Le Sueur COUNTY | MINNESOTA

Cannon River
One Watershed, One Plan
"Aligning local water planning on major watershed boundaries with state strategies towards prioritized, targeted and measurable implementation plans"

CLEAN WATER LAND & LEGACY AMENDMENT

Stantec

Volney, Gorman, & Cordova Septic Inventory Project

Community Wastewater Feasibility Assessment Report

November 2022

Prepared for:

Le Sueur County
515 South Maple Ave
Le Center, MN 56057

Prepared by:

Stantec Consulting Services Inc.
2080 Wooddale Drive, Suite 100
Woodbury, MN 55125

This document entitled Community Wastewater Feasibility Assessment Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Le Sueur County (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by: _____
(signature)

Name: **Eric Blasing**

Reviewed by: _____
(signature)

Name: **Peter Miller**

Approved by: _____
(signature)

Name: **Eric Blasing**

Table of Contents

LIST OF TABLES

LIST OF FIGURES

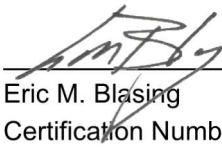
LIST OF APPENDICES

1.0 PROFESSIONAL CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a certified MPCA Advanced Designer under the laws of the state of Minnesota.

Signature/Date:		11/28/2022
Name:	Peter G. Miller	Date
Registration:	Certification Number: C2341	

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a certified MPCA Designer under the laws of the state of Minnesota.

Signature/Date:		11/28/2022
Name:	Eric M. Blasing	Date
Registration:	Certification Number: C7582	

2.0 INTRODUCTION

The Volney, Gorman, and Cordova septic inventory project (Project) is located on the shores of Gorman Lake and Lake Volney in Kilkenny and Le Center; Lexington, Montgomery, Cordova, and Kilkenny Townships, Le Sueur County, Minnesota (Figure 1). The Project area is unsewered and residential wastewater needs are met by individual subsurface sewage treatment systems (ISTS)[1]. Residents are served water by a combination of individual and shared water supply wells. Stantec Consulting Services Inc. (Stantec) was retained to assess the compliance status of existing ISTS, evaluate soil-based subsurface sewage treatment system (SSTS) alternatives, and assess the possible connection to the nearest municipal treatment facility for viable long-term wastewater treatment infrastructure.

This Community Wastewater Feasibility Assessment Report (Report) was made possible through a Minnesota Board of Water and Soil Resources (BWSR) Cannon One Watershed One Plan Implementation Grant. These grants are used to develop watershed-scale water-based planning. These grants are made possible through the Clean Water, Land and Legacy Amendment through the Outdoor Heritage and Clean Water funds. This report would not have been possible without the generous assistance of Le Sueur County Environmental Services Department.

The Project area contains 70 properties, as shown on Figure 1. The study area was selected based on a Project specific Volney, Gorman, & Cordova Septic Inventory Project Le Sueur County Ordinance (Ordinance) defining the Project area as any property within 350 feet of Gorman Lake and Lake Volney (known as “First Tier” properties) and the Village of Cordova (Appendix A). Only properties that do not have an ISTS certificate of compliance (COC) older than 2107 within the Project area were inspected. Individual property details and findings can be found within the parcel data spreadsheet in Appendix B.

2.1 REPORT PURPOSE

This report serves as a planning document for watershed planning and possible long-term wastewater infrastructure solutions for the Project area. The Report is intended to present existing ISTS status and determine if the community is best served in the future by ISTS, shared community SSTS, or connecting to a municipal wastewater treatment facility.

2.2 WORK PERFORMED

An assessment of existing ISTS conditions was executed to determine a Project baseline for analysis. Included in this assessment was a desktop Le Sueur County permit file review and field ISTS compliance investigations. The analysis also evaluated potential future SSTS wastewater treatment options.

[1] ISTS (a.k.a. septic system) is defined in Minnesota Rule Chapter 7080 as a type of SSTS that treats and disperses wastewater via the soil. “ISTS” refers generally to a home septic system.

This wastewater feasibility study includes the development of potential community wastewater collection and treatment options. These options are based on areas of highest need due to poor ISTS compliance, future ISTS type, and/or significant lot constraints. Based on ISTS compliance, existing dwelling locations, and future replacement ISTS, an alternative includes grouping select properties into two separate community cluster SSTS. The remaining properties would continue being served by ISTS. See Section 4 for further discussion.

Useful background information regarding some ISTS specifics (i.e., drainfield trench vs. mound) produced by the University of Minnesota Onsite Sewage Treatment Program (OSTP)[2] is found in Appendix C.

[2] The University of Minnesota OSTP provides technical training and continuing education for individuals who design, inspect, install, and maintain ISTS in Minnesota. Additional homeowner information regarding ISTS can be found at their website: http://septic.umn.edu/

3.0 EXISTING CONDITIONS

This section summarizes existing ISTS conditions within the Project area. All properties evaluated are served by an ISTS including trenches, mounds, cesspool/drywells (CP/DW), and holding tanks. A determination of ISTS compliance status was made and what the likely future ISTS would be to serve the property.

Properties included in the assessment were developed based on conditions of the Ordinance. Individual parcel information and ISTS records were provided by Le Sueur County.

3.1 METHODS

Fieldwork was completed in June and July 2022 and included site visits to each property to locate wells, wastewater tanks, and drainfields. Soil borings were conducted, and ISTS were evaluated to determine their compliance status based on Minnesota Rules Chapters 7080 – 7083 and Le Sueur County SSTS Ordinance Section 17. An assessment was also made regarding the most likely option for each property's replacement ISTS.

Stantec was able to access all participating properties to complete a site inspection with the intent of documenting ISTS compliance and evaluating future ISTS options. Stantec used existing permit records, soil survey data, and completed soil borings on properties to evaluate soils throughout the Project area.

Prior to commencement of fieldwork, Le Sueur County provided available ISTS permitting, design, and inspection records for the properties. In addition, Geographic Information System (GIS) shape files of property boundaries were supplied. This information provided knowledge of existing ISTS, parcel occupancy status, bedroom count, and water supply. Information gleaned from records was incorporated into the parcel data spreadsheet (Appendix B) and used in the assessment.

3.2 FINDINGS

This section summarizes existing ISTS conditions in the Project area. A determination of ISTS compliance status was made along with future wastewater treatment to serve the properties.

3.2.1 Drinking Water Source

Property drinking water sources include individual and shared water supply wells (Figure 2). There is no community public water supply system. Drinking water supply wells are typically described as either deep (greater than 50 feet of watertight casing) or shallow (less than 50 feet of watertight casing). Depth and location of wells must be considered when determining ISTS setback requirements. New ISTS drainfield components must meet a 50-foot setback from a standard deep well and a 100-foot setback from a shallow sensitive well. For shared community collection system forcemain, a 50-foot setback applies. The Minnesota Department of Health governs water supply well setbacks and potential variances.

3.2.2 Parcel Type

Table 3-1 summarizes parcel types in the Project area where data was taken from Le Sueur County parcel data records. A key factor to consider is the dwelling classification as this dictates expected

wastewater volumes generated and the design flow. Minnesota Rules Chapter 7080 classifies dwellings based on structure size and number of water-use appliances (i.e., garbage disposal, self-cleaning humidifier in furnace, large bathtub, wash machine, dishwasher, and water conditioning unit) included in the dwelling from Type I to Type IV. Essentially, the smaller the structure and the less water-use appliances, the lower the flow volumes to expect. A Type I classification would assign the highest flows and Type IV, the lowest. Within the Project area, most dwellings are Type I.

Table 3-1: Parcel Type

Parcel Type	Number	Percentage
Residential	41	59%
Commercial	1	1%
Seasonal Residential	28	40%
Total	**70**	**100%**

3.2.3 ISTS Type

Table 3-2 summarizes ISTS type within the Project area which includes trenches, mounds, CP/DWs, and holding tanks.

Table 3-2: ISTS Type

ISTS Type	Number	Percentage
Trenches	18	26%
Mound	33	47%
CP/DW	15	21%
Holding Tank	4	6%
Total	**70**	**100%**

3.2.4 ISTS Compliance Status

While visiting each parcel, the ISTS compliance status was made based on Minnesota Rules Chapter 7080 – 7083 and Le Sueur County SSTS ordinance Section 17. An existing ISTS can either be compliant or noncompliant including the following:

- Failure to protect groundwater (FTPG). The criteria that determine a FTPG include:
    - Less than 36-inches of vertical separation between the bottom of the drainfield distribution media and limiting condition being periodically saturated soil (seasonally high groundwater) or bedrock. Note, Le Sueur County SSTS Ordinance Section 17 allows for a 15 percent compliance separation reduction for existing systems to account for soil settlement, variation in separation measurements, and soil interpretation.
    - Tank integrity (non-watertight tanks including seepage pits, CP/DW, or leach pit).
    - Not meeting reporting requirements of an operating permit. Operating permits within Le Sueur County are issued for ISTS with pretreatment, non-standard systems, and larger midsized subsurface sewage treatment systems (MSTS).

- Imminent threat to public health or safety (ITPHS). The criteria that determine a ITPHS include:
    - Surfacing of effluent from the soil dispersal system.
    - Sewage backing up into the dwelling.
    - Sewage discharged to the ground surface or surface waters.
    - An ISTS in an unsafe condition (dangerous/missing tank riser covers, exposed wiring, unsound tank, etc.)
    - Any other condition deemed to be a threat to human health or safety.

Table 3-3 summarizes compliance status of the 70 properties within the Project area.

Table 3-3: ISTS Compliance Status

Status	Number	Percentage
Compliant	31	44%
Noncompliant FTPG	29	41%
Noncompliant ITPHS	10	15%
Total	**70**	**100%**

The parcel data spreadsheet (Appendix B) contains property specific ISTS compliance status and Figure 3 provides a visual depiction within the Project area.

3.2.5 ISTS Age

Age is a factor in determining the overall health of a community's ISTS infrastructure. The typical ISTS lifespan is 25 to 40 years under normal use and with proper maintenance. Over time, ISTS components degrade, the drainfield/soil surface interface can plug, and soil beneath the drainfield can eventually lose capacity to accept and treat wastewater.

Wastewater strength, flow volume, and system maintenance are fundamental factors in how long an ISTS functions, but eventually all ISTS need to be replaced. Table 3-4 summarizes ISTS age within the Project area. System ages were based on Le Sueur County permit records. Figure 4 provides a visual representation of current ISTS ages.

Table 3-4: ISTS Age

System Age* (years)	Number	Percentage
≥ 40	2	3%
30 – 39	9	13%
20 – 29	23	33%
10 – 19	11	16%
< 10	5	7%
Unknown	20	28%
Total	**70**	**100%**

*As of 2022

3.2.6 Summary

Of the 70 ISTS within the Project area, 31 (44%) are compliant and thus are not in need of replacement. Of the compliant ISTS, four are holding tank systems. Of the 39 (56%) noncompliant ISTS, 15 are a CP/DW. These systems are outdated, do not protect groundwater, and are no longer allowed to be installed in Minnesota. Cesspools are a buried vessel with no bottom or with walls that allow wastewater to seep directly into the soil and/or groundwater.

4.0 ALTERNATIVES

When considering future wastewater treatment facility alternatives, three components are evaluated including:

- Collection: the means wastewater generated from individual dwellings is conveyed to the wastewater treatment facility.
- Treatment: settlement of solids, removal of pathogens, and reduction of nutrients in primary, secondary, and tertiary processes.
- Effluent dispersal: final distribution of treated effluent to surface waters, the ground surface, or soil.

When a series of homes are connected to a decentralized wastewater treatment facility, it is commonly referred to as a community cluster system. Cluster system ownership, operation, and management occur through a municipality, the formation of a special purpose district, or through private ownership. For this report, the assumption was made that any community cluster system would fall under the ownership of Le Sueur County as a subordinate service district. This would qualify the Project for public funding opportunities. A system developed privately can present legal challenges as it relates to land ownership/easements and fee collection. Also, privately owned systems are not eligible for public funding.

For the Project, connection to a regional wastewater treatment facility was deemed unfeasible and was eliminated from consideration as the distance to the closest facility is considerable and construction would be cost prohibitive. Therefore, feasible alternatives include ISTS to serve each dwelling or shared community cluster systems to serve multiple properties. These alternatives are evaluated within the following section.

4.1 ALTERNATIVES ANALYSIS

The following two alternatives have been evaluated for long-term wastewater treatment infrastructure in the Project area. An alternative to serve all properties was not developed as the Project area is large and abundant collection system piping would be required making it cost prohibitive.

- Alternative 1: private ISTS to serve all properties
- Alternative 2: two separate community cluster systems to serve select properties along (A) Beach Lane and (B) Lake Volney Lane & 400th Street that have noncompliant ISTS or cannot support a Type 1 replacement

Table 4-1 includes the estimated daily wastewater design flow for both alternatives and the associated permit that would apply. Appendix D includes calculation details for Alternative 2 community cluster systems.

Table 4-1: Alternative Permit Type and Wastewater Design Flow

Alternative	No. of Properties	Wastewater Design Flow (gpd)*	Permit Type**
Alternative 1: Private ISTS	56	Varies per property	Le Sueur County ISTS
Alternative 2A: Beach Lane Community Cluster System	8	3,600	Le Sueur County ISTS
Alternative 2B: Lake Volney Lane & 400th Street Community Cluster System	16	5,900	Le Sueur County MSTS

*For the community cluster system wastewater design flow calculation, dwelling bedroom count and classification were based on county permit files. If no permit files were available, the dwelling was assumed to be a 3-bedroom Classification I dwelling. In addition, the community cluster design flows include collection system infiltration and inflow estimates as required by Rule.
**The permit type required assumes that the individual property owners are the ISTS owners/managers. The SSTS permits for shared community cluster systems assumes Le Sueur County is the owner.

Per Minnesota Rules, Part 7081.0120, daily wastewater flows for each cluster system were estimated using a formula specified in the rule. The formula calculates a design flow based on each dwelling's classification (Type I – Type IV) and the total number of dwellings included. Typically, the actual daily wastewater flow observed is less than the estimated design flow as a safety factor is incorporated.

The design flow dictates permitting authority, the level of pretreatment required, and other permitting requirements as summarized by the following classifications:

- Large subsurface sewage treatment system (LSTS): a system with a design wastewater flow greater than 10,000 gpd is permitted through the Minnesota Pollution Control Agency (MPCA) State Disposal System (SDS) program. These systems require enhanced pretreatment with nitrogen limits at the end-of-pipe (prior to soil dispersal) and/or within groundwater monitoring wells.
- Midsized subsurface sewage treatment system (MSTS): a system with a design wastewater flow of 5,000 – 10,000 gpd would be considered a MSTS and be permitted by Le Sueur County. MSTS include more design and permitting requirements than ISTS including a groundwater investigation, nitrogen mitigation, absorption area sizing, and an operation and maintenance plan.
- Individual subsurface sewage treatment system (ISTS): systems designed with a wastewater flow less than 5,000 gpd are considered ISTS and would be permitted by Le Sueur County. These systems have the least design and permitting requirements.

4.1.1 Alternative 1: Private ISTS

The private ISTS alternative would require individual property owners to be responsible for the installation, management, operation, and maintenance of their ISTS. Therefore, operation and maintenance of ISTS would continue as is currently practiced. System upgrades, operation, and maintenance costs would be paid by the property owner with no public funding. Future decisions would be made by the property owner and a county issued ISTS permit would be required for each property.

Advantages of private ISTS ownership can include lower permitting requirements and lower overall costs for installation, operation, and maintenance unless the ISTS is a holding tank. Disadvantages include

management by individuals rather than the community, loss of yard space, potential for improper or lack of maintenance, and potential impacts to property values compared to a property connected to a public wastewater system.

4.1.1.1 Future ISTS Upgrades

As stated in Section 3.2.4, 56% of ISTS within the Project area are noncompliant. This accounts for some type of potential imminent ISTS upgrade at 39 properties. However, all properties need an ISTS upgrade at some point in the future based on their limited life expectancy. The ISTS type needed at upgrade is significant as it directly influences the initial capital, operation, and maintenance costs. Minnesota Rules, part 7080.2200 – 7080.2400 define ISTS type including the following:

- Type 1: standard systems including subsurface or above-grade soil dispersal systems on undisturbed soils. Type 1 systems meet all technical sizing, design, and construction requirements, have suitable soils, and can meet all setbacks.
- Type 2: holding tanks, privies, and systems in floodplains.
- Type 3: non-standard systems that deviate from Type 1 code requirements, are constructed on soil which is difficult, disturbed, or contains seasonally high groundwater. Type 3 systems can include intentionally undersized soil dispersal systems due to inadequate area. These systems must limit the daily effluent discharged to the soil dispersal system.
- Type 4: commonly referred to as “performance” systems. Type 4 systems include secondary pretreatment by means of an aerobic treatment unit or media filter prior to soil dispersal. These pretreatment technologies introduce air either mechanically or passively, which encourages aerobic bacterial growth and reduces loadings such as biochemical oxygen demand (BOD) and total suspended solids (TSS). Adding secondary pretreatment allows treated effluent to be loaded to the soil at a higher rate which reduces the overall size of the soil dispersal system. Type 4 systems can also include tertiary treatment technologies which reduce pathogenic bacteria (fecal coliform used as the indicator). This allows treated effluent to be dispersed with reduced vertical separation from the bottom of the drainfield distribution media to the limiting condition. Type 4 systems are more expensive to design, construct, and maintain.

Appendix B and Figure 5 summarize each property’s most likely future ISTS based on lot size, soil conditions, and current land use. For a dwelling that does not have suitable space for a drainfield, the future ISTS would need to be a holding tank. Whether a Type 3 or Type 4 system is used to address various site constraints is up to the homeowner and their ISTS designer. There are advantages and disadvantages to each. For this study, properties with challenging soils or limited room for a drainfield are classified as needing either a Type 3 or Type 4 system. Tables 4-2, 4-3, and 4-4 summarize likely future ISTS to serve all properties, properties with noncompliant ISTS, and the properties with noncompliant systems or cannot support a Type 1 system, respectively.

Table 4-2: Future ISTS for All Properties

ISTS Type	Number	Percentage
Type 1	34	49%
Type 2	12	17%
Type 3/Type 4	24	34%
Total	**70**	**100%**

Table 4-3: Future ISTS for Properties with Noncompliant ISTS

ISTS Type	Number	Percentage
Type 1	20	51%
Type 2	7	18%
Type 3/Type 4	12	31%
Total	**39**	**100%**

4.1.1.2 Private ISTS Summary

The following points summarize the private ISTS alternative:

- Advantages:
  - Construction, operation, and maintenance costs are based on need and strictly dependent upon the individual property. The community does not share overall costs.
  - Less overall capital costs when compared to a community owned and managed cluster wastewater system.

- Disadvantages:
  - Less freedom on yard usage.
  - Individuals may choose to forgo proper operation and maintenance practices leading to poor ISTS performance, failure, or an imminent threat to public health.
  - Potential lower property values when comparted to a community cluster wastewater system.
  - Grant funding is not available to reduce capital costs.

4.1.2 Alternative 2: Community Cluster System

The community cluster system alternative would include collection, treatment, and an above-grade mound soil dispersal system. It is envisioned two separate community cluster systems would serve select dwellings along (A) Beach Lane and (B) Lake Volney Lane & 400th Street each permitted by Le Sueur County. In each area, properties include those that have a noncompliant ISTS or cannot support a future Type 1 ISTS. These two areas were selected as they have limited compliance and the majority of likely future ISTS would be a holding tank or a Type 3/Type 4.

Eight properties along Beach Lane have been selected and 16 properties along Lake Volney Lane and 400th Street. Only four of the 16 included properties along Lake Volney Lane and 400th Street are compliant and likely future ISTS would include three Type 1, five Type 2, and eight Type 3/Type 4. Along Beach Lane, five ISTS are compliant and likely future ISTS would include four Type 2 and four Type 3/Type 4.

The following section evaluates the community cluster system alternative.

4.1.2.1 Collection System

Four common collection systems are available to convey wastewater which include the following:

- Conventional gravity: conventional gravity sewer includes a building sewer on each property that conveys raw sewage to a large diameter ($\geq$ 8-inch diameter) sewer main. Manholes are required every 400 feet or major directional change along the sewer route and lift stations may be needed depending upon elevation.
- Septic tank effluent gravity (STEG): STEG systems include a septic tank on each property from which settled wastewater or effluent flows into common small diameter gravity piping.
- Septic tank effluent pump (STEP): STEP systems include a septic tank on each property from which effluent is pumped into a common small diameter forcemain.
- Grinder pump low pressure sewer: Grinder pump collection systems include a pump basin on each property. A grinder pump macerates raw sewage that discharges into common small diameter forcemain (see Appendix E for a grinder station detail).

Based on topography, lot size, and construction costs, the grinder pump low pressure sewer collection system would be the most feasible and cost-effective collection system for Alternative 2.

A grinder pump low pressure sewer system utilizes grinder pumps at each home. Grinder pumps work collectively to convey sewage to the treatment site. A small footprint is required at each connection as the grinder pump is housed in a cylindrical 24-inch diameter vault. These systems require power, air release valves, cleanouts, and primary solids settling to occur at a centralized treatment location.

Utilizing a low-pressure sewer significantly reduces potential inflow and infiltration of clear water into the system. Flexible high-density polyethylene (HDPE) piping is directionally drilled which leads to less clearing, grubbing, and overall site disturbance. Sewage flows full and under pressure in the forcemain therefore, piping does not have to maintain a constant grade and can follow topography. Because the piping remains full, it must maintain proper bury depth and incorporate insulation where needed for frost protection.

The design of a pressure collection system incorporates calculations of inline pressures and sewage velocity that will be encountered compared to the number of pumps running simultaneously. The flow velocity must be maintained at or above two feet per second, to ensure proper solids scouring within the piping.

Operation and maintenance tasks include monitoring flows, performing routine system inspections for atypical conditions, and responding to emergency situations. Such circumstances include broken or obstructed pressure mains, power outage, or pump failure. Also, the centralized settling tank(s) would accumulate solids over time and require monitoring and periodic pumping.

An advantage of using grinder stations is that they do not require a septic tank on the property. Therefore, they require less area for construction and site disturbance is minimized. Grinder stations are typically installed using smaller construction equipment which is important on small lots with space constraints due to structures, trees, or other physical impediments.

4.1.2.2 Wastewater Treatment System

Two separate wastewater treatment systems would be designed to accommodate wastewater generated from eight properties along Beach Lane and 16 properties along Lake Volney Lane & 400th Street. Treatment sites have not officially been selected but two areas are preferred as they are nearby. Preliminary soil borings were conducted in these two areas and findings revealed above grade mound soil dispersal systems would be required. The two treatment site areas chosen are shown on Figure 6 and Figure 7. If either community cluster system is selected, the area would need to be further evaluated to ensure the site and soil can accommodate the system.

According to the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, soils within these areas primarily include the Kilkenny clay loam and Hamel loam featuring moderately structured clay loam and loam extending to massive loam with depth. USDA NRCS soil series descriptions can be found in Appendix F. These soils are very deep, moderately well and poorly drained, and formed from glacial till on moraines. Periodically saturated soils are predominant with seasonally high groundwater occurring approximately 16 – 38 inches below ground surface. Based on the desktop analysis, these soils could accommodate an above grade soil dispersal system that would maintain a minimum vertical separation to seasonally high groundwater of 36-inches.

Each grinder collection system would convey raw sewage to the treatment sites which would include treatment tanks and a mound soil dispersal system. Septic tank capacity would be designed to accommodate the design flow per MN Rule 7080.1930 and estimated Beach Lane and Lake Volney Lane & 400th Street cluster system septic tank volumes are 15,000 gallons and 25,000 gallons, respectively. Downstream of the septic tanks would be a dose tank that would time dose a multi-cell mound system. Per rule, the mound system would be designed to accommodate 150% of the design flow as there would be no secondary pretreatment device. An additional 50% reserve area would be set aside for potential future replacement use.

The proposed mound soil loading rate, rock bed loading rate, and contour loading rate are 0.45 gpd/ft^2, 1.2 gpd/ft^2, and 12 gpd/ft, respectively. These loading rates are based on septic tank effluent dispersed on clay loam soil. These values may vary based on a full site assessment and soil investigation. Based on these loading rates, 450 lineal feet of mound would be required at Beach Lane and 740 lineal feet for Lake Volney Lane & 400th Street.

It is envisioned the Beach Lake mound system would include four mound cells each with approximate dimensions of 40 ft. x 130 ft. The Lake Volney Lane & 400th Street mound system would include six mound cells each with dimensions of 40 ft. x 140 ft. Actual number of cells and dimensions would vary depending upon actual site characteristics. Figure 6 and Figure 7 show collection system routes and treatment site locations but do not represent a final design or imply landowner consent to sell the property.

For each wastewater treatment system, a mound cell would receive treated effluent on a timed basis from a dedicated pump within the dose tank. The pumps would alternate throughout the day and the total number of doses to the mound system would depend upon actual wastewater flow generated from the dwellings. Effluent would be distributed evenly within the rock bed via pressure laterals that would infiltrate vertically through the bed and into the clean mound sand. Once through the sand, treated effluent would infiltrate into the native soil.

An automated control panel would govern system operations and it is recommended for it to be equipped with remote telemetry. This feature would allow real-time remote access to detailed operations data, the ability for the operator to change setpoint values, and alarm condition notification.

The cluster system requires routine operation and maintenance responsibilities. Typical tasks include monitoring and logging wastewater flows, inspecting pumps and controls, field flushing pressure distribution laterals, rotating mound cells, and checking treatment tanks for solids accumulation. Tank solids would be pumped periodically, as required by the MPCA, and hauled to an approved facility for proper disposal.

For each cluster system, construction, operation, and maintenance costs for would be assessed equally across service area. See Section 5 for a cost analysis.

4.1.2.3 Community Cluster System Summary

The following points summarize the community cluster system alternative:

- Advantages:
    - Low-interest rate loans and grant programs could be available for design and construction costs with Le Sueur County ownership.
    - Potential property value increase compared to private ISTS.
    - Eliminates the burden of pumping holding tanks and associated costs.
    - Allows for more usable land area on properties.
    - Routine operation and maintenance activities completed by a service provider.

- Disadvantages:
    - Land acquisition in close proximity can be difficult. Currently, there is no agreement or discussion with landowners.
    - Higher capital costs than private ISTS.
    - Potential local opposition.

5.0 OPINION OF PROBABLE COST ANALYSIS

Two alternatives have been evaluated to improve existing wastewater infrastructure of the service area including private ISTS replacement and community cluster systems. The following section includes an opinion of probable cost analysis of these alternatives including capital, operation, maintenance, and replacement (O,M&R) costs.

5.1 OPINION OF PROBABLE CONSTRUCTION COST ESTIMATES

Table 5-1 provides estimated construction costs to replace all ISTS within the service area that are noncompliant or cannot support a future Type 1 system. Type 1 soil dispersal systems would be above-grade mounds, Type 2 holding tanks would be 2,000-gallons in capacity, and Type 3/Type 4 systems would include an ISTS with secondary pretreatment.

Table 5-1: Opinion of Probable Construction Cost Estimate – Private ISTS Replacement

New ISTS Type	Number	Estimated Cost per ISTS	Estimated Construction Cost
Type 1 Mound	20	$25,000	$500,000
Type 2 Holding Tank	12	$7,500	$90,000
Type 3/Type 4	24	$30,000	$720,000
		Construction Cost Subtotal	$1,310,000
		Contingency	$196,500
		Total Estimated Construction Cost	$1,506,500
		Estimated Construction Cost per Property	$26,900

Tables 5-2 and 5-4 summarize estimated construction costs for the two community cluster systems to serve select properties along Beach Lane and Lake Volney Lane & 400th Street, respectively, that have a noncompliant ISTS or cannot support a Type 1 replacement. See Appendix G for a detailed cost estimate. In addition, Tables 5-3 and 5-5 provide ISTS replacement costs of the community cluster properties to better compare the alternatives.

Each community cluster system includes a grinder pump low pressure sewer collection system and mound soil dispersal system. These estimated construction costs do not include reductions from potential grant funding programs. See Section 5.3 for funding details.

Table 5-2: Opinion of Probable Construction Cost Estimate – Beach Lane Community Cluster System

Wastewater Component	Estimated Construction Cost
Alternative 2A: Collection System	$286,000
Alternative 2A: Treatment System	$474,000
Construction Cost Subtotal	$760,000
Contingency	$114,000
Engineering Services	$137,000
Legal & Admin.	$23,000
Total Estimated Construction Cost	$1,034,000
Estimated Construction Cost per Property	$129,300

Table 5-3: Opinion of Probable Construction Cost Estimate – ISTS Replacement of Beach Lane Community Cluster System Properties

New ISTS Type	Number	Estimated Cost per ISTS	Estimated Construction Cost
Type 2 Holding Tank	4	$7,500	$30,000
Type 3/Type 4	4	$30,000	$120,000
Construction Cost Subtotal			$150,000
Contingency			$22,500
Total Estimated Construction Cost			$172,500
Estimated Construction Cost per Property			$21,600

Table 5-4: Opinion of Probable Construction Cost Estimate – Lake Volney Lane & 400th Street Community Cluster System

Wastewater Component	Estimated Construction Cost
Alternative 2B: Collection System	$581,000
Alternative 2B: Treatment System	$679,000
Construction Cost Subtotal	$1,260,000
Contingency	$189,000
Engineering Services	$227,000
Legal & Admin.	$38,000
Total Estimated Construction Cost	$1,714,000
Estimated Construction Cost per Property	$107,200

Table 5-5: Opinion of Probable Construction Cost Estimate – ISTS Replacement of Lake Volney Lane & 400th Street Community Cluster System Properties

New ISTS Type	Number	Estimated Cost per ISTS	Estimated Construction Cost
Type 1 Mound	3	$25,000	$75,000
Type 2 Holding Tank	5	$7,500	$37,500
Type 3/Type 4	8	$30,000	$240,000
Construction Cost Subtotal			$352,500
Contingency			$53,000
Total Estimated Construction Cost			$405,500
Estimated Construction Cost per Property			$25,400

5.2 OPERATION, MAINTENANCE, AND REPLACEMENT COSTS

When comparing wastewater treatment alternatives, O,M&R costs must be included in the evaluation which varies depending on type. Holding tanks have the highest O,M&R costs due to pumping, which can be thousands per year depending upon water usage. For seasonal dwellings with likely future holding tanks, associated costs were estimated based on a 5-month summer dwelling usage at $0.20/gallon pumping cost. Of the five months, it was assumed the dwellings were occupied during weekends for a total of 60-days and generated 150 gpd of wastewater. One year-round property did have a likely future holding tank. For this property it was assumed that the dwelling generated 150 gpd. Type 1 and Type 3/Type 4 ISTS would have much less O,M&R costs than holding tanks and have been estimated at approximately $400 and $775 per year, respectively. Replacement costs are for short-lived assets such as pumps, blowers, and controls. Each replacement cost is calculated based on the component cost spread over its estimated life. Community cluster system O,M&R costs include service provider fees, property insurance, tank pumping, data service, electricity, and equipment replacement costs. Table 5-6 summarizes estimated annual O,M&R costs for each alternative.

Table 5-6: Estimated Annual Operation, Maintenance, & Replacement Costs

	Alternative 1: Private ISTS	Alternative 2A: Beach Ln Community Cluster	ISTS Replacement Beach Ln Community Cluster	Alternative 2B: Lake Volney Ln & 400th St Community Cluster	ISTS Replacement Lake Volney Ln & 400th St Community Cluster
Number of Properties	56	8	8	16	16
Total Annual O,M&R Costs	$64,800	$9,500	$10,300	$14,100	$25,500
Annual O,M&R Costs per Property	$1,160	$1,190	$1,290	$890	$1,600
Monthly O,M&R Costs per Property	$97	$99	$107	$73	$133

5.3 FUNDING

Loan and grant wastewater funding could be available and may be pursued through local, state, and federal programs. Local funding programs would be through Le Sueur County whereas the Minnesota Public Facilities Authority (PFA) administers state and federal opportunities. The PFA provides technical and financial assistance to construct wastewater, drinking water, and transportation infrastructure throughout the state. They work together with the MPCA to administer low-interest loans and grants to local units of government. The following subsections summarize available programs and eligibility requirements that need to be followed.

5.3.1 Local

Le Sueur County has two SSTS funding programs including the Septic Upgrade Loan Program (SULP) and the Septic Low Income Grant program. The SULP provides up to a $15,000 loan for the design and installation of a SSTS at a 4% interest rate. The loan must be paid in full within five years if the amount is $5,000 or less; and within ten years if it is more than $10,000. Construction must occur within one year of the loan approval date.

The Septic Low Income Grant program is funded by the MPCA and assists low-income property owners with costs associated with the design, installation, repair, and replacement of residential SSTS deemed a FTPG or ITPHS. To be eligible, the property owner must meet low-income requirements set by the Le Sueur County Human Services Department. The grant is limited to 75% of the total costs not to exceed $10,000. Unfortunately, currently no grant funding is available for the program.

5.3.2 State

The Small Community Wastewater Treatment Program is made available through the Minnesota Clean Water Fund via the Clean Water, Land, and Legacy Amendment. This funding program is administered by the PFA and provides technical assistance grants and construction grants and loans for public SSTS projects. Cities, counties, townships, and sanitary districts are eligible for up to $60,000 grants for procuring SSTS professionals to conduct a sanitary survey and prepare a feasibility report that summarize SSTS conditions and potential future infrastructure alternatives. Up to $2 million loans at one percent interest and up to 80 percent grants (based on affordability) are available through the program for the design and construction of SSTS to correct noncompliant systems.

5.3.3 Federal

The Clean Water Revolving Fund is jointly administered by the PFA and MPCA and provides low-interest loans to finance public wastewater projects. Projects must be included on the MPCA Project Priority List and the PFA Intended Use Plan; and be MPCA certified before funds are disbursed. Cities, counties, townships, and sanitary districts are eligible, and rates are determined by the PFA with a 20-year term. If the annual residential cost would exceed 1.4 percent of the communities median house income, the term may be up to 30-years.

The Water Infrastructure Fund provides additional grants to public communities based on affordability. If the project does not meet the United States Department of Agriculture Rural Development program requirements, the grant funding is in conjunction with the Clean Water Revolving Fund loan. Project are eligible for the grant if the annual residential cost exceeds 1.4 percent of the communities median house income. The maximum grant may not exceed $5 million or $20,000 per connection, whichever is less.

5.3.4 Opinion of Probable Cost Estimate with Funding - Community Cluster Systems

Table 5-7 summarizes construction costs for both community cluster systems assuming the projects would obtain an 80% grant from the PFA under the Small Community Wastewater Treatment Program. The remaining 20% would be covered by a low-interest loan through the same program. Similar projects have been able to acquire additional grant however, to be conservative, an 80% grant was used in analysis. Note, it is not certain the Project would receive a grant but based on experience, there is opportunity.

Table 5-7: Opinion of Probable Construction Cost Estimate with Funding – Beach Lane and Lake Volney Lane & 400th Street Community Cluster Systems

	Beach Lane Community Cluster	Lake Volney Lane & 400th Street Community Cluster
Total Estimated Probable Construction Cost	$1,034,000	$1,714,000
Grant Funding Reduction	$827,200	$1,371,200
Final Total Estimated Probable Construction Cost	$206,800	$342,800
Estimated Construction Cost per Property	$25,900	$21,500

6.0 SUMMARY AND RECOMMENDATIONS

The Volney, Gorman, and Cordova septic inventory project discovered compliance status for existing ISTS and provides alternatives for long-term wastewater treatment infrastructure. The following is a summary of findings:

- The Project area consists of 41 residential, 1 commercial, and 28 seasonal residential properties.
- The majority (78%) of existing ISTS are greater than 20 years old of unknown age.
- Thirty-one of the 70 ISTS (44%) are compliant.
- Twelve of the 70 properties (17%) would be limited to a future holding tank.
- Twenty-four of the 70 properties (34%) would be served by a likely future Type 3 or Type 4 ISTS.
- Two alternatives were evaluated for long-term wastewater treatment infrastructure including:
    - Alternative 1: private ISTS to serve all properties
    - Alternative 2: two separate community cluster systems to serve select properties along (A) Beach Lane and (B) Lake Volney Lane & 400th Street that have noncompliant ISTS or cannot support a likely Type 1 replacement
- Both wastewater treatment alternatives include systems that would be permitted by Le Sueur County.
- Estimated opinion of probable construction costs for the alternatives are:
    - Alternative 1: $1,506,500 ($26,900 per property)
    - Alternative 2A (before grant funding reduction): $1,034,000 ($129,300 per property)
    - Alternative 2A (after grant funding reduction): $206,800 ($25,900 per property)
    - Alternative 2A ISTS replacement: $172,500 ($21,600 per property)
    - Alternative 2B (before grant funding reduction): $1,714,000 ($107,200 per property)
    - Alternative 2B (after grant funding reduction): $342,800 ($21,500 per property)
    - Alternative 2B ISTS replacement: $405,500 ($25,400 per property)
- Estimated annual O,M&R costs for the alternatives are:
    - Alternative 1: $64,800 ($1,160 per property)
    - Alternative 2A: $9,500 ($1,190 per property)
    - Alternative 2A ISTS replacement: $10,300 ($1,290 per property)
    - Alternative 2B: $14,100 ($890 per property)
    - Alternative 2B ISTS replacement: $25,500 ($1,600 per property)

6.1 RECOMMENDATIONS AND NEXT STEPS

Le Sueur County will continue to enforce MN Rules Chapter 7080 SSTS regulations and county ordinance Section 17. Noncompliant ISTS will require upgrades and homeowners will be responsible for ensuring their ISTS remains in compliance.

This feasibility assessment report provides information to assist in making informed decisions as SSTS information and alternatives are reviewed. It is our recommendation that the following be considered:

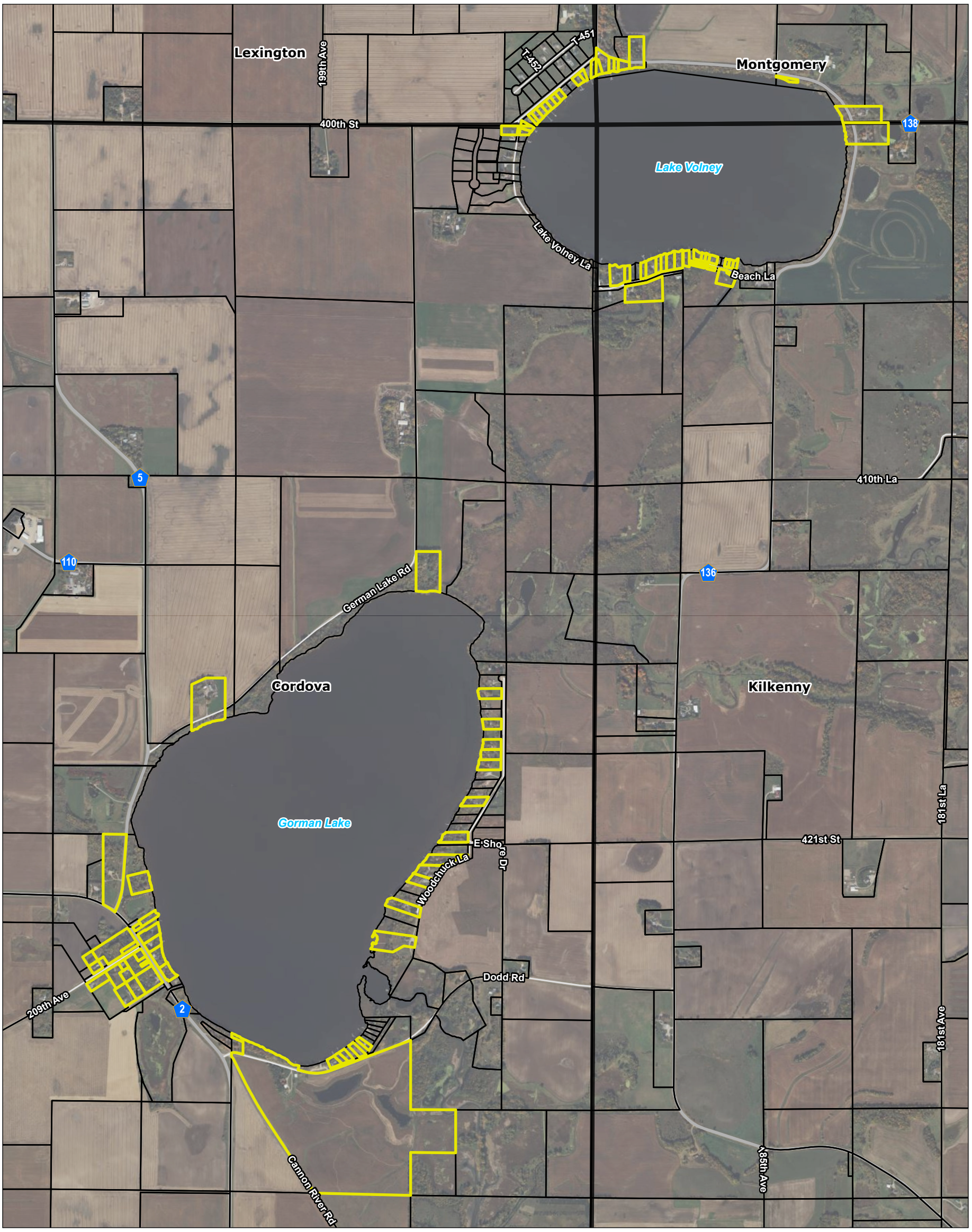
- If Project stakeholders value the lowest capital cost, existing dwellings would continue using private ISTS and noncompliant ISTS should be upgraded.

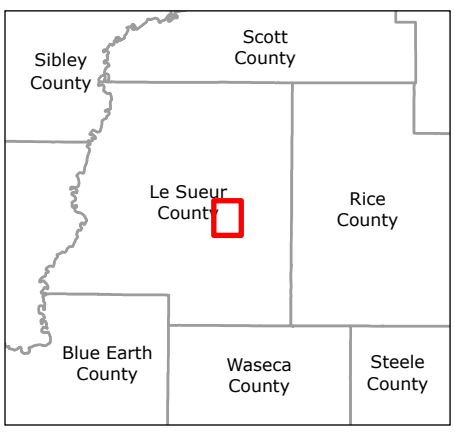
- If Project stakeholders desire a community solution in the two most needed areas, then community cluster systems should be pursued to serve select properties along Beach Lane and Lake Volney Lane & 400th Street. Note, if other nearby properties desire to be included, associated costs per connection would decrease.

The following actions should be taken by stakeholders in pursuing community cluster systems to serve select properties along Beach Lane and Lake Volney Lane & 400th Street:

- Determine the desire of the included property owners to pursue the community cluster system wastewater solution.
- Explore construction financing grant opportunities and in particular, the Small Community Wastewater Treatment Program. Work with the PFA and Stantec for assistance.
- Explore the creation of a subordinate service district which would allow Le Sueur County a means to effectively provide and finance wastewater services for Beach Lane and Lake Volney Lane & 400th Street residents.
- Investigate the opportunity of land acquisition for the community cluster systems as shown on Figure 6 and Figure 7.

FIGURES





Legend

- Study Area Parcels
- County Parcels
- Townhships

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

Client/Project
227704372
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

Figure No.
1

Title
Project Area

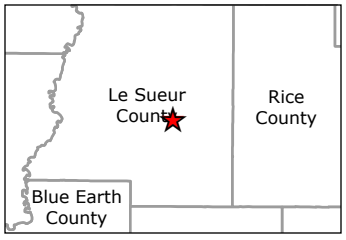
Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur County, Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan
"Aligning local water planning on major watershed boundaries with state strategies towards prioritized, targeted and measurable implementation plans"



- County Parcels
- Study Area Parcels
- Shallow Well 100' Setback Buffer
- Deep Well 50' Setback Buffer
- Shallow Well
- Deep Well

N

0 70 140 Feet
(At original document size of 8.5x11)
1:1,800

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

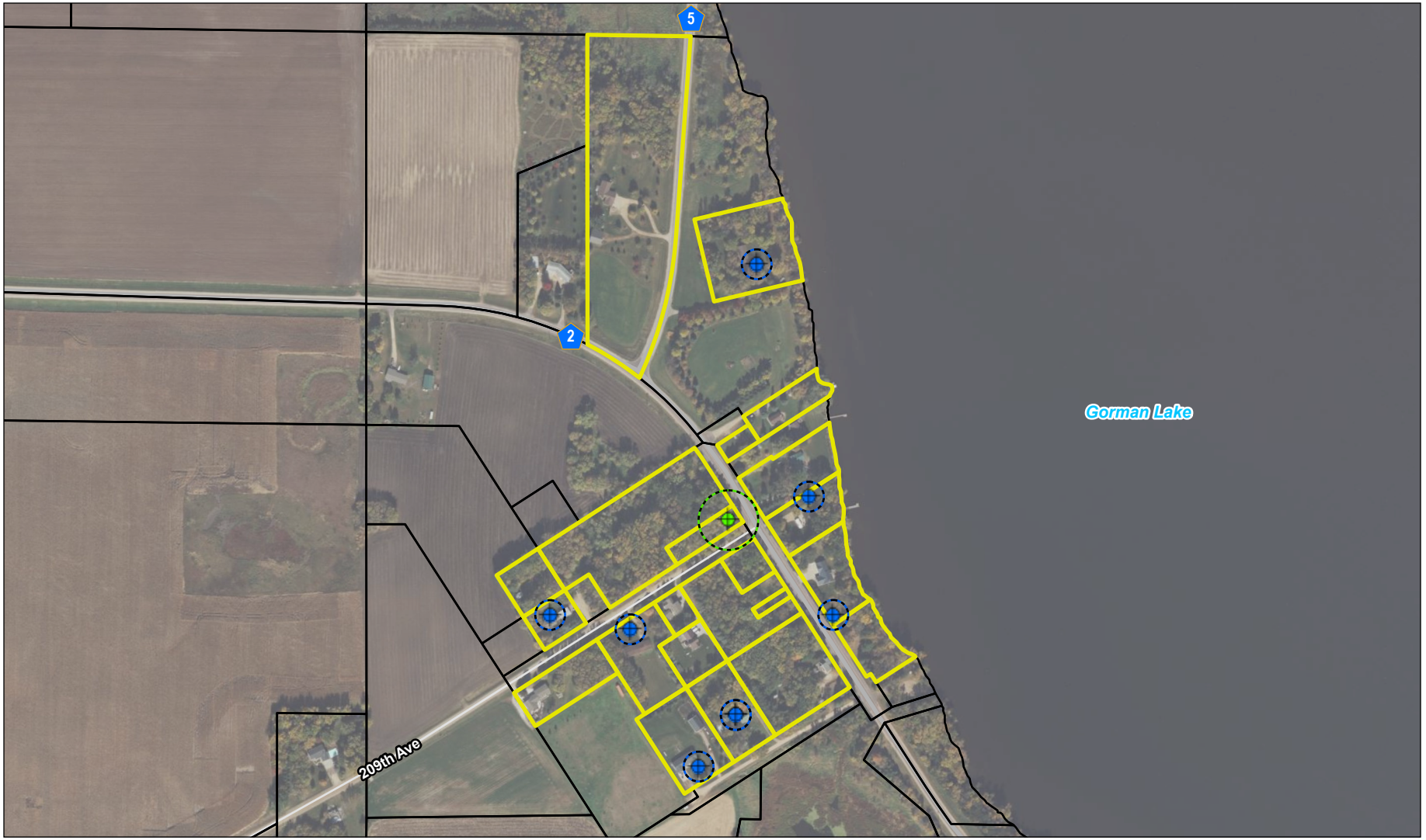
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

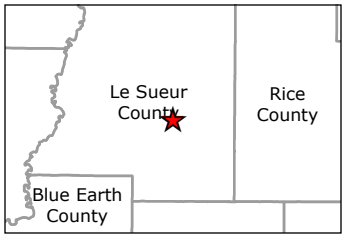
227704372

Figure No.
2-1

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





County Parcels
Study Area Parcels
Shallow Well 100' Setback Buffer
Deep Well 50' Setback Buffer
Shallow Well
Deep Well

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

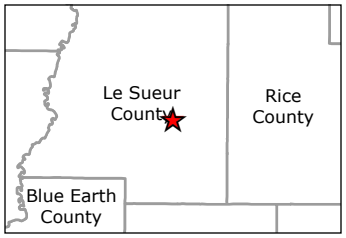
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
2-2

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



County Parcels
Study Area Parcels
Shallow Well 100' Setback Buffer
Deep Well 50' Setback Buffer
Shallow Well
Deep Well

N

0 360 720 Feet
(At original document size of 8.5x11)
1:9,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur COUNTY | MINNESOTA

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

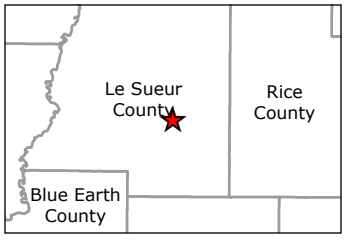
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
2-3

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



- County Parcels
- Study Area Parcels
- Shallow Well 100' Setback Buffer
- Deep Well 50' Setback Buffer
- Shallow Well
- Deep Well

N

0 240 480 Feet

(At original document size of 8.5x11)

1:6,000

Notes

1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

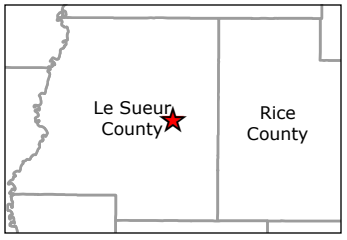
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
2-4

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



County Parcels
Study Area Parcels
Shallow Well 100' Setback Buffer
Deep Well 50' Setback Buffer
Shallow Well
Deep Well

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota
Clean Water Land & Legacy Amendment
Stantec
Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

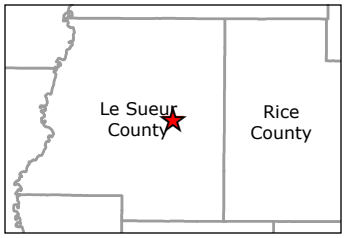
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
2-5

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



County Parcels
Study Area Parcels
Shallow Well 100' Setback Buffer
Deep Well 50' Setback Buffer
Shallow Well
Deep Well

N

0 140 280 Feet
(At original document size of 8.5x11)
1:3,600

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

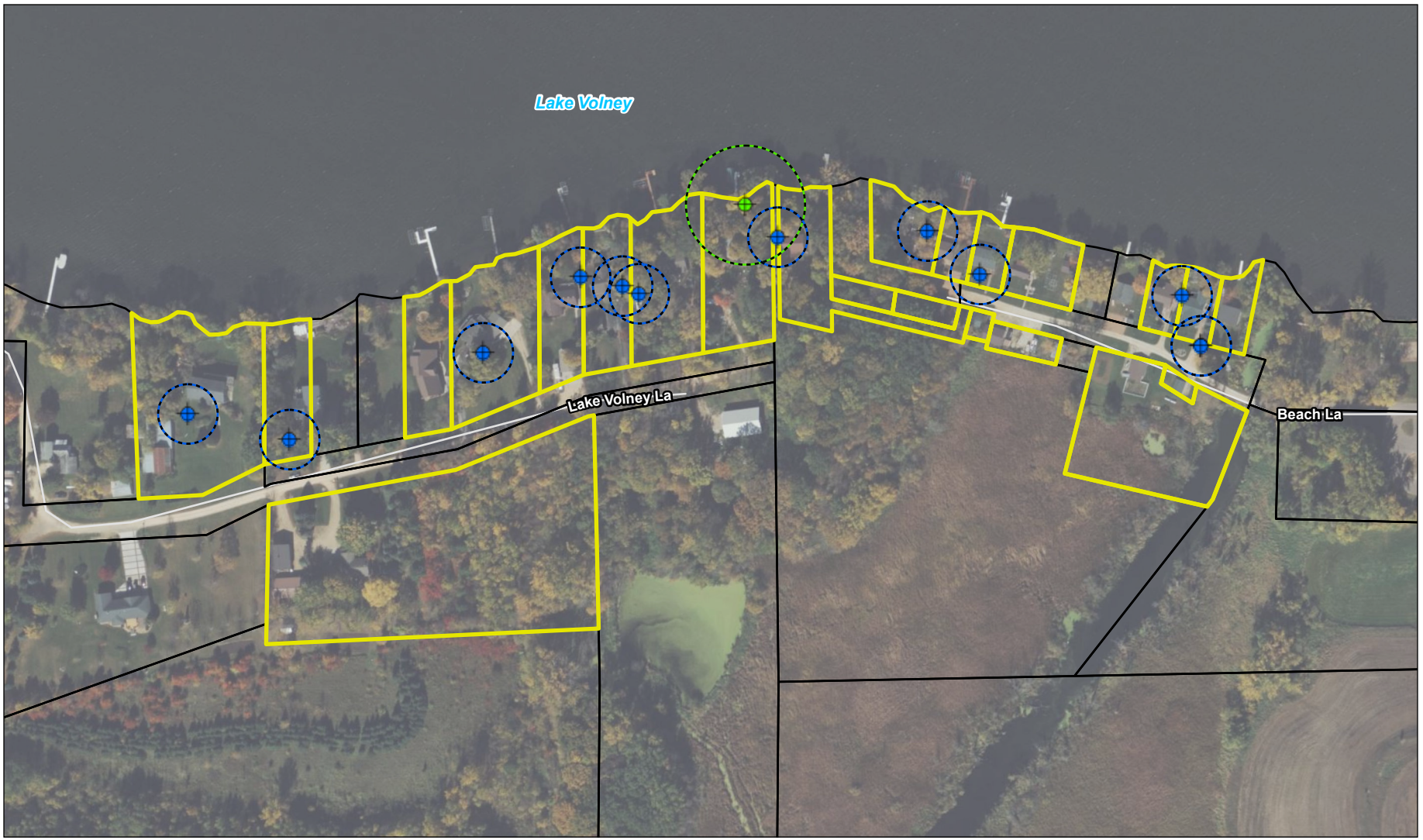
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

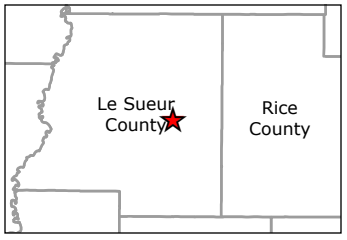
227704372

Figure No.
2-6

Title
Water Supply Well Locations

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams





County Parcels
Study Area Parcels
Shallow Well 100' Setback Buffer
Deep Well 50' Setback Buffer
Shallow Well
Deep Well

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

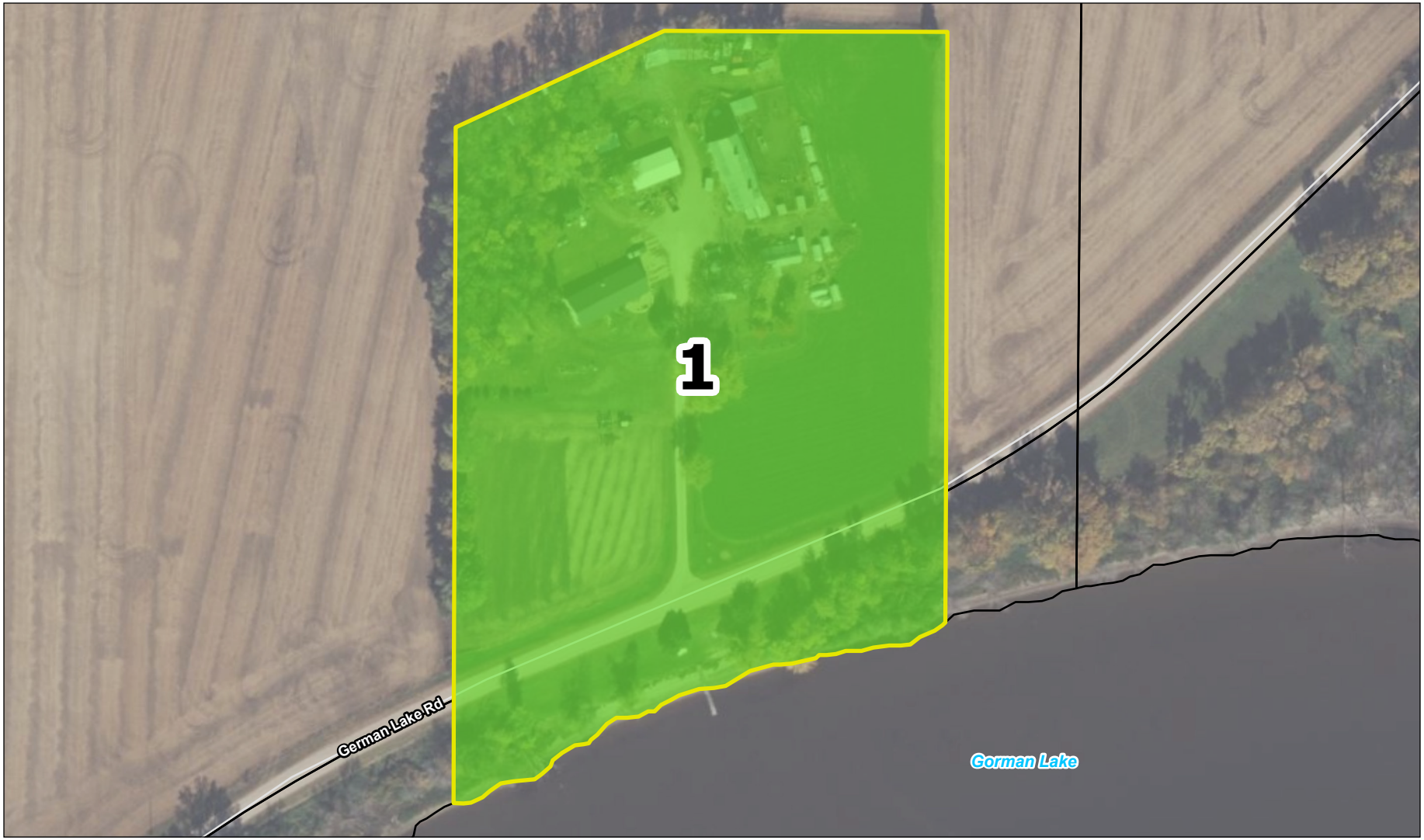
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

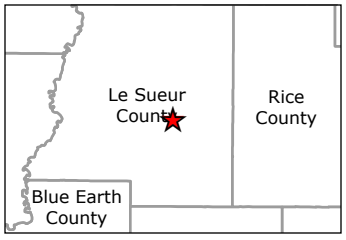
227704372

Figure No.
2-7

Title
Water Supply Well Locations

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 70 140 Feet
(At original document size of 8.5x11)
1:1,800

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

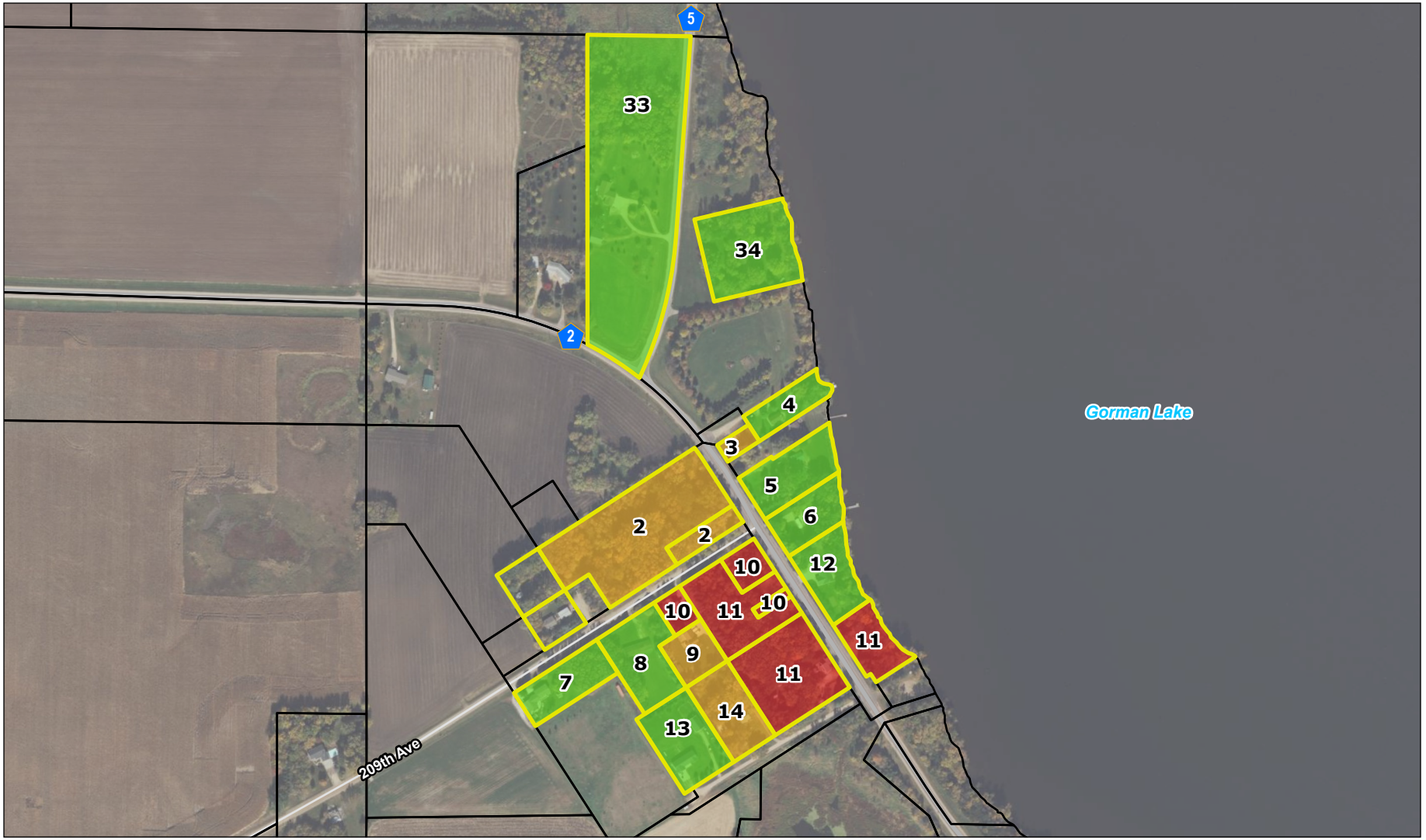
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

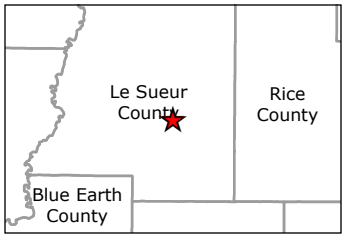
227704372

Figure No.
3-1

Title
ISTS Compliance Status

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-28 By: ahyams





Study Area Parcels
County Parcels

ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

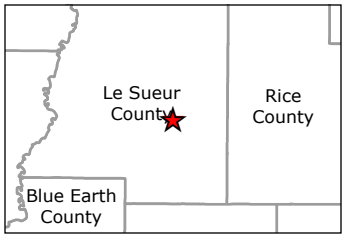
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
3-2

Title
ISTS Compliance Status

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-28 By: ahyams



Study Area Parcels
County Parcels
ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 360 720 Feet
(At original document size of 8.5x11)
1:9,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur COUNTY | MINNESOTA

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

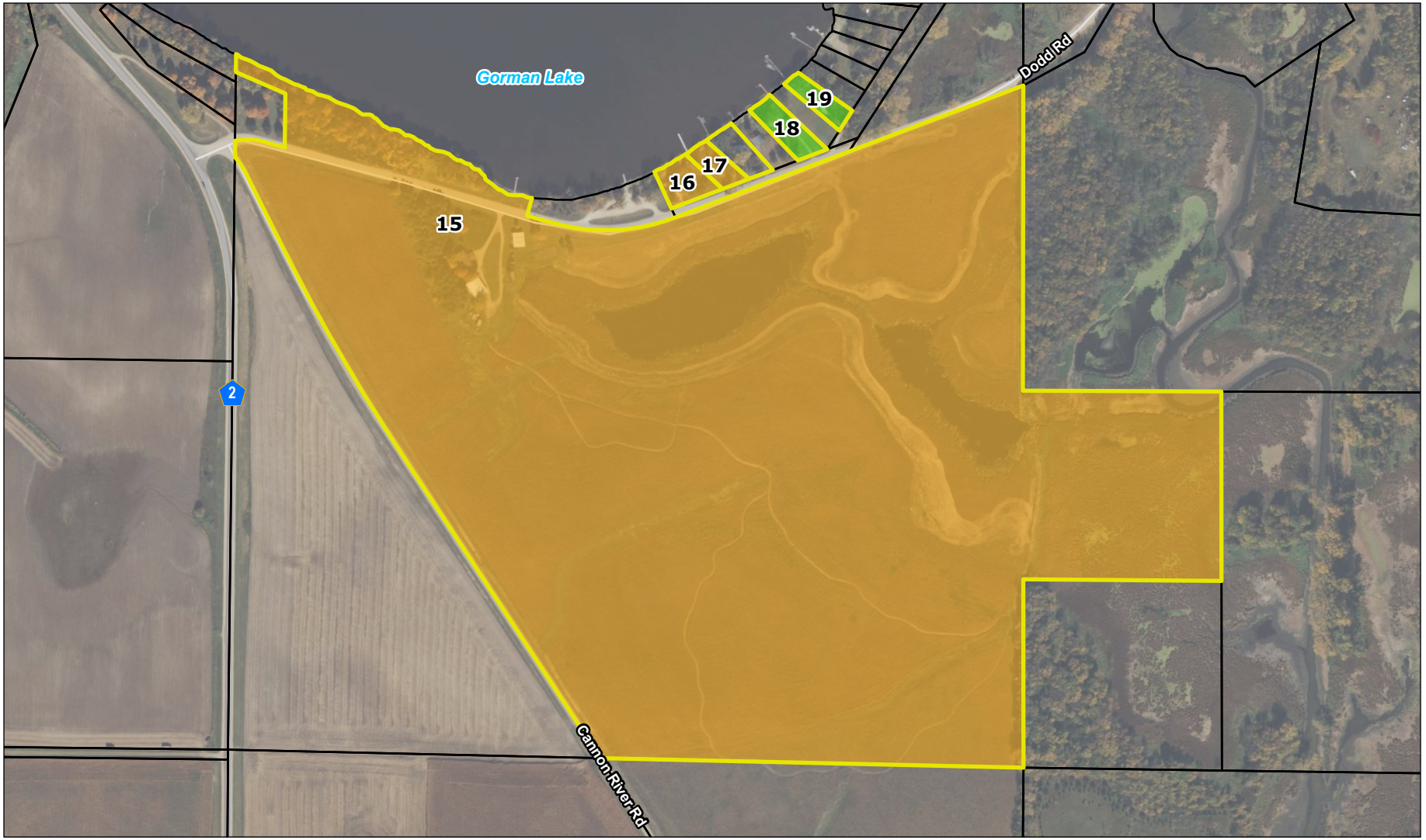
Prepared by ARH on 2022-11-28

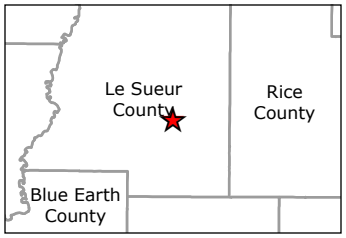
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
3-3

Title
ISTS Compliance Status





Study Area Parcels
County Parcels

ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

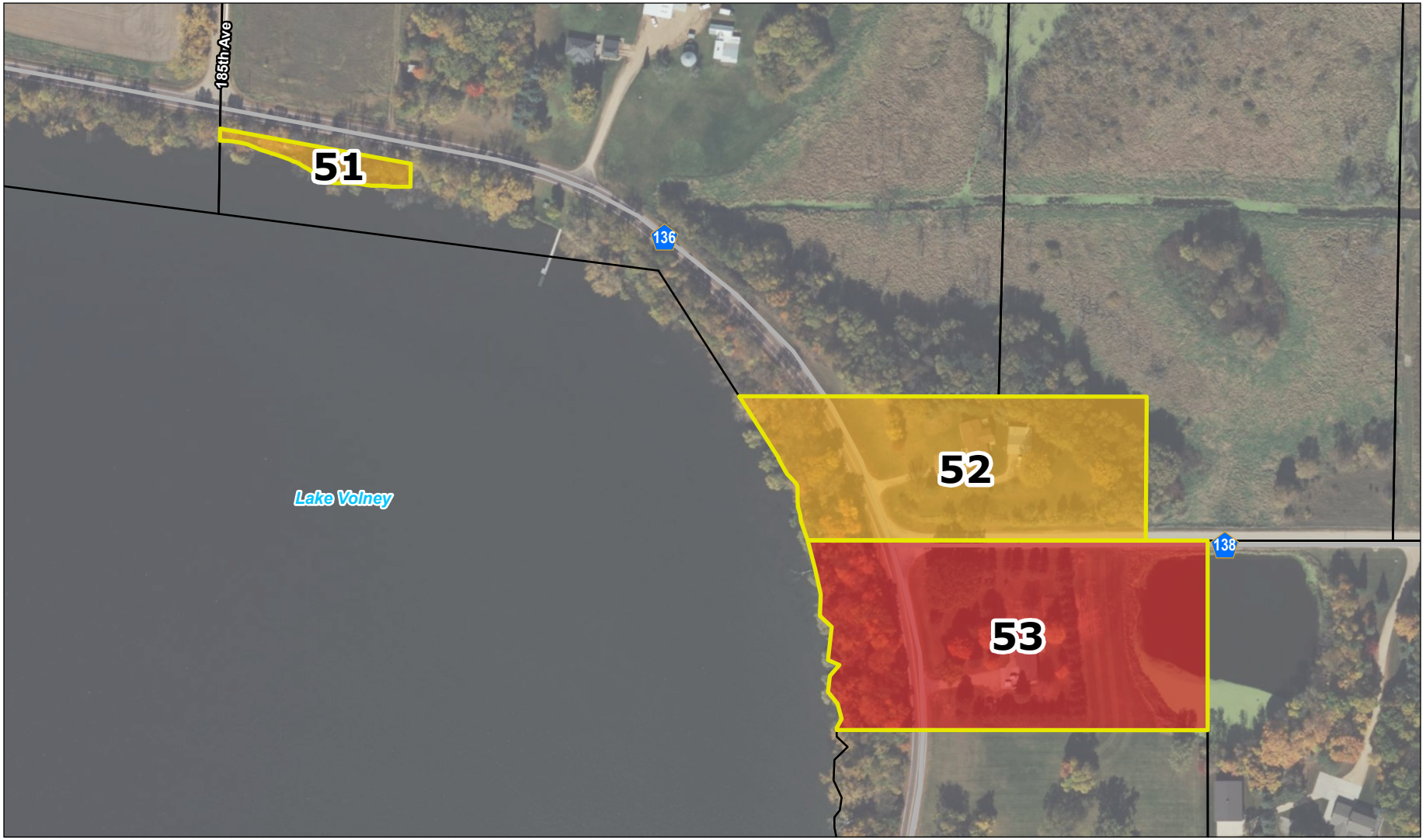
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

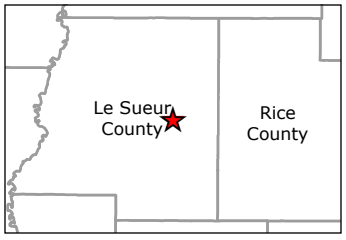
227704372

Figure No.
3-4

Title
ISTS Compliance Status

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-28 By: ahyams





Study Area Parcels
County Parcels

ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota
Clean Water Land & Legacy Amendment
Stantec
Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

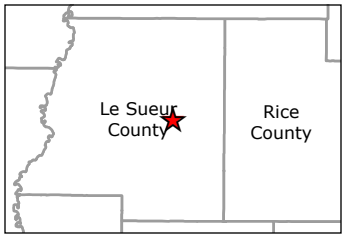
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
3-5

Title
ISTS Compliance Status

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-28 By: ahyams



Study Area Parcels
County Parcels

ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 140 280 Feet
(At original document size of 8.5x11)
1:3,600

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

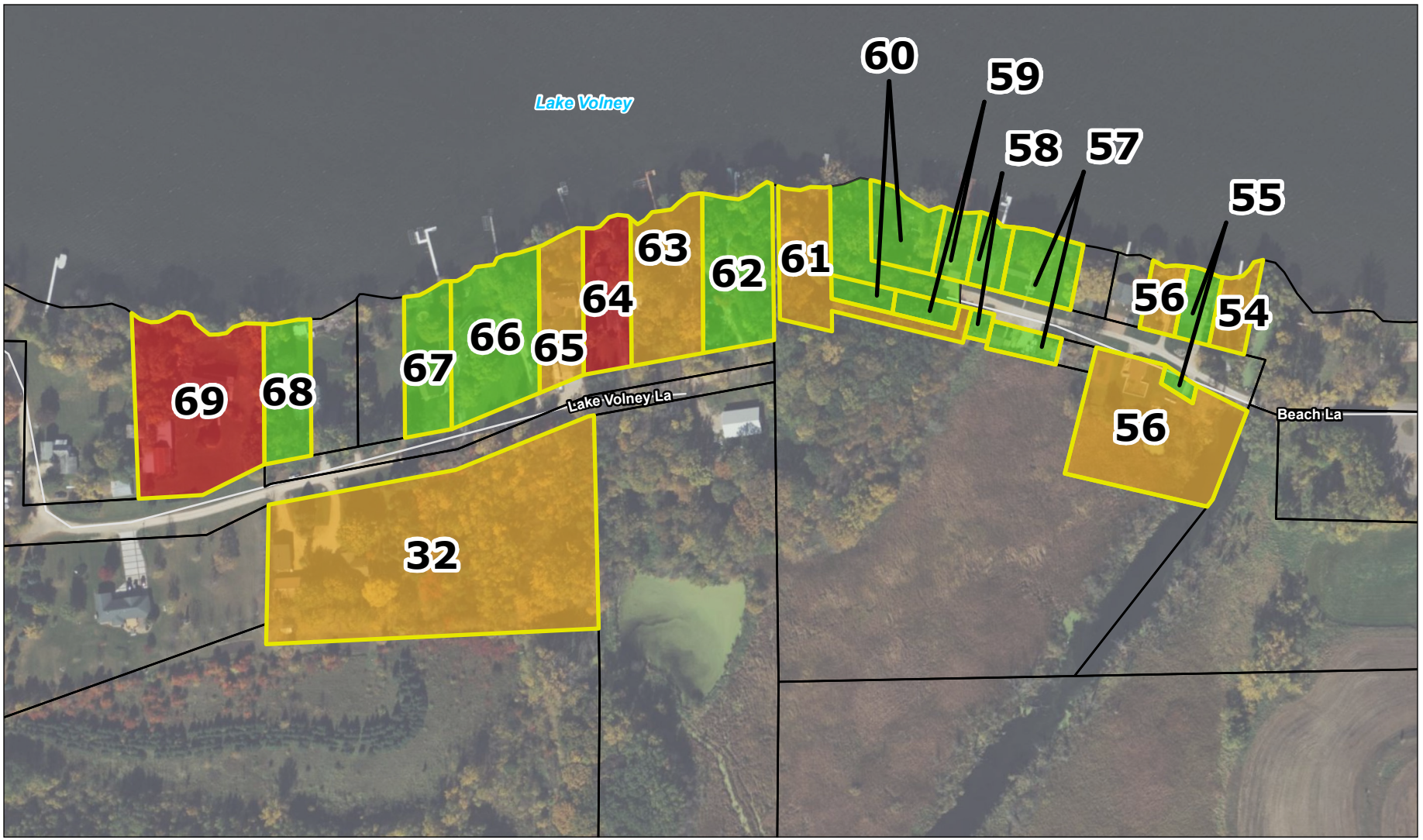
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

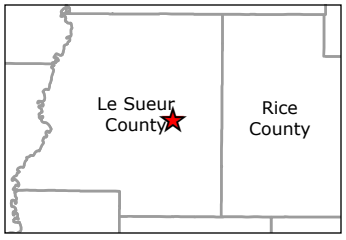
227704372

Figure No.
3-6

Title
ISTS Compliance Status

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-28 By: ahyams





Study Area Parcels
County Parcels
ISTS Compliance Status
Compliant
Failure to Protect Groundwater (FTPG)
Imminent Threat to Public Health or Safety (ITPHS)

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-28

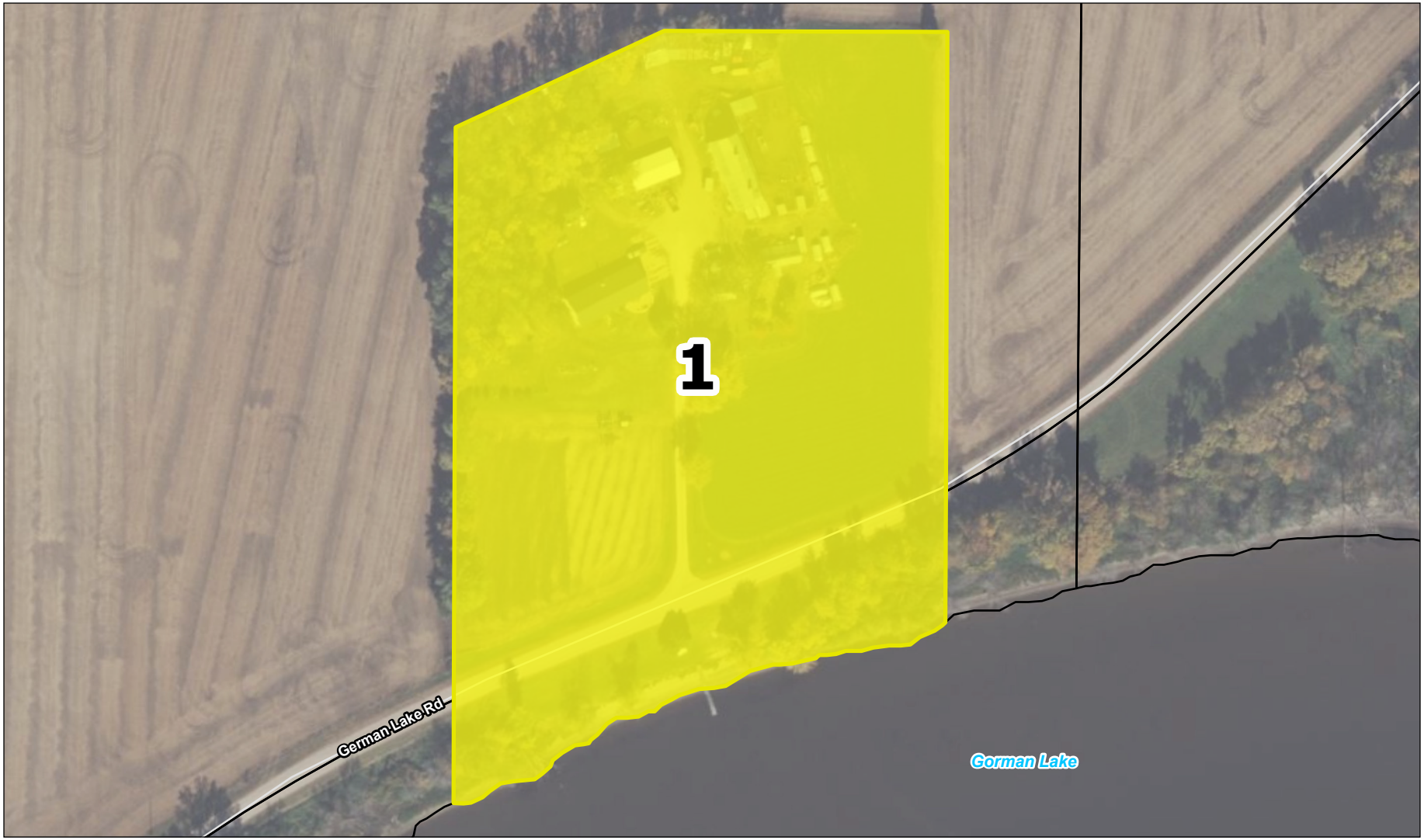
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

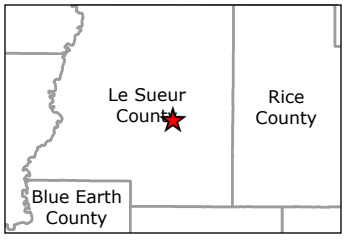
227704372

Figure No.
3-7

Title
ISTS Compliance Status

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-28 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 70 140 Feet
(At original document size of 8.5x11)
1:1,800

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

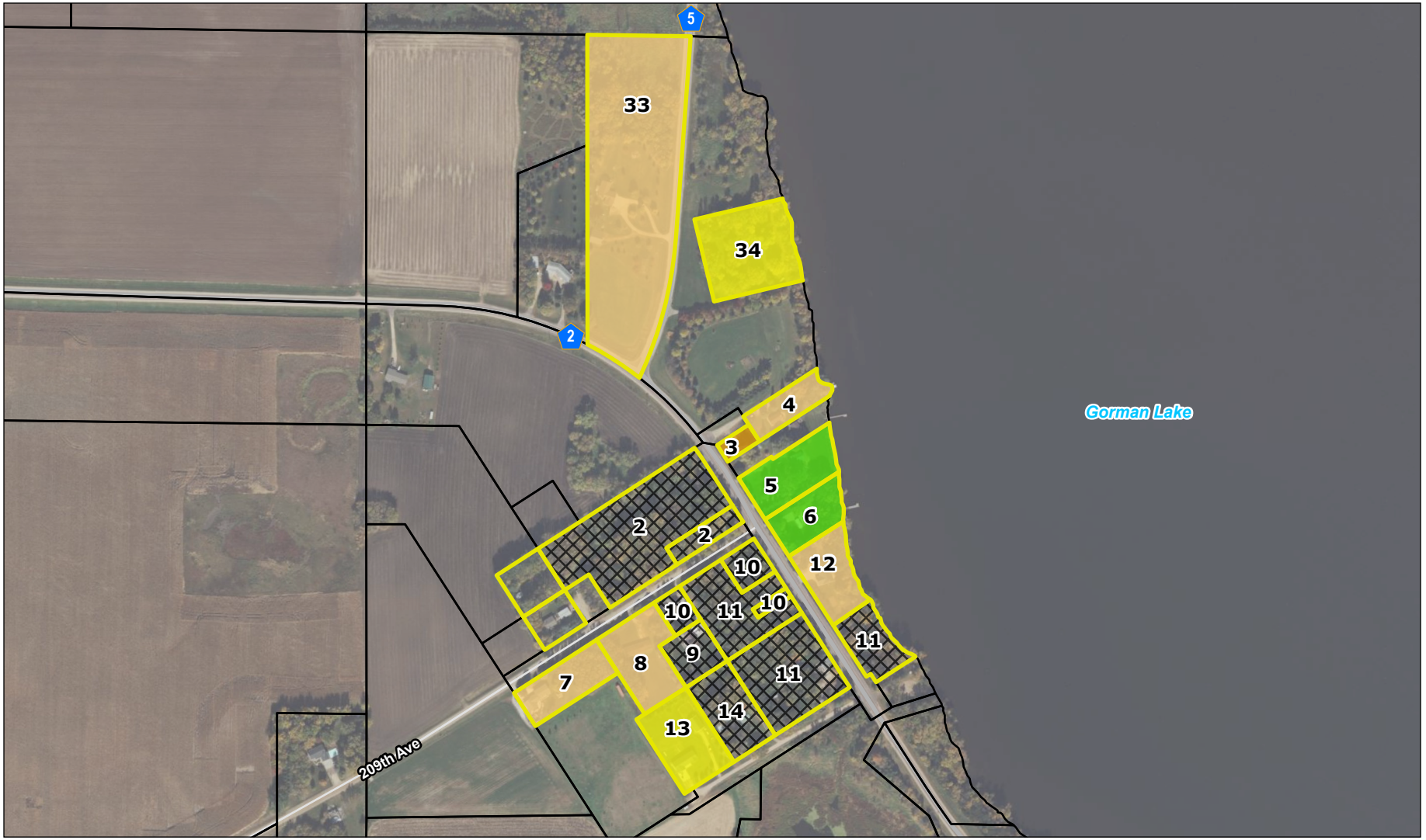
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

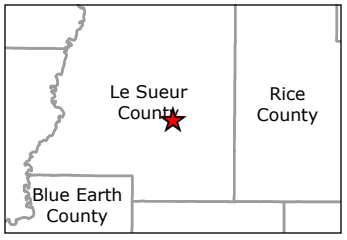
227704372

Figure No.
4-1

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

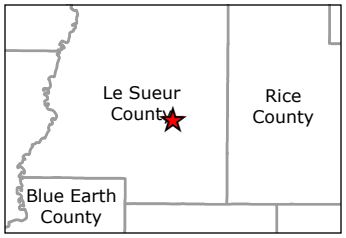
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
4-2

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 360 720 Feet
(At original document size of 8.5x11)
1:9,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

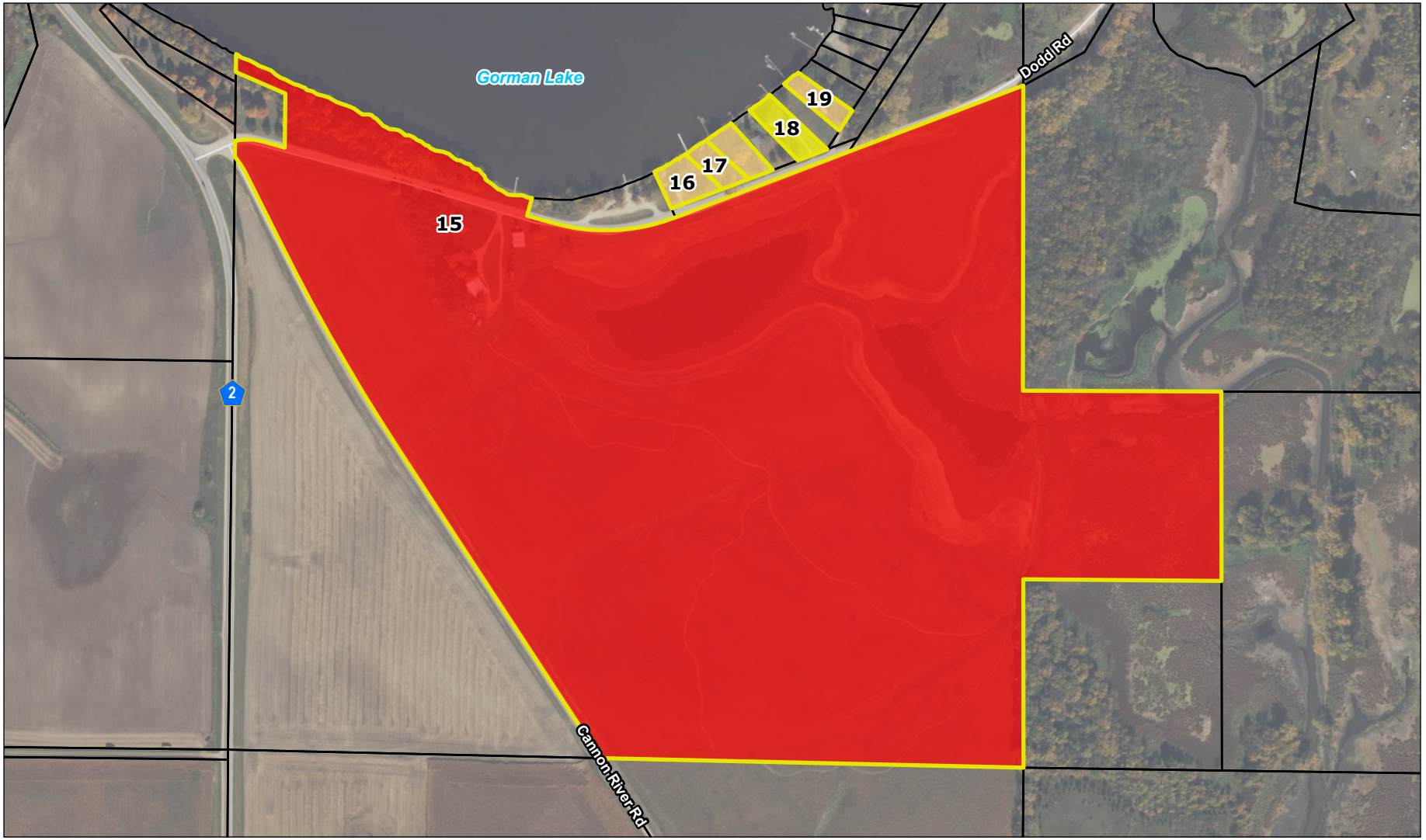
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

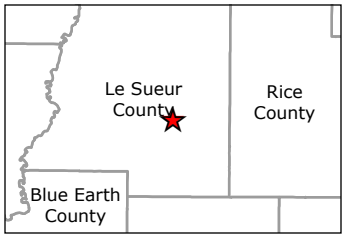
227704372

Figure No.
4-3

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
- Unknown
- <10 Years
- 10-19 Years
- 20-29 Years
- 30-39 Years
- 40+ Years

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

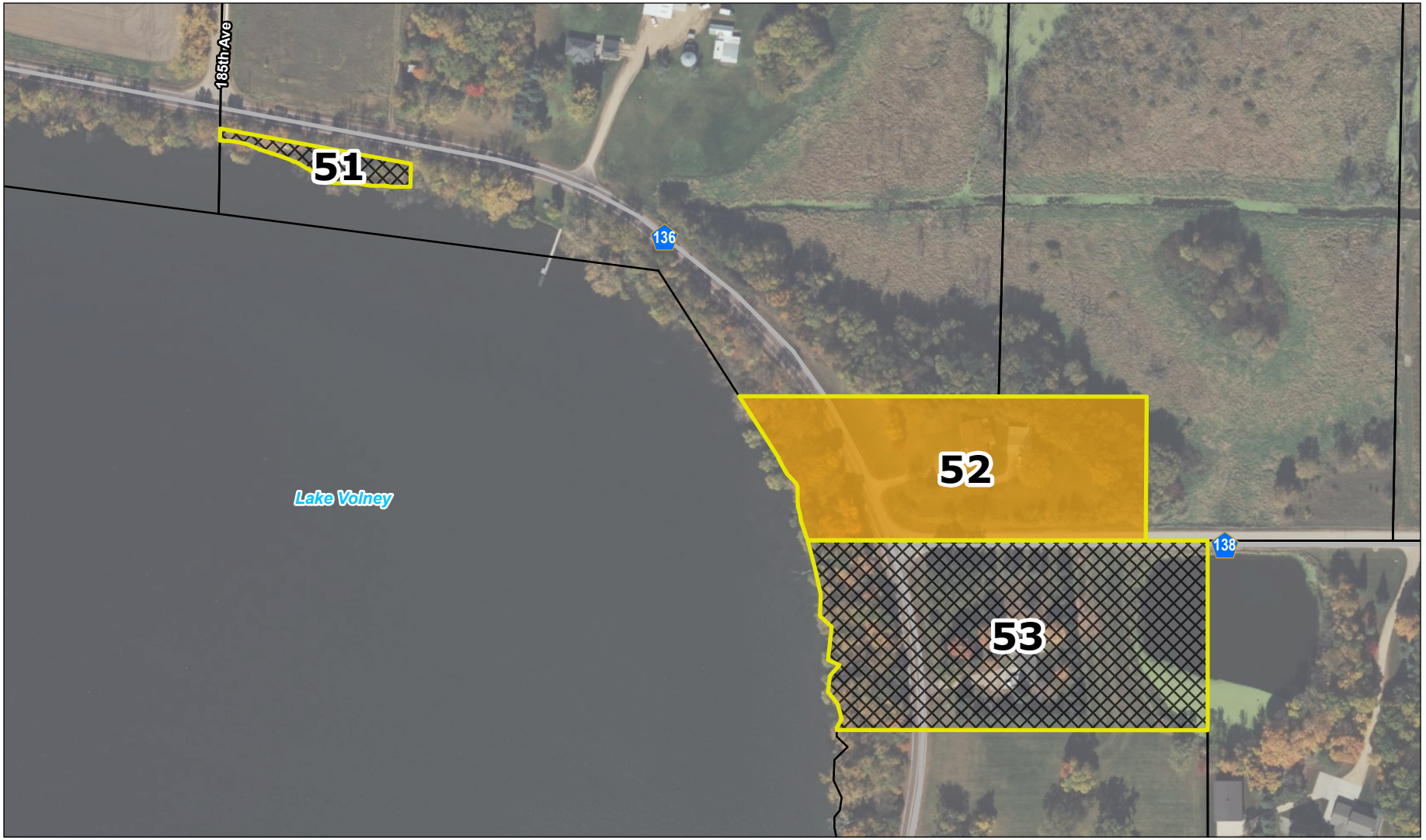
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

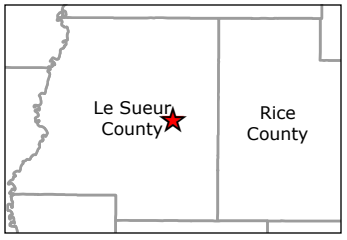
227704372

Figure No.
4-4

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

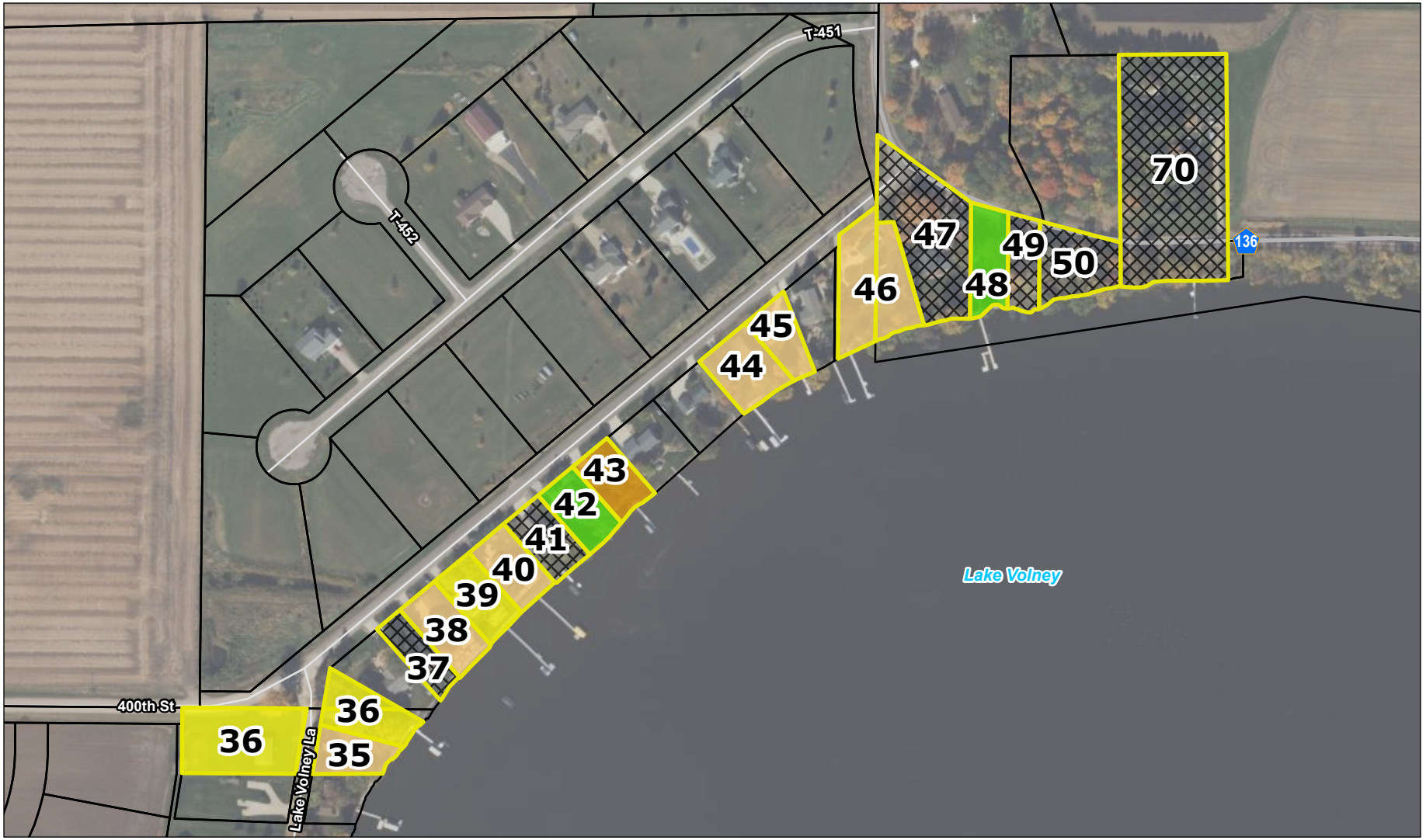
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

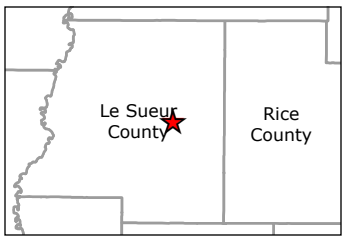
227704372

Figure No.
4-5

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 140 280 Feet
(At original document size of 8.5x11)
1:3,600

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

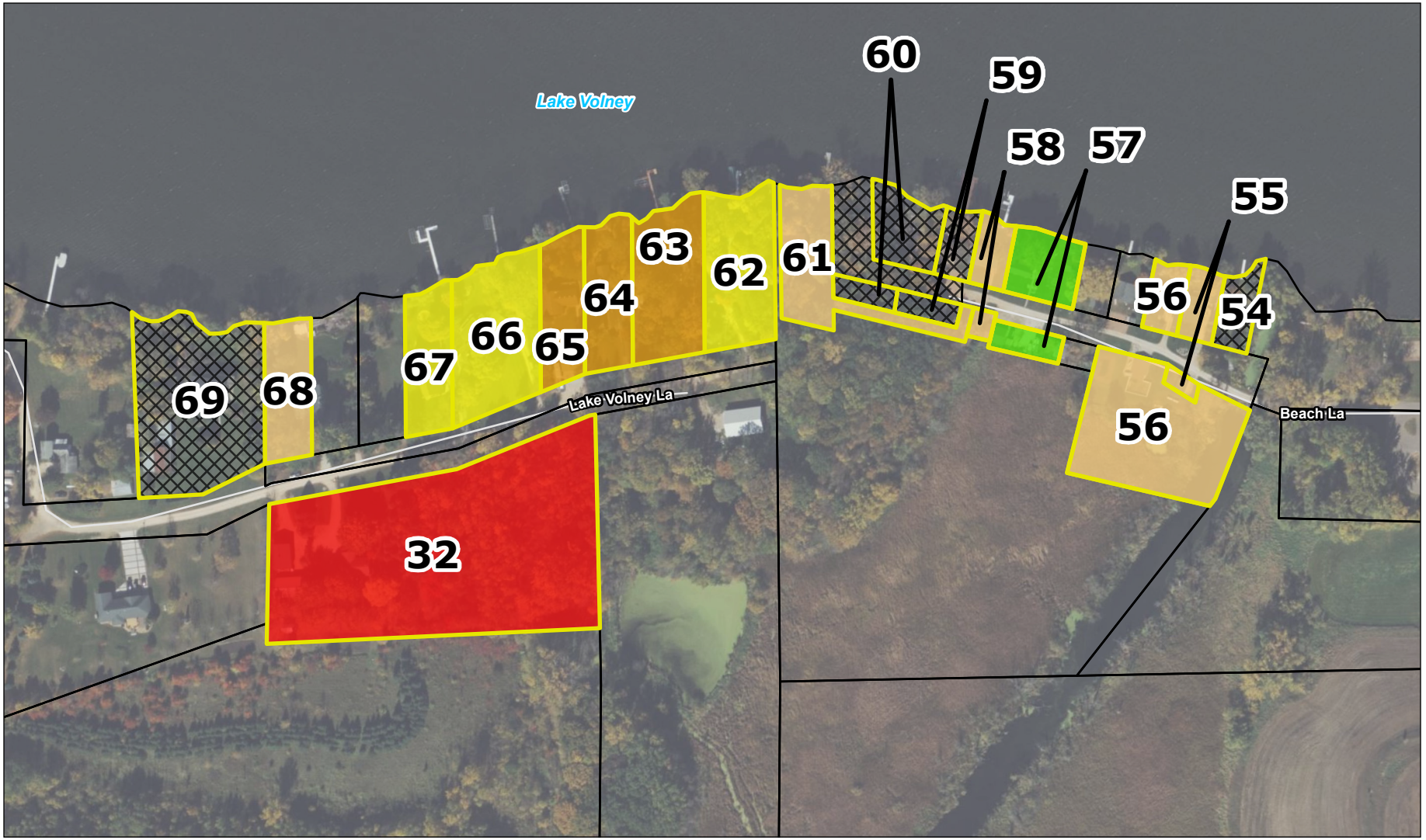
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

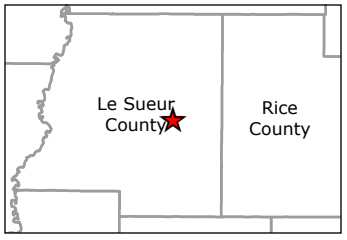
227704372

Figure No.
4-6

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03 data\gis cad\gis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels

ISTS Age
Unknown
<10 Years
10-19 Years
20-29 Years
30-39 Years
40+ Years

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota
Clean Water Land & Legacy Amendment
Stantec
Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

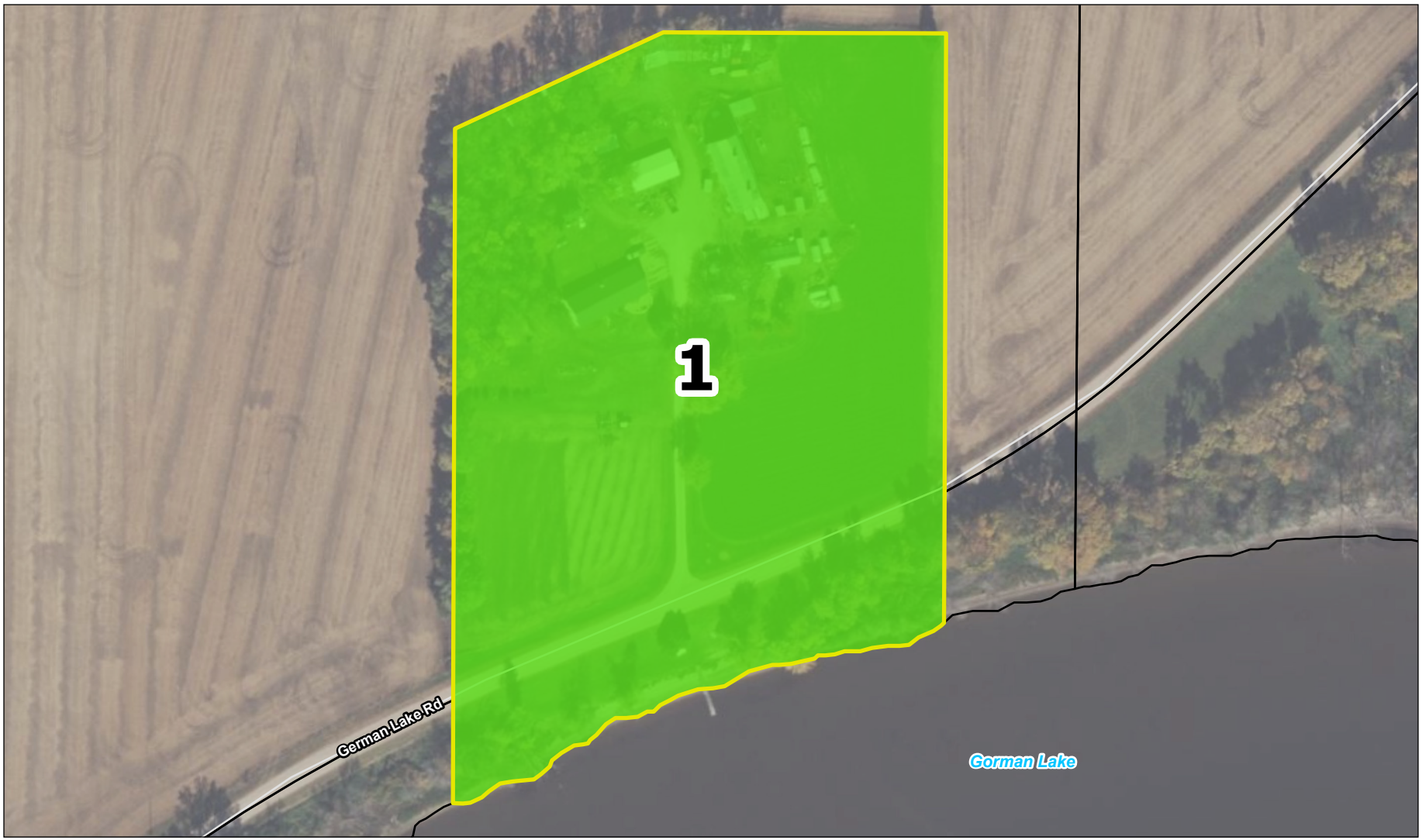
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

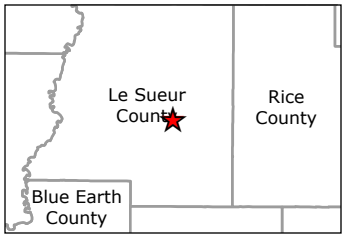
227704372

Figure No.
4-7

Title
ISTS Age (as of 2022)

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 70 140 Feet
(At original document size of 8.5x11)
1:1,800

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

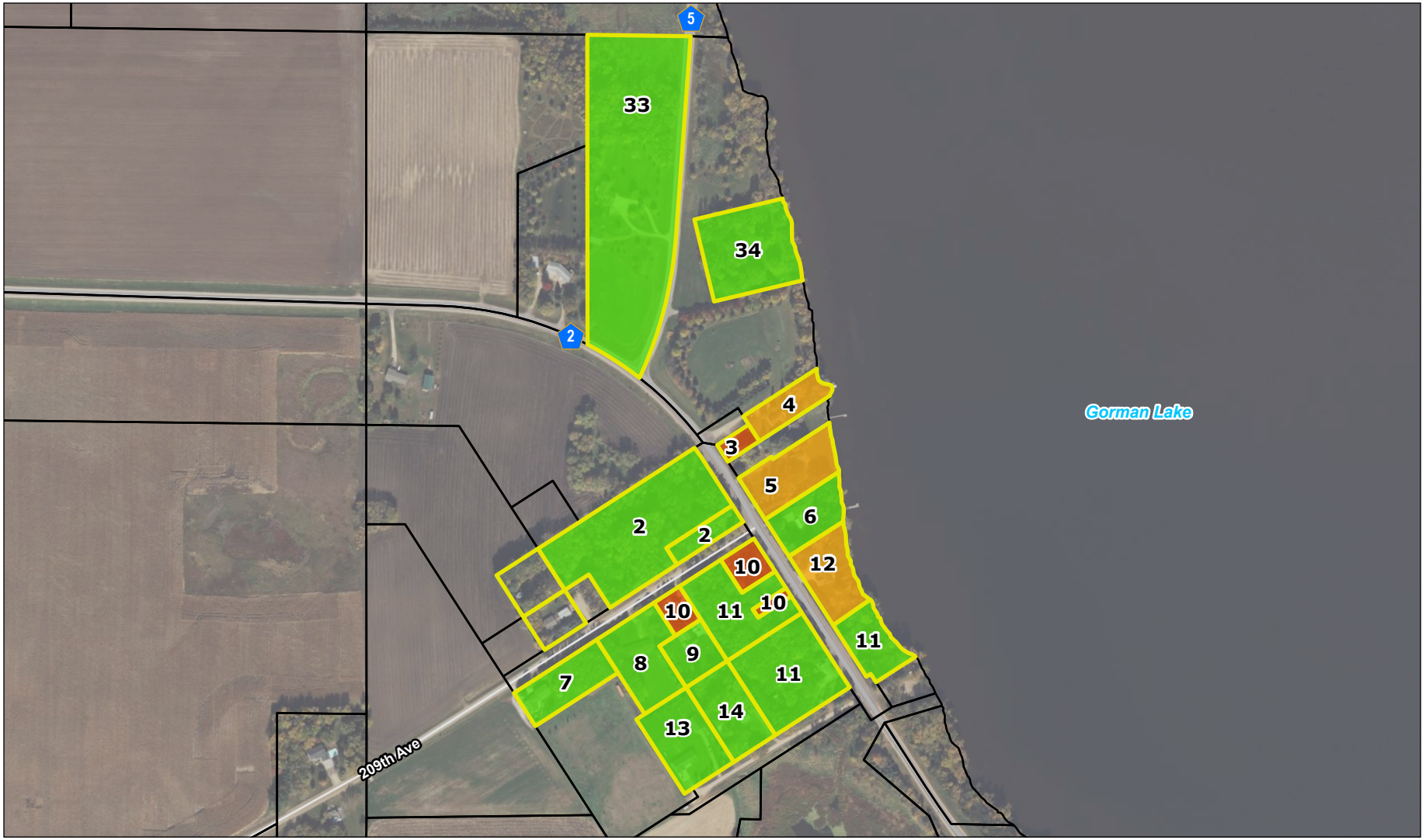
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

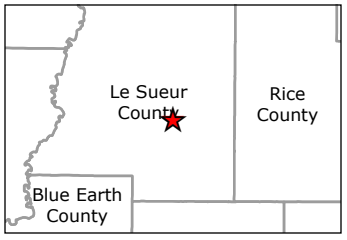
227704372

Figure No.
5-1

Title
Likely Future ISTS

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

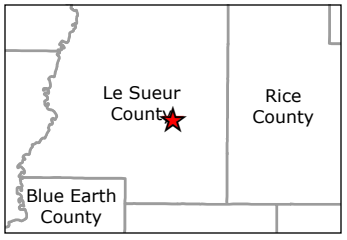
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
5-2

Title
Likely Future ISTS

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 360 720 Feet
(At original document size of 8.5x11)
1:9,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

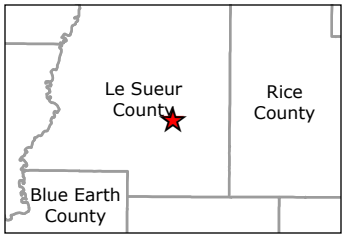
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
5-3

Title
Likely Future ISTS

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams



Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 240 480 Feet
(At original document size of 8.5x11)
1:6,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

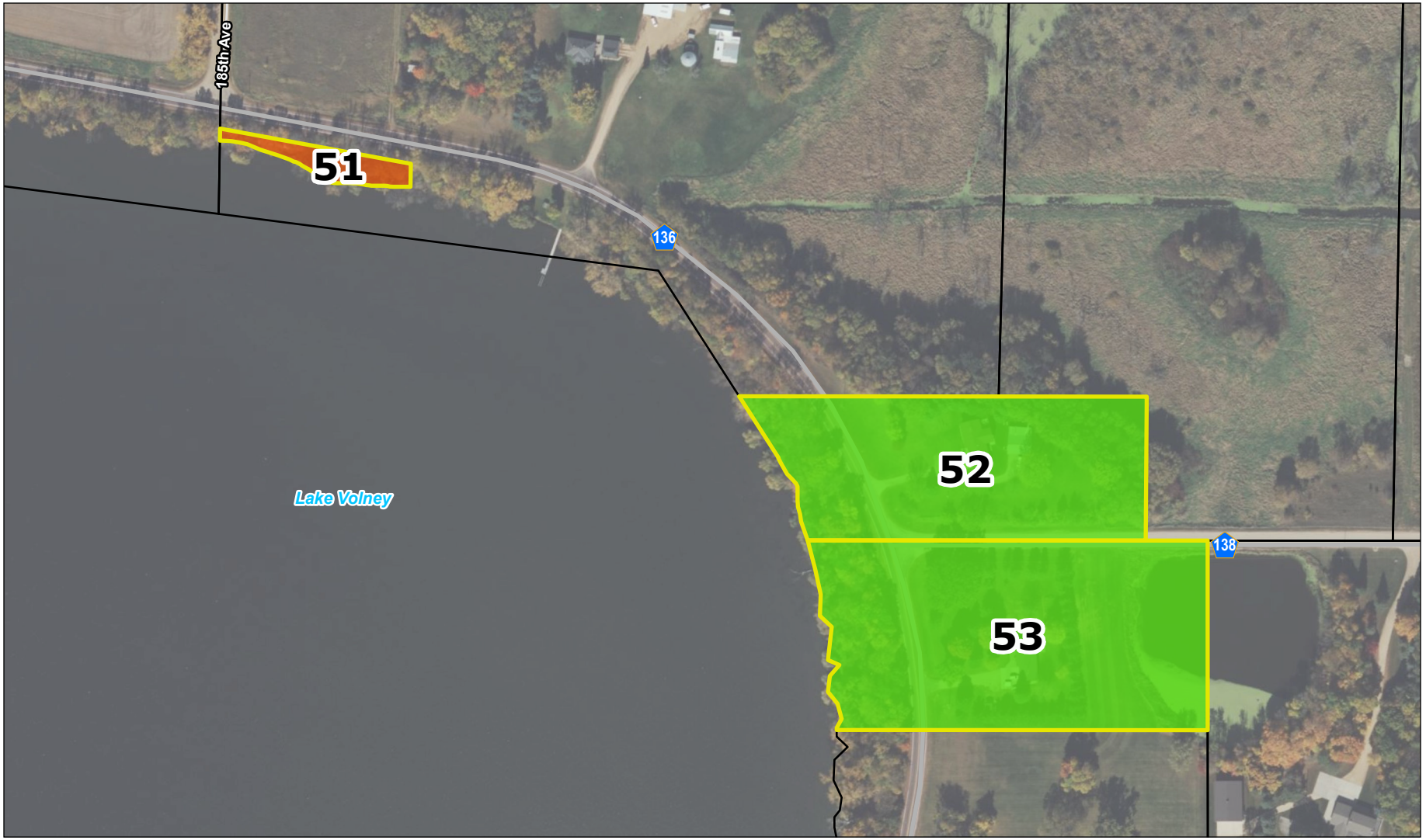
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

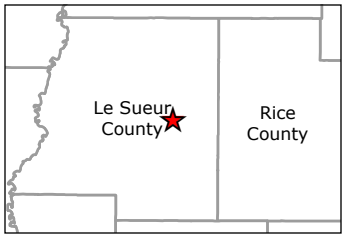
227704372

Figure No.
5-4

Title
Likely Future ISTS

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

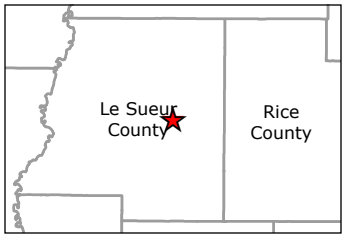
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
5-5

Title
Likely Future ISTS

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 140 280 Feet
(At original document size of 8.5x11)
1:3,600

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

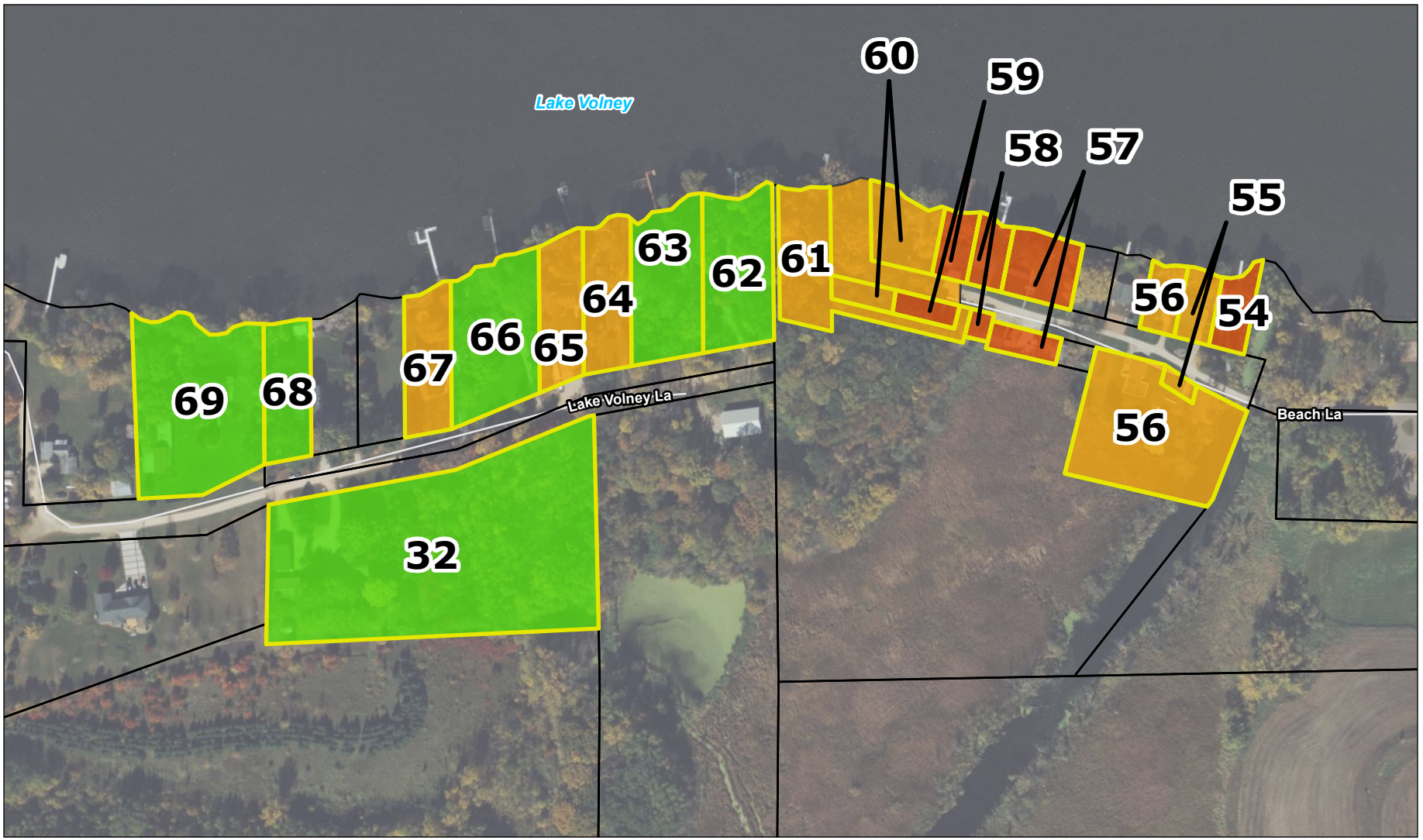
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

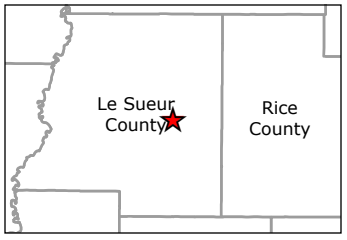
227704372

Figure No.
5-6

Title
Likely Future ISTS

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams





Study Area Parcels
County Parcels
Likely Future ISTS
Type 1
Type 2
Type 3 or 4

N

0 120 240 Feet
(At original document size of 8.5x11)
1:3,000

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

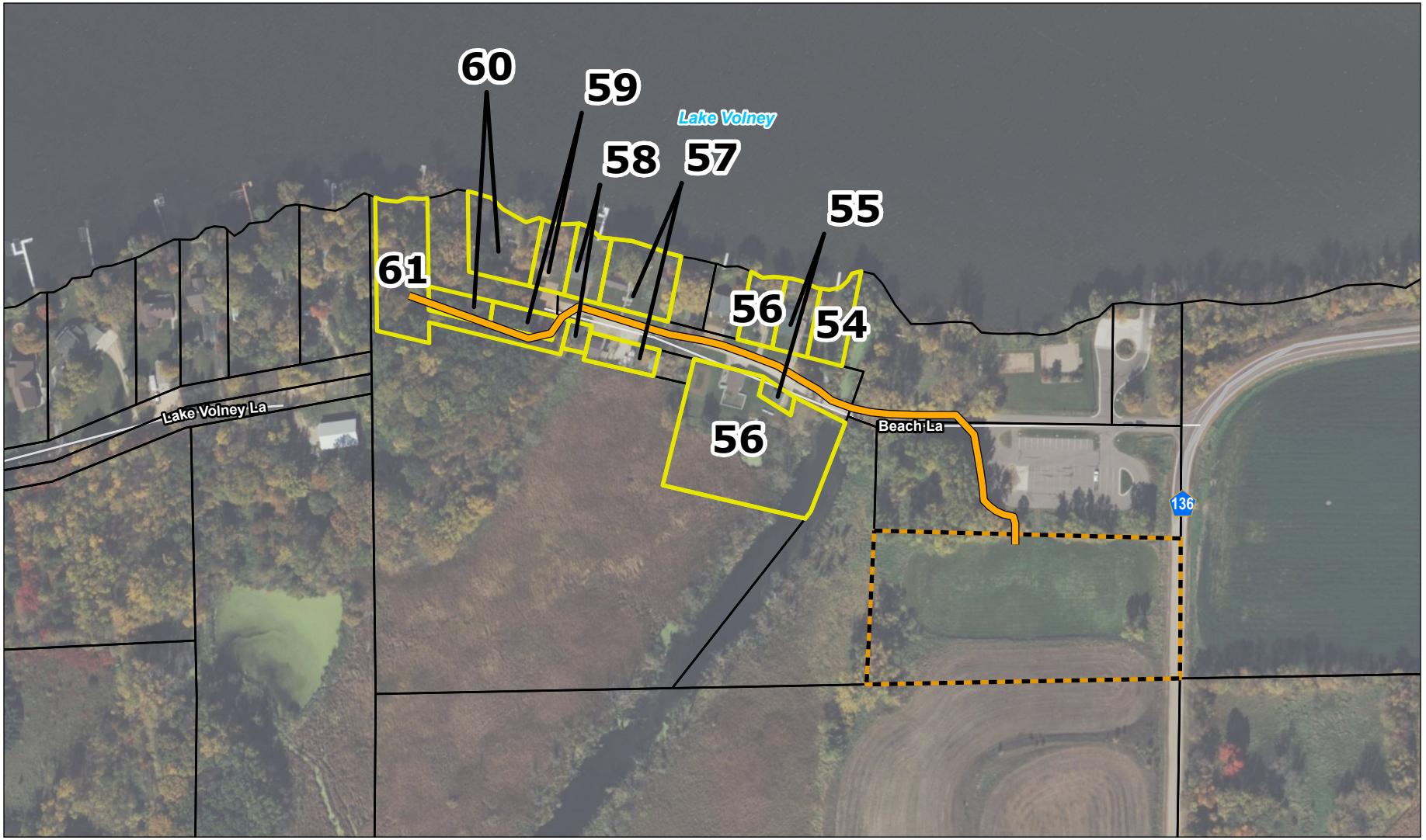
Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

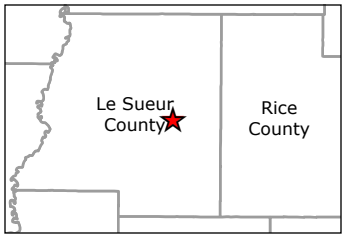
227704372

Figure No.
5-7

Title
Likely Future ISTS

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams





- Study Area Parcels
- County Parcels
- Wastewater Treatment Site
- Collection System Forcemain

N

0 125 250 Feet

(At original document size of 8.5x11)

1:3,000

Notes

1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

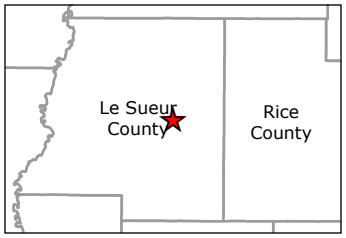
227704372

Figure No.
6

Title
Beach Lane Community Cluster System

Page of

V:\2277\active\227704372\03_data\gis_cad\gis\pro\Le Sueur County SSTS\Le_Sueur_SSTS_Inspections.aprx Revised: 2022-11-17 By: ahyams



- Study Area Parcels
- County Parcels
- Wastewater Treatment Site
- Collection System Forcemain

N

0 200 400 Feet

(At original document size of 8.5x11)
1:4,800

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Le Sueur Feet
2. Data Sources: Le Sueur Co., Stantec
3. Background: Bing World Imagery

Le Sueur County | Minnesota

Clean Water Land & Legacy Amendment

Stantec

Cannon River One Watershed, One Plan

Project Location
Kandiyohi Co., MN

Prepared by ARH on 2022-11-17

Client/Project
Le Sueur Co., MN
Le Sueur County
SSTS Inspections

227704372

Figure No.
7

Title
Lake Volney Lane & 400th Street Community Cluster System

Page of

V:\2277\active\227704372\03 data\gis cadgis\pro\Le Sueur County SSTS\Le Sueur SSTS Inspections.aprx Revised: 2022-11-17 By: ahyams

APPENDIX A

Volney, Gorman, & Cordova Septic Inventory Project
Le Sueur County Ordinance

Le Sueur County Ordinance Requiring Inspection of Subsurface Sewage Treatment Systems (SSTS) Within the First Tier and Recreational Properties Adjacent to Lake Gorman, Lake Volney, and including the Village of Cordova.

Ordinance

This Ordinance shall be in full force and effect from and after its passage and publication according to law.

Passed and Approved: January 25, 2022

Signed: _____
Vice Chair, County Board

Signed: _____
County Administrator

Published: February 3, 2022

[24590-0002/2432532/1]

Section 1 – Statutory Authority

1.1 Le Sueur County is obligated under state law to regulate subsurface sewage treatment systems in unincorporated portions of the County. This Ordinance is enacted pursuant to the authority granted by Minnesota Statutes, including but not limited to, Section 115.55, Section 145A.05, and Section 394.21 to 394.27.

Section 2 – Purpose

2.1 The purpose of the Ordinance is to establish an inspection process in order to inventory the wastewater treatment systems within the area and create a timeframe for compliance. The boundaries of 350' around Lake Gorman, 350' around Lake Volney, and including the Village of Cordova was established for the purpose of addressing wastewater issues around the specific lakes listed and an area with a high density of known and suspected wastewater concerns within the County. The wastewater concerns within the lake areas have the potential to impact public health and water quality.

Section 3 – Definitions

3.1 Area - 350' around Lake Gorman, 350' around Lake Volney, and including the Village of Cordova boundaries established by the Le Sueur County Board.

3.2 Certificate of Compliance - A document, written after a compliance inspection, from a Certified Inspector, certifying that an SSTS is in compliance with the applicable requirements of Minnesota Rules, Chapters 7080 to 7083, as amended, and Section 17 of the Le Sueur County Zoning Ordinance at the time of the inspection.

3.3 Certified Inspector – An individual, or a qualified employee, certified under Minnesota Rules Chapter 7083, as amended.

3.4 Compliance Inspection – The evaluation, investigation, inspection, or other process conducted by a Certified Inspector employed by a Licensed Business for the purpose of issuing a Certificate of Compliance or Notice of Noncompliance.

3.5 Department – Department shall mean the Le Sueur County Environmental Services Department.

3.6 First Tier Property – First Tier Property shall mean any parcel of land not served by a municipal sanitary sewer that:

a) Has a structure within 350 feet of the OHWL of a Regulated Lake that is connected to an SSTS,

b) Has an SSTS located within 350 feet of the OHWL of a Regulated Lake, or

c) Has an SSTS alternative site within 350 feet of the OHWL of a Regulated Lake.

d) Is a currently vacant residential lot that would meet the above conditions if a structure were constructed.

e) Is located within the Village of Cordova.

3.7 Individual Sewage Treatment System (ISTS) – A sewage treatment system, or part thereof, serving a dwelling or other establishment or group thereof, and using sewage tanks or advanced treatment followed by soil treatment and disposal. Individual sewage treatment system includes holding tanks and privies.

3.8 Inspection Report – A Certificate of Compliance or Notice of Noncompliance, together with the Le Sueur County Certification Form, signed and sworn by a Certified Inspector.

3.9 Licensed Business – A business that designs, installs, maintains, repairs, pumps, operates, or inspects SSTS.

3.10 Midsized Subsurface Sewage Treatment Systems (MSTS) – An SSTS that employs sewage tanks or other treatment devices with final discharge into the soil below the natural elevation or elevated grade and that is designed to receive sewage design flow of greater than 5,000 gallons per day to 10,000 gallons per day.

3.11 Notice of Noncompliance – A document written and signed by a certified inspector after a compliance inspection that gives notice that an SSTS is not in compliance as specified under Minnesota Rules 7080.1500, as amended.

3.12 OHWL - Ordinary high water level. Ordinary high water level is the boundary of water basins. The ordinary high water level is an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.

3.13 Recreational Property – Recreational Property shall mean any Campground, Organized Group Camp, Planned Unit Development, or Resort as those terms are defined in Section 4, Subdivision 2 of the Le Sueur County Zoning Ordinance that is not served by a municipal sanitary sewer and:

a) Has a structure within 350 feet of the OHWL of a Regulated Lake that is connected to an SSTS,

b) Has an SSTS located within 350 feet of the OHWL of a Regulated Lake, or

c) Has an SSTS alternative site within 350 feet of the OHWL of a Regulated Lake.

3.14 Regulated Lake - Regulated Lake shall mean Lake Volney (DNR lake number 40003300 in Le Sueur County), Gorman Lake (DNR lake number 40003200 in Le Sueur County).

3.15 SSTS – SSTS shall mean Subsurface Sewage Treatment System and shall be defined as contained in Minnesota Rules, Chapters 7080.

Section 4 – General Provisions

4.1 All SSTS within the First Tier Properties shall be subject to mandatory compliance inspection if the SSTS, alternative SSTS site, or the structure served by the SSTS is within 350 feet of the OHWL of the Regulated Lake.

4.2 All SSTS on Recreational Properties shall be subject to mandatory compliance inspections, regardless of whether the SSTS is located within 350 feet of the OHWL of the Regulated Lake.

4.3 The County reserves the right to seek an administrative search warrant after December 31, 2023 to perform a Compliance Inspection of any property within the District for which an Inspection Report or Certificate of Compliance has not been provided.

4.4 The following SSTS shall be exempt from the requirements of Section 4.1 through Section 4.2 of this Ordinance:

4.4.1 SSTS that were constructed or altered after January 1, 2017 for which a Certificate of Compliance was issued by the Department.

4.4.2 SSTS that were inspected by a state licensed SSTS Inspector after January 1, 2017 for which a Certificate of Compliance was issued by the inspector.

4.4.3 SSTS that were inspected by a state licensed SSTS Inspector after January 1, 2021 for which a Notice of Noncompliance has been issued by the inspector.

4.4.4 Properties whose sewage is regulated under a National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit administered by the Minnesota Pollution Control Agency.

4.5 Compliance inspections shall be completed using the Compliance Inspection Form for Existing SSTS as promulgated by the Minnesota Pollution Control Agency. The Inspection Report must include and follow the instructions on the most current version of the Minnesota Pollution Control Agency's Compliance Inspection Form for existing Subsurface Sewage Treatment Systems (SSTS).

4.6 Compliance inspections must be completed by a State licensed and certified SSTS Inspector by December 31, 2023. No Certified Inspector or Licensed Business who previously designed, installed, inspected, or performed any maintenance on an ISTS may submit an Inspection Report for that ISTS for purposes of this ordinance.

4.7 Compliance inspections shall be paid for by use of $160,000.00 granted to Le Sueur County under the *Lake Gorman, Lake Volney, and the Village of Cordova Septic Inventory* Watershed Based Implementation Funding by the Clean Water Land and Legacy Amendment. Properties subject to the Ordinance are entitled to a free inspection and tank pumping funded by the above mentioned grant if the inspection is completed by the County's contractor for the Gorman-Volney-Cordova Project, Stantec. A Minnesota Pollution Control Agency-licensed SSTS Inspector, Intermediate Inspector, or Advanced Inspector other than Stantec may be utilized, at the owner's expense, for the purpose of satisfying the Provisions of the Ordinance. A licensed inspection business may inspect an existing system that they designed or installed once it has been independently inspected.

4.8 No later than December 31, 2027, all non-compliant ISTSs shall be upgraded, repaired, or replaced in compliance with Minnesota Rules Chapter 7080, as amended, and Section 17 of the Le Sueur County Zoning Ordinance except:

a) SSTS determined to be an Imminent Threat to Public Health and Safety as defined in Minnesota Rules, Chapter 7080-7081 must be upgraded, repaired, or replaced within ten (10) months of the date of the inspection.

Section 5 – Permitting

5.1 No person, firm, or corporation shall install, construct, extend or alter any SSTS in the County without first obtaining a permit as required by the Le Sueur County Zoning Ordinance.

Section 6 – Enforcement

6.1 This Ordinance shall be administered and enforced by the Department or assigned agent.

6.2 The County reserves the right to impose a service charge of $1,000 pursuant to Minnesota Statute Section 375B.09 for any property for which an Inspection Report or Certificate of Compliance has not been provided.

6.3 Any property owner who has not submitted an Inspection Report by December 31, 2023 or has failed to upgrade, repair, or replace a non-compliant ISTS by December 31, 2027 shall be guilty of a misdemeanor.

6.4 Any person, firm or corporation who shall violate any of the provisions hereof or who shall fail to comply with any of the provisions or who shall make any false statement in any document required to be submitted under the provisions hereof, shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine and/or by imprisonment as authorized by law for punishment of a misdemeanor. Each day that a violation continues shall constitute a separate offense.

6.5 In the event any provision or part of this Ordinance is determined to be void or unenforceable by a Court of competent jurisdiction, the remainder of this Ordinance shall remain in full force and effect.

APPENDIX B

Parcel Data Spreadsheet

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
1	02.011.5100	41614 Gorman Lake Rd Le Center, MN	Residential	Yes	2011	11	Mound	X	2022				X		
2	02.700.0170	42318 209th Ave Le Center, MN	Residential	No	Unk	Unk	CP/DW				X	Improper Abandonment, CP/DW	X		
3	02.999.0100	20386 Dodd Rd Le Center, MN	Commercial	Yes	1988	34	CP/DW				X	CP/DW		X	
4	02.700.0280	20390 Dodd Rd Le Center, MN	Seasonal Residential	Yes	1999	23	Mound	X	2022						X
5	02.700.0250	20358 Dodd Rd Le Center, MN	Residential	Yes	2016	6	Mound	X	2022						X
6	02.700.0240	20326 Dodd Rd Le Center, MN	Seasonal Residential	Yes	2013	9	Mound	X	2022				X		
7	02.700.0050	42431 209th Ave Le Center, MN	Residential	Yes	1999	23	Mound	X	2022				X		
8	02.700.0110	42375 209th Ave Le Center, MN	Residential	Yes	2002	20	Mound	X	2022				X		

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
9	02.700.0100	42347 209th Ave Le Center, MN	Residential	No	Unk	Unk	CP/DW				X	CP/DW	X		
10	02.700.0120	42351 209th Ave Le Center, MN	Residential	No	Unk	Unk	CP/DW			X		SD, ST (Tank Integrity)		X	
11	02.700.0200	20291 Dodd Rd Le Center, MN	Residential	No	Unk	Unk	CP/DW			X		ST (Tank Integrity)	X		
12	02.700.0210	20308 Dodd Rd Le Center, MN	Residential	Yes	2001	21	Mound	X	2022						X
13	02.700.0090	20386 A St Le Center, MN	Residential	Yes	2006	16	Mound	X	2022				X		
14	02.700.0080	20334 A St Le Center, MN	Residential	No	Unk	Unk	Trench				X	VS	X		
15	02.013.7500	19935 Dodd Rd Kilkenny, MN	Residential	No	1975	47	Trench				X	VS	X		
16	02.013.7800	19826 Dodd Rd Kilkenny, MN	Seasonal Residential	Yes	2001	21	Trench				X	VS			X

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
17	02.600.0020	19798 Dodd Rd Kilkenny, MN	Seasonal Residential	Yes	2000	22	Trench				X	VS			X
18	02.600.0080	19756 Dodd Rd Kilkenny, MN	Seasonal Residential	Yes	2003	19	Mound	X	2022						X
19	02.600.0120	19738 Dodd Rd Kilkenny, MN	Seasonal Residential	Yes	2001	21	Mound	X	2022						X
20	02.013.5800	42290 Woodchuck Ln Kilkenny, MN	Residential	Yes	1999	23	Mound	X	2022						X
21	02.013.0700	42158 Woodchuck Ln Kilkenny, MN	Residential	Yes	1998	24	Mound	X	2022				X		
22	02.013.0500	42144 Woodchuck Ln Kilkenny, MN	Residential	Yes	2005	17	Mound	X	2022						X
23	02.013.0400	42128 Woodchuck Ln Kilkenny, MN	Residential	Yes	1999	23	Mound	X	2022				X		
24	02.013.0300	42104 Woodchuck Ln Kilkenny, MN	Seasonal Residential	No	Unk	Unk	CP/DW			X		SD	X		

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
25	02.500.0180	42020 East Shore Dr Kilkenny, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW	X		
26	02.500.0140	41898 East Shore Dr Kilkenny, MN	Residential	Yes	2001	21	Trench				X	VS, TI	X		
27	02.500.0100	41794 East Shore Dr Kilkenny, MN	Residential	Yes	1989	33	Trench				X	VS	X		
28	02.500.0090	41766 East Shore Dr Kilkenny, MN	Seasonal Residential	Yes	1992	30	Trench			X		SD	X		
29	02.500.0080	41748 East Lake Dr Kilkenny, MN	Residential	Yes	1990	32	Trench				X	VS	X		
30	02.500.0060	41692 East Shore Dr Kilkenny, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW	X		
31	02.500.0030	41612 East Shore Dr Kilkenny, MN	Residential	Yes	2006	16	Mound	X	2022				X		
32	06.006.0300	40438 Lake Volney Ln Le Center, MN	Residential	Yes	1979	43	CP/DW				X	CP/DW	X		

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
33	02.014.2600	42108 205th Ave Le Center, MN	Residential	Yes	2002	20	Mound	X	2022				X		
34	02.014.2900	42129 205th Ave Le Center, MN	Residential	Yes	2003	19	Mound	X	2022				X		
35	02.450.0020	40015 Lake Volney Ln Le Center, MN	Residential	Yes	2002	20	Trench				X	VS			X
36	02.450.0040	40011 Lake Volney Ln Le Center, MN	Seasonal Residential	Yes	2009	13	Mound	X	2022				X		
37	08.450.0040	19277 400th St Le Center, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW		X	
38	08.450.0050	19269 400th St Le Center, MN	Residential	Yes	2000	22	Trench				X	VS			X
39	08.450.0070	19255 400th St Le Center, MN	Seasonal Residential	Yes	2007	15	Mound				X	Noncompliant per SSTS Operating Permit			X
40	08.450.0080	19241 400th St Le Center, MN	Seasonal Residential	Yes	1999	23	Mound			X		ST (Tank Integrity), VS			X

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
41	08.450.0090	19227 400th St Le Center, MN	Residential	Yes	Unk	Unk	Mound	X	2022						X
42	08.450.0100	19219 400th St Le Center, MN	Seasonal Residential	Yes	2013	9	Mound	X	2022						X
43	08.450.0110	19205 400th St Le Center, MN	Residential	Yes	1992	30	Trench				X	VS			X
44	08.450.0150	19157 400th St Le Center, MN	Residential	Yes	1996	26	Trench				X	VS		X	
45	08.450.0160	19137 400th St Le Center, MN	Seasonal Residential	Yes	1995	27	Mound				X	VS			X
46	08.036.5100	19107 400th St Le Center, MN	Residential	Yes	1999	23	Mound			X		SD	X		
47	09.750.0010	19055 400th St Le Center, MN	Residential	No	Unk	Unk	Trench			X		TI, VS, ST (Cracked Tank)	X		
48	09.750.0030	19039 400th St Le Center, MN	Seasonal Residential	Yes	2015	7	Holding Tank	X	2022					X	

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
49	09.750.0040	19029 400th St Le Center, MN	Seasonal Residential	No	Unk	Unk	Holding Tank	X	2022					X	
50	09.750.0050	18993 400th St Le Center, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW		X	
51	09.031.5100	18551 400th St Le Center, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW		X	
52	09.031.5200	18386 400th St Le Center, MN	Residential	Yes	1987	35	Trench				X	VS	X		
53	06.006.2600	40047 185th Ave Kilenny, MN	Residential	No	Unk	Unk	Trench			X		ST (Tank Integrity), VS	X		
54	06.450.0010	18656 Beach Ln Kilkenny, MN	Seasonal Residential	No	Unk	Unk	CP/DW				X	CP/DW		X	
55	06.450.0020	18662 Beach LnKilkenny, MN	Residential	Yes	1993	29	Mound	X	2022						X
56	06.450.0030	18680 Beach Ln Kilkenny, MN	Residential	Yes	1996	26	Mound				X	VS			X

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
57	06.450.0070	18748 Beach Ln Kilkenny, MN	Seasonal Residential	Yes	2016	6	Holding Tank	X	2022					X	
58	06.450.0080	18782 Beach Ln Kilkenny, MN	Seasonal Residential	Yes	2002	20	Holding Tank	X	2022					X	
59	06.450.0090	18806 Beach Ln Kilkenny, MN	Seasonal Residential	Yes	Unk	Unk	Mound	X	2022					X	
60	06.006.0600	18824 Beach Ln Kilkenny, MN	Seasonal Residential	Yes	Unk	Unk	Mound	X	2022						X
61	06.006.0800	40497 Lake Volney Ln Le Center, MN	Seasonal Residential	Yes	1996	26	Trench				X	VS			X
62	06.550.0010	40493 Lake Volney Ln Le Center, MN	Seasonal Residential	Yes	2004	18	Mound	X	2022				X		
63	06.550.0020	40487 Lake Volney Ln Le Center, MN	Residential	Yes	1988	34	Trench				X	VS, TI	X		
64	06.550.0030	40479 Lake Volney Ln Le Center, MN	Seasonal Residential	Yes	1989	33	Mound			X		ST (Damaged Tank Cover)			X

Volney, Gorman, & Cordova Septic Inventory Project

ISTS Parcel Data Spreadsheet

Le Sueur County, Minnesota

				ISTS Information				Compliance Information					Likely Future ISTS		
										Noncompliant					
Figure ID#	Parcel ID	Address	Property Type: Residential, Seasonal Residential, or Commercial	County SSTS Records on File	Year Installed	ISTS Age (as of 2022)	System Type	Compliant	Certificate of Compliance Date	ITPHS	Failure to Protect Groundwater	VS = Insufficient Vertical Separation TI = Tank Integrity CP/DW = Cesspool/Drywell SD = Surface Discharge ST = Safety Threat (Type)	Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
65	06.550.0040	40461 Lake Volney Ln Le Center, MN	Residential	Yes	1991	31	Trench				X	VS			X
66	06.550.0060	40453 Lake Volney Ln Le Center, MN	Residential	Yes	2005	17	Mound	X	2022				X		
67	06.550.0070	40443 Lake Volney Ln Le Center, MN	Residential	Yes	2008	14	Mound	X	2022						X
68	06.550.0090	40439 Lake Volney Ln Le Center, MN	Residential	Yes	1998	24	Mound	X	2017				X		
69	06.006.0200	40431 Lake Volney Ln Le Center, MN	Residential	No	Unk	Unk	CP/DW			X		CP/DW, ST (Tank Integrity)	X		
70	09.750.0060	18956 400th St Le Center, MN	Residential	No	Unk	Unk	CP/DW				X	CP/DW	X		

APPENDIX C

ISTS Information

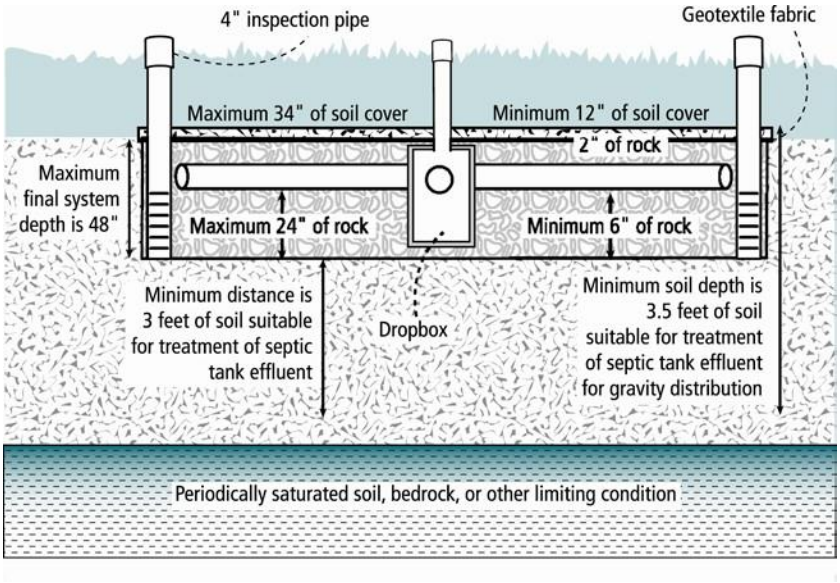
Below-Grade Systems

Below-grade systems are constructed in original soil with distribution of effluent occurring below the soil surface. With below grade systems the soil treatment area is designed and installed such that the infiltrative surface is below the original ground elevation and a final cover of topsoil stabilizes the completed installation, supports vegetative growth, and sheds runoff. It is the underlying soil that treats the many harmful components in the effluent before it reaches surface or ground waters. The two types of below-grade soil treatment systems commonly used are trenches and seepage beds.

Trenches have better oxygen transfer then beds and are recommended whenever the site conditions allow although seepage beds are often more attractive due to reduced land area requirements. In addition, the cost and time of construction, trenches are preferred because they have greater infiltrative surface for the same bottom area, and less damage typically occurs to the infiltrative surface during construction (Otis et al, 1977).

The figure below shows minimum depths and separation requirements for trenches or seepage beds. For systems without pretreatment, at least three feet of soil suitable for treatment should be located below the bottom of the distribution media. The minimum depth of distribution media is six inches, followed by a minimum soil cover of twelve inches, so that the total distance from the periodically saturated or other limiting condition to the final grade is approximately 4.5 feet. Note that this total could be made up of 3.5 feet of original soil and one foot of soil (7080.2150, Subp. 3) over the distribution media of the system.

Figure 1 - Trench and Bed Depth



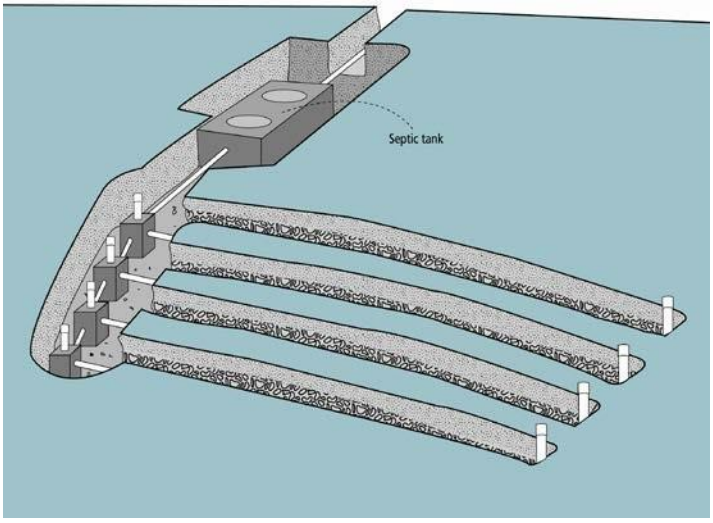
From MN Rules 7080.2260 Subp. 3. If the distribution media in a trench or a bed is in contact with soil texture group 2 through 4 (medium sand, fine sand, coarse and medium loamy sand) pressure distribution must be used.

Below-Grade Systems: Specifications

Trenches

The trench is the most common of the soil treatment systems. **According to MN Rules Chapter 7080.1100, Subp. 89 a trench is defined as a soil treatment and dispersal system, the absorption width of which is 36 inches or less.** Trenches are narrower than they are wide, no wider than three feet, and are laid out along the contours of the soil. A typical trench is constructed by making a level excavation 18 to 36 inches wide.The method of distributing the septic tank effluent can be either pressure or gravity. There are a number of different configurations by which the trenches can be connected with each other and with the septic tank: parallel, serial, and continual. A typical trench is constructed by making a level excavation 18 to 36 inches wide. A typical layout for a trench system is shown in Figure 2.

Figure 2 - Typical Trench Layout



The soil around and beneath the trench must be neither too coarse nor too fine. A coarse soil may not adequately filter pathogens, and a fine soil may be too tight to allow water to pass through. Soils with percolation rates between 0.1 and 60 mpi or soils with a listed loading rate on Table IX in Chapter 7080.2150 are suitable for treating sewage using a Type I below-grade design. **Trench media must never be placed in contact with soils having a percolation rate faster than 0.1 mpi or soil type 1 or slower than 60 mpi. For soils with percolation rates faster than 0.1 mpi and between 61 and 120 mpi, Type I below-grade systems may not be used (7080.2150, Subp. 3).**

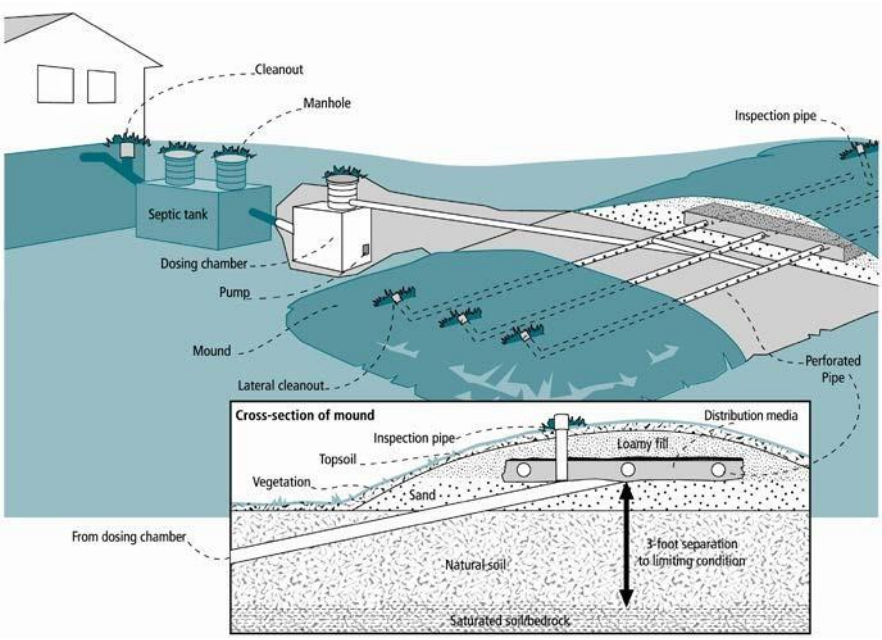
The trench soil treatment system consists of distribution media, covered with a minimum of 12 inches of soil and a close-growing and vigorous vegetation. Many trench systems utilize a pipe and gravel distribution system where effluent passes through the pipe and is stored within the media until it can be absorbed into the soil. Partial treatment is achieved as effluent passes through the biomat. The biomat also distributes effluent across the soil surfaces and maintains aerobic conditions outside the trench.

Mound Systems

Mound systems are defined in Chapter 7080.1100, Subp. 50, as “a soil treatment and dispersal system designed and installed such that all of the infiltrative surface is installed above grade, using clean sand between the bottom of the infiltrative surface and the original ground elevation, utilizing pressure distribution and capped with suitable soil material to stabilize the surface and encourage vegetative growth.”

A sewage treatment mound is nothing more than a seepage bed elevated by clean sand fill to provide adequate separation between where sewage effluent is applied and a limiting soil layer as shown in the figure below. Mounds were developed in the early 1970s to overcome soil and site conditions, which limit the use of trenches and beds (Converse et al., 1977). Limiting conditions include high water tables, shallow soil depth to bedrock, slowly permeable soil, or soil too coarse for treatment.

Figure 1 - Mound System and Components



A mound system is a two-stage process involving both effluent treatment and dispersal. Treatment is accomplished predominately by physical and biochemical processes within the clean sand material and native soil. The physical characteristics of the influent wastewater, influent loading rate temperature, and the nature of the receiving fill material and in situ soil affect these processes.

Physical entrapment, increased retention time, and conversion of pollutants in the effluent are important treatment objectives accomplished under unsaturated conditions. Pathogens contained in the effluent are eventually deactivated through filtering, retention, and adsorption by the fill material. In addition, many pollutants are converted to other chemical forms by oxidation processes.

The mound system addresses high water table conditions by elevating the infiltration bed to achieve the needed vertical separation. By using uniform distribution and adequate vertical separation in the selected sand media, vertical unsaturated flow is maintained, thus ensuring the maximum treatment permitted by this technology. On sites with slowly permeable soils, the mound system helps assure a known level of effluent treatment before effluent is discharged to the native soil. These soils are subject to severe damage from smearing and compaction, especially during the construction of conventional systems, which drastically reduces the permeability of the soil by destroying water-moving

pores and channels. As a result these sites present a high potential for site and soil interface damage in addition to the need for large soil treatment systems to provide adequate infiltration area. For these sites, mound systems provide the following advantages:

- The mound effluent enters the more permeable natural topsoil over a larger area where it can move laterally until absorbed by the less permeable subsoil.
- The bio-mat that develops at the bottom of the media/sand infiltration area will not clog the filter media as readily as it would the less permeable natural soil.
- The infiltration area within the filter media is much smaller than it would be if placed in the more slowly permeable subsoil, yet the total mound area is probably larger than it would be for a conventional soil treatment system, if one could be used.

Mound systems are used primarily in shallow soils overlying a restrictive layer or elevated groundwater table. The shallower the soil, the more attention must be paid to transporting the treated effluent away from the point of application. Fifteen mound systems in Wisconsin were found to have a total nitrogen reduction of at least 55% from the pretreatment effluent to mound toe effluent (Blasing and Converse, 2004). Sufficient numbers of mounds have been installed in Minnesota and elsewhere to prove that the mound treatment system is a Type I technology. There are more than 50,000 single-family mounds successfully treating sewage in Minnesota.

Dispersal is primarily affected by the depth of the unsaturated receiving soils, their hydraulic conductivity, land slope, and the area available for dispersal. The mound consists of sand material, an absorption bed, and cover material. Effluent is dispersed into the absorption bed, where it flows through the fill material and undergoes biological, chemical, and physical treatment. It then passes into the underlying soil for further treatment and dispersal to the environment. Clean sand (defined by state rule) is required for mounds to effectively treat and disperse effluent.

Cover material consists of material that provides erosion protection, a barrier to excess precipitation infiltration, and allows gas exchange. The native soil serves, in combination with the fill, as treatment media, and it also disperses the treated effluent.

APPENDIX D

Wastewater Flow Calculation

Alternative 2A: Beach Lane Community Cluster System
Design Wastewater Flow
(MN Rules 7080.1850, 7081.0120, 7081.0140)

Figure ID#	Address	Parcel ID#	# Bedroom*	Assumed Dwelling Classification*	Flow (gpd)	Reduction Factor	Wastewater Flow (gpd)
54	18656 Beach Lane	06.450.0010	3	I	450	1	450
55	18662 Beach Lane	06.450.0020	3	I	450	1	450
56	18680 Beach Lane	06.450.0030	3	I	450	1	450
57	18748 Beach Lane	06.450.0070	3	I	450	1	450
58	18782 Beach Lane	06.450.0080	3	II	300	1	300
59	18806 Beach Lane	06.450.0090	3	I	450	1	450
60	18824 Beach Lane	06.006.0600	3	I	450	1	450
61	40497 Lake Volney Lane	06.006.0800	3	I	450	1	450

* 3-bedroom Classification I dwelling assumed, if unknown

Count "1" Flow Reduction Factor:	8	
Count "0.45" Flow Reduction Factor:	0	
Total Average Dry Weather (ADW) Flow, gpd:		3,500
2-inch collection system forcemain length (mile)	0.24	
Pipe diameter, inch	2	
Infiltration/Inflow (200 gpd/in. dia./mi), gpd:		100
Total Average Wet Weather Flow (AWW), gpd:		**3,600**

Alternative 2B: Lake Volney Lane & 400th Street Community Cluster System
Design Wastewater Flow
(MN Rules 7080.1850, 7081.0120, 7081.0140)

Figure ID#	Address	Parcel ID#	# Bedroom*	Assumed Dwelling Classification*	Flow (gpd)	Reduction Factor	Wastewater Flow (gpd)
35	40015 Lake Volney Lane	02.450.0020	3	I	450	1	450
37	19277 400th Street	08.450.0040	3	I	450	1	450
38	19269 400th Street	08.450.0050	2	I	300	0.45	135
39	19255 400th Street	08.450.0070	3	I	450	1	450
40	19241 400th Street	08.450.0080	3	I	450	1	450
41	19227 400th Street	08.450.0090	3	I	450	1	450
42	19219 400th Street	08.450.0100	4	I	600	1	600
43	19205 400th Street	08.450.0110	3	I	450	1	450
44	19157 400th Street	08.450.0150	3	I	450	1	450
45	19137 400th Street	08.450.0160	2	I	300	0.45	135
46	19107 400th Street	08.036.5100	3	I	450	1	450
47	19055 400th Street	09.750.0010	3	I	450	1.00	450
48	19039 400th Street	09.750.0030	2	III	180	0.45	81
49	19029 400th Street	09.750.0040	2	I	300	0.45	135
50	18993 400th Street	09.750.0050	3	I	450	0.45	203
70	18956 400th Street	09.750.0060	3	I	450	0.45	203

* 3-bedroom Classification I dwelling assumed, if unknown

Count "1" Flow Reduction Factor:	10	
Count "0.45" Flow Reduction Factor:	6	
Total Average Dry Weather (ADW) Flow, gpd:		5,600
2-inch collection system forcemain length (mile)	0.52	
Pipe diameter, inch	2	
Infiltration/Inflow (200 gpd/in. dia./mi), gpd:		300
Total Average Wet Weather Flow (AWW), gpd:		**5,900**

APPENDIX E

Grinder Station Detail

PENTAIR

HYDROMATIC®
SEWAGE GRINDER PUMPS AND PACKAGES

WWW.HYDROMATIC.COM

Submersible Grinder Pumps

2 HP Submersible Grinders

Hydromatic® 2 HP grinder pumps offer a proven method of reducing residential waste into a fine slurry for ideal transfer to a variety of sewage treatment operations.

Centrifugal Grinders

Our centrifugal grinders use an exclusive dual-cutter design that prevents clogging, binding and roping in a wide range of operating conditions. These cutters cut waste twice to reduce it to an even finer slurry. The first cut is performed by the radial cutter; the second by the axial cutter that recuts the waste in a perpendicular direction to the radial cutters. Centrifugal grinders offer a number of semi-open vortex impeller diameters to generate dependable performance over a wide range of flow and head conditions.

Semi-Positive Displacement Grinders

Semi-positive displacement grinders feature a progressing cavity design with a Buna-N stator for extended durability in the high head conditions required by low pressure sewer systems.

Non-Submersible Grinders

Non-submersible grinder pumps offer the same reliable service that comes with a submersible grinder pump. Our exclusive dual cutters reduce waste into a fine slurry for ideal transfer to a variety of sewage treatment applications. Available with either cast iron or navy M bronze pump ends, these pumps provide the service you need when your application doesn't require a submersible pump.

2 HP Grinder Packages

Hydromatic 2 HP grinder packages provide the superior quality of Hydromatic grinder pumps combined with the highest quality fittings and controls. A control panel specifically designed to optimize pump performance, packaged all together in a durable UV-resistant basin, make for quick and easy installation.

TL-Pro System

Liftout rail system for centrifugal grinders provides ease of installation and removal of the pump. The TL-Pro system uses a cast iron discharge elbow with integrated ball check valve, and is available with spark-proof rails for hazardous locations.

Available with:

- HPGR200
- HPG(X)200
- HGRS200

TL-Pro liftout valve with integral ball check valve.

TG-Pro System

Flexible piping system with slip-fit discharge connection provides ease of installation and removal for all 2 HP grinders. Pumps include a stainless steel stand.

Available with:

- HPD200
- HPG200
- HPGR200
- HGRS200

Heavy-duty 1¼" flexible pipe and easy slip-fit connection allows for quick installations and servicing.

TH-Pro System

Factory assembled discharge piping with single union ball valve disconnect eliminates installation errors and reduces installation time dramatically.

Available with:

- HPD200 and HPGR200

Ball valve with union disconnect allows easy removal of the pump and piping.

Innovative solid state control panel with hand-contact sensor to control the alarm functions and integrated alarm light and buzzer. The control panel includes on-board pumping system diagnostics with pump run time counter and pump cycle counter.

Submersible Grinder Pumps

TL-Pro and TG-Pro

Using an exclusive control circuit board built to maximize the performance of Hydromatic 2 HP grinder pumps, the Novus 1000 Plus Series control panel is an integral part of the 2 HP grinder package. Standard features include lockable latches, sub-door, raised back panel, flashing red alarm light, electronic horn and "Touch-to-Silence" pad in a NEMA 4X enclosure.

Standard Features and Benefits

- 24" fiberglass basin
- UV-resistant basin and lid
- Brass shut-off valve
- Built-in anti-siphon protection
- NEMA 6 JBox
- Weighted float switches
- Slip-fit connection ball check valve
- Pressure-relief valve (HPD200 models only)

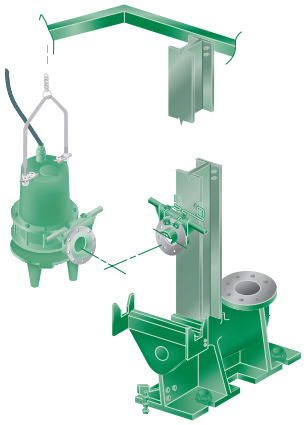
3, 5 & 7.5 HP Submersible Grinders

When your waste removal needs exceed the capabilities of the residentially designed 2 HP submersible grinders, Hydromatic offers a complete line of 3, 5 & 7.5 HP submersible grinder pumps with a variety of high flow and high head conditions. These grinders use the exclusive dual cutter grinder system and have dual seals for added motor protection and are available for Class I and Class II hazardous locations.

Hydromatic 3, 5 & 7.5 HP grinder packages combine the quality of Hydromatic grinder pumps with our exclusive Novus Series of control panels. Available with a variety of material and NEMA-rating enclosures, Novus Series control panels use state-of-the-art digital controllers to optimize operation of your simplex, duplex or triplex grinder system.

PR Rail System

Non-corrosive lift-out rail system designed for horizontal discharge pumps (HPGFH/HPGHH) feature a reliable connection/disconnection system, including a diaphragm gasket, for sealing to the discharge elbow. The system will accept 3" flow.



Submersible Grinder Guide

		Single Seal			Dual Seal			Hazardous Location		
		HGRS200	HPGR200	HPD200	HPG200	HPGH / HPGHH	HPGF / HPGFH	HPG(X)200	HPGH(X) / HPGHH(X)	HPGF(X) / HPGFH(X)
Cord Entry: Sealed for maximum protection from wicking and water seepage into the motor housing.	Compression Fitting	X	X	X	X	X	X	X	X	X
	Epoxy Barrier				X	X	X	X	X	X
	O-Rings				X	X	X	X	X	X
	Connection Box								X	X
Bearings: Heavy-duty ball bearings, upper (radial) and lower (thrust), are continuously lubricated by oil to ensure long service life.		X	X	X	X	X	X	X	X	X
Motor: Oil-filled motor provides superior cooling and permanent lubrication of bearings, low maintenance and extended service life. Electrical design combines the advantages of high torque output with optimum running efficiency engineered specifically for grinder operation.	Single Phase: Start capacitors for maximum starting torque. Motor windings contain automatic thermal overload protection.	2 HP 230V 60 Hz 3450 RPM	2 HP 230V 60 Hz/50 Hz 3450/2900 RPM	2 HP 230V 60 Hz/50 Hz 1750/1460 RPM	2 HP 200/230V 60 Hz/50 Hz 3450/2900 RPM	3 & 5 HP 200/230V 60 Hz/50 Hz 3450/2900 RPM	3 & 5 HP 200/230V 60 Hz/50 Hz 1750/1460 RPM	2 HP 200/230V 60 Hz/50 Hz 3450/2900 RPM	3 & 5 HP 200/230V 60 Hz/50 Hz 3450/2900 RPM	3 & 5 HP 200/230V 60 Hz/50 Hz 1750/1460 RPM
	Three Phase				2 HP 200/230/460/575V 60 Hz/50 Hz 3450/2900 RPM	3, 5, 7½ HP 200/230/460/575V 60 Hz/50 Hz 3450/2900 RPM	3, 5, 7½ HP 200/230/460/575V 60 Hz/50 Hz 1750/1460 RPM	2 HP 200/230/460/575V 60 Hz/50 Hz 3450/2900 RPM	3, 5, 7½ HP 200/230/460/575V 60 Hz/50 Hz 3450/2900 RPM	3, 5, 7½ HP 200/230/460/575V 60 Hz/50 Hz 1750/1460 RPM
Stator Bolts: Stator is secured to the motor housing by means of stator bolts which ensures ease of maintenance if the need ever arises.		X	X	X	X	X	X	X	X	X
Shaft: Stainless steel shaft to eliminate corrosion and fatigue for longer pump life. Minimized shaft overhang decreases deflection and increases bearing and seal life.		X	X	X	X	X	X	X	X	X
Seals: Mechanical seal constructed with a ceramic stationary face and a carbon rotating face. Field-proven for long service life.	Single Seal	X	X	X	X	X	X	X	X	X
	Dual Seal: Maximum moisture protection for the motor.				X	X	X	X	X	X
Moisture Probes: Electrical sensors to detect the presence of moisture in the seal chamber before it damages the motor.	Single Probe				X	X	X			
	Two Probes: Redundant protection from moisture intrusion							X	X	X
Cutters: Reduce solids to the smallest particle size, thereby greatly reducing clogging, roping or binding.	High efficiency cutter	X		X						
	Exclusive dual cutter design		X		X	X	X	X	X	X
Discharge	1¼" NPT vertical discharge	X	X	X	X			X		
	2" NPT vertical discharge					X	X		X	X
	3" 125 lb. horizontal flange					X	X		X	X
Impeller: Multi-vane, semi-open impeller precludes material buildup around shaft and seal.	Valox® with insert	X	X		X	X	X			
	Cast bronze				X			X	X	X
Progressing Cavity: Semi-positive displacement feed system designed specifically for LPS applications. 300 Series stainless steel single lobe rotor and Buna-N double helix stator for extended life.				X						

PENTAIR

740 EAST 9TH STREET,
ASHLAND, OHIO 44805
WWW.HYDROMATIC.COM

269 TRILLIUM DRIVE, KITCHENER,
ONTARIO, CANADA N2G 4W5
WWW.HYDROMATIC.COM

APPENDIX F

Soil Information

LOCATION KILKENNY MN+IA

Established Series
Rev. KDS-TCJ-AGG
12/2005

KILKENNY SERIES

The Kilkenny series consists of very deep, moderately well drained soils that formed in a mantle of clayey glacial till or flow till and underlying loamy glacial till on moraines. These soils have moderately slow permeability. Their slopes range from 2 to 35 percent. The mean annual precipitation is about 28 inches. Mean annual air temperature is about 48 degrees F.

TAXONOMIC CLASS: Fine, smectitic, mesic Oxyaquic Vertic Hapludalfs

TYPICAL PEDON: Kilkenny clay loam, on a 15 percent linear side slope, on a glacial moraine, in a pastured field. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 9 inches; very dark brown (10YR 2/2) clay loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common very fine roots; about 2 percent gravel; moderately acid (pH 5.6); abrupt smooth boundary. (6 to 10 inches thick)

Bt1--9 to 19 inches; brown (10YR 4/3) silty clay loam; moderately medium subangular blocky structure parting to moderately fine subangular blocky; firm; common fine and very fine roots; few distinct very dark brown (10YR 2/2) clay films on faces of peds; about 3 percent gravel; strongly acid; gradual wavy boundary.

Bt2--19 to 38 inches; brown (10YR 4/3) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine roots; common distinct very dark brown (10YR 2/2) clay films on faces of peds; about 5 percent gravel; strongly acid; gradual wavy boundary.

Bt3--38 to 53 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure parting to weak fine subangular blocky; firm; common distinct very dark brown (10YR 2/2) clay films on faces of peds; about 5 percent gravel; few fine distinct brown (7.5YR 4/4) Fe concentrations; moderately acid; gradual smooth boundary. (Combined thickness of the Bt horizon is 20 to 40 inches.)

2BC--53 to 65 inches; light olive brown (2.5Y 5/4) loam; weak fine subangular blocky structure; few distinct dark brown (10YR 3/3) clay films on faces of peds; friable; about 8 percent gravel; about 2 percent cobbles; few fine distinct brown (7.5YR 4/4) Fe deletions; slightly effervescent; slightly alkaline; gradual wavy boundary.

2C--65 to 80 inches; light olive brown (2.5Y 5/4) loam; massive; friable; few concentrations of light gray (2.5Y 7/2) calcium carbonates in pores; brown (7.5YR 4/4) soft masses of iron-manganese in nodules; about 8 percent gravel; about 2 percent cobbles; common medium prominent dark yellowish brown (10YR 4/6) Fe concentrations and common medium distinct gray (2.5Y 5/1) Fe depletions; strongly effervescent; moderately alkaline.

TYPE LOCATION: Le Sueur County, Minnesota; about 3 miles west and 3 miles south of Montgomery; located about 300 feet east and 800 feet north of the southwest corner of section 19, T. 111 N., R. 23 W.; USGS Le Center topographic quadrangle; lat. 44 degrees 24 minutes 3 seconds N. and long. 93 degrees 38 minutes 42 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: Depth to carbonates range from 20 to 60 inches. Gravel of mixed lithology, but dominated by shale fragments, typically make up 2 to 8 percent of the volume of the series control section, but the upper part of the profile in some pedons contains less than 2 percent gravel. Rounded shale

fragments dominate the coarse sand fraction. Soil saturation occurs above a depth of 40 inches in 6 out of 10 years.

The Ap or A horizon has hue of 10YR, value of 2 or 3 and chroma of 1 or 2. It is clay loam, silty clay loam, loam or silt loam. The reaction is moderately acid to neutral.

Some pedons have a thin E horizon.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 5. Faint to prominent Fe concentrations and depletions commonly are above a depth of 40 inches. Redoximorphic depletions do not occur in the upper 10 inches of this horizon. The upper 20 inches of the Bt horizon typically contains 35 to 45 percent clay. B/A clay ratios are 1.2 to 1.4. The Bt horizon is clay loam, silty clay loam, or clay. The reaction ranges from strongly acid to neutral.

The 2BC horizon has properties similar to the 2C horizon. Some pedons have a 2BK horizon.

The 2C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 5. It is clay loam or loam. The reaction is slightly alkaline or moderately alkaline.

COMPETING SERIES: There are no competing series.

GEOGRAPHIC SETTING: Kilkenny soils have plane and convex slopes on gently sloping to steep end moraines of the Des Moines lobe of the Late Wisconsinan glaciation. Their slopes range from 2 to 35 percent. They formed in a mantle of clayey glacial till or flow till and underlying loamy glacial till on moraines. Mean annual air temperature ranges from 45 to 52 degrees F. Mean annual precipitation is about 25 to 32 inches. Frost-free period ranges from 145 to 175 days. Elevation ranges from 800 to 1,500 feet above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Glencoe, Lerdal, Lester, Le Sueur, Lura, Mazaska, and Shields series. The very poorly drained Glencoe and Lura soils are in the lower lying drainageways and depressions. The somewhat poorly drained Lerdal soils are on gently sloping to moderately steep areas. Shields soils are poorly drained, and are on slightly elevated flats. Mazaska soils are poorly drained, and are on slightly elevated flats and swales above or within areas of Kilkenny soils. Also, the well drained Lester soils and the moderately well drained Le Sueur soils are associated in a few areas.

DRAINAGE AND PERMEABILITY: Moderately well drained. Permeability is moderately slow. Runoff is medium to very high. A perched seasonal high water table occurs at depths of 2.5 to 4.0 feet during the period April, May, and June in normal years.

USE AND VEGETATION: Most areas are cultivated. The principal crops are corn, grain, hay, and soybeans. Some areas are used for pasture and some are forested. Native vegetation is mixed prairie and forest species.

DISTRIBUTION AND EXTENT: South central Minnesota and north-central Iowa. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: St. Paul, Minnesota

SERIES ESTABLISHED: Waseca County, Minnesota, 1963.

REMARKS: Diagnostic horizons and features recognized in this pedon include: Ochric epipedon - the zone from the soil surface to a depth of 9 inches (Ap horizon); Argillic horizon - the zone from 9 to 53 inches (Bt1, Bt2, Bt3 horizons); Oxyaquic subgroup based on saturation above a depth of 40 inches; Vertic subgroup based on more than 6 cm of COLE in upper 40 inches. Water table studies and field observations have verified a perched condition in normal years, particularly in periods of extended rainfall.

ADDITIONAL DATA: Soil Interpretation Record number MN0376.

National Cooperative Soil Survey
U.S.A.

LOCATION HAMEL MN

Established Series
Rev. AGG-TCJ
03/2014

HAMEL SERIES

The Hamel series consists of very deep, poorly drained and somewhat poorly drained soils that formed in slope colluvium and glacial till on moraines. These soils have moderately slow permeability. Their slopes range from 1 to 4 percent. Mean annual precipitation is about 28 inches. Mean annual air temperature is about 47 degrees F.

TAXONOMIC CLASS: Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

TYPICAL PEDON: Hamel loam with a 2 percent concave slope on a glacial moraine in a cultivated field. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 10 inches; black (10YR 2/1) loam, very dark brown (10YR 2/2) dry; weak very fine subangular blocky structure; friable; common very fine roots; about 1 percent gravel; neutral; abrupt smooth boundary.

A--10 to 16 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak very fine subangular blocky structure; friable; common very fine roots; about 4 percent gravel; neutral; gradual smooth boundary. (Combined thickness of A horizon is 14 to 30 inches.)

AB--16 to 24 inches; very dark gray (10YR 3/1) clay loam, dark grayish brown (10YR 4/2) dry; many fine prominent brown (7.5YR 4/4) Fe concentrations; moderate fine angular blocky structure; friable; common very fine roots; about 4 percent gravel; neutral; gradual wavy boundary. (0 to 10 inches thick.)

Btg1--24 to 40 inches; very dark grayish brown (2.5Y 3/2) clay loam, grayish brown (10YR 5/2) dry; many fine prominent brown (7.5YR 4/4) Fe concentrations; moderate medium prismatic structure; friable; few black (10YR 2/1) clay films on faces of peds; about 5 percent gravel; neutral; gradual wavy boundary.

Btg2--40 to 46 inches; dark grayish brown (2.5Y 4/2) clay loam; many coarse prominent brown (7.5YR 4/4) Fe concentrations; moderate medium subangular blocky structure; friable; few black (10YR 2/1) clay films on faces of peds; about 4 percent gravel; neutral; clear wavy boundary. (Combined thickness of Btg horizons is 12 to 30 inches.)

Cg1--46 to 55 inches; olive gray (5Y 5/2) loam; many medium prominent yellowish brown (10YR 5/6) Fe concentrations; massive; friable; about 3 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

Cg2--55 to 80 inches; olive gray (5Y 5/2) loam; many medium prominent yellowish brown (10YR 5/6) Fe concentrations; massive; friable; about 4 percent gravel; slightly effervescent; slightly alkaline.

TYPE LOCATION: Wright County, Minnesota; about 1.5 miles southwest of Silver Creek, 1200 feet south and 2300 feet west of the northeast corner of Sec. 18, T.121 N., R.26 W., USGS Annandale quadrangle; lat. 45 degrees 17 minutes 34 seconds N.; long. 94 degrees 00 minutes 13 seconds W., NAD27

RANGE IN CHARACTERISTICS: Depth to free carbonates range from 30 to 65 inches. The mollic epipedon thickness ranges from 24 to 60 inches. Typically the upper colluvim contains less than 2 percent gravel by

volume and the lower part contains 2 to 6 percent gravel by volume of mixed lithology.

The A horizons have hue of 10YR or is neutral, value of 2 or 3, and chroma of 0 to 2. Typically it is loam or clay loam, but silt loam or silty clay loam are within the range. It has coatings of clean sand and silt particles in the lower part of the A horizon in some pedons. It is moderately acid to neutral.

The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 2 to 4, and chroma of 1 or 2. It is clay loam, silty clay loam high in sand, or loam. It has between 25 and 35 percent clay and 15 to 35 percent fine sand and coarser. It has B/A clay ratios of 1.2 to 1.4. It has few to many, faint to prominent clay films. It is moderately acid to neutral.

The C horizon has hue of a 2.5Y or 5Y, value of 4 to 6, chroma of 1 or 2. It is loam or clay loam. It is slightly alkaline or moderately alkaline. The clay content ranges from 18 to 32 percent and the total sand content ranges from 25 to 45 percent.

COMPETING SERIES: These are the Alvada, Barry, Berville, Brookston, Buntingville, Clackamas, Cordova, Forestcity, Jameston, Marengo, Millgrove, Navan, Nosoni, Rensselaer, and Westland soils. The Alvada series (Tentative - OH) is not in the OSD file at this time. The Barry, Berville, Brookston, Cordova, Marengo, Millgrove, Navan, Rensselaer, and Westland soils have a mollic epipedon that is less than 24 inches thick. The Buntingville soils have carbonates at depths of less than 20 inches. The Clackamas and Nosoni soils lack free carbonates in the series control section.
The Forestcity soils have 45 to 65 percent sand and 10 to 18 percent clay in the underlying material. The Jamestown soils formed in a firm and very firm till associated with the Iowan Erosional surface.

GEOGRAPHIC SETTING: Hamel soils have concave slopes in swales, rims of closed depressions, foot and toe slopes, and upper drainageways below sloping to very steep slopes. Slope gradients are 1 to 4 percent. Hamel soils formed in slope colluvium and glacial till of Late Wisconsinan Age. Mean annual air temperature is about 45 to 48 degrees F. Mean annual precipitation is about 25 to 30 inches. Frost free days range from 125 to 165. Elevation above sea level ranges from 700 to 1600 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are principally the Hayden and Lester soils. These soils are well drained and are on the higher lying, gently sloping to very steep slopes.

DRAINAGE AND PERMEABILITY: Poorly drained and somewhat poorly drained. Surface runoff is low or moderately low. Permeability is moderately slow. The apparent seasonal high water table is at .5 to 1.5 feet for the poorly drained phase and 1.5 to 2.5 feet for the somewhat poorly drained phase during spring in normal years.

USE AND VEGETATION: Most of this soil is cropped to corn, hay, soybeans, and small grains. However, significant areas are in pasture and forest. Native vegetation is mixed wet-mesic prairie species such as big bluestem, switchgrass, prairie cordgrass, wooly sedge, giant goldenrod, Canada goldenrod and deciduous forest.

DISTRIBUTION AND EXTENT: Primarily in the southeast one-quarter of Minnesota in the timbered, hilly, "gray" till region. Moderately extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: St. Paul, Minnesota

SERIES ESTABLISHED: Hennepin County, Minnesota, 1969.

REMARKS: Diagnostic horizons and features recognized in this pedon are: mollic epipedon - the zone from the surface to a depth of 40 inches (Ap, A, AB and Btg1); argillic horizon - the zone from 24 to 46 inches (Btg1, Btg2,). Type location moved from Hennepin County, Mn. to Wright County, Mn., 11/96 to better exemplify the series concept.

A somewhat poorly drained overwash phase is recognized that has 8 to 20 inches of colluvium over the original dark colored surface.

ADDITIONAL DATA: Refer to MAES Central File Code No. 785 for results of some laboratory analysis of this series.

National Cooperative Soil Survey
U.S.A.

APPENDIX G

Cost Analysis

Probable Construction Cost Estimate
Alternative 2A: Community Cluster System
Beach Lane

Item No.	Item	Quantity	Unit	Unit Cost	Total Cost
	Collection - Grinder Pump Low Pressure Sewer				
1	Mobilization and Demobilization	1	LS	$16,200	$16,200
2	Septic Tank Abandonment	8	EA	$1,000	$8,000
3	Grinder Station Package and Controls	8	EA	$10,000	$80,000
4	Grinder Electrical Installation	8	EA	$1,250	$10,000
5	Sanitary Building Sewer Cleanout	8	EA	$500	$4,000
6	Connect to Existing Sanitary Sewer Service	8	EA	$500	$4,000
7	4" Gravity Sanitary Building Sewer	320	LF	$50	$16,000
8	Pressure Sewer	1,250	LF	$35	$43,750
9	2" Pressure Sewer Lateral	800	LF	$35	$28,000
10	Air/Vacuum Release Valve and Manhole	1	EA	$12,000	$12,000
11	Isolation Valve	1	EA	$4,500	$4,500
12	Pressure Sewer Cleanout	1	EA	$2,500	$2,500
13	2" Curb stops	8	EA	$1,500	$12,000
14	Washed Stone	95	CY	$50	$4,750
15	Select Granular	95	CY	$50	$4,750
16	Insulation (4")	140	SY	$30	$4,200
17	Property Site Restoration	8	EA	$1,500	$12,000
18	Class V Gravel Roadway Patch	300	SY	$50	$15,000
19	Erosion Control	1	LS	$2,500	$2,500
20	Traffic Control	1	LS	$1,500	$1,500
				Collection Subtotal:	**$286,000**
	Treatment - Mound Soil Dispersal System				
21	Mobilization and Demobilization	1	LS	$27,000	$27,000
22	Septic Tank	15,000	GAL	$2.00	$30,000
23	Dose Tank	5,000	GAL	$2.00	$10,000
24	Treatment Tank Installation	20,000	GAL	$2.00	$40,000
25	Aluminum Access Hatch	3	EA	$2,500	$7,500
26	Tank Riser Pipe	20	LF	$100	$2,000
27	Tank Riser/tank Adapter	4	EA	$300	$1,200
28	Riser Fiberglass Lid	4	EA	$300	$1,200
29	Effluent Screen	1	EA	$1,500	$1,500
30	Submersible Effluent Pump	4	EA	$3,000	$12,000
31	Pump Guide Rails & Discharge Piping	4	EA	$3,000	$12,000
32	Main Treatment System Control Panel	1	LS	$25,000	$25,000
33	Float Switch Sensors	4	EA	$500	$2,000
34	Mound Bed System	450	LF	$350	$157,500
35	Yard Piping	800	LF	$25	$20,000
36	Insulation (4")	110	SY	$40	$4,400
37	Gravel Access Road	75	LF	$75	$5,625
38	Perimeter Fence	1,500	LF	$15	$22,500
39	Site Restoration	1.5	ACRE	$15,000	$22,500
40	Erosion Control	1	LS	$5,000	$5,000
41	Electrical Service	1	LS	$10,000	$10,000
42	Electrical Component Installation Costs	1	LS	$25,000	$25,000
43	Land Acquisition	3	Acre	$10,000	$30,000
				Treatment Subtotal:	**$474,000**
				Collection & Treatment Subtotal:	**$760,000**
				Contingency:	**$114,000**
				Engineering Services:	**$137,000**
				Legal & Administrative:	**$23,000**
				Total Probable Construction Cost Estimate:	**$1,034,000**
				Cost per Property:	**$129,300**

Annual Operation, Maintenance, & Replacement Cost Estimate
Alternative 2A: Community Cluster System
Beach Lane

Collection System	**Estimated Cost**	**Notes**
Service Provider	$1,500	
Miscellaneous Repairs/Service	$1,000	
Electricity		
Grinder Pumps & Controls	$0	To be paid for by private property owner
Equipment Replacement	$1,100	
Collection Subtotal:	**$3,600**	

Treatment System	**Estimated Cost**	**Notes**
Service Provider	$1,750	
Property Insurance	$900	$75/month
Miscellaneous Repairs/Service	$500	
Septage Hauling/Disposal	$800	4,000 gallons a year at $0.20/gallon
Data Service	$480	$40/month
Electricity		
Pumps & Controls	$480	
Equipment Replacement	$900	
Treatment Subtotal:	**$5,900**	

Total Annual O,M&R Costs:	**$9,500**	
Cost per Property per Year:	**$1,190**	8 Connections
Cost per Property per Month:	**$100**	

Probable Construction Cost Estimate
Alternative 2B: Community Cluster System
Lake Volney Lane & 400th Street

Item No.	Item	Quantity	Unit	Unit Cost	Total Cost
	Collection - Grinder Pump Low Pressure Sewer				
1	Mobilization and Demobilization	1	LS	$32,900	$32,900
2	Septic Tank Abandonment	16	EA	$1,000	$16,000
3	Grinder Station Package and Controls	16	EA	$10,000	$160,000
4	Grinder Electrical Installation	16	EA	$1,250	$20,000
5	Sanitary Building Sewer Cleanout	16	EA	$500	$8,000
6	Connect to Existing Sanitary Sewer Service	16	EA	$500	$8,000
7	4" Gravity Sanitary Building Sewer	640	LF	$50	$32,000
8	Pressure Sewer	2,750	LF	$35	$96,250
9	2" Pressure Sewer Lateral	1,600	LF	$35	$56,000
10	Air/Vacuum Release Valve and Manhole	2	EA	$12,000	$24,000
11	Isolation Valve	2	EA	$4,500	$9,000
12	Pressure Sewer Cleanout	3	EA	$2,500	$7,500
13	2" Curb stops	16	EA	$1,500	$24,000
14	Washed Stone	205	CY	$50	$10,250
15	Select Granular	205	CY	$50	$10,250
16	Insulation (4")	285	SY	$30	$8,550
17	Property Site Restoration	16	EA	$1,500	$24,000
18	Class V Gravel Roadway Patch	600	SY	$50	$30,000
19	Erosion Control	1	LS	$2,500	$2,500
20	Traffic Control	1	LS	$1,500	$1,500
				Collection Subtotal:	**$581,000**
	Treatment - Mound Soil Dispersal System				
21	Mobilization and Demobilization	1	LS	$39,000	$39,000
22	Septic Tank	25,000	GAL	$2.00	$50,000
23	Dose Tank	5,000	GAL	$2.00	$10,000
24	Treatment Tank Installation	30,000	GAL	$2.00	$60,000
25	Aluminum Access Hatch	4	EA	$2,500	$10,000
26	Tank Riser Pipe	20	LF	$100	$2,000
27	Tank Riser/tank Adapter	4	EA	$300	$1,200
28	Riser Fiberglass Lid	4	EA	$300	$1,200
29	Effluent Screen	1	EA	$1,500	$1,500
30	Submersible Effluent Pump	6	EA	$3,000	$18,000
31	Pump Guide Rails & Discharge Piping	6	EA	$3,000	$18,000
32	Main Treatment System Control Panel	1	LS	$25,000	$25,000
33	Float Switch Sensors	4	EA	$500	$2,000
34	Mound Bed System	740	LF	$350	$259,000
35	Yard Piping	1,200	LF	$25	$30,000
36	Insulation (4")	110	SY	$40	$4,400
37	Gravel Access Road	100	LF	$75	$7,500
38	Perimeter Fence	2,000	LF	$15	$30,000
39	Site Restoration	2.0	ACRE	$15,000	$30,000
40	Erosion Control	1	LS	$5,000	$5,000
41	Electrical Service	1	LS	$10,000	$10,000
42	Electrical Component Installation Costs	1	LS	$25,000	$25,000
43	Land Acquisition	4	Acre	$10,000	$40,000
				Treatment Subtotal:	**$679,000**
				Collection & Treatment Subtotal:	**$1,260,000**
				Contingency:	**$189,000**
				Engineering Services:	**$227,000**
				Legal & Administrative:	**$38,000**
				Total Probable Construction Cost Estimate:	**$1,714,000**
				Cost per Property:	**$107,200**

Annual Operation, Maintenance, & Replacement Cost Estimate
Alternative 2B: Community Cluster System
Lake Volney Lane & 400th Street

Collection System	Estimated Cost	Notes
Service Provider	$3,000	
Miscellaneous Repairs/Service	$1,500	
Electricity		
Grinder Pumps & Controls	$0	To be paid for by private property owner
Equipment Replacement	$2,200	
Collection Subtotal:	**$6,700**	

Treatment System	Estimated Cost	Notes
Service Provider	$2,500	
Property Insurance	$900	$75/month
Miscellaneous Repairs/Service	$500	
Septage Hauling/Disposal	$1,200	6,000 gallons a year at $0.20/gallon
Data Service	$480	$40/month
Electricity		
Pumps & Controls	$530	
Equipment Replacement	$1,200	
Treatment Subtotal:	**$7,400**	

Total Annual O,M&R Costs:	**$14,100**	
Cost per Property per Year:	**$890**	16 Connections
Cost per Property per Month:	**$75**	