Community Assessment Report for Frontenac Station, MN

Florence Township
Goodhue County, MN
September 2021

Prepared by:

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Project No. 19257000

SUBMITTAL CERTIFICATION

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

Print Name: Tom Dye, PE

Signature: Tom Dye

Date: 9/28/2021 License #: 23787

I hereby certify that I am a duly Certified SSTS Advanced Designer and Advance Inspector under the laws of the State of Minnesota.

Print Name: Matthew Davidson

Signature: Matthew Davidson

Date: 9/28/2021 Certification #: 2913 L 1071

Community Assessment Report for Frontenac Station, MN
Florence Township

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EXECUTIVE SUMMARY

This report provides a summary of the evaluation of the existing on-site septic systems, also known as subsurface sewage treatment systems (SSTS), in the community of Frontenac Station, Minnesota. Florence Township applied for and received a Small Community Technical Assistance grant which provided funding for this Community Assessment Report.

In February 2019, Goodhue County completed an unsewered area needs documentation which indicated all SSTS in Frontenac Station were non-compliant with county requirements. Goodhue County indicated that every septic system either did not meet setback requirements or did not protect groundwater. The next step in the process of mitigating non-compliant systems is to complete this Community Assessment Report (CAR) which included the following tasks:

- Based on the Goodhue County report, a site visit and a field evaluation was performed for each SSTS that was indicated as "failing to protect groundwater".
- Evaluate soil and depth to seasonal high groundwater during site visits.
- Evaluate property regarding setback requirements from property lines and wells.
- Perform a records review of the SSTS that were indicated as not meeting setback requirements.
- Summarize findings indicating compliant and non-compliant systems. If a system can be made compliant, evaluate which type of system could be constructed, and the estimated cost of construction.
- Perform a site visit to possible sites for a SSTS sized to treat the flow from the entire community. Evaluate soils on community sites.
- Calculate design flows for a community sized SSTS.
- Provide cost estimates for replacement of individual STSS on each property, provide cost estimates for a collection system and community sized system.
- Summarize findings in a report.

The evaluation found that there are 5 compliant systems out of 91 properties (6%). The main reason systems are not compliant is they fail to protect groundwater due to soil conditions between the drain field and seasonal high groundwater level. Of the 86 non-compliant systems, there are 28 properties that appear to be too small to meet setback requirements for an SSTS. These properties would have to install a holding tank which is allowed by Goodhue County Ordinance, but would have to be permitted by the County. 34 properties would require a new well to meet setback requirements before installing a new SSTS system. The remaining 24 properties could construct a new SSTS on the property.

For comparison, an evaluation of the present worth cost of replacing all non-compliant systems, and the cost of constructing a collection system and community sized treatment system, was completed. Present worth cost takes into account annual and capital costs. The present worth cost of replacing all SSTS in Frontenac Station is $4,084,000 ($1,434,000 capital cost) compared to the cost of a collection and community treatment system of $9,729,000 ($8,034,000 capital cost). The ISTS Alternative has the lowest present worth cost, however there are 28 properties that lack sufficient space for a SSTS and would require a County approved holding tank.

If the community desires to pursue other alternatives for Frontenac Station, a feasibility study can be done to evaluate connecting to the sanitary sewer system of Lake City. This study should take into consideration the greater Frontenac area as well as areas between Frontenac and Lake City that could be served by a collection system. This could make the regional system more cost effective for each user. Evaluation of this alternative is outside the scope of this report.

A summary of this report was presented to the Florence Township Board and public in attendance on September 20, 2021.

CHAPTER 1 – INTRODUCTION

1.1 BACKGROUND

Frontenac Station is an unincorporated community located near the Mississippi River along US Highway 61 approximately 13 miles south of Red Wing, MN and 6 miles north of Lake City. The 2010 census data indicates a population of 282 with 114 households for an average of 2.47 persons per household. A major feature in the community is Highway 61, which splits the study area. The study area is shown in Figure 1.1.

Goodhue County did a previous evaluation of the parcels in Frontenac Station based on records and parcel information. The resulting Unsewered Area Needs Documentation (UAND) Form is include in Appendix A. The County evaluation listed 102 parcels in Frontenac Station with an individual subsurface treatment system (ISTS). In the Goodhue County list, the parcel where the mobile home park is located was listed 12 times – this was treated as one parcel for evaluation. Also there were some parcels that were not on the County list that were included in the evaluation. Many of these were adjacent parcels owned by the same owner that was listed by the County. There was one new house that was built in 2019, subsequent to the County UAND. The total number of parcels included in the investigation was 96 parcels, with five being listed under the same owner resulting in 91 distinct properties that were evaluated. Forty-five properties were determined by the County as non-compliant due to setback requirements/parcel size, and 44 were non-compliant for not protecting groundwater (2 properties included in the CAR were not included on the UAND). Based on the results of the Goodhue County evaluation, Florence Township applied, and was awarded, a Small Community Technical Assistance Grant from the Minnesota Public Facilities Authority. The grant was used to fund this Community Assessment Report (CAR).

1.2 SCOPE AND PURPOSE

The purpose of the Community Assessment Report (CAR) is to evaluate the existing ISTS, commonly known as septic systems, in the community of Frontenac Station to determine if the systems comply with current County and State requirements. The scope of the CAR also included evaluating soil-based treatment options and providing present worth costs for these options. The two options evaluated were replacing ISTS on each parcel, and constructing a community treatment system. The evaluation included site visits to existing properties to evaluate existing ISTS, perform hand auger soil borings, site visits to potential community system sites, and excavating soil pits on one potential community system site.

The results will provide Frontenac Station, Florence Township, and Goodhue County with valuable information to figure out the best solution for Frontenac Station's wastewater systems and to protect the health and environment. The CAR can be used to apply for funding to improve the treatment systems whether that is replacing the ISTS on residential parcels or construction of a large subsurface treatment system (LSTS) to serve the entire community of Frontenac Station.

1.3 SITE VISITS

The scope of the study included making a site visit to the parcels identified in the Unsewered Area Needs Documentation (UAND), as "Failure to Protect Groundwater". Owners of properties were

sent a letter requesting permission to access their property and perform an evaluation of their on-site wastewater system. Property owners that did not respond to the letter were contacted in person to request permission.

Site visits included pumping out the existing tank if needed, hand auger borings to verify soils, evaluating parcel for setback requirements, evaluating the parcel for possible location for ISTS replacement, locating well, evaluating condition of existing ISTS, and determining separation from seasonal high groundwater.

The field work also included site visits to two possible community system sites. Hand auger borings were conducted on both sites and test pits were excavated on one of the potential community sites.

A parcel map of Frontenac Station and the possible community sites that were visited are shown in Figure 1.2.

Print Date: 3/8/2021

Figure 1.1

CAR Study Area

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

CAR Study Area
Goodhue County Parcels

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA

0 200 400 Feet

N

Print Date: 3/25/2021

Figure 1.2

Parcel Basemap and Community Sites

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

Goodhue County Parcels

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA

0 200 400 Feet

N

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CHAPTER 2 –EXISTING CONDITIONS

2.1 GENERAL

The CAR study area includes properties within Frontenac Station that are located on either side of US Highway 61. The majority of the properties (about 70) included in the CAR are located north of Highway 61. The properties to the south of Highway 61 tend to be larger lots with less dense housing than on the north side of the highway.

Based on the Goodhue County UAND, 44 properties were identified as "failing to protect groundwater" and a site visit was performed for these parcels. The UAND listed 45 properties that fail to meet setbacks and the records for these properties were reviewed to determine if setbacks requirements could be met within the parcel. Most of these properties were visually observed from the road while on-site.

2.2 EVALUATION CRITERIA

ISTS were evaluated per MN Rule 7080, and for setbacks requirements. During the site visit to properties, the following were evaluated and recorded for each parcel:

- Type of Parcel: House or Business
- Well type: Deep, Shallow, Unknown, Community, or None
- Type of SSTS: Drainfield, Mound, Holding Tank, None, or Unknown. Unknown was assigned if the system could not be located.
- ISTS compliance: Systems were evaluated for compliance and the reason for non-compliance was documented, as well as systems that pose an Imminent Threat to Public Health or Safety in regard to Chapter 7080.15 of the MN Rules.
- Setback status from wells, buildings, property lines, surface waters
- Parcels were evaluated for a replacement system for each type of SSTS - Type 1 through Type 5. The best option was indicated for each parcel.
- Number of bedrooms for each residence was recorded from County GIS data.

The Goodhue County SSTS Ordinance (adopted 2014, amended 2018) details many requirements for SSTS design and also incorporates Minnesota Rules Chapter 7080 and 7081 (with some described changes). MN Rules define the following SSTS setback requirements:

Property line: 10 feet for tank, 10 feet for drainfield
Structures: 10 feet for tank, 20 feet for drainfield
Shallow well (less than 100 feet deep): 100 feet
Deep well (100 feet deep or more): 50 feet

2.2.1 PROPERTY INFO

The number of properties included in the evaluation and the types of these properties (business, residential, other), are shown in Table 2-1 below. There are a total of 91 properties listed because there is a business that has a home on the same parcel and the church has a home. The mobile home park was also listed as one home - there is one residential house and about 15 mobile homes on this parcel.

Table 2-1 Property Types

Type of Building	Quantity	Comments
Business	8	
Residential - Home	81*	3 Properties have 2 parcels each
Public or Church	2	Church occupies 2 parcels and Community Center occupies 2 parcels

*Does not include 15 mobile homes on parcel #320151700

2.2.2 FIELD INVESTIGATION

Figure 2.1 shows the parcels that were visited to evaluate the ISTS and property configuration. Table 2-2 lists the properties by PID number and summarizes the findings of the evaluation of each property.

There were many properties that the location of the well was not evident during the site visit and in several cases the home owner was not certain where the well was located. For most of these, the well is believed to be located inside the residence or a building. These were listed as Unknown ("Unk"). The Minnesota Well Index was consulted and only 18 wells are listed on the Index. Information on wells listed on the Well Index was added to the spreadsheet with the well depth shown in the "Comments".

2.2.3 SOILS AND TOPOGRAPHY

The area of Frontenac Station to the north of Highway 61 has very little elevation change with less than 4 feet across most of this area. The exception is the area between Hibernia Street and the water body leading to Wells Creek, which has a steep downgrade to the water, dropping over 30 feet in elevation in less than 300 feet. Conversely the area to the south of Highway 61 has much more elevation change and includes a steep hill with a grade change of 40 feet in 130 feet (30% grade).

The soils in the region tend to be sandy or sandy loam with layers of gravel. Some areas in the region have shallow or exposed bedrock. Hand auger boring performed throughout the study area reflect the soils of the region. The most significant soil feature with respect to subsurface treatment systems is the layer of river rock encountered at about 20 inches of depth. This layer was encountered throughout the study area. This layer of river rock was unable to be penetrated by most hand auger borings. The few hand auger borings that got through the river rock layer found redoximorphic features at a depth ranging from 24 to 38 inches. This indicates the seasonal high groundwater level.

As defined in MN Rules 7080, the river rock layer (greater than 50% of soil is rock) does not provide soil treatment of the septic tank effluent. This combined with the indication of seasonal groundwater at a shallow depth mean that the ISTS is failing to provide protection of groundwater. The fact that the river rock layer is found throughout the study area is an indication that almost every SSTS within the area would not protect groundwater unless the system includes a mound to provide sufficient depth of the proper soil type to allow soil treatment prior to reaching groundwater. If there is less than 3 feet of suitable soil beneath the drain field, by Minnesota state standards the SSTS is failing to protect groundwater.

This layer of river rock was also encountered in the test pits that were performed on the possible community treatment system. The rock layer was found at 18 inches deep in two test pits and 40 inches deep in the third test pit. However the third test pit was taken at an elevation that was about 10 feet higher than the other two test pits. Figure 2.2 shows the possible location of the community system and the test pits on that property. Test pit logs are included in Appendix B.

The conclusion based on the soil investigation is any proposed on site treatment system would have to include a mound in order to provide proper treatment and groundwater protection.

2.2.4 SITE VISIT RESULTS

Of the 44 parcels where site visits were planned, 4 owners denied access to the property resulting in 40 properties visited. For the 4 properties where access was denied, a drive by of the properties showed that 3 appear to be large enough for an ISTS, and one lacked space for an ISTS. Out of the 40 properties, only 3 were found to have compliant systems. All non-compliant systems were deemed as failing to protect groundwater either due to lack of vertical separation, or the system contained a cesspool (drywell). Three (3) parcels were found to have property line setback issues.

Of the properties visited, the existing on site systems consist of one (1) straight pipe system (deemed imminent threat to public health and safety), 6 drywells, 3 holding tanks, and the remainder have a septic tank with drain field. No existing mound systems are present. On two (2) of the properties the system could not be located and were listed as Unknown (U) along with the 4 properties where access was denied by the owner. Some of the existing tanks were buried as much as 8 feet in the ground. Some systems could not be located due to the access hatches being buried.

2.3 RECORDS REVIEW

For parcels that were identified on the UAND as having setback issues, the records for the parcels were reviewed to determine compliance with setbacks from property lines and wells. In addition, a review of the property was conducted from the public streets for most of these properties. These parcels are shown in Figure 2.3. An SSTS must be 10 feet from property lines and 10 feet from structures.

2.4 EVALUATION RESULTS

The results of the evaluation of all parcels are summarized in Table 2.2. As shown in the table, the evaluation determined that only 5 were found to be compliant out of 91 properties (5%). There are 28 properties that appear to be too small to meet setback requirements for an ISTS. These properties would have to install a holding tank which is allowed by Goodhue County Ordinance

but must be sized at a minimum of 5 times the estimated daily flow from the dwelling or establishment. There are 34 properties that would likely require a new well in addition to a new SSTS. There are 24 properties that have the space to construct a new SSTS and meet setback requirements. The "Comments" column in Table 2-2 indicates Compliant Systems as green highlighting, and properties that need a New Well as blue highlighting. Properties that will need Holding Tanks are indicated as such in the "Upgrade Type for Noncompliant".

TABLE 2.2 - Part 1- Parcel Data For Site Visits

Existing Status Report for Florence Township

						PPL Unsewered Documentation															
						Compliance evaluation status				Setback Status X if in violation				UAND Existing System Condition Status	Yes/No each; * best option						
							Likely non-compliant														
OAK ID#	Parcel ID	House (H), Vacant (V) Cabin (C), Business (B)	# of Bedrooms	Well Type: Deep (D), Shallow (S), Unknown (U), Community (C), None (N)	Current SSTS type: drainfield (D), mound (M), holding tank (H), none (N) or unknown (U) *=Outer	SSTS Likely Compliant (X if True)	TPHS (X if True)	Likely failing to protect groundwater (X if True)	Reason: (lack of vertical separation (V), cesspool (C), privy (P), surfacing (S), no permit (N))	Drinking water supply - deep well (50' setback) or shallow well (100' setback)	Buildings (house, garage, out)	Property lines	Surface waters	Score: 1=TPHS, 2=FTPGW, 3=Compliant not meeting setbacks, 4=Compliant meeting setbacks	Type 1 (standard)	Type 2 (holding tank, privy, floodplain)	Type 3 (other, <12", problem soils, rip and replace)	Type 4 or 5	Upgrade Type for Noncompliant	Average upgrade cost to SSTS for residential properties	Comments
1	321400780	H	4	Unk	D			X	V	X				2	Yes	No	No	Yes*	Mound	$18,000	No Site with Well Set back unless Verified or Variance Drainfield is full Tank over full. Newer tank Ok
2	321400820	H	4	Unk	D			X	V	X		X		2	No	No	Yes*	Yes	Mound	$20,000	Well will Need to be verified or variance. Type III due to space. Tank is old and not water tight.
3	320150700	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$20,000	Plenty of room for two systems. Well not located. Large lot. Old tank
4	320152000	H	2	D	D			X	C					2	Yes*	No	No	Yes	Mound	$18,000	DryWell Plenty room for 2 systems well looks newer
5	320151600	H	4	D	N		X							1	Yes*	No	No	Yes	Mound	$18,000	Straight Pipe Room for two sites Well Newer
6	320150900	H	2	Unk	U			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Denied Access to Property. Tank in front of house. Well is Unkown. Room for two sites
7	321400280, 321400290, 321400300	B, H	1	Unk	D	X				Unk				4	Yes*	No	No	Yes			Church and Parsonage share same system. Newer tank for both properties.
8	321400330	H	3	S	D			X	C	Shallow				2	Yes*	No	No	Yes	Mound	$18,000	Drywell Room for one site if wells are sealed and new well drilled and shared with neighbor.
9	321400320	H	4	S	N			X	C	Shallow		X		2	No	No	No	No	Mound	$20,000	Drywell No room for a site. Would have to share system with the nieghbor along with a well
10	321400370	H	2	Unk	U			X	Unk	Unk	X	X		2	No	Yes	No	No	Holding tank	$10,000	Well unknown. Small lot could not locate the system. Lot is mostly buildings. Holding tank option but would require removal of buildings.
11	321400360	H	3	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for one site depending on the nieghbors well. Existing tanks are 8 feet deep.
12	321400350	H	2	S	D			X	C	Shallow				2	Yes*	No	No	Yes	Mound	$18,000	Drywell Room for two sites if a new well is drilled
13	321400340	H	2	Unk	D			X	C	Unk				2	Yes*	No	No	Yes	Mound	$18,000	DryWell told by owner. Was not allowed access to property.
14	321000250	H	3		U														Mound	$18,000	Denied Access to Property - Large lot room for system
15	321400010	H	3	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Tank is good. Room for one site with the well location. Well is 143 ft deep
16	321400040	H	2	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Tank is good. Room for one site with the well location. New Well - 150 feet deep
17	321400050	H	3	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Tank is good. Room for two sites well is in good spot for set backs. Well is 126 ft deep
18	321400250	H	4	Unk	D			X	V	Unk				2	Yes	Yes*	Yes*	Yes	Mound	$18,000	Old sytem Tank 3 feet inground. Does not meet well set back now and will not unless new well is drilled.
19	321400110	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Big lot room for 2 sytems well won't be an issue
20	321400630	B		Unk	D			X	V	Unk				2	No	No	No	No	Holding tank	$6,000	No room for a system. Would not meet well set back
21	321400580	H	4	Unk	D			X	C	Unk				2	No	Yes*	No	No	Holding tank	$6,000	No room for a system. Tanks 8 feet in the ground. Well unlocatable. Likely in the Basement or shared.
22	321400310	H	3	D	D	X								4	Yes*	No	No	Yes	At-Grade		System is 5 years old. Should be permit on file. New Well. Room for one more system
23	321400070	H	3	D	D			X	C	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Drywell System is 40+ years old. Well is newer Room for one system. Well is 141 ft deep
24	320150300	B		Unk	U					Unk				2	No	Yes	No	No	Holding tank	$6,000	No room for a system. Room for only a holding tank now
25	321400400, 321400390	H	3	Unk	D			X	C	Unk				2	No	Yes	No	No	Holding tank	$6,000	No Room for a system
26	321000160	H	4	Unk	U														Mound	$18,000	No Access Alowed. Decent size lot could get a system in
27	321400180	H	1	Unk	U														Holding Tank	$6,000	No Access Alowed. Small lot no room for system
28	321000180	H	2	D	D			X	V	Deep				2	No	Yes*	No	No	Holding Tank	$6,000	Small Lot Well Set backs cold not be meet. Holding tank only. Well is 135 ft deep
29	321400120, 321400240	H	2	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Good size lot could get two systems in. Well 170 ft deep
30	321400490	H	3	Unk	D			X	V	Unk				2	No	Yes*	No	No	Holding tank	$6,000	Most of the lot is buildings. Well issues. Room only for a holding tank.

TABLE 2.2 - Part 1- Parcel Data For Site Visits

Existing Status Report for Florence Township

						PPL Unsewered Documentation								UAND Existing System Condition Status	Yes/No each; * best option						
							Compliance evaluation status				Setback Status X if in violation										
								Likely non-compliant													
CAR ID#	Parcel ID	House (H), Vacant (V) Cabin (C), Business (B)	# of Bedrooms	Well Type: Deep (D), Shallow (S), Unknown (U), Community (C), None (N)	Current SSTS type: drainfield (D), mound (M), holding tank (H), none (N) or unknown (U) *=Cluster	SSTS Likely Compliant (X if True)	ITPHS (X if True)	Likely failing to protect groundwater (X if True)	Reason: (lack of vertical separation (V), cesspool (C), privy (P), surfacing (S), no permit (N))	Drinking water supply - deep well (50' setback) or shallow well (100' setback)	Buildings (house, garage, out)	Property lines	Surface waters	Score: 1=ITPHS, 2=FTPGW, 3=Compliant not meeting setbacks, 4=Compliant meeting setbacks	Type 1 (standard)	Type 2 (holding tank, privy, floodplain)	Type 3 (other, <12", problem soils, rip and replace)	Type 4 or 5	Upgrade Type for Noncompliant	Average upgrade cost to SSTS for residential properties	Comments
31	321400560	B		Unk	H					Unk				4	No	Yes*	No	No	Holding tank	$6,000	No site for a system. Has Holding tank already
32	321400730, 321400720	H	4	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Has two lots would be room for 2 systems pending well depths
33	321400570	H	5	Unk	D			X	V	Unk				2	No	Yes*	No	No	Holding tank	$6,000	Small Lot Well Set backs can not be meet. Holding tank only
34	321400090	H	3	D	D			X	V	Deep				2	No	Yes*	No	No	Holding tank	$6,000	Small Lot Well Set backs can not be meet. Holding tank only - 170 ft well
35	321400100	H	1	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Lot has room for one system Wells may need to be verified
36	321400170	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Lot has room for one system Wells may need to be verified
37	321400420	H	4	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding tank	$6,000	Lot is mostly Buidings. No room for a site Holding Tank
38	321400410	H	3	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding tank	$6,000	Lot is mostly Buidings. No room for a site Holding Tank Well would need to be verified
39	321400270	H	1	Unk	D			X	V	Unk				2	No	No	Yes*	Yes	Mound	$18,000	Little room for a system, caould get a modified system in. Well would need to be verified or drill a new one.
40	321400260	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for one site depending on the neighbors well being verified
41	321400520	H	2	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for one site - depending on well verification Well is 190 ft deep
42	321400690	H	3	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding tank	$6,000	No room Well
43	321400760	B		D	H	X				Deep				4	No	Yes	No	No	Holding Tank		Holding Tank now with Operating permit. No room for system. Well 180 ft deep
44	321400800	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Has two lots Already has a design for a mound on empty second Lot

TABLE 2.2 - Part 2- Parcel Data For Records Review

						PPL Unsewered Documentation															
						Compliance evaluation status				Setback Status X if in violation				UAND Existing System Condition Status	Yes/No each; * best option						
							Likely non-compliant														
CAR ID#	Parcel ID	House (H), Vacant (V) Cabin (C'), Business (B)		Well Type: Deep (D), Shallow (S), Unknown (U), Community (C), None (N)	Current SSTS type: drainfield (D), mound (M), holding tank (H), none (N) or unknown (U)	SSTS Likely Compliant (X if True)	TPHS (X if True)	Likely failing to protect groundwater (X if True)	Reason: (lack of vertical separation (V), cesspool (C), privy (P), surfacing (S), no permit (N))	Drinking water supply -deep well (50' setback) or shallow well (100' setback)	Buildings (house, garage, out)	Property lines	Surface waters	Score: 1=TPHS, 2=FTPGW, 3=Compliant not meeting setbacks, 4=Compliant meeting setbacks	Type 1 (standard)	Type 2 (holding tank, privy, floodplain)	Type 3 (other, <12", problem soils, rip and replace)	Type 4 or 5	Upgrade Type for Noncompliant	Average upgrade cost to SSTS for residential properties	Comments
Records Review Performed on Following Parcels																					
45	320150101	B		Unk	H			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
46	320150400	H	3	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
47	320150500	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Big lot Room for two systems
48	320151000	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 System Well
49	320151100	H	6	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 System Well
50	320151200	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for two systems Big Lot
51	320151500	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 System Well
52	320151700 Mobile home park	H	3	Unk	D			X	V	Unk				2	Yes*	No	Yes	Yes	Mound	$60,000	No room likley to handle the gallons from the mobile home park
53	321000200	H	2	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for two systems - well depth is 180 feet
54	321000210	H	4	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for two systems - well 118 ft deep
55	321000220	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for two systems
56	321000230	H	3	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for two systems - well 260 ft deep
57	321000290	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system
58	321000310	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
59	321400020	H	5	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
60	321400060	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
61	321400080	H	3	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well is 200 feet deep
62	321400130	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 2 systems depending on well
63	321400140	H	2	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
64	321400150	H	3	D	D			X	V	Deep				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well - well is 160 ft deep
65	321400190	H	1	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
66	321400210, 321400220	H	2	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system has 2 lots
67	321400230	H	2	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
68	321400380	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
69	321400421	B		Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
70	321400430	H	4	D	D			X	V	Deep				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well - well is 175 feet deep
71	321400450	H	4	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
72	321400460	H	2	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well - well is 180 ft deep
73	321400480	H	4	D	D			X	V	Deep				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well - well is 383 ft deep
74	321400500	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
75	321400550	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
76	321400590	H	3	D	D			X	V	Deep				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well -well is 160 ft deep
77	321400600	H	2	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
78	321400650	B, H	3	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
79	321400660	B		Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
80	321400700	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
81	321400740	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
82	321400770	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
83	321400790	H	3	Unk	D			X	V	Unk				2	No	Yes	No	No	Holding Tank	$6,000	No Room Well
84	321400830	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
85	321400870	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system Well
86	320150800	H	3	Unk	D			X	V	Unk				2	No	No	Yes*	Yes	Mound	$18,000	Room for 1 system Well
87	320151900	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 System Well

TABLE 2.2 - Part 2- Parcel Data For Records Review

						PPL Unsewered Documentation															
						Compliance evaluation status				Setback Status X if in violation				UAND Existing System Condition Status	Yes/No each; * best option						
							Likely non-compliant														
CAR ID#	Parcel ID	House (H), Vacant (V) Cabin (C), Business (B)		Well Type: Deep (D), Shallow (S), Unknown (U), Community (C), None (N)	Current SSTS type: drainfield (D), mound (M), holding tank (H), none (N) or unknown (U) *=Cluster	SSTS Likely Compliant (X if True)	HTPHS (X if True)	Likely failing to protect groundwater (X if True)	Reason: (lack of vertical separation (V), cesspool (C), priv (P), surfacing (S), no permit (N))	Drinking water supply -deep well (50' setback) or shallow well (100' setback)	Buildings (house, garage, out)	Property lines	Surface waters	Score: 1=HTPHS, 2=FTPGW, 3=Compliant not meeting setbacks, 4=Compliant meeting setbacks	Type 1 (standard)	Type 2 (holding tank ,privy, floodplain)	Type 3 (other, <12", problem soils, rip and replace)	Type 4 or 5	Upgrade Type for Noncompliant	Average upgrade cost to SSTS for residential properties	Comments
Records Review Performed on Following Parcels																					
88	320152501 and 320152601	B		Deep	D	X				Deep				4	Yes*	No	No	No	At-Grade		Community Center Soils done sytem ok
89	321000300	H	3	Unk	D			X	V	Unk				2	Yes*	No	No	Yes	Mound	$18,000	Room for 1 system well
90	321400750	B		Unk	Unk															$18,000	Town Hall & Post Office
91	321000211	H	2			X															Built in 2019 (Not on County UAND)

Well needed = 34
System is Compliant = 5
Holding Tank = 28
Need new SSTS = 24

Print Date: 9/22/2021

FIGURE 2.1

PARCELS FIELD EVALUATED

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

- Goodhue County Parcels
- Field Evaluation Performed on Parcel

Public Health

- Imminent Threat to Public Health & Safety
- Failing
- System Compliant

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA

0 200 400 Feet

N

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Figure 2.2

Possible Community Site

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

Goodhue County Parcels

Soil Test Pits

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA

0 50 100 Feet

N

Print Date: 3/25/2021

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Print Date: 3/25/2021

FIGURE 2.3

RECORDS REVIEW PARCELS

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

Parcels with Completed Record Review but No Site Visit

Goodhue County Parcels

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA

0 200 400 Feet

N

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CHAPTER 3 – EVALUATION OF ALTERNATIVES

3.1 GENERAL

Based on the results of the ISTS evaluation 86 parcels are in need of a replacement ISTS or an alternative wastewater treatment system. This evaluation is limited to soil based systems and therefore included the following alternatives:

1. Replace ISTS with a compliant system on residential parcels
2. Construct a collection system and a large subsurface treatment system (LSTS) referred to as community system, to treat wastewater from all (or most) residences.

3.2 DESCRIPTION OF ALTERNATIVES

3.2.1 REPLACE ISTS

For the properties in Frontenac Station that have sufficient area to construct a new ISTS on the site, a new ISTS would take the form of a septic tank and mound system. For the properties where there is insufficient area for a mound, a holding tank would be the only option for an on-site system. Each parcel was evaluated and the recommended on-site system for each property was listed in Table 2.2 along with an estimated cost to replace the existing system with the listed system. The cost of a new well was not included in the costs shown Table 2.2 but is included in the cost estimate in Section 3.4.

3.2.2 COMMUNITY TREATMENT SYSTEM

A community system would include large septic tanks, a wastewater pretreatment system, and a dispersal system. The effluent dispersal system would be a mound system consisting of several dispersal zones that could operate independently. Dosing pumps would periodically convey treated effluent to the mound.

To protect groundwater quality, a LSTS is required to meet a 10 mg/l Total Nitrogen (TN) either at the downstream end of the pretreatment system, or in the groundwater at the property line. Meeting the 10 mg/l TN limit at end of the pipe requires a pretreatment system but is also the easiest regarding permitting and approval from MPCA. If a permittee plans to implement a system intended to meet the 10 mg/l TN in the groundwater at the property line, a complete hydrogeological study is required. The study must estimate nitrogen concentration in the LSTS effluent, analyze nitrogen removal in the soil, quantify groundwater in the affected area, determine and model groundwater movement, and estimate effluent dilution. If during operation of such a system, the groundwater exceeds the limit at the property line, the permittee will be required to implement a pretreatment system to remove nitrogen.

With shallow bedrock, the groundwater can move quickly and have little dilution. Due to the risk and uncertainty of trying to meet the nitrogen limit in the groundwater at the property line, this option is eliminated from further consideration within this study. The Community System alternative will include a pretreatment system capable of meeting 10 mg/l Total Nitrogen at the end of the pipe prior to discharge into the drain field.

3.2.2.1 **Pretreatment System Alternatives**

There are many treatment systems that could meet the required treatment levels, and specifically the nitrogen limit. However most of these systems include a mechanical style treatment plant that is designed for larger flows and surface water discharge. The two systems that fit the situation and are considered for Frontenac are:

- Manufactured pretreatment system that is designed to fit into below grade precast concrete tanks. System includes aerobic attached-growth treatment, nitrogen removal, and clarification. The system is specifically designed to nitrify and denitrify to meet a 10 mg/l TN limit.

- Recirculating Gravel Filter that includes below grade precast concrete settling tanks, gravel media filters, recirculation tanks, and a recirculation pump station. The settled wastewater trickles over the gravel media to form a biofilm that removes pollutants in the wastewater. The gravel filters are above ground and susceptible to cold weather which adversely affects nitrogen removal.

To evaluate the treatment systems, the following criteria were considered for each system:

- Reliability – ability to consistently meet effluent quality, mechanical reliability
- Implementation – ease of system construction on a site near Frontenac Station, land requirements
- Operational Complexity – level of operator knowledge and ability required to operation and maintain the system
- Relative Cost – capital and annual costs of the system

Error! Reference source not found. shows the scoring of the pretreatment systems (0 to 5, with 5 being best) for each of the criteria.

Table 3-1 Pretreatment Systems

Criteria	Manufactured System	Recirculating Gravel Filter
Reliability	5	2
Implementation	4	4
Operational Complexity	5	5
Relative Cost	4	5
Total	**18**	**16**

Although the Recirculating Gravel Filter would have slightly lower capital and annual costs, the major factor differentiating the two systems is the reliability to meet the required 10 mg/l total nitrogen limit. The Recirculating Gravel Filter will not reliably meet the nitrogen limit due to the susceptibility to cold weather. Since the gravel media is exposed, the water temperature will drop during winter months causing a significant reduction in nitrogen removal. Extended periods of below normal winter temperatures could cause nitrification to stop completely. For this reason the Manufactured Pretreatment System is the selected option for the treatment system.

Figure 3.1 shows a schematic of the pretreatment system and the mound dispersal system. The facility would require about 6 acres of land. The facility would fit within the property where test pits were excavated (shown in Figure 2.1) which has about 14 acres.

3.2.2.2 Collection System

For the Community System, a collection system is required to convey wastewater from each property to the community treatment system. There are two types of collection systems that could be implemented in Frontenac Station: traditional gravity sewers with lift stations, or a small diameter (1.25-inch to 2-inch piping) pressure system with a residential grinder pumps at each property. The pressure system requires each home owner to maintain the small grinder pump station that would be located on each property. In addition, the pressure system would have a significantly higher capital cost than the gravity sewer system.

For these reasons, the low-pressure collection system was not considered further. A possible layout of a gravity collection system is shown in Figure 3.12

3.3 DESIGN FLOWS

3.3.1 FLOW FROM DWELLINGS

Table 3-2 shows the estimated flow from the dwellings within Frontenac Station. The flow estimate was done in accordance with Minnesota Rules 7081.0110. This rule states the flow from the 10 highest users is estimated without reduction and the flow from rest of the dwellings is reduced by a factor of 0.45. The estimate assumes that half of the dwellings are Class I and half are Class II. The flow estimate results in an average of about 194 gallons per day from each dwelling.

Table 3-2 Residential Flow Estimate

# of BRs	Quantity	Class	Flow per HH, gpd	Reduction Factor	Design Flow, gpd
6 BR	1	I	900	1	900
5 BR	2	I	750	1	1,500
4 BR	7	I	600	1	4,200
4 BR	3	I	400	0.45	540
4 BR	3	II	375	0.45	506
3 BR	18	I	450	0.45	3,645
3 BR	18	II	300	0.45	2,430
2 or 1 BR	15	I	300	0.45	2,025
2 or 1 BR	15	II	225	0.45	1,519
Mobile Home	15	II	225	0.45	1,519
				Total	**18,784**

FIGURE 3.1
COMMUNITY TREATMENT SYSTEM SCHEMATIC

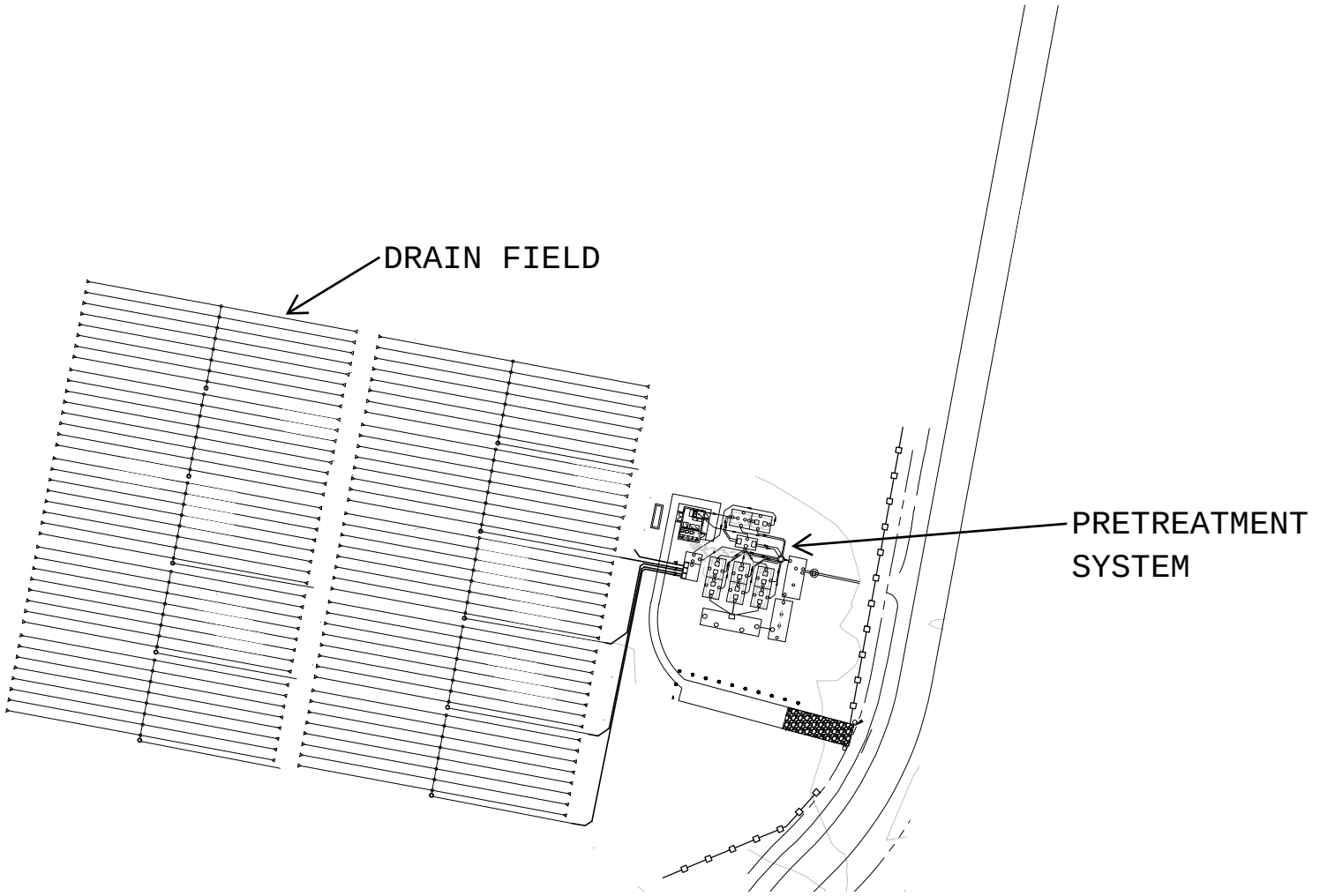

FIGURE 3.2

COLLECTION SYSTEM

FRONTENAC STATION
COMMUNITY ASSESSMENT

FRONTENAC STATION
GOODHUE CO., MN

- Manhole
- PS — Pump Station
- Gravity Sewer
- Forcemain

Data Sources:
Parcels and Base Data - Goodhue Co
Imagery - Goodhue County 2018

MSA 0 200 400 Feet N

Possible Community Site

Possible Community Site

3.3.2 FLOW FROM COMMERCIAL AND OTHER ESTABLISHMENTS

Flow from commercial and public establishments is calculated in accordance with Minnesota Rules 7081.0130. The flows are assigned to various establishments based on applicable criteria such as seating capacity of a restaurant.

Table 3-3 Flow from Commercial and Other Establishments

Description	Quantity	Units	GPD/Unit	Total Flow, gpd
Bar/Restaurant	44	Seats	50	2,200
Car Service	4	Bays	50	200
Restaurant	52	Seats	30	1,560
Retail Store	5,280	Sq Feet	0.13	686
Convenience Store	2,400	Sq Feet	0.13	312
Auto Service - Shop area	4	Bays	50	200
- Office space	360	Sq Feet	0.18	65
Auto Dealer	4,062	Sq Feet	0.13	528
Retail Store	900	Sq Feet	0.13	117
Community Center	200	Seats	4	800
Church - Worship Area	80	Seats	4	320
- Classroom	20	Students	14	280
Town Hall	25	Seats	4	100
			Total	**7,368**

3.3.3 FLOW FROM INFLOW AND INFILTRATION (I/I)

Flow from leaking manholes and pipes allow groundwater and runoff water to enter the sanitary collection system. This is termed inflow and infiltration (I/I). Although the collection system would be new construction, the MPCA requires an allowance for I/I be designed into the system. Flow from I/I is estimated by size of piping and length of piping in the collection system. For Frontenac there would be about 2 miles of 8-inch sanitary sewer piping in the collection system. The allowable leakage, or I/I is 200 gallons per inch of pipe diameter per mile of pipe.

Flow from I/I = 200 gal/inch/mile x 8 inch pipe x 2 miles = 3,200 gal/day.

3.3.4 DESIGN FLOW

The Design Flow for the evaluation of alternatives is the total flow from residential, commercial, and I/I sources. For Frontenac Station the total design flow is 29,352 gallons per day (21 gallons per minute). This represents the average daily flow. Components of the collection system such as sewer pipes and pump stations, must be sized for peak day and peak hour flows. For low flows, peaking factors are about 6 resulting in estimated peak hour flows of around 125 gallons per minute (gpm). The smallest gravity sewer allowed by standards is 8-inch diameter which can carry about 300 gpm at minimum pipe slope. The alternative treatment systems considered within

the study include flow equalization tanks that would absorb any peak flows and protect any downstream components and processes.

3.4 EVALUATION OF ALTERNATIVES

3.4.1 REPLACE RESIDENTIAL ISTS

For the purposes of comparison the assumption is that all existing failing ISTS systems within Frontenac Station would be replaced. Thus 86 out of the 91 existing systems would be replaced with a septic tank (Type 1 system) and a mound dispersal system, or a holding tank (Type 2). Holding tank systems would need an alarm to notify the owner when the tank is full. If there is no alarm system the tank could overflow and cause an imminent threat to public health and safety.

As the soil evaluation discovered there is a layer of river rock about 1.5 to 2 feet below the ground surface. Per SSTS design rules, this layer does not provide soil treatment due to the large percentage of rock in this existing soil layer. Thus almost every system in the Frontenac Station area would require a mound dispersal system to provide sufficient depth of specific soil material for treatment as well as provide separation from groundwater. Alternatively the rock layer could be removed to reduce the height of the mound.

Replacing the existing ISTS includes removal of the existing tank and drain field piping. The costs reflected in the Table 2.2 and Table 3.4 include the cost of removal of existing systems.
The septic tank and mound system would operate similar to the existing systems in Frontenac Station but would include a pump to lift the septic tank effluent up to the mound. These system require very little operation and maintenance but must be pumped out every 3 years. Septic tank pumping is estimated at $300 and the annual electric cost would be about $16.

The holding tanks would require pumping of the contents on a regular basis. Assuming 100 gallons per day is discharge into the tank every day, 36,500 gallon per year would need to be pumped out and hauled away. Assuming a cost of $250 for a 1,500 gallon tank, this would cost each holding tank owner $6,100 per year for wastewater pumping. Total cost per year for the 28 holding tanks is estimated at $170,300.

3.4.2 COMMUNITY TREATMENT SYSTEM AND COLLECTION SYSTEM

A Community treatment system would be design with an average daily capacity of 30,000 gallons per day. The system would consist of a series of large precast concrete septic tanks, aeration tanks, equalization tank, and a nitrogen removal system. The final tank would be a drainfield (mound) dosing tank that would allow the mound to be dosed periodically at an even rate throughout the day. The tanks would range in size from 12,500 to 30,000 gallons. Pretreatment equipment would include pumps, aeration blowers, aeration diffusers, flow meters, chemical feed equipment, and a control system. A small control building would be required to house electrical panels and controls. The pretreatment system would discharge effluent that meets the total nitrogen limit of 10 mg/l.

The pretreatment system carries a significant annual cost to operate and maintain. Due to the mechanical equipment, a licensed operator would be required to monitor the system, perform wastewater sampling, routine maintenance, and create monthly reports. Additional O&M items include insurance, electricity, chemical, site maintenance, wastewater testing, and solids hauling.

The tanks in the pretreatment system must be pumped periodically to remove settled solids. This is normally performed by a septage hauler but would require many truckloads compared to an ISTS.

The annual operation and maintenance of the pretreatment system is estimated at $97,800 and includes costs for the previously described O&M requirements as well as an annual replacement fund to be used to replace mechanical equipment that has reached the end of its useful life. Equipment such as pumps have an estimate useful life of 10 to 15 years depending on the conditions and if routine maintenance is regularly performed.

To convey raw wastewater from each property to the community treatment system would require a collection system. This system would consist of 8-inch diameter gravity sewers, manholes, a pump station, and a 4-inch diameter forcemain. Each dwelling or establishment would be connected to the gravity sewer through a 4-inch diameter service lateral. The gravity sewer would range in depth from 8 to 15 feet.

Construction of the collection system would disturb about two thirds of the streets in Frontenac Station and would require acquisition of a small parcel of land (2,500 square feet) for the lift station. To serve dwellings on both sides of Highway 61, collection system piping would need to cross both the highway and the railroad track. Areas of shallow rock may also be encountered during construction. The cost estimate includes costs for these construction items. Also there would be annual costs for electricity, routine maintenance, and system monitoring for the collection system.

3.4.3 COMPARISON OF ALTERNATIVES

The two alternatives have dramatically different operation and management requirements, permitting, and impacts on the community. In addition, the impact on the environment would be different between the two alternatives.

3.4.3.1 Wastewater Collection System and Community Treatment System

Implementing a collection system and community treatment system would require a large undertaking logistically, physically, and financially. The community would have to establish a rate and billing system to cover debt service, operation, maintenance, and replacement costs. Likely a sanitary district would be needed to manage, operate, and maintain the collection and treatment system.

Advantages of this alternative are

- State and federal grant funding is available to construct a collection and community treatment system. These funds are not available for replacement of private septic systems.
- Eliminating private septic systems allows more usable land on lots
- Improved property value
- Increased environmental and drinking water protection due to the pretreatment system and the highly treated effluent being discharged at a distance from the existing wells

- In order to make the project affordable the vast majority of the capital cost would have to be paid through grant funds.

3.4.3.2 **Replace Private ISTS**

This alternative would involve each property owner replacing their individual soil treatment systems with a compliant system. Most would require a mound system to provide groundwater protection and achieve the required separation from high groundwater. Some parcels do not have sufficient space for a replacement system and installing a holding tank may be the only option, which requires an individual permit from the County. The estimated costs for each property reflect the type of system that could be constructed on that property. However the cost does not take into account the size of the dwelling or establishment. The actual cost would vary depending on the number of bedrooms or the estimated flow from the establishment. Cost estimate includes $5,000 for a new well for the 34 properties where this would be needed to meet setback requirements.

Property owners would be responsible to obtain a permit, arrange for the replacement of their ISTS, and would be responsible for the cost and payment directly to a private contractor. Once replacement is complete, the property owner would be required to confirm completion with the County so the records can be updated.

Advantages of this alternative:

- Each property owner pays for their own system replacement
- Relatively low capital cost
- Minimal operation and maintenance required
- System longevity is 20+ years
- Little disturbance to community and roadways

3.4.4 **COST EVALUATION**

To provide a direct comparison of the costs of alternatives, a present worth cost analysis is required. The present worth cost includes both capital and annual costs converted into one current dollar value. The present worth cost represents the amount of funds that would need to be deposited to cover the cost of construction of a system (capital) and to cover the annual costs each year. The analysis for this report was based on a 20-year study period with a discount rate of 3.0%.

Table 3-4 presents a summary of the present worth costs for the two alternative systems. Detailed cost breakdowns are included in Appendix C.

Table 3-4 Present Worth Cost Of Alternatives

ALTERNATIVE	CAPITAL COST	ANNUAL COST	PRESENT WORTH COST*
Replace ISTS	$1,434,000	$177,700	**$4,084,000**
Community Treatment System	$4,740,000	$ 97,800	$6,195,000
Collection System	$3,292,000	$ 17,400	$3,551,000
Alternative Total	$8,032,000	$114,200	**$9,746,000**

*Present Worth Factor = 14.877 for 20 years, 3%

The annual cost shown for the ISTS alternative includes the cost of regularly pumping 28 holding tanks in addition to pumping 63 septic tanks every 3 years. Thus the annual cost shown for the alternatives is the total cost for the community. The average annual cost per property for the ISTS alternative is $1,960 ($163/month) and for the Community System alternative is $1,250 ($104/month), (these costs do not include debt service).

Even with 100% grant funding to cover the capital cost, the annual O&M cost of either alternative appears to be unaffordable for Frontenac Station residents. Based on a median household income of $41,667, $104/month represents 3% of median income. This is well above the affordability index for USDA funding (1.5%) and for PFA funding (1.4%).

CHAPTER 4 – SUMMARY

4.1 SUMMARY OF EXISTING SYSTEMS

Based on the field visit and records review, of the 91 properties in the study area:

- 5 (6%) of the existing ISTS systems were verified to be compliant. Four ISTS are compliant septic systems and 1 property has a holding tank.
- 28 properties (31%) have insufficient space to meet setbacks for a dispersal system and would be limited to a holding tank as a replacement for the existing system.
- 34 properties (37%) likely need a new well to make a new ISTS feasible
- 24 properties (26%) would support a new septic tank and mound system
- Due to soils found throughout the area (river rock layer), an at-grade drainfield would not meet groundwater protection requirements and mound systems would be required. Alternatively the existing rock could be removed to lower the height of mound required.

4.2 FEASIBILITY OF ALTERNATIVES

Replacement of ISTS is feasible. There are 5 existing systems that are compliant including 1 permitted holding tank in Frontenac Station. Some of the 34 properties that have possible well setback issues may be left with a holding tank as the only option. Having 20 to 30 properties with holding tanks would increase the risk of wastewater overflow which is an imminent threat to public health and safety. The County would have to approve the installation of holding tanks.

The Community Treatment and Collection system is feasible to construct, but appears to be cost prohibitive even if 100% of the capital cost were covered with grant funding.

4.3 RECOMMENDATIONS

The most cost effective alternative is likely to have property owners replace existing non-compliant ISTS with a compliant system that is acceptable to the County.

If the community desires to pursue other alternatives for Frontenac Station, a feasibility study can be done to evaluate connecting to the sanitary sewer system of Lake City. This study should take into consideration the greater Frontenac area as well as areas between Frontenac and Lake City that could be served by a collection system. This could make the regional system more cost effective for each user. Evaluation of this alternative is outside the scope of this report.

APPENDIX A

Florence UAND

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

Unsewered Area Needs Documentation Form

Clean Water Revolving Fund Project Priority List

Doc Type: Priority Points/Admin. Checklist

Site Location (address, plat number, unique numbering system, or owner name)	Existing System Condition (see Section A on page 1)	Documentation of Need and Method of Determination (see Section B on page 1)	Is one or more of the non-conforming SSTS discharging within 500 feet of an impaired water or ORVW?	Residential or Non-Residential Property
320150101	Setback issues	Review of government records	Yes	Non-Residential
320150300	Failure to protect GW	Review of government records	Yes	Non-Residential
320150400	Setback issues	Review of government records	Yes	Residential
320150500	Setback issues	Review of government records	No	Residential
320150700	Failure to protect GW	Review of government records	No	Residential
320150900	Failure to protect GW	Review of government records	No	Residential
320151000	Setback issues	Review of government records	No	Residential
320151100	Setback issues	Review of government records	No	Residential
320151200	Setback issues	Review of government records	No	Residential
320151500	Setback issues	Review of government records	No	Residential
320151600	Failure to protect GW	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320152000	Failure to protect GW	Review of government records	No	Residential
321000160	Failure to protect GW	Review of government records	Yes	Residential
321000180	Failure to protect GW	Review of government records	Yes	Residential
321000200	Setback issues	Review of government records	Yes	Residential
321000210	Setback issues	Review of government records	Yes	Residential
321000220	Setback issues	Review of government records	Yes	Residential
321000230	Setback issues	Review of government records	Yes	Residential
321000290	Setback issues	Review of government records	Yes	Residential
321000310	Setback issues	Review of government records	Yes	Residential
321400010	Failure to protect GW	Review of government records	Yes	Residential
321400020	Setback issues	Review of government records	Yes	Residential
321400040	Failure to protect GW	Review of government records	Yes	Residential
321400050	Failure to protect GW	Review of government records	Yes	Residential
321400060	Setback issues	Review of government records	Yes	Residential
321400070	Failure to protect GW	Review of government records	Yes	Residential
321400080	Setback issues	Review of government records	Yes	Residential
321400090	Failure to protect GW	Review of government records	No	Residential
321400100	Failure to protect GW	Review of government records	No	Residential
321400110	Failure to protect GW	Review of government records	No	Residential
321400120	Failure to protect GW	Review of government records	No	Residential
321400130	Setback issues	Review of government records	No	Residential

	Residential Systems	Non Residential Systems	All Systems
ITPHS	0	0	0
Failure to protect GW	14	1	15
Setback issues	24	1	25
Conforming systems	0	0	0
TOTAL	38	2	40

Page Number:	1
Of Total Pages:	3

Minnesota Pollution Control Agency
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St. Paul, MN 55155-4194

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Site Location (address, plat number, unique numbering system, or owner name)	Existing System Condition (see Section A on page 1)	Documentation of Need and Method of Determination (see Section B on page 1)	Is one or more of the non-conforming SSTS discharging within 500 feet of an impaired water or ORVW?	Residential or Non-Residential Property
321400140	Setback issues	Review of government records	No	Residential
321400150	Setback issues	Review of government records	No	Residential
321400170	Failure to protect GW	Review of government records	No	Residential
321400180	Failure to protect GW	Review of government records	No	Residential
321400190	Setback issues	Review of government records	No	Residential
321400210	Setback issues	Review of government records	No	Residential
321400230	Setback issues	Review of government records	No	Residential
321400250	Failure to protect GW	Review of government records	No	Residential
321400260	Failure to protect GW	Review of government records	No	Residential
321400270	Failure to protect GW	Review of government records	No	Residential
321400290	Failure to protect GW	Review of government records	No	Non-Residential
321400300	Setback issues	Review of government records	No	Non-Residential
321400310	Failure to protect GW	Review of government records	No	Residential
321400320	Failure to protect GW	Review of government records	No	Residential
321400330	Failure to protect GW	Review of government records	No	Residential
321400340	Failure to protect GW	Review of government records	No	Residential
321400350	Failure to protect GW	Review of government records	No	Residential
321400360	Failure to protect GW	Review of government records	No	Residential
321400370	Failure to protect GW	Review of government records	No	Residential
321400380	Setback issues	Review of government records	No	Residential
321400400	Failure to protect GW	Review of government records	No	Residential
321400410	Failure to protect GW	Review of government records	No	Residential
321400420	Failure to protect GW	Review of government records	No	Residential
321400421	Setback issues	Review of government records	No	Non-Residential
321400430	Setback issues	Review of government records	No	Residential
321400450	Setback issues	Review of government records	No	Residential
321400460	Setback issues	Review of government records	No	Residential
321400480	Setback issues	Review of government records	No	Residential
321400490	Failure to protect GW	Review of government records	No	Residential
321400500	Setback issues	Review of government records	No	Residential
321400520	Failure to protect GW	Review of government records	No	Residential
321400550	Setback issues	Review of government records	No	Residential
321400560	Failure to protect GW	Review of government records	No	Non-Residential
321400570	Failure to protect GW	Review of government records	No	Residential
321400580	Failure to protect GW	Review of government records	No	Residential
321400590	Setback issues	Review of government records	No	Residential
321400600	Setback issues	Review of government records	No	Residential
321400630	Failure to protect GW	Review of government records	No	Non-Residential
321400650	Setback issues	Review of government records	No	Residential
321400660	Setback issues	Review of government records	No	Non-Residential

	Residential Systems	Non Residential Systems	All Systems
ITPHS	0	0	0
Failure to protect GW	19	3	22
Setback issues	15	3	18
Conforming systems	0	0	0
TOTAL	34	6	40

Page Number:	2
Of Total Pages:	3

Minnesota Pollution Control Agency
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Unsewered Area Needs Documentation Form

Clean Water Revolving Fund Project Priority List

Doc Type: Priority Points/Admin. Checklist

Site Location (address, plat number, unique numbering system, or owner name)	Existing System Condition (see Section A on page 1)	Documentation of Need and Method of Determination (see Section B on page 1)	Is one or more of the non-conforming SSTS discharging within 500 feet of an impaired water or ORVW?	Residential or Non-Residential Property
321400690	Failure to protect GW	Review of government records	No	Residential
321400700	Setback issues	Review of government records	Yes	Residential
321400730	Failure to protect GW	Review of government records	No	Residential
321400740	Setback issues	Review of government records	No	Residential
321400760	Failure to protect GW	Review of government records	No	Non-Residential
321400770	Setback issues	Review of government records	No	Residential
321400780	Failure to protect GW	Review of government records	No	Residential
321400790	Setback issues	Review of government records	No	Residential
321400800	Failure to protect GW	Review of government records	No	Residential
321400820	Failure to protect GW	Review of government records	No	Residential
321400830	Setback issues	Review of government records	No	Residential
321400870	Setback issues	Review of government records	No	Residential
Outside Impact Density				
320150800	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151700	Setback issues	Review of government records	No	Residential
320151900	Setback issues	Review of government records	No	Residential
320152401	Setback issues	Review of government records	No	Residential
320152601	Setback issues	Review of government records	No	Non-Residential
321000250	Failure to protect GW	Review of government records	No	Residential
321000300	Setback issues	Review of government records	No	Residential

	Residential Systems	Non Residential Systems	All Systems
ITPHS	0	0	0
Failure to protect GW	6	1	7
Setback issues	14	1	15
Conforming systems	0	0	0
TOTAL	20	2	23

Page Number:	3
Of Total Pages:	3

APPENDIX B

Soil Pit Logs - Groth Property

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client: Groth Property

Location / Address:

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (select one)	Slope %:	Slope shape:	Elevation-relative to benchmark:
Vegetation:	Soil survey map units:		Limiting Layer Elevation:
Weather Conditions/Time of Day:		Date	
Observation #/Location: Pit 1		Observation Type:	

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-15	Loam	<35%							
15-40	Silty Clay Loam	>50%							
40-60	Sand	<35%							

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU Inspector)	(Signature)	(Cert. #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Groth Property			Location / Address:	
Soil parent material(s): (Check all that apply)	☐ Outwash	☐ Lacustrine	☐ Loess	☐ Till	☐ Alluvium	☐ Bedrock	☐ Organic Matter
Landscape Position: (select one)		Slope %:	Slope shape:		Elevation-relative to benchmark:		
Vegetation:		Soil survey map units:			Limiting Layer Elevation:		
Weather Conditions/Time of Day:				Date			
Observation #/Location:	Pit 2			Observation Type:			

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure		
							Shape	Grade	Consistence
0-16	Loam	<35%							
16-40	Bedrock	>50%							

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU Inspector)	(Signature)	(Cert. #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Groth Property			Location / Address:					
Soil parent material(s): (Check all that apply)	☐ Outwash	☐ Lacustrine	☐ Loess	☐ Till	☐ Alluvium	☐ Bedrock	☐ Organic Matter		
Landscape Position: (select one)		Slope %:		Slope shape:			Elevation-relative to benchmark:		
Vegetation:		Soil survey map units:					Limiting Layer Elevation:		
Weather Conditions/Time of Day:							Date		
Observation #/Location:	Pit 3						Observation Type:		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-16	Loam	<35%							
16-24	Sandy Clay Loam	<35%							
24-48	Sandy Loam	<35%							
48	Bedrock	>50%							

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU Inspector)	(Signature)	(Cert. #)	(Date)

APPENDIX C

CAR Cost Estimates

FRONTENAC STATION					
Community Wastewater Treatment Facility					
Opinion of Probable Project Costs					
					Date: 2/22/2021
ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Site Fencing	1	LS	$ 20,000	$ 20,000
2	Site Prep	1	ACRE	$ 10,000	$ 10,000
3	4" Forcemain	385	LF	$ 40	$ 15,400
4	Connect Forcemain to Septic Tank	1	EA	$ 2,000	$ 2,000
5	Septic Tank - 2 @ 30,000 Gal each	60000	GAL	$ 3.25	$ 195,000
6	6-inch PVC Sanitary	125	LF	$ 50	$ 6,250
7	Septic Tank #2 Fine Bubble Diffusion Aerator	1	EA	$ 22,500	$ 22,500
8	Flowmeter Manhole	1	LS	$ 35,000	$ 35,000
9	Receiving Manhole	1	LS	$ 10,000	$ 10,000
10	Equalization Tank - 30,000 Gal	30000	GAL	$ 3.25	$ 97,500
11	Equalization Pumps/Appurtenances	1	LS	$ 35,000	$ 35,000
12	Aerobic Treatment Unit Tank	60000	GAL	$ 3.25	$ 195,000
13	BioMicrobics MyFAST 1.0	3	EA	$ 55,000	$ 165,000
14	BioMicrobics MyNitriFAST 1.0	3	EA	$ 55,000	$ 165,000
15	Denitrification Unit Dose Tank	6000	GAL	$ 3.25	$ 19,500
16	Denitrification Unit Dosing Pumps and Appurtenances	1	LS	$ 25,000	$ 25,000
17	Denitrification Unit Tank	12000	GAL	$ 3.25	$ 39,000
18	BioMicrobics MyABC-N 1.0	1	EA	$ 55,000	$ 55,000
19	Chemical Feed Equipment	1	EA	$ 12,500	$ 12,500
20	Control Building	1	LS	$ 85,000	$ 85,000
21	Control Building Equipment & Furnishings	1	LS	$ 7,500	$ 7,500
22	Polishing Tank	12000	GAL	$ 3.25	$ 39,000
23	Polishing Treatment Unit	1	EA	$ 55,000	$ 55,000
24	Drainfield Dose Tank	12000	GAL	$ 3.25	$ 39,000
25	Effluent Screen	1	GAL	$ 1,500	$ 1,500
26	Drainfield Dosing Pumps and Appurtenances	1	LS	$ 45,000	$ 45,000
27	Drainfield Cell Connection	6	LS	$ 1,500	$ 9,000
28	Drainfield Cell Distribution Box Cover	6	LS	$ 500	$ 3,000
29	Drainfield	10	LS	$ 125,000	$ 1,250,000
30	Control Panel	1	LS	$ 75,000	$ 75,000
31	Yard Piping	2200	LF	$ 40	$ 88,000
32	Insulation (4")	800	SY	$ 10.00	$ 8,000
33	Gravel Access Drive	130	LF	$ 35	$ 4,550
34	Gravel Access Walkway	200	LF	$ 20	$ 4,000
35	Protection Bollard	12	EA	$ 300	$ 3,600
36	Site Restoration	1	ACRE	$ 10,000	$ 10,000
37	Erosion Control	1	LS	$ 5,000	$ 5,000
38	Electrical Utility Upgrade	1	LS	$ 30,000	$ 30,000
39	Electrical Work	1	LS	$ 175,000	$ 175,000
40	Electrical Generator	1	LS	$ 55,000	$ 55,000
41	Mobilization & Demobilization	1	LS	$ 180,000	$ 180,000
				Subtotal	$ 3,297,000
				15% Contingency	$ 495,000
				Total Estimated Construction Cost	$ 3,792,000
				Engineering, Administration, and Financing (25%)	$ 948,000
				Total Estimated Project Cost	$ 4,740,000

Community System - Collection System					
					Date: 3/12/2021
ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	Pavement Removal	11000	Ton	$ 20	$ 220,000
2	Manholes	34	EA	$ 3,500	$ 119,000
3	8-inch Gravity Sewer	10000	LF	$ 80	$ 800,000
4	Service Laterals to Building	91	EA	$ 3,000	$ 273,000
5	Connect Lateral to Gravity Sewer	91	EA	$ 1,500	$ 136,500
6	Pump Station & Control Panel	1	LS	$ 300,000	$ 300,000
7	4-inch Forcemain	1200	LF	$ 50	$ 60,000
8	Highway& Railroad Crossing	220	LF	$ 500	$ 110,000
9	Rock removal	1	LS	$ 100,000	$ 100,000
10	Pavement Restoration	11000	Ton	$ 50.00	$ 550,000
11	Restoration	1	LS	$ 75,000	$ 75,000
				Subtotal	$ 2,743,500
				20% Contingency	$ 548,700.00
				Total	$ 3,292,200

Community System Annual O, M & R Cost							
						Date:	3/12/2021
ITEM No.	ITEM DESCRIPTION	QUANTITY	SIZE	UNIT	HOURS	UNIT COST	ANNUAL COST
1	Septic Tank Aerator	1	0.50	HP	24	$ 0.12	$ 394
2	Equalization Pumps	1	1.0	HP	8	$ 0.12	$ 263
3	BioMicrobics MyFAST Aerator	3	0.50	HP	24	$ 0.12	$ 1,183
4	BioMicrobics MyNitriFAST Aerator	3	0.50	HP	24	$ 0.12	$ 1,183
5	Denitrification Dosing Pumps	1	1.0	HP	8	$ 0.12	$ 263
6	BioMicrobics Clarifier Pump	1	1.0	HP	24	$ 0.12	$ 788
7	Chemical Feed Equipment	1	0.10	HP	24	$ 0.12	$ 79
8	Chemical Usage	1	6.0	GPD	365	$ 5.00	$ 10,950
9	Control Building Power, Heat	1	1	LS	1	$ 1,200	$ 1,200
10	Polishing Treatment Unit	1	0.50	HP	24	$ 0.12	$ 394
11	Drainfield Dosing Pumps	10	1.0	HP	12	$ 0.12	$ 3,942
12	Standby Generator	1	1	LS	1	$ 200	$ 200
13	Solids Hauling	1	1	LS	1	$ 3,500	$ 3,500
14	Wastewater Sampling and Testing	1	1	LS	1	$ 11,700	$ 11,700
15	Repair and Replacement (5% of Equip Cost)	1	1	LS	1	$ 29,000	$ 29,000
16	Annual Treatment System Operations Labor	312	1	Day	2	$ 45	$ 28,080
17	Annual Treatment System Operations Labor	52	1	Day	2	$ 45	$ 4,680
						Total	$ 97,798
	3% Discount Rate, 20 years					Present Worth Factor	14.877
						Present Worth	$ 1,454,947

ISTS Annual O, M & R Cost							
						Date:	9/21/2021
ITEM No.	ITEM DESCRIPTION	QUANTITY	SIZE	UNIT	HOURS	UNIT COST	ANNUAL COST
1	Mound Pump	63	0.50	HP	1	$ 0.12	$ 1,035
2	Solids Removal from Septic Tank	63	1.0	LS		$ 100.00	$ 6,300
3	Pumping Holding Tanks	28	36,500	Gals/yr		$ 0.17	$ 170,327
						Total for 91 Systems	$ 177,661
	3% Discount Rate, 20 years					Present Worth Factor	14.877
						Present Worth	$ 2,643,067

Collection System Annual O, M & R Cost							
						Date:	9/21/2021
ITEM No.	ITEM DESCRIPTION	QUANTITY	FREQUENCY	UNIT		UNIT COST	ANNUAL COST
1	Flushing System 1/ 3years	10000	0.33	LF		$ 2.00	$ 6,660
2	Solids Removal from Septic Tank	4	52	Hrs		$ 45.00	$ 9,360
3	Electrical	10	4	HP Hrs	365	$ 0.12	$ 1,314
						Total	$ 17,334
	3% Discount Rate, 20 years					Present Worth Factor	14.877
						Present Worth	$ 257,878