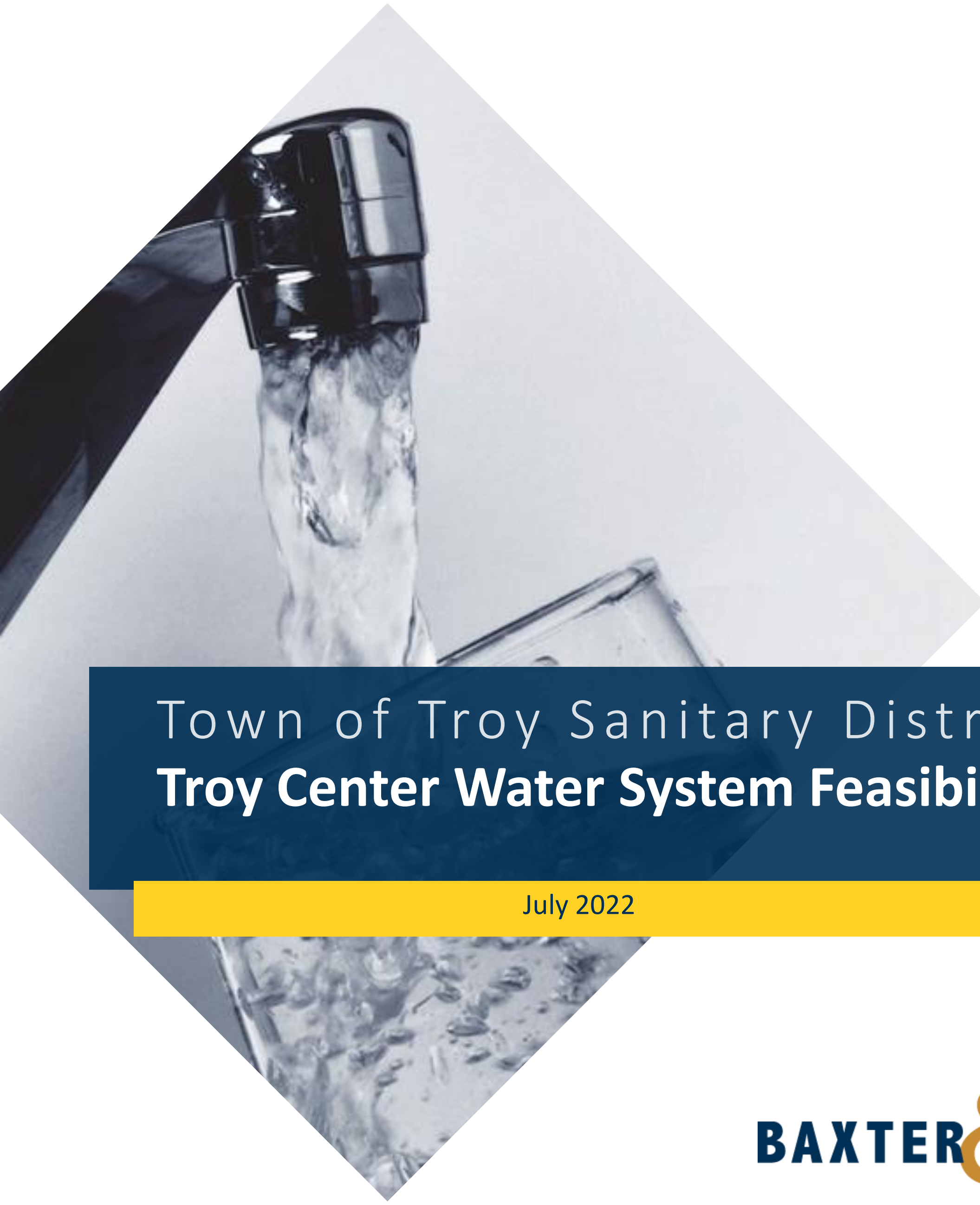

Town of Troy Sanitary District No. 1

Troy Center Water System Feasibility Study

July 2022

BAXTER & WOODMAN
Consulting Engineers

Town of Troy Sanitary District No. 1
Troy Center Water System Feasibility Study
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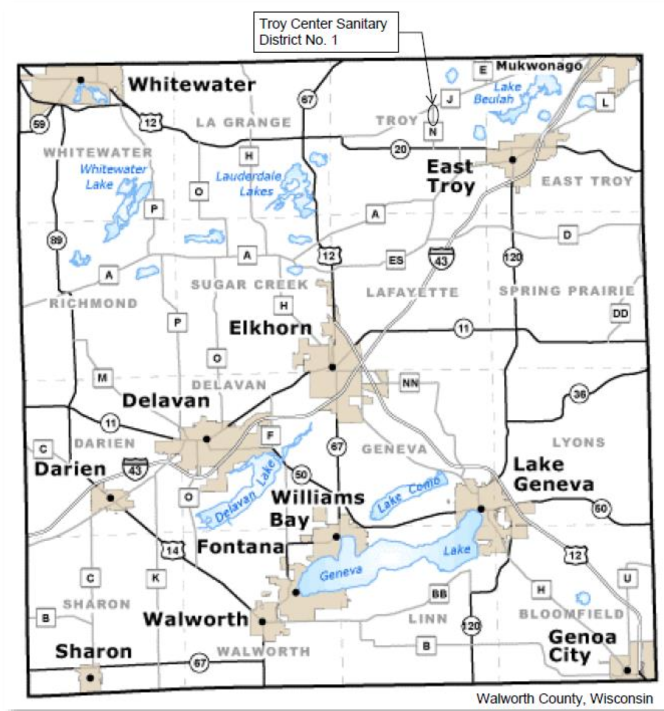
LIST OF ABBREVIATIONS

CTH	-	County Trunk Highway
GPD	-	Gallons per Day
GPPD	-	Gallons per Person per Day
mg/L	-	milligrams per liter
psi	-	pounds per square inch
PSC	-	Public Service Commission of Wisconsin
WDNR	-	Wisconsin Department of Natural Resources

1. INTRODUCTION

1.1 Purpose and Scope

The Town of Troy Sanitary District No. 1 (District) owns and operates a municipal community water system known as the Troy Center Sanitary District. The water system is located in unincorporated Troy Center located just south of the intersections of CTH J and CTH N in northern Walworth County.



The purpose of this study is to determine if the existing water system is the most feasible type of system to provide water service to the study area for the next twenty year planning period. The scope will include a review and evaluation of the existing water system, investigation of a possible future private well system, a financial analysis of the alternatives, and a recommended plan.

1.2 Previous Studies and Sanitary Survey Discussion

No previous studies of the existing water system are known to exist. However, plans of the original wellhouse and water main design do exist and were reviewed to assist in preparation of this report. Also available is a water system map included in Appendix A and a hydro-pneumatic tank cleaning report found in Appendix B.

Another important report with valuable information is the Wisconsin Department of Natural Resources (WDNR) sanitary survey reports. These reports are prepared by the WDNR Water Supply Engineer approximately every three years. The surveys typically include a site visit and are used to evaluate the system's source, facilities, equipment, operation, maintenance, and management as they relate to providing safe drinking water. Sanitary surveys from 2000 through today were reviewed and are discussed below.

- 2000 Sanitary Survey: No major deficiencies were identified but it did list numerous requirements for the District to meet including having a certified operator, correcting bacteriological sampling protocol, providing auxiliary power at the wellhouse, installing a pressure relief device at the hydro-pneumatic tank, hydrant maintenance, ordinance enforcement, valve exercising, and minor wellhouse facility repairs.

- 2005 Sanitary Survey: Three deficiencies were identified including updating the District's emergency plan, Cross-Connection Ordinance, and Well Abandonment Ordinance. The Survey also included numerous recommendations regarding operations of the system in general.

- 2009 Sanitary Survey: No deficiencies were found and only noted a few recommendations relating to water system rates, capital improvements and infrastructure replacement planning, and preparing a comprehensive water system study.

- 2012 Sanitary Survey: No deficiencies or recommendations noted.

- 2014 Sanitary Survey: No deficiencies noted but did recommend a review of the water rates.

- 2017 Sanitary Survey: No deficiencies listed but had several recommendations relating to removing old chlorine, water system rates, inspecting pumps on a regular basis, and emergency operations. This survey also began identifying non-conforming features of the water system that would not be allowed based on current codes and regulations. These items do not need to be corrected immediately, but should be addressed when performing upgrades at the facility. These included water draining to the ground and insufficient pump base height. This survey also noted that the system has insufficient source capacity due to only having one well and water loss within the system exceeded the recommended limit set by the WDNR.

- 2020 Sanitary Survey: Identified insufficient exercising of the emergency generator as the only deficiency. The survey also identified two recommendations. The first recommendation was to determine a successor for the Sanitary Commission President to ensure that the administrative and compliance roles are adequately covered and the second recommendation was to conduct emergency "table-top" exercises to practice what to do during emergency situations. The survey also noted the non-conforming features and insufficient source capacity from the previous survey.

2. EXISTING WATER SYSTEM

2.1 Existing Water System

The existing water supply system consists of one well (Well No. 1) and a 4,000 gallon hydro-pneumatic pressure tank located within a building. A magnetic flow meter on the well pump discharge piping measures the quantity of water being pumped from the ground and supplied to the distribution system. The distribution system consists of approximately 1.1 miles of 6-inch cast and ductile iron pipe. The static pressure range throughout the system is 35 – 62 psi. Several hydrants and valves are located throughout the distribution system. The distribution system hydrants are used for flushing and cannot provide fire protection. Many, if not all, of the main line valves are inoperable and the exact location of some valves is unknown. The valves shown on the water system map are based on record drawings and are adequately spaced throughout the system to provide proper isolation. The water service piping most likely consists of galvanized steel or copper tubing; there are no reports of lead service lines within the distribution system. Nearly half of the water service shut-off valves reportedly do not operate.

The existing water system components are well past their depreciated life but continue to function. Well No. 1 was originally constructed in 1944 and purchased by the District in 1957 when the hydro-pneumatic tank and much of the distribution system was installed. The well was reportedly last inspected in 2010. The well pump was pulled and rebuilt in 1997. The well pump should be replaced soon. The hydro-pneumatic tank was reportedly last inspected in 2018 and must be inspected again in 2023. The report for the 2013 tank inspection found it to be in very good condition. The District must use an alternate supply during work being performed on the well or well pump and would benefit from a second well. The distribution system piping has experienced occasional breaks, mainly along CTH N, but should function satisfactorily for the 20-year planning period.

2.2 Population and Service Area

The 2021 Public Service Commission (PSC) Annual Report notes the Troy Center Sanitary District water system serves 49 residential customers and two commercial customers. The 2020 WDNR Sanitary Survey reports that the District serves a population of approximately 170 people. This equates to approximately 3.47 persons per household, which appears reasonable based on the family-oriented makeup of the community. The 2000 WDNR Sanitary Survey lists the population as approximately 170 people with 47 service connections. There has been little to no growth within the water system over the past 17 years and that trend is expected to continue for the 20-year planning period of this report.

See Appendix A for a water system map with the service area. The water system does not serve the Town of Troy Town Hall/Troy Center Fire Department or the Troy Center Department of Public Works buildings just to the north.

2.3 Water Demands

Table 1 is a summary of the water demands from the PSC Annual Reports. Average day and maximum day demands peaked in 2018. The large amount of water pumped during the maximum day in 2018 was due to a water main break and closely matched the rated well capacity meaning the well pumped nearly continuously all day long. The water use in the period between 2019 and 2021 is representative of the current conditions. The average water consumption is less than normal but this can be attributed to the mainly residential nature of the water system. Water sales within the District averaged about 89% residential and 11% commercial in the five year period.

TABLE 1

Historical Water Demands

Year	Average Day Demand (GPD)	Calculated Consumption (GPPD)	Maximum Day Demand (GPD)	Max. Day to Avg. Day Ratio
2017	6,964	41	58,000	8.33
2018	7,471	44	111,000	14.86
2019	5,984	35	29,000	4.85
2020	6,279	37	40,000	6.37
2021	6,219	37	48,000	7.72
Average	6,583	39	57,200	8.42

2.4 Existing Geology and Well Information

The geology in the area consists of sand and gravel from the surface down to about 340 feet, with an underlying dolomite layer to 525 feet, and sandstone below that. Exhibits from the Wisconsin Geological and Natural History Survey are included in Appendix C.

The well serving the water system (Well No. 1) was originally drilled in 1944 for the United Milk Company. The well was deepened to its current depth of 626 feet in 1946. The well was purchased by the District in 1957 to start the development of the community water system. The limestone/sandstone well is cased to a depth of 352 feet with cement grout to 130 feet. Appendix D contains a Well Constructor's Report and the Well Driller's Log for Well No. 1. Future District wells or private residential wells should have a similar diameter and depth as Well No. 1.

2.5 Water Quality Information and Existing Treatment

There have been no violations of the maximum contaminant level for primary drinking water contaminants including inorganic chemicals, synthetic organic contaminants, volatile organic contaminants, microbiological contaminants, lead, copper, or radionuclides. See Appendix E for the most recent water quality test results.

Iron is an issue in the system. Since this is considered a secondary standard, the contaminant is not hazardous to health but may be objectionable in regards to taste, odor, and aesthetics. Iron levels in the water system have been reported to range from 1.0 – 1.1 mg/L. The secondary standard for iron is set at 0.3 mg/L. This means iron levels are three to four times greater than recommended for drinking water. Too much iron can cause an unpleasant taste but will also likely cause staining on fixtures and appliances. Most private wells will install treatment units in the home to reduce iron concentrations below the secondary standard.

Hardness is also an issue in this system. Hardness has been reported to range from 320 – 350 mg/L. There is no secondary standard for hardness, but hardness above 180 mg/L is considered very hard. Hardness will cause spots on dishes, deposits on fixtures, and can reduce the life of plumbing fixtures and appliances due to mineral buildup. Most private well systems will install a water softener in the home to reduce hardness to an acceptable level.

The District currently does not provide treatment for iron or hardness. The wellhouse has an emergency chlorination system in place in the event of bacteriological contamination. It is unknown whether individual District customers have treatment equipment installed at their residence to reduce iron and hardness.

2.6 Description of 20-Year Improvements

The components of a water system have varying lengths of useful life depending on the type of component. Mechanical and electrical components typically have shorter lives while tanks and piping typically have longer lives. Table 2 provides details about age, useful life, and importance.

TABLE 2

Water System Assets

Asset	Age (Years)	Useful Life (Years)	Importance	Notes
Well	85+	50+	High	Only one well serves entire system
Pumping Equipment	25+	10-20	High	Only one pump provides water to the system
Hydro-Pneumatic Tank	65+	20-30	High	Only one tank maintains pressure in the system
Electrical Systems	65+	20-30	High	Controls pumping equipment, appears to be original
Generator	20+	10-20	High	Used for standby power only
Wellhouse Building	65+	50+	High	Appears to be original structure, poor condition
Distribution System Piping	50+	50+	Medium	Original cast and ductile iron piping

Asset	Age (Years)	Useful Life (Years)	Importance	Notes
Hydrants	Varies	50+	Low	Only used for flushing, some original, some have been replaced
Valves	Varies	50+	Low	Only used for isolation, most are inoperable
Water Service Piping	60+	50+	Low	Original galvanized steel and copper, numerous shut-off valves have failed

Redundancy within a water system is critical to ensure an uninterrupted supply of safe drinking water at all times and to prevent notices of non-compliance or notices of violation. The well, pumping equipment, hydro-pneumatic tank, and electrical systems are all past their useful life expectancy, are of high importance, and do not have redundancy. Therefore, addressing redundancy should be a top priority for the District. The WDNR requires any water system without elevated storage serving more than 50 living units, be provided with two or more wells or pumping units (NR 811.26 (2)). There are 49 living units currently being served, therefore, the system is at maximum capacity. The District would benefit from a second source of water supply; this would address the critical components in Table 2. Elevated storage is not recommended for a system of this size due to low water turnover in the system and not being cost effective. A 100,000 gallon elevated tower would cost approximately $1,500,000.

Replacement of some of the existing components is strongly recommended, but construction of redundant components is more important to the overall reliability of the system. Replacement of the existing components does not address the capacity or redundancy issues. The non-conforming features identified in the Sanitary Surveys will need to be corrected with any proposed improvements. In addition to that, there are setback requirements for the well that do not currently meet code and may preclude the District from upgrading the well without addressing these items first. A meeting with the WDNR to discuss any issues is necessary prior to starting any improvement projects.

The generator needs to be replaced to ensure reliable operation. The wellhouse building itself is critical to protecting the mechanical and electrical components of the water system. There are aesthetic issues with the building but they are not critical. Much of the distribution system piping is the original cast and ductile iron pipe installed in the 1950's and 1960's. The condition of the pipe depends on many factors including quality of installation, soil conditions, groundwater, and quality of the water being carried among other things. Since many of the distribution system valves are inoperable and isolation of the distribution system is unreliable, a pipe leak will likely result in a system-wide shutdown. The water main pipe condition should be evaluated regularly and planned for replacement as problems arise or as the age nears 75 years.

The hydrants and valves within the distribution system are used for maintenance purposes, therefore, these items are of low importance and only need to be replaced as needed or during water main replacement. Regular exercising and lubrication will prolong the life of these components. Since many of the distribution valves are inoperable, we recommend replacing the valves when the water lines are replaced, however, replacing valves individually is also an option. The water service piping and components are also of low importance and should be replaced from the main line to the service shut-off box during water main replacement. The failed water service shut-off valves can be replaced individually if desired. Any work on the existing distribution system will require careful planning and coordination to limit the number of customers without water and limit the amount of time the system is shut down. Water service disruptions will be unavoidable.

Water treatment at the well building is recommended but not required. Adding a phosphate to the water can sequester (prevent iron from converting from the ferrous form to the oxidized ferric form) the iron and prevent it from becoming red and brown and causing issues in the distribution system. This will help to prolong the life of all water system components and plumbing fixtures throughout the entire system. Sequestration is typically suitable when iron concentrations are 1.0 mg/L or less, but is still expected to be highly effective in treating iron. Chemical addition will definitely improve water quality and clarity with respect to iron and is a much more cost effective solution than installing filtration equipment at the well building.

Treatment for hardness would require the installation of a water softening system at the well. Water softening systems are effective at reducing hardness and iron, but are somewhat costly to operate, require special operator certification, and produce a highly concentrated brine waste stream. Since the District does not have a sewage collection system, disposal of the wastewater would be difficult. The installation of a softening system should only be considered if most of the individual homes do not already have an individual water treatment system.

Regular chlorination of the water will prevent waterborne viruses and bacteria from potentially entering the distribution system and may be a requirement of any future community system improvement. The loss of pressure in the system (boil water notification) would likely trigger the addition of continuous chlorination. The addition of chlorine will likely cause water quality complaints (red and brown staining due to oxidized iron) unless water treatment is added for iron at the well building.

3. PRIVATE WELL SYSTEM ALTERNATIVE

3.1 Introduction

Community water systems in small, unincorporated areas similar to Troy Center are not common unless there is contamination such as nitrates or spills. Typically, each property relies on a private well. Elimination of the community water system for an individual private well system could provide benefits over the current municipal water system but also has some drawbacks. Each property owner would be in control of their water supply, however, the costs of installing and maintaining the system would fall solely on the individual property owner.

3.2 Private Well Discussion and Costs

Each property that is currently served by the municipal water system would need to drill a new private well on their property, modify the existing yard plumbing, and install a pump and tank and possibly treatment. Setback requirements and protection from on-site septic tanks and drain fields also needs to be taken into consideration. The WDNR private well code (NR 812) requires a cased well to at least 40 feet below the surface, at least 25 feet between a well and wastewater holding tank, and 50 feet between well and drainfield. The close proximity to agricultural farming also raises the potential for nitrates in the groundwater supply and will need to be monitored on a regular basis.

As noted earlier, a sand and gravel layer is present from the surface down to about 340 feet with dolomite and sandstone beneath. Typically, private wells are drilled into the shallow sand and gravel formation. Shallow wells are often reliable, productive, have adequate water quality, and are cost effective for private wells. However, the driller's well log for Well No. 1 indicates fine sand present in this layer. Fine sand will travel with the water, enter the well screen, and damage the well pump and components of the plumbing system. Although no description was given as to why the original well was deepened after only two years of operation, it may have been due to the presence of this fine sand.

Each property may have slightly different geology, so it would be up to the well driller at the time of drilling the new private well to determine the best option for the site. Shallow wells between 100'-300' deep would be expected, however, some wells up to 600' deep may be necessary. A shallow well with a pump and yard plumbing modifications is expected to cost $15,000 to $20,000 while a deep well with a pump and yard plumbing modifications would cost $65,000 to $70,000. See Appendix F for shallow well and deep well cost estimates.

The private wells should have similar water quality as Well No. 1, including iron and hardness. Therefore, a whole house water softening and filtration system would most likely be required if one is not already installed.

3.3 Procedure for Municipal System Abandonment

The municipal water system would no longer be needed after the private well installations. The municipal water system would need to be properly abandoned in accordance with PSC and WDNR regulations. The well pump, suction piping, and any other non-permanent well appurtenances must be removed from the well prior to filling the well with concrete or other approved material. This will prevent the possible entry of contaminants into the groundwater system. The remainder of the water system components located at the well site can either be abandoned in place or removed in their entirety at the discretion of the District. The water distribution system piping can be abandoned in place, but the hydrants and valves should be removed to a depth of at least three feet below ground surface. The cost to abandon the system as outlined above would be approximately $60,000 to $80,000.

4. ALTERNATIVES ANALYSIS

4.1 Continue with Municipal System

There are many benefits to continue using the municipal system. Much of the infrastructure is already in place, although, much of it is past its useful life. Operation and maintenance of the system is performed by the District rather than the need for individual homeowners to operate and maintain a private system. The water is routinely tested and historically has tested safe. The municipal water system has WDNR oversight and regularly inspects the system for maintenance and safety issues, providing a level of security and comfort for the customers.

There are also some drawbacks of continuing with the municipal system. Since much of the infrastructure is past its useful life, replacement of the critical components must be considered in the near future. Also, redundancy should be provided to allow for continuous operation of the system during an emergency event. Currently, with a single source of supply, if the aquifer, well, well pumping equipment, or electrical system were to become compromised in any way, the entire water system would be without water for an extended period of time.

This alternative has the lowest 20-year present worth cost and lowest upfront capital cost per customer of approximately $27,500. See the present worth cost summary in Appendix F.

4.2 Private Well System

By switching to a private well system, all infrastructure currently in place will become obsolete. Each customer will be required to hire a certified well driller to construct a new private well on their property. The initial cost will be quite high, but annual costs for operating and maintaining the system should be significantly lower than customer's current quarterly water bills from the District. The customer will have complete control and responsibility over the quality and quantity of water being used.

This alternative has the highest 20-year present worth cost and the highest upfront capital cost per customer of approximately $47,000. See the present worth cost summary in Appendix F.

5. RECOMMENDATIONS

5.1 Recommended Plan

Our recommendation is to continue using the municipal water system with several upgrades. The most cost effective and simplest upgrade to implement is a valve replacement program to address the inoperable main line valves and the failed water service shut-off valves. The second recommended improvement is the addition of a chemical feed system and electrical upgrades at the existing wellhouse. This would include the addition of phosphates for iron sequestration and chlorine for disinfection. A separate chemical feed building would likely be required, but it will improve water quality system-wide. The highest priority recommended improvement is to provide redundant supply capacity. We recommend drilling a second well and providing a new wellhouse with a second hydro-pneumatic tank, chemical feed system, and updated controls. Once the second wellhouse is on-line, we recommend replacing the Well No. 1 pumping equipment and remodeling the wellhouse. Finally, a capital improvement program should be established to replace all distribution system water mains, valves, hydrants, and water service piping within the next 20-30 years. Areas of the system with the highest frequency of water main breaks should be prioritized first. This work can be spread out over the course of several years as funding allows.

5.2 Opinion of Probable Capital Cost Summary & Schedule

Table 3 outlines the opinion of probable capital costs for the recommended plan and provides a general timeline for when each item should be implemented. By spreading the projects out over a 10-year time frame, the annual cost impact to customers will be less severe. Also, the District can apply for various forms of funding and grants to delay or offset some of the costs.

TABLE 3

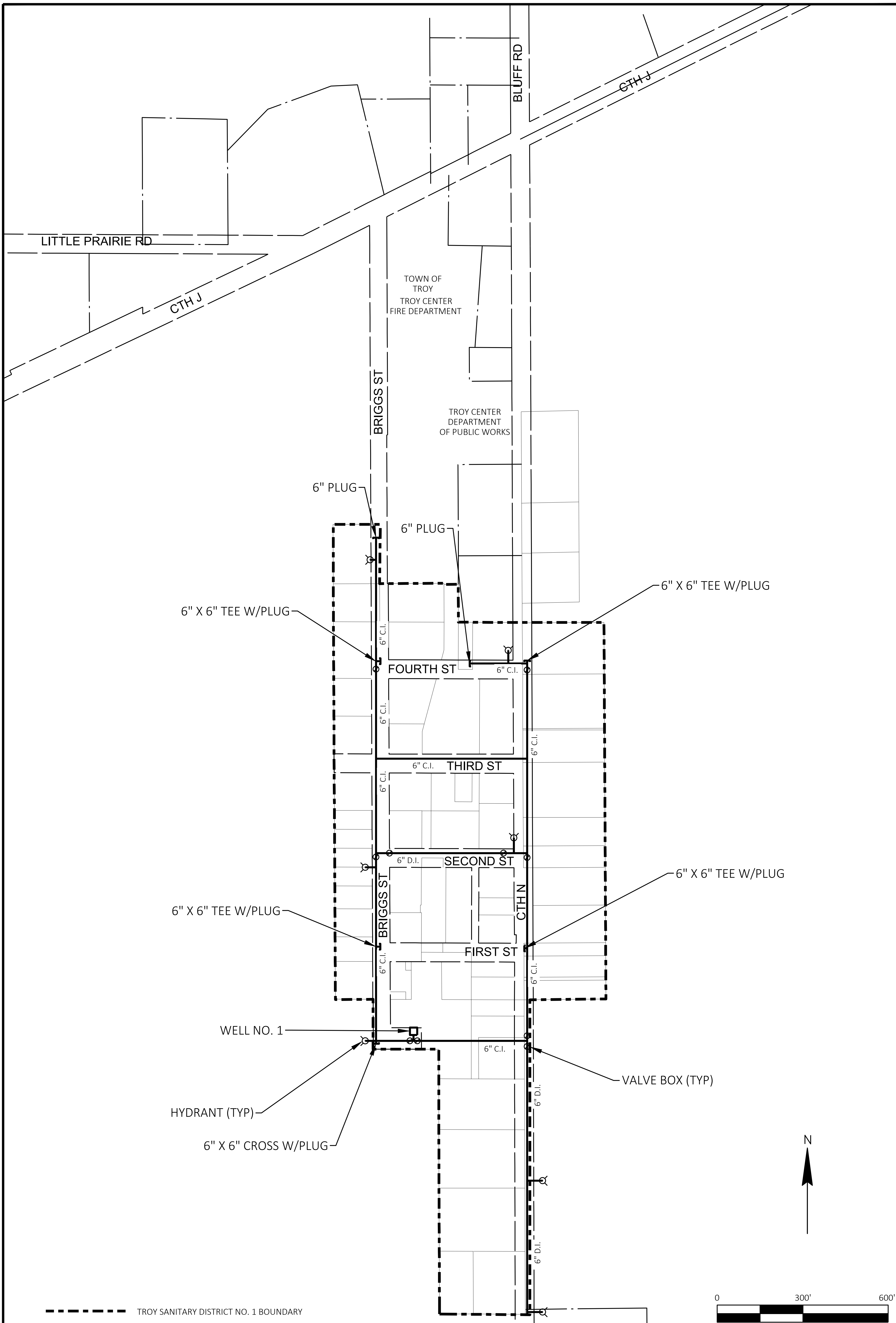
Recommended Plan

Item	Total Project Cost	Construction Time Frame
Valve Replacement Program	$70,000	0-3 years
Well No. 1 Chemical Feed System for Iron Sequestration & Chlorination, Chemical Feed Facility, Upgrade Wellhouse No. 1 Electrical and Generator	$225,000	3-5 years
Drill Well No. 2, Well No. 2 Pumping Equipment and Hydro-Pneumatic Tank, Wellhouse No. 2 Building	$780,000	5-10 years
Well No. 1 Pumping Equipment Replacement, Remodel Wellhouse No. 1	$325,000	5-10 years
Total	**$1,400,000**	

APPENDICES

APPENDIX A

TROY SANITARY DISTRICT NO. 1
WATER SYSTEM MAP



BAXTER & WOODMAN
Consulting Engineers

TROY CENTER SANITARY DISTRICT NO 1
WATER SYSTEM MAP

DESIGNED BY --	SCALE 1" = 300'
DRAWN BY NAH	PROJECT NO. 220260
CHECKED BY JWM	SHEET NO.
DATE 6/8/22	1 OF 1

APPENDIX B

HYDRO-PNEUMATIC TANK CLEANING REPORT

MUNICIPAL
WELL & PUMP

July 24, 2013

Troy Sanitary District
Attn: Ms Lisa Brockman
N8718 Briggs Street
East Troy, WI 53120

RE: Hydro-Pneumatic Tank Cleaning Report

Dear Ms. Brockman,

On July 23, 2013 your Hydro-Pneumatic Tank was taken out of service for cleaning and inspection. System pressure was maintained by SD personnel utilizing a pressure maintenance valve on a hydrant, and running the well pump constantly while cleaning and inspection occurred.

The cleaning crew implemented confined space entry protocol, and cleaned/removed approximately three gallons of iron and mineral scale solids from the vessel. The entire interior of the tank was high-pressure washed, and found to be in very good condition. Coating systems on the inside and out are holding up well to the intended service. All the inlet and outlet fittings on the tank were also found to be in very good condition.

Upon completion of the cleaning and inspection, the tank was chlorinated, flushed, sampled, and returned to service.

There are not any recommended repairs or modifications to the tank at this time.

I have included some photos of the tank interior that I will forward via email.

If you have any questions or concerns, please contact me at your convenience. I trust you will also forward this report to you DNR Representative for their review and approval.

Sincerely,

MUNICIPAL WELL & PUMP, A Division of Midwest Well Services, Inc.

Donald W. Rens
President

1212 Storbeck Drive, P.O. Box 311, Waupun, WI 53963
Office: 920-324-3400 – Toll-Free: 800-383-7412 – Fax: 920-324-3431 - IL: 847-541-8816
www.municipalwellandpump.com

PUMP DATA SHEET Turbine 60 Hz

any: Municipal Well and Pump | Customer: Troy Center
ne: Well # 1 - Troy Center
ate: 02/27/06 | Order No:

Pump:

Size: 5THC (18 stages)
Type: Lineshaft | Speed: 1770 rpm
Synch speed: 1800 rpm | Dia: 3.5 in
Curve: E6405TEPC0
Specific Speeds: | Ns: 3395
Pump Notes for Standard Sizes:
Suction Size-4" Discharge Sizes-3",4"
Vertical Turbine: | Bowl size: 5.13 in
Max lateral: 0.25 in
Thrust K factor: 2.36 lb/ft

Pump Limits for Standard Construction:

Temperature: 120 °F | Pressure: 480 psi g
Sphere size: 0.43 in

Search Criteria:

Flow: 110 US gpm | Head: 195 ft

Fluid:

Water | Temperature: 60 °F
SG: 1 | Vapor pressure: 0.2563 psi a
Viscosity: 1.105 cP | Atm pressure: 14.7 psi a
NPSHa: --- ft

Motor:

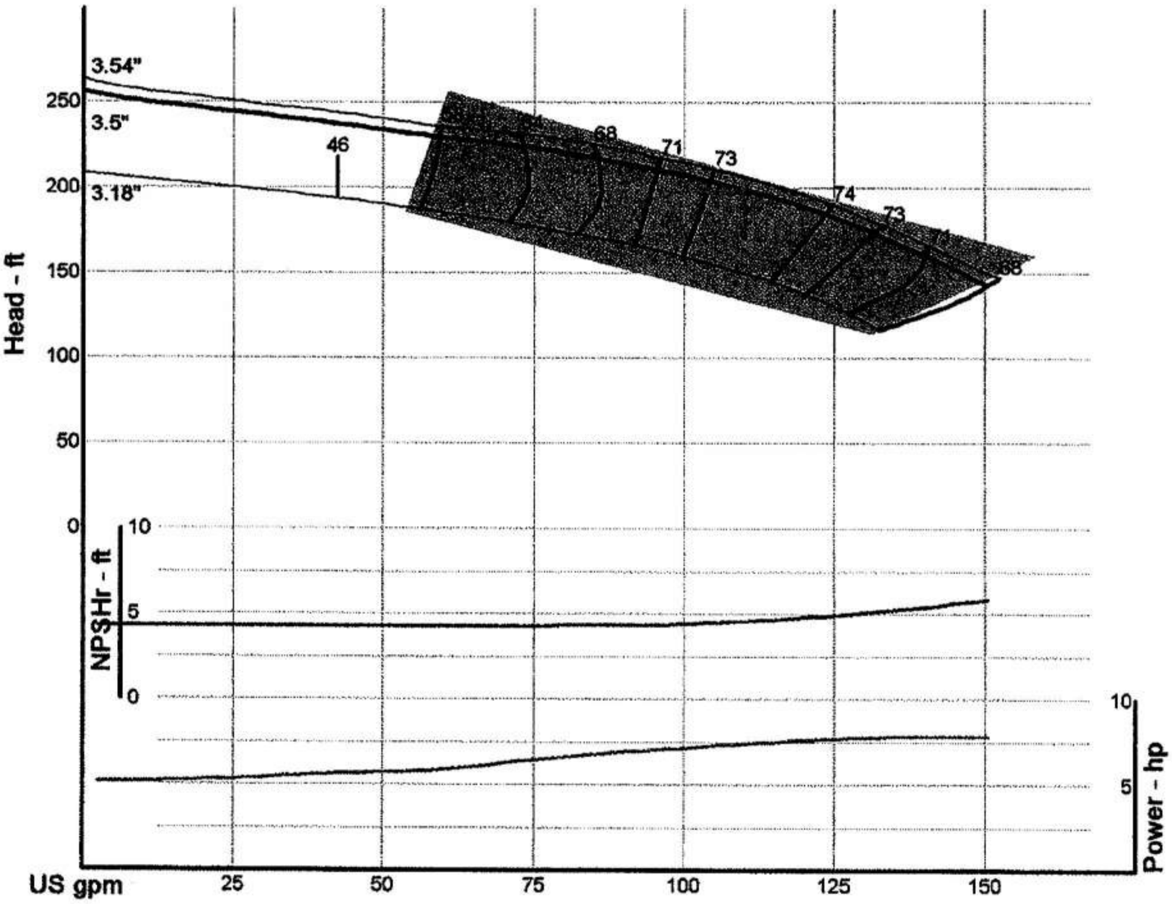
Standard: NEMA | Size: 10 hp
Speed: 1800

Sizing criteria: Max Power on Design Curve

---- Data Point ----
Flow: 109 US gpm
Head: 196 ft
Eff: 73.2%
Power: 7.32 hp
NPSHr: 4.48 ft

-- Design Curve --
Shutoff Head: 253 ft
Shutoff dP: 109 psi
Min Flow: --- US gpm
BEP: 74% eff
@ 124 US gpm
NOL Pwr: 7.81 hp
@ 140 US gpm

-- Max Curve --
Max Pwr: 8.12 hp
@ 141 US gpm



Performance Evaluation:

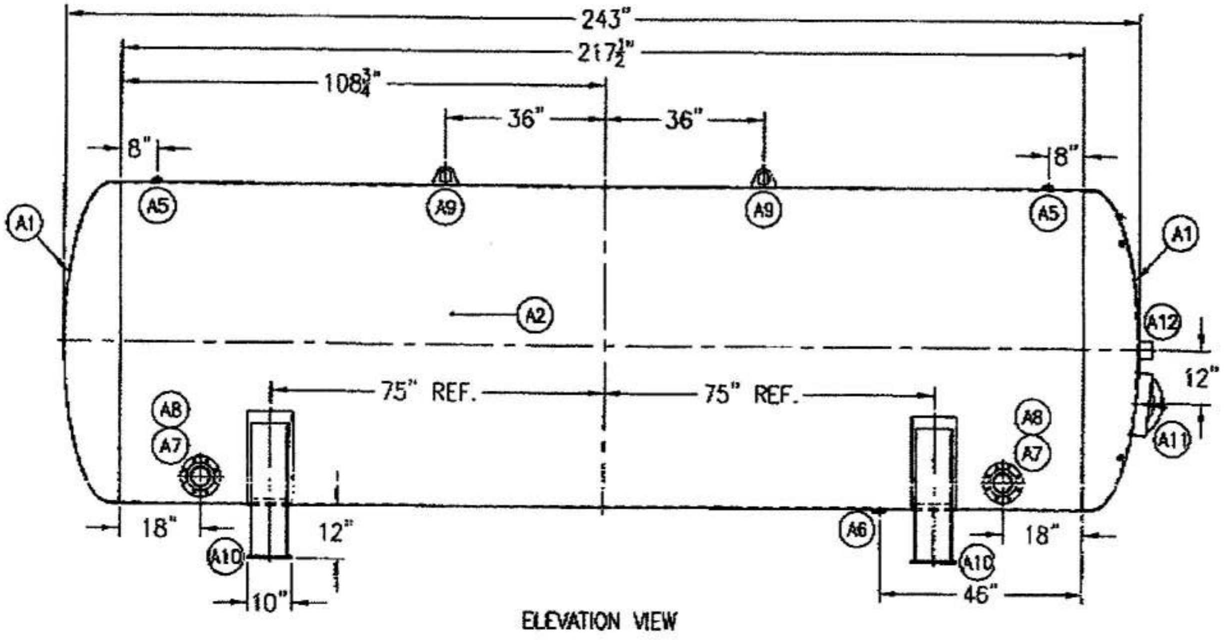
Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
132	1770	170	72.9	7.74	5.06
110	1770	195	73.3	7.34	4.5
88	1770	212	68.8	6.83	4.25
66	1770	223	60.8	6.08	4.19
44	1770	233	45.7	5.64	4.19

NOTES:
1. BUTT WELD SHELL TO HEADS.
2. ITEM A11 INCLUDES ELLIPTICAL RING, COVER, GASKET, TWO YOKES & TWO BOLTS AND NUTS.
3. DO NOT WELD SADDLES TO TANK.
4. GRIND ALL INTERNAL WELDS SMOOTH & TWO COATS OF TNEMEC POTAPOX.
5. EXTERIOR GRAY PRIMED & ONE COAT OF WHITE.

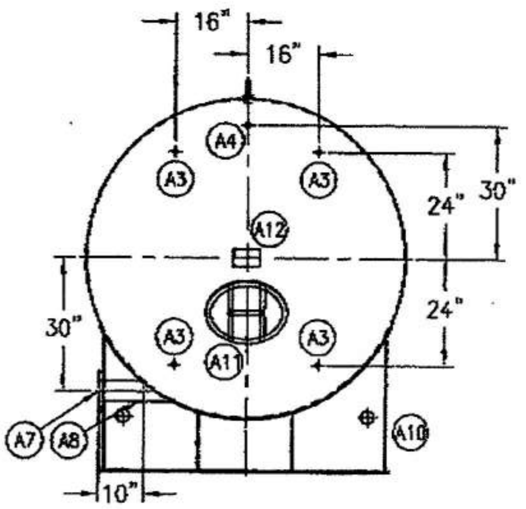
Reviewed for compliance with Contract Document requirements and actual project conditions. Variations from Engineer's design are highlighted.
By [signature]
On 10-27-05
For Municipal Well & Pump

BILL OF MATERIALS

ITEM	QTY.	DESCRIPTION
A1	2	HEAD, ø72" x 3/8" FLANGED & DISHED ([illegible] NON-CODE)
A2	1	SHELL, ø72" x 217½" x 5/16" THK
A3	4	FULL COUPLING, ø½" NPT
A4	1	FULL COUPLING, ø½" NPT
A5	2	HALF COUPLING, ø1" NPT
A6	1	HALF COUPLING, ø2" NPT
A7	2	FLANGE, ø4" 150# RAISED FACE SLIP-ON
A8	2	PIPE, ø4" x 18" LG. SCH 40
A9	2	LIFT LUGS, MEDIUM
A10	2	SADDLE, ø6' x 12" HIGH (SINGLE WALL) (SHIPPED LOOSE)
A11	1	MANWAY, 12" x 16" x ¾" x 4" ELLIPTICAL
A12	1	BRACKET, 12 GA. x 6"L x 4⅝"W x 3"H (FORMED)



ELEVATION VIEW



END VIEW

Lannon Tank
CORPORATION
20134 Main St., Lannon, WI 53046
1-800-207-7890

NO.	DATE	REVISION	INT	APP'D
.	.	.	.	

THIS DRAWING IS PROPERTY OF LANNON TANK CORP. AND MUST NOT BE COPIED, LOANED, OR DISTRIBUTED WITHOUT WRITTEN PERMISSION. PROPRIETARY – [illegible]

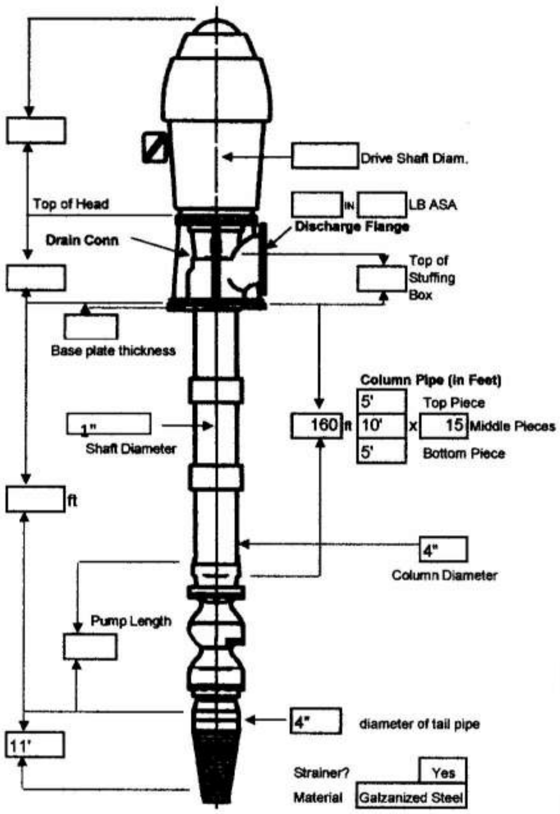
TITLE: PRESSURE VESSEL, 6' DIA. x 20'-3" 4,000 GAL. (NON-ASME CODE)			DRN BY: DMS
			CHKD BY:
CUSTOMER: MUNICIPAL WELL & PUMP	PO NO: MP05-263		DATE: 10/19/05
DWG NO: 4000PV	WEIGHT: 7,800 LBS.	SIZE: "A" PAGE: 1 OF 1	SCALE: 1:40

MUNICIPAL
WELL & PUMP

Line Shaft Turbine Pump

Installation Outline

		Job #	MP05-263
		Completed by:	Wes Derksen
Project Name	Troy Sanitary District	Date	5/16/2016



Customer Information					
Customer:	Troy Sanitary District				
Address:	N8718 Briggs Street				
City:	Troy Center	ST:		ZIP:	
Phone #		Fax: #			
Contact Name:	Lisa / Dawn	MWP Salesman		Don Rens	

Material of Construction			
Bowl:	Goulds 5 THC-18 stg	Impeller:	Bronze - 3.5" trim
Bowl Shaft:	SS - 1"	Shaft Coupling:	SS
Bowl Bearings:	Bronze	Shaft Bearings:	Bronze
Strainer:	Galvanized Cone	Bowl W/R:	
Shaft Sleeves:	1 & 3/16" SS	Column Pipe:	4" Stl w/combo cplgs
Lineshaft:	1" SS	Packing:	Graphite
Base Plate:	None	Head:	Layne

Pump			
Manufacturer Name:	Goulds	Model:	5THC
Suction:	4"	Discharge Head:	Layne 4"
Lineshaft:	SS	Discharge:	4"
Lubrication:	W/L	Column Pipe:	4" Schd 40 Steel
Stage:	18	Shaft Sleeves:	SS
TDH:	196	Trim:	3.5"
GPM:	109	BHP:	7.32 @ Design
RPM:	1770	Serial Number	511258

Motor			
Manufacturer Name	U.S	Type:	AUE
Enclosure:	B/H	NRR:	
SRC:	1.15	HP:	7.5
RPM:	1765	Phase:	3
Hertz:	60	Voltage:	480
Frame No:	FR 213TP	Type Coupling:	
Serial Number	Cat #H07E2BLE Model BF27 ID#K03-BF27-M		

Form Revised: 1/5/2010

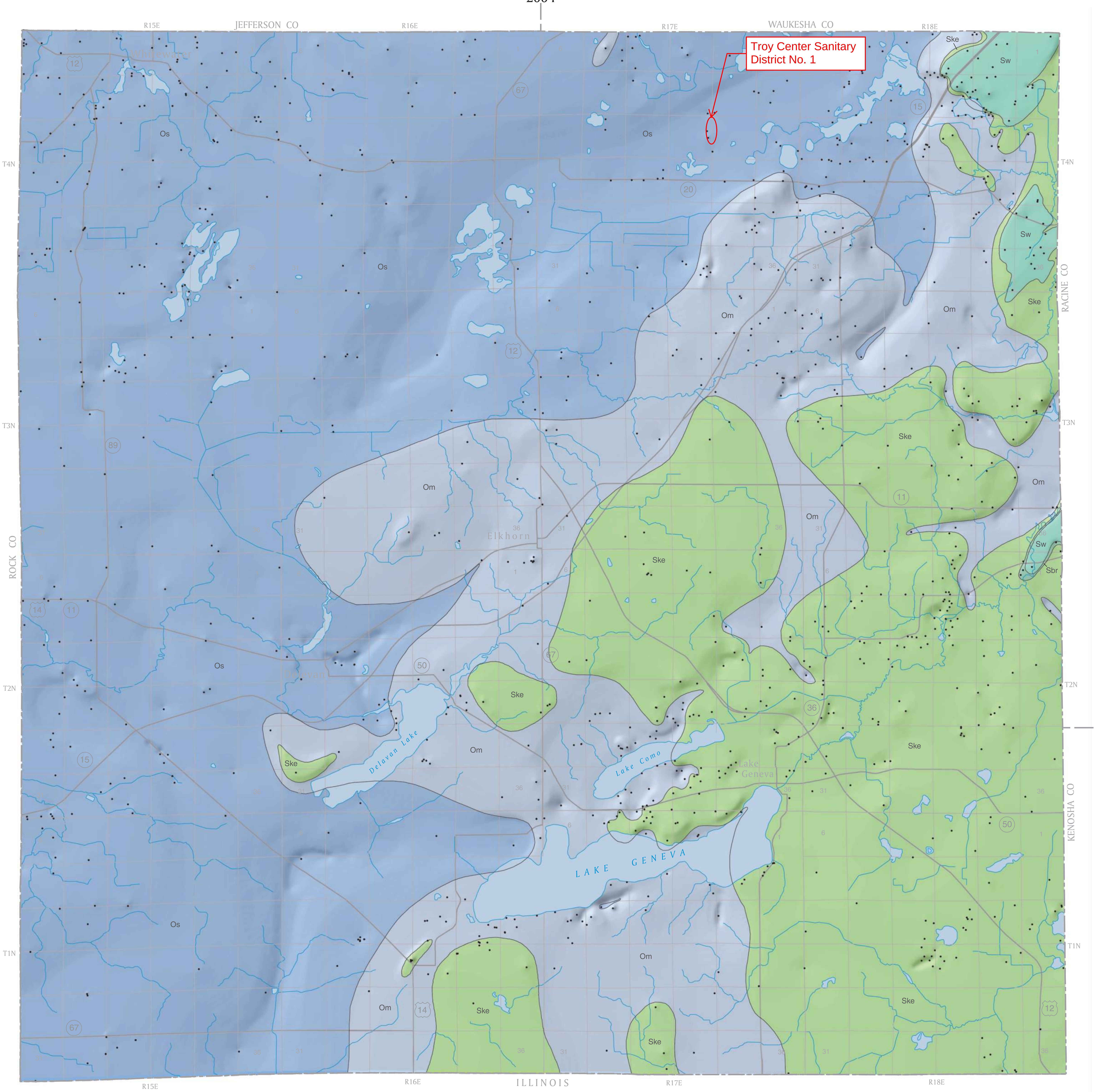
APPENDIX C

WALWORTH COUNTY GEOLOGIC MAPS

Preliminary bedrock geologic map of Walworth County, Wisconsin

K.M. Massie-Ferch

2004



EXPLANATION

Map units shown are covered by younger, unconsolidated sediment varying in thickness from a few feet to more than 500 feet.

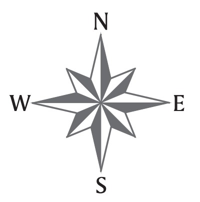
Silurian

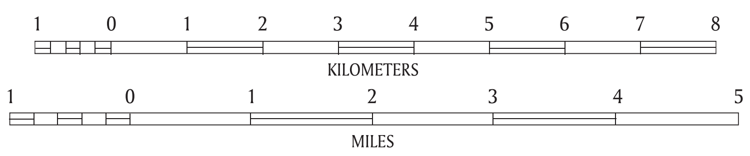
- Sw — **Waukesha Formation.** Dolomite, medium grained, thin- to medium-bedded, light to medium gray, locally cherty.
- Sbr — **Brandon Bridge Formation.** Dolomite, very argillaceous, pale green to pink.
- Ske — **Kankakee Equivalent.** Dolomite, fine to medium grained, light to medium gray, locally cherty and fossiliferous.

Ordovician

- Om — **Maquoketa Formation.** Shale, greenish gray to purplish; dolomite, very argillaceous, tan.
- Os — **Sinnipee Group.** Dolomite, tan to buff in color, thin to medium-bedded, fossiliferous, locally cherty.

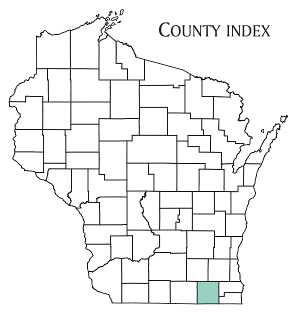
Contact   • Data point





Shaded relief of bedrock surface vertical exaggeration 5x

Wisconsin Transverse Mercator Projection
1991 adjustment to the North American Datum of 1983 (NAD 83/91)



This map represents work performed by the Wisconsin Geological and Natural History Survey and is released to the open files in the interest of making the information readily available. This map has not been edited or reviewed for conformity with Wisconsin Geological and Natural History Survey standards and nomenclature.

This map is part of an ongoing project funded by STATEMAP, the state component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey.

UW Extension
Wisconsin Geological and Natural History Survey
3817 Mineral Point Road, Madison, Wisconsin 53705-5100
phone 608/263-7389 fax 608/262-8086 www.uwex.edu/wgnhs/

James M. Robertson, *Director and State Geologist*

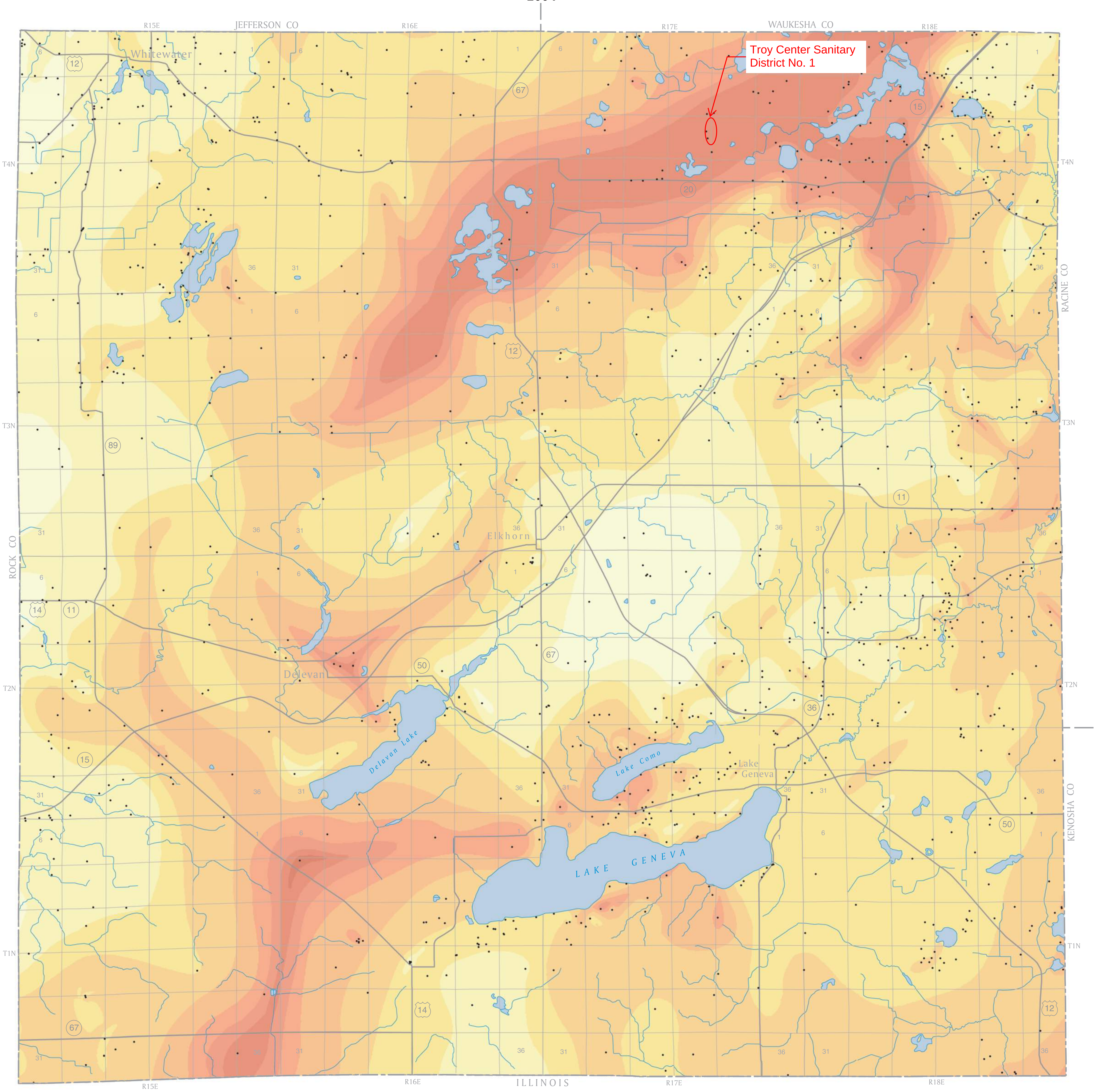
Data entry and processing by K.K. Zeiler. Cartography by D.L. Patterson.

Wisconsin Geological and Natural History Survey
Open-File Report 2004-11A

Preliminary bedrock topography map of Walworth County, Wisconsin

K.M. Massie-Ferch

2004



ESTIMATED ELEVATION IN FEET
(ABOVE MEAN SEA LEVEL)

> 850	600 - 650
800 - 850	550 - 600
750 - 800	500 - 550
700 - 750	< 500
650 - 700	· data point

N W E S

KILOMETERS 1 0 1 2 3 4 5 6 7 8

MILES 1 0 1 2 3 4 5

COUNTY INDEX

Wisconsin Transverse Mercator Projection
1991 adjustment to the North American Datum of 1983 (NAD 83/91)

This map represents work performed by the Wisconsin Geological and Natural History Survey and is released to the open files in the interest of making the information readily available. This map has not been edited or reviewed for conformity with Wisconsin Geological and Natural History Survey standards and nomenclature.

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James M. Robertson, *Director and State Geologist*

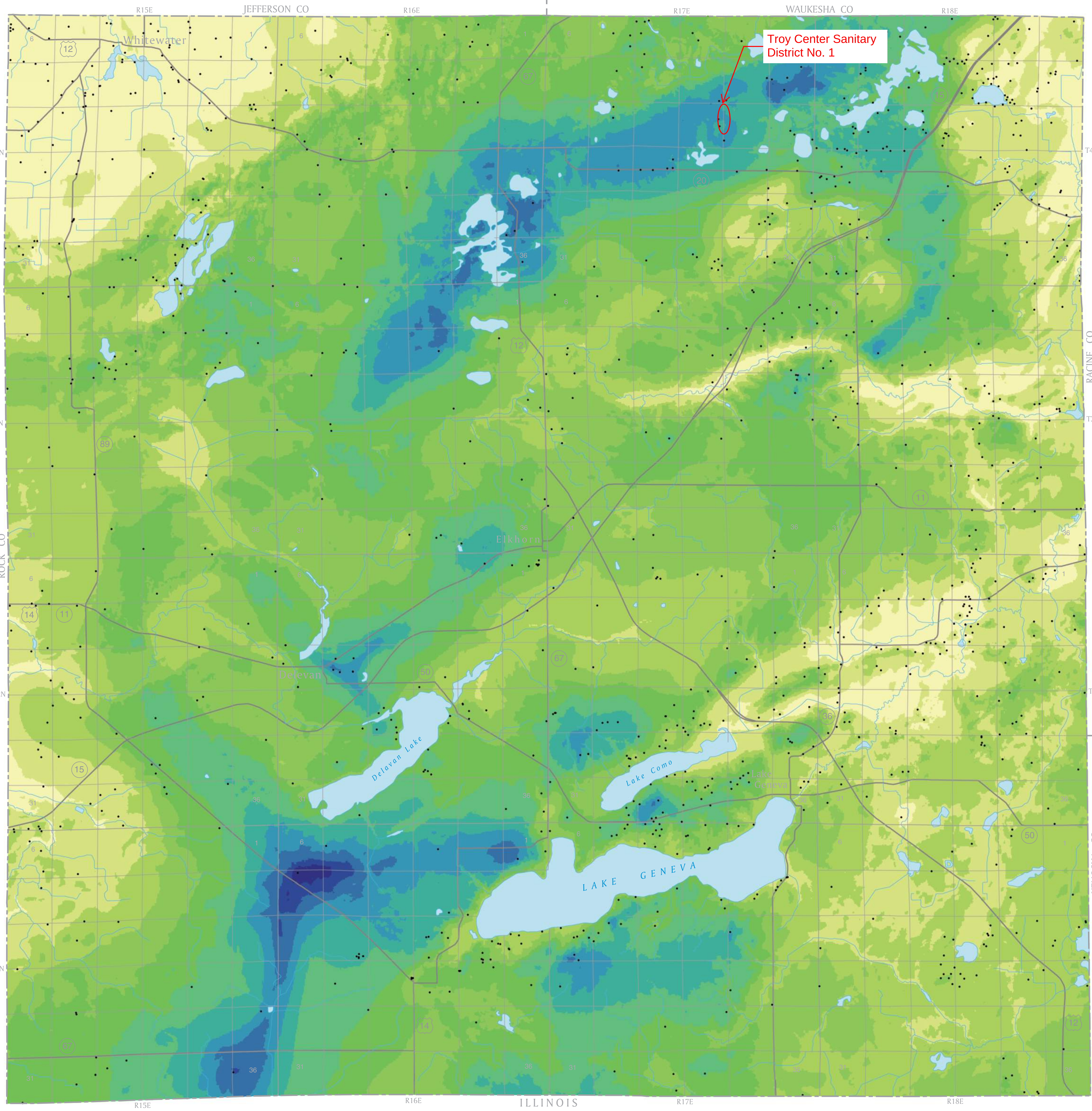
Data entry and processing by K.K. Zeiler. Cartography by D.L. Patterson.

Wisconsin Geological and Natural History Survey
Open-File Report 2004-11B

Preliminary depth to bedrock map of Walworth County, Wisconsin

K.M. Massie-Ferch

2004



ESTIMATED DEPTH IN FEET
(ABOVE MEAN SEA LEVEL)

< 50	200 – 250	400 – 450
50 – 100	250 – 300	450 – 500
100 – 150	300 – 350	> 500
150 – 200	350 – 400	data point

This map represents work performed by the Wisconsin Geological and Natural History Survey and is released to the open files in the interest of making the information readily available. This map has not been edited or reviewed for conformity with Wisconsin Geological and Natural History Survey standards and nomenclature.

This map is part of an ongoing project funded by STATEMAP, the state component of the National Cooperative Geologic Mapping Program of the U.S. Geological Survey.

N E S W

COUNTY INDEX

KILOMETERS 1 0 1 2 3 4 5 6 7 8

MILES 1 0 1 2 3 4 5

Wisconsin Transverse Mercator Projection
1991 adjustment to the North American Datum of 1983 (NAD 83/91)

UW Extension
Wisconsin Geological and Natural History Survey
3817 Mineral Point Road, Madison, Wisconsin 53705-5100
phone 608/263-7389 fax 608/262-8086 www.uwex.edu/wgnhs/

James M. Robertson, *Director and State Geologist*

Data entry and processing by K.K. Zeiler. Cartography by D.L. Patterson.

Wisconsin Geological and Natural History Survey
Open-File Report-2004-11C

APPENDIX D

WELL NO. 1 CONSTRUCTION REPORTS

Well Construction Report
WISCONSIN UNIQUE WELL NUMBER BH189

Drinking Water and Groundwater - DG/5
Department of Natural Resources, Box 7921
Madison WI 53707
Form 3300-077A

Property Owner	TROY SANITARY DISTRICT
Phone #	(414)363-6500
Mailing Address	N8661 HWY N
City	EAST TROY
State	WI
Zip Code	53120
County	Walworth
Co. Permit #	
Notification #	
Completed	01-01-1946

1. Well Location
Town of TROY CENTER
Fire # (if avail.)

Subdivision Name	Lot #	Block #

Well Constructor (Business Name)	Lic. #	Facility ID # (Public Wells)
LAYNE CHRISTENSEN COMPANY	582	265014640

Method Code: GPS008

Well Plan Approval #

Address: W229 N5005 DUPLAINVILLE
PEWAUKEE WI 53072

or Govt Lot #	Section	Township	Range
	15	4 N	17 E

Approval Date (mm-dd-yyyy)

2. Well Type Reconstruction
of previous unique well # constructed in

Hicap Permanent Well #	Common Well #	Specific Capacity
87521	001	1

Reason for replaced or reconstructed well ?

3. Well serves # of
Municipal/Community
Heat Exchange____# of drillholes

Hicap Well ?
Hicap Property ?
Hicap Potable ?

Construction Type Drilled

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
10	Surface	130
6	130	626

Upper Enlarged Drillhole / Lower Open Bedrock
- Rotary - Mud Circulation ....
- Rotary - Air ....
- Rotary - Air & Foam ....
- Drill-Through Casing Hammer
- Reverse Rotary
- Cable-tool Bit ____in. dia...
- Dual Rotary ....
- Temp. Outer Casing ____in. dia
- Removed? ____depth ft. (If NO explain on back side)

8. Geology

Geology Codes				**8. Geology** Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
		Z		CLAY @ GRAVEL	Surface	25
		M	T	SAND @ SILT WITH TILL	25	160
		S		SAND	160	340
		L		DOLOMITE-GALENA-PLATTEVILLE	340	525
G		N		SANDSTONE-ST PETER	525	560
	H	N	M	SILTSTONE @ SS-ST PETER	560	626

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
10		Surface	130
6		0	352

Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)

9. Static Water Level
52 ft. below ground surface

11. Well Is
18 in. above grade
Developed ?
Disinfected ?
Capped ?

10. Pump Test
Pumping level 152 ft. below surface
Pumping at 100 GP for 4 Hrs.
Pumping Method ?

7. Grout or Other Sealing Material
Method

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	Surface	130	

12. Notified Owner of need to fill & seal ?
Filled & Sealed Well(s) as needed?

13. Constructor / Supervisory Driller	Lic #	Date Signed
Drill Rig Operator	Lic or Reg #	Date Signed

4a. Potential Contamination Sources Is the well located in floodplain ?

Comment: ORIGINALLY DRILLED IN 1944-DEEPENED IN 1946 TO 626'-WAS ORIGINALLY OWNED BY UNITED MILK PRODUCTS UNTIL SANITARY DISTRICT PURCHASED IN 1957

Water Quality Text:

Water Quantity Text: PUMP CAPACITY IS 120 GPM

Difficulty Text:

Created On: 03-09-1999 Created by: WELL CONST LOAD Updated On: 10-24-2002 Updated by: WELL PROCESS

UNITED MILK PRODUCTS CO. WELL, TROY CENTER, WIS.

Sec. 15, T. 4 N., R. 17 E.

Layne-Northwest Co., Contractors, 1944, 1946

Samples examined by F. T. Thwaites, Nos. 119766-119826; 128509-128547

DRIFT	0-5	5	Clay, sandy, brown-gray	
	5-25	20	Gravel, fine sandy	
	25-50	25	Sand, coarse, gray, dolomitic	
	50-70	20	Till, very sandy, yellow-gray, dolomitic	52 water
	70-90	20	Silt, gray, dolomitic	10" pipe
	90-100	10	Sand, very fine, gray, dolomitic	6" pipe cemented
	100-103	3	Silt, gray, dolomitic	
	103-107	4	Sand, medium to fine, gray, dolomitic	
	107-120	13	Sand, fine to silty, gray, dolomitic	130 shoe
	120-160	40	Silt, gray, dolomitic	
	160-190	30	Sand, very fine to silty, gray, dolomitic	
	190-220	30	Sand, fine, gray, dolomitic	6" pipe
	220-250	30	Sand, medium to fine, gray, dolomitic	
	250-280	30	Sand, fine to silty, possibly till	
	280-330	50	Sand, fine, gray, dolomitic	
340	330-340	10	Sand, medium to fine, gray, dolomitic	
GALENA-PLATTEVILLE	340-360	20	Dolomite, light gray, broken, much sand	352
	360-390	30	Dolomite, gray, broken, much sand, very fine to silty in crevices	
	390-405	15	Dolomite, light gray	6" hole
	405-410	5	Dolomite, gray, much sand	
	410-418	8	No samples	
	418-435	17	Dolomite, light gray, some blue-gray	
	435-460	25	Dolomite, light gray	
	460-490	30	Dolomite, light gray, blue-gray	
	490-515	25	Dolomite, light gray	
185	515-525	10	Dolomite, lt.gray, gn-gray, sandy, pyritic	
ST. PETER	525-540	15	Sandstone, fine to medium, light gray, dol	
	540-555	15	Sandstone, medium to fine, light gray	
	555-560	5	Sandstone, fine to medium, light gray	
	560-570	10	Siltstone, sandy, light gray, dolomitic	
	570-575	5	Sandstone, fine to medium, light gray	
	575-580	5	Siltstone, sandy, light gray	
	580-600	20	Sandstone, fine, much silt, light gray	
	600-605	5	Siltstone, sandy, light gray	
101	605-610	5	Sandstone, fine, much silt, light gray	
	610-615	5	Siltstone, sandy, light gray	
	615-626	11	Sandstone, fine, silty, lt.gy, dol; cf, shale	

rmations: Drift(outwash, till, lake deposits); Galena-Platteville; St. Peter

ested in 1944 at depth 410 for 4 hours at 100 g.p.m. specific capacity = 1.04 g.p.m./ft.
tested at total depth at [illegible] g.p.m. specific capacity = [illegible] g.p.m./ft.

APPENDIX E

WATER QUALITY TEST RESULTS

ANALYTICAL REPORT

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034
Printed: 05/03/22

Client: **Town of Troy Sanitary District 1**
Attn: Darrel Markham
N8870 Briggs Street
East Troy, WI 53120

NLS Project: 382901
NLS Customer: 114180
Fax: 262 642 5227 Phone: 262 642 5292

Project: **New Well/99047**

EP1 NLS ID: 1306291
COC: 266257:1 Matrix: DW
Collected: 04/05/22 14:00 Received: 04/06/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Alkalinity, tot. as CaCO3 (unfiltered)	270	mg/L	1	1.0	2.0	04/13/22	2320 B-1997	721026460
Aluminum, tot. recoverable as Al by ICP-MS	ND	mg/L	1	0.0090	0.031	04/12/22	EPA 200.8, Rev 5.4	721026460
Antimony, tot. recoverable as Sb by ICP-MS	ND	ug/L	1	0.32	1.1 / 6.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Arsenic, tot. recoverable as As by ICP-MS	3.6	ug/L	1	0.85	2.8 / 10	04/12/22	EPA 200.8, Rev 5.4	721026460
Asbestos, water by TEM	ND	MF/L	1	0.20	/ 7000000	04/25/22	EPA 100.2	11839
	Sample ozonated prior to analysis due to lab receipt time exceeding 48hr method hold time.							
Barium, tot. recoverable as Ba by ICP-MS	120	ug/L	1	0.20	0.67 / 2000	04/12/22	EPA 200.8, Rev 5.4	721026460
Beryllium, tot. recoverable as Be by ICP-MS	ND	ug/L	1	0.060	0.20 / 4.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Cadmium, tot. recoverable as Cd by ICP-MS	ND	ug/L	1	0.12	0.40 / 5.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Calcium, tot. recoverable as Ca by ICP	77	mg/L	1	0.19	0.63	04/07/22	EPA 200.7, Rev 4.4	721026460
Chloride, as Cl (unfiltered)	7.9	mg/L	1	0.32	2.0	04/06/22	EPA 300.0, Rev 2.1	721026460
Chromium, tot. recoverable as Cr by ICP	ND	ug/L	1	1.1	3.8 / 100	04/07/22	EPA 200.7, Rev 4.4	721026460
Copper, tot. recoverable as Cu by ICP-MS	ND	ug/L	1	1.7	5.6 / 1300	04/12/22	EPA 200.8, Rev 5.4	721026460
Cyanide, tot. (distilled) as CN	ND	mg/L	1	0.011	0.036 / 0.20	04/14/22	4500-CN-E-1999	721026460
Fluoride, as F (unfiltered)	0.13	mg/L	1	0.030*	0.10 / 4.0*	04/06/22	EPA 300.0, Rev 2.1	721026460
Hardness, tot. recoverable as CaCO3 (calc/unfilt/icpms)	350	mg/L	1	0.61	2.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Iron, tot. recoverable as Fe by ICP	1.1	mg/L	1	0.063	0.21	04/07/22	EPA 200.7, Rev 4.4	721026460
Lead, tot. recoverable as Pb by ICP-MS	ND	ug/L	1	0.25	0.82 / 15	04/12/22	EPA 200.8, Rev 5.4	721026460
Magnesium, tot. recoverable as Mg by ICP	37	mg/L	1	0.023	0.075	04/07/22	EPA 200.7, Rev 4.4	721026460
Manganese, tot. recoverable as Mn by ICP-MS	26	ug/L	1	1.9	6.3	04/12/22	EPA 200.8, Rev 5.4	721026460
Mercury, tot. recoverable as Hg by ICP-MS	ND	ug/L	1	0.047	0.16 / 2.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Nickel, tot. recoverable as Ni by ICP-MS	ND	ug/L	1	1.0	3.4 / 100	04/15/22	EPA 200.8, Rev 5.4	721026460
Nitrogen, ammonia as N (unfiltered)	[0.11]	mg/L	1	0.039	0.13	04/07/22	4500-NH3 G-1997	721026460
Nitrate as N, corr. for NO2 (unfilt)	ND	mg/L	1	0.073	0.24 / 10	04/06/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, nitrite as N	ND	mg/L	1	0.040*	0.13 / 1.0*	04/06/22	EPA 300.0, Rev 2.1	721026460
Nitrogen, NO2 + NO3 as N (unfiltered)	ND	mg/L	1	0.073	0.24 / 10	04/06/22	EPA 300.0, Rev 2.1	721026460
pH, Lab	7.23	s.u.	1			04/06/22	4500-H+B-2000	721026460
Radioactivity, Gross Alpha (including Uranium & Radon)	6.45 +/- 2.63	pCi/L		2.8		04/28/22	EPA 900.0	999407970
Radioactivity, Gross Alpha (excluding Uranium & Radon)	6.38	pCi/L	1		/ 15	05/02/22	EPA 900.0	999407970
Radon-222	882 +/- 107	pCi/L		130		04/13/22	SM7500 RnB	999407970
Radium 226, total	1.00 +/- 0.513	pCi/L		0.52	/ 5.0	04/28/22	EPA 903.1	999407970
Radium 228, total	0.833 +/- 0.429	pCi/L		0.82	/ 5.0	04/26/22	EPA 904.0	999407970
Uranium	0.099 +/- 0.021	ug/L		0.26	/ 30	04/27/22	ASTM D5174.97	999407970
Selenium, tot. recoverable as Se by ICP-MS	ND	ug/L	1	1.0	3.3 / 50	04/12/22	EPA 200.8, Rev 5.4	721026460
Silver, tot. recoverable as Ag by ICP-MS	ND	ug/L	1	0.26	0.85	04/12/22	EPA 200.8, Rev 5.4	721026460
Sodium, tot. recoverable as Na by ICP	2.9	mg/L	1	0.12	0.41	04/07/22	EPA 200.7, Rev 4.4	721026460
Solids, tot. dis. (TDS)	360	mg/L	1	2.0*	2.0*	04/13/22	2540 C-1997	721026460
Sulfate, as SO4 (unfiltered)	45	mg/L	1	0.31	2.0	04/06/22	EPA 300.0, Rev 2.1	721026460
Thallium, tot. recoverable as Tl by ICP-MS	ND	ug/L	1	0.54	1.8 / 2.0	04/12/22	EPA 200.8, Rev 5.4	721026460
Turbidity, screening - SDWA	ND	NTU	1	1.0*	1.0*	04/07/22	EPA 180.1	721026460
Lab filtration for TDS	yes					04/13/22	EPA 160.1	721026460
SDWA Volatile Organics (VOCs) by EPA 524.2	see attached					04/07/22	EPA 524.2, Rev 4.1	721026460
1,2-Dibromoethane (EDB) by EPA 504.1	ND	ug/L	1	0.0065	0.022 / 0.050	04/19/22	EPA 504.1, Rev 1.1	721026460
1,2-Dibromo-3-Chloropropane (DBCP) by EPA 504.1	ND	ug/L	1	0.0074	0.025 / 0.20	04/19/22	EPA 504.1, Rev 1.1	721026460
Multi-Component Pesticides and PCBs by EPA 505	see attached					04/11/22	EPA 505, Rev 2.1	721026460

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

Client: Town of Troy Sanitary District 1
Attn: Darrel Markham
N8870 Briggs Street
East Troy, WI 53120

NLS Project: 382901
NLS Customer: 114180
Fax: 262 642 5227   Phone: 262 642 5292

Project: New Well/99047

EP1 NLS ID: 1306291
COC: 266257:1 Matrix: DW
Collected: 04/05/22 14:00 Received: 04/06/22

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Micro extraction - (504.1)	yes					04/19/22	EPA 504.1, Rev 1.1	721026460
Micro extraction - (505)	yes					04/11/22	EPA 505, Rev 2.1	721026460
EPA 549.2 Solid Phase Extraction	yes					04/11/22	EPA 549.2, Rev 1	721026460
Endothall by EPA 548.1	ND	ug/L	1	1.5*	5.1*	04/12/22	EPA 548.1, Rev 1	721026460
Glyphosate by EPA 547	ND	ug/L	1	5.6*	19*	04/12/22	EPA 547, 1990	721026460
	The laboratory control spike and laboratory control spike duplicate relative percent difference exceeded QC limits.							
Carbamates by EPA 531.1	see attached					04/13/22	EPA 531.1, Rev 3.1	721026460
Cyanazine Drinking Water Analysis GC/MS by EPA 525.2	see attached				*	04/13/22	EPA 525.2, Rev 2	721026460
EPA 525.2 Cyanazine Solid Phase Extraction	yes					04/12/22	EPA 525.2, Rev 2	721026460
EPA 525.2 Solid Phase Extraction	yes					04/12/22	EPA 525.2, Rev 2	721026460
EPA 548.1 Solid Phase Extraction	yes					04/11/22	EPA 548.1, Rev 1	721026460
Semi-Volatile Drinking Water Analysis GC/MS by 525.2	see attached					04/13/22	EPA 525.2, Rev 2	721026460
Diquat (DW) by EPA 549.2	ND	ug/L	1	0.34*	1.1*	04/12/22	EPA 549.2, Rev 1	721026460
Acid Herbicides (DW) by EPA 515.3	see attached					04/13/22	EPA 515.3	632021390

Trip Blank NLS ID: 1306292
Matrix: TB
Collected: 04/05/22 00:00 Received: 04/06/22

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
SDWA Volatile Organics (VOCs) by EPA 524.2	not analyzed					04/11/22	EPA 524.2	721026460
1,2-Dibromoethane (EDB) by EPA 504.1	not analyzed		1			04/19/22	EPA 504.1	721026460
1,2-Dibromo-3-Chloropropane (DBCP) by EPA 504.1	not analyzed		1			04/19/22	EPA 504.1	721026460
Micro extraction - (504.1)	not analyzed					04/19/22	EPA 504.1	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.
ND = Not Detected (< LOD)   LOD = Limit of Detection   LOQ = Limit of Quantitation   NA = Not Applicable
DWB = Dry Weight Basis   %DWB = (mg/kg DWB) / 10000   1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples.   Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

ANALYTICAL RESULTS: Multi-Component Pesticides and PCBs by EPA Method 505, Rev 2.1

Customer: Town of Troy Sanitary District 1 NLS Project: 382901
Project Description: New Well/99047
Project Title: Template: 505DW Printed: 05/03/2022 09:20

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/11/22 - Analytes: 3

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Total Chlordane	ND	ug/L	1	0.034	0.11	2	
Total PCBs ***	ND	ug/L	1	0.10	0.40	.5	
Toxaphene	ND	ug/L	1	0.66	2.2	3	

*** LODs (ug/L) - PCB1016 (0.082); PCB1221 (0.087); PCB1232 (0.141); PCB1242 (0.152); PCB1248 (0.103); PCB1254 (0.073); PCB1260 (0.066). MCL value is as DCB.

ANALYTICAL RESULTS: ACID HERBICIDE ANALYSES BY SDWA METHOD 515.3

Customer: Town of Troy Sanitary District 1 NLS Project: 382901

Project Description: New Well/99047

Project Title: Template: DAVYSDW6 Printed: 05/03/2022 09:19

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/13/22 - Analytes: 7

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
2,4-D	ND	ug/L	1	0.24	0.80	70	
Dalapon	ND	ug/L	1	1.7	5.8	200	
Dicamba	ND	ug/L	1	0.21	0.70		
Dinoseb	ND	ug/L	1	0.17	0.56	7	
Pentachlorophenol	ND	ug/L	1	0.040	0.14	1	
Picloram (Tordon)	ND	ug/L	1	0.10	0.33	500	
2,4,5-TP (Silvex)	ND	ug/L	1	0.13	0.44	50	
2,4-Dichlorophenylacetic Acid (SURR)	100%		1				S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: GCMS 524.2, Rev 4.1 Safe Drinking Water Analysis

Customer: Town of Troy Sanitary District 1 NLS Project: 382901

Project Description: New Well/99047

Project Title: Template: 524W Printed: 05/03/2022 09:19

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/07/22 - Analytes: 60

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Benzene	ND	ug/L	1	0.30	1.0	5	
Bromobenzene	ND	ug/L	1	0.19	0.64		
Bromochloromethane	ND	ug/L	1	0.18	0.61		
Bromodichloromethane	ND	ug/L	1	0.15	0.48	80	
Bromoform	ND	ug/L	1	0.14	0.45	80	
Bromomethane	ND	ug/L	1	0.49	1.6		
n-Butylbenzene	ND	ug/L	1	0.20	0.68		
sec-Butylbenzene	ND	ug/L	1	0.21	0.70		
tert-Butylbenzene	ND	ug/L	1	0.20	0.68		
Carbon Tetrachloride	ND	ug/L	1	0.23	0.78	5	
Chlorobenzene	ND	ug/L	1	0.18	0.59	100	
Chloroethane	ND	ug/L	1	1.5	4.9		
Chloroform	ND	ug/L	1	0.20	0.66	80	
Chloromethane	ND	ug/L	1	0.26	0.87		
2-Chlorotoluene	ND	ug/L	1	0.18	0.60		
4-Chlorotoluene	ND	ug/L	1	0.16	0.52		
Dibromochloromethane	ND	ug/L	1	0.18	0.61	80	
1,2-Dibromo-3-Chloropropane	ND	ug/L	1	0.20	0.67		
1,2-Dibromoethane	ND	ug/L	1	0.10	0.34		
Dibromomethane	ND	ug/L	1	0.17	0.57		
1,2-Dichlorobenzene	ND	ug/L	1	0.12	0.39	600	
1,3-Dichlorobenzene	ND	ug/L	1	0.21	0.69		
1,4-Dichlorobenzene	ND	ug/L	1	0.19	0.64	75	
Dichlorodifluoromethane	ND	ug/L	1	0.45	1.5		
1,1-Dichloroethane	ND	ug/L	1	0.21	0.68		
1,2-Dichloroethane	ND	ug/L	1	0.14	0.48	5	
1,1-Dichloroethene	ND	ug/L	1	0.27	0.89	7	
cis-1,2-Dichloroethene	ND	ug/L	1	0.15	0.49	70	
trans-1,2-Dichloroethene	ND	ug/L	1	0.32	1.1	100	
1,2-Dichloropropane	ND	ug/L	1	0.18	0.58	5	
1,3-Dichloropropane	ND	ug/L	1	0.13	0.43		
2,2-Dichloropropane	ND	ug/L	1	0.30	0.99		
1,1-Dichloropropene	ND	ug/L	1	0.21	0.71		
cis-1,3-Dichloropropene	ND	ug/L	1	0.18	0.60		
trans-1,3-Dichloropropene	ND	ug/L	1	0.27	0.92		
Ethylbenzene	ND	ug/L	1	0.14	0.47	700	
Hexachlorobutadiene	ND	ug/L	1	0.32	1.1		
Isopropylbenzene	ND	ug/L	1	0.21	0.71		
p-Isopropyltoluene	ND	ug/L	1	0.24	0.79		
Methylene chloride	ND	ug/L	1	1.3	4.3	5	
Naphthalene	ND	ug/L	1	0.46	1.5		
n-Propylbenzene	ND	ug/L	1	0.28	0.92		
Styrene	ND	ug/L	1	0.18	0.60	100	
ortho-Xylene	ND	ug/L	1	0.26	0.86		
1,1,1,2-Tetrachloroethane	ND	ug/L	1	0.11	0.38		
1,1,2,2-Tetrachloroethane	ND	ug/L	1	0.17	0.57		
Tetrachloroethene	ND	ug/L	1	0.42	1.4	5	
Toluene	ND	ug/L	1	0.20	0.67	1000	
1,2,3-Trichlorobenzene	ND	ug/L	1	0.21	0.68		
1,2,4-Trichlorobenzene	ND	ug/L	1	0.16	0.54	70	
1,1,1-Trichloroethane	ND	ug/L	1	0.18	0.59	200	
1,1,2-Trichloroethane	ND	ug/L	1	0.18	0.60	5	
Trichloroethene	ND	ug/L	1	0.26	0.85	5	

ANALYTICAL RESULTS: GCMS 524.2, Rev 4.1 Safe Drinking Water Analysis

Customer: Town of Troy Sanitary District 1 NLS Project: 382901

Project Description: New Well/99047

Project Title: Template: 524W Printed: 05/03/2022 09:19

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/07/22 - Analytes: 60

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Trichlorofluoromethane	ND	ug/L	1	0.24	0.80		
1,2,3-Trichloropropane	ND	ug/L	1	0.28	0.92		
1,2,4-Trimethylbenzene	ND	ug/L	1	0.29	0.98		
1,3,5-Trimethylbenzene	ND	ug/L	1	0.27	0.91		
Vinyl chloride	ND	ug/L	1	0.11	0.36	.2	
meta,para-Xylene	ND	ug/L	1	0.52	1.7	10000	
MTBE	ND	ug/L	1	0.20	0.66		
4-Bromofluorobenzene (SURR)	75%		1				S
1,2-Dichlorobenzene-d4 (SURR)	84%		1				S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.

ANALYTICAL RESULTS: GCMS 525.2, Rev 2 Safe Drinking Water Analysis - DNR form

Customer: Town of Troy Sanitary District 1 NLS Project: 382901

Project Description: New Well/99047

Project Title: Template: 525DNRL.ISQ Printed: 05/03/2022 09:20

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/13/22 - Analytes: 24

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Alachlor (Lasso)	ND	ug/L	1	0.0052	0.017	2	
Aldrin	ND	ug/L	1	0.013	0.042		
Atrazine	ND	ug/L	1	0.0060	0.020	3	
Benzo[a]pyrene	ND	ug/L	1	0.011	0.037	.2	
Butachlor	ND	ug/L	1	0.031	0.10		
Chlordane alpha	ND	ug/L	1	0.013	0.043		
Chlordane gamma	ND	ug/L	1	0.013	0.045		
Cyanazine	ND	ug/L	1	0.054	0.18		
Deethylatrazine	ND	ug/L	1	0.036	0.12		
Deisopropylatrazine	ND	ug/L	1	0.31	1.0		
Dieldrin	ND	ug/L	1	0.014	0.047		
Di(2-ethylhexyl)adipate	ND	ug/L	1	0.42	1.4	400	
Di(2-ethylhexyl)phthalate	ND	ug/L	1	0.47	1.6	6	
Endrin	ND	ug/L	1	0.0080	0.027	2	LCH
Heptachlor	ND	ug/L	1	0.013	0.043	.4	
Heptachlor epoxide	ND	ug/L	1	0.013	0.043	.2	
Hexachlorobenzene	ND	ug/L	1	0.014	0.047	1	
Hexachlorocyclopentadiene	ND	ug/L	1	0.026	0.086	50	
BHC gamma (Lindane)	ND	ug/L	1	0.0049	0.016	.2	
Methoxychlor	ND	ug/L	1	0.0094	0.031	40	
Dual (Metolachlor)	ND	ug/L	1	0.0064	0.021		
Metribuzin (Sencor)	ND	ug/L	1	0.028	0.093		
Propachlor	ND	ug/L	1	0.0056	0.019		
Simazine	ND	ug/L	1	0.023	0.076	4	
1,3-Dimethyl-2-Nitrobenzene (SURR)	111%		1				S
Triphenylphosphate (SURR)	109%		1				S
Perylene-d12 (SURR)	78.1%		1				S

NOTES APPLICABLE TO THIS ANALYSIS:

S = This compound is a surrogate used to evaluate the quality control of a method.
LCH = Laboratory control spike recovered above QC limits.
The surrogate 1,3-Dimethyl-2-Nitrobenzene recovered above QC limits in the analysis of Cyanazine.
The surrogate Perylene-d12 recovered below QC limits in the analysis of Cyanazine.

ANALYTICAL RESULTS: Carbamates by EPA Method 531.1, Rev 3.1

Customer: Town of Troy Sanitary District 1 NLS Project: 382901

Project Description: New Well/99047

Project Title: Template: 531DW1200 Printed: 05/03/2022 09:20

Sample: 1306291 EP1 Collected: 04/05/22 Analyzed: 04/13/22 - Analytes: 8

ANALYTE NAME	RESULT	UNITS	DIL	LOD	LOQ	MCL	Note
Aldicarb	ND	ug/L	1	0.25	0.82		
Aldicarb Sulfone	ND	ug/L	1	0.087	0.29		
Aldicarb Sulfoxide	ND	ug/L	1	0.070	0.23		
Carbaryl	ND	ug/L	1	0.084	0.28		
Carbofuran	ND	ug/L	1	0.12	0.39	40	
3-Hydroxycarbofuran	ND	ug/L	1	0.12	0.41		
Methomyl	ND	ug/L	1	0.089	0.30		
Oxamyl (Vydate)	ND	ug/L	1	0.094	0.31	200	

APPENDIX F

PRESENT WORTH COST SUMMARY

20 YEAR PRESENT WORTH COST COMPARISON

Water System Feasibility Study

Town of Troy Sanitary District No. 1

ITEM	Option 1 Maintain Municipal Water System	Option 2 Private Well System	Option 1 Maintain Municipal Water System	Option 2 Private Well System	Option 1 Maintain Municipal Water System	Option 2 Private Well System
Construction Cost	$1,080,000	$1,825,000	$1,080,000	$1,825,000	$1,080,000	$1,825,000
Engineering, Legal, & Contingencies	$320,000	$550,000	$320,000	$550,000	$320,000	$550,000
Project Cost	$1,400,000	$2,375,000	$1,400,000	$2,375,000	$1,400,000	$2,375,000
Present Worth Operation & Maintenance Cost	$271,807	$0	$229,398	$0	$196,363	$0
Present Worth of Replacement Costs	$0	$0	$0	$0	$0	$0
Present Worth Salvage Value	($234,127)	($457,300)	($159,956)	($312,428)	($110,063)	($214,977)
Total Present Worth Cost	$1,437,680	$1,917,700	$1,469,443	$2,062,572	$1,486,300	$2,160,023
Total Present Worth Cost	**$1,438,000**	**$1,918,000**	**$1,469,000**	**$2,063,000**	**$1,486,000**	**$2,160,000**
Ratio to Lowest Cost Alternative	**1.00**	**1.33**	**1.00**	**1.40**	**1.00**	**1.45**
Comparison Annual Interest Rate (%) =	4.000		6.000		8.000	

Option 1: Maintain the Existing Municipal Water System

Interest Rate = 4.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Well No. 2	$100,000	50				$60,000
Construct Wellhouse No. 2	$300,000	50				$180,000
Remodel Wellhouse No. 1	$200,000	50				$120,000
Wellhouse No. 1 Electrical and Generator Upgrade	$50,000	20				$0
Water Main Valve Replacement (10 Valves)	$30,000	50				$18,000
Water Service Shut-off Valve Replacements (50%)	$25,000	50				$15,000
Subtotal =	**$705,000**		**$0**	**$0**	**$0**	**$393,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Well No. 2 Pumping Equipment and Piping	$50,000	20				$0
Well No. 2 Hydro-Pneumatic Tank	$100,000	50				$60,000
Well No. 1 Modifications	$25,000	20				$0
Subtotal =	**$175,000**		**$0**	**$0**	**$0**	**$60,000**

Misc. Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Sitework	$100,000	50				$60,000
Chemical Feed System(s) w/ Separate Building	$100,000	20				$0
Subtotal =	**$200,000**		**$0**	**$0**	**$0**	**$60,000**

			$0	**$0**	**$0**	**$513,000**
			0.8219	**0.6756**	**0.5553**	**0.4564**
Construction Cost =	**$1,080,000**		**$0**	**$0**	**$0**	**$234,127**

Engineering & Contingencies (30%) =	**$320,000**
Project Cost =	**$1,400,000**

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Labor	$15,000
Chemical Costs	$5,000

Annual O&M Cost =	**$20,000**
Present Worth Factor =	**13.5903**
Present Worth O&M Cost =	**$271,807**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	**$1,437,680**	**(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,080,000
Engineering, Legal, & Contg. (+)	$320,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$271,807
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$234,127
Total Present Worth Cost	**$1,437,680**

BAXTER & WOODMAN

Option 2: Private Well System

Interest Rate = 4.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Shallow Private Well (75% of Properties)	$760,000	50				$456,000
Drill Deep Private Well (25% of Properties)	$910,000	50				$546,000
Subtotal =	**$1,670,000**		**$0**	**$0**	**$0**	**$1,002,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
New/Upgrade Treatment (50% of Properties)	$75,000	20				$0
Subtotal =	**$75,000**		**$0**	**$0**	**$0**	**$0**

Misc. Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Water System Component Abanodonment	$60,000	N/A				
Well Abandonment	$20,000	N/A				
Subtotal =	**$80,000**		**$0**	**$0**	**$0**	**$0**

			$0	**$0**	**$0**	**$1,002,000**
			0.8219	**0.6756**	**0.5553**	**0.4564**
Construction Cost =	**$1,825,000**		**$0**	**$0**	**$0**	**$457,300**
Engineering & Contingencies (30%) =	**$550,000**					
Project Cost =	**$2,375,000**					

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Annual O&M Cost =	**$0**
Present Worth Factor =	**13.5903**
Present Worth O&M Cost =	**$0**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	**$1,917,700**	**(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,825,000
Engineering, Legal, & Contg. (+)	$550,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$0
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$457,300
Total Present Worth Cost	**$1,917,700**

BAXTER & WOODMAN

Option 1: Maintain the Existing Municipal Water System

Interest Rate = 6.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Well No. 2	$100,000	50				$60,000
Construct Wellhouse No. 2	$300,000	50				$180,000
Remodel Wellhouse No. 1	$200,000	50				$120,000
Wellhouse No. 1 Electrical and Generator Upgrade	$50,000	20				$0
Water Main Valve Replacement (10 Valves)	$30,000	50				$18,000
Water Service Shut-off Valve Replacements (50%)	$25,000	50				$15,000
Subtotal =	**$705,000**		**$0**	**$0**	**$0**	**$393,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Well No. 2 Pumping Equipment and Piping	$50,000	20				$0
Well No. 2 Hydro-Pneumatic Tank	$100,000	50				$60,000
Well No. 1 Modifications	$25,000	20				$0
Subtotal =	**$175,000**		**$0**	**$0**	**$0**	**$60,000**

Misc. Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Sitework	$100,000	50				$60,000
Chemical Feed System(s) w/ Separate Building	$100,000	20				$0
Subtotal =	**$200,000**		**$0**	**$0**	**$0**	**$60,000**

Year 5	Year 10	Year 15	Year 20
$0	**$0**	**$0**	**$513,000**
0.7473	**0.5584**	**0.4173**	**0.3118**
$0	**$0**	**$0**	**$159,956**

Construction Cost =	**$1,080,000**
Engineering & Contingencies (30%) =	**$320,000**
Project Cost =	**$1,400,000**

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Added Labor	$15,000
Chemical Costs	$5,000

Annual O&M Cost =	**$20,000**
Present Worth Factor =	**11.4699**
Present Worth O&M Cost =	**$229,398**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost = $1,469,443 **(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,080,000
Engineering, Legal, & Contg. (+)	$320,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$229,398
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$159,956
Total Present Worth Cost	**$1,469,443**

BAXTER & WOODMAN

Option 2: Private Well System

Interest Rate = 6.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Shallow Private Well (75% of Properties)	$760,000	50				$456,000
Drill Deep Private Well (25% of Properties)	$910,000	50				$546,000
Subtotal =	**$1,670,000**		**$0**	**$0**	**$0**	**$1,002,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
New/Upgrade Treatment (50% of Properties)	$75,000	20				$0
Subtotal =	**$75,000**		**$0**	**$0**	**$0**	**$0**

Misc. Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Water System Component Abanodonment	$60,000	N/A				
Well Abandonment	$20,000	N/A				
Subtotal =	**$80,000**		**$0**	**$0**	**$0**	**$0**

		$0	**$0**	**$0**	**$1,002,000**
		0.7473	**0.5584**	**0.4173**	**0.3118**
Construction Cost =	**$1,825,000**	**$0**	**$0**	**$0**	**$312,428**
Engineering & Contingencies (30%) =	**$550,000**				
Project Cost =	**$2,375,000**				

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Annual O&M Cost =	**$0**
Present Worth Factor =	**11.4699**
Present Worth O&M Cost =	**$0**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	**$2,062,572**	**(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,825,000
Engineering, Legal, & Contg. (+)	$550,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$0
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$312,428
Total Present Worth Cost	**$2,062,572**

BAXTER & WOODMAN

Option 1: Maintain the Existing Municipal Water System

Interest Rate = 8.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Well No. 2	$100,000	50				$60,000
Construct Wellhouse No. 2	$300,000	50				$180,000
Remodel Wellhouse No. 1	$200,000	50				$120,000
Wellhouse No. 1 Electrical and Generator Upgrade	$50,000	20				$0
Water Main Valve Replacement (10 Valves)	$30,000	50				$18,000
Water Service Shut-off Valve Replacements (50%)	$25,000	50				$15,000
Subtotal =	**$705,000**		**$0**	**$0**	**$0**	**$393,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Well No. 2 Pumping Equipment and Piping	$50,000	20				$0
Well No. 2 Hydro-Pneumatic Tank	$100,000	50				$60,000
Well No. 1 Modifications	$25,000	20				$0
Subtotal =	**$175,000**		**$0**	**$0**	**$0**	**$60,000**

Misc. Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Sitework	$100,000	50				$60,000
Chemical Feed System(s) w/ Separate Building	$100,000	20				$0
Subtotal =	**$200,000**		**$0**	**$0**	**$0**	**$60,000**

	Year 5	Year 10	Year 15	Year 20
	$0	**$0**	**$0**	**$513,000**
	0.6806	**0.4632**	**0.3152**	**0.2145**
	$0	**$0**	**$0**	**$110,063**

Construction Cost =	**$1,080,000**
Engineering & Contingencies (30%) =	**$320,000**
Project Cost =	**$1,400,000**

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Added Labor	$15,000
Chemical Costs	$5,000

Annual O&M Cost =	**$20,000**
Present Worth Factor =	**9.8181**
Present Worth O&M Cost =	**$196,363**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost = $1,486,300 **(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,080,000
Engineering, Legal, & Contg. (+)	$320,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$196,363
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$110,063
Total Present Worth Cost	**$1,486,300**

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Option 2: Private Well System

Interest Rate = 8.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Drill Shallow Private Well (75% of Properties)	$760,000	50				$456,000
Drill Deep Private Well (25% of Properties)	$910,000	50				$546,000
Subtotal =	**$1,670,000**		**$0**	**$0**	**$0**	**$1,002,000**

Mechanical Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
New/Upgrade Treatment (50% of Properties)	$75,000	20				$0
Subtotal =	**$75,000**		**$0**	**$0**	**$0**	**$0**

Misc. Construction	Initial Cost	Service Life (Years)	Year 5	Year 10	Year 15	Year 20
Water System Component Abanodonment	$60,000	N/A				
Well Abandonment	$20,000	N/A				
Subtotal =	**$80,000**		**$0**	**$0**	**$0**	**$0**

Construction Cost =	**$1,825,000**
Engineering & Contingencies (30%) =	**$550,000**
Project Cost =	**$2,375,000**

Year 5	Year 10	Year 15	Year 20
$0	**$0**	**$0**	**$1,002,000**
0.6806	**0.4632**	**0.3152**	**0.2145**
$0	**$0**	**$0**	**$214,977**

2) OPERATION & MAINTENANCE COST

Items	Annual Cost

Annual O&M Cost =	**$0**
Present Worth Factor =	**9.8181**
Present Worth O&M Cost =	**$0**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	**$2,160,023**	**(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$1,825,000
Engineering, Legal, & Contg. (+)	$550,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$0
Total Replacement Cost (+)	$0
Total Salvage Value (-)	$214,977
Total Present Worth Cost	**$2,160,023**

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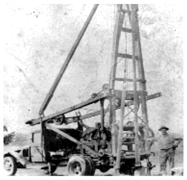


Biersack Well Service

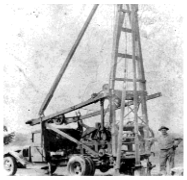
W4502 State Rd. 20, East Troy, WI. 53120   262-642-7668   rkbiersack@gmail.com

TROY CENTER SANITARY
RE: ESTIMATE FOR PLANNING

Drill a 6” steel cased well to an estimated depth of 200 feet including drive shoe, permit, chlorination and sample. The minimum charge for drilling is 100 feet. Drilling beyond the estimated depth will adjust the proposed sum at a rate of $55.00 per ft.

Install a 3/4 HP pump and a WM-12 tank including sanitary pit less adapter and up to 25 feet of water line trenching. Site clean up and final landscape by others.

PROPOSED SUM: $14990.00



Biersack Well Service

W4502 State Rd. 20, East Troy, WI. 53120   262-642-7668   rkbiersack@gmail.com

TROY CENTER SANITARY
RE: ESTIMATE FOR PLANNING

Drill a 6" steel cased well to an estimated depth of 600 feet including drive shoe, permit, chlorination and sample. Drilling to this depth will require an upper enlarged borehole and cement grout through the upper formations down to the second limestone. Approximated cost for this are included in this estimate.

Install a 1-1/2 HP pump and a WM-12 tank including sanitary pit less adapter and up to 25 feet of water line trenching. Site clean up and final landscape by others.

PROPOSED SUM: $63700.00