

March 27, 2024

VIA EMAIL

Angie Lipelt  
Mower County  
1105 8<sup>th</sup> Ave NE  
Austin, MN 55912

RE: Dobbins Creek South Branch Community  
Community Assessment Report Approval  
Project Number 280706

Dear Angie Lipelt:

The Minnesota Pollution Control Agency (MPCA) is pleased to inform you that we are hereby granting approval of your Community Assessment Report (CAR) submitted on November 29, 2023, and final revised and submitted on February 19, 2024 by Stantec Consulting Services Inc.

The proposed report is the background study for Dobbins Creek South Branch Community in Mower County for the possible usage of subsurface treatment systems for the community or sewer connection to the city of Austin. The legal description of the location of the proposed area is Sections 31, 32, Township 103 North, Range 17W, Section 5, 6, Township 102N, Range 17W, Red Rock and Windom Township, Mower County.

The CAR and related information indicate that the recommends three options: continue with private subsurface sewage treatment systems (SSTs), or connect to the city of Austin, or construct a cluster large subsurface treatment system (LSTS) and pursue a state permitted community system that has an estimated design flow of 20,000 gallons per day that would utilize pretreatment and meet an end of pipe total nitrogen limit of 10 milligrams per liter (mg/L).

Angie Lipelt  
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March 27, 2024

If you have any questions regarding this approval, please contact me at 507-206-2603.

Sincerely,

*Corey J. Hower*

*This document has been electronically signed.*

Corey J. Hower  
Engineering Specialist  
Municipal Division

CJH:cac

cc: Eric Blasing, Stantec (electronic)  
Anita Gallentine, Public Facilities Authority (electronic)  
Katelyn Kanuit, Public Facilities Authority (electronic)  
Bill Dunn, MPCA



**Dobbins Creek South Branch  
Community**

Community Assessment Report

February 2024

Prepared for:

Mower County  
1105 8<sup>th</sup> Ave NE  
Austin, MN 55912

Prepared by:

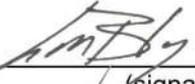
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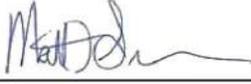
# Dobbins Creek South Branch Community Assessment Report

February 2024

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Prepared by:   
(signature)

**Name: Eric Blasing**

Reviewed by:   
(signature)

**Name: Mathew Summers**

Approved by:   
(signature)

**Name: Peter Miller**



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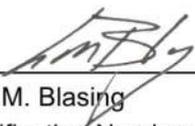


## 1.0 PROFESSIONAL CERTIFICATION

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:	 _____	<u>February 19, 2024</u>
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:	 _____	<u>February 19, 2024</u>
Name:	Eric M. Blasing	Date
Registration:	Certification Number: C7582	



## **2.0 INTRODUCTION**

The Dobbins Creek South Branch community (Project) is located adjacent to and east of Austin in Red Rock and Windom Townships, Mower County, Minnesota (Figure 1). The community is unsewered, and residential wastewater needs are met by individual subsurface sewage treatment systems (ISTS)<sup>1</sup>. Residents are served water by a combination of individual and shared water supply wells. Stantec Consulting Services Inc. (Stantec) was retained to assess the probable compliance status of existing ISTS, and to evaluate alternatives for viable long-term wastewater treatment infrastructure.

This Community Assessment Report (CAR) was made possible through a Small Community Wastewater Program Technical Assistance Grant from the Minnesota Public Facilities Authority (PFA). These grants are available to small unsewered communities and used to analyze possible solutions to wastewater problems associated with noncompliant ISTS. Small Community Wastewater Program Technical Assistance grants are designed to help communities develop the technical, managerial, and financial capacity necessary to build, operate, and maintain new subsurface sewage treatment systems (SSTS). This report would not have been possible without the generous assistance of Mower County, the Minnesota Pollution Control Agency (MPCA), and PFA.

The Project area contains 76 properties, as shown on Figure 1, including 73 residential and three commercial. The study area was selected based on proximity to Dobbins Creek, lot density, lot size, lot constraints, and expected ISTS status as these are the primary factors in considering a community wastewater solution. Individual property details and findings can be found within the parcel data spreadsheet in Appendix A.

### **2.1 PREVIOUS INVESTIGATIONS**

An Unsewered Area Needs Documentation<sup>2</sup> assessment was completed prior to grant funding being received for the preparation of the CAR. Information gathered in the Unsewered Area Needs Documentation was reviewed and incorporated into the findings of this report.

### **2.2 REPORT PURPOSE**

This report serves as a planning document for possible long-term wastewater infrastructure solutions for the Dobbins Creek South Branch community. The CAR is intended to present existing ISTS status and

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<sup>1</sup> 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.

<sup>2</sup> Unsewered Area Needs Documentation is a form created by the MPCA for unsewered communities when applying for funding. The form provides a preliminary status of existing ISTS conditions within the community.



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determine if the community is best served in the future by ISTS, a shared community system, or connection to a regional municipal wastewater treatment facility (WWTF).

## 2.3 WORK PERFORMED

An assessment of existing ISTS conditions was executed to determine a project baseline for analysis. Included in this assessment was a desktop review of Mower County permit files and field investigations to determine likely ISTS compliance status. The analysis also evaluated potential future wastewater treatment options to serve the Project. Useful background information regarding some ISTS specifics (i.e., drainfield trench vs. mound) produced by the University of Minnesota Onsite Sewage Treatment Program (OSTP)<sup>3</sup> can be found in Appendix B.

A typical CAR investigation 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 the likely ISTS compliance, future replacement ISTS, and proximity to Austin, the Project includes a community wastewater collection and treatment alternative and connection to a regional municipal WWTF. See Section 4 for further discussion.

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<sup>3</sup> 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, mound, cesspool/drywell (CP/DW), or holding tank. A determination of likely ISTS compliance status was made for each property. In addition, a determination was made as to what the likely future ISTS would be to serve the property.

Properties included in the assessment were developed by Mower County, who also provided individual parcel information and ISTS records.

### **3.1 METHODS**

Fieldwork was completed in the summer 2023 and included site visits to each participating property to locate wells, wastewater tanks, and soil dispersal systems. Soil borings were conducted as needed, and ISTS were evaluated to determine their likely compliance status. An assessment was also made regarding the most likely option for each property's replacement ISTS.

Of the 76 properties, 20 agreed to participate in an onsite property assessment. Stantec was able to access all participating properties to complete a site inspection with the intent of documenting likely 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.

Fifty-six properties did not participate in an onsite assessment. Likely ISTS compliance status for these properties was determined by permit record review, visual assessment from the public right-of-way or adjacent property, soil conditions observed on neighboring properties, and professional judgement.

Prior to commencement of fieldwork, Mower County provided available ISTS permit files, design, and inspection records for the properties, and Geographic Information System (GIS) shape files of property boundaries. In addition, homeowner surveys were collected for participating properties to gain further knowledge of existing ISTS, parcel occupancy status, bedroom count, water supply, and dwelling water-use appliances. Information gleaned from records and homeowner surveys was incorporated into the parcel data spreadsheet (Appendix A) and used in the assessment.

### **3.2 FINDINGS**

This section summarizes existing conditions of ISTS in the Project area. All properties evaluated contained an ISTS. A determination of likely 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. Note, not all water supply wells were located as gathering locations on non-participating properties was not possible. Therefore, Figure 2 does not illustrate an inclusive exhibit of water supply wells serving the Project area. Also included on Figure 2 is the 100-year floodplain and floodway areas.

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



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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. Data is from homeowner surveys, parcel zoning records, and fieldwork observations. An important 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 Dobbins Creek South Branch community, the assumed dwelling classification is Type I.

**Table 3-1: Parcel Type**

Parcel Type	Number	Percentage
Residential	73	96%
Commercial	3	4%
<b>Total</b>	<b>76</b>	<b>100%</b>

### 3.2.3 ISTS Type

Table 3-2 summarizes ISTS types in the Project area which includes trenches, mounds, CP/DWs, and a holding tank.

**Table 3-2: ISTS Type**

ISTS Type	Number	Percentage
Trenches	20	26%
Mound	43	57%
CP/DW	12	16%
Holding Tank	1	1%
<b>Total</b>	<b>76</b>	<b>100%</b>

### 3.2.4 ISTS Compliance Status

While evaluating each parcel, the likely ISTS compliance status was made based on Minnesota Rules Chapter 7080 and Mower County SSTS ordinance. An existing ISTS can either be compliant or deemed noncompliant including the following categories:

- Failure to protect groundwater (FTPG). The criteria that determine a FTPG include:
  - Less than 36 inches of vertical separation between the bottom of the soil dispersal system distribution media and limiting condition such as seasonally high groundwater, hardpan, or bedrock.



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- Non-watertight tanks (includes CP/DW and outhouse/privy systems).
- Not meeting reporting requirements of an operating permit. Operating permits within Mower County are issued for ISTS with secondary pretreatment, non-standard systems, and larger mid-sized subsurface sewage treatment systems (MSTS).
- Imminent threat to public health or safety (ITPHS). The criteria that determine a ITPHS include:
  - Effluent surfacing on the ground surface from the soil dispersal system.
  - Sewage backing up into the dwelling.
  - Sewage discharged to the ground surface or surface waters without treatment.
  - 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 likely compliance status within the Project area. Likely compliance status is based on Mower County permit information, soils data, information provided by property owners, and onsite field assessments.

**Table 3-3: Likely ISTS Compliance Status**

Status	Number	Percentage
Compliant	37	49%
Noncompliant ITPHS	2	2%
Noncompliant FTPG	37	49%
<b>Total</b>	<b>76</b>	<b>100%</b>

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

### 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 approximately 25 to 40 years under normal use and with proper maintenance. Over time, ISTS components can degrade, the distribution rock or sand/soil surface interface can plug, and soil beneath the soil dispersal system can eventually lose capacity to treat pollutants.

Waste 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 ranges within the Project area. System ages were based on Mower County records and homeowner surveys. Eleven properties lacked County records or homeowner survey information, thus the ISTS ages are unknown. ISTS lacking County records were likely either installed without a permit or installed prior to County recordkeeping. Figure 4 provides a visual representation of current ISTS ages within the Project area.



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**Table 3-4: ISTS Age (as of 2023)**

<b>System Age</b>	<b>Number</b>	<b>Percentage</b>
< 10	11	14%
10 – 19	15	20%
20 – 29	15	20%
30 – 39	9	12%
> 40	15	20%
Unknown	11	14%
<b>Total</b>	<b>76</b>	<b>100%</b>

### 3.2.6 Summary

Of the 76 ISTS within the Project, 37 (49%) are compliant and thus are not in need of immediate replacement. Of the 39 noncompliant ISTS, 12 are likely a CP/DW. These systems are outdated, do not protect groundwater, and are no longer allowed to be installed in Minnesota. Cesspools are basically 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 alternatives for long term wastewater infrastructure, three components are evaluated including:

- Collection: the means wastewater generated from individual dwellings is conveyed to the wastewater treatment system.
- 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 subsurface soils.

When a series of homes are connected to a decentralized wastewater treatment system, 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 Mower County as a subordinate service district. This would qualify the project for public funding opportunities. A system developed privately is not eligible for public financing and can present legal challenges as it relates to land ownership/easements and fee collection.

City of Austin (Austin) sanitary infrastructure is nearby and the option to connect to their municipal WWTF is potentially viable. Therefore, feasible wastewater alternatives for the Project include the installation of ISTS to serve each dwelling, private ISTS w/o holding tanks (13 holding tank properties served by a community cluster SSTS), a shared community cluster SSTS, and connecting to Austin sanitary services. These alternatives are evaluated within the following section. Another alternative was investigated that connected properties that are noncompliant to a shared community cluster SSTS. However, preliminary design flow and construction cost calculations revealed the system to be cost prohibitive, and the alternative was removed from consideration.

### **4.1 ALTERNATIVES ANALYSIS**

The following alternatives have been evaluated for long-term wastewater treatment infrastructure to serve properties within the Project:

- Alternative 1: (1a): Private ISTS and (1b): Private ISTS w/o Holding Tanks (13 holding tank properties served by a community cluster SSTS)
- Alternative 2: Community Cluster Large Subsurface Sewage Treatment System (LSTS)
- Alternative 3: Regionalization to the City of Austin

Table 4-1 includes the estimated design wastewater flow for the alternatives and the associated permit that would apply.



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

Alternative	No. of Properties	Design Wastewater Flow (gpd)*	Permit Type**
Alternative 1a: Private ISTS	76	Varies per property	Mower County ISTS
Alternative 1b: Private ISTS w/o Holding Tanks (13 holding tank properties served by community cluster SSTS)	63 13	ISTS varies per property 4,825	Mower County ISTS
Alternative 2: Community Cluster LSTS	76	20,000	State SDS
Alternative 3: Regionalization to the City of Austin	76	18,560	State NPDES

\*Permit flow is not the actual flow observed, but rather is a prescribed design flow. The design flow considers an allowed reduction in per-dwelling flow estimates for community cluster systems with over 10 dwellings and includes infiltration and inflow for the collection system.

\*\*Permit type required for ISTS assumes that the individual property owners are the ISTS owners/managers. The SDS permit required for the shared community SSTS assumes Mower County is the owner.

Per Minnesota Rule 7081.0120, a daily wastewater flow was estimated for Alternative 1b (the community cluster SSTS serving 13 holding tank properties) and Alternative 2 using a formula specified in the rule. The formula calculates a design flow based on each dwelling’s classification 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 commercial establishments design flows were calculated using Minnesota Rule, Part 7081.0130. Also included is the collection system infiltration and inflow (I/I) as specified in Minnesota Rule 7081.0120. As an SSTS is not included in Alternative 3, the wastewater design flow was estimated using flow estimates within 10-States Standards for Wastewater Facilities, 2014 Edition. See Appendix C for wastewater design flow calculation details.

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

- A system designed with a wastewater flow less than 5,000 gpd is considered an ISTS and would be permitted by Mower County. These systems have the least design and permitting requirements.
- A system with a design wastewater flow greater than 10,000 gpd is permitted through the 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. These systems are considered LSTS.
- A system where surface discharge to a receiving water is employed like Austin, permitting is completed through the MPCA National Pollutant Discharge Elimination System (NPDES) permit.

## 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



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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. The community cluster SSTS serving the 13 holding tank properties, would qualify for public funding and a certified Service Provider/Operator would be required for operation and maintenance activities.

The typical life expectancy for a properly installed and maintained ISTS is 25 to 40 years. Life expectancy varies significantly depending on wastewater strength, water use, construction, operation, and maintenance.

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 inadequate 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, 51% of ISTS within the Project are likely 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 may require flow restriction that limits 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 will reduce 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, operate, and maintain.

Appendix A and Figure 5 summarize each property’s most likely future ISTS based on the lot size, soil conditions, and current land use. For a dwelling that does not have suitable space for a soil dispersal system due to setbacks and/or the floodplain/floodway, the future ISTS would likely be a holding tank.



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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 report, properties with challenging soils or limited room for a soil dispersal system are classified as needing either a Type 3 or Type 4 system. Table 4-2 and Table 4-3 summarize likely future ISTS for noncompliant properties and all Project properties, respectively.

**Table 4-2: Future ISTS for Noncompliant Properties**

ISTS Type	Number	Percentage
Type 1	13	33%
Type 2	11	28%
Type 3 or Type 4	15	39%
<b>Total</b>	<b>39</b>	<b>100%</b>

**Table 4-3: Future ISTS for All Properties**

ISTS Type	Number	Percentage
Type 1	37	49%
Type 2	13	17%
Type 3 or Type 4	26	34%
<b>Total</b>	<b>76</b>	<b>100%</b>

Of the 76 evaluated properties, 37 properties (49%) have adequate area for a standard Type 1 ISTS while 39 (51%) do not. Those 39 properties would need to be served by either a Type 2 holding tank or a Type 3 or Type 4 ISTS. Of the 39 likely noncompliant properties, 13 (33%) have adequate area for a Type 1 ISTS while 26 (67%) do not.

To address the 13 likely future holding tanks, Private ISTS Alternative 1b has been developed that would remove the 13 holding tank ISTS. Wastewater generated from these 13 properties (Figure 5) would be treated by a community cluster SSTS consisting of a collection and treatment system. The estimated design flow from the 13 holding tank properties is 4,825 gpd, classifying the system as an ISTS. The closest treatment site available would be just north of the service area as described in Section 4.1.2.2. The selected collection system would be the same as described 4.1.2.1. The treatment system would include septic tanks, a dose tank, and absorption beds sized at 1.2 gpd/ft<sup>2</sup>. Based on the estimated design flow and soil loading rate, a minimum 4,025 ft<sup>2</sup> of infiltrative area would be required. A secondary site would also be needed to be set aside for potential future use. For this alternative, the remaining 63 properties would be served by Type 1 and Type 3/Type 4 ISTS, as summarized in Table 4-3.



#### **4.1.1.2 Private ISTS Summary**

The following points summarize the private ISTS alternative:

- Advantages:
  - Alternative 1a:
    - 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 system.
    - Local groundwater recharge
  - Alternative 1b:
    - Low-interest rate loans and grant programs available for design and construction costs for the community cluster SSTS w/o holding tanks.
    - Allows for more usable land area on properties served by community cluster SSTS w/o holding tanks.
    - Routine operation and maintenance activities completed by a certified Service Provider/Operator for the community cluster SSTS w/o holding tanks.
    - Local groundwater recharge
- Disadvantages:
  - Alternative 1a:
    - 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 compared to a community cluster SSTS.
    - Grant funding is not available to reduce capital costs for the ISTS only option.
  - Alternative 1b:
    - Land acquisition in close proximity can be difficult for the community cluster SSTS w/o holding tanks. Currently, there is no agreement or discussion with landowners.
    - High estimated construction cost for the community cluster SSTS serving the holding tank properties, making grant programs a requirement for affordability.

#### **4.1.2 Alternative 2: Community Cluster LSTS**

The community cluster system alternative would include collection, treatment, and a below-grade soil dispersal system. Due to the estimated design wastewater flow, the cluster system would be considered a LSTS and be permitted by the MPCA. The following section evaluates a community cluster LSTS to serve the Project area.



### **4.1.2.1 Collection System**

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

- Conventional gravity
  - A conventional gravity collection system 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 pressure 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 pressure forcemain (see Appendix D for a grinder station detail).

Based on topography, reduced land disturbance, and construction costs, the grinder pump low pressure sewer collection system would be the most feasible and cost-effective collection system to serve the Project area.

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 pressurized grinder system significantly reduces potential I/I 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.

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.

The design of a pressure collection system incorporates calculations of inline pressures and flow 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.



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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**

The wastewater treatment system would provide primary, secondary, and tertiary treatment prior to being dispersed to the soil. The system would include pretreatment components designed to treat wastewater constituents and in particular, total nitrogen to less than 10 mg/L end-of-pipe, as would be required by the MPCA permit.

A treatment site has not been selected as land was not available to be evaluated during fieldwork. Two open farm fields adjacent to the Project area were initially selected but are not available based on conversations with the landowners. However, one open farm field to the north was chosen that is higher in elevation, contains better mapped soils, and appears feasible (Figure 6). If a community cluster LSTS is selected, this 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 this area primarily includes the Lilah sandy loam featuring moderately structured sandy loam extending to sand with depth. The USDA NRCS soil series description can be found in Appendix E. These soils are very deep, excessively drained, and formed from gravelly outwash. Periodically saturated soils are not expected within these soils. Based on the desktop analysis, these soils could accommodate a below grade soil dispersal system that would maintain a minimum vertical separation to seasonally high groundwater of 36-inches.

The grinder pump low presser sewer collection system would convey raw sewage to the treatment site, which would include buried precast concrete tanks, aerobic treatment units (ATU), a denitrification unit, pumps, controls, an absorption bed soil dispersal system, and other associated appurtenances. A small control building would be located adjacent to the treatment tanks and house the control panel, electrical distribution panel, carbon source chemical feed equipment, blowers, and be equipped with a generator for backup power. A gravel drive would provide access and the entire site would include perimeter fencing.

The proposed absorption bed soil loading rate is 1.6 gpd/ft<sup>2</sup>. This loading rate is based on highly treated effluent dispersed in sand. This loading rate may vary based on a full site assessment and soil investigation.

Based on the design wastewater flow and expected soil loading rate, 12,500 ft<sup>2</sup> of absorption area would be required. However, based on state LSTS requirements, an extra 50% of the required absorption area (6,250 ft<sup>2</sup>) would also be constructed. Additionally, another 50% of the required absorption area would need to be set aside as reserve. It is envisioned six absorption beds would be constructed each with dimensions of 24 ft. x 134 ft. The actual number of cells and dimensions would vary depending upon actual site characteristics. Figure 6 shows the treatment site location but does not imply landowner consent to sell the property. The estimated treatment site area shown is five acres.



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Each absorption bed 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 absorption bed system would depend upon the actual wastewater flow volume. Effluent would be distributed evenly within the rock bed via pressure laterals that would infiltrate vertically through the bed and into the native soil.

An automated control panel would govern system operations and 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 community cluster LSTS requires routine operation and maintenance responsibilities. Typical tasks include monitoring and logging wastewater flows, inspecting pumps and blowers, inspecting grinder stations, field flushing pressure distribution laterals, rotating absorption beds, checking treatment tanks for solids accumulation, sampling, reporting, and monitoring treatment processes. Accumulated tank solids would be pumped periodically, as required by the MPCA, and hauled to an approved facility for proper disposal.

Construction, operation, and maintenance costs for the cluster LSTS would be assessed equally across the service area. See Section 5 for a cost analysis.

### **4.1.2.3 Community Cluster LSTS Summary**

The following points summarize the community cluster system alternative:

- Advantages:
  - Low-interest rate loans and grant programs available for design and construction costs.
  - Potential property value increase compared to private ISTS.
  - Allows for more usable land area on properties.
  - Routine operation and maintenance activities completed by a certified Service Provider/Operator.
  - Local groundwater recharge.
- Disadvantages:
  - Land acquisition in close proximity can be difficult. Currently, there is no agreement or discussion with landowners.
  - Highest estimated construction cost making grant programs a requirement for affordability.
  - High operation, maintenance, and replacement costs
  - Potential local opposition.

### **4.1.3 Alternative 3: Regionalization to the City of Austin**

Regionalization refers to the conveyance of one entity's wastewater to an existing WWTF.

Regionalization may be advantageous for both parties as there would be an economy of scale to treat the



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wastewater. If the existing treatment facility has capacity, the cost to treat a gallon of wastewater decreases as additional users are included. Collection and conveyance construction costs to transport the raw wastewater is the primary component with no treatment system construction costs.

Prior to analyzing the regionalization alternative, the Austin Public Works department was contacted to explore if regionalization is feasible. The Austin Engineer and Director of Public Works agreed that the possibility of connecting the Project to their existing WWTF is viable and it has sufficient capacity to accommodate the added flow. The existing WWTF recently underwent major improvements to treat more flow and address nutrient effluent limits. The WWTF is designed to treat 10.6 million gpd and consists of treatment processes for domestic and industrial flow streams. Domestic wastewater is treated by an activated sludge process and the industrial portion an anaerobic contact process. Final treated effluent from both are combined and discharged to the Cedar River.

Regionalization would serve all 76 properties within the Project area and provide opportunity for future growth on nearby parcels. Wastewater within the community would be collected and conveyed to an Austin manhole located adjacent to and westerly of the Austin Country Club (Figure 7). Per Austin, the desired collection system to serve the Project area would be a conventional gravity system consisting of sewer main installed within public road right of way. Each property owner would be responsible for their sewer service lateral from the dwelling to the sewer main. All piping would be installed with uniform gradients designed to achieve a minimum two foot per second scouring velocities. Raw wastewater would be conveyed from the dwellings via gravity to two main duplex lift stations however, one western property would require a grinder pump station. From the far western lift station, raw sewage would be pumped to the manhole and ultimately to the Austin WWTF.

Regionalization would require City of Austin annexation of the Project area. Austin would be the owner of collection system infrastructure minus the sewer service laterals on private properties. All operation, maintenance, and repairs on the sewer main would be completed by Austin. For purposes of billing, each property would be required to install a water meter.

### **4.1.3.1 Regionalization to the City of Austin Summary**

The following points summarize the regionalization to Austin alternative:

- Advantages:
  - Low-interest rate loans and grant programs available for design and construction costs.
  - Allows for more usable land area on properties.
  - Reliable wastewater treatment.
  - No land acquisition required.
  - No new state SDS or NPDES permit required.
  - Allows for future growth on nearby vacant parcels. Currently, the owner of a 40-acre parcel (Parcel ID/PIN: 16.031.0170) located east of the Austin Country Club is pursuing to develop the land into 40 to 50 residential lots. In addition, the property owner of a 60-acre parcel (Parcel ID/PIN: 16.031.0021) located along 570<sup>th</sup> Avenue, has expressed interest in doing the same. These developments would lower the cost per connection of the existing Project area substantially.



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- Operation, maintenance, and replacement costs would be the responsibility of Austin.
- Administration would be the responsibility of Austin.
- No certified Service Provider/Operator would be required.
  
- Disadvantages:
  - Annexation of the Project area would be required.
  - All work and associated costs on private property would be the responsibility of the property owner.
  - Dobbins Creek users would be dependent upon and subject to conditions required by Austin.



## 5.0 OPINION OF PROBABLE COST ANALYSIS

Alternatives have been evaluated to improve existing wastewater infrastructure within the Project area including private ISTS replacement, private ISTS w/o holding tanks (13 holding tank properties served by a community cluster SSTS), community cluster LSTS, and regionalization to the City of Austin. The following section includes an opinion of probable cost analysis of these alternatives including capital, operation, maintenance, and replacement (OM&R) costs. A 20-year present worth and financing analysis have also been completed.

### 5.1 OPINION OF PROBABLE COST ESTIMATE

Table 5-1 provides estimated construction costs to replace all ISTS within the Project. The replacement ISTS would include Type 1 mounds, Type 2 holding tanks (2,000-gallons), and Type 3 or 4 systems.

**Table 5-1: Private ISTS Opinion of Probable Cost Estimate**

New ISTS Type	Number	Estimated Cost per ISTS	Estimated Construction Cost
Type 1 Mound	37	\$30,000	\$1,110,000
Type 2 Holding Tank	13	\$7,500	\$97,500
Type 3 or Type 4	26	\$35,000	\$910,000
<b>Construction Cost Subtotal</b>			\$2,117,500
<b>Contingency</b>			\$211,750
<b>Total Estimated Construction Cost</b>			\$2,329,250
<b>Estimated Construction Cost per Connection</b>			\$30,650

Table 5-2 provides estimated construction costs to replace all holding tanks with a community cluster SSTS. The remaining 63 properties within the Project would be served by replacement ISTS including Type 1 mounds and Type 3 or 4 systems. Note, the estimated community cluster SSTS construction costs do not include reductions from potential grant funding programs. The community cluster system includes a grinder pump low pressure sewer collection system and a SSTS consisting of primary treatment prior to being dispersed to soil absorption beds. See Appendix F for a detailed cost estimate.



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**Table 5-2: Private ISTS Opinion of Probable Cost Estimate without Holding Tanks**

New ISTS Type	Number	Estimated Cost per ISTS	Estimated Construction Cost
Type 1 Mound	37	\$30,000	\$1,110,000
Type 3 or Type 4	26	\$35,000	\$910,000
Cluster SSTS	13	N/A	\$1,161,000
<b>Construction Cost Subtotal</b>			\$3,181,000
<b>Contingency</b>			\$318,000
<b>Engineering Services (Cluster SSTS)</b>			\$209,000
<b>Legal &amp; Administrative (Cluster SSTS)</b>			\$24,000
<b>Total Estimated Construction Cost</b>			\$3,732,000
<b>Estimated Construction Cost per Connection</b>			\$49,100

**Table 5-3: Community Cluster LSTS Opinion of Probable Construction Cost Estimate**

Collection System	Treatment System	Contingency	Engineering Services	Legal & Admin.	Total Estimated Construction Cost	Estimated Construction Cost per Connection
\$3,519,000	\$3,037,000	\$656,000	\$1,181,000	\$132,000	\$8,525,000	\$112,200

Table 5-3 summarizes estimated construction costs for regionalization to the Austin WWTF. Note, these estimated construction costs do not include work on private property or reductions from potential grant funding programs. This alternative would include a gravity collection system conveying wastewater to an Austin manhole located adjacent to and westerly of the Austin Country Club. See Appendix F for a detailed cost estimate. As stated earlier, the addition of lots through development of two nearby farm fields would substantially lower the construction cost per connection for the Project.

**Table 5-4: Regionalization to the City of Austin Probable Construction Cost Estimate**

Collection System	Treatment System	Contingency	Engineering Services	Legal & Admin.	Total Estimated Construction Cost	Estimated Construction Cost per Connection
\$2,759,000	N/A	\$276,000	\$497,000	\$56,000	\$3,588,000	\$47,300

## 5.2 OPERATION, MAINTENANCE, AND REPLACEMENT COSTS

When comparing wastewater treatment alternatives, OM&R costs must be included in the evaluation. Table 5-4 provides estimated annual OM&R costs for each alternative with costs shared by all 76 connections.

Annual OM&R for ISTS vary greatly depending on type. Holding tanks have the highest OM&R costs due to pumping, which can be thousands per year depending upon water usage. Type 1 and Type 3 or 4 ISTS would have much less OM&R costs than holding tanks and have been estimated at approximately \$400 and \$1,000 per year, respectively. Replacement costs are for short-lived assets such as pumps, blowers,



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and controls. Each replacement cost is calculated based on the component cost spread over its estimated life.

Annual OM&R costs for Alternative 1a was the highest due to holding tank pumping costs. Annual OM&R costs for Alternative 2 was the second highest due to added electricity to operate blowers, equipment replacement, Service Provider/Operator fees, laboratory costs, and chemical costs. Annual OM&R for Alternative 3 was the lowest, as Austin would be responsible for OM&R of the sewer main and lift stations, and no Service Provider/Operator is needed. The only cost would be the monthly connection charge and sewer service fee based on water usage. For purposes of this study, it was assumed that half the established design wastewater flow would be generated from the properties.

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

	<b>Alternative 1a: Private ISTS</b>	<b>Alternative 1b: Private ISTS w/o Holding Tanks*</b>	<b>Alternative 2: Community Cluster LSTS</b>	<b>Alternative 3: Regionalization to the City of Austin</b>
<b>Total Annual OM&amp;R Costs</b>	\$216,100	\$76,500	\$105,200	\$39,400
<b>Estimated Annual OM&amp;R Costs per Connection</b>	\$2,850	\$1,010	\$1,385	\$520
<b>Estimated Monthly OM&amp;R Costs per Connection</b>	\$237	\$84	\$116	\$44

\*Includes \$63,000/year for the 63 ISTS on private properties and \$13,500/year for the 13-dwelling community cluster SSTS.

### 5.3 PRESENT WORTH ANALYSIS

A present worth analysis allows the direct comparison of alternatives by converting future costs into present-day dollar amounts. Future expenditures on capital replacement, operations, and maintenance are converted by using financial calculation formulas, an assumed 20-year timeframe, and a discount rate. The discount rate is generally described as the difference between the available rate of return on an investment and the average inflation rate. A discount rate of 0.5% was utilized in the analysis. After converting future expenditures into a present worth value, these costs were added to estimated capital construction costs and used in alternative comparison.

Annual costs for each alternative include OM&R and debt service on loans taken out for construction. Capital construction costs not covered by grant funding would be paid for by a low-interest loan available through the PFA. Each connection would be responsible for their equal share of the debt service which would be assessed on annual property taxes. If desired, the property owner could pay their share as a lump sum to avoid interest charges.

Table 5-5 summarizes the present worth and financing analysis. For Alternative 1b (community cluster SSTS), Alternative 2, and Alternative 3, it was assumed the project would obtain a grant from the PFA. The alternatives could pursue funding through the Small Community Wastewater Treatment Program, Point Source Implementation Grant Program, and/or the Water Infrastructure Fund. The remaining costs would be covered by a 20-year, 1.9% loan (current rate per PFA). Grant eligibility is based on affordability, total project construction costs, project priority list (PPL) ranking, funding reserves, median household income, and other factors. Note, it is not certain the project would receive a grant but based on experience, there is opportunity. To equally compare the alternatives, it was assumed private ISTS would be covered by loans of the same length and interest rate by the property owners.



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**Table 5-6: Present Worth and Financing Analysis**

	<b>Alternative 1a: Private ISTS</b>	<b>Alternative 1b: Private ISTS w/o Holding Tanks</b>	<b>Alternative 2: Community Cluster LSTS</b>	<b>Alternative 3: Regionalization to the City of Austin</b>
<b>Present Worth Analysis</b>				
<b>Total Estimated Probable Construction Cost</b>	\$2,329,250	\$3,732,000	\$8,525,000	\$3,588,000
<b>Grant Funding Reduction to Capital Construction Cost (80% Grant Award for Alternative 2 &amp; 60% Grant Award for Alternative 3)</b>	\$0	\$1,208,800	\$6,820,000	\$2,152,800
<b>Final Total Estimated Probable Construction Cost</b>	\$2,329,250	\$2,523,200	\$1,705,000	\$1,435,200
<b>Final Total Estimated Probable Construction Cost per Connection</b>	\$30,650	\$33,200	\$22,450	\$18,900*
<b>Annual OM&amp;R Present Worth</b>	\$4,102,000	\$1,453,000	\$1,988,000	\$749,000
<b>Total Estimated Present Worth</b>	\$6,431,250	\$3,976,200	\$3,703,000	\$2,184,200
<b>Financing Analysis</b>				
<b>Estimated Loan Amount</b>	\$2,329,250	\$2,523,200	\$1,705,000	\$1,435,200
<b>Annual Loan Payment (20-year, 1.9% Interest)</b>	\$141,100	\$152,900	\$103,300	\$87,000
<b>Annual OM&amp;R Costs</b>	\$216,100	\$76,500	\$105,200	\$39,400
<b>Total Estimated Annual Costs (OM&amp;R and Loan Payment)</b>	\$357,200	\$229,400	\$208,500	\$126,400
<b>Estimated Annual Costs per Connection</b>	\$4,700	\$3,020	\$2,750	\$1,670
<b>Estimated Monthly Costs per Connection</b>	\$392	\$252	\$229	\$139

Note: Per Austin, based on previous projects, construction costs per connection historically range from \$17,500 to \$20,000. Austin has a minimum sanitary sewer access charge of \$17,500 and depending upon the percent grant and eligible project construction costs, the total per connection cost may be higher.



## 6.0 SUMMARY AND RECOMMENDATIONS

The CAR investigation determined the likely compliance status for existing ISTS in the Project area and provides a direct comparison of alternatives for long-term wastewater treatment infrastructure. The following is a summary of findings:

- The majority (66%) of existing ISTS are greater than 20 years old or of unknown age.
- Thirty-seven of 76 properties (49%) likely have a compliant ISTS.
- Likely future ISTS to serve the properties include 37 Type I (49%), 13 Type 2 (17%) and 26 Type 3 or Type 4 (34%).
- The alternatives evaluated for long-term wastewater treatment infrastructure include: Alternative 1a: Private ISTS, Alternative 1b: Private ISTS w/o Holding Tanks, Alternative 2: Community Cluster LSTS, Alternative 3: Regionalization to the City of Austin.
- Estimated opinion of probable construction costs for the alternatives are:
  - Alternative 1a: \$2,329,250 (\$30,650 per connection)
  - Alternative 1b (before grant funding reduction): \$3,732,000 (\$49,100 per connection)
  - Alternative 1b (after grant funding reduction): \$2,523,200 (\$33,200 per connection)
  - Alternative 2 (before grant funding reduction): \$8,525,000 (\$112,200 per connection)
  - Alternative 2 (after grant funding reduction): \$1,705,000 (\$22,450 per connection)
  - Alternative 3 (before grant funding reduction): \$3,588,000 (\$47,300 per connection)
  - Alternative 3 (after grant funding reduction): \$1,435,200 (\$18,900 per connection)
- Estimated present worth values for the alternatives are:
  - Alternative 1a: \$6,431,250
  - Alternative 1b: \$3,976,200
  - Alternative 2: \$3,703,000
  - Alternative 3: \$2,184,200
- Estimated annual costs per connection including potential grant funding, low-interest loan principal forgiveness, and OM&R costs for the alternatives are:
  - Alternative 1a: \$4,700 (\$392 per month)
  - Alternative 1b: \$3,020 (\$252 per month)
  - Alternative 2: \$2,750 (\$229 per month)
  - Alternative 3: \$1,670 (\$139 per month)

### 6.1 RECOMMENDATIONS

This CAR provides information that will assist in making informed decisions on the next steps to take as alternatives are reviewed. It is our recommendation that the following be considered:

- If project stakeholders value the lowest capital cost (without grant funding reduction), existing dwellings would continue using private ISTS and noncompliant ISTS should be upgraded.
- If project stakeholders desire a community solution, then regionalization to the Austin should be pursued. Regionalization would also provide sanitary sewer services to the two vacant farm fields that are interested in residential development which would lower the estimated costs per connection.



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- If project stakeholders do not want annexation to Austin and desire a community solution, then the community cluster LSTS should be pursued. Further considerations for this alternative include:
  - Explore construction financing grant opportunities and in particular, the Point Source Implementation Grant program. Work with PFA and Stantec for assistance.
  - Explore the creation of a subordinate service district which would allow Mower County a means to effectively provide and finance wastewater services for the Project.
  - Investigate the opportunity of acquiring land (Parcel ID/PIN: 16.031.0010) for the LSTS at the location shown on Figure 6.

## **6.2 NEXT STEPS**

Mower County will continue to enforce MN Rules Chapter 7080 SSTS regulations and the county septic ordinance. Noncompliant ISTS will require upgrades and homeowners will be responsible for ensuring their ISTS remain in compliance.

The following actions should be taken by Project stakeholders based on selecting a community solution:

- Determine the desire of property owners within the Project area to pursue a community solution.
- If regionalization is desirable, continue discussion with the City of Austin to determine next steps.
  - Explore construction financing grant opportunities and in particular, the Water Infrastructure Fund. Work with the PFA, Austin, and Stantec for assistance.
- If a community cluster LSTS is desirable, explore construction financing grant opportunities, creation of a subordinate service district, and land acquisition as described in Section 6.1.



# **FIGURES**

**Figure 1: Project Area**

**Figure 2: Water Supply Well Locations with FEMA 1% Floodplain**

**Figure 3: Likely ISTS Compliance Status**

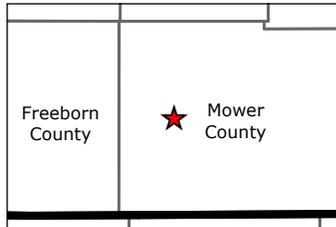
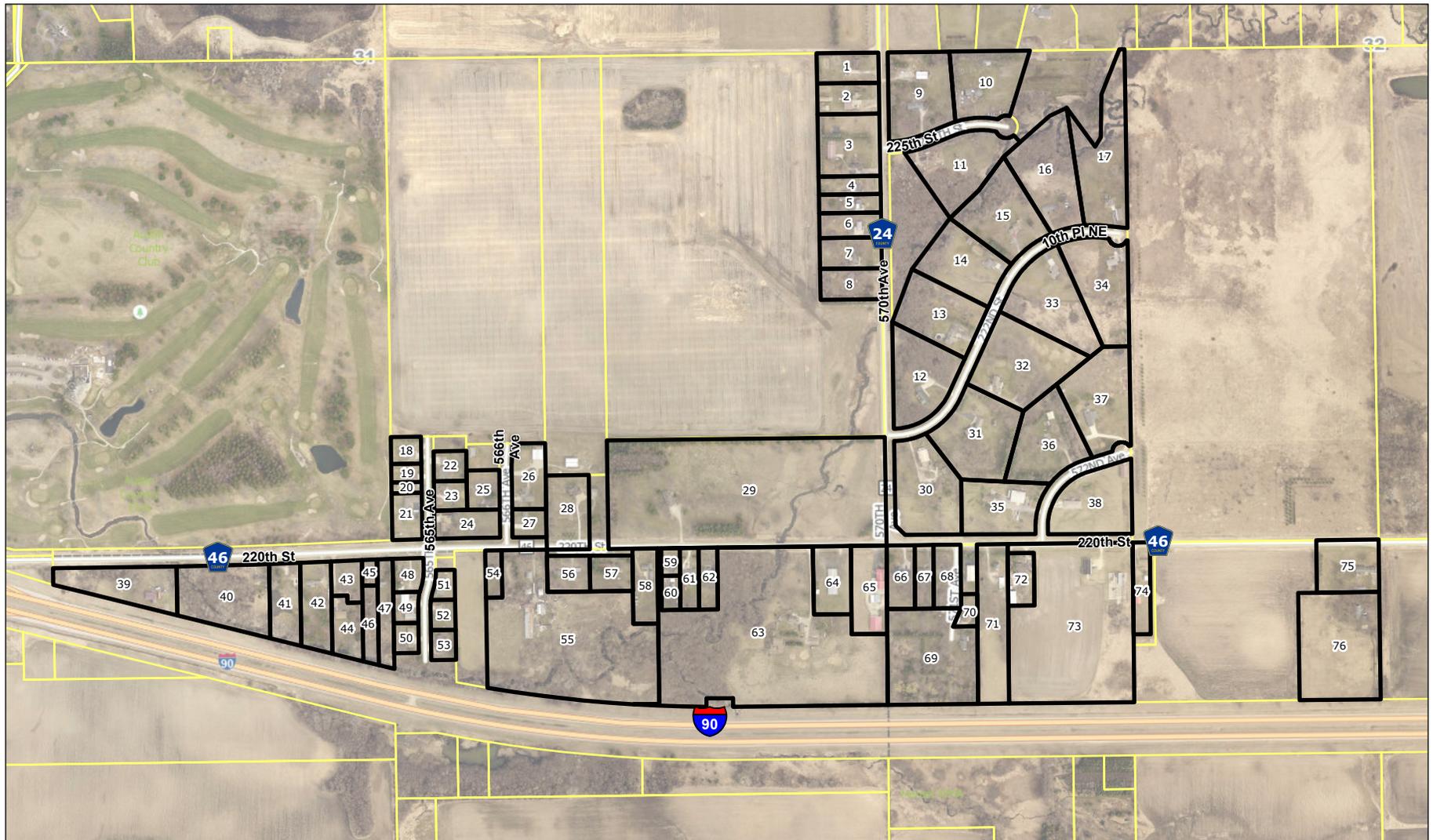
**Figure 4: ISTS Age (as of 2023)**

**Figure 5: Likely Future ISTS for All Properties**

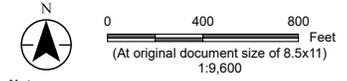
**Figure 6: Community Cluster LSTS Concept**

**Figure 7: Regionalization to the City of Austin Concept**

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 Study Area Parcels  
 County Parcels

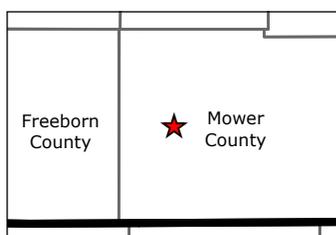
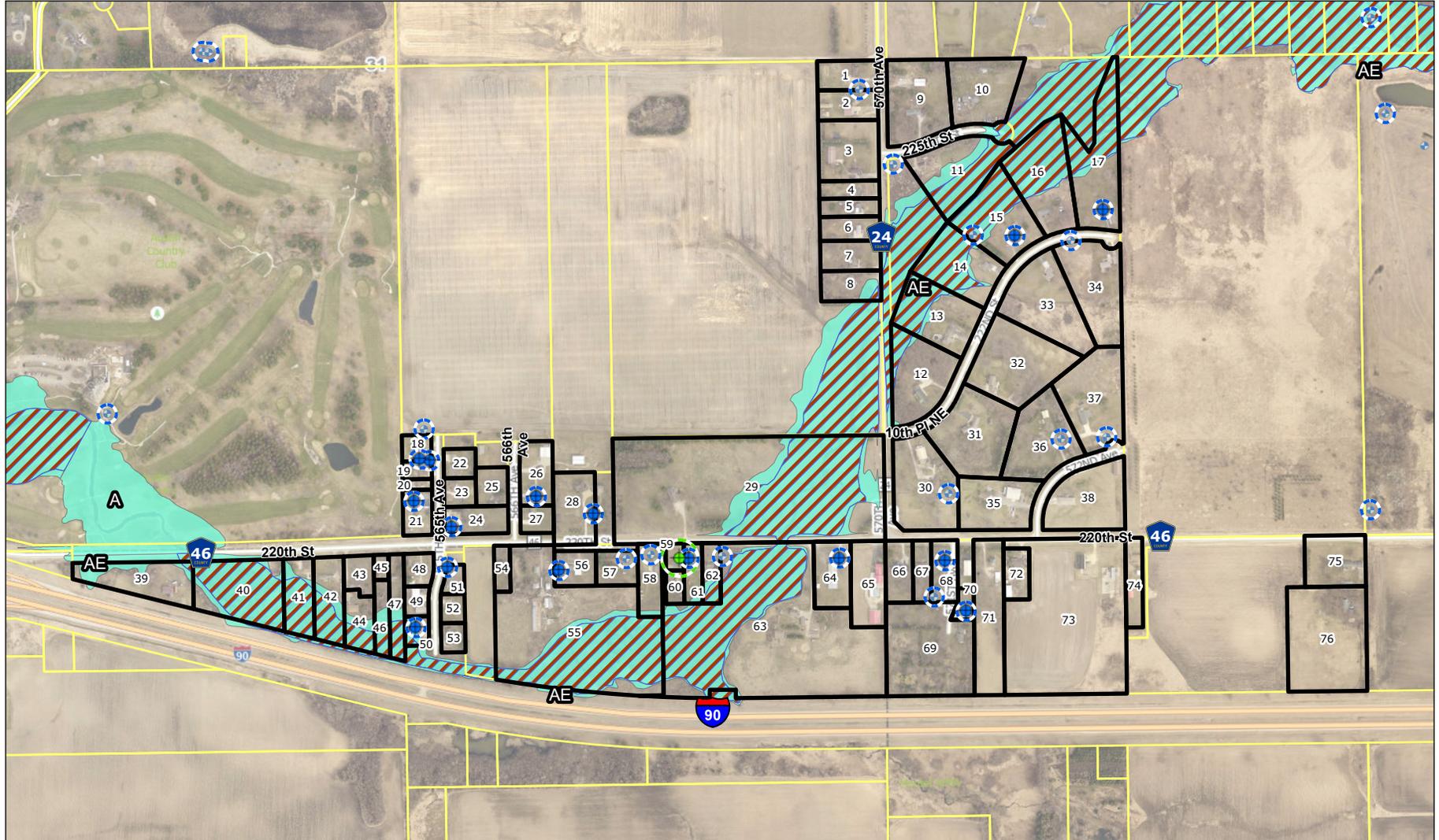


**Notes**  
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet  
2. Data Sources: Mower Co., Stantec  
3. Background: 2021 Mower Co. Aerial

Project Location Austin, Mower Co., MN Prepared by ARH on 2023-11-28  
Client/Project Mower County, MN 227705757  
Dobbins Creek South Branch Community  
Community Assessment Report  
Figure No. 1  
Title Project Area

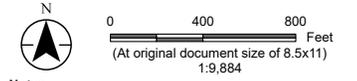


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- ◆ Deep Well\*
- ◆ Shallow Well\*
- ⊕ County Well Index
- ⊕ Verified Well Location
- 🌊 100 Year Floodplain
- 🌀 Regulatory Floodway
- ▭ Deep Well 50 ft Setback Buffer
- ▭ Shallow Well 100 ft Setback Buffer
- Study Area Parcels
- County Parcels

\*Water supply wells only located on parcels that granted permission to access the property



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial



Project Location: Austin, Mower Co., MN  
 Prepared by ARH on 2023-12-04

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Client/Project: Mower County, MN  
 227705757  
 Dobbins Creek South Branch Community  
 Community Assessment Report

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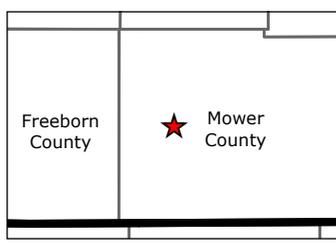
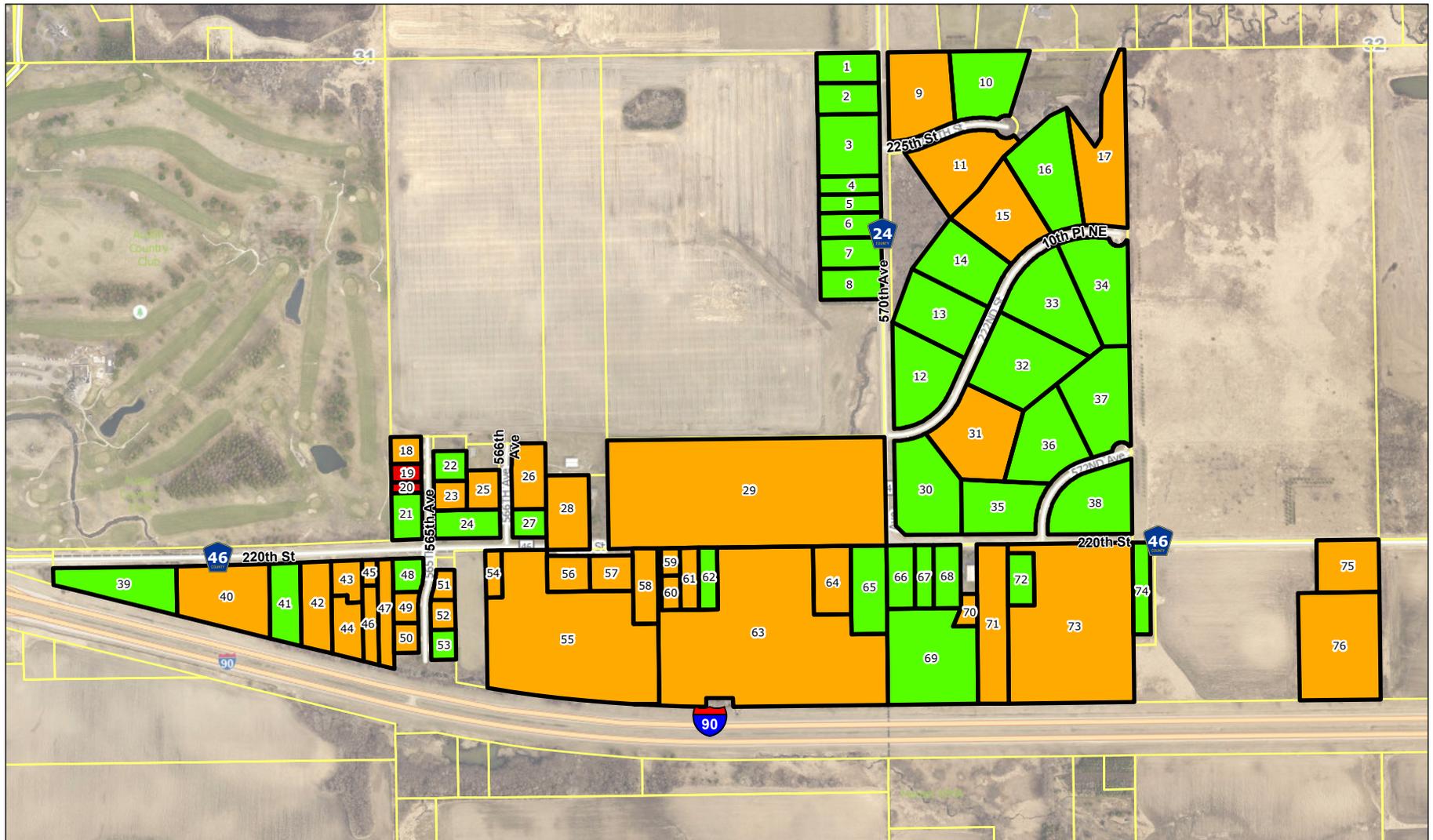
Figure No.: **2**

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Title: **Water Supply Well Locations with FEMA 1% Floodplain**

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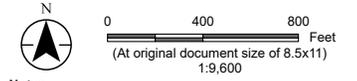


**Study Area Parcels**

**County Parcels**

**Likely Compliance Status**

- Compliant
- Failure to Protect Groundwater (FTPG)
- Imminent Threat to Public Health or Safety (ITPHS)



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial



Project Location: Austin, Mower Co., MN  
 Prepared by ARH on 2023-10-30

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Client/Project: Mower County, MN  
 Dobbins Creek South Branch Community  
 Community Assessment Report  
 227705757

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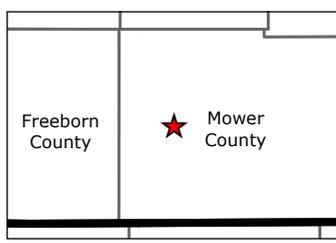
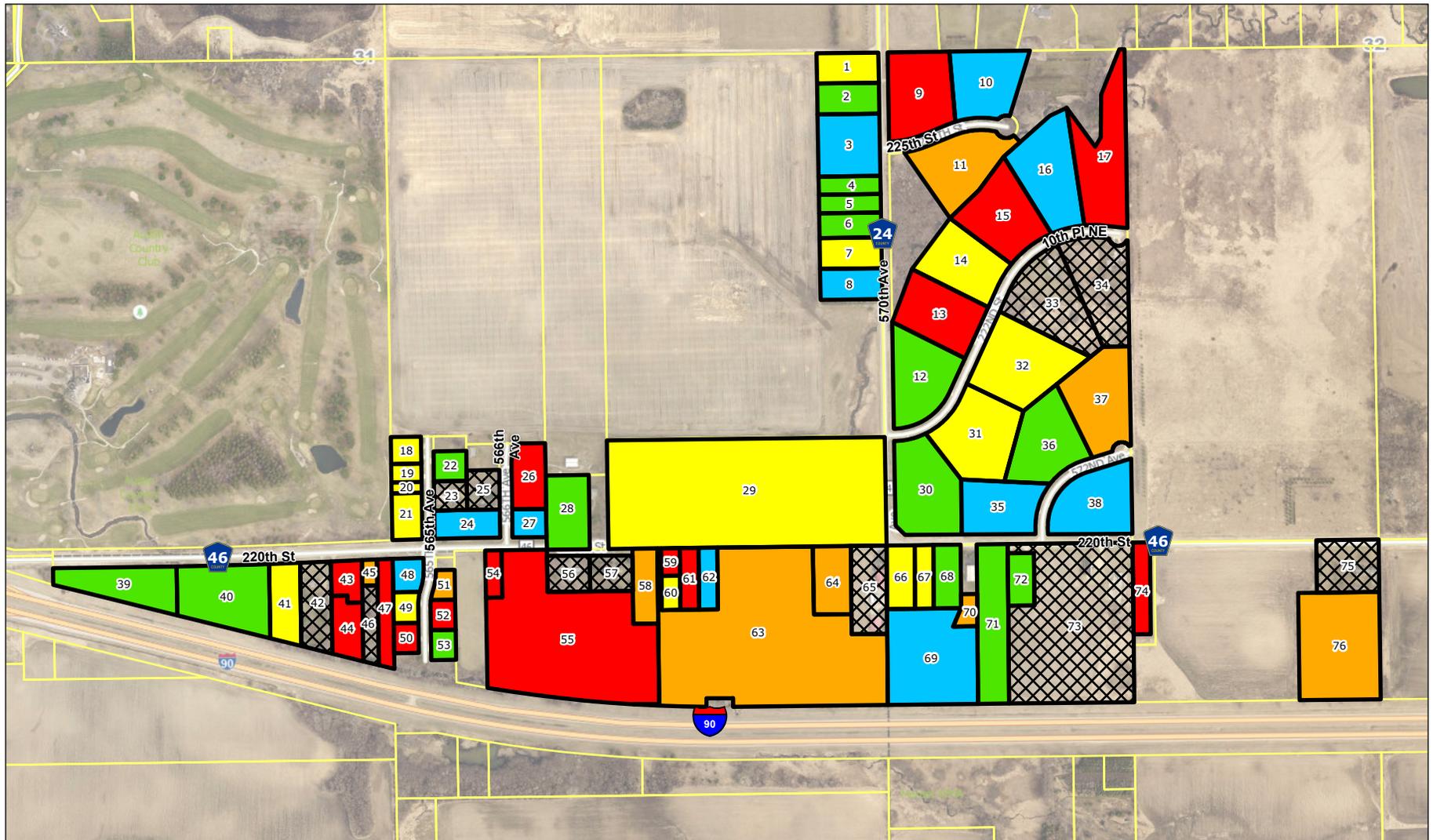
Figure No.: **3**

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Title: **Likely ISTS Compliance Status**

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

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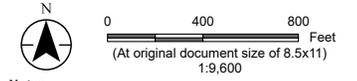


**Study Area Parcels** (Black outline)

**County Parcels** (Yellow outline)

**SSTS Age**

- Unknown
- <10 Years
- 10-19 Years
- 20-29 Years
- 30-39 Years
- >40 Years



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial



**Project Location** Austin, Mower Co., MN

**Prepared by** ARH on 2023-11-28

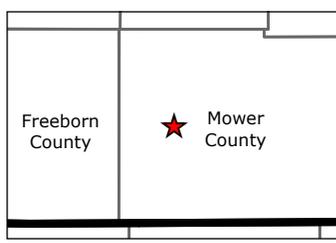
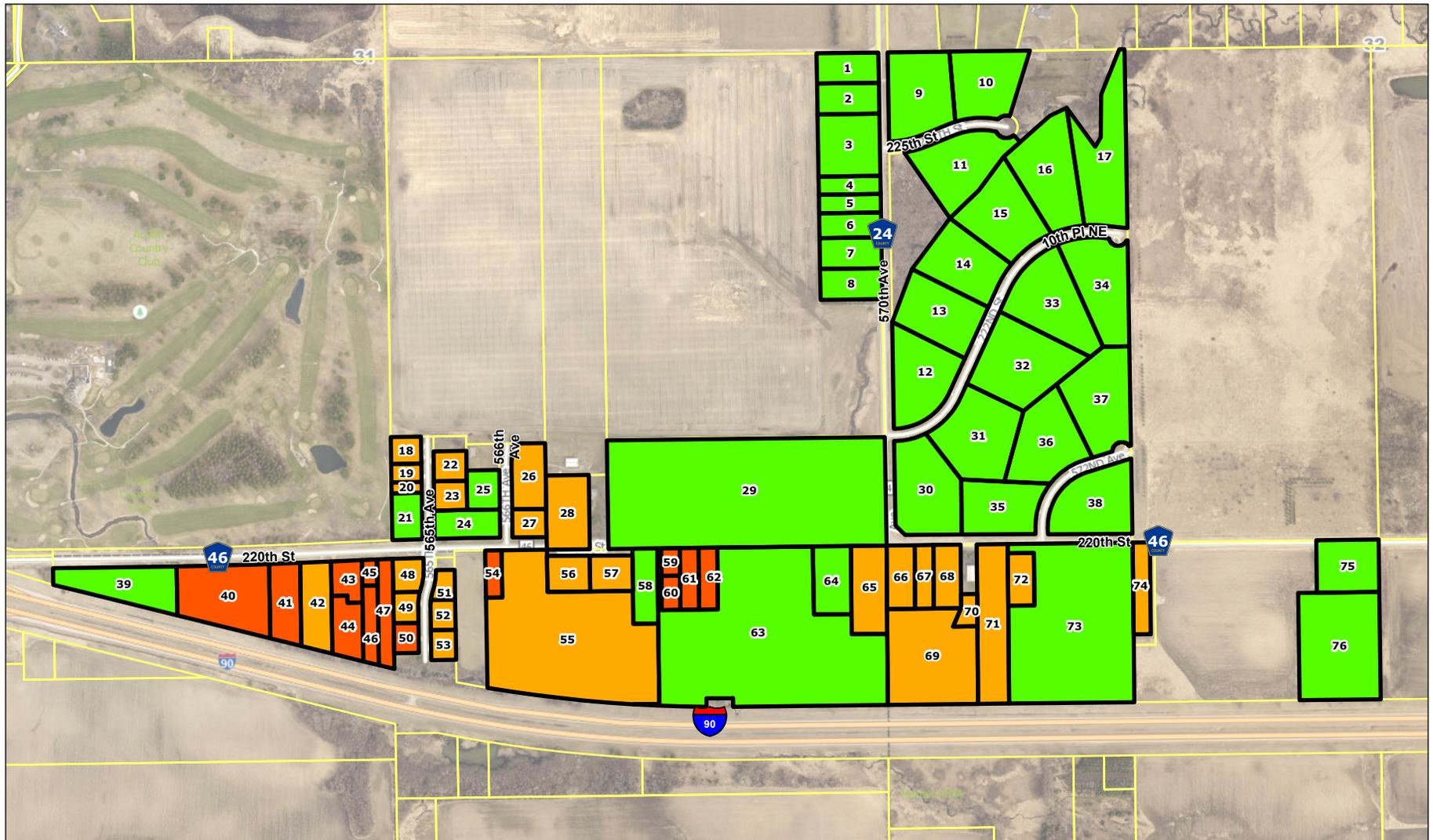
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**Client/Project** Mower County, MN  
Dobbins Creek South Branch Community  
Community Assessment Report

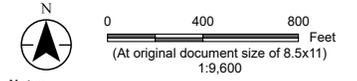
**Figure No.** 4

**Title** ISTS Age (as of 2023)

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- Study Area Parcels
- County Parcels
- Likley Future ISTS**
- Type I
- Type II
- Type III/IV



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial

Project Location: Austin, Mower Co., MN  
 Prepared by ARH on 2023-12-07

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Client/Project: Mower County, MN  
 Dobbins Creek South Branch Community  
 Community Assessment Report  
 227705757

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Figure No.: **5**

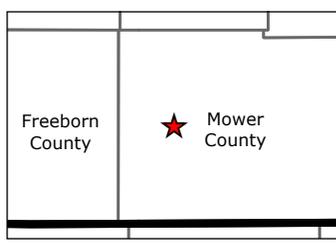
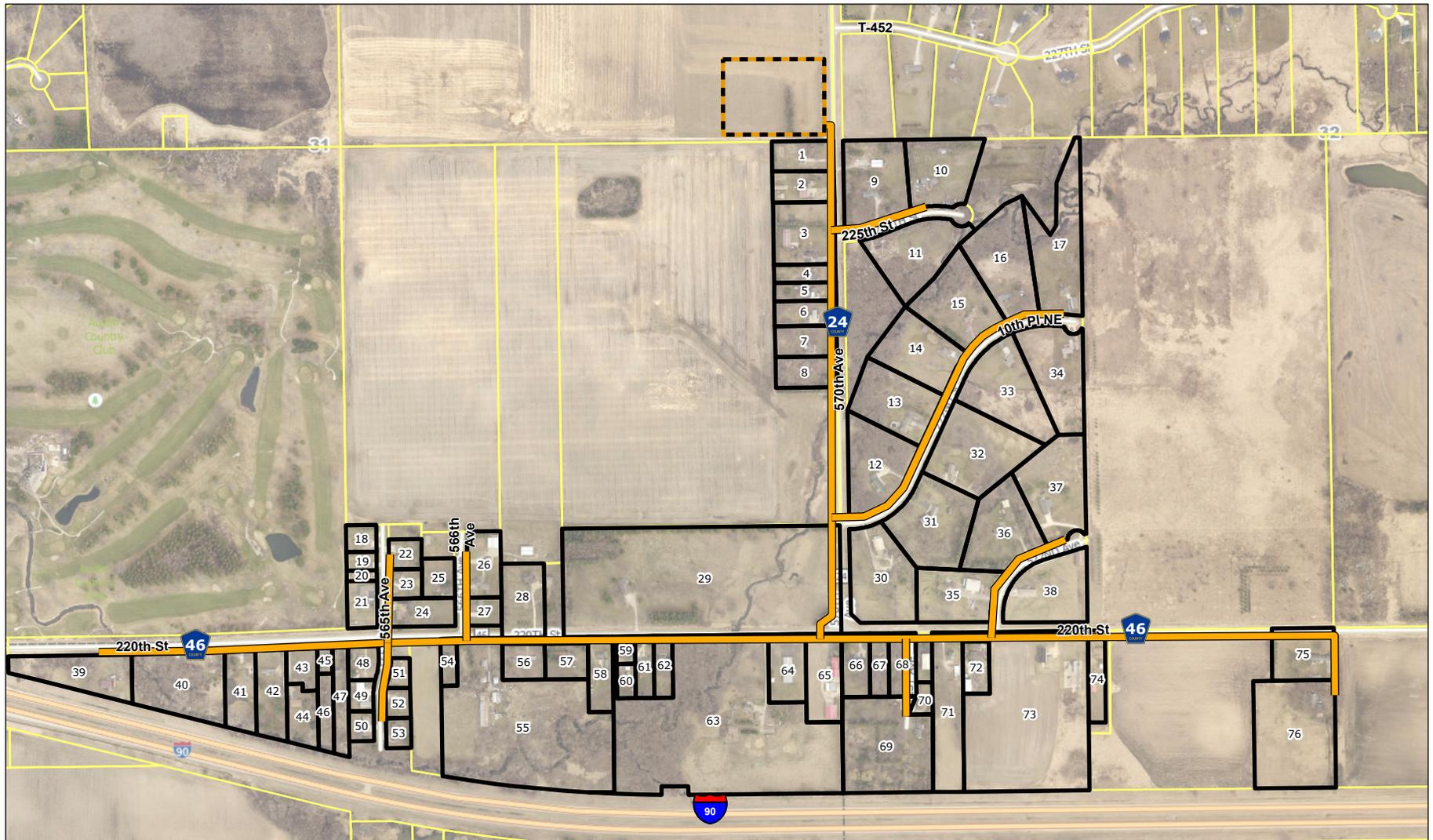
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Title: **Likley Future ISTS for All Properties**

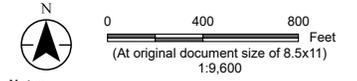


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- Study Area Parcels
- County Parcels
- Wastewater Treatment Site
- Collection System Pressure Sewer Forcemain



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial

Project Location: Austin, Mower Co., MN  
 Prepared by ARH on 2023-10-30

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Client/Project: Mower County, MN  
 Dobbins Creek South Branch Community  
 Community Assessment Report  
 227705757

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Figure No.: **6**

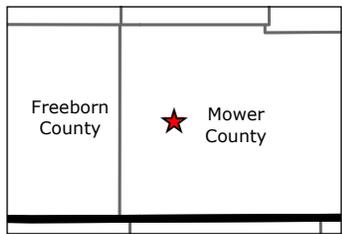
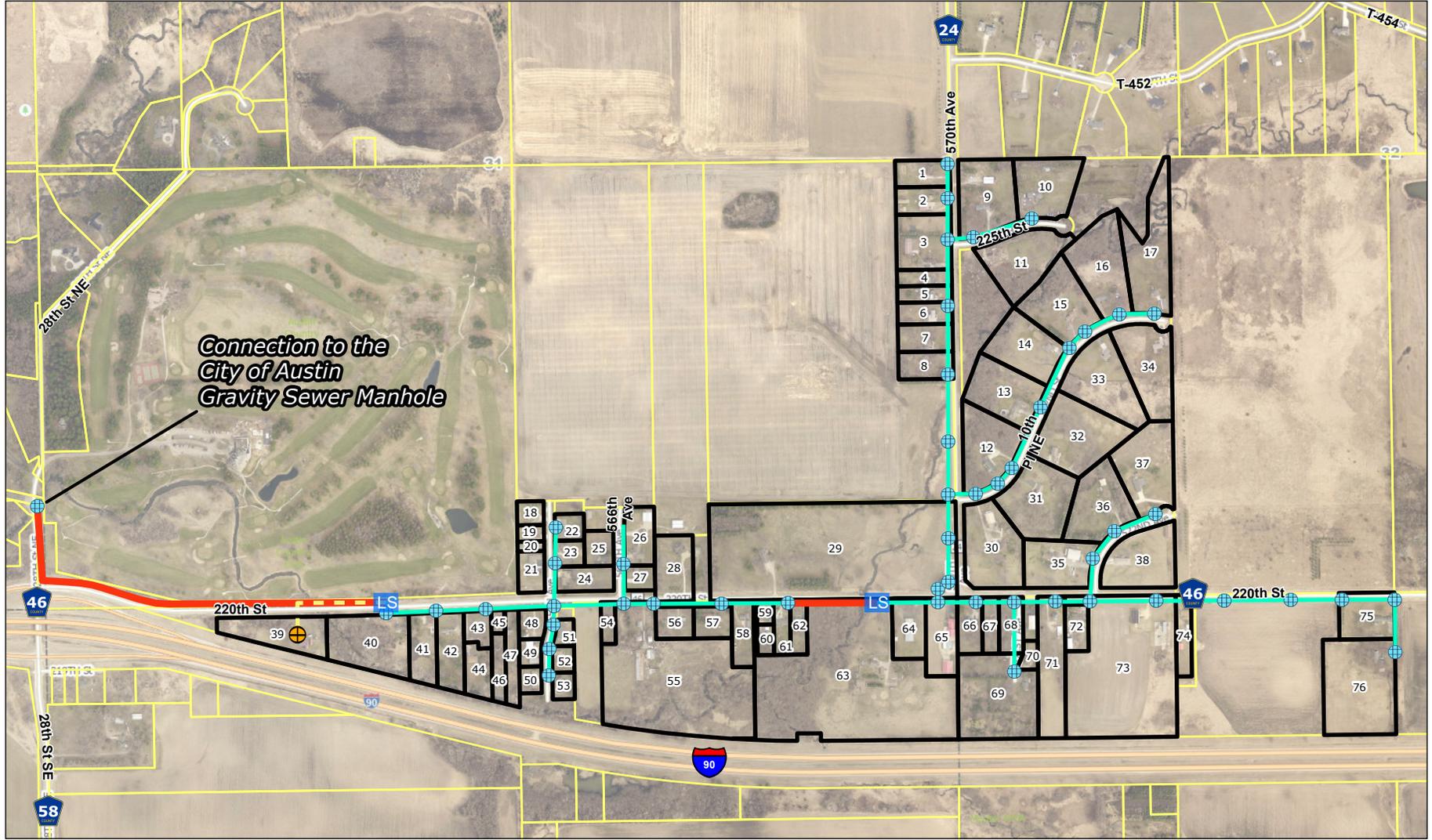
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Title: **Community Cluster LSTS Concept**

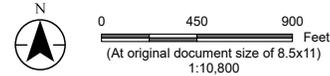


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- Study Area Parcels
- County Parcels
- Gravity Sewer Mains
- Pressure Sewer
- Pressure Sewer Lateral
- Sanitary Manholes
- LS Lift Station
- ⊕ Residential Grinder Station



- Notes**
1. Coordinate System: NAD 1983 HARN Adj MN Mower Feet
  2. Data Sources: Mower Co., Stantec
  3. Background: 2021 Mower Co. Aerial



Project Location: Austin, Mower Co., MN      Prepared by ARH on 2023-11-28

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Client/Project: Mower County, MN      227705757  
 Dobbins Creek South Branch Community  
 Community Assessment Report

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Figure No.: **7**

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Title: **Regionalization to the City of Austin**

# **APPENDIX A**

## **Parcel Data Spreadsheet**

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

CAR MAP ID#	Parcel ID	Address	Property Type: Commercial, Residential, or Other (No Dwelling or Vacant)	ISTS Information								Compliance Information					Likely Future ISTS			Estimated New ISTS Replacement Cost	Estimated Annual Operation, Maintenance, & Replacement Costs
				County Permit on File	Permit File Link	Year Installed	ISTS Age as of 2023	System Type	Number of Bedrooms	Estimated Design Flow	Likely Compliance status					Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)			
											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant								
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)						
1	16.031.0100	22507 570th Ave	Residential	Yes	<a href="#">LINK</a>	2001	22	Mound	2	300	X				X			\$30,000	\$400		
2	16.031.0110	22447 570th Ave	Residential	Yes	<a href="#">LINK</a>	2012	11	Mound	2	300	X				X			\$30,000	\$400		
3	16.031.0090	22405 570th Ave	Residential	Yes	<a href="#">LINK</a>	2016	7	Mound	3	450	X				X			\$30,000	\$400		
4	16.031.0050	22383 570th Ave	Residential	Yes	<a href="#">LINK</a>	2004	19	Mound	3	450	X				X			\$30,000	\$400		
5	16.031.0080	22361 570th Ave	Residential	Yes	<a href="#">LINK</a>	2009	14	Mound	3	450	X				X			\$30,000	\$400		
6	16.031.0070	22341 570th Ave	Residential	Yes	<a href="#">LINK</a>	2009	14	Mound	3	450	X				X			\$30,000	\$400		
7	16.031.0060	22305 570th Ave	Residential	Yes	<a href="#">LINK</a>	2001	22	Mound	3	450	X				X			\$30,000	\$400		
8	16.031.0040	22291 570th Ave	Residential	Yes	<a href="#">LINK</a>	2022	1	Mound	2	300	X				X			\$30,000	\$400		
9	16.042.0010	57094 225th St	Residential	Yes	<a href="#">LINK</a>	1974	49	Trench	4	600			X	VS	X			\$30,000	\$400		
10	16.042.0020	57196 225th St	Residential	Yes	<a href="#">LINK</a>	2017	6	Mound	4	600	X				X			\$30,000	\$400		
11	16.042.0110	57075 225th St	Residential	Yes	<a href="#">LINK</a>	1985	38	CP/DW	3	450			X	CP/DW	X			\$30,000	\$400		
12	16.042.0090	57102 222nd St	Residential	Yes	<a href="#">LINK</a>	2006	17	Mound	4	600	X				X			\$30,000	\$400		
13	16.042.0080	57166 222nd St	Residential	Yes	<a href="#">LINK</a>	1983	40	Mound	3	450	X				X			\$30,000	\$400		
14	16.042.0070	57242 222nd St	Residential	Yes	<a href="#">LINK</a>	1998	25	Mound	3	450	X				X			\$30,000	\$400		

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

CAR MAP ID#	Parcel ID	Address	Property Type: Commercial, Residential, or Other (No Dwelling or Vacant)	ISTS Information								Compliance Information					Estimated New ISTS Replacement Cost	Estimated Annual Operation, Maintenance, & Replacement Costs		
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											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant			Type 1 (Standard Type & Size)			Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)					
15	16.042.0060	57280 222nd St	Residential	Yes	<a href="#">LINK</a>	1977	46	Trench	4	600				X	VS	X			\$30,000	\$400
16	16.042.0050	57326 222nd St	Residential	Yes	<a href="#">LINK</a>	2019	4	Mound	3	450	X					X			\$30,000	\$400
17	16.042.0040	57394 222nd St	Residential	Yes	<a href="#">LINK</a>	1974	49	Trench	3	450				X	VS	X			\$30,000	\$400
18	16.050.0030	22071 565th Ave	Residential	Yes	<a href="#">LINK</a>	2000	23	Mound	2	300		2014		X	VS			X	\$35,000	\$1,000
19	16.050.0020	22067 565th Ave	Residential	No	<a href="#">LINK</a>	1999	24	Mound	4	600		2013	X		SD (MOUND SEEPING FROM TOE)			X	\$35,000	\$1,000
20	16.050.0010	22059 565th Ave	Residential	No	<a href="#">LINK</a>	1999	24	Mound	2	300			X		SD (MOUND SEEPING FROM TOE)			X	\$35,000	\$1,000
21	16.041.0030	22037 565th Ave	Residential	Yes	<a href="#">LINK</a>	1997	26	Mound	3	450	X					X			\$30,000	\$400
22	16.041.0110	22064 565th Ave	Residential	Yes	<a href="#">LINK</a>	2005	18	Mound	3	450	X							X	\$35,000	\$1,000
23	16.041.0090	22050 565th Ave	Residential	No	<a href="#">LINK</a>	Unk	Unk	CP/DW	4	600				X	CP/DW			X	\$35,000	\$1,000
24	16.041.0080	22026 565th Ave	Residential	Yes	<a href="#">LINK</a>	2017	6	Mound	3	450	X					X			\$30,000	\$400
25	16.041.0150	22041 566th Ave	Residential	No		Unk	Unk	CP/DW	3	450				X	CP/DW	X			\$30,000	\$400
26	16.041.0220	22048 566th Ave	Residential	Yes	<a href="#">LINK</a>	1971	52	Trench	3	450				X	VS			X	\$35,000	\$1,000
27	16.041.0200	22024 566th Ave	Residential	Yes	<a href="#">LINK</a>	2022	1	Mound	3	450	X							X	\$35,000	\$1,000
28	16.031.0031	56674 220th St	Residential	Yes	<a href="#">LINK</a>	2006	17	Mound	4	600				X	VS			X	\$35,000	\$1,000

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

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											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant								
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)						
29	16.031.0020	56788 220th St	Residential	Yes	<a href="#">LINK</a>	1994	29	Trench	4	600			X	VS	X			\$30,000	\$400		
30	16.042.0160	57027 222nd St	Residential	Yes	<a href="#">LINK</a>	2005	18	Mound	4	600	X	2014				X		\$30,000	\$400		
31	16.042.0150	57081 222nd St	Residential	Yes	<a href="#">LINK</a>	1994	29	Trench	6	900		2014	X	VS	X			\$30,000	\$400		
32	16.042.0140	57151 222nd St	Residential	Yes	<a href="#">LINK</a>	1998	25	Mound	3	450	X	2012				X		\$30,000	\$400		
33	16.042.0130	57305 222nd St	Residential	No		Unk	Unk	Mound	4	600	X					X		\$30,000	\$400		
34	16.042.0120	57391 222nd St	Residential	No		Unk	Unk	Mound	3	450	X					X		\$30,000	\$400		
35	16.042.0170	22025 572nd Ave	Residential	Yes	<a href="#">LINK</a>	2018	5	Mound	4	600	X					X		\$30,000	\$400		
36	16.042.0180	22061 572nd Ave	Residential	Yes	<a href="#">LINK</a>	2004	19	Mound	3	450	X					X		\$30,000	\$400		
37	16.042.0190	22097 572nd Ave	Residential	Yes	<a href="#">LINK</a>	1993	30	Mound	4	600	X					X		\$30,000	\$400		
38	16.042.0200	22032 572nd Ave	Residential	Yes	<a href="#">LINK</a>	2022	1	Mound	5	750	X					X		\$30,000	\$400		
39	20.037.0120	56235 220th St	Residential	Yes	<a href="#">LINK</a>	2007	16	Mound	4	600	X					X		\$30,000	\$400		
40	20.037.0080	56325 220th St	Residential	Yes	<a href="#">LINK</a>	2004	19	Trench	2	300			X	VS		X		\$7,500	\$10,950		
41	20.037.0070	56351 220th St	Residential	Yes	<a href="#">LINK</a>	1999	24	Mound	2	300	X					X		\$7,500	\$10,950		
42	20.037.0060	56377 220th St	Residential	No		Unk	Unk	CP/DW	1	150			X	CD/DW			X	\$35,000	\$1,000		

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

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				County Permit on File	Permit File Link	Year Installed	ISTS Age as of 2023	System Type	Number of Bedrooms	Estimated Design Flow	Likely Compliance status					Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)			
											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant								
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)						
43	20.037.0040	56387 220th St	Residential	Yes	<a href="#">LINK</a>	1974	49	Trench	3	450				X	CD/DW		X		\$7,500	\$16,430	
44	20.037.0050	56385 220th St	Residential	Yes	<a href="#">LINK</a>	1974	49	Trench	3	450				X	CD/DW		X		\$7,500	\$16,430	
45	20.037.0020	56419 220th St	Residential	Yes	<a href="#">LINK</a>	1986	37	Trench	2	300				X	VS		X		\$7,500	\$10,950	
46	20.037.0010	56421 220th St	Residential	No		Unk	Unk	CP/DW	2	300				X	CP/DW		X		\$7,500	\$10,950	
47	20.037.0030	56425 220th St	Residential	Yes	<a href="#">LINK</a>	1971	52	CP/DW	2	300				X	CP/DW		X		\$7,500	\$10,950	
48	20.038.0090	56447 220th St	Residential	Yes	<a href="#">LINK</a>	2015	8	Mound	2	300	X							X	\$35,000	\$1,000	
49	20.038.0080	21945 565th Ave	Residential	Yes	<a href="#">LINK</a>	2002	21	Mound	2	300				X	VS			X	\$35,000	\$1,000	
50	20.038.0060	21917 565th Ave	Residential	Yes	<a href="#">LINK</a>	1966	57	CP/DW	2	300				X	CP/DW		X		\$7,500	\$10,950	
51	20.038.0010	21964 565th Ave	Residential	Yes	<a href="#">LINK</a>	1992	31	Trench	3	450				X	VS			X	\$35,000	\$1,000	
52	20.038.0030	21930 565th Ave	Residential	Yes	<a href="#">LINK</a>	1966	57	CP/DW	3	450				X	CP/DW			X	\$35,000	\$1,000	
53	20.038.0050	21904 565th Ave	Residential	Yes	<a href="#">LINK</a>	2011	12	Mound	2	300	X							X	\$35,000	\$1,000	
54	20.006.0060	56571 220th St	Residential	Yes	<a href="#">LINK</a>	1965	58	Trench	3	450				X	CP/DW		X		\$7,500	\$16,430	
55	20.006.0010	56625 220th St	Residential	Yes	<a href="#">LINK</a>	1976	47	Trench	3	450				X	CD/DW			X	\$35,000	\$1,000	
56	20.042.0010	56655 220th St	Residential	No	<a href="#">LINK</a>	Unk	Unk	CP/DW	3	450				X	CD/DW			X	\$35,000	\$1,000	

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

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											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant								
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)						
57	20.042.0020	56711 220th St	Residential	No		Unk	Unk	CP/DW	3	450				X	CD/DW			X	\$35,000	\$1,000	
58	20.006.0020	56731 220th St	Residential	Yes	<a href="#">LINK</a>	1984	39	Trench	3	450				X	VS	X			\$30,000	\$400	
59	20.006.0090	56767 220th St	Residential	Yes	<a href="#">LINK</a>	1969	54	Trench	3	450				X	CP/DW		X		\$7,500	\$16,430	
60	20.006.0110	56757 220th St	Residential	Yes	<a href="#">LINK</a>	2000	23	Trench	2	300				X	VS (2022 NONC)		X		\$7,500	\$10,950	
61	20.006.0100	56793 220th St	Residential	Yes	<a href="#">LINK</a>	1978	45	Trench	3	450				X	VS		X		\$7,500	\$16,430	
62	20.006.0120	56815 220th St	Residential	Yes	<a href="#">LINK</a>	2018	5	Mound	3	450	X						X		\$7,500	\$16,430	
63	20.006.0140	56915 220th St	Residential	Yes	<a href="#">LINK</a>	1984	39	Trench	3	450				X	VS	X			\$30,000	\$400	
64	20.006.0141	56937 220th St	Commercial	Yes	<a href="#">LINK</a>	1987	36	Trench	N/A	N/A				X	VS	X			\$30,000	\$400	
65	20.006.0130	56989 220th St	Commercial	No		Unk	Unk	Holding Tank	N/A	N/A	X							X	\$35,000	\$1,000	
66	20.005.0150	57015 220th St	Residential	Yes	<a href="#">LINK</a>	2001	22	Mound	4	600	X							X	\$35,000	\$1,000	
67	20.005.0160	57039 220th St	Residential	Yes	<a href="#">LINK</a>	2002	21	Mound	3	450	X	2019						X	\$35,000	\$1,000	
68	20.005.0110	21990 571st Ave	Residential	Yes	<a href="#">LINK</a>	2004	19	Mound	3	450	X							X	\$35,000	\$1,000	
69	20.005.0190	21860 571st Ave	Residential	Yes	<a href="#">LINK</a>	2018	5	Mound	3	450	X							X	\$35,000	\$1,000	
70	20.005.0170	21888 571st Ave	Residential	Yes	<a href="#">LINK</a>	1993	30	Mound	3	450				X	VS			X	\$35,000	\$1,000	

**Dobbins Creek South Branch Community  
Parcel Data Spreadsheet**

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				County Permit on File	Permit File Link	Year Installed	ISTS Age as of 2023	System Type	Number of Bedrooms	Estimated Design Flow	Likely Compliance status					Type 1 (Standard Type & Size)	Type 2 (Holding Tank)	Type 3 or 4 (Poor Soils, Undersized, or Rip & Replace)			
											Compliant (X if Yes)	Certificate of Compliance Date	Noncompliant								
													ITPHS (X if Yes)	Failure to Protect Groundwater (X if Yes)	VS = lack of vertical separation SD = surface discharge CP/DW = cesspool/drywell SA = safety threat (type of threat)						
71	20.005.0140	57105 220th St	Residential	Yes	<a href="#">LINK</a>	2007	16	Mound	4	600				X	VS			X	\$35,000	\$1,000	
72	20.005.0180	57149 220th St	Residential	Yes	<a href="#">LINK</a>	2005	18	Mound	3	450	X	2015						X	\$35,000	\$1,000	
73	20.005.0130	57225 220th St	Commercial	No		Unk	Unk	CP/DW	N/A	N/A				X	CD/DW	X			\$30,000	\$400	
74	20.005.0040	57261 220th St	Residential	Yes	<a href="#">LINK</a>	1978	45	Mound	2	300	X	2021						X	\$35,000	\$1,000	
75	20.005.0050	57487 220th St	Residential	No		Unk	Unk	CP/DW	3	450				X	CD/DW	X			\$30,000	\$400	
76	20.005.0090	57489 220th St	Residential	Yes	<a href="#">LINK</a>	1984	39	Trench	3	450				X	VS	X			\$30,000	\$400	

# **APPENDIX B**

## **ISTS Information**

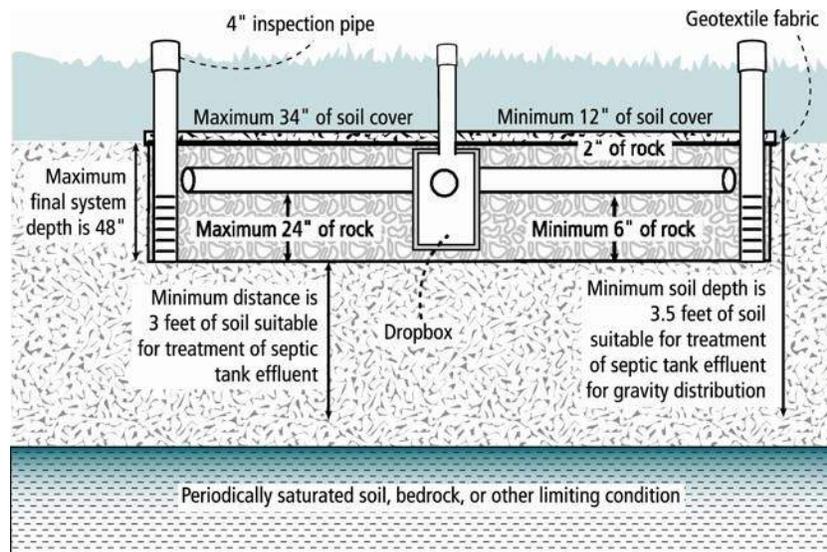
# Below-Grade Systems

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 than 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



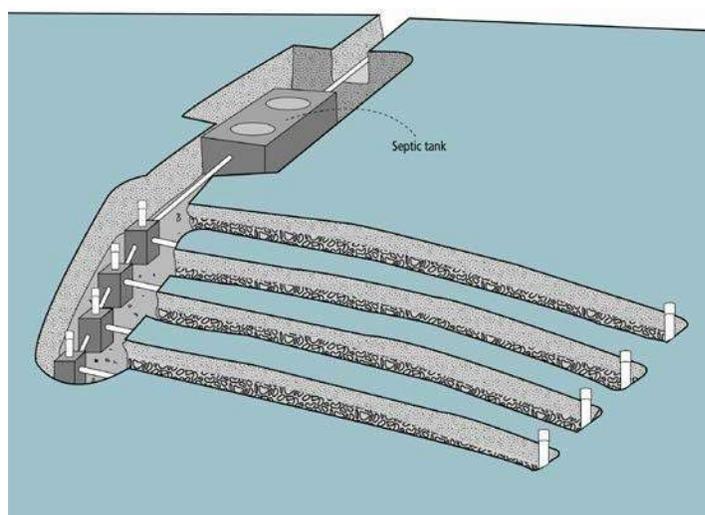
**From MN Rules 7080.2260 Subp. 3. If the distribution media in a trench or a bed is in contact with soil texture group 2 through 4 (medium sand, fine sand, coarse and medium loamy sand) pressure distribution must be used.**

# 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).**

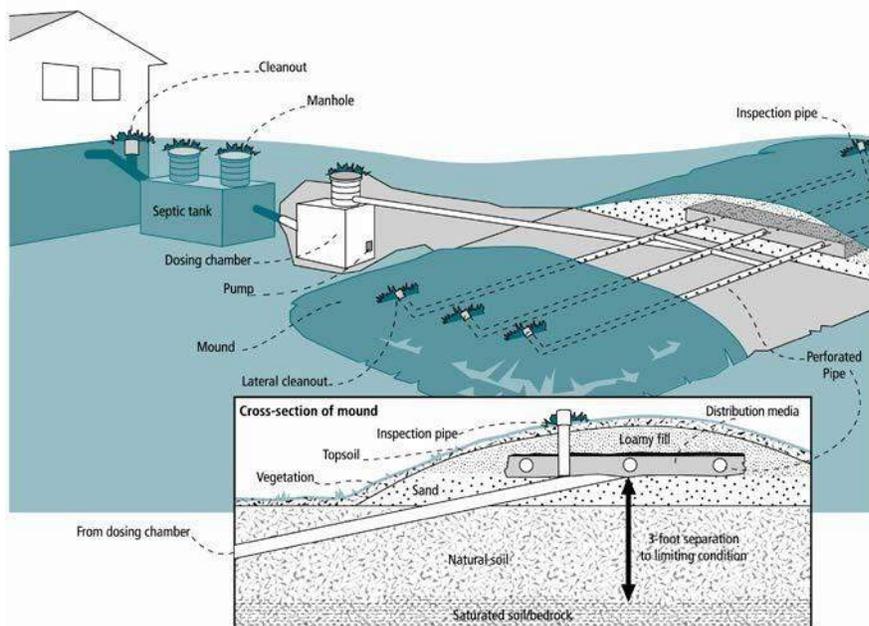
The trench soil treatment system consists of distribution media, covered with a minimum of 12 inches of soil and a close-growing and vigorous vegetation. Many trench systems utilize a pipe and gravel distribution system where effluent passes through the pipe and is stored within the media until it can 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 C**

## **Wastewater Flow Calculation**

**Dobbins Creek South Branch Community**  
**Alternative 1b: Community Cluster SSTS for 13 Holding Tank Properties**  
**Design Wastewater Flow**  
**(MN Rules 7080.1850, 7081.0120, 7081.0140)**

CAR Map ID#	Address	Parcel ID#	# Bedroom	Dwelling Classification*	Flow (gpd)	Reduction Factor	Wastewater Flow (gpd)
40	56325 220th St	20.037.0080	2	I	300	1.00	300
41	56351 220th St	20.037.0070	2	I	300	1.00	300
43	56387 220th St	20.037.0040	3	I	450	1.00	450
44	56385 220th St	20.037.0050	3	I	450	1.00	450
45	56419 220th St	20.037.0020	2	I	300	1.00	300
46	56421 220th St	20.037.0010	2	I	300	1.00	300
47	56425 220th St	20.037.0030	2	I	300	0.45	135
50	21917 565th Ave	20.038.0060	2	I	300	0.45	135
54	56571 220th St	20.006.0060	3	I	450	1.00	450
59	56767 220th St	20.006.0090	3	I	450	1.00	450
60	56757 220th St	20.006.0110	2	I	300	0.45	135
61	56793 220th St	20.006.0100	3	I	450	1.00	450
62	56815 220th St	20.006.0120	3	I	450	1.00	450

\*MN Rule 7080 Classification designation assumed to be Classification I

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Total Average Dry Weather (ADW) Flow, gpd: 4,305

2-inch collection system forcemain length (mile) 1.30  
Pipe diameter, inch 2

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Infiltration/Inflow (200 gpd/in. dia./mi), gpd: 520

**Total Average Wet Weather Flow (AWW), gpd: 4,825**

**Dobbins Creek South Branch Community  
Alternative 2: Community Cluster LSTS  
Design Wastewater Flow  
(MN Rules 7080.1850, 7081.0120, 7081.0140)**

CAR Map ID#	Address	Parcel ID#	# Bedroom	Dwelling Classification*	Flow (gpd)	Reduction Factor	Wastewater Flow (gpd)
1	22507 570th Ave	16.031.0100	2	I	300	0.45	135
2	22447 570th Ave	16.031.0110	2	I	300	0.45	135
3	22405 570th Ave	16.031.0090	3	I	450	0.45	203
4	22383 570th Ave	16.031.0050	3	I	450	0.45	203
5	22361 570th Ave	16.031.0080	3	I	450	0.45	203
6	22341 570th Ave	16.031.0070	3	I	450	0.45	203
7	22305 570th Ave	16.031.0060	3	I	450	0.45	203
8	22291 570th Ave	16.031.0040	2	I	300	0.45	135
9	57094 225th St	16.042.0010	4	I	600	1	600
10	57196 225th St	16.042.0020	4	I	600	1	600
11	57075 225th St	16.042.0110	3	I	450	0.45	203
12	57102 222nd St	16.042.0090	4	I	600	1	600
13	57166 222nd St	16.042.0080	3	I	450	0.45	203
14	57242 222nd St	16.042.0070	3	I	450	0.45	203
15	57280 222nd St	16.042.0060	4	I	600	1	600
16	57326 222nd St	16.042.0050	3	I	450	0.45	203
17	57394 222nd St	16.042.0040	3	I	450	0.45	203
18	22071 565th Ave	16.050.0030	2	I	300	0.45	135
19	22067 565th Ave	16.050.0020	4	I	600	1	600
20	22059 565th Ave	16.050.0010	2	I	300	0.45	135
21	22037 565th Ave	16.041.0030	3	I	450	0.45	203
22	22064 565th Ave	16.041.0110	3	I	450	0.45	203
23	22050 565th Ave	16.041.0090	4	I	600	1	600
24	22026 565th Ave	16.041.0080	3	I	450	0.45	203
25	22041 566th Ave	16.041.0150	3	I	450	0.45	203
26	22048 566th Ave	16.041.0220	3	I	450	0.45	203
27	22024 566th Ave	16.041.0200	3	I	450	0.45	203
28	56674 220th St	16.031.0031	4	I	600	1	600
29	56788 220th St	16.031.0020	4	I	600	1	600
30	57027 222nd St	16.042.0160	4	I	600	0.45	270
31	57081 222nd St	16.042.0150	6	I	900	1	900
32	57151 222nd St	16.042.0140	3	I	450	0.45	203
33	57305 222nd St	16.042.0130	4	I	600	0.45	270
34	57391 222nd St	16.042.0120	3	I	450	0.45	203
35	22025 572nd Ave	16.042.0170	4	I	600	0.45	270
36	22061 572nd Ave	16.042.0180	3	I	450	0.45	203
37	22097 572nd Ave	16.042.0190	4	I	600	0.45	270
38	22032 572nd Ave	16.042.0200	5	I	750	1	750
39	56235 220th St	20.037.0120	4	I	600	0.45	270
40	56325 220th St	20.037.0080	2	I	300	0.45	135
41	56351 220th St	20.037.0070	2	I	300	0.45	135
42	56377 220th St	20.037.0060	1	I	150	0.45	68
43	56387 220th St	20.037.0040	3	I	450	0.45	203
44	56385 220th St	20.037.0050	3	I	450	0.45	203
45	56419 220th St	20.037.0020	2	I	300	0.45	135
46	56421 220th St	20.037.0010	2	I	300	0.45	135

CAR Map ID#	Address	Parcel ID#	# Bedroom	Dwelling Classification*	Flow (gpd)	Reduction Factor	Wastewater Flow (gpd)
47	56425 220th St	20.037.0030	2	I	300	0.45	135
48	56447 220th St	20.038.0090	2	I	300	0.45	135
49	21945 565th Ave	20.038.0080	2	I	300	0.45	135
50	21917 565th Ave	20.038.0060	2	I	300	0.45	135
51	21964 565th Ave	20.038.0010	3	I	450	0.45	203
52	21930 565th Ave	20.038.0030	3	I	450	0.45	203
53	21904 565th Ave	20.038.0050	2	I	300	0.45	135
54	56571 220th St	20.006.0060	3	I	450	0.45	203
55	56625 220th St	20.006.0010	3	I	450	0.45	203
56	56655 220th St	20.042.0010	3	I	450	0.45	203
57	56711 220th St	20.042.0020	3	I	450	0.45	203
58	56731 220th St	20.006.0020	3	I	450	0.45	203
59	56767 220th St	20.006.0090	3	I	450	0.45	203
60	56757 220th St	20.006.0110	2	I	300	0.45	135
61	56793 220th St	20.006.0100	3	I	450	0.45	203
62	56815 220th St	20.006.0120	3	I	450	0.45	203
63	56915 220th St	20.006.0140	3	I	450	0.45	203
64	56937 220th St	20.006.0141	N/A	I	160	N/A	160
65	56989 220th St	20.006.0130	N/A	I	50	N/A	50
66	57015 220th St	20.005.0150	4	I	600	0.45	270
67	57039 220th St	20.005.0160	3	I	450	0.45	203
68	21990 571st Ave	20.005.0110	3	I	450	0.45	203
69	21860 571st Ave	20.005.0190	3	I	450	0.45	203
70	21888 571st Ave	20.005.0170	3	I	450	0.45	203
71	57105 220th St	20.005.0140	4	I	600	0.45	270
72	57149 220th St	20.005.0180	3	I	450	0.45	203
73	57225 220th St	20.005.0130	N/A	I	50	N/A	50
74	57261 220th St	20.005.0040	2	I	300	0.45	135
75	57487 220th St	20.005.0050	3	I	450	0.45	203
76	57489 220th St	20.005.0090	3	I	450	0.45	203

\*MN Rule 7080 Classification designation assumed to be Classification I

---

Total Average Dry Weather (ADW) Flow, gpd: 18,800

2-inch collection system forcemain length (mile) 2.80  
Pipe diameter, inch 2

---

Infiltration/Inflow (200 gpd/in. dia./mi), gpd: 1,200

**Total Average Wet Weather Flow (AWW), gpd: 20,000**

**Dobbins Creek South Branch Community**  
**Alternative 3: Regionalization to the City of Austin**  
**Design Wastewater Flow**

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# Households in Project Area	73	
Population	183	2.5 persons per household (2017-2021 US Census for Austin, MN)

**WASTEWATER FLOW**

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Residential Flow (gpd)	18,300	100 gpcd (10-States Standards 11.243)
Commercial Flow (gpd)	260	MN Rules 7081.0130
<b>Total Average Wet Weather Flow (gpd)</b>	<b>18,560</b>	

# **APPENDIX D**

## **Grinder Station Detail**





**HYDROMATIC<sup>®</sup>**  
SEWAGE GRINDER PUMPS  
AND PACKAGES

# 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 1 1/4" 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)



**NOVUS**  
1000 PLUS SERIES

## 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	1½" 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						



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ASHLAND, OHIO 44805  
WWW.HYDROMATIC.COM

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

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Hydromatic® is a registered trademark of Pentair Ltd.

Because we are continuously improving our products and services, Pentair reserves the right to change specifications without prior notice.  
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# **APPENDIX E**

## **Soil Information**



Established Series  
Rev. RLB-ECS-TWN  
02/2007

## LILAH SERIES

The Lilah series consists of very deep, excessively drained soils formed in 25 to 50 centimeters of loamy sediments and in the underlying sandy and gravelly outwash. These soils are on outwash areas on dissected till plains and treads and risers on stream terraces. Slope ranges from 0 to 35 percent. Mean annual air temperature is about 8 degrees C. Mean annual precipitation is about 850 millimeters.

**TAXONOMIC CLASS:** Mixed, mesic Psammentic Hapludalfs

**TYPICAL PEDON:** Lilah sandy loam, on a west-facing, convex slope of 5 percent, in a pasture. (Colors are for moist soil unless otherwise stated.)

**Ap**--0 to 15 centimeters; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; very friable; about 6 percent rock fragments (2 to 5 millimeters in diameter); moderately acid; abrupt smooth boundary. (13 to 23 centimeters thick)

**BA**--15 to 23 centimeters; dark yellowish brown (10YR 3/4) sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; very friable; many very dark grayish brown (10YR 3/2) worm casts; common distinct pale brown (10YR 6/3) dry silt and sand coats on faces of peds; about 6 percent rock fragments (2 to 5 millimeters in diameter); strongly acid; clear wavy boundary. (0 to 13 centimeters thick)

**Bt1**---23 to 38 centimeters; brown (7.5YR 4/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; common distinct brown (7.5YR 4/4) and brown (10YR 4/3) clay films on faces of peds; common clay bridging between sand grains; very pale brown (10YR 7/3) dry silt and sand coats on faces of peds; about 20 percent rock fragments (2 to 5 millimeters in diameter); strongly acid; clear smooth boundary. (13 to 20 centimeters thick)

**2Bt2**--38 to 71 centimeters; strong brown (7.5YR 5/6) gravelly loamy sand; weak coarse subangular blocky structure; very friable; common distinct brown (7.5YR 4/4) clay films on faces of peds; clay bridging between many sand grains; few thin (5 to 10 millimeters) horizontal lamellae of brown (7.5YR 4/4) sandy loam with many dark brown (7.5YR 3/2) clay films on faces of peds; about 18 percent rock fragments (2 to 5 millimeters in diameter); very strongly acid; clear wavy boundary. (25 to 51 centimeters thick)

**2Bt3**--71 to 99 centimeters; strong brown (7.5YR 5/8) sand; weak coarse subangular blocky structure; very friable; few thin (3 to 8 millimeters thick) horizontal lamellae of brown (7.5YR 4/4) loamy sand with clay bridging at intervals of 1.5 to 8 centimeters; about 7 percent rock fragments (2 to 5 millimeters in diameter); very strongly acid; clear wavy boundary. (23 to 46 centimeters thick)

**2C**--99 to 203 centimeters; strong brown (7.5YR 5/8) loamy sand; single grain; loose; about 2 percent rock fragments (2 to 75 millimeters in diameter); very strongly acid.

**TYPE LOCATION:** Major Land Resource Area (MLRA) 104-Eastern Iowa and Minnesota Till Prairies; Howard County, Iowa subset; about 1 mile south and 1 mile west of the town of Chester; located about 2,345 feet north and 96 feet east of the southwest corner of section 15, T. 100 N., R. 13 W.; USGS Lime Springs topographic quadrangle; lat. 43 degrees 28 minutes 44 seconds N. and long 92 degrees 22 minutes 30 seconds W., NAD 83.

**RANGE IN CHARACTERISTICS:**

Depth to carbonates--more than 150 centimeters

Clay content of the particle-size control section (weighted average)--2 to 12 percent

Sand content of the particle-size control section (weighted average)--80 to 95 percent, dominantly medium sand and coarse sand

A or Ap horizon:

Hue--10YR

Value--2 or 3

Chroma--1 to 3

Texture--sandy loam

Clay content--5 to 15 percent

Sand content--55 to 75 percent

Rock fragment content--2 to 15 percent

Reaction--strongly acid to neutral

E horizon (when present):

Hue--10YR

Value--4

Chroma--2 or 3

Texture--sandy loam

Clay content--5 to 15 percent

Sand content--55 to 75 percent

Rock fragment content--2 to 15 percent

Reaction--very strongly acid to slightly acid

Bt horizon:

Hue--7.5YR or 10YR

Value--4 or 5

Chroma--3 to 6

Texture--sandy loam or gravelly sandy loam

Clay content--10 to 18 percent

Sand content--55 to 85 percent

Rock fragment content--5 to 25 percent

Reaction--very strongly acid to slightly acid

Some pedons have layers, less than 20 centimeters thick, with textures of loamy fine sand or finer

2Bt horizon:

Hue--7.5YR or 10YR

Value--4 or 5

Chroma--3 to 8

Texture--loamy sand, sand, loamy coarse sand, coarse sand, gravelly loamy sand, gravelly sand, gravelly loamy coarse sand, or gravelly coarse sand

Clay content--2 to 10 percent

Sand content--75 to 95 percent

Rock fragment content--10 to 50 percent

Reaction--very strongly acid to slightly acid

Lamellae may or may not be present

Some pedons have a thin layer of gravelly sandy loam

2C horizon:

Hue--7.5YR or 10YR

Value--4 or 5

Chroma--4 to 8

Texture--loamy sand, sand, loamy coarse sand, coarse sand, gravelly loamy sand, gravelly sand, gravelly loamy coarse sand or gravelly coarse sand

Clay content--2 to 6 percent

Sand content--75 to 95 percent

Rock fragment content--2 to 20 percent

Reaction--very strongly acid to slightly acid

**COMPETING SERIES:** These are the [Bristol](#), [Gotham](#), [Montieth](#), [Shavenaugh](#), and [Vistula](#) series.

Bristol--have a sand content of more than 75 percent in the upper third of the series control section and are slightly alkaline or moderately alkaline in the lower third of the series control section

Gotham--have a rock fragment content of 0 to 2 percent in the upper third of the series control section and have horizons with medium sand and coarse sand content of less than 50 percent

Montieth--have a paralithic contact with sandstone within a depth of 102 centimeters

Shavenaugh--have carbonates within a depth of 127 centimeters

Vistula--have a sand content of more than 75 percent in the upper third of the series control section, have redoximorphic features in the lower third of the series control section, and have carbonates in the lower third of the series control section

#### **GEOGRAPHIC SETTING:**

Parent material--25 to 50 centimeters of loamy sediments and the underlying sandy and gravelly outwash

Landform--outwash areas on dissected till plains and treads and risers on stream terraces

Slope--0 to 35 percent

Elevation--210 to 400 meters above sea level

Mean annual air temperature--6 to 10 degrees C

Mean annual precipitation--735 to 965 millimeters

Frost-free period--145 to 205 days

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Burkhardt](#), [Clyde](#), [Dickinson](#), and [Racine](#) soils.

Burkhardt--are in similar landscape positions to those of the Lilah soils and have a mollic epipedon 17 to 49 centimeters thick

Clyde--are at lower elevations in flat to concave drainageways and are frequently saturated at the surface of the soil during the wettest periods of normal years

Dickinson--are in similar landscape positions to those of the Lilah soils, have a mollic epipedon 30 to 60 centimeters thick and have a rock fragment content of 0 to 5 percent in the lower third of the series control section

Racine--are in similar landscape positions to those of the Lilah soils and have a clay content that averages 20 to 28 percent in the particle-size control section

#### **DRAINAGE AND PERMEABILITY:**

Drainage class--excessively drained--a frequently saturated zone does not occur within a depth of 1.8 meters in normal years

Saturated hydraulic conductivity--10.00 to 100.00 micrometers per second in the loamy sediments and 100.00 to 705.00 micrometers per second in the sandy and gravelly outwash

Surface runoff potential--negligible to low

#### **USE AND VEGETATION:**

Most areas are pastured. Some areas are cultivated. The principal crops are oats and hay. The native vegetation is mixed big bluestem, little bluestem, switchgrass, other grasses of the tall grass prairie and deciduous trees.

#### **DISTRIBUTION AND EXTENT:**

Physiographic Division--Interior Plains

Physiographic Province--Central Lowland

Physiographic sections--Dissected till plains, Wisconsin driftless section

MLRAs--Eastern Iowa and Minnesota Till Prairies (104) and Northern Mississippi Valley Loess Hills (105)  
Local physiographic area--Iowa Erosion Surface  
LRR M; northeastern Iowa and southern Minnesota  
Extent--small

**MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE:** Indianapolis, Indiana

**SERIES ESTABLISHED:** Howard County, Iowa, 1969

**REMARKS:**

Particle-size control section--the zone from a depth of 23 to 73 centimeters (Bt1, 2Bt2, and 2Bt3 horizons);  
series control section--the zone from the surface to a depth of 150 centimeters (Ap, BA, Bt1, 2Bt2, 2Bt3 and 2C horizons).

Diagnostic horizons and features recognized in this pedon:

ochric epipedon--the zone from the surface to a depth of 15 centimeters (Ap horizon);  
argillic horizon--the zone from a depth of 23 to 99 centimeters (Bt1, 2Bt2, and 2Bt3 horizons);  
udic moisture regime.

Lilah series could be challenged for coarse-loamy particle-size family depending on the thickness and texture of the upper 75 centimeters of the argillic horizon.

Lilah series may classify as a Mollic Hapludalfs, but the sandy loam portion of the argillic horizon is thought to be consistently less than 20 centimeters thick and this series is classified on that basis. There is some question as to the presence of an argillic horizon as the illuvial horizon does not always have a 3 percent (absolute) increase in total clay than the eluvial horizon.

Taxonomy version--Keys to Soil Taxonomy, tenth edition, 2006.

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National Cooperative Soil Survey  
U.S.A.

# **APPENDIX F**

## **Cost Analysis**



**Probable Construction Cost Estimate**  
**Alternative 1b: Community Cluster SSTS for 13 Holding Tank Properties**  
Dobbins Creek South Branch Community

<u>Item No.</u>	<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<b><u>Collection System</u></b>					
1	Mobilization and Demobilization	1	LS	\$ 45,900	\$ 45,900
2	Septic Tank Abandonment	13	EA	\$ 1,500	\$ 19,500
3	Grinder Station and Controls	13	EA	\$ 17,500	\$ 227,500
4	Grinder Electrical Installation	13	EA	\$ 1,250	\$ 16,250
5	Building Sanitary Sewer Cleanout	13	EA	\$ 550	\$ 7,150
6	Connect to Existing Sanitary Sewer Service	13	EA	\$ 750	\$ 9,750
7	4" Gravity Building Sanitary Sewer	520	LF	\$ 50	\$ 26,000
8	Pressure Sewer	6,700	LF	\$ 30	\$ 201,000
9	2" Pressure Sewer Lateral	1,300	LF	\$ 35	\$ 45,500
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	7	EA	\$ 4,500	\$ 31,500
13	2" Curb Stops	13	EA	\$ 1,500	\$ 19,500
14	Washed Stone	200	CY	\$ 50	\$ 10,000
15	Select Granular	200	CY	\$ 50	\$ 10,000
16	Insulation (4")	250	SY	\$ 50	\$ 12,500
17	Property Site Restoration	13	EA	\$ 2,500	\$ 32,500
18	Asphaltic Roadway Patch	300	SY	\$ 100	\$ 30,000
19	Class V Gravel Roadway Patch	300	SY	\$ 25	\$ 7,500
20	Silt Fence	1,500	LF	\$ 5	\$ 7,500
21	Sediment Control Log	800	LF	\$ 10	\$ 8,000
22	Traffic Control	1	LS	\$ 10,000	\$ 10,000

**Collection Subtotal: \$ 811,000**

<b><u>Treatment System</u></b>					
23	Mobilization and Demobilization	1	LS	\$ 20,000	\$ 20,000
24	Septic Tank	20,000	GAL	\$ 4.50	\$ 90,000
25	Dose Tank	5,000	GAL	\$ 4.50	\$ 22,500
26	Aluminum Access Hatch	3	EA	\$ 2,500	\$ 7,500
27	Tank Riser Pipe	25	LF	\$ 250	\$ 6,250
28	Tank Riser/tank Adapter	7	EA	\$ 100	\$ 700
29	Riser Fiberglass Lid	7	EA	\$ 300	\$ 2,100
30	Effluent Screen	1	EA	\$ 2,500	\$ 2,500
31	Submersible Effluent Pump	4	EA	\$ 3,000	\$ 12,000
32	Pump Guide Rails & Discharge Piping	4	EA	\$ 3,000	\$ 12,000
33	Control Panel	1	LS	\$ 25,000	\$ 25,000
34	Float Switch Sensors	4	EA	\$ 500	\$ 2,000
35	Absorption Bed System	176	LF	\$ 325	\$ 57,200
36	Yard Piping	50	LF	\$ 30	\$ 1,500
37	Absorption Bed Forcemain	500	LF	\$ 30	\$ 15,000
38	Tank Insulation	1	LS	\$ 5,000	\$ 5,000
39	Gravel Access Road	45	CY	\$ 100	\$ 4,500
40	Culvert	1	LS	\$ 2,500	\$ 2,500
41	Clearing & Grubbing	0.0	ACRE	\$ 15,000	\$ -
42	Site Restoration	0.5	ACRE	\$ 25,000	\$ 12,500
43	Silt Fence	500	LF	\$ 5	\$ 2,500
44	Rock Construction Entrance	1	LS	\$ 1,500	\$ 1,500
45	Electrical Service	1	LS	\$ 25,000	\$ 25,000
46	Electrical Component Installation Costs	1	LS	\$ 12,500	\$ 12,500
47	Land	1	ACRE	\$ 7,500	\$ 7,500

**Treatment Subtotal: \$ 350,000**

**Collection & Treatment Subtotal: \$ 1,161,000**

**Contingency: \$ 117,000**

**Engineering Services: \$ 209,000**

**Legal & Administrative: \$ 24,000**

**Total Probable Construction Cost Estimate: \$ 1,511,000**

**Cost per Connection: \$ 116,300**

**Annual Operation, Maintenance, & Replacement Cost Estimate**  
**Alternative 1b: Community Cluster SSTS for 13 Holding Tank Properties**  
Dobbins Creek South Branch Community

<b>Collection System</b>	<b>Estimated Cost</b>	<b>Notes</b>
Service Provider	\$2,500	20 hrs/year @125/hr for residential grinder inspections
Miscellaneous Repairs/Service	\$750	
Electricity		
Grinder Pumps & Controls	\$0	To be paid for by private property owner
Equipment Replacement	\$4,100	

**Collection Subtotal:       \$7,400**

<b>Treatment System</b>	<b>Estimated Cost</b>	<b>Notes</b>
Service Provider	\$1,500	12 hrs/year @125/hr
Property Insurance	\$600	\$50/month
Miscellaneous Repairs/Service	\$750	
Septage Hauling/Disposal	\$500	\$0.20/gallon, 5,000 gallons every 2 years
Mowing/Snow Removal	\$250	
Telemetry	\$600	\$50/month
Electricity		
Pumps & Controls	\$500	
Equipment Replacement	\$1,400	

**Treatment Subtotal:       \$6,100**

**Total Annual OM&R Costs:   \$13,500**

**Cost per Connection per Year:   \$1,040**       13 Connections  
**Cost per Connection per Month:   \$87**

**Probable Construction Cost Estimate**  
**Alternative 2: Community Cluster LSTS**  
Dobbins Creek South Branch Community

<u>Item No.</u>	<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<b><u>Collection System</u></b>					
1	Mobilization and Demobilization	1	LS	\$ 199,200	\$ 199,200
2	Septic Tank Abandonment	76	EA	\$ 1,500	\$ 114,000
3	Grinder Station and Controls	76	EA	\$ 17,500	\$ 1,330,000
4	Grinder Electrical Installation	76	EA	\$ 1,250	\$ 95,000
5	Building Sanitary Sewer Cleanout	76	EA	\$ 550	\$ 41,800
6	Connect to Existing Sanitary Sewer Service	76	EA	\$ 750	\$ 57,000
7	4" Gravity Building Sanitary Sewer	3,040	LF	\$ 50	\$ 152,000
8	Pressure Sewer	14,700	LF	\$ 30	\$ 441,000
9	2" Pressure Sewer Lateral	7,600	LF	\$ 35	\$ 266,000
10	Air/Vacuum Release Valve and Manhole	4	EA	\$ 12,000	\$ 48,000
11	Isolation Valve	6	EA	\$ 4,500	\$ 27,000
12	Pressure Sewer Cleanout	20	EA	\$ 4,500	\$ 90,000
13	2" Curb Stops	76	EA	\$ 1,500	\$ 114,000
14	Washed Stone	910	CY	\$ 50	\$ 45,500
15	Select Granular	910	CY	\$ 50	\$ 45,500
16	Insulation (4")	1,350	SY	\$ 50	\$ 67,500
17	Property Site Restoration	76	EA	\$ 2,500	\$ 190,000
18	Asphaltic Roadway Patch	1,200	SY	\$ 100	\$ 120,000
19	Class V Gravel Roadway Patch	1,200	SY	\$ 25	\$ 30,000
20	Silt Fence	2,500	LF	\$ 5	\$ 12,500
21	Sediment Control Log	800	LF	\$ 10	\$ 8,000
22	Traffic Control	1	LS	\$ 25,000	\$ 25,000

**Collection Subtotal: \$ 3,519,000**

<b><u>Treatment System</u></b>					
23	Mobilization and Demobilization	1	LS	\$ 170,000	\$ 170,000
24	Septic Tank #1	40,000	GAL	\$ 4.50	\$ 180,000
25	Septic Tank #2	40,000	GAL	\$ 4.50	\$ 180,000
26	Equalization Tank	25,000	GAL	\$ 4.50	\$ 112,500
27	ATU Tank	50,000	GAL	\$ 4.50	\$ 225,000
28	Denitrification Dose Tank	12,500	GAL	\$ 4.50	\$ 56,250
29	Denitrification Treatment Tank	12,500	GAL	\$ 4.50	\$ 56,250
30	Polishing ATU Tank	12,500	GAL	\$ 4.50	\$ 56,250
31	Dose Tank	12,500	GAL	\$ 4.50	\$ 56,250
32	Aluminum Access Hatch	20	EA	\$ 2,500	\$ 50,000
33	Tank Riser Pipe	150	LF	\$ 250	\$ 37,500
34	Tank Riser/tank Adapter	50	EA	\$ 100	\$ 5,000
35	Riser Fiberglass Lid	50	EA	\$ 300	\$ 15,000
36	Effluent Screen	3	EA	\$ 2,500	\$ 7,500
37	Submersible Effluent Pump	22	EA	\$ 3,000	\$ 66,000
38	Pump Guide Rails & Discharge Piping	20	EA	\$ 3,000	\$ 60,000
39	Control Panel	1	LS	\$ 120,000	\$ 120,000
40	Float Switch Sensors	12	EA	\$ 500	\$ 6,000
41	Aerobic Treatment Unit	2	EA	\$ 75,000	\$ 150,000
42	Nitrification Treatment Unit	2	EA	\$ 75,000	\$ 150,000
43	Denitrification Treatment Unit	1	EA	\$ 60,000	\$ 60,000
44	Polishing Aerobic Treatment Unit	1	EA	\$ 75,000	\$ 75,000
45	Preaeration Equipment	1	EA	\$ 25,000	\$ 25,000
46	Sludge Receiving Manhole	1	LS	\$ 25,000	\$ 25,000
47	Chemical Feed Equipment	1	LS	\$ 35,000	\$ 35,000
48	Magnetic Flow Meter Manhole	1	LS	\$ 60,000	\$ 60,000

49	Control Building	1	LS	\$	100,000	\$	100,000
50	Control Building Furnishings	1	LS	\$	12,500	\$	12,500
51	Absorption Bed System	804	LF	\$	325	\$	261,300
52	Yard Piping	1,000	LF	\$	30	\$	30,000
53	Absorption Bed Force Main	1,200	LF	\$	30	\$	36,000
54	Tank Insulation	1	LS	\$	50,000	\$	50,000
55	Gravel Access Road	90	CY	\$	100	\$	9,000
56	Culvert	1	LS	\$	2,500	\$	2,500
57	Perimeter Fence	2,000	LF	\$	20	\$	40,000
58	Clearing & Grubbing	0.0	ACRE	\$	15,000	\$	-
59	Site Restoration	3.0	ACRE	\$	25,000	\$	75,000
60	Silt Fence	1,250	LF	\$	5	\$	6,250
61	Rock Construction Entrance	1	LS	\$	1,500	\$	1,500
62	Electrical Service	1	LS	\$	35,000	\$	35,000
63	Backup Generator	1	LS	\$	100,000	\$	100,000
64	Electrical Component Installation Costs	1	LS	\$	200,000	\$	200,000
65	Land	5	ACRE	\$	7,500	\$	37,500

**Treatment Subtotal: \$ 3,037,000**

**Collection & Treatment Subtotal: \$ 6,556,000**

**Contingency: \$ 656,000**

**Engineering Services: \$ 1,181,000**

**Legal & Administrative: \$ 132,000**

**Total Probable Construction Cost Estimate: \$ 8,525,000**

**Cost per Connection: \$ 112,200**

**Annual Operation, Maintenance, & Replacement Cost Estimate**  
**Alternative 2: Community Cluster LSTS**  
Dobbins Creek South Branch Community

<b>Collection System</b>	<b>Estimated Cost</b>	<b>Notes</b>
Service Provider	\$5,000	40 hrs/year @125/hr for residential grinder inspections
Miscellaneous Repairs/Service	\$2,500	
Electricity		
Grinder Pumps & Controls	\$0	To be paid for by private property owner
Equipment Replacement	\$23,500	

**Collection Subtotal:      \$31,000**

<b>Treatment System</b>	<b>Estimated Cost</b>	<b>Notes</b>
Service Provider	\$30,000	\$2,500/month for third party Service Provider
Property Insurance	\$1,200	\$100/month
Administration	\$900	1 hr/month @ \$75/hr
MPCA Permit	\$250	New permit \$1,250 every 5 years
Miscellaneous Repairs/Service	\$2,500	
Septage Hauling/Disposal	\$1,500	\$0.20/gallon, 15,000 gallons every 2 years
Mowing/Snow Removal	\$750	
Laboratory	\$5,000	
Chemical	\$10,000	
Telemetry	\$600	\$50/month
Electricity		
Pumps & Controls	\$16,300	
Equipment Replacement	\$5,200	

**Treatment Subtotal:      \$74,200**

**Total Annual OM&R Costs:      \$105,200**

**Cost per Connection per Year:      \$1,390      76 Connections**  
**Cost per Connection per Month:      \$116**

**Probable Construction Cost Estimate**  
**Alternative 3: Regionalization to the City of Austin**  
Dobbins Creek South Branch Community

<b>Item No.</b>	<b>Item</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Cost</b>	<b>Total Cost</b>
1	Mobilization and Demobilization	1	LS	\$ 156,200	\$ 156,200
2	8" Gravity Sewer	12,000	LF	\$ 65	\$ 780,000
3	8" x 4" Wye	76	EA	\$ 500	\$ 38,000
4	4' Dia. Sanitary Manholes	650	VF	\$ 500	\$ 325,000
5	Sanitary Manhole Casting	50	EA	\$ 1,000	\$ 50,000
6	Lift Station and Valve Vault	2	LS	\$ 200,000	\$ 400,000
7	Lift Station Electrical/Control	2	EA	\$ 50,000	\$ 100,000
8	Magnetic Flow Meter	2	EA	\$ 15,000	\$ 30,000
9	Backup Generator	2	EA	\$ 80,000	\$ 160,000
10	Pressure Sewer	2,700	LF	\$ 30	\$ 81,000
11	Grinder Station and Controls	1	EA	\$ 17,500	\$ 17,500
12	2" Pressure Sewer Lateral	725	LF	\$ 35	\$ 25,375
13	2" Curb Stops	1	EA	\$ 1,500	\$ 1,500
14	Connect to Existing City of Austin Manhole	1	LS	\$ 7,500	\$ 7,500
15	Air/Vacuum Release Valve and Manhole	1	EA	\$ 12,000	\$ 12,000
16	Isolation Valve	2	EA	\$ 4,500	\$ 9,000
17	Pressure Sewer Cleanout	5	EA	\$ 4,500	\$ 22,500
18	Washed Stone	315	CY	\$ 50	\$ 15,750
19	Select Granular	1,100	CY	\$ 50	\$ 55,000
20	Site Restoration	17,800	SY	\$ 7.50	\$ 133,500
21	Asphaltic Roadway Patch	1,645	SY	\$ 100	\$ 164,500
22	Class V Gravel Roadway Patch	1,800	SY	\$ 25	\$ 45,000
23	Silt Fence	17,270	LF	\$ 5	\$ 86,350
24	Sediment Control Log	800	LF	\$ 10	\$ 8,000
25	Erosion Control Blanket	2,000	SY	\$ 5	\$ 10,000
26	Traffic Control	1	LS	\$ 25,000	\$ 25,000

**Subtotal: \$ 2,759,000**

**Contingency: \$ 276,000**

**Engineering Services: \$ 497,000**

**Legal & Administrative: \$ 56,000**

**Total Probable Construction Cost Estimate: \$ 3,588,000**

**Cost per Connection: \$ 47,300**

**Annual Operation, Maintenance, & Replacement Cost Estimate**  
**Alternative 3: Regionalization to the City of Austin**  
Dobbins Creek South Branch Community

<b>Item</b>	<b>Estimated Cost</b>	<b>Notes</b>
City of Austin Sewer Service Fee	<b>\$39,400</b>	2024 monthly City of Austin connection charge: \$19.04 2024 City of Austin wastewater flow charge per 750 gallons: \$4.87 Assume actual wastewater flow is 50% of AWW (9,280 gpd)
<hr/>		
<b>Total Annual OM&amp;R Costs:</b>	<b>\$39,400</b>	
<b>Cost per Connection per Year:</b>	<b>\$520</b>	76 Connections
<b>Cost per Connection per Month:</b>	<b>\$44</b>	

