010-00726	PLOCHOCKI GREGG	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
56	731-0010-00727	NELSON RYAN LEE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PLANS TO BUILD NEW HOUSE - 3 BED, 2 BATH									
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
57	731-0010-00728	MCGHEE DOC	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
58	731-0010-00725	MCGHEE DOC	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
59	731-0010-00720	ST OF MN C278 L35	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
60	731-0022-00140	DRM LIVING TRUST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
61	731-0022-00130	PAHL JOSEPH	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
62	731-0022-00120	PLOCHOCKI GREGG	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
63	731-0022-00110	TROUNCE TIMOTHY D	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		ADDITIONAL FUTURE		0	1	0	0	0	0	0	0	0	0	0	0	0	PLANS OF 1 BED, 1 BATH ADDITION									
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0	0	0	0	0	0	0	0	0	0										
64	731-0022-00100	PLOCHOCKI LARRY M	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
65	731-0022-00090	ESKELSON JAMIE N	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		ADDITIONAL FUTURE		0	0	0	1	0	0	0	0	0	0	0	0	0	POSSIBLY A 3 BED, 1 BATH CABIN - POSSIBLY A GARAGE AFTER									
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0.8	0	0	0	0	0	0	0	0	0										
66	731-0022-00060	KUCERA CHRIS	18.9	1	0	0	0	0	0	18	0	0	0	0	0	0			7	18	180	218	256	100	100	2500
		ADDITIONAL FUTURE		0	6	1	0	0	0	0	0	0	1	0	0	0	ASH RIVIERA RESORT									
		TOTAL EDU FOR EACH CATEGORY		1	3.6	0.7	0	0	0	12.6	0	0	1	0	0	0										
67	731-0010-00736	FADDEN LARRIE L ETUX	5.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	4	0	0	0	OTHER SEWAGE PRODUCING STRUCTURES	2	2		180	218	256	100	100	380
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	4	0	0	0										
68	731-0023-00010	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
69	731-0023-00100	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
70	731-0023-00090	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
71	731-0023-00080	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
72	731-0023-00020	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS								
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
73	731-0023-00070	HIRSCHFELT RICHARD L & DENISE K	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
74	731-0023-00060	LAVOI DENNIS	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
75	731-0023-00030	VOLK BRIAN W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
76	731-0023-00040	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
77	731-0023-00050	ASH RIVER PROPERTIES INC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF RESORT	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
78	731-0022-00160	GORACZKOWSKI JOHN	14.1	1	0	0	0	0	0	16	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	1	0	0	1	0	0	0	0	0	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		1	0	0.7	0	0	1.2	11.2	0	0	0	0	0	0										
79	731-0160-00020	GORACZKOWSKI JOHN	9.6	1	0	0	0	0	0	0	0	0	0	0	0	0	SUNSET RESORT		32	16				100	100	4800
		ADDITIONAL FUTURE		0	4	2	3	1	1	0	0	0	0	1	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		1	2.4	1.4	2.4	1	1.2	0	0	0	0	0.2	0	0										
80	731-0025-00001	PINE TREE RIDGE UNIT OWNERS ASSOC.	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
81	731-0025-00080	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
82	731-0025-00090	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
83	731-0025-00100	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
84	731-0025-00110	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
85	731-0025-00120	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
86	731-0026-00010	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
87	731-0025-00130	HRABAN MARK W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
88	731-0025-00150	LUNZER ERICH	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	EMPTY LOT BUT HAS FUTURE PLANS PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
89	731-0025-00170	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
90	731-0025-00160	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
91	731-0026-00020	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
92	731-0026-00150	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
93	731-0026-00030	QUAYLE JULIE PATRICIA	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0										
94	731-0025-00070	QUAYLE JULIE PATRICIA	0.7	0	0	0	0	0	0	1	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	POSSIBLE FUTURE HOUSE PART OF CAMPGROUND	1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0.7	0	0	0	0	0	0										
95	731-0025-00060	SCHMELING HARLAN	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	STORAGE BUILDING			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0										
96	731-0025-00050	SCHMELING ARNOLD	0.7	0	0	0	0	0	0	1	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0.7	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS								
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
97	731-0025-00040	FREEMYER WAYNE A	1.4	0	0	0	0	0	0	2	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND			2	180	218	256	100	100	200
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	1.4	0	0	0	0	0	0	0										
98	731-0025-00030	KLEMETSEN ROSIE	0.7	0	0	0	0	0	0	1	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	2		1	180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0.7	0	0	0	0	0	0	0										
99	731-0025-00020	BURFIEND PHILIP A	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0	BOTH LOTS USED AS ONE PART OF CAMPGROUND			1				100	100	100
100	731-0025-00010	ADDITIONAL FUTURE	0.7	0	0	0	0	0	0	1	0	0	0	0	0	0	0									
				0	0	0	0	0	0	0	0	0	0	0	0	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0.7	0	0	0	0	0	0	0										
101	731-0026-00140	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
102	731-0026-00160	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
103	731-0026-00040	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
104	731-0026-00050	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
105	731-0026-00060	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
106	731-0026-00070	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
107	731-0026-00080	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
108	731-0026-00090	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
109	731-0026-00100	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
110	731-0026-00110	HRABAN MARK W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
111	731-0026-00130	GORACZKOWSKI JOHN	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
112	731-0026-00120	GORACZKOWSKI JOHN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PART OF CAMPGROUND	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
113	731-0010-00701	JOHNSON MICHAEL BRUCE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
114	731-0010-00704	BENEFICIAL INVESTMENT TRUST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		4			225	300	375	100	100	375
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
115	731-0010-00703	KOLNER DEAN E	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
116	731-0010-00702	EBEL JUSTIN M	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
117	731-0010-00590	HRABAN MARK W & LYNETTE D	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
118	731-0160-00010	HRABAN MARK W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
119	731-0010-00594	SHEGA NANCY J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
120	731-0010-00592	ROTHE STEVE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	POSSIBLY SOME CAMP SITES?	2		6	180	218	256	100	100	780
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS							
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
121	731-0010-00572	HRABAN MARK	18.1	1	0	0	0	0	0	12	0	4	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	3	1	0	3	0	0	0	0	0	0	1	0	ASH KA NAM RESORT		32		180	218	256	100	100	3200
		TOTAL EDU FOR EACH CATEGORY		1	0	2.1	0.8	0	3.6	8.4	0	2	0	0	0	0.2	0										
122	731-0010-00573	ECK BRIAN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
123	731-0010-00570	STADIN RENE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	1	0	0	0	0	0	0		1		1	180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
124	731-0010-00575	EDWARDS PATRICK H	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
125	731-0010-00571	JOHNSON GARY E	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
127	732-0030-00180		0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
128	732-0030-00120	BEHR AUCTION SERVICE LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			225	300	375	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
129	732-0030-00130	CARR PATRICIA ANN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
130	732-0030-00140	JONES DEBRA JEAN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	3BR TRAILER & 3BR SEASONAL	3		1	180	218	256	100	100	318
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
131	732-0030-00150	LINDVALL BRIAN FLOYD	0.7	0	0	0	0	0	0	1	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0.7	0	0	0	0	0	0	0										
132	732-0030-00160	and 00150?	5.9	1	0	0	0	0	0	7	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2		7	180	218	256	100	100	880
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	4.9	0	0	0	0	0	0	0										
133	732-0010-04170	DEBRA SANDERS	10.4	1	0	0	0	0	0	10	0	0	0	0	0	0	0	FRONTIER RESORT									
		ADDITIONAL FUTURE		0	0	2	1	0	0	0	0	0	0	0	0	1	0		3	7	10	180	218	256	100	100	1918
		TOTAL EDU FOR EACH CATEGORY		1	0	1.4	0.8	0	0	7	0	0	0	0	0	0.2	0										
134	732-0030-00010	BURGGRAF SUSAN	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
135	732-0030-00020	BENDIX GARY A & JOFRAN G TRUST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
136	732-0030-00030	WELLMAN WALTER R	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
137	732-0030-00040	DADY MICHAEL R	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	POSSIBLE FUTURE GARAGE	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
138	732-0030-00050	LARSON JACK A	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
139	732-0030-00060	MICNIC-BEACH 2003 LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
140	732-0030-00070	MICNIC CABIN MN LLC	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
141	732-0030-00080	MICNIC	2.0	1	0	0	0	0	0	0	0	0	1	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3	1		180	218	256	100	100	318
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	1	0	0	0	0										
142	732-0030-00090	WESTON STEVE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
143	732-0030-00100	CHRISTIANSEN LEE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
144	732-0030-00110	PEDGINSKI MICHAEL	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	EMPTY LOT, PLANS FOR A 3 BED, 2 BATH HOME AND A GARAGE	3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
145	732-0010-04294	THIESSEN JOHN P & YVONNE C TRUST	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		3			180	218	256	100	100	218
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS								
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
146	732-0010-04293	WAHL PATRICK B	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	FUTURE GARAGE EXPANSION	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
147	732-0010-04292	MILLER DAVID	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
148	732-0010-04172	BRADLE CARRIE JO COLE	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
148	732-0010-04296	BRADLE CARRIE JO COLE	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	SAME LOT	3						100	100	218
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0					180	218	256			
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
149	732-0030-00170		6.9	1	0	3	3	0	0	2	5	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	FRONTIER RESORT	2	15	7	180	218	256	100	100	2380
		TOTAL EDU FOR EACH CATEGORY		1	0	2.1	2.4	0	0	1.4	0	0	0	0	0	0	0										
150	731-0020-00150	SPENCER CARLYLE W	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
200	731-0010-00850	EBEL KATHERINE J	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
201	731-0010-00840	EBEL KATHERINE J	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
202	731-0010-00845	ST OF MN FOR BESTE-WUORINEN GINA L	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	CLEARING SITE FOR NEW CABIN	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
203	731-0021-00060	BRAUN KENNETH W	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
204	731-0021-00050	LOUX RICHARD T	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
205	731-0021-00040	MOORE RICHARD	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	NO RUNNING WATER	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
206	731-0021-00030	ASUMA ARLENE M	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
207	731-0021-00020	PERSHERN SCOTT J	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
208	731-0021-00010	SCHAUST STEVEN J	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	1	0	0	0	0	0	0	0	0	0	0	0	0	1 BED IN SHED	1	1		180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0	0	0	0	0	0	0	0	0	0	0										
209	731-0010-00600	HAUTAJARVI LLOYD D	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	1	0	0	0	0	0	0	0	0	0	0	0	0	2 CABINS AND A GARAGE	1	1		180	218	256	100	100	280
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0	0	0	0	0	0	0	0	0	0	0										
210	731-0010-00544	HAUTAJARVI LLOYD D	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
212	731-0010-00545	PEDERSON KURT C	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	COMPOST TOILET	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
213	731-0010-00546	LINDIG JOHANNA M	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	1	0	0	0	0	0	0	0	0	0	0	0	0	2 CABINS	2	2		180	218	256	100	100	380
		TOTAL EDU FOR EACH CATEGORY		1	0.6	0	0	0	0	0	0	0	0	0	0	0	0										
214	731-0010-00540	JOHNSON GARY E	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 LOTS FOR FUTURE CABINS	EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
215	731-0010-00542	SLATINSKI JOHN IV	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	NO RUNNING WATER	1			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
216	731-0010-00560	SLATINSKI JOHN IV	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	PLAN ON TEARING DOWN CABIN AND REPLACING WITH FOUR SEAON STRUCTURE. ADDITIONAL FUTURE 3 BED CABIN USABLE FOR 2 SEASONS		3		180	218	256	100	100	300
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
217	731-0010-00550	URNESS JAMES L	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
218	731-0010-00500	GABLE RICHARD J & JO A	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	MUTIPLE OTHER CABINS ON PROPERTY, BUT ONLY ONE IS ACCOUNTED FOR	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										

				1.00	0.60	0.70	0.80	1.00	1.20	0.70	0.00	0.50	1.00	0.200	1.00	0.200	0.600		FLOW CALCULATIONS								
SEH LOT #	PIN	Owner Name	EDU Used in Rate Calcs	PRIMARY DWELLING	1 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	2 BD/1 BA CABIN (ADD'L TO PRIMARY DWELLING)	3 BD/2 BA CABIN (ADD'L TO PRIMARY DWELLING)	4 BD CABIN (ADD'L TO PRIMARY DWELLING)	5 BD CABIN (ADD'L TO PRIMARY DWELLING)	RV w/ SEWER & WATER HOOKUP	RV w/o SEWER & WATER HOOKUP	ROOM (MOTEL / LODGE)	RESTROOM (ADD'L)	FISH CLEANING FACILITY (ADD'L)	LAUNDRY (ADD'L)	RESTAURANT = 1/9. RESTROOM ALLOCATED SEPARATELY	HOUSEBOATS	NOTES	BDS IN PRIMARY DWELLING	BDS IN ADDITIONAL CABINS	NUMBER OF RV Spaces	FLOW 2 OR LESS BDS	FLOW 3 BDS	FLOW 4 BDS	ADD FLOW PER BEDROOM IN ADD CABINS	ADD FLOW for RV Site	DESIGN FLOW (GPD)
219	732-0010-04150	STATE OF MINNESOTA	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
220	732-0010-04299	HOLTON CINDY R	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
221	732-0010-04298	KESKE TRAVIS B	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
222	732-0010-04290	BRADLE CARRIE JO COLE	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
223	731-0010-00740	STATE OF MINNESOTA	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0		EMPTY LOT			180	218	256	100	100	0
		TOTAL EDU FOR EACH CATEGORY		0	0	0	0	0	0	0	0	0	0	0	0	0	0										
224	732-0010-04280	LUCE DENNIS R	1.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0									
		ADDITIONAL FUTURE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	COLLECT GREY WATER IN BUCKETS NO FLUSHING TOILET	2			180	218	256	100	100	180
		TOTAL EDU FOR EACH CATEGORY		1	0	0	0	0	0	0	0	0	0	0	0	0	0										
		TOTAL:	231.6																						TOTAL:	42,875

LEGEND

SOIL BORING LOCATIONS

200 0 200 400

scale 100 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES - 146794

DATE:
2/25/2020

OVERALL MAP

MAP NO. 1

Save: 7/16/2019 11:58 AM cmaki Plot: 2/25/2020 9:20 AM P:\PT\S\STLES\146794\5-final-dsgn\51-drawings\10-Civil\cadd\dwg\exhibit\SL146794_Overall Map.dwg

LEGEND

SOIL BORING LOCATIONS

FM

N

200 0 200 400

scale 100 feet

SEH

PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
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FILE NO.
STLES - 146794

DATE:
2/25/2020

OVERALL MAP

MAP NO. 2

Save: 7/16/2019 11:58 AM cmaki Plot: 2/25/2020 9:20 AM P:\PT\S\STLES\146794\5-final-dsgn\51-drawings\10-Civil\cad\dwg\exhibit\SL146794_Overall Map.dwg

Appendix D

Forcemain Layouts

PROPOSED TREATMENT FACILITY

4" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

RIVER CROSSING

2" DRILLED HDPE FM

2" DRILLED HDPE FM

2" DRILLED HDPE FM

3" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

2" DRILLED HDPE FM

ASH RIVER TRAIL

2" DRILLED HDPE FM

ASH RIVER TRAIL S

N

400 0 400 800

scale 200 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
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FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT NO. 1

FM

FM

3" DRILLED HDPE FM

FM

FM

FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

PROPOSED SANITARY SERVICE
WITH GRINDER STATION

2" DRILLED HDPE FM

ASH RIVER TRAIL

2" DRILLED HDPE FM

N

150 0 150 300
scale 75 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 2

Save: 2/14/2020 7:50 AM cmak| Plot: 2/14/2020 8:01 AM P:\PT\S\STLES\146794\5-final-dsgn\51-drawings\10-Civil\cad\dwg\exhibit\SL146794_Layout 1.dwg

FM

2" DRILLED HDPE FM

3" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

PROPOSED SANITARY SERVICE
WITH GRINDER STATION

N

150 0 150 300
scale 75 feet

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SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
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FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 3

PROPOSED TREATMENT FACILITY

PROPOSED SANITARY SERVICE WITH GRINDER STATION

2" DRILLED HDPE FM

4" DRILLED HDPE FM

3" DRILLED HDPE FM

2" DRILLED HDPE FM

2" HDPE RIVER CROSSING

2" DRILLED HDPE FM

2" DRILLED HDPE FM

FM

N

150 0 150 300

scale 75 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT NO. 4

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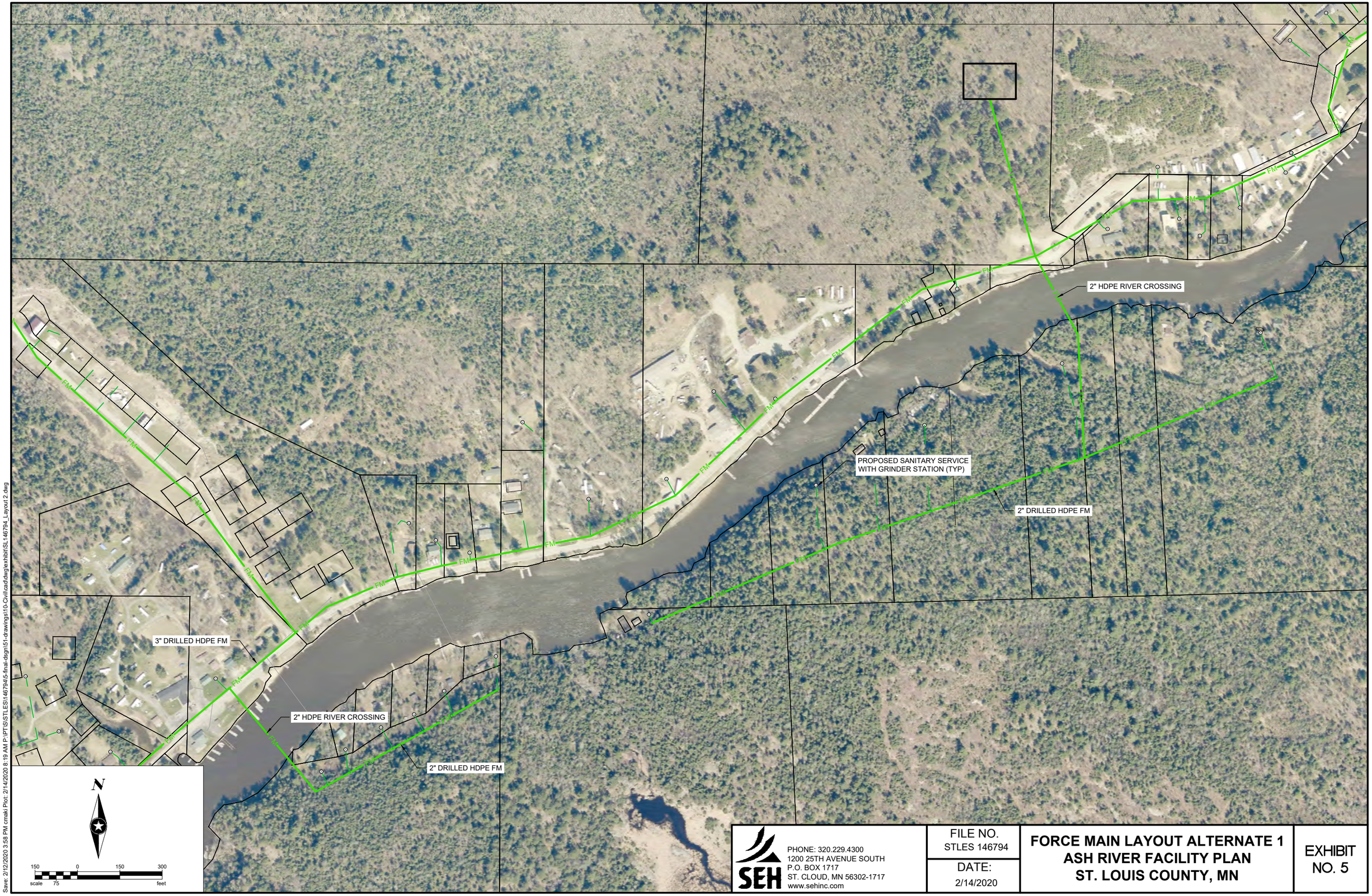

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SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
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FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT ALTERNATE 1
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 5

PROPOSED SANITARY SERVICE WITH GRINDER STATION (TYP)

2" DRILLED HDPE FM

PROPOSED WASTEWATER TREATMENT FACILITY

2" DRILLED HDPE FM

PROPOSED WASTEWATER TREATMENT FACILITY

N

150 0 150 300

scale 75 feet

SEH

PHONE: 651.490.2000
3535 VADNAIS CENTER DRIVE
ST. PAUL, MN 55110-5196
www.sehinc.com

FILE NO.
STLES 146794

DATE:
2/14/2020

FORCE MAIN LAYOUT ALTERNATIVE 2
ASH RIVER FACILITY PLAN
ST. LOUIS COUNTY, MN

EXHIBIT NO. 6

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Appendix E

WWTP Layouts

SULLIVAN BAY
(KABETOGAMA LAKE)

SURFACE DISCHARGE LOCATION 1

APPROXIMATE PROPOSED
TREATMENT AREA

SUBSURFACE DISCHARGE
LOCATION 2

SURFACE DISCHARGE
LOCATION 3

ASH RIVER

FM

N

200 0 200 400
scale 100 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES - 146794

DATE:
2/24/2020

DISCHARGE MAP
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 8

Save: 2/24/2020 1:57 PM cmaki Plot: 2/24/2020 2:16 PM P:\PT\S\STLES\146794\5-final-dsgn\51-drawings\10-Civil\cad\dwg\exhibit\SL146794_Discharge Map.dwg

SULLIVAN BAY
(KABETOGAMA LAKE)

TREATED EFFLUENT
DISPERSAL SITE

WASTEWATER TREATMENT
FACILITY SITE

TREATED EFFLUENT
DISPERSAL SITE

PROPOSED FORCE MAIN

FM

S

ASH RIVER TRAIL

ASH RIVER

N

60 0 60 120
scale 30 feet

SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES - 146794

DATE:
3/4/2020

WWTP SITE LAYOUT
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 9

TANK #1
SEPTIC TANK/SETTLING
38,000 GALLONS

TANK #2
SEPTIC TANK/PRE-AERATION
38,000 GALLONS
W/ 2.0 LIXOR UNITS (2 each)

TANK #3
EQUALIZATION TANK
38,000 GALLONS
W/ TRIPLEX EQUALIZATION

TANKS #4-6
TREATMENT TANKS
25,000 GALLONS EACH
W/ TWO COMPARTMENTS

EACH TANK WITH MYFAST 1.0/MYNITRIFAST 1.0,
SLUDGE RETURN PUMP IN EACH COMPARTMENT

TANK #7
ABCN DOSING TANK
9,000 GALLONS
W/ DUPLEX ABCN DOSING PUMPS &
DUPLEX RECIRC/SLUDGE RETURN

TANK #8
ABCN DENITE/POLISHING TANK
25,000 GALLONS/TWO COMPARTMENTS
MY ABCN 1.0/MYFAST 1.0,
SLUDGE RETURN PUMP IN EACH COMPARTMENT

TANK #9
CLARIFICATION/DOSE TANK
12,500 GALLONS/TWO COMPARTMENTS
CLARIFICATION FILTER, SLUDGE
RETURN PUMP, FIELD DOSING PUMPS

CONTROL BUILDING
THREE ROOM BUILDING
BLOWER ROOM, CONTROL
ROOM, & CHEMICAL FEED ROOM

SUSTAINABLE DRAINFIELD
DISTRIBUTION

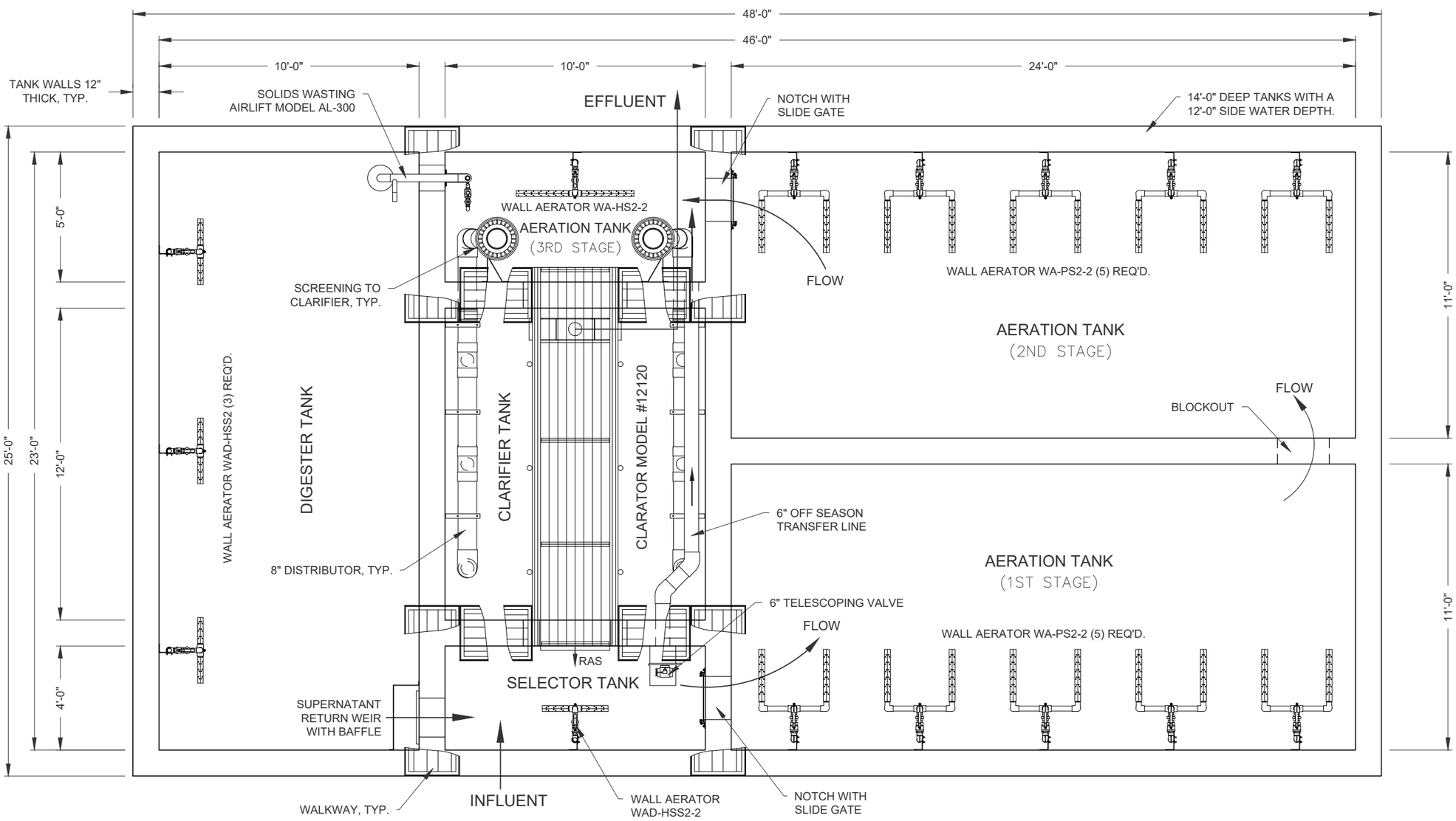
SEH
PHONE: 320.229.4300
1200 25TH AVENUE SOUTH
P.O. BOX 1717
ST. CLOUD, MN 56302-1717
www.sehinc.com

FILE NO.
STLES - 146794

DATE:
3/2/2020

TREATMENT SCHEMATIC
ASH RIVER SEWER DISTRICT
ST. LOUIS COUNTY, MN

EXHIBIT
NO. 10



Date: 02/25/20
Scale: NTS
Chk by:
Drawn by: JB
Title:

ASH RIVER, MN
WASTE WATER TREATMENT PLANT

Aero - Mod, Inc.
7927 U.S. Highway 24
Manhattan, Kansas 66502
PHONE: (785) 537-4995

Appendix F

Cost Estimates

3/5/2020

Ach River Facility plan, St. Louis County, MN
Sanitary Sewer Collection & Treatment
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - LOW PRESSURE COLLECTION SYSTEM

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
GENERA					
1	MOBILIZATION	LS	1.00	$315,000.00	$315,000.00
2	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$75,000.00	$75,000.00
3	CLEARING AND GRUBBING	LS	1.00	$40,000.00	$40,000.00
4	REMOVE EXISTING SEPTIC TANK	EA	105.00	$1,500.00	$157,500.00
PIPING AND TRANSMISSION					
5	4" HDPE FORCE MAIN PIPE (9' DEPTH,TRENCHLESS, ROCK)	LF	300.00	$120.00	$36,000.00
6	4" HDPE FORCE MAIN PIPE (9' DEPTH,TRENCHLESS, SOIL)	LF	300.00	$40.00	$12,000.00
7	3" HDPE FORCE MAIN PIPE (9' DEPTH,TRENCHLESS, ROCK)	LF	800.00	$100.00	$80,000.00
8	3" HDPE FORCE MAIN PIPE (9' DEPTH,TRENCHLESS, SOIL)	LF	7,000.00	$35.00	$245,000.00
9	2" HDPE FORCE MAIN (9' DEPTH, TRENCHLESS, ROCK)	LF	6,100.00	$110.00	$671,000.00
10	2" HDPE FORCE MAIN (9' DEPTH, TRENCHLESS, SOIL)	LF	2,100.00	$30.00	$63,000.00
11	4" GATE VALVE AND BOX	EA	2.00	$1,500.00	$3,000.00
12	3" GATE VALVE AND BOX	EA	4.00	$800.00	$3,200.00
13	2" GATE VALVE AND BOX	EA	10.00	$600.00	$6,000.00
14	1 1/2" PE FORCE MAIN SERVICE (9' DEPTH, TRENCHLESS, SOIL)	LF	2,900.00	$30.00	$87,000.00
15	1 1/2" PE FORCE MAIN SERVICE (9' DEPTH, TRENCHLESS, ROCK)	LF	9,000.00	$110.00	$990,000.00
16	1 1/2" CURB STOP AND BOX	EA	110.00	$700.00	$77,000.00
17	FORCE MAIN FLUSHING CONNECTION	EA	22.00	$4,700.00	$103,400.00
18	MAIN LINE TRACER WIRE ACCESS BOX	EA	40.00	$500.00	$20,000.00
19	AIR RELEASE MANHOLE 3" FM	EA	6.00	$8,500.00	$51,000.00
20	AIR RELEASE MANHOLE 2" FM	EA	4.00	$8,000.00	$32,000.00
21	CLEANOUT MANHOLE 3" FM	EA	5.00	$8,000.00	$40,000.00
22	CLEANOUT MANHOLE 2" FM	EA	3.00	$7,500.00	$22,500.00
23	STREET RESTORATION - GRAVEL (AS NEEDED)	CY	1,000.00	$40.00	$40,000.00
24	STREET RESTORATION - COUNTY ROAD (AS NEEDED)	SQ YD	1,000.00	$70.00	$70,000.00
25	MAINLINE ROCK EXCAVATION	CY	2,000.00	$200.00	$400,000.00
26	ROCK EXCAVATION LATERAL ASSEMBLY	EA	110.00	$1,800.00	$198,000.00
27	COMMON BORROW	CY	2,000.00	$16.00	$32,000.00
28	TOPSOIL BORROW	CY	1,000.00	$28.00	$28,000.00
29	CONNECT TO EXISTING SERVICE	EA	110.00	$650.00	$71,500.00
GRINDER STATIONS					
30	SIMPLEX GRINDER STATION (30" x 132")	EA	90.00	$18,000.00	$1,620,000.00
31	DUPLEX GRINDER STATION (60" x 132")	EA	20.00	$32,000.00	$640,000.00
32	GRANULAR FOUNDATION	CY	2,500.00	$30.00	$75,000.00
33	LATERAL ASSEMBLY (GRINDER STATION)	EA	110.00	$1,000.00	$110,000.00
34	ROCK EXCAVATION (GRINDER) (EV)	CY	1,200.00	$200.00	$240,000.00
				Subtotal:	**$6,655,000.00**

Contigency (20%):	$1,331,000.00
Engineering (Design and Bidding):	$666,000.00
Engineering (Construction Administration):	$666,000.00
Material Testing (2%):	$133,000.00
Legal and Administrative (2%):	$133,000.00
Bonding and Insurance (2%):	$133,000.00
TOTAL CAPITAL COST:	**$9,717,000.00**

3/5/2020

Ach River Facility plan, St. Louis County, MN
Sanitary Sewer Collection & Treatment
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - ADDITIONAL COST FOR ONE RIVER CROSSING TO SERVE PROPERTIES ON SOUTH SIDE OF ASH RIVER

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
COLLECTION SYTEM - ONE RIVER CROSSING					
1	MOBILIZATION	LS	1.00	$70,000.00	$70,000.00
2	BARGE COSTS	LS	1.00	$75,000.00	$75,000.00
3	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$20,000.00	$20,000.00
4	CLEARING AND GRUBBING	LS	1.00	$25,000.00	$25,000.00
5	2" HDPE FORCE MAIN (9' DEPTH, TRENCHLESS, ROCK)	LF	4,100.00	$110.00	$451,000.00
6	RIVER CROSSING (2" HDPE FM AND CASING)	LF	315.00	$200.00	$63,000.00
7	BRIDGE FOR PIPE CROSSING	LS	250,000.00	$1.00	$250,000.00
8	1 1/2" PE FORCE MAIN SERVICE (9' DEPTH, TRENCHLESS, ROCK)	LF	1,850.00	$110.00	$203,500.00
9	SIMPLEX GRINDER STATION (30" x 132")	EA	12.00	$18,000.00	$216,000.00
10	GRANULAR FOUNDATION	CY	500.00	$30.00	$15,000.00
11	LATERAL ASSEMBLY (GRINDER STATION)	EA	12.00	$1,000.00	$12,000.00
12	MAINLINE ROCK EXCAVATION	CY	300.00	$200.00	$60,000.00
13	ROCK EXCAVATION (GRINDER) (EV)	CY	100.00	$200.00	$20,000.00
				Subtotal	**$1,480,500.00**
				Contigency (20%):	$296,000.00
				Engineering (Design and Bidding):	$148,000.00
				Engineering (Construction Administration):	$148,000.00
				Material Testing (2%):	$30,000.00
				Legal and Administrative (2%):	$30,000.00
				Bonding and Insurance (2%):	$30,000.00
				TOTAL CAPITAL COST:	**$2,162,500.00**

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3/5/2020

Ach River Facility plan, St. Louis County, MN
Sanitary Sewer Collection & Treatment
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - ADDITIONAL COST FOR TWO RIVER CROSSINGS TO SERVE PROPERTIES ON SOUTH SIDE OF ASH RIVER

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
COLLECITON SYSTME ALTERNATIVE 1 - TWO SEPARATE RIVER CROSSINGS					
1	MOBILIZATION	LS	1.00	$85,000.00	$85,000.00
2	BARGE COSTS	LS	1.00	$75,000.00	$75,000.00
3	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$20,000.00	$20,000.00
4	CLEARING AND GRUBBING	LS	1.00	$25,000.00	$25,000.00
3	2" HDPE FORCE MAIN (9' DEPTH, TRENCHLESS, ROCK)	LF	3,560.00	$110.00	$391,600.00
4	RIVER CROSSING (BRIDGE W/ 2" HDPE FM AND CASING)	LF	800.00	$200.00	$160,000.00
5	BRIDGE FOR PIPE CROSSING	LS	500,000.00	$1.00	$500,000.00
5	1 1/2" PE FORCE MAIN SERVICE (9' DEPTH, TRENCHLESS, ROCK)	LF	1,850.00	$110.00	$203,500.00
6	SIMPLEX GRINDER STATION (30" x 132")	EA	12.00	$18,000.00	$216,000.00
7	GRANULAR FOUNDATION	CY	500.00	$30.00	$15,000.00
8	LATERAL ASSEMBLY (GRINDER STATION)	EA	12.00	$1,000.00	$12,000.00
9	MAINLINE ROCK EXCAVATION	CY	300.00	$200.00	$60,000.00
10	ROCK EXCAVATION (GRINDER) (EV)	CY	100.00	$200.00	$20,000.00
				Subtotal	**$1,783,100.00**
				Contigency (20%):	$357,000.00
				Engineering (Design and Bidding):	$178,000.00
				Engineering (Construction Administration):	$178,000.00
				Material Testing (2%):	$36,000.00
				Legal and Administrative (2%):	$36,000.00
				Bonding and Insurance (2%):	$36,000.00
				TOTAL CAPITAL COST:	**$2,604,100.00**

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3/5/2020

Ach River Facility plan, St. Louis County, MN
Sanitary Sewer Collection & Treatment
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - ADDITIONAL COST FOR INSTALLATION OF COLELCTION AND TRETAMENT SYSTEMS SOUTH OF ASH RIVER

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
ALTERNATE 2 - TWO COMMUNITY COLLECTION AND TREATMENT FACILITIES					
1	MOBILIZATION	LS	1.00	$68,000.00	$68,000.00
2	BARGE COSTS	LS	1.00	$250,000.00	$250,000.00
3	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$20,000.00	$20,000.00
4	CLEARING AND GRUBBING	LS	1.00	$25,000.00	$25,000.00
3	2" HDPE FORCE MAIN (9' DEPTH, TRENCHLESS, ROCK)	LF	3,200.00	$110.00	$352,000.00
4	1 1/2" PE FORCE MAIN SERVICE (9' DEPTH, TRENCHLESS, ROCK)	LF	1,850.00	$110.00	$203,500.00
5	SIMPLEX GRINDER STATION (30" x 132")	EA	12.00	$18,000.00	$216,000.00
6	GRANULAR FOUNDATION	CY	500.00	$30.00	$15,000.00
7	ON SITE SEWAGE TREATMENT FACILITY	EA	2.00	$150,000.00	$300,000.00
8	LATERAL ASSEMBLY (GRINDER STATION)	EA	12.00	$1,000.00	$12,000.00
9	MAINLINE ROCK EXCAVATION	CY	250.00	$200.00	$50,000.00
10	ROCK EXCAVATION (GRINDER) (EV)	CY	100.00	$200.00	$20,000.00
				Subtotal	**$1,531,500.00**
				Contigency (20%):	$306,000.00
				Engineering (Design and Bidding):	$153,000.00
				Engineering (Construction Administration):	$153,000.00
				Material Testing (2%):	$31,000.00
				Legal and Administrative (2%):	$31,000.00
				Bonding and Insurance (2%):	$31,000.00
				TOTAL CAPITAL COST:	**$2,236,500.00**

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3/5/2020

Ach River Facility plan, St. Louis County, MN
Sanitary Sewer Collection & Treatment
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - GRAVITY COLLECTION SYSTEM

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
GENERA					
1	MOBILIZATION	LS	1.00	$434,000.00	$434,000.00
2	DEWATERING	LS	1.00	$100,000.00	$100,000.00
3	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$125,000.00	$125,000.00
4	CLEARING AND GRUBBING	LS	1.00	$75,000.00	$75,000.00
5	REMOVE EXISTING SEPTIC TANK	EA	105.00	$1,500.00	$157,500.00
PIPING AND TRANSMISSION					
6	8" GRAVITY SEWER PIPE (TRENCHLESS, ROCK)	LF	12,000.00	$300.00	$3,600,000.00
7	8" GRAVITY SEWER PIPE (TRENCHLESS, SOIL)	LF	4,600.00	$40.00	$184,000.00
8	4" GRAVITY SERVICE PIPE (TRENCHLESS, ROCK)	LF	11,900.00	$200.00	$2,380,000.00
9	8" GATE VALVE AND BOX	EA	9.00	$4,000.00	$36,000.00
10	4" GATE VALVE AND BOX	EA	86.00	$3,000.00	$258,000.00
11	PUMP STATION	EA	4.00	$250,000.00	$1,000,000.00
12	MAIN LINE TRACER WIRE ACCESS BOX	EA	10.00	$500.00	$5,000.00
13	CLEANOUT MANHOLE 8"	EA	5.00	$20,000.00	$100,000.00
14	STREET RESTORATION - GRAVEL (AS NEEDED)	CY	1,000.00	$35.00	$35,000.00
15	STREET RESTORATION - COUNTY ROAD (AS NEEDED)	SQ YD	1,000.00	$60.00	$60,000.00
16	MAINLINE ROCK EXCAVATION	CY	2,500.00	$200.00	$500,000.00
17	COMMON BORROW	CY	2,000.00	$14.00	$28,000.00
18	TOPSOIL BORROW	CY	1,000.00	$28.00	$28,000.00
				Subtotal	**$9,106,000.00**

Contigency (20%):	$1,821,000.00
Engineering (Design and Bidding):	$911,000.00
Engineering (Construction Administration):	$911,000.00
Material Testing (2%):	$182,000.00
Legal and Administrative (2%):	$182,000.00
Bonding and Insurance (2%):	$182,000.00
TOTAL CAPITAL COST:	**$13,295,000.00**

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3/5/2020

Ash River Facility plan, St. Louis County, MN
Wastewater Treatment - Opinion of Probable Cost
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - SUBSURFACE DISCHARGE WITH FAST SYSTEM

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
GENERA					
1	MOBILIZATION	LS	1.00	$171,000.00	$171,000.00
2	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$60,000.00	$60,000.00
3	CLEARING AND GRUBBING	AC	4.00	$7,500.00	$30,000.00
TREATMENT FACILITY					
4	ROCK EXCAVATION FOR TREATMENT TANKS	CY	5,300.00	$180.00	$954,000.00
5	ACCESS ROAD AND PARKING AREA COMMON EXCAVATION	CY	6,000.00	$8.00	$48,000.00
6	ACCESS ROAD AND PARKING AREA CL 5	CY	6,000.00	$35.00	$210,000.00
7	FENCING - 6' CHAINLINK	LF	1,400.00	$30.00	$42,000.00
8	25' ROLLING VEHICLE GATE	EA	1.00	$8,000.00	$8,000.00
9	PEDESTRIAN GATE	EA	2.00	$1,000.00	$2,000.00
10	SITE ELECTRICAL SERVICE	LS	1.00	$75,000.00	$75,000.00
11	CHEMICAL, CONTROL, AND UV BUILDING - PREFAB ON CONCRETE PAD	LS	1.00	$80,000.00	$80,000.00
12	PRETREATMENT EQUIPMENT, TANKS AND INSTALLATION	LS	1.00	$875,000.00	$875,000.00
13	FLOW METER MANHOLE - ASSUME MANHOLE AND 2 METERS	LS	1.00	$40,000.00	$40,000.00
14	SITE PIPING	LS	1.00	$75,000.00	$75,000.00
15	HVAC	LS	1.00	$50,000.00	$50,000.00
16	ELECTRICAL AND CONTROLS	LS	1.00	$150,000.00	$150,000.00
17	GENERATOR WITH PAD	LS	1.00	$60,000.00	$60,000.00
MOUND DISTRIBUTION					
18	DISTRIBUTION FORCEMAIN	LF	5,000.00	$35.00	$175,000.00
19	MOUND DISTRIBUTION CHAMBERS	LS	1.00	$25,000.00	$25,000.00
20	CLEARING AND GRUBBING	AC	2.00	$7,500.00	$15,000.00
21	GRANULAR BORROW	CY	3,200.00	$28.00	$89,600.00
22	COMMON BORROW	CY	3,200.00	$18.00	$57,600.00
23	TOPSOIL BORROW	CY	1,600.00	$20.00	$32,000.00
24	PIEZOMETERS	EA	12.00	$2,000.00	$24,000.00
25	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$80,000.00	$80,000.00
				Subtotal:	**$3,429,000.00**

Contigency (20%):	$686,000.00
Land:	$100,000.00
Engineering (Design and Bidding):	$343,000.00
Engineering (Construction Administration):	$343,000.00
Material Testing (2%):	$69,000.00
Legal and Administrative (2%):	$69,000.00
Bonding and Insurance (2%):	$69,000.00
TOTAL CAPITAL COST:	**$5,108,000.00**

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3/5/2020

Ash River Facility plan, St. Louis County, MN
Wastewater Treatment - Opinion of Probable Cost
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - SUBSURFACE DISCHARGE WITH FAST SYSTEM - O & M

	Annual Cost	TOTAL
Operation and Management (Management Companay Costs)		
Contract Operator	$36,000.00	
Sample Collection	$7,500.00	
Regulatory Reporting	$2,500.00	
Potential Additional Testing	$2,500.00	
Status Reporting	$1,500.00	**$50,000.00**
Routine Maintenance and Operation Expenses		
Sanitary District Administrative	$800.00	
Potential Legal and Engineering Services	$2,500.00	
Insurance	$2,000.00	
Electrical	$24,000.00	
Mowing	$600.00	
Snow Removal	$1,800.00	
Supplies	$7,500.00	
Chemical	$5,500.00	
Treatment Facility Septage Hauling	$2,000.00	**$46,700.00**
Annualized Capital Replacement Costs		
Grinder Pumps	$4,500.00	
Treatment System Pumps	$1,200.00	
Treatment System Blowers	$1,000.00	**$6,700.00**
	TOTAL:	**$103,400.00**

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3/5/2020

Ash River Facility plan, St. Louis County, MN
Wastewater Treatment - Opinion of Probable Cost
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - SURFACE DISCHARGE WITH AEROMOD SYSTEM

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	CAPITAL COST
GENERA					
1	MOBILIZATION	LS	1.00	$149,000.00	$149,000.00
2	EROSION CONTROL AND TURF RESTORATION	LS	1.00	$45,000.00	$45,000.00
3	CLEARING AND GRUBBING	AC	2.00	$7,500.00	$15,000.00
TREATMENT FACILITY					
4	ROCK EXCAVATION FOR TREATMENT TANKS	CY	2,500.00	$180.00	$450,000.00
5	ACCESS ROAD AND PARKING AREA COMMON EXCAVATION	CY	6,000.00	$8.00	$48,000.00
6	ACCESS ROAD AND PARKING AREA CL 5	CY	6,000.00	$35.00	$210,000.00
7	FENCING - 6' CHAINLINK	LF	1,400.00	$30.00	$42,000.00
8	25' ROLLING VEHICLE GATE	EA	1.00	$8,000.00	$8,000.00
9	PEDESTRIAN GATE	EA	2.00	$1,000.00	$2,000.00
10	SITE ELECTRICAL SERVICE	LS	1.00	$100,000.00	$100,000.00
11	SEPTIC AND EQ TANKS AND INSTALLATION	LS	1.00	$50,000.00	$50,000.00
12	EQ TANK PUMPS	LS	1.00	$40,000.00	$40,000.00
13	CHEMICAL FEED TANK AND PUMP SKID	LS	1.00	$35,000.00	$35,000.00
14	UV DISINFECTION SYSTEM	LS	1.00	$60,000.00	$60,000.00
15	WASTEWATER TREATMENT BUILDING	LS	1.00	$750,000.00	$750,000.00
16	AERO-MOD TREATMENT EQUIPMENT, TANKS AND INSTALLATION	LS	1.00	$600,000.00	$600,000.00
17	FLOW METER MANHOLE - ASSUME MANHOLE AND 2 METERS	LS	1.00	$40,000.00	$40,000.00
18	SITE PIPING	LS	1.00	$75,000.00	$75,000.00
19	HVAC	LS	1.00	$125,000.00	$125,000.00
20	ELECTRICAL AND CONTROLS	LS	1.00	$175,000.00	$175,000.00
21	GENERATOR WITH PAD	LS	1.00	$100,000.00	$100,000.00
				Subtotal:	**$3,119,000.00**
				Contigency (20%):	$624,000.00
				Land:	$100,000.00
				Engineering (Design and Bidding):	$312,000.00
				Engineering (Construction Administration):	$312,000.00
				Material Testing (2%):	$62,000.00
				Legal and Administrative (2%):	$62,000.00
				Bonding and Insurance (2%):	$62,000.00
				TOTAL CAPITAL COST:	**$4,653,000.00**

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3/5/2020

Ash River Facility plan, St. Louis County, MN
Wastewater Treatment - Opinion of Probable Cost
Ash River Area
SEH No. STLES 146794

OPINION OF PROBABLE COST - SURFACE DISCHARGE WITH AEROMOD SYSTEM - O & M

	Annual Cost	TOTAL
Operation and Management (Management Companay Costs)		
Contract Operator	$65,000.00	
Sample Collection	$7,500.00	
Regulatory Reporting	$2,500.00	
Potential Additional Testing	$2,500.00	
Status Reporting	$1,500.00	**$79,000.00**
Routine Maintenance and Operation Expenses		
Sanitary District Administrative	$800.00	
Potential Legal and Engineering Services	$2,500.00	
Insurance	$2,000.00	
Electrical	$36,000.00	
Mowing	$600.00	
Snow Removal	$1,800.00	
Supplies	$7,500.00	
Chemical	$12,000.00	
Treatment Facility Septage Hauling	$2,000.00	**$65,200.00**
Annualized Capital Replacement Costs		
Grinder Pumps	$4,500.00	
Treatment System Pumps	$1,200.00	
Treatment System Blowers	$2,600.00	**$8,300.00**
	TOTAL:	**$152,500.00**

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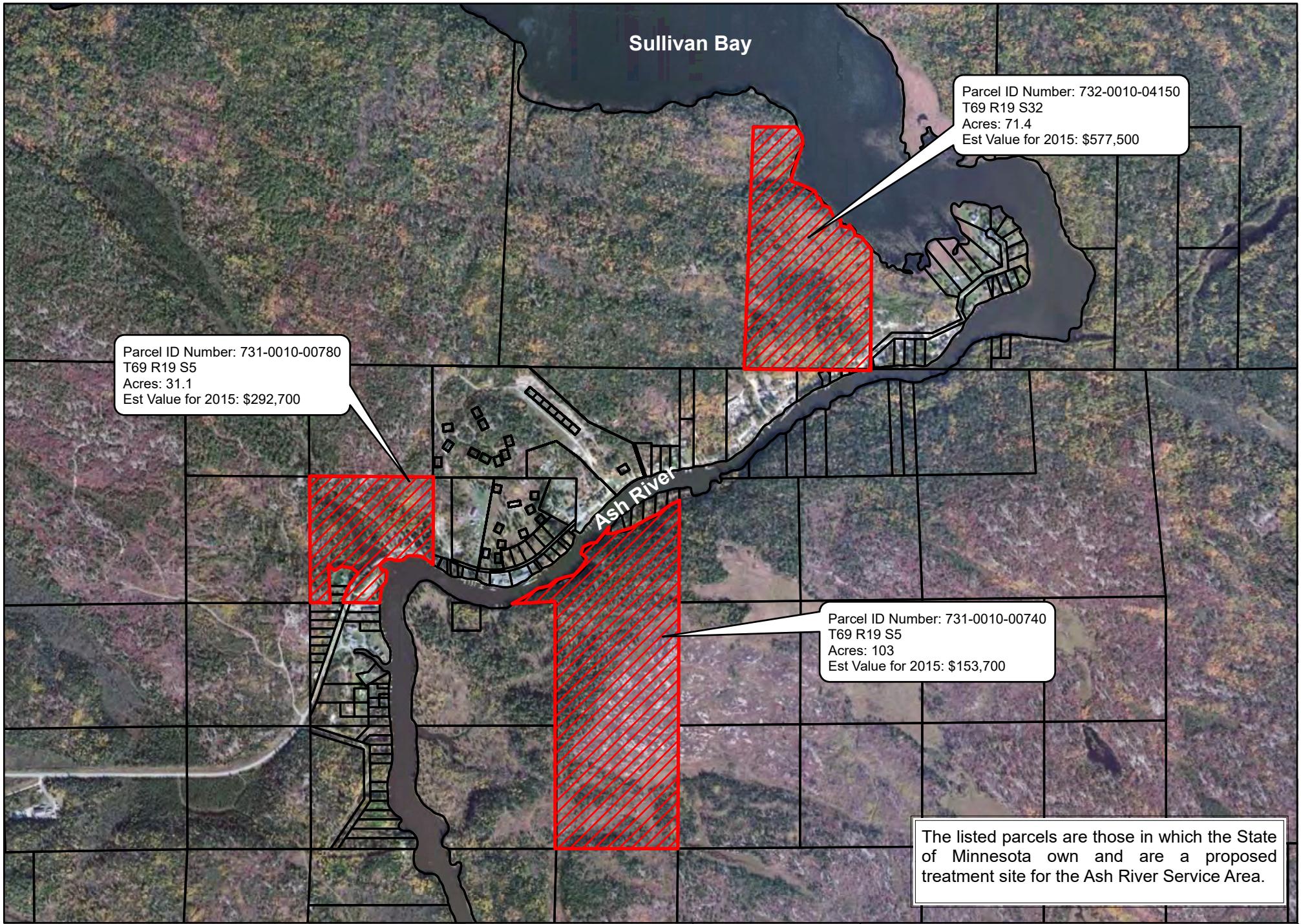
Appendix G

Soil Exploration Areas



Short Elliott Hendrickson
21 NE 5th Street, Suite 200
Grand Rapids, MN 55744
Phone: 218.322.4500

0 750 1,500 Feet

Note: Proposed location of improvements are approximate.

Project Number:
-

Date: April 16, 2014

Ash River
State of Minnesota Owned Land

1/1

Path: P:\PT\S\STLCO\118965\1-genl\16-meet&monthlyupdates\April2014\AshRiverDNRLAND.mxd

February 25, 2016

Mr. Mark St. Lawrence, Director
St. Louis County Environmental Services Department
Northland Office Center
307 South First Street, Suite 115
Virginia, MN 55792

Re: Onsite Wastewater System Planning
Ash River, Unorganized Twp., St. Louis Co., MN

Dear Mr. St. Lawrence:

You retained MATRIX Soils & Systems to evaluate feasibility of treating and dispersing wastewater from the Ash River area within a proximal State of Minnesota parcel. This letter report presents results and conclusions of the evaluation including subsurface and surface methods of dispersal being feasible for projected wastewater flows.

BACKGROUND

Ash River, an unincorporated rural community comprised of resorts and single family dwellings along the shores at mouth of its namesake, is a popular point of entry to the eastern end of Kabetogama and western end of Namakan lakes in St. Louis County, Minnesota. Because the community is rural and somewhat remote, community water supply and wastewater systems are on site. Some of the wastewater systems do not meet current code requirements resulting in the need for their replacement. Development density and difficult site and soil conditions necessitate pursuit of an off-site centralized wastewater system to meet these needs. St. Louis County and Short Elliott Hendrickson of St. Cloud, Minnesota, are assisting the community with wastewater facility planning and are considering dispersal of community wastewater to a parcel currently owned by the State of Minnesota. MATRIX Soils & Systems was retained to determine feasibility of parcel use and best method of wastewater dispersal through evaluating subsurface and surface wastewater dispersal capabilities.

SITE AND SOIL CONDITIONS

Community to be served by the wastewater facility is comprised of resorts, which typically include offices, lodges, and cabins, and single family cabins located in parts of sections 4 and 5, Township 68 North, and parts of sections 32 and 33, Township 69 North, both unorganized townships of Range 19 West in St. Louis County, Minnesota, approximately thirty miles east-southeast of International Falls. As is typical of resort areas in northern Minnesota, summer populations are highest with winter populations being only a fraction. Current estimate of wastewater flow associated with summer populations is 41,800 gallons per day (gpd).

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Wooded land being considered for wastewater treatment and dispersal is a 71.4-acre parcel, which lies immediately adjacent to the community near its northeastern end and is currently owned by the State of Minnesota, in part of the southeast ¼ of the southwest ¼ of Section 32 of township 69. Parcel width is approximately 1,300 feet (east-west) and 2,600 feet deep (north-south). Southwestern shore of Sullivan Bay of Lake Kabetogama borders northeastern side of the parcel. Southeastern corner of the parcel lies along the northern shore of Ash River. Other undeveloped and developed public and private lands border the other sides.

Potential treatment and dispersal area site and soil conditions of a portion of the parcel were observed during site visits October 3rd, and 26th through 30th, 2015. Vegetation and ground surface conditions were visually observed. Soil test pits were exposed by a machine excavator and by hand. A total of 19 test pits were excavated within two areas, six hand-excavated in the Western Area and thirteen machine-excavated in the Eastern Area. The observed soil profiles were described using U.S. Department of Agriculture (USDA) nomenclature. In addition, saturated hydraulic conductivity (k_{sat}) of surface, subsoil, and substrate horizons was measured in vicinity of the pits at 29 locations, 23 using a compact constant head permeameter and methods outlined by Amoozegar and Warrick[1] and six using a mini disk infiltrometer and methods provided by the device manufacturer[2]. Test pits and other observed features were horizontally located using an hand-held geographic positioning system (GPS) unit. Approximate test pit locations are shown in the attached Figure 1.

Physiographically, the potential treatment and dispersal areas lie upon summit, shoulder, and back slopes of two wooded hills, bases and summits of which are approximately 50 feet and 85-to-90 feet, respectively, above surface level of the bay and river. Outcrops of bedrock are observable on both hills. A large approximately 13-acre low area likely to be classed as wetland in central portion of the parcel separates the hills. Six soil series have been mapped by the United States Department of Agriculture Natural Resources Conservation Service in southern half of the parcel: one (Conic) on hill of the Western Area, two (Rollins and Biwabik) on hill of the Eastern Area, and three (Foglake-Hassman depressional complex, Cathro, and Tacoosh) in the low area. The Western Area soil is generally formed in shallow loamy glacial tills above bedrock, whereas, the Eastern Area soils formed in deep sandy glacial outwash materials. Soils of the low area are generally mucky organic material above fine and coarse-textured loams that are very poorly drained. These soils reflect conditions typical of the geomorphic region, the Tower-Ely Glacial Drift and Bedrock Complex, in which a thin layer of gravelly glacial till mostly covers the underlying bedrock and areas of sandy outwash can be found.[3]

[1] Amoozegar, A. and A.W. Warrick. 1986. Hydraulic conductivity of saturate soils: Field methods. pp. 735 – 770. *In* A. Klute (ed.) Methods of Soil Analysis Part 1, Physical and Mineralogical Methods, 2nd Ed. ASA/SSSA, Madison, WI.

[2] Decagon Devices, Inc. 2005. Mini Disk Infiltrometer User's Manual. Decagon Devices, Pulman, WA.

[3] Univ. of MN Dept. of Soil Science et al. 1981. Minnesota soil atlas, International Falls-Two Harbors sheet. Misc. Rep. No. 177. Univ. of MN Ag. Exp. Sta., St. Paul.

Observed soil conditions resembled those mapped. Throughout the Western Area the soils are somewhat coarser than the typical Conic series, but remain within the accepted range of variability.[4] Soils of the Eastern Area are comprised of those mapped, Rollins at crest, shoulder, and upper back-slopes of the hill and Biwabik on the lower back-slopes. Two other soil series: Cutaway-like and Spooner-like, which were not mapped but are not atypical of the region, were observed on northern back and foot-slope of the Eastern Area hill. Interspersed among the soils are a few areas dominated by outcrops of bedrock. Figure 2 presents projected extent of the eight mapping units delineated: Conic-like above bedrock, Conic-like over a clayey substrate above bedrock, Rollins-like, Biwabik-like above bedrock, Biwabik-like above periodically saturated horizons, Cutaway-like, and Spooner-like. The mapping unit (C2) is presented as likely being hydric based on its depressional topographic position and cursory observation of vegetation. Detailed profile descriptions associated with all but mapping unit C2 for which none were observed are attached.

Both evaluated areas have potential for wastewater treatment and dispersal. Within the Western Area slopes are typically 14 percent, ranging from 3 percent to 20 percent. Cross-slope distance available for treatment and dispersal is approximately 700 feet, width approximately 150 feet, and total area approximately 4-¼ acres. Soils within the area typically consist of 8 inches of moderately structured loamy fine sand above 9 inches of weakly to unstructured fine sand subsoil over 4 inches of unstructured fine sand above 3 inches of unstructured very fine sand substrates underlain by bedrock, fractured to varying degrees. Soil mottling, an indication of periodic saturation, was only observed in the fine sand substrate of Mapping Unit A4 near base of the hill slope and above the clayey horizon of Mapping Unit A5 on eastern side of the hill (see soil profile descriptions TP1 through TP6).

In the Eastern Area, the two mapping units having the most potential for wastewater treatment and dispersal are A1, the Rollins-like soil, and A2, the Biwabik-like soil, both formed in glacial outwash material. Mapping Unit A1 slope ranges from 6 percent to 24 percent, and cross-slope distance and width available for treatment and dispersal are 600 feet and 320 feet, respectively. Soil of this unit is typically 6 inches of moderately structured loamy sand above 10 inches of weakly structured loamy sand subsoil over unstructured sand to very coarse sand substrates. Consistently unsaturated permeable soil depth is at least 74 inches. Site characteristics of Mapping Unit A2 include a typical slope of 10 percent, cross-slope distance of approximately 600 feet, and width of 190 feet. Soil of this unit is typically 6 inches of weakly structured sand to loamy sand above 13 inches of unstructured sand subsoil over unstructured sand substrate underlain by bedrock fractured to varying degrees. Consistently unsaturated permeable soil depth is typically 48 inches ranging from 33 inches to 87-plus inches. Total area available for treatment and dispersal including mapping units B and C1 is approximately 9-¾ acres.

[4] Risley, R. 2016. Personal communication. USDA, NRCS, Duluth, MN.

Saturated hydraulic conductivity (k_{sat}) was measured in surface horizons throughout both potential treatment and dispersal areas, to estimate of infiltration capability, as well as in subsoil and substrate horizons. Specific rates measured for the surface horizons of each mapping unit are indicated in the table on the attached Figure 2. Surface, subsoil, and substrate k_{sat} measurements in the Western Area were 7.8 inches per hour (in./hr.) or 116 gallons per day per square foot (gpd/ft^2), 30 gpd/ft^2, and 30 gpd/ft^2, respectively; and in the Eastern Area, for Mapping Unit A1, 12 in./hr. (180 gpd/ft^2), 285 gpd/ft^2, and 98.0 gpd/ft^2, respectively; for mapping units A2 and A3, 4.8 in./hr. (72 gpd/ft^2), 119 gpd/ ft^2, and 170 gpd/ft^2, respectively; and for the surface horizons of mapping units B and C1, 17 in./hr. (255 gpd/ft^2).

WASTEWATER TREATMENT AND DISPERSAL CAPABILITY

WASTEWATER

Service area water use is and will remain residential and commercial in nature, comprised primarily of typical household activities (toilet use, bathing, food preparation, and cleaning), but also includes commercial preparation of food and laundry associated with some of the resorts. On these bases, a higher than residential waste strength is expected, and additional pretreatment of septic tank effluent prior to dispersal should be planned. Recommended target additional pretreatment level is 30-day averages of biochemical oxygen demand (BOD_5) no more than 25 milligrams per liter (mg/L) and total suspended solids (TSS) no more than 30 mg/L, i.e. a secondary treatment level[5] equal to or better than a Minnesota Pollution Control Agency (MPCA) Subsurface Sewage Treatment System Program treatment level of B, which includes a fecal coliform count limit of no more than 10^4 per 100 milliliters (ml)[6].

SUBSURFACE INFILTRATION

Subsurface treatment and dispersal capability is dependent mainly on soil conditions of a site, but it's also dependent on type of wastewater discharged to the soil as such affects system configuration and amount of land required. In addition to service area septic tank effluent being expected to be stronger than residential, within the Western Area additional pretreatment of septic tank effluent would be necessary prior to or with dispersal because there is less than three feet of consistently unsaturated permeable (suitable) soil, which, due to the underlying bedrock being fractured to varying degrees, will cause subsurface water movement to be primarily horizontal. Under such conditions, site dispersal capability as represented by contour loading rate would be the factor limiting system size, 15.3 gpd per foot (gpd/ft) being the maximum acceptable rate projected based on the current observations and measurements of site conditions. With the approximate 700-foot area cross-slope distance available for a system, dispersal capability is projected to be 10,700 gpd, less than the projected summer flow rate.

[5] Crites, R., and G. Tchobanoglous. 1998. Small and Decentralized Wastewater Management Systems. WCB/McGraw-Hill, Boston, MA.

[6] Minnesota Pollution Control Agency. 2008. Minnesota Rules, Chap. 7083.4030 Table III. Office of the Revisor, St. Paul, MN.

Within Mapping Unit A1 of the Eastern Area, flow of soil water would be primarily vertical due to suitable soil depths being four feet or greater, and normal septic tank effluent and standard construction practices would be the factors limiting site treatment and dispersal capability. For an MPCA Treatment Level B effluent, a loading rate of 1.6 gpd/ft^2 would be the recommended rate for infiltrative surfaces installed as deep as 36 inches below existing ground surface. Construction of infiltrative surfaces within 40 percent to 50 percent of an available area is typical. On these bases site treatment and dispersal capability would be in the range of 41,200 gpd to 51,500 gpd, sufficient to accommodate the projected summer flow rate.

Within Mapping Unit A2 of the Eastern Area suitable soil depths above bedrock are at least nominally three feet, and flow of soil water would be vertical as well as horizontal. For such conditions contour loading rate may be the factor limiting treatment and dispersal capability. Placing infiltrative surfaces at grade would maximize capability and result in a contour loading of 59 gpd/ft being the maximum acceptable rate projected based on the current observations and measurements of site conditions. With the approximate 600-foot area cross-slope distance available for a system, dispersal capability is projected to be 35,400 gpd, somewhat less than the projected summer flow rate.

IRRIGATION

Capability of an area to accommodate surface irrigation of wastewater is dependent on the interaction of soil conditions, vegetation, and environmental inputs of precipitation and temperature. Hydraulically, an area must be able to process the addition of wastewater without loss by surface runoff and subsurface leaching, which thereby results in unsaturated, aerobic soils fostering the treatment of wastewater nutrients and other constituents. Therefore, not only can wastewater not be added at a rate in excess of the soil infiltration rate, it cannot be added in amounts that exceed the ability of the soil-vegetation system to store and use the added water. Common practice is to limit the amount of wastewater that may be irrigated to the amount of evapotranspiration (ET) that exceeds precipitation inside the limits of soil available water-holding capacity (AWHC), which is the amount of water remaining in a thoroughly wetted soil that has freely drained (by gravity) for a two-to-three day period (soil field capacity, when drainage theoretically becomes negligible) less the amount of water held by the soil at its permanent wilting point, i.e. the amount held by the soil at a suction of 1.5 megapascals (15 bars).[7] The permanent wilting point is often thought to be the soil moisture content at which plants can no longer extract water, and for wastewater irrigation systems this is an acceptable assumption. Nevertheless, the ability of plants to extract water varies. In essence, an area being used for wastewater irrigation is being managed to remain at an unsaturated level where gravity drainage is negligible by irrigating wastewater at an overall rate no faster than it plus precipitation can be used (transpired) by area plants and/or freely evaporated.

[7] Soil Science Society of America. 1997. Glossary of soil science terms 1996. SSSA, Madison, WI.

Operation of a wastewater irrigation system is typically managed via monitoring precipitation and ET, and applying no more wastewater than is allowed to bring the soil moisture level to field capacity using a simple model adapted from the University of Minnesota Extension's Irrigation Scheduling Checkbook Method for irrigating crops.[8] With this method, if a soil moisture deficit – a moisture amount below field capacity – is determined, irrigation can proceed by the amount of the deficit. The deficit of a given day is determined by adding the deficit of the previous day to evapotranspiration of the current day and subtracting precipitation and any irrigation. This deficit can be no greater than AWHC of the soil; if a greater deficit is computed, the soil AWHC becomes the deficit. If precipitation plus irrigation of a given day exceeds the deficit available, the method sets the deficit to zero, ignoring the excess soil moisture thereby assuming its loss from the system, which may or may not be true during wet times of the year or in shallow or dense soils, or soils with a high percentage of coarse fragments, and thereby overestimate subsequent available deficits. On the other hand, runoff, comprised of surface losses of precipitation including overland flow and interception, is also ignored by the method resulting in underestimates of available deficits when such occurs. In the case of forested areas, interception of up to 25 percent of annual precipitation has been observed,[9] but such depends on precipitation event intensity, and its exclusion from the computations can be considered a safety factor. During an irrigation season, typically May through October, wastewater generated during the whole year is treated and dispersed with off-season flows being stored until conditions are suitable for irrigation.

The table in Figure 2 summarizes mapping unit irrigation capacities computed using a modified Checkbook Method. Mapping units A1, A2, and B each have projected annual irrigation capacity of at least 10 inches, whereas, mapping units A3 and A4 each have a projected 9-inch per year capacity, and Mapping Unit A5 a 7-inch per year capacity. These rates compare favorably to the target rate of 8-to-10 inches per year suggested[10]. Projected annual irrigation capacity for mapping unit C1 is 2 inches because of shallow depth of consistently unsaturated soil. Considering these projected irrigation capacities and excluding the contribution of Mapping Unit C2 due to its likely hydric condition, in the Western Area there is an estimated 1.0-million-gallon annual irrigation capability and in the Eastern Area a 2.9-million-gallon annual irrigation capability, the sum of these just exceeding the currently projected (90-day) summer need of 3.8 million gallons.

Note Checkbook Method modifications utilized to compute mapping unit irrigation capacities were accounting for loss of precipitation due to ongoing drainage and accounting for the

[8] Univ. of MN Ext. 2002. Irrigation scheduling checkbook method. http://www.extension.umn.edu/distribution/cropsystems/DC1322.html.

[9] Schwab, G.O., R.K. Frevert, T.W. Edminster, and K.K. Barnes. 1966. Soil Water and Conservation Engineering, 2nd Ed. John Wiley & Sons, New York, NY.

[10] Stark, S. 2012. Personal communication. MPCA, Brainerd, MN.

accumulation of soil water in excess of soil AWHC. (The effect of runoff was excluded because precipitation event intensity cannot be gauged via the available data.) Also note capacities were computed using daily precipitation data from a climate station in the Kettle Falls area, and ET computed for a location in vicinity of the Ash River area by a model available on the internet, for a nine-year period, 2007 through 2015, along with bulk density and AWHC estimated from literature data for each mapping unit horizon in consideration of observed morphological characteristics.[11, 12, 13, 14, 15]

CONCLUSIONS

For the site conditions observed and results of this evaluation, the following are concluded:

- Summer wastewater flows are projected to average 41,800 gpd and total approximately 3.8 million gallons.
- Service area septic tank effluent strength is projected to be higher than residential because of the commercial facilities that will contribute wastewater flows, which will necessitate the need for additional pretreatment.
- Sufficient area of suitable conditions exists within the Eastern Area for subsurface infiltration of projected summer wastewater flows.
- Use of both potential wastewater treatment and dispersal areas would be necessary for surface irrigation, but the amount of area may be insufficient to accommodate annual flows.

Based evaluation results and these conclusions, subsurface infiltration of the Ash River area wastewater is feasible, and surface irrigation within the areas reviewed is likely not. Nevertheless, there likely is sufficient area for surface irrigation within the parcel considering only its southern half has been evaluated. Therefore, acquisition of the parcel is recommended, and further wastewater facility planning be pursued. Should subsurface infiltration be the preferred method of treatment and dispersal, further soil and hydrogeologic investigations would be necessary for wastewater system design. Should surface irrigation be preferred, additional mapping of site and soil conditions would be necessary to identify sufficient area to accommodate annual flows and appropriate set-back distances.

[11] Univ. of MN, MN Climatology Working Group. 2016. Historical precipitation data retrieval. http://climate.umn.edu/hidradius/radius_new.asp.

[12] Univ. of WI Ext. 2016. Estimated ET for WI and MN. http://agwx.soils.wisc.edu/uwex_agwx/sun_water/et_wimn.

[13] USDA NRCS. 2016. National Coop. Soil Survey physical soil properties. Web Soil Survey, http://websoilsurvey.nrcs.usda.gov.

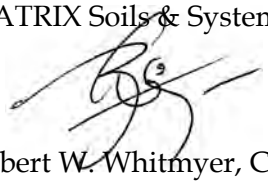
[14] USDA NRCS. 2001. Estimating soil moisture by feel and appearance. nmp.tamu.edu/content/tools/estimatingsoilmoisture.pdf.

[15] Saxton, K.E. and W.J. Rawls. 2006. Soil water characteristic estimates by texture and organic matter for hydrologic solutions. SSSA Jour. 70(5): 1569-1578.

This letter report should provide the information necessary to continue the Ash River service area wastewater system planning process. If you or anyone else has questions regarding this report, please call me at (218)390-2869.

Sincerely,

MATRIX Soils & Systems, Inc.



Robert W. Whitmyer, CPSS, PSS, Advanced Designer/Inspector, Service Provider
President

Attachments

cc: Randy Jenniges, Short Elliott Hendrickson – St. Cloud

DRAWN RWW	SITE PLAN	AS SHOWN	0	SOIL TEST LOCATIONS	10/28/15
		SCALE	REV.	DESCRIPTION	DATE

MATRIX Soils & Systems

ASH RIVER

PART SE 1/4 OF THE SW 1/4 OF SEC. 32
T69N, R19W, UNORGANIZED TOWNSHIP
ST. LOUIS COUNTY, MINNESOTA

FIGURE 1

SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
TEST PIT* TP19
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 15 % convex, linear ridge summit-slope @ 42° & 222°
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 5	10YR 3/2	sand; 25-30% surface cobbles and boulders	weak to moderate, medium granular; very friable, moist		many very fine, common fine, and few medium and coarse roots; clear wavy boundary	0.8/1.6§
Bw	5 – 12	10YR 4/4	sand	single grain; very friable, moist		common very fine and fine, and few medium roots; gradual wavy boundary	0.8/1.6§
C1	12 – 21	10YR 5/6	sand; < 5% gravel	single grain; loose, dry to moist		few very fine, fine, and medium roots; gradual wavy boundary	0.8/1.6§
C2	21 – 33	10YR 5/8	sand	single grain; loose, dry to moist		very abrupt irregular boundary	0.8/1.6§
2R	33		FRACTURED BEDROCK			END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

§ Provisional rate, i.e. rate that is or would be acceptable with an underlying 3 feet of consistently unsaturated, permeable soil.

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 License No. 30355

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP1
LOCATION† 13 % convex, concave back-slope @ 63°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 7	10YR 3/2	loamy fine sand	moderate, fine granular; very friable, moist		many very fine, common fine, and few medium and coarse roots; clear wavy boundary	0.6/1.0§
Bw	7 – 17	10YR 4/6	fine sand	weak, fine granular; very friable, moist		common very fine and fine, and few medium and coarse roots; clear wavy boundary	0.6/1.0§
C	17 – 21	2.5Y 6/4	fine sand	massive; very friable, moist to very moist	common, fine, faint 2.5Y 5/4, round Fe concentrations	few very fine and fine roots; abrupt wavy boundary	NP‖
2BC	21 – 24	10YR 5/4	clay	weak, fine angular blocky; very firm, sticky, moist to dry	common, fine, faint 10YR 5/6, round Fe concentrations	few very fine and fine roots	NP
	24		BEDROCK @ 47 in.			END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

§ Provisional rate, i.e. rate that is or would be acceptable with an underlying 3 feet of consistently unsaturated, permeable soil.

‖ Discharge of STE to this horizon is not permitted.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP2
LOCATION† 3 % convex, convex summit-slope @ 207°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 9	10YR 3/2	fine sand	moderate, medium granular; very friable, moist to dry		common very fine and fine, and few medium and coarse roots; clear wavy boundary	0.6/1.0§
C1	9 – 17	10YR 6/4	fine sand; < 5% gravel	massive; very friable, moist		common very fine and fine, and few medium and coarse roots; gradual wavy boundary	0.4/0.8§
C2	17 – 27	10YR 7/3	very fine sand; < 5% gravel and cobbles	massive; slightly hard to soft, dry to moist		few very fine, fine, and medium roots; very abrupt wavy boundary	0.4/0.8§
2R	27		BEDROCK			END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP3
LOCATION† 20 % linear, convex back-slope @ 326°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
AB	0 – 8	10YR 4/3	fine sand	weak, fine granular; soft, dry to moist		common very fine and fine, and few medium roots; very abrupt wavy boundary	0.6/1.0§
Bw	8 – 16	10YR 4/6	fine sand; < 5% gravel	single grain; loose, moist to dry		common very fine, fine, and medium, and few coarse roots; abrupt wavy boundary	0.6/1.0§
C	16 – 24	2.5Y 7/3	very fine sand; < 5% gravel, cobbles, and stones	massive; soft to slightly hard, dry to moist		few very fine, fine, and medium roots; very abrupt wavy boundary	0.4/0.8§
2R	24		BEDROCK			END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP4
LOCATION† 18 % linear, convex back-slope @ 258°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 8	10YR 3/3	loamy fine sand	moderate, medium granular; very friable, moist		many very fine, common fine, and few medium and coarse roots; abrupt wavy boundary	0.6/1.0§
Bw	8 – 17	10YR 5/6	fine sand; < 5% gravel	weak, fine subangular blocky; very friable, moist		common very fine and fine, and few medium and coarse roots; gradual wavy boundary	0.6/1.0§
C	17 – 29	2.5Y 7/3	fine sand to very fine sand; 10-15% gravel and cobbles	massive; soft, dry		common very fine and few fine roots; very abrupt irregular boundary	0.4/0.8§
2R	29		FRACTURED BEDROCK			END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP5
LOCATION† 8 % linear, linear back-slope @ 264°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 10	10YR 3/3	loamy fine sand	moderate, very fine subangular blocky; very friable, moist to dry		many very fine, fine, and medium, and few coarse roots; abrupt wavy boundary	0.6/1.0§
C1	10 – 14	10YR 5/4	fine sand	massive; very friable, moist to dry		common very fine and fine, and few medium roots; clear wavy boundary	0.4/0.8§
C2	14 – 21	10YR 6/3	fine sand; 5-10% gravel	massive; very friable, moist to dry	common, fine, distinct 10YR 6/6, round Fe concentrations	few very fine and fine roots	NP‖
	21					END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP6
LOCATION† 13 % concave, linear foot-slope @ 173°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 9	10YR 3/2	sandy loam	moderate, fine subangular blocky; very friable, moist		many very fine and fine, common medium, and few coarse roots; abrupt wavy boundary	0.6/1.0§
Bw	9 – 18	10YR 4/6	loamy fine sand; 15-20% gravel and cobbles	moderate, medium granular; very friable, moist		common very fine and fine roots; abrupt wavy boundary	0.6/1.0§
C	18 – 24	2.5Y 6/4	very fine sand	moderate, fine platy; slightly hard, dry	common, fine, faint 2.5Y 6/6, round Fe concentrations	few very fine and fine roots	NP‖
	24					END OF EXCAVATION	

* Hand excavated.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
TEST PIT* TP7
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 10 % linear, linear foot-slope @ 168°
DATE 10/26/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 5	10YR 3/2	loamy sand; < 5% gravel and cobbles	moderate, medium granular; very friable, moist to dry		many very fine and fine, and common medium and coarse roots; abrupt wavy boundary	0.8/1.6
Bw	5 – 13	10YR 4/6	loamy sand; < 5% gravel and cobbles	moderate to weak, fine granular; very friable to loose, moist to dry		common very fine, fine, medium, and coarse roots; clear wavy boundary	0.8/1.6
C1	13 – 32	10YR 6/4	fine sand to sand; 30-35% gravel and cobbles	single grain; loose, dry		common very fine and fine, and few medium and coarse roots; abrupt wavy boundary	0.6/1.0
C2	32 – 54	10YR 7/4	sand; 5-10% gravel and cobbles	single grain; loose, dry		few very fine and fine roots; very abrupt wavy boundary	0.8/1.6§
C3	54 – 80	10YR 6/3	sand; 30-35% gravel and cobbles	single grain; loose, dry to moist			0.8/1.6§
	80					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County - Ash River
TEST PIT* TP8
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 24 % convex, convex back-slope @ 180°
DATE 10/26/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 5	10YR 3/2	loamy sand; < 5% gravel	moderate, medium granular; very friable, moist to dry		many very fine, fine, and medium, and few coarse roots; very abrupt wavy boundary	0.8/1.6
E	5 – 8	10YR 5/2	sand; 5-10% gravel and cobbles	weak, medium subangular blocky; very friable, moist to dry		common very fine and fine, and few medium and coarse roots; gradual wavy boundary	0.8/1.6
C1	8 – 43	10YR 6/4	fine sand to sand; < 5% gravel and cobbles	single grain; loose, dry to moist		common very fine and fine, and few medium roots; clear wavy boundary	0.6/1.0§
C2	43 – 52	10YR 6/4	sand to coarse sand; 25-30% gravel and cobbles	single grain; loose, dry		common very fine and fine roots; clear wavy boundary	0.8/1.6§
C3	52 – 74	10YR 6/3	coarse sand; 10-15% gravel and cobbles	single grain; loose, dry			1.0/2.0§
	74					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County - Ash River
TEST PIT* TP9
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 13 % convex, linear shoulder-slope @ 169°
DATE 10/26/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 - 7	10YR 3/2	sandy loam; < 5% gravel	strong, fine granular; very friable to friable, moist		many very fine, common fine and medium, and few coarse roots; clear wavy boundary	0.6/1.0
Bw1	7 - 24	10YR 4/6	loamy sand; 10-15% gravel and cobbles	weak, medium granular; very friable, moist		common very fine and fine, and few medium and coarse roots; clear wavy boundary	0.8/1.6
Bw2	24 - 42	10YR 5/8	coarse sand to loamy coarse sand; 30-35% gravel and cobbles	single grain; loose, dry		common very fine and fine roots; very abrupt wavy boundary	1.0/2.0
C1	42 - 60	10YR 6/4	sand to coarse sand; 5-10% gravel and cobbles	single grain; loose, dry to moist		very abrupt wavy boundary	1.0/2.0§
C2	60 - 85	10YR 3/6	very coarse sand; 15-20% gravel	single grain; loose, dry			1.0/2.0§
	85					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP10
LOCATION† 6 % linear, linear hill summit-slope @ 26°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/26/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 6	10YR 2.5/2	sandy loam; < 5% gravel	moderate, fine subangular blocky to medium granular; friable to very friable, moist		many very fine, common fine and medium, and few coarse roots; abrupt wavy boundary	0.6/1.0§
Bw1	6 – 14	10YR 3/6	sandy loam to loamy sand; 15-20% gravel and cobbles	moderate, fine subangular blocky; very friable, moist		many very fine and fine, common medium, and few coarse roots; gradual wavy boundary	0.6/1.0§
Bw2	14 – 24	10YR 3/6	loamy very coarse sand; 50-55% gravel	single grain; loose, moist		common very fine, fine, and medium roots; gradual wavy boundary	NP‖
Bw3	24 – 44	10YR 4/6	very coarse sand; 55-60% gravel and cobbles	single grain; loose, moist to dry		common very fine and fine roots; clear wavy boundary	NP
C	44 – 76	10YR 5/6	very coarse sand; 30-35% gravel	single grain; loose, moist to dry		common very fine and fine roots to 57 in.	1.0/2.0§
	76					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP11
LOCATION† 11 % concave, linear back-slope @ 10°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/26/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 8	10YR 3/2	loamy sand	weak, medium granular; very friable, moist		common very fine, fine, and medium, and few coarse roots; abrupt wavy boundary	0.8/1.6§
Bw	8 – 18	10YR 4/6	sand; < 5% gravel	single grain; loose, moist		common very fine and fine, and few medium and coarse roots; clear wavy boundary	0.8/1.6§
C1	18 – 23	10YR 5/6	sand; < 5% gravel	single grain; loose, moist to dry		common very fine and fine roots; very abrupt wavy boundary	0.8/1.6§
2C2	23 – 27	2.5Y 6/3	silt loam; < 5% gravel	moderate, fine subangular blocky; firm to friable, moist	common, fine, distinct 2.5Y 5/6, round Fe concentrations	common very fine and fine, and few medium roots; very abrupt wavy boundary	NP‖
3R	27 – 41	5Y 8/2	very fine sand (sandstone residuum)	massive; friable, moist to dry	common, coarse, distinct 2.5Y 7/4, round Fe concentrations	few very fine, fine, and medium roots	NP
	41					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County - Ash River
SCOPE Site Evaluation
TEST PIT* TP12
LOCATION† 11 % concave, concave back-slope @ 324°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 - 5	7.5YR 3/2	loamy sand	moderate, medium granular; very friable, moist		many very fine, common fine, and few medium and coarse roots; clear wavy boundary	0.8/1.6§
Bw1	5 - 13	10YR 4/3	sand	weak, medium granular to single grain; very friable, moist	common, medium, distinct 7.5YR 4/6, round Fe concentrations	few very fine and fine roots; clear wavy boundary	NP‖
2Bw2	13 - 23	5Y 7/1	silty clay	moderate, fine subangular blocky; firm, moist	many, fine, prominent 10YR 5/8, round Fe concentrations; and few, fine, distinct 5G 7/1, round Fe depletions		NP
	23					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP13
LOCATION† 10 % linear, linear foot-slope @ 12°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 4	10YR 2.5/2	loamy sand	moderate, fine granular; very friable, moist		many very fine and fine, and few medium and coarse roots; abrupt wavy boundary	0.8/1.6§
E	4 – 14	10YR 5/2	sand	weak, fine granular to single grain; very friable, moist	common, fine, faint 10YR 5/4, round Fe concentrations	few very fine and fine roots; clear wavy boundary	NP‖
C	14 – 18	2.5Y 6/2	sand	single grain; loose, moist to very moist	common, coarse, prominent 7.5YR 4/6, round Fe concentrations	very abrupt wavy boundary	NP
2Bw	18 – 21	5Y 7/1	clay to silty clay	weak to moderate, fine subangular blocky; firm, moist	common, fine, prominent 10YR 5/8, round Fe concentrations; and few, fine, distinct 2.5Y 5/1, and few, fine, distinct 5G 7/1, round Fe depletions		NP
	21					END OF EXCAVATION	

* Excavator dug.

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‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP14
LOCATION† 12 % concave, linear back-slope @ 280°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 6	10YR 3/2	loamy sand to sand	moderate, fine granular; very friable, moist		many very fine and fine, common medium, and few coarse roots; abrupt wavy boundary	0.8/1.6
Bw	6 – 19	10YR 4/6	sand; < 5% gravel	single grain to weak, medium granular; very friable, moist		common very fine and fine, and few medium roots; gradual wavy boundary	0.8/1.6§
C1	19 – 36	10YR 5/4	sand to fine sand; < 5% gravel and cobbles	single grain to massive; loose to very friable, moist to dry		common very fine and fine roots; gradual wavy boundary	0.6/1.0§
C2	36 – 49	2.5Y 6/6	fine sand; < 5% gravel and cobbles	massive; soft, dry to moist	few, fine, prominent 10YR 4/6, round Fe concentrations (relict)	abrupt wavy boundary	0.4/0.8§
C3	49 – 59	2.5Y 6/4	fine sand; 5-10% gravel	weak, fine platy; friable, moist to dry	common, fine, faint 10YR 6/4, round Fe concentrations	few very fine and fine roots; very abrupt irregular boundary	NP‖
2R	59		BEDROCK			END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
TEST PIT* TP15
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 7 % convex, linear shoulder-slope @ 280°
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 4	10YR 3/2	loamy sand to sand	weak, medium granular; very friable, moist		many very fine and fine, and common medium and coarse roots; clear wavy boundary	0.8/1.6
Bw	4 – 14	10YR 4/6	sand; < 5% gravel	single grain; very friable, moist		common very fine and fine, and few medium and coarse roots; gradual wavy boundary	0.8/1.6
BC	14 – 24	10YR 5/6	sand; < 5% gravel	single grain; loose, moist		few very fine and fine roots; gradual wavy boundary	0.8/1.6
C1	24 – 35	10YR 6/6	sand; < 5% gravel	single grain; loose to very friable, moist		few very fine and fine roots; very abrupt wavy boundary	0.8/1.6§
C2	35 – 61	10YR 6/6	coarse sand; 15-20% gravel	single grain; loose, moist to dry		few very fine roots to 52 in.; very abrupt wavy boundary	1.0/2.0§
C3	61 – 74	2.5Y 6/3	sand; < 5% gravel	massive to single grain; very friable to loose, moist to dry	common, fine, distinct 10YR 5/6, round Fe concentrations	very abrupt irregular boundary	NP‖
2R	74		FRACTURED BEDROCK			END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
TEST PIT* TP16
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP

SCOPE Site Evaluation
LOCATION† 7 % convex, convex shoulder-slope @ 191°
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 7	10YR 3/2	sand	weak, medium granular; soft, dry to moist		many very fine and fine, and common medium and coarse roots; abrupt wavy boundary	0.8/1.6
Bw	7 – 17	10YR 4/4	sand to fine sand	weak, coarse granular; very friable, moist		many very fine, common fine and medium, and few coarse roots; gradual wavy boundary	0.6/1.0
C1	17 – 30	10YR 6/6	sand to fine sand	single grain; loose, dry to moist		common very fine and fine, and few medium and coarse roots; gradual wavy boundary	0.6/1.0
C2	30 – 52	2.5Y 7/3	fine sand to sand	massive; soft, dry		few very fine, fine, and medium roots; few, coarse, distinct 2.5Y 6/6 Fe staining; abrupt wavy boundary	0.4/0.8§
C3	52 – 72	2.5Y 7/2	fine sand to sand	massive to single grain; loose to soft, dry to moist		few fine roots; few 1/32-in. 2.5Y 6/6 discontinuous horizontal lamellae; very abrupt wavy boundary	0.4/0.8§
C4	72 – 87	2.5Y 7/3	sand	single grain; loose, dry			0.8/1.6§
	87					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

§ Provisional rate, i.e. rate that is or would be acceptable with an underlying 3 feet of consistently unsaturated, permeable soil.

MATRIX Soils & Systems, Inc.
3990 Fairview Road, Rice Lake, MN 55803-2708
(218)390-2869, FAX (218)464-4799, e-mail: rwwhitmyer.matrixss@charter.net

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 License No. 30355

SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP17
LOCATION† 13 % concave, concave back-slope @ 158°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 6	10YR 3/2	loamy sand	moderate, fine granular; very friable, moist		many very fine, common fine and medium, and few coarse roots; abrupt wavy boundary	0.8/1.6
Bw	6 – 24	10YR 4/6	sand	single grain; very friable, moist		common very fine and fine, and few medium and coarse roots; abrupt wavy boundary	0.8/1.6
C1	24 – 42	2.5Y 7/4	fine sand	massive; very friable, moist to dry		few very fine, fine, and medium roots; few 1/32-in. 10YR 5/8 discontinuous horizontal lamellae; gradual wavy boundary	0.4/0.8§
C2	42 – 54	2.5Y 6/6	fine sand	massive; very friable, moist	common, medium, distinct 10YR 5/8, Fe concentrations in root channels (relict)	few very fine, fine, and medium roots; few, 1/16-in. 10YR 5/8 discontinuous horizontal lamellae; very arupt wavy boundary	0.4/0.8§
C3	54 – 75	2.5Y 7/3	sand	massive; very friable to loose, moist to dry		common 1/8-in. 10YR 5/8 discontinuous very fine to fine sand horizontal lamellae	0.6/1.0§
	75					END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

§ Provisional rate, i.e. rate that is or would be acceptable with an underlying 3 feet of consistently unsaturated, permeable soil.

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SOIL PROFILE DESCRIPTION

PROJECT St. Louis County – Ash River
SCOPE Site Evaluation
TEST PIT* TP18
LOCATION† 16 % convex, linear back-slope @ 188°
DESCRIPTION BY R.W. Whitmyer, CPSS, PSS, AD/I, SP
DATE 10/27/15

HORIZON	DEPTH (in.)	MATRIX COLOR	TEXTURE	STRUCTURE-CONSISTENCE	REDOXIMORPHIC FEATURES	OTHER	STE LOADING RATE (gpd/ft²)‡
A	0 – 7	10YR 3/2	sand	moderate, fine granular; very friable, moist		many very fine and fine, and common medium and coarse roots; abrupt wavy boundary	0.8/1.6§
Bw	7 – 13	10YR 3/8	sand	single grain; loose, moist		common very fine, fine, and medium, and few coarse roots; clear wavy boundary	0.8/1.6§
C1	13 – 21	10YR 5/4	sand	single grain; loose, moist		few very fine and fine roots; clear wavy boundary	0.8/1.6§
C2	21 – 26	10YR 6/2	sand	single grain to massive; very friable, moist	common, medium, prominent 10YR 5/6, round Fe concentrations	few very fine roots; abrupt wavy boundary	NP‖
C3	26 – 58	2.5Y 5/3	sand	massive; very friable, moist to very moist	common, coarse, prominent 7.5YR 4/6, and few, fine, distinct 2.5Y 4/3, round Fe concentrations	very abrupt wavy boundary	NP
2R	58		BEDROCK			END OF EXCAVATION	

* Excavator dug.

† Degree of slope for down- and cross-slope shapes at position and direction indicated.

‡ Loading rate in gpd/ft² (gallons per day per square foot) for code projected peak (design) flows of residential strength septic tank (Level C)/additionally pretreated (Level B-2 or cleaner) effluents. Loading rate for average flows would be 67 percent of the rate indicated.

§ Provisional rate, i.e. rate that is or would be acceptable with an underlying 3 feet of consistently unsaturated, permeable soil.

‖ Discharge of STE to this horizon is not permitted.

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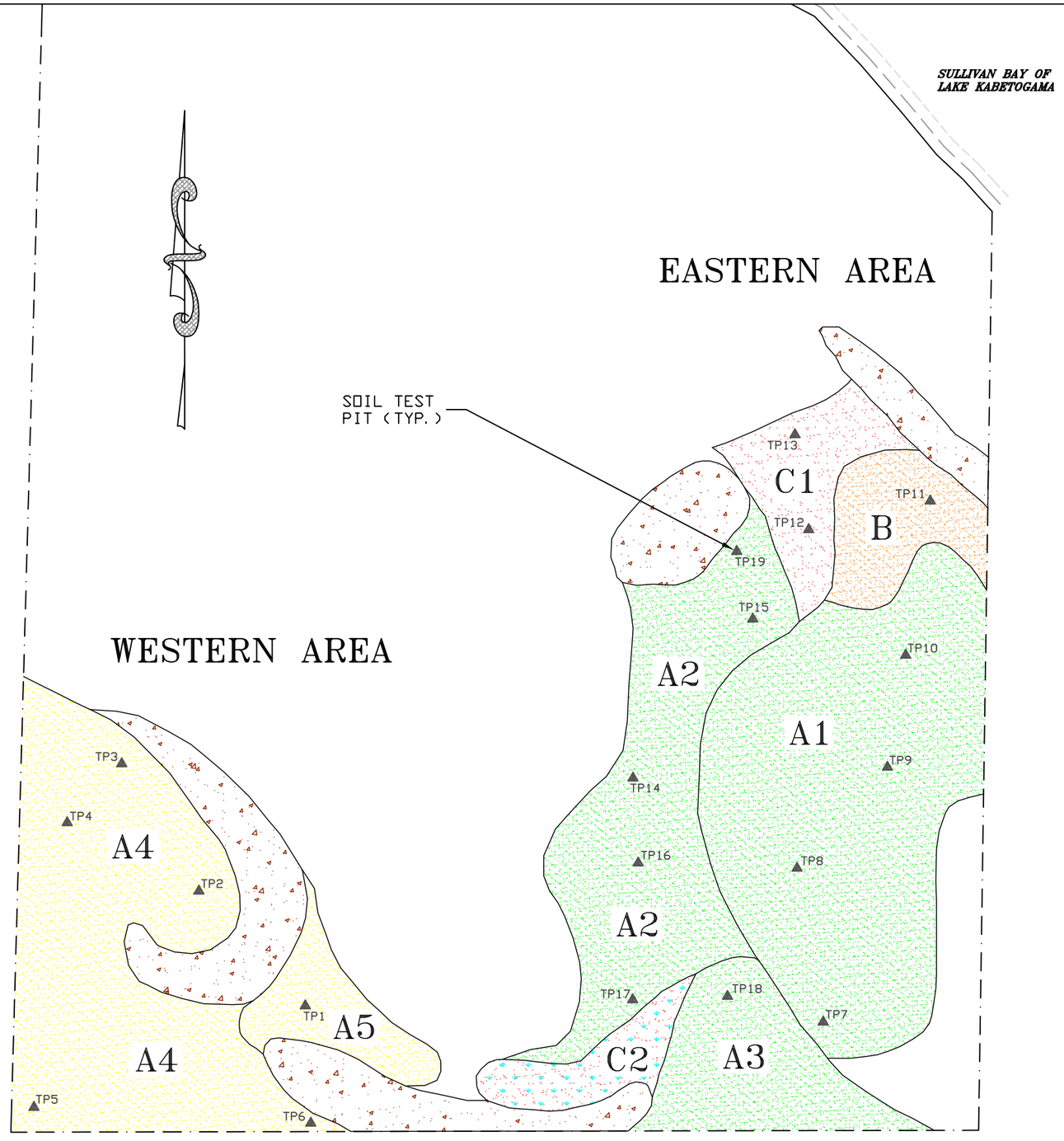

SOIL MAPPING UNIT LEGEND

- A1: ROLLINS-LIKE W/ DEEP SOILS
- A2: BIWABIK-LIKE W/ MODERATELY DEEP SOILS ABOVE BEDROCK
- A3: BIWABIK-LIKE W/ MODERATELY DEEP SOILS ABOVE GROUNDWATER
- A4: CONIC-LIKE W/ SHALLOW BEDROCK
- A5: CONIC-LIKE W/ SHALLOW GROUNDWATER
- B: CUTAWAY-LIKE W/ SHALLOW GROUNDWATER & BEDROCK
- C1: SPOONER-LIKE W/ SHALLOW GROUNDWATER
- C2: HYDRIC (LIKELY)
- BEDROCK DOMINATED SURFACE

100 0 200
APPROXIMATE SCALE IN FEET

MAPPING UNIT	INFILTRATION (in./hr.)	TOTAL AVAILABLE WATER HOLDING CAPACITY (in.)	PROJECTED ANNUAL IRRIGATION CAPACITY (in.)
A1	12.0	7.98	12
A2	4.8	5.11	12
A3	4.8	2.24	9
A4	7.8	2.16	9
A5	7.8	1.53	7
B	17.0	2.96	10
C1	17.0	1.20	2
C2	NA*	NA	NA

*NA = NOT AVAILABLE.

NOTES

1. SOIL MAPPING UNIT BOUNDARIES ARE APPROXIMATE. MAPPING UNITS WILL HAVE SMALL INCLUSIONS OF SOIL WITH CONDITIONS ATYPICAL OF UNIT.
2. MAPPING SOURCES ARE ST. LOUIS COUNTY GIS, USGS 7.5-MINUTE QUADRANGLE, FIELD OBSERVATIONS AND MEASUREMENTS.

APPRD
DATE 02/24/16
DRAWN RWW
DATE 10/27/15

SITE PLAN

MATRIX Soils & Systems

AS SHOWN	0	PROJECTED EXTENT OF OBSERVED SOILS
SCALE	REV.	DESCRIPTION

ASH RIVER
PART SE 1/4 OF THE SW 1/4 OF SEC. 32
T69N, R19W, UNORGANIZED TOWNSHIP
ST. LOUIS COUNTY, MINNESOTA

FIGURE 2

Building a Better World for All of Us®

Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a company-wide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.

Join Our Social Communities