

# SALT CREEK ESTATES

## 2023 PRELIMINARY ENGINEERING REPORT

### DRINKING WATER SYSTEM

**NOVEMBER 2023**

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**RQAW**

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## **INTRODUCTION / EXECUTIVE SUMMARY**

### **PLANNING PURPOSE**

Salt Creek Services, Inc. (SCSI) commissioned a preliminary engineering report (PER) study of its water and wastewater systems in 2023. This report focuses exclusively on the potable water system. Salt Creek Estates is located in Salt Creek Township in Monroe County, Indiana. The objectives of this planning study are to gather an understanding and document the components and condition of the existing system, the current and projected needs for the system, alternatives and proposed recommendations, and the final recommendations for the water utility of Salt Creek Estates.

This plan was developed by following the guidelines of the Indiana Finance Authority's (IFA) Small Systems Grant Application (SSG) as well as the State Revolving Fund (SRF) Loan Program.

SCSI commissioned RQAW Corporation (RQAW) as the engineering consultant to complete this report. Several meetings and conversations took place between May and August of 2023 to gather the necessary data and information from the utility to determine the recommended alternatives.

### **HOW TO USE THIS PLANNING STUDY**

Included in the water system Preliminary Engineering Report (PER) is a detailed evaluation and list of recommendations for Salt Creek Estates' water utility. These recommendations are for the upcoming twenty-year planning period.

### **Drinking Water Plan**

SCSI owns and operates its own water system consisting of approximately two and one quarter (2.25) miles of pipe, an intake structure on Lake Monroe, a water treatment plant (WTP), and a 38,000-gallon water storage tank. The following planning document details the components of the existing system, the current and projected needs for the system, alternatives, and proposed recommendations for the water utility.

### **FUTURE GROWTH**

Anticipated future growth for SCSI includes the potential for new single-family residential developments in unoccupied parcels as well as additions to existing homes. Currently, the utility services 46 homes on 73 lots. All proposed projects have been sized to meet twice the equivalent demand to ensure that any new development can be served by the utility for years to come.

### **NEED FOR PROJECT**

SCSI's WTP and drinking water distribution system need substantial repairs. Issues with operations and maintenance at the WTP are prevalent and cause significant concerns, indicated by SCSI's contracted operator as well as IDEM inspection reports and previous studies collected for this report. The distribution pipes are original to the system and have occasional leaks which are manageable. Unlike water production components, the existing water storage tank consistently remains in good working order and is frequently maintained. Many of the water plant's components have far surpassed their anticipated useful life and are in need of repair or replacement.

### **PLANNING PROCESS**

Salt Creek Estates and RQAW discussed avenues to evaluate opportunities to remediate difficulties within the drinking water system, and ultimately allow for more cost efficient and more reliable service for customers. Information from SCSI was used to come up with several alternatives to improve the water system. This plan

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should be used by SCSI to help in the planning process of upgrading utility infrastructure to ensure proper function for the future.

On June 7<sup>th</sup>, 2023, a meeting was conducted between RQAW and the Indiana Department of Environmental Management (IDEM) to discuss a high-level overview of the current conditions at Salt Creek Estates and the potential upgrades and replacement options that could be made. IDEM expressed that this area would be a good candidate for regionalization; however, the implications are discussed further in Chapter 4.

### **ALTERNATIVE EVALUTION**

Three (3) design alternatives were considered to improve the wastewater system for SCSI. These alternatives include:

0. No Action
1. Rehabilitation of Existing WTP
2. Replacement of Existing WTP
3. Regionalization

### **SELECTED PLAN**

It is recommended that SCSI pursue Alternative 2 as described in Chapter 4 in the immediate future. The total cost for these alternatives is broken down in Chapter 5.

## **CHAPTER 1: PROJECT PLANNING**

### **1.1 Introduction**

Salt Creek Estates is a community on the Northeast shore of Lake Monroe that has a IDEM-licensed water treatment plant (WTP) that processes surface water from Lake Monroe. Operation of the Salt Creek Estates WTP, and governance of homes in Salt Creek Estates, is authorized by collective ownership of a not-for-profit corporation, Salt Creek Services Inc. This corporation has an elected Board of Directors that are responsible for ensuring that the community has potable water.

This PER presents different options for replacing a WTP nearing its end of useful life. The aging technology of the existing WTP, coupled with challenges in purification of surface water from a lake that has seasonal periods of high turbidity, has led to exorbitantly high water rates. Replacement of the existing facility with modern technology will address this water rate issue and also provides a solution to current limitations of potable water production.



*Figure 1-1: Salt Creek Estates General Location*

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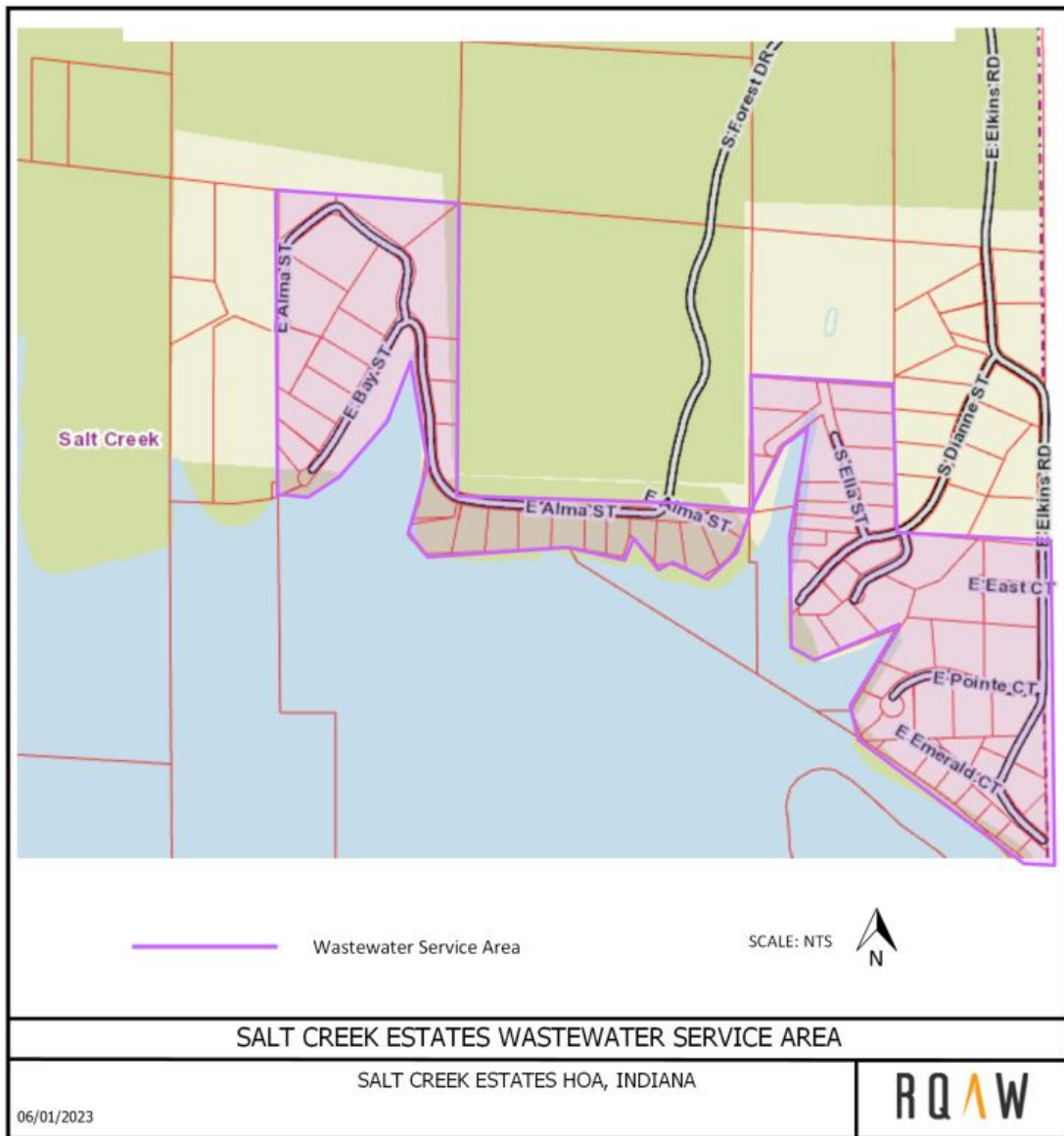


Figure 1-2: Map of Water Service Area Boundaries

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

Table 1-1: Salt Creek Estates Location Information

LOCATION INFORMATION					
Description	USGS Quad Map Name	Civil Township	Township	Range	Section(s)
Drinking Water Service Area Boundaries	Allens Creek	Salt Creek	8N	1E	35
	Elkinsville	Salt Creek	8N	1E	35

## 1.2 Community Engagement

Salt Creek Estates is governed by a not-for-profit corporation called Salt Creek Services Inc. Each lot owner is a co-owner of the corporation with each lot owner holding one vote on matters that require a vote. The corporation has an elected Board of Directors comprised of a President, Vice President, Secretary, Treasurer and seven additional Directors.

The Board of Directors have the responsibility of assuring proper operation and maintenance of a community WTP that pulls and purifies water from Lake Monroe to provide potable water. The corporation also owns and operates a Wastewater Treatment Plant (WWTP) that processes sewage and discharges processed effluent back into Lake Monroe. The Board of Directors hires a commercial utility operator (currently Bynum Fanyo Utilities (BFU) Utilities in Bloomington) that has IDEM licensed employees that operate the WTP and WWTP.

Funding of the WTP involves two sources. One is monthly HOA dues paid by each lot owner. The dues are set by the Board of Directors yearly to balance income with projected operating expenses. A second means of funding involves the Board of Directors power to levy assessments for the repair or replacement of these utilities. Failure to pay dues and assessments can result in liens placed on properties to recover unpaid debt. In extreme cases, the Board also has the ability of undertake legal foreclosure of properties from owners that fail to pay outstanding debt.

While the Board of Directors has the sole voting authority to levy and set HOA dues and assessments, it is customary for the Board to discuss funding issues with lot owners at an annual community meeting before major financial decisions are made. Furthermore, members of the community would be significantly affected by the levy of a large assessment, which is why the Board is pursuing alternate funding options, such as those administered by the Indiana Finance Authority.

Regarding community engagement, the Board of Directors maintains a Salt Creek HOA web site where lot owners can download minutes of quarterly board meeting, quarterly reports that discuss the status of water and wastewater treatment plants, and treasurer's reports that itemize utility expenses. The President also writes a quarterly letter to each lot owner that highlights pressing issues to the community and actions taken by the Board to address such issues. Recent President's letters have stressed the need to replace the aging WTP and efforts by the Board to address funding options, such as low interest loans and grants administrated by the Indiana Finance Authority. Consequently, the community is well informed on the status of the aging utilities that are owned and operated by Salt Creek Services Inc., and the need to have these utilities replaced or significantly upgraded.



## CHAPTER 2: EXISTING FACILITIES

### 2.1 WTP Location

Salt Creek Estates is on the Northeast shore of Lake Monroe, which is the source of water for the City of Bloomington and surrounding communities. It is the largest reservoir in Indiana, holding between 292 to 428 giga litres of freshwater depending on the lake water level. Given that Lake Monroe provides Salt Creek Estates ready access to freshwater, it is not surprising that this community installed a water treatment plant during its development in the late 1960's.

The Salt Creek Estates WTP is in a ravine that contains a dry creek bed that empties into a bay in Lake Monroe. Several pumps that feed lake water to the WTP are in a region that was historically known as Crooked Creek. Crooked Creek is one of two small rivers that feed surface water to Lake Monroe. The circle in Figure 2-1 is the location of pumps that feed water to the WTP and the rectangle represents the location of the water storage tank.



Figure 2-1: Salt Creek Estates WTP Location Map

## 2.2 WTP History

Salt Creek Estates was incorporated and developed in 1967 soon after the construction of a dam that created the Lake Monroe Reservoir.

Two of three WTP buildings, and much of the equipment, are original installations from the late 1960's. The water distribution system was completed around the same time. The overall condition of the existing WTP is poor, a fact also noted by IDEM. An IDEM inspection summary of the WTP from March 11<sup>th</sup>, 2022 is in **Appendix F**.

The WTP was expanded in 1976 to include a separate settling basin building.

## 2.3 Condition of Facilities

### WATER SUPPLY

There is no groundwater aquifer present.

Unlike drawing water from aquifers that have stable low turbidity, surface water production from Lake Monroe is challenged by very high seasonal variations in turbidity. Silt from rain runoff on regional hills that feeds water into the lake via streams and creeks lead to high spring turbidity values, often exceeding 200 Nephelometric Turbidity Unit (NTU) and is shown in the Monthly Report of Operations (MRO) Summary in **Appendix C**.

High spring turbidity provides a significant operational challenge to WTP operators that are required by IDEM to provide Salt Creek with potable water within IDEM mandated turbidity limits. The only way WTP operators can provide turbidity compliance when the lake has high turbidity is to significantly increase the time of sedimentation of flocculants, and slow down subsequent filtration rates through the sand/carbon filters. This necessitated seasonal slowing of water production leads to very high operation costs relative to the volume of water produced.

### WATER TREATMENT PLANT

The existing WTP uses 1960's era technology involving a mixing basin where flocculation chemicals are mixed with incoming surface water. After mixing, the water enters a sedimentation basin where flocculation removes particulates. The final stage involves filtration through a sand/carbon matrix and treatment with chorine.

Two of three WTP buildings, and much of the equipment, are original installations from the late 1960's. The overall condition of the existing WTP is poor, a fact also noted by IDEM. The original buildings are cinderblock construction with poor footers, so the buildings have undergone significant settling and movement down a slope, which has caused significant cracks in the floors and walls as shown in the photos Figure 2-2. The building's walls surrounding the settling basin are so close to the basin that operators need to walk along the lip of the basin to reach the back portion of the settling basin. Given that the settling basin is 8 ft deep, this is a significant operational hazard. Wiring and electrical panels are also original and not current with modern code. The process flow diagram for the existing Water Treatment Plant is shown in Figure 2-2.

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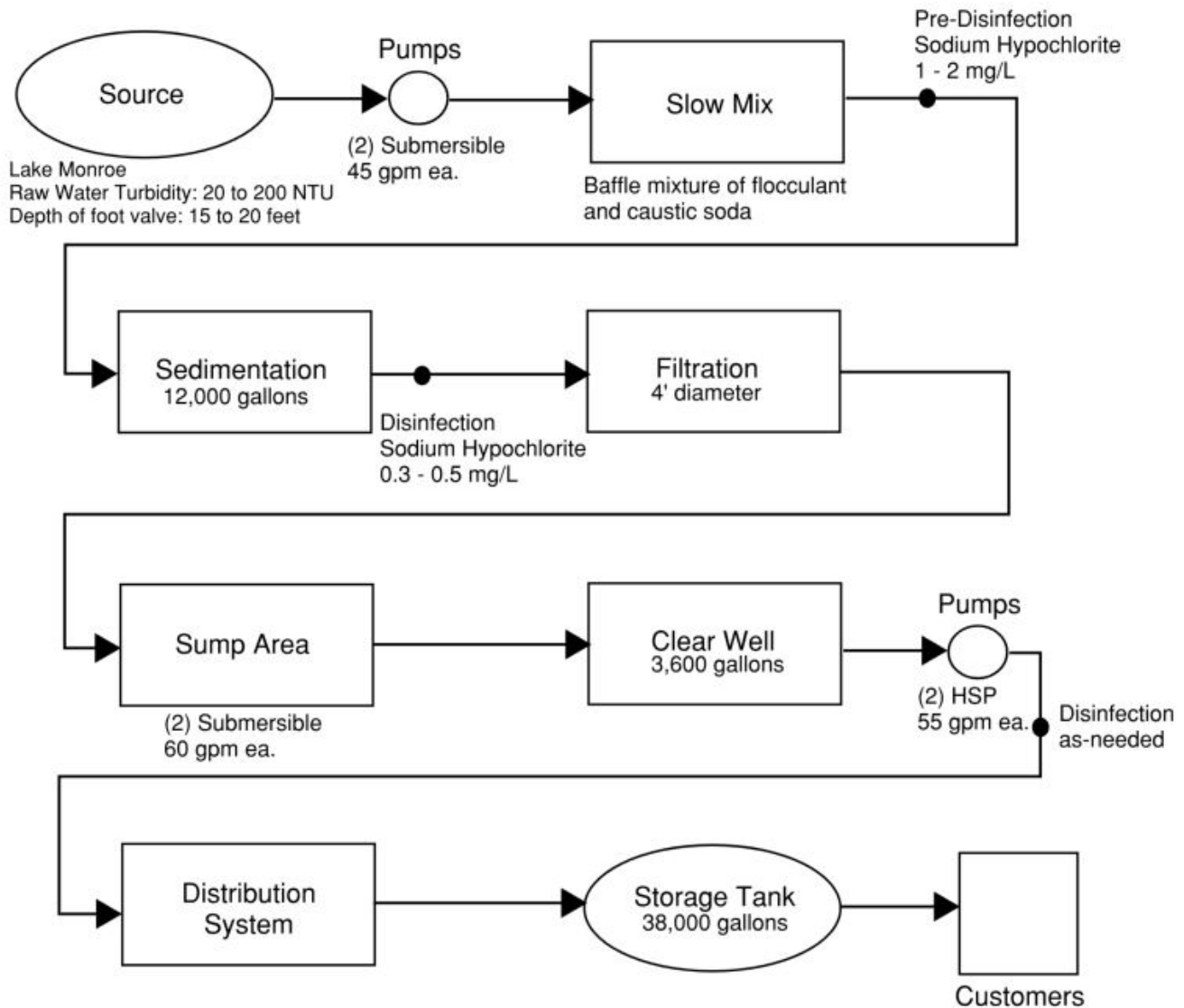


Figure 2-2: Existing WTP Process Flow Diagram

Monthly Reports of Operation for the system indicate water usage and are supplied to IDEM for compliance. Information on daily pumping rates can be found in **Appendix C**. Chlorine Residuals are measured in the distribution system and are reported to IDEM via Monthly Reports of Operation. Data on free and total chlorine residuals can be found in **Appendix C**.

### WATER DISTRIBUTION SYSTEM

Like the WTP, the main water lines that run from the water tower to individual homeowner meters are also original installation and are now over 50 years old. The 4 in. main water lines are constructed with PVC tubing and fittings. Water main pipe leaks typically occur once or twice a year and can cause water loss. There are no meters that monitor pressure in the water mains, hampering the ability to locate areas of water loss. There are water meters that measure water flow from the mains to individual houses, but they are also many decades old and are of questionable accuracy.





*Figure 2-3: Photographs of the existing WTP. Top Left: Baffle System, Top Right: Rapid Sand Filters, Bottom Left: Process Piping in Filter Building, Bottom Right: Sedimentation Tank*

## **CHAPTER 3: NEED FOR PROJECT**

### **3.1 Operational Risk**

The currently used 1960's era technology is a very labor-intensive operation involving manual chemical addition, flow rate control, and flow destination. Proper addition (and amounts of) chemicals rely on operator experience and close oversight. Given that there is no automation at the existing WTP, there is current operational risk caused by operator oversight, error in calculations, or error in product analysis.

### **3.2 Constraints in Water Production and Storage**

In the spring months lake turbidity is exceptionally high (exceeding 200 NTU) so water production must slow down to address turbidity constraints. Because of this operational constraint, operators are barely able to produce sufficient amount of water for the needs of the community, which has a lower population of residents during this time of year. In summer months where there is lower turbidity (typically <10 NTU), WTP operators can manufacture 3-4 times more gallons per 8-hour shift. However, this increase in production remains barely enough to fulfill community needs as the population of residents, visitors, and their water usage, significantly increases in the summer months.

Besides constraints in water production, there are also constraints in water storage. Water purified by the Salt Creek WTP is stored in a 38,000-gallon water tank along a high bluff overlooking the community. This water is then gravity fed to community homes via aging PVC water mains. During summer months 38,000-gallon storage tank can be drained during a three-day weekend often necessitating expensive water production during these holiday periods. A summary of the current and anticipated capacity (double current capacity) is in Table 3-1.

*Table 3-1: Water Treatment Plant Existing and Future Capacity Summary*

<b>Current Capacity</b>			<b>Anticipated Capacity</b>	
<b>Current Low Flow (gpd)</b>	<b>Average Daily Flow (gpd)</b>	<b>Peak Daily Flow (gpd)</b>	<b>Average Daily Flow (gpd)</b>	<b>Peak Daily Flow (gpd)</b>
1,500	7,512	14,100	15,000	37,500

Although water loss may also play a part in the heightened demands of the system, it cannot easily be calculated. SCSJ does not read existing meters consistently for billings purposes; however, when the meters are read, they do not indicate substantial losses on SCSJ-owned assets. Rather, a majority of the water loss is assumed to come from private-side leaks.

### **3.3 Water Production Costs**

Analysis of water production costs shows that Salt Creek residents shoulder an exorbitantly high cost for their potable water. Calculations show that the average estimated cost of water production, maintenance of the WTP and water leakage is currently \$372 per 4,000 gallons of water (9 cents/gallon).

These high rates are a consequence of operating a 1960's era WTP that requires extensive and time-consuming manual operation, coupled with difficulties of reaching currently mandated IDEM purification levels using outdated technology that slows down production rates. Newer water treatment technology, such as ceramic filtration, can more efficiently handle seasonal high levels of lake water turbidity. Significantly increasing the volume water production per work period would drive down high water rates.



### **3.4 IDEM Concerns**

Recent IDEM reports cite several deficiencies at the Salt Creek Estates WTP. For example, total chlorine residual measurements are currently manually recorded by the plant operators who are only present at the plant 3-4 times a week. However, IDEM wants this measured and recorded every day. Measuring chlorine when the plant operators are not present requires a significant SCADA upgrade in existing equipment. The inspector also noted: "There are minimal controls to warn of treatment failures. The only notifications are if the storage tank levels drop. System needs to consider installing SCADA controls." IDEM also noted "The overall condition of the Water Treatment Plant is significantly deteriorating". An IDEM inspection report summary from March 11<sup>th</sup>, 2022 is in **Appendix F**.

## **CHAPTER 4: IMPLEMENTATION OF ALTERNATIVES**

### **4.1 No Action Alternative**

Under the “No Action” alternative, the utility will continue to perform daily operations without any improvements or replacements.

This “No Action” alternative does not have environmental impacts due to construction and does not have an initial capital cost. However, long-term production, operation, and maintenance costs are expected to increase due to the condition of the existing infrastructure. The WTP equipment has far surpassed its useful life, the system has significant water loss, and it takes an extremely high amount of money (estimated at well over \$300 per 4000 gallons) to produce potable water with the current system. This is partially due to the lack of SCADA system, requiring part-time operators from Bynum Fanyo Utilities (BFU), the HOA’s contract operator, to be onsite for all pumping hours to adjust chemicals and turn valves. This is extremely costly.

The “No Action” alternative is not an acceptable alternative for in the long term. To maintain the integrity of the utility and improve reliability and cost, action must be taken. Therefore, the “No Action” alternative will not be considered further for this study period.

### **4.2 Alternative #1: Rehabilitation of Existing WTP**

#### **A. Description**

The existing WTP intakes surface water from Lake Monroe. There is no groundwater aquifer present. Source water is pulled and sent into a slow-mix baffle with a mixture of NaOH and Alum as needed. Water is then pre-disinfected with 12.5% sodium hypochlorite. Water then travels to the 12,000-gallon sedimentation basin where more bleach is added, and is filtered through 4’ diameter cylindrical filters with 27 in. of rapid sand and 25 in. of gravel. Water is finally pumped to a 3,600-gallon clear well before being sent via high service pump to the distribution system and 38,000 gallon storage tank. The WTP was originally constructed in the 1960’s. The existing WTP has been outgrown and has surpassed its useful life. The WTP has no SCADA system and requires constant supervision. Per the Ziptility report, One of the two existing influent intake lines (raw water intake pipe) was found to be at least in a fair condition while the other one was found to be in excellent condition.

This alternative aims to rehabilitate the existing WTP through installing new equipment, constructing a new combined sedimentation and chemical building, expanding the existing filter building, while retaining certain existing treatment equipment. Per IDEM’s deficiency notices, the WTP was found to be “significantly deteriorating” with the foundation in the filter building cracked and there being a large structural crack in the wall of the Chemical building. Also, due to the existing location of the intake pumps for the WTP on lake Monroe, the plant treats water with high turbidity, leading to higher chemical dosing and higher water rates.

#### **B. Design Criteria**

The rehabilitated WTP is designed around filling the existing water tower tank in one (1) 8-hour cycle with a flow of 80 gpm. This was done for two reasons; to avoid high project costs associated with replacing the existing water tower (which is in good condition) and reducing the operator’s time at the WTP. An operator will only have to be at the plant for around 8 hours to fill up the water tower tank

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to meet 4 to 5 days of average water demand. The calculations for the proposed demand are shown in **Appendix C**.

Rehabilitating the existing WTP will expand the plant's capacity to handle the full build out condition of Salt Creek Estates community. This proposed alternative consists of a new combined chemical and sedimentation building structure, an expanded filter building, and slight expansion of the WTP site. A new intake pump structure will be constructed to elevate the intake pumps to a higher elevation in the water column as shown in Figure 4-1. This should result in lower turbidity for the influent water sent to the WTP.

Additional water treatment chemical bulk storage for up to 30 days of operation will be installed to meet IDEM requirements. The day tanks in the chemical storage building and the chemical dosing pumps will be reused.

A flow through baffle system with a capacity of 5,250 gallons will be installed to handle the proposed raw water demand.

A new 24,000 gallon sedimentation tank will be constructed. This is adequate for the proposed capacity of the rehabilitated WTP as it is double the capacity of the existing 12,000 gallon sedimentation tank which handles existing raw water flows just fine. Meeting redundancy would require an additional sedimentation tank and a larger treatment building which is beyond what Salt Creek Estates can afford.

A new 3 ft. x 3 ft. backwash pit in the filter building will prevent backup flow into the rapid sand filters in the event of a clog in the community's sewer main system.

In addition, several new monitoring systems for the WTP will be integrated into the facilities to improve monitoring of influent raw water and treated potable water. This includes a new SCADA system, chlorine analyzer, and TSS analyzer.

A list of proposed improvements to the existing WTP is in Table 4-1.

*Table 4-1: List of Improvements for Alternative 1: Rehabilitate Existing WTP*

Item No. #	Description
1	Demolition of existing sedimentation and chemical buildings on WTP site.
2	A new intake pipe structure will adjust elevation of intake pumps in Lake Monroe. This will include two (2) new 80 gpm submersible pumps for full build out.
3	A new combined chemical and sedimentation building to provide room for 30 days of storage for all treatment chemicals and upsized sedimentation tank.
4	A new 6.7 ft. diameter baffle system with a capacity of 5,250 gallons.
5	A new 40 – gallon chlorine storage drum for future demand.
6	One (1) new 120-gallon drum for sodium hydroxide NaOH storage for future demand.
7	One (1) new 250-gallon drum for alum storage for future demand.
8	One (1) new sedimentation tank with 24,000 gallons capacity, Diameter: 23 ft., Height: 8 ft.
9	Upsize and repair existing filter building to repair cracked foundation and to provide room for one additional rapid sand filter and related equipment.
10	One (1) new rapid sand filter with the same capacity of the existing two rapid sand filters for a total of 3 units, one of which will operate in standby mode.
11	One (1) new backwash pit will be used as an overflow structure in case sewer backs up (IDEM and Ten State Standards requirement).
12	Two (2) new 120 gpm sump pumps. Upsized to handle full build out.
13	One (1) new clear well tank with capacity of 7,200 gallons., Diameter 13 ft., Height: 8 ft. Upsized to handle full build out.

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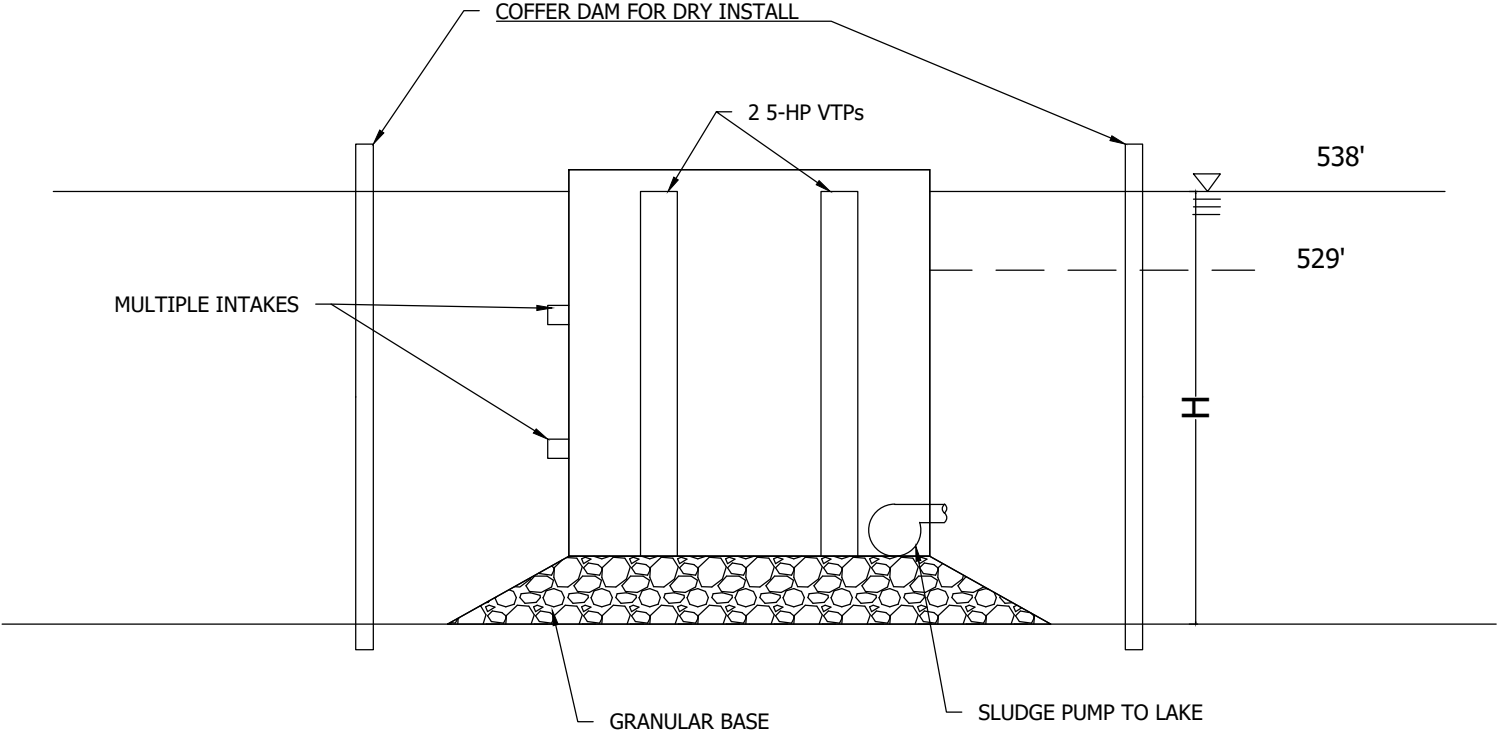
14	One (1) additional service pump for the new rapid sand filter.
15	Additional process piping, valves, and fittings required for new rapid sand filter.
16	Replacement of current chlorine analyzer as it doesn't work.
17	One (1) new TSS Analyzer as none are currently on site.
18	One (1) new flow meter tied into SCADA system.
19	344 LFT. of Six (6) ft. tall chain linked safety fence with a 12 ft. fence gate at the entrance to the site (IDEM requirement).
20	40 CYD of no.53 aggregate for 6 in. gravel on top of existing gravel driveway.
21	One (1) new SCADA system for WTP (Ten State Standards and IDEM requirement).
22	One (1) new emergency backup generator (IDEM requirement).
23	Site lighting will need to be installed for the new facilities at the WTP site.
24	Tree removal for new facilities and to reduce potential environmental hazards.
25	Bulk water delivery for the 38,000-gallon storage tank for the duration in which water treatment is down for construction.

### C. Map

The existing and proposed facilities for the site are shown in the conceptual plan in Figure 4-1.

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Figure 4-1  
Intake Pipe Structure



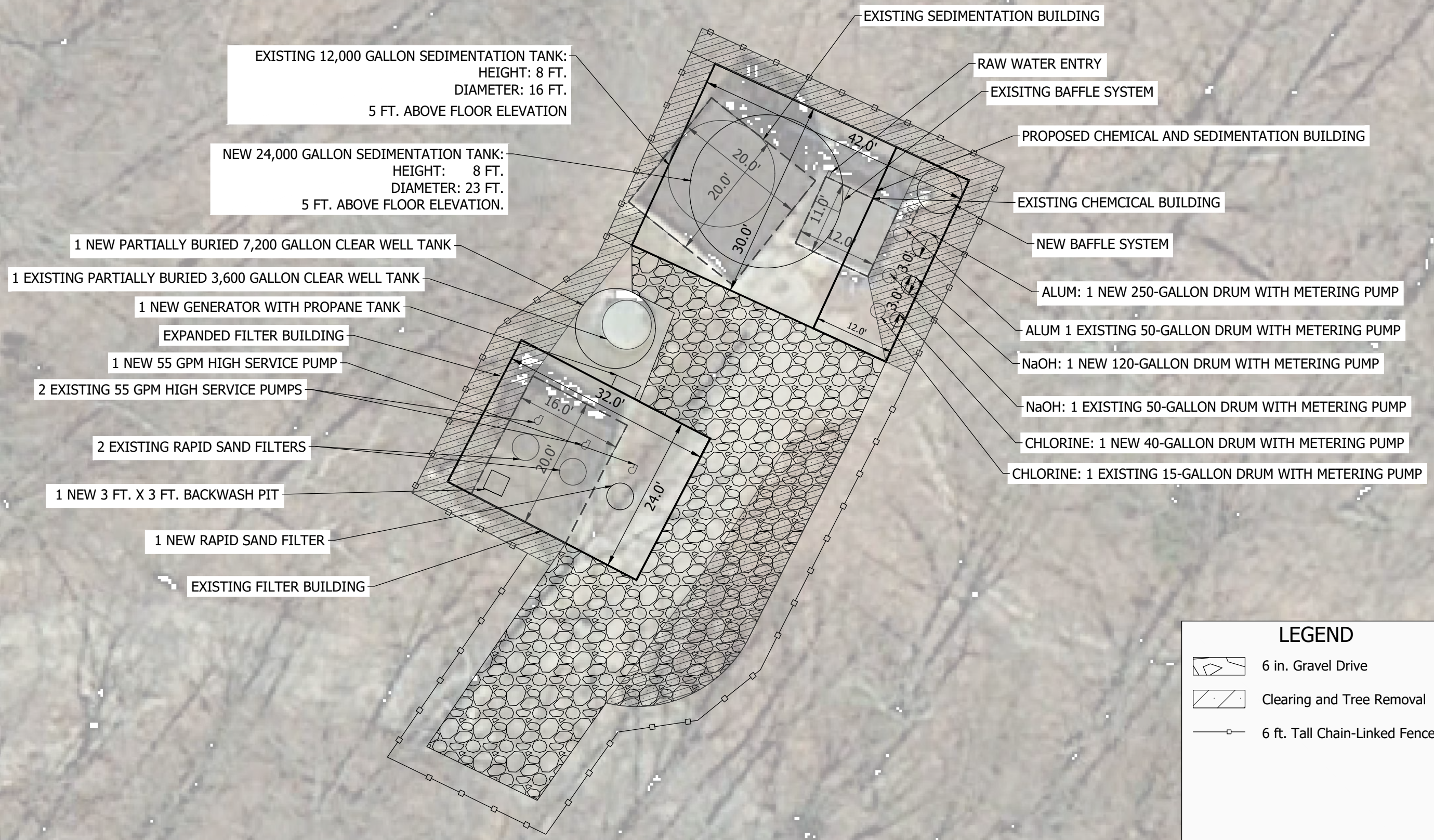
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Designed By:	JDP
Drawn By:	JDP
Checked By:	ALC
Date:	08/16/2023



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Figure 4-2  
WTP Rehabilitation (Alternative 1)

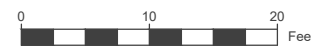


**LEGEND**

- 6 in. Gravel Drive
- Clearing and Tree Removal
- 6 ft. Tall Chain-Linked Fence

#	Revision	Date

Project #:	23-400-188-1
Designed By:	JDP
Drawn By:	JDP
Checked By:	ALC
Date:	08/16/2023





**D. Environmental Impacts**

No impacts to wetlands, or waterways are anticipated. Tree removal will be required to expand the facilities at the existing WTP for this alternative.

The WTP site is outside of the 100-year and 500-year floodplain areas of Lake Monroe.

Rehabilitation of the WTP will allow for more efficient water treatment and reduce the overall quantity of treatment chemicals.

**E. Land Requirements**

The easement for the WTP is not known. An easement may be required depending on the extents of SCS's WTP easement parcel. Some tree clearing will be required to expand the WTP.

**F. Construction Considerations**

Construction considerations unique to this project include contracting a company with proper licensure and experience in WTP rehabilitation.

Special considerations should be made to ensure that there no disruptions in water service during rehabilitation of existing water treatment plant. This proposed project will require the demolition of the existing chemical and clarification building and expansion of the filter building. Traffic control and maintenance will be additional cost of this project due to narrow access road to the Salt Creek Estates community.

Additionally, applicable Monroe County permits will need to be secured along with state permits.

**G. Sustainability Consideration**

**a. Water and Energy Efficiency**

The proposed project does not address energy efficiency. The rehabilitation of WTP will result in less chemicals needing to be used, resulting in a more efficient treatment process.

**b. Green Infrastructure**

The proposed project does not include any green infrastructure.

**H. Advantages and Disadvantages**

**a. Advantages**

Rehabilitation of the Water Treatment will provide the following advantages:

- Reduction in overall maintenance of the WTP due to new SCADA system and some new facilities.
- More cost efficient water treatment from reduced labor and monitoring needs.
- Increased capacity to handle the full build out of the Salt Creek Estates community.
- More accurate water quality monitoring

**b. Disadvantages**

Disadvantages of this project include:

- The demolition of some of the existing water treatment facilities could lead to high costs associated with trucking in treated drinking water
- Not replacing equipment that is near the end of its service life

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

- The risk of damaging existing equipment during the expansion of the existing filter building
- Risk of running into asbestos during demolition given existing water treatment plant buildings were constructed in the late 1960s.

### I. Cost Estimates

The preliminary opinion of probable construction cost is included in Table 4-2 below.

*Table 4-2: Preliminary Opinion of Probable Construction Cost for Alternative #1*

ALTERNATIVE #1 – REHABILITATION OF EXISTING WTP					
Item No.	Description	Quantity	Units	Unit Price	Total Amount
1	MOBILIZATION AND DEMOBILIZATION	1	LS	\$88,000	\$88,000
2	CONSTRUCTION ENGINEERING	1	LS	\$22,000	\$22,000
3	EROSION AND SEDIMENTATION CONTROL	1	LS	\$22,000	\$22,000
4	DEMOLITION OF EXISTING CHEMICAL AND SEDIMENTATION BUILDINGS	1	LS	\$200,000	\$200,000
5	INTAKE PUMP STATION IMPROVEMENT	1	LS	\$276,000	\$276,000
6	CHEMICAL AND SEDIMENTATION BUILDING STRUCTURE (42 FT. X 30 FT.)	1	LS	\$410,000	\$410,000
7	BAFFLE SYSTEM (6.7 FT. DIAMETER, WITH A CAPACITY OF 5,250 GALLONS)	1	LS	\$44,000	\$44,000
8	CHLORINE STORAGE TANK, 40-GALLON, DOUBLE WALL	1	EACH	\$14,000	\$14,000
9	SODIUM HYDROXIDE [NAOH] STORAGE TANK, 120-GALLON, DOUBLE WALL	1	EACH	\$17,000	\$17,000
10	ALUM STORAGE TANK, 250-GALLON, DOUBLE WALL	1	EACH	\$22,000	\$22,000
11	SEDIMENTATION TANK, DIAMETER: 23 FT., HEIGHT: 8 FT.	1	EACH	\$66,000	\$66,000
12	FILTER BUILDING STRUCTURE RENNOVATION, (24 FT. X 16 FT.)	1	LS	\$250,000	\$250,000
13	RAPID SAND FILTER, DIAMETER 4 FT., 18,100 GPD	1	EACH	\$121,000	\$121,000
14	BACKWASH PIT, 3 FT. X 3 FT.	1	LS	\$8,000	\$8,000
15	SUMP PUMP, 120 GPM	2	EACH	\$12,000	\$24,000
16	CLEAR WELL, DIAMETER: 13 FT., HEIGHT: 8 FT.	1	EACH	\$28,000	\$28,000
17	HIGH SERVICE PUMP, 55 GPM	1	EACH	\$33,000	\$33,000
18	PROCESS PIPING	1	LS	\$89,000	\$89,000
19	CHLORINE ANALYZER	1	EACH	\$14,000	\$14,000
20	TSS ANALYZER	1	EACH	\$14,000	\$14,000
21	FLOW METER TIED INTO SCADA	1	LS	\$10,000	\$10,000
22	SITE FENCING, 6 FT. TALL CHAIN LINKED FENCE WITH GATE	344	LFT	\$90	\$31,000

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

23	SITE DRIVE - 6 IN. GRAVEL	40	CYD	\$300	\$12,000
24	SCADA	1	LS	\$150,000	\$150,000
25	EMERGENCY BACKUP GENERATOR WITH PROpane TANK	1	EACH	\$77,000	\$77,000
26	SITE LIGHTING	1	LS	\$5,000	\$5,000
27	TREE CLEARING	165	SYD	\$125	\$21,000
28	TEMPORARY POTABLE WATER	1	LS	\$200,000	\$200,000
<b>Estimated Construction Cost Subtotal</b>					<b>\$2,268,000</b>

\* High cost of submersible pump is due to installation costs associated with setting up a coffer dam

### 4.3 Alternative #2: Replacement of Existing WTP

#### A. Description

RQAW looked at two (2) different alternatives to replace the existing WTP; a membrane filtration-based treatment system from Westech and a packaged WTP from EFI. These WTP replacement alternatives were evaluated in terms of their cost, water treatment technology, size of plant footprint, duration of downtime for water treatment, and the engineering work required for design.

Both the Westech WTP and the EFI Solutions packaged WTP options are designed around filling the existing water tower tank in one (1) 8-hour cycle with a flow of 80 gpm. This was done for two reasons; to avoid high project costs associated with replacing the existing water tower (which is in good condition) and reducing the operator's time at the WTP. An operator will only have to be at the plant for around 8 hours to fill up the water tower tank to meet 4 to 5 days of average water demand. The calculations for the proposed demand are shown in **Appendix C**.

#### B. Westech Water Treatment Plant

The WTP package from Westech includes a combination of two (2) Tri-Mite Package Treatment Model 2TM-100A Units, an AltaPac Ultrafiltration System (Model UFT41C), and a SuperSettler Inclined Plate Clarifier (Model PSS40N1). The Tri-Mite Package Treatment system is a factory assembled water treatment system that uses a patented MMAC adsorption Clarifier and mixed media filter to treat raw water. The system includes a low-profile direct retention air/water backwash underdrain system.

The AltaPac system is skid-mounted membrane filtration system sized to achieve a net production capacity of 90 gpm. The filtration process is a pressure driven process to remove suspended solids and turbidity. Raw water from the source is subject to pre-treatment by coagulant addition with flash mixing. Filtrate is sent to the clear well. Backwashing is used to remove accumulated foulants by reversed inside/out flow at an interval of 20-60 minutes with air scour for increased agitation. A drain or filter-to-waste step is used to remove any additional accumulated material. Membrane integrity testing is conducted automatically once every 24 hours.

The SuperSettler inclined plate system includes a combination rapid mix and flocculation tank where raw water is fed to the rapid mix chamber. The water is flocculated in the mix chamber to remove charge and then sent over a baffle in the flocculation zone where particles are gently mixed for 5 to 10 minutes. Water enters the SuperSettler inclined plate system at the base of the plates, where feed channels are specially designed to promote quiescent flow into the plates. Solids settle and collect along each plate surface as water continues to flow upward. As solids accumulate on the plate surface, they begin to slough off the plates and fall into a conical hopper at the bottom of the inclined plate basin. Flocculated water then flows under another baffle to enter the separator transfer pipe under laminar flow conditions to the inclined plate basin.

### **Advantages**

The Westech packaged water treatment plant would require less chemicals in the water treatment process compared to the packaged treatment unit from EFI.

### **Disadvantages**

Installation of the packaged treatment plant from Westech will require the demolition of the existing facilities prior to completion of the new water treatment plant. This would result in additional costs associated with trucking in water prior to completion of the new water treatment plant. In addition, the Westech proposal for the new WTP would require utility layout and pipe process design for the new buildings that would be constructed at the site. The substantial design required to complete the WTP replacement will result in a longer design timeline and longer construction timeline.

The Westech plant would have a higher capital cost than the EFI plant due to high cost of the proposed equipment. In addition, the Westech water treatment plant setup would require additional land acquisition and tree clearing as the buildings required to house the equipment are larger than the existing footprints of the buildings on site.

The Westech plant would require a WT6 operator certification which the current operators of the WTP do not have. This would require additional training to operate the plant in comparison with the EFI packaged water treatment plant.

## **C. EFI Packaged Water Treatment Plant**

The packaged water treatment plant from EFI Solutions includes Tonka Water Vertical pressure vessels with aggregate media that include chlorine treatment. This packaged unit includes a filter room with boost pumps to fill the storage tank, a chemical feed room and equipment for the water treatment chemicals. The entire packaged water treatment plant will be completely assembled and tested prior to delivery at the jobsite. The size of the footprint of the packaged unit is approximately 44 ft. – 0 in. x 15 ft. – 6 in. The packaged water treatment plant will be automatically controlled and operated via EFI PLC/HMI with remote monitoring capabilities. The EFI packaged WTP meets the redundancy requirement for pre-engineered water treatment plants. EFI Solutions' prepackaged treatment plant is designed where one pump can meet the domestic flow requirement. Each pump is plumbed in separately such that if one were to fail, another one would be operational. A list of improvements for the WTP replacement using the EFI Packaged Water Treatment Plant is in Table 4-3. The flexibility of the chemical feed, flocculation, and settling in the Unitized Treatment System as part of the EFI's packaged WTP can treat the higher turbidity found in the raw water from Lake Monroe. Supporting information for EFI's packaged treatment plant can be found in **Appendix G**.



# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

Table 4-3: List of Improvements for Alternative 2: Replacement of Existing WTP

Item No. #	Description
1	Concrete pad foundation of 8 in. in depth for EFI packaged water treatment plant.
2	One (1) EFI packaged water treatment plant.
3	344 LFT. of Six (6) ft. tall chain linked safety fence with a 12 ft. fence gate at the entrance to the site (IDEM requirement).
4	40 CYD of no.53 aggregate for 6 in. gravel on top of existing gravel driveway.
5	A new intake pipe structure will adjust elevation of intake pumps in Lake Monroe. This will include two (2) new 80 gpm submersible pumps for full build out.
6	One (1) new emergency backup generator (IDEM requirement).
7	Tree removal for new facilities and to reduce potential environmental hazards.
8	Site lighting will need to be installed for the new facilities at the WTP site.

### Advantages

The single preassembled packaged water treatment plant from EFI would not require water trucking costs. Also, no demolition work of existing facilities is required to install the packaged treatment plant and thus, the existing WTP could remain in service until the new plant is ready.

The overall project cost is less than that of a new Westech plant.

### Disadvantages

Compared to the treatment plant option offered by Westech, the packaged treatment plant from EFI would require more chemicals in the water treatment process; however, it is anticipated the treatment chemicals used would be similar to the current setup.

### D. Map

The proposed improvement area can be found in Figure 4-3.



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PLOT SCALE: 1:186.91  
EDIT DATE: 8/25/23 - 1:55 PM  
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DRAWING FILE: \\RQAWF1\PROJECTS\23-400-188-1 SALT CREEK ESTATES UTILITIES\ACAD\PLAN SHEETS & WORKING DRAWINGS\SALT CREEK WTP REPLACEMENT EXHIBIT.DWG

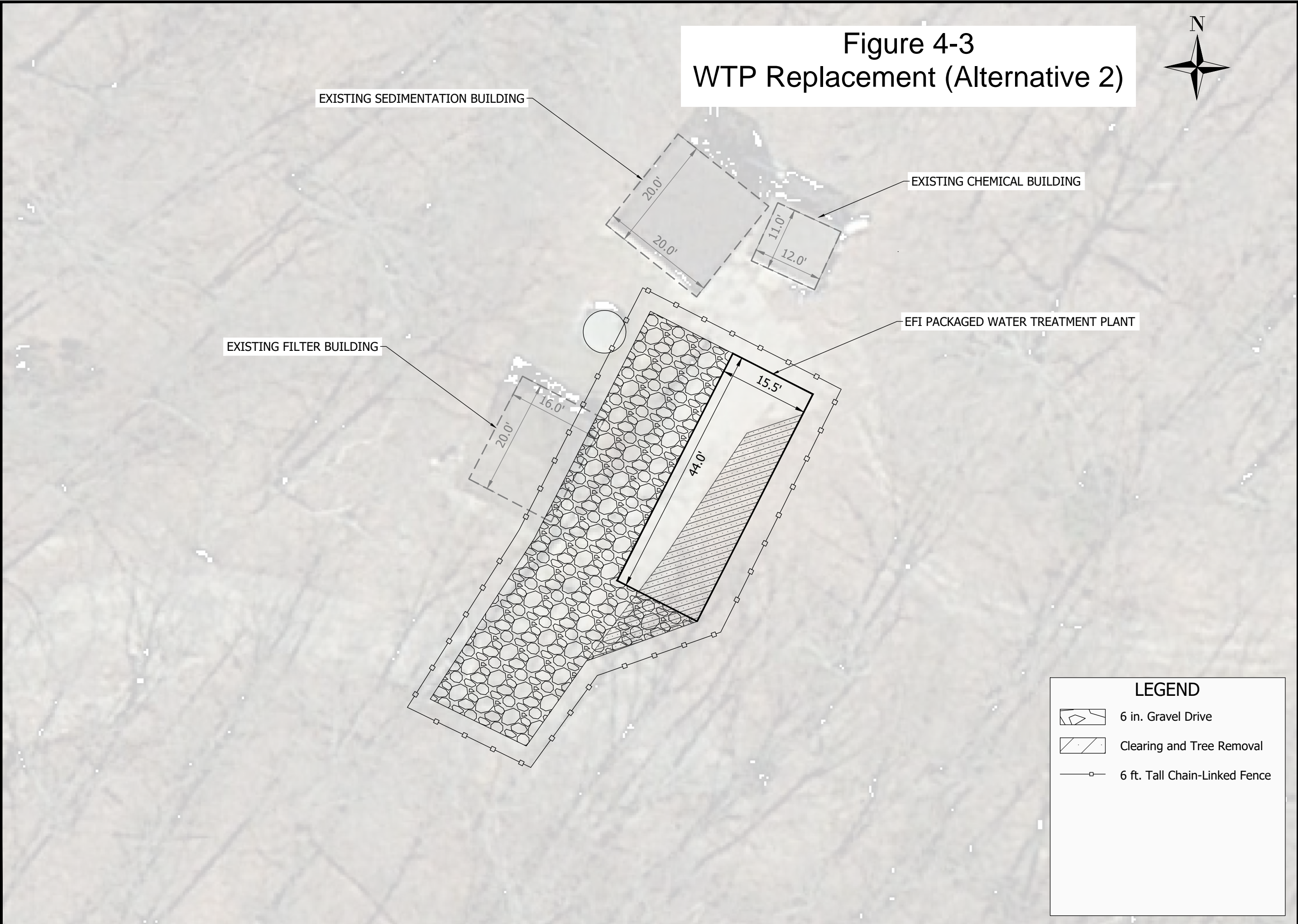


Figure 4-3  
WTP Replacement (Alternative 2)

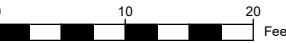


#	Revision	Date

Project #:	23-400-188-1
Designed By:	JDP
Drawn By:	JDP
Checked By:	ALC
Date:	08/16/2023

**LEGEND**

- 6 in. Gravel Drive
- Clearing and Tree Removal
- 6 ft. Tall Chain-Linked Fence





**E. Environmental Impacts**

No impacts to historic structures, wetlands, waterways, or groundwater are anticipated. Tree removal will be required for the new packaged Water Treatment Plant.

The WTP site is outside of the 100-year and 500-year floodplain areas of Lake Monroe.

On-site erosion control measures including silt fence will be in place to prevent sediment runoff from the construction site into lake Monroe.

**F. Land Requirements**

The easement for the WTP is not known. An easement may be required depending on the extents of SCS's WTP easement parcel. Some tree clearing will be required to expand the WTP.

**G. Construction Considerations**

Special considerations should be made to ensure that there are no disruptions in the water service during construction of the new water treatment plant. This proposed project will require the demolition of the existing WTP facilities once the new packaged treatment plant has been connected to the water distribution system. Traffic control and maintenance will be an additional cost of this project due to the narrow access road to the Salt Creek Estates community.

All applicable local and state permits will need to be obtained.

**H. Sustainability Consideration**

**a) Water and Energy Efficiency**

The proposed project will replace the existing WTP that has inefficient treatment.

**b) Green Infrastructure**

The proposed new Water Treatment Plant project does not include any green infrastructure.

**I. Advantages and Disadvantages**

**a) Advantages**

Advantages of replacing the Water Treatment Plant include:

- Lower operational cost for the WTP
- Resolving outstanding IDEM deficiency notices
- Facilitating better water quality monitoring and maintenance
- Completely replacing all equipment and thus not maintaining equipment that has surpassed its useful life

**b) Disadvantages**

Disadvantages of replacing the Water Treatment Plant include:

- Possible risk of asbestos exposure from demolishing existing facilities
- Significant projected capital cost would be extremely difficult to finance.

**J. Cost Estimates**

The preliminary opinion of probable construction cost for the proposed alternative can be found in Table 4-4.

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

*Table 4-4: Preliminary Opinion of Probable Construction Cost for Alternative #2*

EFI PACKAGED WATER TREATMENT PLANT					
Item No.	Item Description	Qty.	Units	Unit Price	Total Cost
1	MOBILIZATION AND DEMOBILIZATION	1	LS	\$126,000	\$126,000
2	CONSTRUCTION ENGINEERING	1	LS	\$126,000	\$126,000
3	MAINTENANCE OF TRAFFIC	1	LS	\$42,000	\$42,000
4	EROSION CONTROL	1	LS	\$42,000	\$42,000
5	BUILDING FOUNDATION	17	CYD	\$1,600	\$27,000
6	EFI PACKAGED TREATMENT PLANT	1	LS	\$3,700,000	\$3,700,000
7	SITE FENCING WITH GATE	240	LFT	\$90	\$22,000
8	SITE DRIVE - 6 IN. GRAVEL	1	LS	\$12,000	\$12,000
9	INTAKE PUMP STATION IMPROVEMENT	1	LS	\$276,000	\$276,000
10	EMERGENCY BACKUP GENERATOR WITH PROPOANE TANK	1	EA	\$77,000	\$77,000
11	TREE CLEARING	1	LS	\$21,000	\$21,000
12	SITE LIGHTING AND ELECTRICAL	1	LS	\$58,000	\$58,000
<b>Estimated Construction Cost Subtotal</b>					<b>\$4,529,000</b>

## 4.4 Alternative #3: Regionalization

### A. Description

The nearest utility to Salt Creek Estates is the East Monroe Water Corporation (EMWC). EMWC currently purchases their water from Bloomington and services portions of eastern Monroe County as well as western Brown County. A connection to EMWC was explored for Salt Creek Estates in 2017 by Commonwealth Engineers. At that time, a project was conceptualized to tie-in to EMWC at its closest connection point on Pine Grove Road. This would require 26,000 linear feet of new 6-inch water main, of which nearly 1,200 would need to be directionally drilled under Lake Monroe.

This connection would allow for Salt Creek Estates to no longer have to utilize their own WTP to produce water. However, the HOA would need to purchase water from EMWC for their usage as well as find a way to fund the capital costs of the project.

Other connection points could be explored during detailed design and through further conversations with regional partners such as EMWC, but those were not explored as part of this study.

### B. Design Criteria

This alternative would include the installation of more than 4.5 miles of water main along rural roadways, crossing under Lake Monroe. Although some customers could be picked up and serviced by EMWC, the number is not expected to be substantial and utilization rates have not been studied.

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

Additional modeling would need to be done to determine feasibility of connecting in new customers along the route other than Salt Creek Estates.

Additionally, the alternative would require a chlorine injection point, to boost chlorine residual at Salt Creek Estates. This injection point would also be home to a meter for EMWC to utilize for billing.

### C. Maps

A map depicting the project extents has been provided in Figure 4-4.

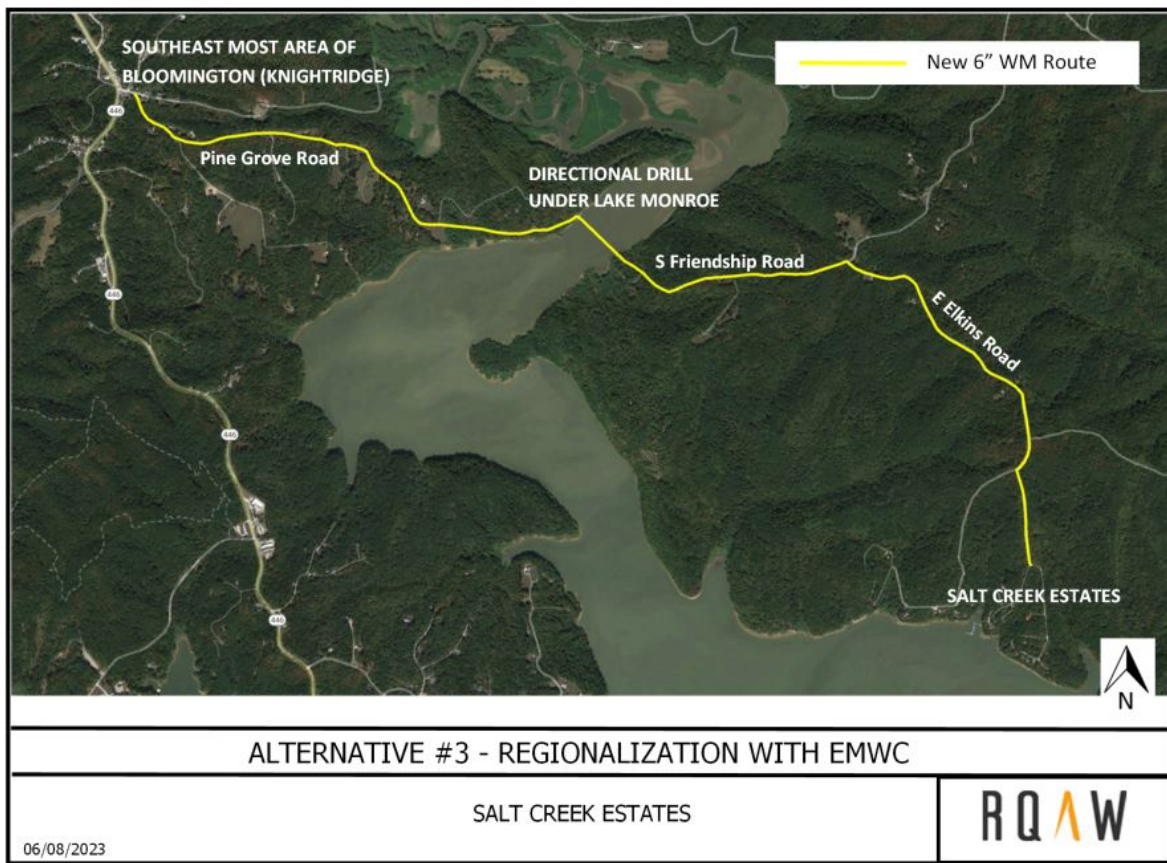


Figure 4-4: Alternative #3 Regionalization Figure

**D. Environmental Impacts**

The long directional bore route under Lake Monroe would be of significant importance in maintaining positive or neutral environmental impacts. Permitting would likely require substantial time and coordination with several state entities.

**E. Land Requirements**

Although land would not be required for the water main itself, a new easement or area would be required at the connection point with the neighborhood for a chlorine injection shed. An easement location would be determined during design and be coordinated through the HOA.

**F. Construction Considerations**

Traffic control will be required throughout water main installation. At least one lane of all roadways should remain open throughout the duration of construction. In addition, the long directional drilling distance across the lake would require substantial constructability research and consideration.

**G. Sustainability Considerations**

**a) Water and Energy Efficiency**

Additional miles of water main lead to additional locations where leaks may occur. In order to preserve water efficiency, metering can be added at both the connection point and at the entrance to the estates to ensure no major water leaks are occurring.

**b) Green Infrastructure**

The proposed water main replacement project does not include any green infrastructure.

**H. Advantages and Disadvantages**

**a) Advantages**

Advantages for this project include the overall regionalization of the area. It is preferable to have less individual intake structures in Lake Monroe and helps to eliminate concerns with permitting and inspections through the Indiana Department of Environmental Management. Additionally, the costs associated with maintaining the new connection would be substantially less than what is currently needed to run the existing WTP.

**b) Disadvantages**

This project removes the ability for Salt Creek Estates to control their own water quality. It introduces several miles of new main that need to be upkept and repaired in the event of a leak. Additionally, there is a substantial disadvantage with regard to the lack of looping. In the event of a leak, the serviced areas may be without water until repairs are made. To make matters more severe, the distance of main bored under the lake is critical and would be extremely costly to repair. Another disadvantage would be the uncertainty of soil conditions and difficulty in collecting bore samples under the creek.

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

### I. Cost Estimates

*Table 4-5: Preliminary Opinion of Probable Construction Cost for Alternative #3*

REGIONALIZATION WITH EMWC					
Item No.	Item Description	Qty.	Units	Unit Price	Total Cost
1	MOBILIZATION AND DEMOBILIZATION	1	LS	\$193,700	\$193,700
2	MAINTENANCE OF TRAFFIC	1	LS	\$64,600	\$64,600
3	CONSTRUCTION ENGINEERING	1	LS	\$193,700	\$193,700
4	EROSION AND SEDEMENTATION CONTROL	1	LS	\$64,600	\$64,600
5	6-INCH WATER MAIN	26,000	LFT	\$170	\$4,420,000
6	6-INCH GATE VALVE	26	EA	\$3,000	\$78,000
7	COMPLETE CHLORINE INJECTION SHED AT SALT CREEK	1	LS	\$100,000	\$100,000
8	NEW 6" FLOW METER WITH HAND HOLE VAULT	2	EA	\$6,000	\$12,000
9	HDPE CASING BY HORIZONTAL DIRECTIONAL DRILL - LAKE MONROE	1,200	LFT	\$800	\$960,000
10	HYDRANT ASSEMBLY, COMPLETE	50	EA	\$7,000	\$350,000
11	CONNECT TO EXISTING WATER MAIN	2	EA	\$7,000	\$14,000
12	SITE RESTORATION	1	LS	\$520,000	\$520,000
<b>Estimated Construction Cost Subtotal</b>					<b>\$6,970,600</b>



## **CHAPTER 5: RECOMMENDED ALTERNATIVE**

### **5.1 General**

The proposed drinking water system improvements projects consist of the following alternatives. These alternatives were developed with input from SCSI.

#### **Alternative 1: Rehabilitation of Existing WTP**

Alternative 1 was selected to address the existing issues with the water treatment plant. The WTP is deteriorating and in urgent need of repair. The rehabilitation of the WTP was selected over the replacement alternative given the substantial financial burden and higher net present worth of the replacement alternative.

#### **ALTERNATIVE 1 – REHABILITATION OF EXISTING WTP**

Preliminary design includes:

1. Mobilization and demobilization, maintenance of traffic, erosion control and construction engineering.
2. Utility coordination and site survey.
3. Installing a new raw water intake pump structure in Lake Monroe to improve the quality of the raw water.
4. Installation of all new/replacement equipment as outlined in Alternative 1
5. Expansion of existing facilities as outlined in Alternative 1

The preliminary opinion of probable construction cost for this project is \$2,268,000.

### **5.2 Permit Requirements**

The proposed project may require the following permits:

- IDEM Water Treatment Plant Construction Permit
- IDEM Water Main Extension NOI Permit
- Construction Stormwater General Permit (CSGP)
- Construction in Floodway Permit
- County and Local Permits

### **5.3 Project Workforce**

SCSI does not have their own workforce. Contractors will be required for the construction and repair proposed. SCSI will provide operation and maintenance once the construction is complete.

### **5.4 Ordinances and Easements**

For Alternative 1, RQAW believes no easement acquisition will be necessary, but this will need to be verified during the design phase.

### **5.5 Sustainability Considerations**

#### **WATER AND ENERGY EFFICIENCY**

The proposed drinking water system improvements will help the utility better serve customers by protecting public safety and addressing outstanding IDEM deficiency notices. The improvements will also reduce maintenance costs of the system for the community. The proposed project will not significantly impact energy efficiency.

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

### GREEN INFRASTRUCTURE

The proposed projects do not include any green infrastructure initiatives.

### 5.6 Total Project Cost Estimate

The preliminary opinion of probable total project cost is \$3,761,500. This includes construction contingency and non-construction costs in 2023 dollars. Table 5-1 provides a detailed summary of costs.

Table 5-1: Preliminary Opinion of Probable Project Cost

PRELIMINARY OPINION OF PROBABLE PROJECT COSTS		
No.	Project	Cost
1	Alternative #2 - WTP Replacement	\$2,268,000
<b>25% Construction Contingency</b>		\$567,000
<b>Total Estimated Construction Cost</b>		<b>\$2,835,000</b>
<b>Non-Construction Costs</b>		
Engineering Fee (Survey, Design, Permitting, Bidding, Construction Administration, and Inspection)		\$775,000
Grant Administration		\$56,000
Labor Standards Administration		\$15,000
Financing and Legal Fees		\$80,500
<b>Total Estimated Project Cost</b>		<b>\$3,761,500</b>

### 5.7 Annual Operating Budget

#### GENERAL

SCSI is in stable financial condition. The utility's income is suitable to handle operating and maintenance costs; however, more detailed information is not available at this time. SCSI has no reserve funds for large capital improvements projects. A new water fee would be calculated by SCSI per household to cover costs on a monthly basis.

#### OPERATION AND MAINTENANCE COSTS

Each stage of the Water Treatment process is manually operated and must be closely monitored by WTP operators. In 2022 the Salt Creek Estates WTP produced 1,259,000 gallons of treated potable water. A cost breakdown for the estimated water rate for each 4,000 gallons produced based on the costs from the 2022 operating year is shown in Table 5-3. This cost breakdown includes operation and maintenance costs as well as contingency costs. These numbers do not reflect revenue and that collected rates are enough to cover operating and maintenance costs.

Table 5-2: Water Rate per 4,000 Gallons Based on 2022 Operating Costs

Expense Item	Rate Per 4,000 Gallons
Electricity	\$20.76
Chemicals	\$5.35
Lab Fees/Tests	\$18.88
Subcontract (Bynum Fanyo)	\$196.79
Dues and Fees	\$1.23

# SALT CREEK ESTATES PRELIMINARY ENGINEERING REPORT

## DRINKING WATER SYSTEM

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Office Supplies / Misc	\$2.68
Insurance (Fixed)	\$2.75
Repairs and Maintenance	\$94.66
Cushion/Contingency	\$14.94
Asset Purchases	\$13.90
<b>Water Rate per 4,000 Gallons (2022)</b>	<b>\$371.93</b>

### **CAPITAL IMPROVEMENTS**

SCSI has \$29,795.00 budgeted for repairs and maintenance for 2023. SCSI replaced their WTP's influent intake pumps in 2019 and their WTP's sump pumps in 2021.

Currently, treating water at the SCSI's WTP is time consuming with operation requiring approximately 1,300 to 1,400 man hours per year. With the current rate of \$125/hour on a normal basis, year-round labor costs would be \$175,000 annually. Per the Ziptility Report in **Appendix E**, this is \$100,000 more compared to what BFU charges for year-round operation at a WTP.

Replacing the WTP would also reduce the labor costs from operating the plant.

### **5.8 Project Funding**

The total estimated project cost for the recommended improvements is \$3,761,500. This cost would cause significant financial burden for the community, whose user base is less than 50 customers. Grant funding is of great need in order to provide the community with safe drinking water for years to come.

## **CHAPTER 6: CONCLUSIONS**

SCSI is committed to providing safe, reliable drinking water to its residents. For the utility to achieve this, it is important that they maintain their existing drinking water system infrastructure. The system has components that need replacement and/or repair.

The following alternative is recommended for the community:

### **Alternative 1: Rehabilitate Existing WTP**

This project will aid the community in continuing to provide safe, reliable drinking water for their residents.

SCSI was heavily involved in the production of this plan in coordination with RQAW. SCSI prioritized the alternatives by discussing RQAW's recommendations and the funding needed for each alternative.

## APPENDIX A: ENVIRONMENTAL FIGURES





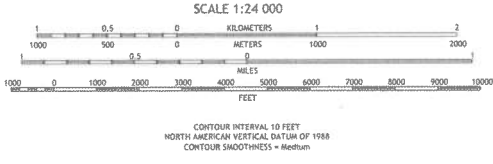
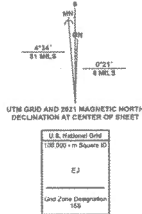
U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY



ALLENS CREEK QUADRANGLE  
INDIANA - MONROE COUNTY  
7.5-MINUTE TOPO



Produced by the United States Geological Survey  
North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84). Projection and  
1000-meter grid/Universal Transverse Mercator, Zone 18S  
Data is provided by The National Map (TNM), is the best available at the time of map  
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ROAD CLASSIFICATION  
Expressway  
Secondary Hwy  
Ramp  
Interstate Route  
US Route  
FS Primary Route  
Local Connector  
Local Road  
RWD  
State Route  
FS Passenger Route  
FS Hqs. Clearance Route  
  
Check with local Forest Service unit  
for current travel conditions and restrictions.

ALLENS CREEK, IN  
2023





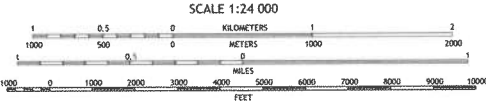
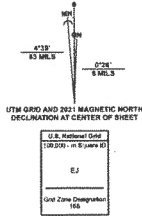
U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY



ELKINSVILLE QUADRANGLE  
INDIANA  
7.5-MINUTE TOPO



Produced by the United States Geological Survey  
North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84). Projection and  
1000-meter grid Universal Transverse Mercator, Zone 16S  
Data is provided by The National Map (TNM), is the best available at the time of map  
generation, and includes data content from supporting themes of Elevation,  
Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover,  
and Orthorectification. Refer to associated Federal Geographic Data Committee (FGDC)  
Metadata for additional source data information.  
This map is not a legal document. Boundaries may be generalized for this map scale.  
Private lands within government reservations may not be shown. Obtain permission  
before entering private lands. Temporal changes may have occurred since these data  
were collected and some data may no longer represent actual surface conditions.  
Learn About The National Map: <https://nationalmap.gov>



CONTOUR INTERVAL: 10 FEET  
NORTH AMERICAN VERTICAL DATUM OF 1988  
CONTOUR SMOOTHNESS: Medium



QUADRANGLE LOCATION		
Unionville	Berlin	Heaville
Albert Creek	Elkinsville	Story
Berlinville	Norman	Roller

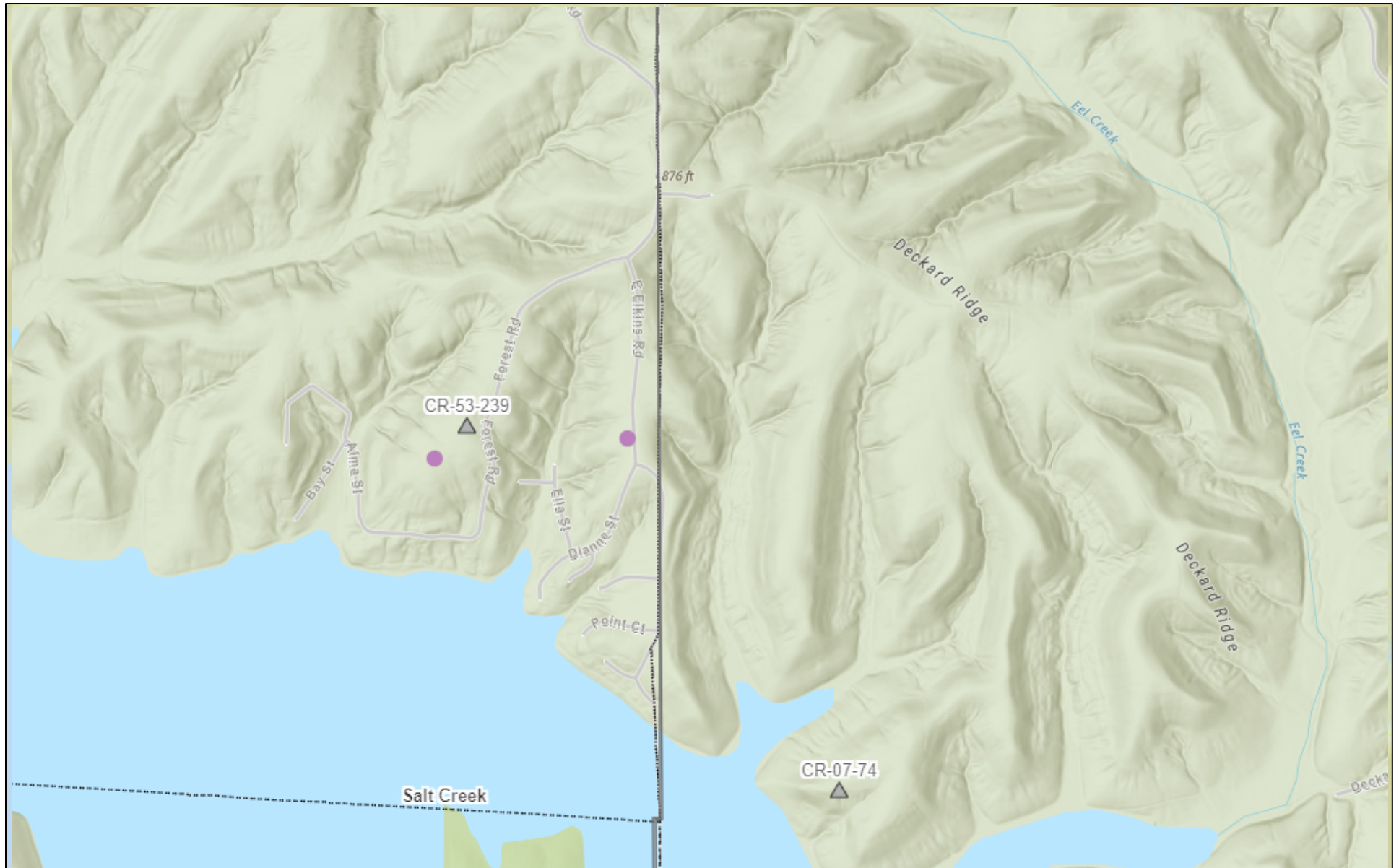
ADJOINING QUADRANGLES



ELKINSVILLE, IN  
2023



# Historic Buildings, Bridges, and Cemeteries Map



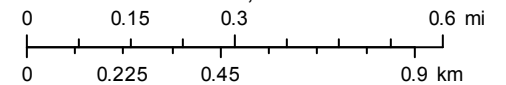
6/5/2023, 12:30:43 PM

△ Cemeteries

**County Survey Sites**

● Contributing

1:17,539



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),


# Soil Map—Brown County, Indiana, and Monroe County, Indiana






## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Brown County, Indiana

Survey Area Data: Version 24, Sep 3, 2022

Soil Survey Area: Monroe County, Indiana

Survey Area Data: Version 29, Sep 2, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 15, 2022—Jul 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

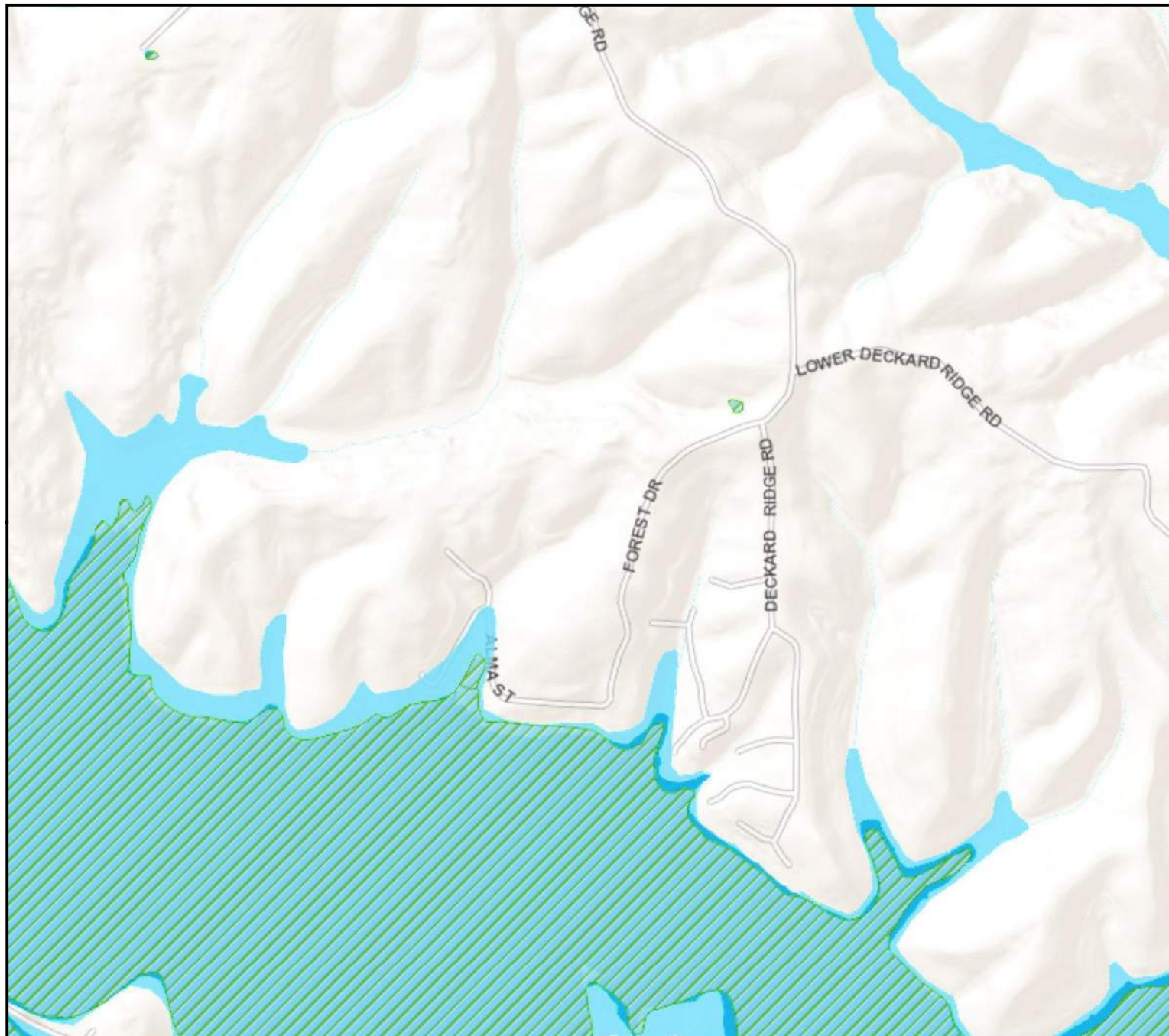
## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BgF	Berks-Trevlac-Wellston complex, 20 to 70 percent slopes	17.8	3.9%
WaD	Wellston-Berks-Trevlac complex, 6 to 20 percent slopes	17.8	3.9%
<b>Subtotals for Soil Survey Area</b>		<b>35.6</b>	<b>7.9%</b>
<b>Totals for Area of Interest</b>		<b>452.7</b>	<b>100.0%</b>

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcrAW	Beanblossom silt loam, 0 to 3 percent slopes, occasionally flooded, very brief duration	10.9	2.4%
BkF	Brownstown-Gilwood silt loams, 25 to 75 percent slopes	175.0	38.7%
TIB	Zanesville silt loam, 2 to 6 percent slopes	8.5	1.9%
W	Water	99.6	22.0%
WyqD	Wrays-Gilwood silt loams, 6 to 20 percent slopes	123.1	27.2%
<b>Subtotals for Soil Survey Area</b>		<b>417.1</b>	<b>92.1%</b>
<b>Totals for Area of Interest</b>		<b>452.7</b>	<b>100.0%</b>

# Salt Creek Estates

Date: 6/5/2023



## Legend

 Wetlands NWI (USFWS)


Wetlands Project Metadata NWI (U.S. Army Corps of Engineers)

### Lakes (Local-Resolution NHD)

 Estuary

 Ice Mass

 LakePond


 Playa


 Reservoir


 SwampMarsh

### Floodplains - FIRM (Mar 2020)

 Floodway

 1% Annual Chance Flood Hazard

 0.2% Annual Chance, Protected by

 0.2% Annual Chance Flood Hazard

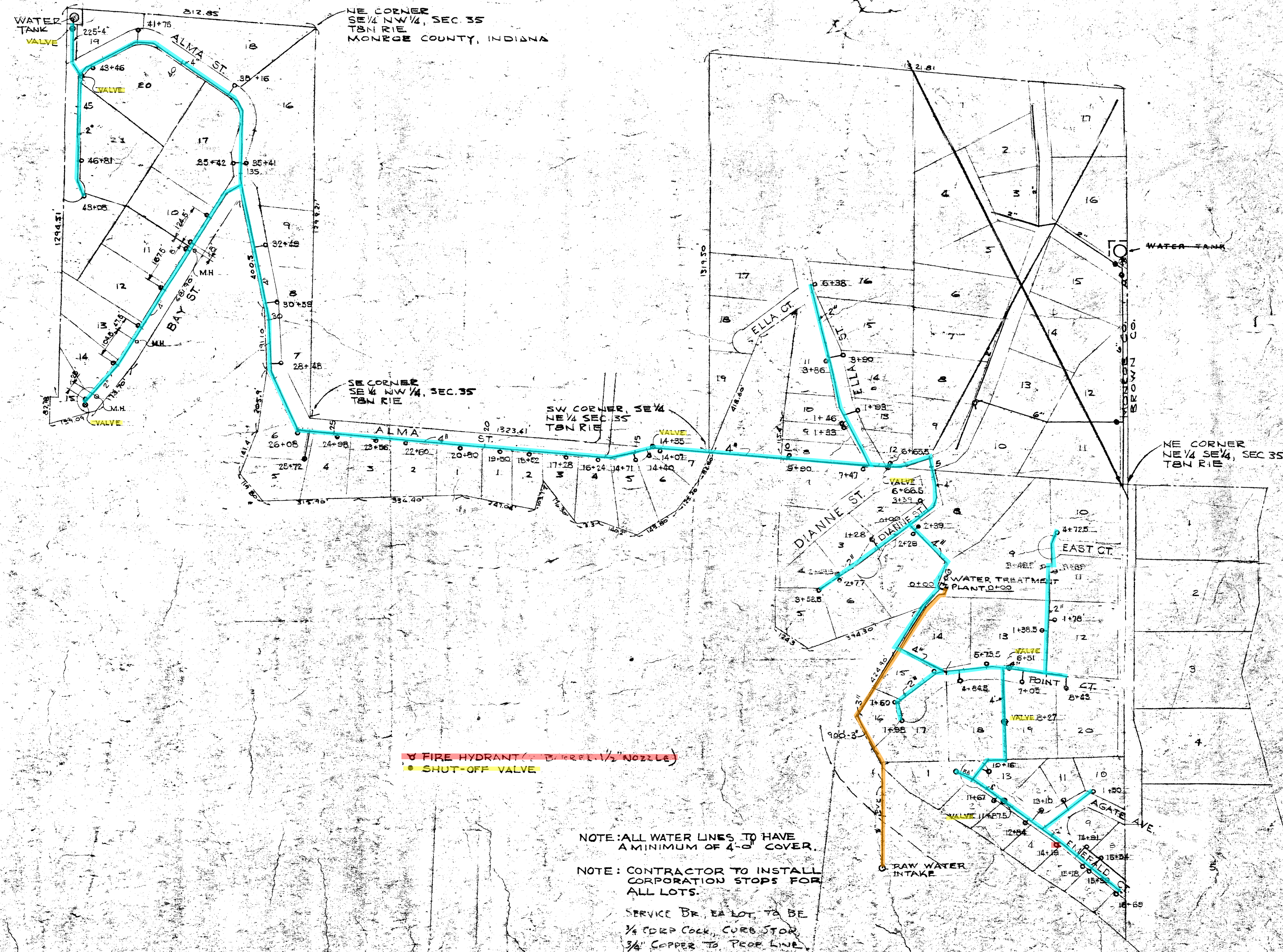


## APPENDIX B: DRINKING WATER SYSTEM MAPS

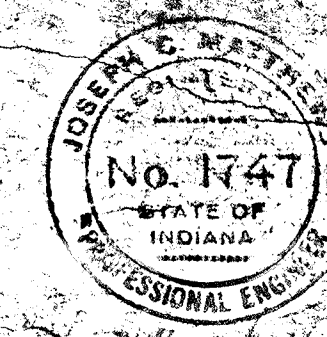
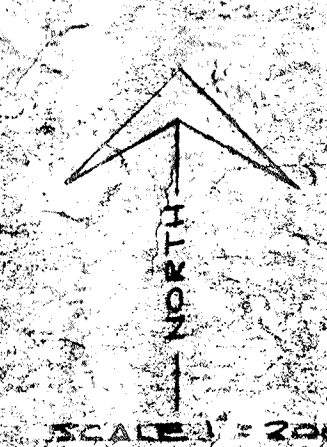








4" P.V.C. 160'±  
3" P.V.C. 160'±  
2" P.V.C. 160'±





## APPENDIX C: MROs and Calculations

Month	Day	Year	Date	Turbidity		pH		Water Treated	Backwash Gallon	Gallons Between Backwash	Chemicals Used (gallons)			Chlorine Residual - Plant Tap		Chlorine Residual - DS	
				Raw	Finished	Raw	Finished				Alum	NaOH	Cl2	Free	Total	Free	Total
2	1	2021	2/1/2021	39.7	0.05	7.6	8	7400	2000		4.2	3.2	0.225	1.3	1.5	1.1	1.3
2	3	2021	2/3/2021	35.1	0.08	7.5	7.9	9500	0		9.8	4.8	0.675	1.1	1.3	0.8	1
2	5	2021	2/5/2021	42.8	0.08	7.6	7.8	4000	0		8.4	1.6	0.375	1	1.2	0.8	1.1
2	8	2021	2/8/2021	50.7	0.07	7.1	8.1	4400	0		1.4	1.6	0.15	1.6	1.8	1.2	1.4
2	10	2021	2/10/2021	68.4	0.07	7.2	7.6	3000	2000	20900	8.4	1.6	0.18	2.1	2.3	1.7	1.9
2	11	2021	2/11/2021	65.4	0.08	7.2	7.5	1500	0		1	3.2	0.195	2.1	2.3	1.8	2
2	12	2021	2/12/2021	47.8	0.08	6.8	7.4	10200	0		1.28	4.8	0.225	1.6	1.8	1.3	1.5
2	14	2021	2/14/2021	38.4	0.04	6.7	7.4	4700	0		5.32	4.8	0.165	1.3	1.5	1	1.2
2	15	2021	2/15/2021	39.3	0.04	6.6	8.1	8200	0		8.4	3.2	0.21	1.3	1.5	0.9	1.1
2	16	2021	2/16/2021	40.7	0.07	6.6	8.1	2300	0		2.8	1.6	0.075	1.3	1.5	1	1.2
2	17	2021	2/17/2021	35.9	0.07	6.5	8	7900	0		8.4	3.2	0.15	1	1.2	0.8	1
2	20	2021	2/20/2021	26.7	0.05	6.7	8.3	7400	0		5.6	3.2	0.15	1	1.2	0.9	1.1
2	21	2021	2/21/2021	21.8	0.1	7	8.5	3400	0		2.8	1.6	0.15	1.2	1.4	1	1.2
2	23	2021	2/23/2021	15.5	0.04	7.3	8.4	7800	2000	53400	7	0.64	0.225	1.2	0.4	0.9	1.1
2	26	2021	2/26/2021	17.9	0.05	7.1	8.5	8000	0		7	0.96	0.225	1	1.2	0.8	1
2	28	2021	2/28/2021	19.1	0.05	7.3	8.4	1800	0		2.8	0.64	0.15	1	1.2	0.85	1
4	2	2021	4/2/2021	17.7	0.08	7.5	9.2	5000	2000	14800	5.6	0	0.15	0.8	1	0.8	1
4	5	2021	4/5/2021	10.8	0.06	7.2	7.9	3700	0		2.8	0	0.075	0.8	1.1	0.8	1
4	7	2021	4/7/2021	8.9	0.06	7.1	8.1	5900	0		7	0.96	0.3	0.9	1.1	0.8	1
4	8	2021	4/8/2021	9.7	0.07	7.2	8.2	2400	0		2.8	1.28	0.135	0.8	1.1	0.7	0.9
4	9	2021	4/9/2021	13.9	0.11	7.1	7.9	3000	2000	15000	4.2	0.32	0.165	0.9	1.2	0.8	1
4	12	2021	4/12/2021	9.3	0.05	7.3	8	7400	0		4.2	0.32	0.18	0.8	1	0.7	0.9
4	14	2021	4/14/2021	11.6	0.04	7.3	8	3400	0		7	0.96	0.27	1	1.2	0.8	1
4	16	2021	4/16/2021	15	0.05	7.2	7.9	5600	0		5.6	1.92	0.315	1.2	1.4	1	1.2
4	19	2021	4/19/2021	12.4	0.06	7.1	7.8	4300	0		4.2	0.32	0.27	1.1	1.3	0.9	1.1
4	20	2021	4/20/2021	12.2	0.05	7.1	7.6	3900	0		5.6	0.64	0.165	1	1.2	0.8	1
4	23	2021	4/23/2021	13.4	0.06	7.1	7.5	4600	0		5.6	1.28	0.315	1.2	1.4	1	1.2
4	26	2021	4/26/2021	12.7	0.04	7.2	7.6	2900	0		2.8	0.96	0.135	1.3	1.5	1.1	1.3
4	30	2021	4/30/2021	21.6	0.04	7.3	7.2	4900	2000	37000	5.6	1.28	0.375	1.3	1.5	1	1.2
5	3	2021	5/3/2021	21.6	0.04	7.3	7.8	2500	0		2.5	2.56	0.15	1.2	1.4	1	1.2
5	5	2021	5/5/2021	27.5	0.03	7.2	7.9	6800	2000	9300	10.97	2.56	0.2	1.1	1.3	0.8	1
5	7	2021	5/7/2021	24.6	0.03	7.2	8.1	3000	0		3.6	1.28	0.23	1	1.3	1	1.2
5	10	2021	5/10/2021	31.9	0.04	7.3	8	2500	0		3.92	0.64	0.14	1.1	1.3	0.9	1.1
5	12	2021	5/12/2021	24.1	0.06	7.2	8.3	4000	2000	9500	2.8	1.28	0.2	1.2	1.4	1.1	1.3
5	17	2021	5/17/2021	21.7	0.04	7.1	8	4000	0		4.48	3.2	0.33	1	1.1	0.9	1.1
5	18	2021	5/18/2021	19.6	0.04	7.2	8.2	2800	0		3.92	3.2	0.2	1	1.2	0.8	1.1
5	19	2021	5/19/2021	18.1	0.04	7.1	8.3	3000	0		2.8	0.96	0.23	0.9	1.1	0.8	1.1
5	21	2021	5/21/2021	16.5	0.05	7.2	8.1	3300	2000	13100	4.2	0.64	0.29	0.8	1	0.7	0.9
5	22	2021	5/22/2021	14.3	0.04	7.1	8	2000	0		2.8	0.64	0.21	0.9	1	0.8	1
5	24	2021	5/24/2021	13.1	0.04	7.3	7.9	7000	2000	9000	2.8	0.64	0.21	1	1.2	0.8	1
5	25	2021	5/25/2021	12.4	0.06	7.2	7.8	5000	0		2.8	1.28	0.18	0.9	1	0.8	1
5	26	2021	5/26/2021	10.5	0.03	7.4	7.8	4600	0		4.2	1.28	0.18	1.3	1.5	1.3	1.2



5	27	2021	5/27/2021	11.7	0.04	7.3	8.1	5800	0		8.4	1.6	0.23	1.4	1.6	1.3	1.5
5	28	2021	5/28/2021	9.7	0.04	7.3	8.3	5500	4000	20900	7	1.6	0.23	1.4	1.6	1.2	1.4
6	2	2021	6/2/2021	23.1	0.17	7.2	8.1	8900	0		8.4	1.6	0.18	1.4	1.6	0.8	1
6	4	2021	6/4/2021	7.08	0.04	7	7.4	9500	0		7.56	1.28	0.195	1.2	1.4	1	1.1
6	7	2021	6/7/2021	12.1	0.06	7.2	8.1	8200	0		6.44	1.92	0.3	1.5	1.7	1.3	1.5
6	9	2021	6/9/2021	14.9	0.04	7.1	7.8	8200	0		7	1.6	0.225	1.3	1.5	1.2	1.4
6	11	2021	6/11/2021	19.4	0.04	7.2	7.9	6800	0		4.2	1.6	0.195	1.4	1.6	1.2	1.4
6	14	2021	6/14/2021	12.2	0.04	7.3	8.3	8200	0		5.6	0.32	0.165	1.4	1.6	1.3	1.5
6	16	2021	6/16/2021	7.9	0.04	7.4	8.5	8800	2000	58600	7	0.64	0.165	1.4	1.6	1.2	1.4
6	18	2021	6/18/2021	8.4	0.03	7.4	7.7	7900	0		8.4	0.64	0.225	1.2	1.4	1	1.2
6	21	2021	6/21/2021	29.7	0.06	7.3	8.3	5500	0		5.6	0.64	0.255	0.9	1.1	0.8	1
6	23	2021	6/23/2021	19.1	0.05	7.4	8.3	4200	0		4.2	0.96	0.165	0.8	1	0.7	0.9
6	25	2021	6/25/2021	22.1	0.04	7.2	7.8	6500	0		2.8	0.96	0.15	0.9	1.1	0.8	1
6	28	2021	6/28/2021	19.7	0.06	7.4	7.8	6500	2000	30600	5.6	0.64	0.225	1.1	1.3	1	1.2
6	30	2021	6/30/2021	16.9	0.08	7.4	8.1	5300	0		4.2	0	0.255	0.9	1.1	0.8	1
7	2	2021	7/2/2021	20.6	0.07	7.1	8.3	6800	0		4.2	0	0.255	1	1.2	0.8	1
7	4	2021	7/4/2021	21.7	0.06	7.2	8.3	3300	0		1.4	1.6	0.18	0.9	1.1	0.7	0.9
7	6	2021	7/6/2021	18.6	0.05	7.3	8.5	6800	0		2.8	1.6	0.21	0.9	1.1	0.8	0.9
7	7	2021	7/7/2021	17.3	0.06	7.3	8.4	4400	0		1.4	1.6	0.195	0.9	1.1	0.8	1
7	9	2021	7/9/2021	15.9	0.06	7.2	8.5	7700	0		5.6	2.56	0.42	1.3	1.5	1.2	1.4
7	12	2021	7/12/2021	18.7	0.05	7.3	8.1	9000	2000	43300	5.6	1.28	0.54	1.1	1.3	0.9	1.1
7	14	2021	7/14/2021	15.7	0.05	7.2	8	7800	0		4.2	2.24	0.315	1.4	1.6	1.3	1.5
7	16	2021	7/16/2021	19.7	0.05	7.1	8.1	9500	0		5.6	2.56	0.255	1.5	1.5	1.3	1.5
7	19	2021	7/19/2021	15.7	0.07	7.1	8	6700	0		5.6	2.56	0.195	1.3	1.5	1.1	1.3
7	21	2021	7/21/2021	18.8	0.06	7	7.8	6500	2000	30500	2.8	1.28	0.3	1.2	1.4	1	1.2
7	23	2021	7/23/2021	21.9	0.04	6.7	7.6	8500	0		2.8	2.56	0.225	1.1	1.3	0.9	1
7	26	2021	7/26/2021	22.7	0.04	6.8	7.6	8800	0		2.8	2.56	0.375	1	1.2	0.8	1
7	29	2021	7/29/2021	21.9	0.04	6.7	7.8	6900	0		2.8	2.56	0.315	1.1	1.3	0.9	1.1
7	30	2021	7/30/2021	23.5	0.06	6.6	7.7	5600	4000	29800	4.2	2.24	0.33	1.2	1.4	1	1.2
8	2	2021	8/2/2021	7.9	0.07	7.3	7.9	7900	0		9.52	0.96	0.33	1.3	1.5	1	1.2
8	4	2021	8/4/2021	8.3	0.06	7.2	8	8300	0		4.48	1.92	0.345	1.3	1.5	1.2	1.4
8	6	2021	8/6/2021	10.5	0.04	7.1	7.9	10500	0		3.92	1.92	0.255	1.1	1.3	1.2	1.4
8	9	2021	8/9/2021	13.9	0.05	7.2	8.3	13900	0		3.36	1.92	0.36	1.2	1.4	1	1.2
8	12	2021	8/12/2021	11.8	0.04	7.2	8.3	11800	0		2.52	2.88	0.18	1	1.2	0.8	1
8	16	2021	8/16/2021	13.9	0.04	7.1	8.2	13900	2000	66300	3.36	2.88	0.375	1.1	1.3	0.9	1.1
8	18	2021	8/18/2021	11.2	0.06	7.2	8.3	11200	0		3.08	1.92	0.225	0.9	1.1	0.8	1
8	20	2021	8/20/2021	12.9	0.07	7.1	8.6	12900	0		2.8	3.2	0.24	1.4	1.6	1.2	1.4
8	23	2021	8/23/2021	13.7	0.09	7	8.3	13700	0		4.48	1.92	0.33	0.9	1.1	0.8	1
8	26	2021	8/26/2021	9.9	0.06	6.9	8.2	9900	2000	47700	6.16	2.56	0.39	1.1	1.3	1	1.2
8	27	2021	8/27/2021	11.6	0.05	6.9	8.2	11600	0		4.48	2.56	0.36	1.1	1.3	0.9	1.1
8	30	2021	8/30/2021	14.1	0.07	6.8	8.1	14100	0		3.64	2.56	0.345	1.3	1.5	1.2	1.4
10	1	2021	10/1/2021	7.9	0.07	7.5	8.5	11800	0		5.6	1.6	0.6	1.9	2.1	1.2	1.4
10	4	2021	10/4/2021	11.1	0.06	7.7	8.4	5500	0		1.4	0	0.21	1.3	1.5	0.6	0.8
10	6	2021	10/6/2021	11.7	0.02	7.8	8.4	8100	0		2.8	1.6	0.57	1.1	1.5	1.5	1.7
10	8	2021	10/8/2021	9.1	0.01	7.8	8.4	8800	2000	59900	4.2	0	0.375	1.9	2	0.7	0.9
10	11	2021	10/11/2021	11.8	0.01	7.5	8.3	9200	0		4.2	1.6	0.375	1.9	2.2	0.6	0.8
10	13	2021	10/13/2021	9.4	0.02	7.4	8.4	9400	0		4.2	1.6	0.45	1.9	2.1	0.7	0.8

10	15	2021	10/15/2021	9.5	0.02	7.5	8.6	10100	0		5.6	1.6	0.495	1.7		0.5	0.6
10	18	2021	10/18/2021	12.7	0.02	7.6	8.5	8900	2000	37600	2.8	1.28	0.465	1.6	1.9	0.4	0.5
10	20	2021	10/20/2021	10.6	0.02	7.7	8.4	10000	0		5.6	1.6	0.465	1.7	1.9	0.3	0.4
10	22	2021	10/22/2021	9.8		7.8	8.4	5900	0							0.4	0.4
10	25	2021	10/25/2021	10.1	0.02	7.8	8.5	9800	0		8.4	3.2	0.345	1.8	2.1	0.4	0.4
10	27	2021	10/27/2021	9.46	0.02	7.8	8	4500	0		1.96	1.6	0.225	2.1	2.3	0.3	0.3
10	29	2021	10/29/2021	16.7	0.04	7.8	8.6	4900	0						2.2	0.5	0.6
11	1	2021	11/1/2021	9.37	0.02	7.8	8.6	8600	0		5.04	2.56	0.465	2	2.2	0.3	0.4
11	5	2021	11/5/2021	11.5	0.02	7.5	8.9	11000	0		3.36	1.28	0.345		2.2	0.4	0.6
11	8	2021	11/8/2021	7.08	0.02	7.5	8.8	10800	0		4.48	1.28	0.375	2.1	2.3	0.5	0.7
11	9	2021	11/9/2021	8.13	0.02	7.5	8.7	9200	0		4.76	1.28	0.3	2.1	2.3	0.7	0.9
11	12	2021	11/12/2021	9.11	0.05	7.6	8.7	3200	2000	77900	1.96	1.6	0.18		2.2	0.6	0.7
11	15	2021	11/15/2021	6.7	0.03	7.7	8.8	10400	0		3.92	1.6	0.39	2.1	2.3	0.5	0.7
11	17	2021	11/17/2021	8.03	0.03	7.5	8.9	10100	0		4.48	1.6	0.39	2.1	2.2	0.6	0.8
11	22	2021	11/22/2021	5.07	0.03	7.3	8.8	10700	0		4.48	1.6	0.36	1.9	2.2	0.5	0.6
11	24	2021	11/24/2021	4.54	0.03	7.2	9	11000	2000	42200	4.48	1.6	0.39	1.9	2.1	0.3	0.5
11	29	2021	11/29/2021	4.97	0.03	7.3	8.8	9000	0		4.48	1.6	0.39	1.9	2.2	0.4	0.6
12	1	2021	12/1/2021	4.54	0.03	7.7	8.8	8600	2000	17600	4.5	1.6	0.33	1.9	2.1	0.5	0.6
12	3	2021	12/3/2021	4.82	0.02	7.7	8.7	8300	0		4.48	1.6	0.36	1.8	2.1	0.6	0.6
12	6	2021	12/6/2021	5.27	0.03	7.6	8.8	8800	2000	17100	3.92	1.6	0.33	1.9	2.1	0.5	0.6
12	9	2021	12/9/2021	26.3	0.04	7.5	8.7	9100	0		4.48	1.6	0.36	1.8	2.1	0.4	0.5
12	10	2021	12/10/2021	27.4	0.04	7.4	8.9	2800	0		2.8	0.96	0.28	2	2.3	0.5	0.6
12	13	2021	12/13/2021	19.7	0.05	7.3	8.9	6400	2000	18300	3.92	1.92	0.39	1.9	2.1	0.4	0.4
12	15	2021	12/15/2021	24.1	0.05	7.3	8.7	6500	0		3.64	1.92	0.36	1.9	2.1	0.4	0.5
12	17	2021	12/17/2021	26.5	0.05	7.3	8.6	2200	2000	8700	4.2	1.6	0.27	1.9	2.2	0.5	0.5
12	20	2021	12/20/2021	24.2	0.05	7.5	8.6	8200	0		4.2	1.6	0.27	1.8	2	0.4	0.5
12	22	2021	12/22/2021	24.3	0.03	7.5	8.7	4100	0		4.2	1.6	0.2	1.8	2	0.5	0.5
12	23	2021	12/23/2021	24.5	0.05	7.5	8.8	5600	2000	17900	4.2	1.6	0.3	1.8	2	0.5	0.7
12	27	2021	12/27/2021	20.4	0.04	7.5	8.9	4900	0		4.2	1.7	0.3	1.8	2	0.4	0.5
12	28	2021	12/28/2021	21.1	0.04	7.4	8.8	3100	2000	8000	4.2	1.5	0.33	1.9	2	0.5	0.5
12	29	2021	12/29/2021	15.4	0.04	7.3	8.9	4300	0		4.2	1.6	0.35	1.9	2	0.4	0.6
12	30	2021	12/30/2021	14.4	0.04	7.5	8.8	6700	2000	11000	4.2	1.6	0.38	1.8	2	0.8	0.9
12	31	2021	12/31/2021	14.1	0.04	7.4	8.8	3400	0		4.2	1.6	0.29	2	2.1	0.7	0.8
1	3	2022	1/3/2022	20.1	0.05	7.5	8.7	7200	0		4.2	1.6	0.36	1.9	2	0.5	0.6
1	4	2022	1/4/2022	18.4	0.04	7.4	8.7	8000	0		4.2	1.6	0.33	1.9	2.1	0.4	0.5
1	5	2022	1/5/2022	18.7	0.04	7.4	8.6	7500	0		4.2	1.6	0.33	1.9	1.9	0.5	0.6
1	6	2022	1/6/2022	19.5	0.04	7.6	8.6	3600	2000	29700	2.52	1.28	0.24	1.7	1.8	0.4	0.6
1	7	2022	1/7/2022	19.5	0.05	7.5	8.7	3200	0		2.8	1.28	0.24	1.8	1.9	0.5	0.6
1	10	2022	1/10/2022	17.2	0.04	7.4	8.6	5900	0		4.48	1.28	0.36	1.6	1.8	0.4	0.6
1	12	2022	1/12/2022	12.4	0.05	7.4	8.7	4800	0		4.2	1.28	0.24	1.9	2	0.4	0.5
1	14	2022	1/14/2022	11.9	0.05	7.4	8.6	3800	0		4.2	1.28	0.3	1.8	2	0.5	0.5
1	17	2022	1/17/2022	14.3	0.04	7.5	8.6	8400	2000	26100	4.2	1.6	0.33	1.8	2	0.4	0.6
1	19	2022	1/19/2022	12.9	0.07	7.4	8.6	5700	0		4.2	1.6	0.33	1.5	1.7	0.4	0.4
1	20	2022	1/20/2022	12.2	0.04	7.4	8.5	2100	0		2.8	1.28	0.24	1.7	1.9	0.4	0.5
1	21	2022	1/21/2022	12.4	0.04	7.3	8.6	5400	0		4.2	1.92	0.33	1.6	1.8	0.4	0.4
1	24	2022	1/24/2022	12.5	0.04	7.3	8.6	6800	0		4.2	1.6	0.3	1.7	1.7	0.4	0.4
1	25	2022	1/25/2022	12.7	0.05	7.3	8.6	3000	2000	23000	2.8	1.6	0.24	1.6	1.7	0.4	0.5

1	26	2022	1/26/2022	11.6	0.05	7.2	8.7	5800	0		4.2	1.6	0.33	1.7	1.8	0.4	0.4
1	28	2022	1/28/2022	11.6	0.05	7.2	8.6	4300	0		4.2	1.6	0.3	1.5	1.7	0.4	0.5
1	31	2022	1/31/2022	42.2	0.05	7.2	8.6	6600	0		4.2	1.6	0.3	1.6	1.6	0.4	0.4
2	1	2022	2/1/2022	9.17	0.05	7.3	8.6	9400	0		4.2	1.6	0.39	1.6	1.8	0.4	0.6
2	2	2022	2/2/2022	8.67	0.05	7.3	8.5	8800	2000	34900	4.2	1.6	0.39	1.7	1.7	0.4	0.5
2	7	2022	2/7/2022	9.14	0.05	7.4	8.5	7200	0		4.2	1.6	0.33	1.7	1.8	0.4	0.4
2	9	2022	2/9/2022	16.1	0.05	7.4	8.6	4100	0		3.08	1.28	0.27	1.5	1.6	0.4	0.5
2	10	2022	2/10/2022	18.3	0.06	7.5	8.5	6200	0		3.92	1.92	0.36	1.6	1.7	0.5	0.6
2	14	2022	2/14/2022	23.9	0.06	7.2	8.6	6000	0		4.2	1.92	0.39	1.5	1.6	0.5	0.6
2	16	2022	2/16/2022	25.1	0.05	7.4	8.5	8100	2000	31600	4.2	1.92	0.36	1.4	1.6	0.5	0.6
2	18	2022	2/18/2022	26.2	0.05	7.4	8.6	6500	0		4.2	1.6	0.39	1.6	1.7	0.6	0.6
2	21	2022	2/21/2022	21.4	0.05	7.3	8.5	7400	0		4.2	1.6	0.39	1.6	1.6	0.6	0.6
2	23	2022	2/23/2022	20.8	0.06	7.3	8.6	5000	0		3.92	1.6	0.36	1.5	1.5	0.5	0.6
2	25	2022	2/25/2022	22.1	0.04	7.4	8.5	6400	0		3.92	1.6	0.36	1.4	1.6	0.6	0.6
2	28	2022	2/28/2022	20.4	0.06	7.5	8.6	5800	2000	31100	3.92	1.6	0.39	1.6	1.7	0.6	0.6
3	2	2022	3/2/2022	11.3	0.05	7.4	8.5	6700	0		3.36	1.6	0.39	1.6	1.7	0.7	0.8
3	4	2022	3/4/2022	11.9	0.05	7.4	8.4	4200	0		3.92	1.28	0.375	1.6	1.8	0.8	0.8
3	7	2022	3/7/2022	9.14	0.05	7.5	8.5	5000	2000	15900	4.2	1.92	0.375	1.7	1.8	0.7	0.7
3	9	2022	3/9/2022	16.1	0.05	7.4	8.6	2100	0		4.2	1.28	0.3	1.5	1.6	0.6	0.8
3	11	2022	3/11/2022	21.4	0.05	7.2	8.5	3500	0		4.2	2.56	0.345	1.7	1.7	0.8	1
3	14	2022	3/14/2022	23.9	0.06	7.2	8.6	2100	0		4.2	2.56	0.33	1.5	1.7	0.7	0.8
3	16	2022	3/16/2022	19.5	0.05	7.4	8.5	3400	2000	11100	4.2	1.92	0.36	1.4	1.6	0.7	0.8
3	18	2022	3/18/2022	22.2	0.05	7.4	8.6	3500	0		4.2	2.56	0.39	1.6	1.6	0.7	0.7
3	21	2022	3/21/2022	19.7	0.05	7.3	8.5	4000	0		3.92	1.92	0.33	1.6	1.7	0.8	0.9
3	23	2022	3/23/2022	20.8	0.06	7.3	8.6	5000	0		4.48	1.92	0.3	1.5	1.5	0.7	0.8
3	25	2022	3/25/2022	21.4	0.04	7.4	8.5	4500	2000	17000	4.48	1.92	0.39	1.7	1.7	0.7	0.9
3	28	2022	3/28/2022	20.4	0.06	7.5	8.6	3600	0		3.92	1.92	0.3	1.6	1.7	0.6	0.8
4	1	2022	4/1/2022	14.7	0.07	7.5	8.5	4800	0		4.2	1.6	0.45	1.7	1.9	1.4	1.5
4	2	2022	4/2/2022	32.6	0.12	7.5	8.5	1500	0		3.36	1.6	0.39	1.8	1.8	1.3	1.4
4	7	2022	4/7/2022	22.8	0.05	7.4	8.5	3600	0		4.2	1.92	0.375	1.8	1.9	1.5	1.5
4	8	2022	4/8/2022	20.7	0.06	7.5	8.4	5500	2000	19000	4.4	1.8	0.45	1.7	2	1.4	1.6
4	11	2022	4/11/2022	21.4	0.05	7.2	8.5	6400	0		4.2	2.56	0.35	1.7	1.7	1.5	1.6
4	13	2022	4/13/2022	20.9	0.05	7.3	8.4	6600	0		4.4	2.6	0.38	1.6	1.9	1.4	1.5
4	15	2022	4/15/2022	19.8	0.05	7.3	8.4	7100	0		4.6	1.8	0.38	1.7	1.8	1.6	1.7
4	18	2022	4/18/2022	22.2	0.05	7.4	8.6	6500	0		4.2	2.5	0.4	1.6	1.6	1.4	1.5
4	20	2022	4/20/2022	19.9	0.04	7.2	8.4	5600	0		4.4	2	0.45	1.7	1.7	1.5	1.6
4	22	2022	4/22/2022	18.5	0.04	7.2	8.3	7800	0		4.4	1.92	0.39	1.6	1.8	1.4	1.6
4	25	2022	4/25/2022	17.3	0.04	7.4	8.4	8800	2000	48800	4.5	2	0.4	1.7	1.7	1.5	1.6
4	29	2022	4/29/2022	17.6	0.04	7.3	8.5	5200	0		4.4	2.5	0.4	1.8	1.8	1.5	1.5
5	2	2022	5/2/2022	19.7	0.05	7.4	8.4	8400	2000	13600	3.36	1.6	0.4	1.7	1.8	1.4	1.4
5	4	2022	5/4/2022	18.3	0.04	7.3	8.5	6800	0		3.56	1.3	0.4	1.6	1.8	1.5	1.6
5	6	2022	5/6/2022	17.8	0.04	7.2	8.4	4500	0		3.36	1.6	0.375	1.7	1.7	1.6	1.6
5	9	2022	5/9/2022	16.9	0.04	7.3	8.5	9300	2000	20600	4.2	1.3	0.4	1.8	1.9	1.6	1.8
5	11	2022	5/11/2022	21.4	0.05	7.2	8.5	7600	0		4.2	1.5	0.4	1.8	1.9	1.5	1.6
5	16	2022	5/16/2022	15.4	0.04	7.2	8.6	9100	2000	16700	4.4	1.8	0.4	1.7	1.7	1.6	1.7
5	18	2022	5/18/2022	14.7	0.04	7.3	8.6	8400	0		4.4	1.8	0.43	1.7	1.7	1.6	1.6
5	20	2022	5/20/2022	19.9	0.04	7.2	8.6	6400	0		3.86	1.6	0.4	1.6	1.7	1.5	1.6

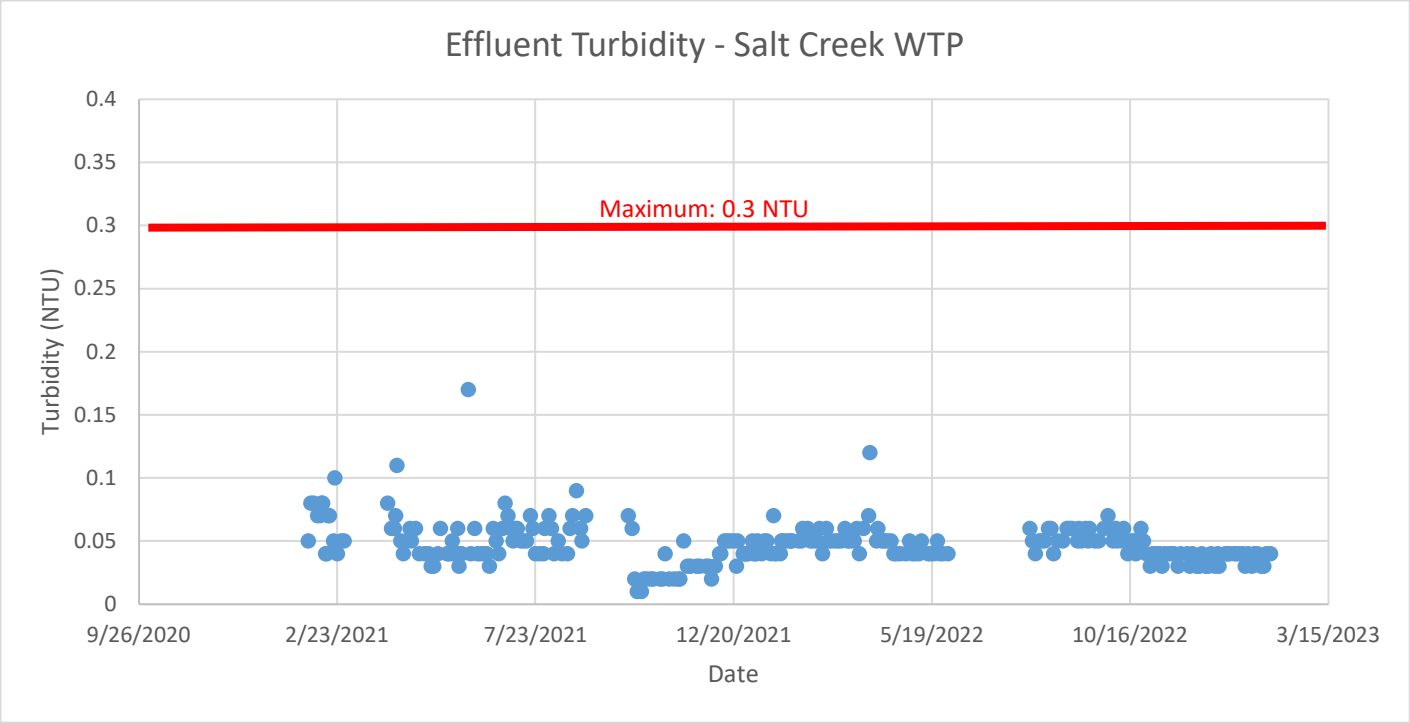
5	23	2022	5/23/2022	14.9	0.05	7.1	8.6	5600	2000	20400	4.2	1.7	0.38	1.6	1.8	1.7	1.7
5	25	2022	5/25/2022	13.2	0.04	7.2	8.5	7100	0		4.3	1.8	0.39	1.7	1.7	1.5	1.7
5	27	2022	5/27/2022	11.9	0.04	7.1	8.6	6800	0		4.8	1.6	0.39	1.8	1.8	1.6	1.8
5	31	2022	5/31/2022	10.2	0.04	7.2	8.6	9600	2000	23500	4.5	1.7	0.44	1.8	1.8	1.7	1.7
8	1	2022	8/1/2022	14.1	0.06	7.4	8.4	9800	0		3.36	2.56	0.45	1.4	1.5	1.2	1.4
8	3	2022	8/3/2022	12.9	0.05	7.4	8.5	9500	2000	19300	3.92	1.92	0.45	1.5	1.5	1.3	1.3
8	5	2022	8/5/2022	13.2	0.04	7.5	8.4	10300	2000	10300	3.36	2.56	0.48	1.6	1.7	1.3	1.5
8	8	2022	8/8/2022	12.8	0.05	7.5	8.5	11100	0		3.36	2.56	0.48	1.6	1.7	1.3	1.5
8	10	2022	8/10/2022	12.1	0.05	7.4	8.6	5800	0		3.36	2.56	0.36	1.5	1.6	1.2	1.4
8	12	2022	8/12/2022	12.2	0.05	7.4	8.5	8600	0		3.36	1.92	0.33	1.4	1.6	1.2	1.3
8	15	2022	8/15/2022	11.7	0.06	7.3	8.4	11800	2000	37300	3.36	1.92	0.33	1.3	1.5	1.2	1.4
8	17	2022	8/17/2022	13.1	0.06	7.3	8.5	9200	2000	9200	2.8	2.56	0.45	1.4	1.6	1.2	1.3
8	19	2022	8/19/2022	11.7	0.04	7.3	8.5	9000	0		1.68	1.92	0.42	1.5	1.5	1.2	1.4
8	22	2022	8/22/2022	13.1	0.05	7.3	8.4	8200	0		2.24	1.92	0.36	1.3	1.5	1.2	1.3
8	26	2022	8/26/2022	11.3	0.05	7.4	8.6	10100	2000	27300	2.24	2.56	0.39	1.5	1.6	1.3	1.4
8	29	2022	8/29/2022	12.3	0.06	7.4	8.5	10700	2000	10700	2.24	1.92	0.39	1.4	1.5	1.2	1.4
8	31	2022	8/31/2022	13.2	0.06	7.4	8.4	10600	0		2.24	1.92	0.39	1.5	1.5	1.3	1.3
9	2	2022	9/2/2022	9.4	0.06	7.4	8.4	11700	0		2.8	1.92	0.42	1.3	1.5	1.1	1.3
9	6	2022	9/6/2022	11.3	0.05	7.4	8.4	10300	2000	32600	2.8	1.92	0.39	1.5	1.5	1.2	1.4
9	7	2022	9/7/2022	12.4	0.06	7.3	8.5	10700	2000	10700	2.8	2.56	0.39	1.4	1.5	1.1	1.3
9	9	2022	9/9/2022	12.8	0.05	7.3	8.4	8600	0		2.8	2.56	0.42	1.5	1.6	1.2	1.4
9	12	2022	9/12/2022	10.9	0.06	7.4	8.5	10000	0		2.24	2.56	0.42	1.3	1.5	1.3	1.4
9	14	2022	9/14/2022	13.1	0.05	7.4	8.5	8000	2000	26600	2.8	2.56	0.36	1.4	1.4	1.3	1.3
9	15	2022	9/15/2022	12.4	0.06	7.3	8.4	8200	0		3.36	2.56	0.36	1.3	1.4	1.2	1.4
9	19	2022	9/19/2022	9.7	0.05	7.3	8.5	9600	2000	17800	2.8	2.56	0.42	1.3	1.5	1.3	1.4
9	22	2022	9/22/2022	10.6	0.05	7.4	8.4	9000	0		2.8	2.56	0.42	1.2	1.4	1.2	1.3
9	26	2022	9/26/2022	14	0.06	7.3	8.5	7800	2000	16800	3.36	2.56	0.42	1.5	1.5	1.3	1.4
9	29	2022	9/29/2022	12.8	0.07	7.4	8.4	9500	0		3.36	2.56	0.39	1.5	1.6	1.4	1.5
9	30	2022	9/30/2022	13.9	0.06	7.3	8.5	7200	0		3.36	2.56	0.45	1.3	1.3	1.2	1.4
10	3	2022	10/3/2022	12.9	0.05	7.4	8.4	9000	0		2.8	1.92	0.3	1.4	1.5	1.2	1.3
10	5	2022	10/5/2022	13.2	0.06	7.5	8.5	10000	0		2.8	1.92	0.36	1.5	1.5	1.3	1.3
10	6	2022	10/6/2022	14.1	0.05	7.4	8.4	10400	2000	46100	2.8	1.92	0.36	1.5	1.6	1.2	1.3
10	10	2022	10/10/2022	11.9	0.05	7.3	8.3	12000	2000	12000	2.8	1.92	0.36	1.3	1.4	1.1	1.2
10	11	2022	10/11/2022	13.4	0.06	7.2	8.5	11600	0		2.24	1.92	0.412	1.4	1.5	1.2	1.3
10	14	2022	10/14/2022	10.9	0.04	7.1	8.5	9000	0		3.36	2.56	0.42	1.5	1.5	1.3	1.3
10	17	2022	10/17/2022	10.3	0.05	7.1	8.4	11400	2000	32000	2.8	2.56	0.39	1.6	1.7	1.3	1.4
10	19	2022	10/19/2022	11.1	0.05	7.3	8.5	12800	0		2.8	2.56	0.39	1.7	1.7	1.4	1.4
10	20	2022	10/20/2022	12.7	0.04	7.3	8.4	10500	0		2.8	1.92	0.39	1.6	1.7	1.4	1.5
10	21	2022	10/21/2022	17.1	0.05	7.6	8.3	11300	2000	34600	2.8	1.92	0.45	1.7	1.7	1.4	1.5
10	24	2022	10/24/2022	14.2	0.06	7.4	8.5	13500	0		2.8	1.92	0.45	1.5	1.5	1.3	1.4
10	26	2022	10/26/2022	12.1	0.05	7.3	8.4	12600	2000	26100	3.36	1.92	0.39	1.6	1.7	1.3	1.5
10	28	2022	10/28/2022	12.5	0.04	7.4	8.3	11500	0		3.36	1.92	0.45	1.6	1.7	1.4	1.5
10	31	2022	10/31/2022	15.4	0.03	7.2	8.5	11700	0		2.8	2.56	0.45	1.4	1.6	1.3	1.5
11	2	2022	11/2/2022	12.7	0.04	7.3	8.7	10300	0		2.8	1.28	0.3	1.7	1.9	1.5	1.7
11	4	2022	11/4/2022	13.6	0.04	7.4	8.6	8600	2000	42100	2.24	1.28	0.24	1.6	1.8	1.4	1.6
11	7	2022	11/7/2022	12.2	0.04	7.3	8.7	9600	0		2.8	1.92	0.3	1.5	1.7	1.5	1.5
11	9	2022	11/9/2022	11.4	0.03	7.3	8.8	10400	2000	20000	2.8	1.92	0.3	1.7	1.9	1.6	1.7

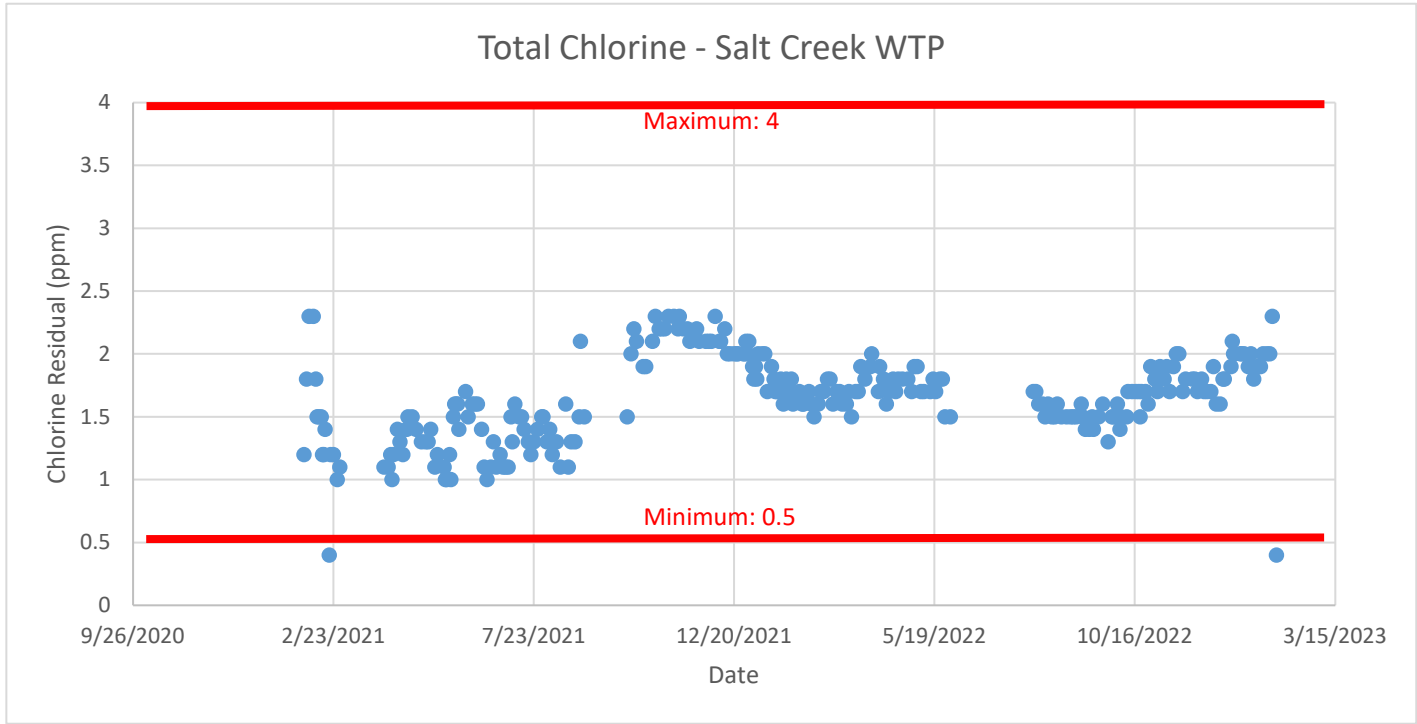
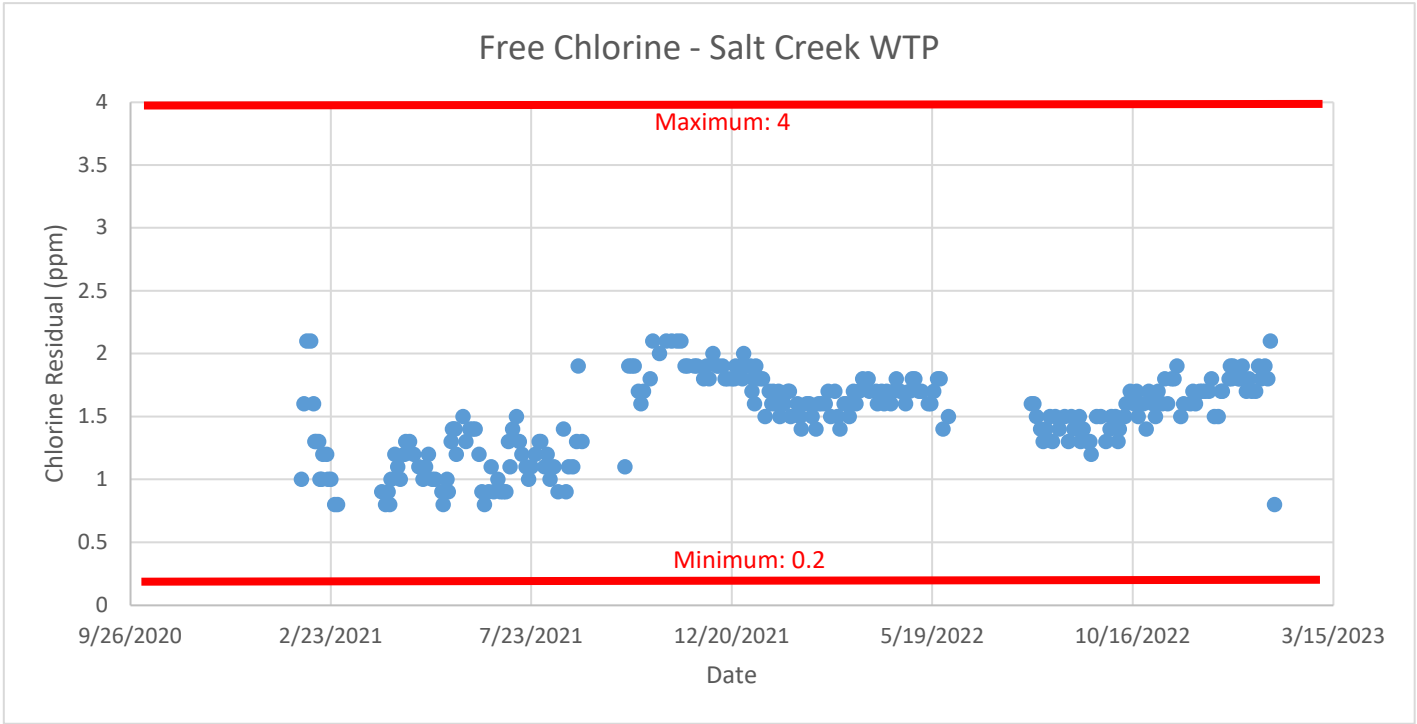


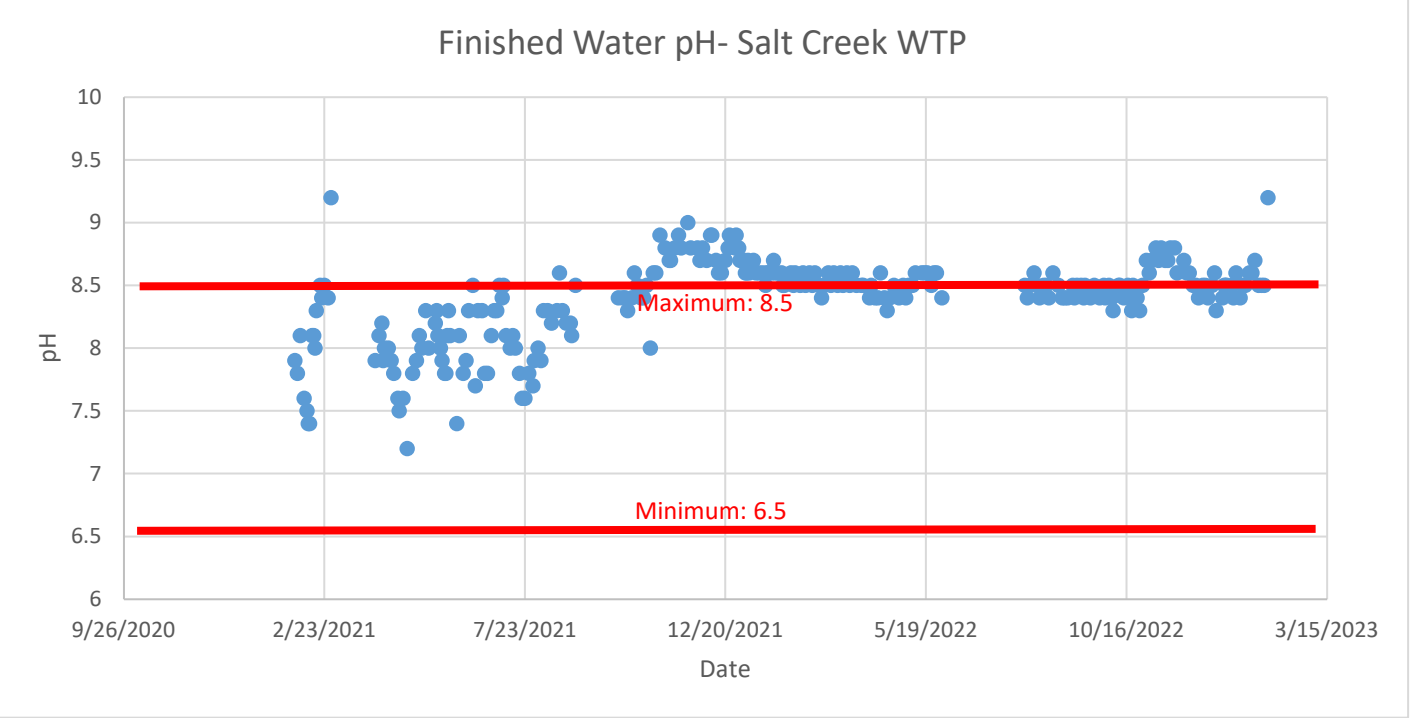
11	11	2022	11/11/2022	10.8	0.04	7.5	8.7	10500	0		2.8	1.92	0.3	1.6	1.8	1.6	1.7
11	14	2022	11/14/2022	12	0.04	7.3	8.8	9800	2000	20300	2.8	1.92	0.36	1.8	1.9	1.5	1.8
11	16	2022	11/16/2022	13.1	0.04	7.2	8.7	8300	0		2.8	2.56	0.33	1.6	1.7	1.4	1.5
11	18	2022	11/18/2022	12.6	0.04	7.4	8.7	10100	2000	18400	3.36	1.92	0.3	1.8	1.9	1.7	1.8
11	21	2022	11/21/2022	9.8	0.03	7.3	8.8	9300	0		2.8	1.92	0.33	1.8	2	1.6	1.8
11	23	2022	11/23/2022	11.9	0.04	7.2	8.8	9200	0		2.8	2.56	0.33	1.9	2	1.7	1.9
11	28	2022	11/28/2022	12.3	0.04	7.3	8.6	11700	2000	30200	3.36	2.56	0.33	1.5	1.7	1.4	1.5
11	30	2022	11/30/2022	8.6	0.03	7.4	8.7	10400	0		3.36	2.56	0.3	1.6	1.8	1.5	1.7
12	2	2022	12/2/2022	9.1	0.04	7.5	8.6	11400	0				0.38	1.6	1.8	1.4	1.7
12	5	2022	12/5/2022	9.9	0.03	7.5	8.6	11100	2000	32900			0.38	1.7	1.8	1.4	1.6
12	7	2022	12/7/2022	8.7	0.03	7.4	8.5	11300	0				0.38	1.6	1.7	1.5	1.5
12	9	2022	12/9/2022	9.5	0.04	7.4	8.5	11500	0				0.38	1.7	1.8	1.4	1.5
12	12	2022	12/12/2022	11.1	0.03	7.3	8.4	11000	2000	33800			0.38	1.7	1.7	1.4	1.5
12	14	2022	12/14/2022	10.4	0.03	7.5	8.5	11300	0				0.38	1.7	1.7	1.5	1.6
12	16	2022	12/16/2022	12.1	0.04	7.4	8.5	10900	2000	22200			0.38	1.7	1.7	1.6	1.6
12	19	2022	12/19/2022	10.3	0.03	7.3	8.4	11000	0				0.38	1.8	1.9	1.5	1.6
12	21	2022	12/21/2022	9.3	0.04	7.3	8.5	10900	2000	21900			0.38	1.5	1.6	1.4	1.4
12	22	2022	12/22/2022	9.9	0.03	7.4	8.6	10600	0				0.38	1.5	1.6	1.3	1.4
12	27	2022	12/27/2022	12.7	0.04	7.5	8.3	9600	2000	20200			0.38	1.7	1.8	1.6	1.7
12	28	2022	12/28/2022	13.1	0.04	7.5	8.4	10100	0				0.38	1.7	1.8	1.6	1.7
12	29	2022	12/29/2022	11.9	0.04	7.5	8.5	10800	2000	20900			0.38	1.8	1.9	1.7	1.7
12	30	2022	12/30/2022	10.2	0.04	7.4	8.5	10900	0				0.38	1.9	2.1	1.7	1.7
1	3	2023	1/3/2023	13.3	0.04	7.4	8.5	9800	2000	20700	3.36	2.56	0.36	1.8	2	1.7	1.8
1	4	2023	1/4/2023	12.9	0.04	7.4	8.5	9800	0		3.36	2.56	0.36	1.9	2	1.7	1.9
1	6	2023	1/6/2023	12.7	0.04	7.5	8.4	7700	0		2.8	1.92	0.33	1.8	2	1.6	1.8
1	9	2023	1/9/2023	14.4	0.04	7.5	8.6	10000	2000	27500	3.36	2.56	0.36	1.8	2	1.7	1.8
1	11	2023	1/11/2023	12.6	0.03	7.4	8.4	10000	0		3.36	2.56	0.36	1.9	2	1.8	1.8
1	13	2023	1/13/2023	11.4	0.04	7.3	8.5	8500	0		2.85	1.92	0.33	1.7	1.9	1.7	1.7
1	16	2023	1/16/2023	10.9	0.03	7.3	8.5	11600	2000	30100	3.36	2.56	0.36	1.8	2	1.6	1.8
1	18	2023	1/18/2023	12.4	0.04	7.4	8.6	9200	0		3.36	2.56	0.36	1.7	1.8	1.6	1.7
1	20	2023	1/20/2023	14.1	0.04	7.3	8.6	6700	0		2.8	1.92	0.33	1.7	1.9	1.6	1.7
1	23	2023	1/23/2023	11.9	0.03	7.4	8.7	8500	2000	24400	3.36	2.56	0.33	1.9	1.9	1.6	1.7
1	25	2023	1/25/2023	8.9	0.03	7.5	8.5	6800	0		2.8	1.92	0.33	1.8	2	1.7	1.8
1	27	2023	1/27/2023	10.3	0.04	7.4	8.5	5900	0		2.8	1.92	0.33	1.9	2	1.7	1.7
1	30	2023	1/30/2023	11.2	0.04	7.3	8.5	6600	2000	19300	3.36	1.92	0.36	1.8	2	1.7	1.8
MAXIMUM			#VALUE!	68.4	0.17	7.8	9.2	14100	4000	77900	10.97	4.8	0.675	2.1	2.3	1.8	2
MINIMUM			#VALUE!	4.54	0.01	6.5	7.2	1500	0	8000	1	0	0.075	0.8	0.4	0.3	0.3
AVERAGE				16.1694	0.047538	7.315849	8.390566	7511.698113	596.2264151	26094.73684	4.022249	1.819518	0.326719	1.501916	1.654753	1.017925	1.152075

608  
3274.013158 average day demand  
3700 wastewater, increase to this.

STANDARDS			
Turbidity	(less than)	0.3	95%
	(no higher ever)	1	
pH	6.5 to		8.5
Chlorine Residual	(greater than)	0.2 free chlorine	
		0.5 total chlorine	
	less than	4 total chlorine	











PROJECT:	Salt Creek Estates
LOCATION:	Nashville, IN
RQAW #:	23-400-188-1
DESCRIPTION:	Head Loss Calcs

DESIGNED BY:	WMW
DATE:	6/12/2023
CHECKED BY:	
DATE:	

User Input <sup>3</sup>	Source of Existing and Proposed Demand	#	Unit	Demand Calculation Factor		Total Average Flow		Peaking Factor	Total Peak Flow	
						(gpd)	(gpm)		(gpd)	(gpm)
	Fill water tower in one (1) 8-hour shift. Pumping Rate Maximum 80 gpm	1	Pump	38000	GPD/UNIT			2.5	38,000	79
			UNIT		GPD/UNIT	0	0.0	2.5	0	0
			UNIT		GPD/UNIT	0	0.0	2.5	0	0.00

Design Average Demand =  
Design Peak Demand =

0	gpm
80	gpm

TOTALS

ADCD (gpd)	(gpm)		PF	PDF (gpd)	(gpm)
0	0.0		2.50	38,000	79.2

**NOTES:**  
1 Flow factors from 327 IAC 3-6-11 (2019)

Legend	
Example	= User Input
Example	= Calculation
Example	= Output
Example	= Explanatory Text

ADF	= Average Daily Flow
P	= Equivalent Polution in Thousands
PF	= Peak Factor
PDF	= Peak Daily Flow



PROJECT:	Salt Creek Estates	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/12/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	Head Loss Calcs	DATE:	

RAW PUMP STATION INFORMATION:

Controlling Elevations				Flow Rate & Pump Rate			
Forcemain Discharge =	535.00	ft		Peak Inflow Rate =	80	gpm	
Forcemain High Point =	588.00	ft		Pumping Rate =	80.00	gpm	
Pump ON =		ft		Pumping Rate =	0.18	cfs	
Pump OFF =	535.00	ft		Pumping Rate =	115,200	gpd	
FRICITION LOSSES:							
Nominal Pipe Diameter, Pipe Type =							
Pipe Inside Diameter (inches) =							
C value (130 HDPE, 130 PVC, 120 DI) =							
Average velocity in pipe (ft/s) =							
Total length of FM =							
V = 1.318 C R <sup>0.63</sup> S <sup>0.54</sup> , therefore, S (ft/ft) =							
S = h <sub>f</sub> / L							
therefore, h(friction)(ft) =							

MINOR LOSSES (PIPE FITTINGS):

Reference: Chicago Pumps, Hydraulics & Useful Information							
Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50		0.00		0.00	1	0.50
Outlet Loss	1.00		0.00		0.00	1	1.00
90 degree bend	0.30		0.00		0.00		0.00
45 degree bend	0.23		0.00		0.00	8	1.84
22.5 degree bend	0.15		0.00		0.00		0.00
11.25 degree bend	0.09		0.00		0.00		0.00
Plug Valve	0.30		0.00		0.00		0.00
Check Valve	2.50		0.00		0.00		0.00
Tee (through)	0.60		0.00		0.00		0.00
Tee (side flow)	1.8		0.00		0.00		0.00
Wye (thru)	1.00		0.00		0.00		0.00
Reducer/Expander	0.19		0.00		0.00	1	0.19
Total K Values:			0.00		0.00		3.53
Head Loss from fittings = h <sub>m</sub> = KV <sup>2</sup> / (2g)							
therefore, h(fittings)(ft) =							

STATIC LOSSES:							
Elevation of highest point (discharge)(ft)=	Maximum		588.00	Minimum		588.00	
Low water level in LS (Pump OFF)(ft) =			535.00			535.00	
Static head losses = high point - LS level							
therefore, h(static)(ft)=							

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) =	58.2	ft
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Pressure:	25	psi
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SYSTEM CURVE:

FLOW RATE	LS DISCHARGE PIPING			VALVE VAULT PIPING			FORCEMAIN PIPING			TDH
	VELOCITY	FRICITION LOSS	MINOR LOSS	VELOCITY	FRICITION LOSS	MINOR LOSS	VELOCITY	FRICITION LOSS	MINOR LOSS	
(gpm)	(ft/s)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft)
0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	0.00	#DIV/0!
10	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.23	0.11	0.00	#DIV/0!
20	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.46	0.39	0.01	#DIV/0!
30	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.68	0.82	0.03	#DIV/0!
40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.91	1.40	0.05	#DIV/0!
50	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.14	2.11	0.07	#DIV/0!
60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.37	2.96	0.10	#DIV/0!
70	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.60	3.93	0.14	#DIV/0!
80	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.83	5.04	0.18	#DIV/0!
90	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.05	6.26	0.23	#DIV/0!
100	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.28	7.61	0.29	#DIV/0!
110	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.51	9.08	0.35	#DIV/0!
120	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.74	10.67	0.41	#DIV/0!
130	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.97	12.38	0.48	#DIV/0!
140	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.20	14.20	0.56	#DIV/0!
150	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.42	16.13	0.64	#DIV/0!
160	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.65	18.18	0.73	#DIV/0!

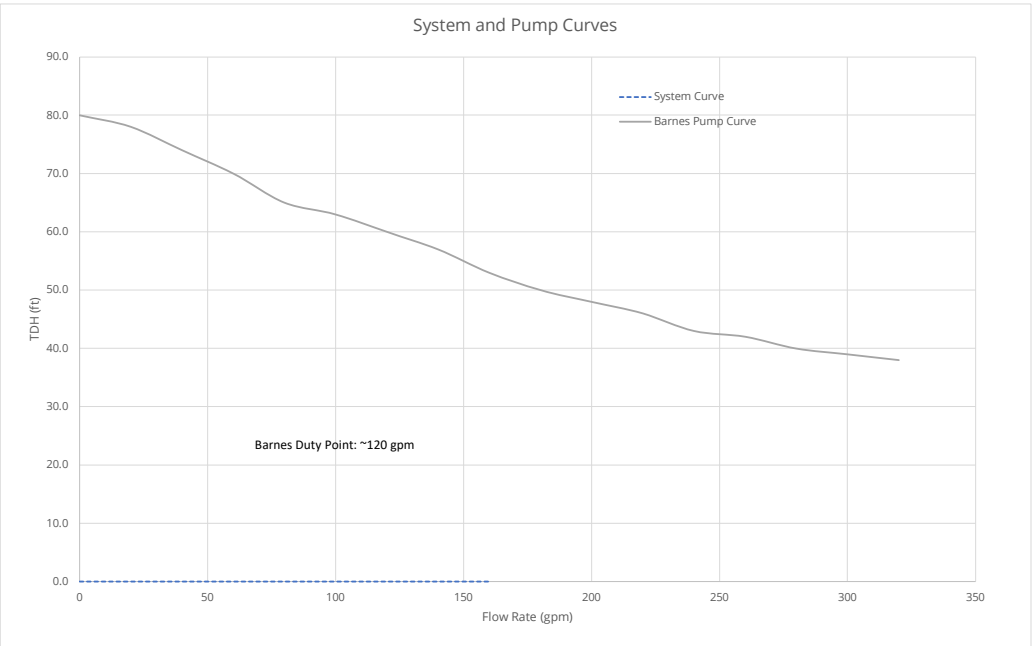
NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)	33.96	@ sea level
Vapor Pressure of liqued (hvpa-ft)	0.78	@ 68°F
Static Height above impeller (hst-ft)	1.00	(pump off - impeller)
Suction line losses (hfs-ft)	0.00	(submersible)

NPSHA = ha - hvpa + hst - hfs	34.2	ft	NPSHR must be 5' less than NPSHA (safety factor)
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HORSEPOWER

Water Horsepower =	1.18	hp
Assumed Efficiency =	26.6	%
Pump Horsepower =	4.42	hp
Pump Horsepower (Rounded) =	5	hp



PUMP MANUFACTURER:	BARNES
PUMP MODEL:	4SCMC100N4

PUMP CURVE:

FLOW RATE	FLOW RATE	TDH	
(gpm)	(cfs)	(ft)	
0	0.00	80	Shutoff Head
20	0.04	78	
40	0.09	74	
60	0.13	70	
80	0.18	65	Design Point
100	0.22	63	
120	0.27	60	
140	0.31	57	
160	0.36	53	Operating Point
180	0.40	50	
200	0.45	48	
220	0.49	46	
240	0.53	43	
260	0.58	42	
280	0.62	40	
300	0.67	39	
320	0.71	38	



PROJECT:	Salt Creek Estates	DESIGNED BY:	WMW
LOCATION:	Nashville, IN	DATE:	6/12/2023
RQAW #:	23-400-188-1	CHECKED BY:	
DESCRIPTION:	Head Loss Calcs	DATE:	

**HIGH SERVICE PUMP STATION INFORMATION:**

Controlling Elevations	
Forcemain Discharge =	588.00 ft
Forcemain High Point =	735.00 ft
Pump ON =	
Pump OFF =	588.00 ft

Flow Rate & Pump Rate	
Peak Inflow Rate =	80 gpm
Pumping Rate =	80.00 gpm
Pumping Rate =	0.18 cfs
Pumping Rate =	115,200 gpd

**FRICTION LOSSES:**

Nominal Pipe Diameter, Pipe Type =  
Pipe Inside Diameter (inches) =  
C value (130 HDPE, 130 PVC, 120 DI) =  
Average velocity in pipe (ft/s) =  
Total length of FM =

LS Discharge Piping	Valve Vault	Forcemain	
		4" PVC C900 DR18	
		4.230	
		130	
#DIV/0!	#DIV/0!	1.83	
		4650	
#DIV/0!	#DIV/0!	0.0038	Total Friction
#DIV/0!	#DIV/0!	17.61	17.61

$$V = 1.318 C R^{0.63} S^{0.54}, \text{ therefore, } S \text{ (ft/ft)} = S = h_f / L$$

**MINOR LOSSES (PIPE FITTINGS):**

Reference: Chicago Pumps, Hydraulics & Useful Information

Fittings Description	K-value	No.	Total	No.	Total	No.	Total
Entrance Loss	0.50		0.00		0.00	1	0.50
Outlet Loss	1.00		0.00		0.00	1	1.00
90 degree bend	0.30		0.00		0.00		0.00
45 degree bend	0.23		0.00		0.00	24	5.52
22.5 degree bend	0.15		0.00		0.00		0.00
11.25 degree bend	0.09		0.00		0.00		0.00
Plug Valve	0.30		0.00		0.00		0.00
Check Valve	2.50		0.00		0.00		0.00
Tee (through)	0.60		0.00		0.00	2	1.20
Tee (side flow)	1.8		0.00		0.00	1	1.80
Wye (thru)	1.00		0.00		0.00		0.00
Reducer/Expander	0.19		0.00		0.00	1	0.19
		Total K Values:	0.00		0.00		10.21

$$\text{Head Loss from fittings} = h_m = KV^2 / (2g)$$

therefore,  $h(\text{fittings})(\text{ft}) =$  #DIV/0! #DIV/0! 0.53 0.53

**STATIC LOSSES:**

Elevation of highest point (discharge)(ft)=

Low water level in LS (Pump OFF)(ft) =

Static head losses = high point - LS level

Maximum	Minimum	Minimum	
735.00	735.00	735.00	Total Static Head
588.00	588.00	588.00	
= 147.00	147.00	147.00	147.00

TOTAL DYNAMIC HEAD (TDH) = h(friction) + h(fittings) + h(static) =	165.1	ft
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Pressure:	71	psi
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**SYSTEM CURVE:**

FLOW RATE	LS DISCHARGE PIPING			VALVE VAULT PIPING			FORCEMAIN PIPING			TDH
	VELOCITY	FRICTION LOSS	MINOR LOSS	VELOCITY	FRICTION LOSS	MINOR LOSS	VELOCITY	FRICTION LOSS	MINOR LOSS	
(gpm)	(ft/s)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft)
0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.00	0.00	0.00	#DIV/0!
10	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.23	0.37	0.01	#DIV/0!
20	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.46	1.35	0.03	#DIV/0!
30	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.68	2.86	0.07	#DIV/0!
40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0.91	4.88	0.13	#DIV/0!
50	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.14	7.37	0.21	#DIV/0!
60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.37	10.34	0.30	#DIV/0!
70	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.60	13.75	0.40	#DIV/0!
80	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.83	17.61	0.53	#DIV/0!
90	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.05	21.90	0.67	#DIV/0!
100	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.28	26.62	0.83	#DIV/0!
110	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.51	31.76	1.00	#DIV/0!
120	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.74	37.31	1.19	#DIV/0!
130	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	2.97	43.27	1.40	#DIV/0!
140	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.20	49.64	1.62	#DIV/0!
150	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.42	56.40	1.86	#DIV/0!
160	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	3.65	63.56	2.12	#DIV/0!

## NET POSITIVE SUCTION HEAD AVAILABLE

Absolute Pressure on surface (ha-ft)

Vapor Pressure of liqued (hvp<sub>a</sub>-ft)

Static Height above impeller (hst-ft)

Suction line losses (hfs-ft)

33.96	@ sea level
0.78	@ 68°F
1.00	(pump off - impeller)
0.00	(submersible)

$$\text{NPSHA} = h_a - h_{vpa} + h_{st} - h_{fs}$$

NPSHR must be 5' less than NPSHA (safety factor)

**HORSEPOWER**

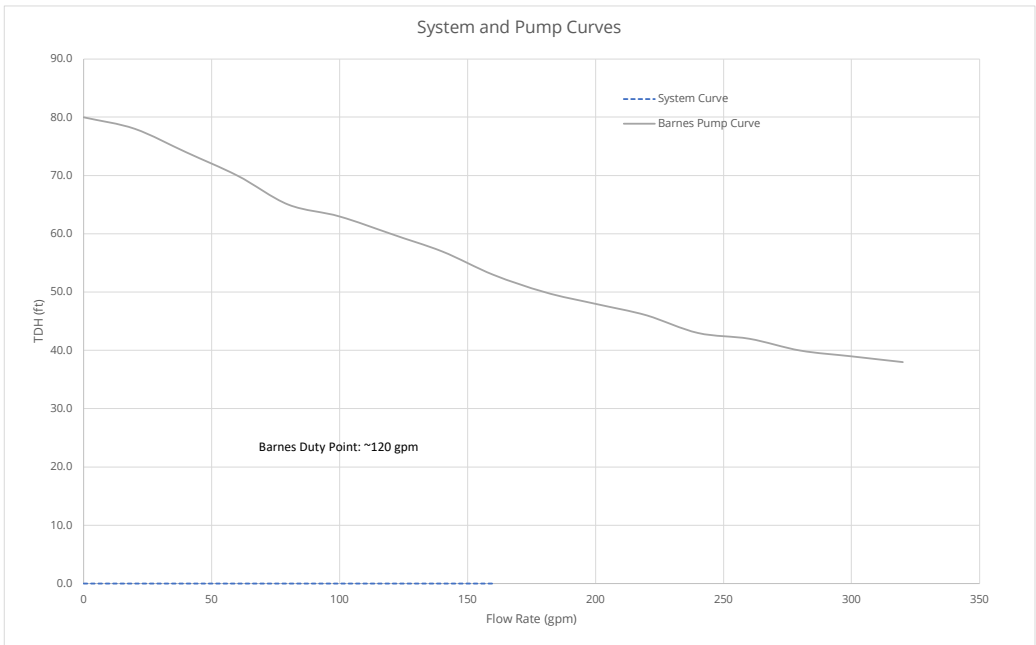
Water Horsepower =

Assumed Efficiency =

Pump Horsepower =

Pump Horsepower (Rounded) =

3.34	hp
26.6	%
12.55	hp
15	hp



PUMP MANUFACTURER:	BARNES
PUMP MODEL:	4SCMC100N4

**PUMP CURVE:**

FLOW RATE	FLOW RATE	TDH	
(gpm)	(cfs)	(ft)	
0	0.00	80	Shutoff Head
20	0.04	78	
40	0.09	74	
60	0.13	70	
80	0.18	65	
100	0.22	63	Design Point
120	0.27	60	Operating Point
140	0.31	57	
160	0.36	53	
180	0.40	50	
200	0.45	48	
220	0.49	46	
240	0.53	43	
260	0.58	42	
280	0.62	40	
300	0.67	39	
320	0.71	38	

## APPENDIX D: WTP EQUIPMENT QUOTES



# Commercial Proposal

Proposal Name: Salt Creek WTP

Proposal Number: 1630016

Friday, June 30, 2023

## 1. Bidder's Contact Information

Company Name	WesTech Engineering, LLC
Primary Contact Name	Tom Dumbaugh
Phone	(801) 265-1000
Email	tdumbaugh@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

## 2. Budget Pricing

Currency: USD

### Scope of Supply

A	AltaPac™ Ultrafiltration System, Model UFT41C	\$398,500
	Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	Not Included

Prices are valid for a period not to exceed 30 days from date of proposal.

### Additional Field Service

Daily Rate (Applicable Only to Field Service Not Included in Scope)	\$1,200
---	---------

Pricing does not include field service unless noted in scope of supply, but is available at the daily rate plus expenses. The greater of a two week notice or visa procurement time is required prior to departure date. Our field service policy can be provided upon request for more details.

## 3. Payment Terms

Purchase Order Acceptance and Contract Execution	10%
Submittals Provided by WesTech	15%
Release for Fabrication	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. An approved Letter of Credit is required if Incoterms CIF, CFR, DAP, CIP, or CPT are applicable. Payment is required in full for all other Incoterms prior to international shipment. Other terms per WesTech proforma invoice. Please note that the advising bank must be named as: Wells Fargo Bank, International Department, 9000 Flair Drive, 3rd Floor, El Monte, California 91731, USA.

## 4. Schedule

Submittals, after Purchase Order Acceptance and Contract Execution	6 to 8 weeks
Ready to Ship, after Receipt of Final Submittal Approval	20 to 24 weeks
<b>Estimated Weeks to Ready to Ship</b>	<b>26 to 32 weeks*</b>

\*Customer submittal approval is typically required to proceed with equipment fabrication and is not accounted for in the schedule above. Project schedule will be extended to account for time associated with receipt of customer submittal approval.

## 5. Freight

Domestic	FOB Shipping Point - Full Freight Allowed to Jobsite (FSP-FFA)	
<b>From</b>	<b>Final Destination</b>	<b>Number of Trucks or Containers</b>
WesTech Shops	Nashville, IN	Approximately 1

# Commercial Proposal

Proposal Name: Salt Creek WTP

Proposal Number: 1630016

Friday, June 30, 2023

## 1. Bidder's Contact Information

Company Name	WesTech Engineering, LLC
Primary Contact Name	Tom Dumbaugh
Phone	(801) 265-1000
Email	tdumbaugh@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

## 2. Budget Pricing

Currency: USD

### Scope of Supply

A	Two (2) Tri-Mite® TM-100A Units, Model 2TM-100A	\$575,000
	Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	Not Included

Prices are valid for a period not to exceed 30 days from date of proposal.

### Additional Field Service

Daily Rate (Applicable Only to Field Service Not Included in Scope)	\$1,200
---	---------

Pricing does not include field service unless noted in scope of supply, but is available at the daily rate plus expenses. The greater of a two week notice or visa procurement time is required prior to departure date. Our field service policy can be provided upon request for more details.

## 3. Payment Terms

Purchase Order Acceptance and Contract Execution	10%
Submittals Provided by WesTech	15%
Release for Fabrication	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. An approved Letter of Credit is required if Incoterms CIF, CFR, DAP, CIP, or CPT are applicable. Payment is required in full for all other Incoterms prior to international shipment. Other terms per WesTech proforma invoice. Please note that the advising bank must be named as: Wells Fargo Bank, International Department, 9000 Flair Drive, 3rd Floor, El Monte, California 91731, USA.

## 4. Schedule

Submittals, after Purchase Order Acceptance and Contract Execution	10 to 12 weeks
Ready to Ship, after Receipt of Final Submittal Approval	22 to 24 weeks
<b>Estimated Weeks to Ready to Ship</b>	<b>32 to 36 weeks*</b>

\*Customer submittal approval is typically required to proceed with equipment fabrication and is not accounted for in the schedule above. Project schedule will be extended to account for time associated with receipt of customer submittal approval.

## 5. Freight

Domestic	FOB Shipping Point - Full Freight Allowed to Jobsite (FSP-FFA)	
<b>From</b>	<b>Final Destination</b>	<b>Number of Trucks or Containers</b>
WesTech Shops	Salt Creek Water WTP, IN (on Lake Monroe)	TBD

# Commercial Proposal

Proposal Name: Salt Creek WTP

Proposal Number: 1630016

Tuesday, July 18, 2023

## 1. Bidder's Contact Information

Company Name	WesTech Engineering, LLC
Primary Contact Name	Tom Dumbaugh
Phone	(801) 265-1000
Email	tdumbaugh@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

## 2. Budget Pricing

Currency: USD

### Scope of Supply

A	SuperSettler™ Inclined Plate Clarifier, Model PSS40N1, Qty 1	\$340,000
	Taxes (sales, use, VAT, IVA, IGV, duties, import fees, etc.)	Not Included

Prices are valid for a period not to exceed 30 days from date of proposal.

### Additional Field Service

Daily Rate (Applicable Only to Field Service Not Included in Scope)	\$1,200
---	---------

Pricing does not include field service unless noted in scope of supply, but is available at the daily rate plus expenses. The greater of a two week notice or visa procurement time is required prior to departure date. Our field service policy can be provided upon request for more details.

## 3. Payment Terms

Purchase Order Acceptance and Contract Execution	10%
Submittals Provided by WesTech	15%
Release for Fabrication	35%
Notification of Ready to Ship	40%

All payments are net 30 days. Partial shipments are allowed. An approved Letter of Credit is required if Incoterms CIF, CFR, DAP, CIP, or CPT are applicable. Payment is required in full for all other Incoterms prior to international shipment. Other terms per WesTech proforma invoice. Please note that the advising bank must be named as: Wells Fargo Bank, International Department, 9000 Flair Drive, 3rd Floor, El Monte, California 91731, USA.

## 4. Schedule

Submittals, after Purchase Order Acceptance and Contract Execution	6 to 8 weeks
Ready to Ship, after Receipt of Final Submittal Approval	24 to 26 weeks
<b>Estimated Weeks to Ready to Ship</b>	<b>30 to 34 weeks*</b>

\*Customer submittal approval is typically required to proceed with equipment fabrication and is not accounted for in the schedule above. Project schedule will be extended to account for time associated with receipt of customer submittal approval.

## 5. Freight

Domestic	FOB Shipping Point - Full Freight Allowed to Jobsite (FSP-FFA)	
<b>From</b>	<b>Final Destination</b>	<b>Number of Trucks or Containers</b>
WesTech Shops	Nashville, IN	Approximately 2

Whitney –

EFI has finished the rough design and budget estimate including a filter room with boost pumps to fill the storage tank and a chemical feed room and equipment for the three chemicals that are presently injected. The entire plant will completely assembled and tested prior to delivery to the jobsite. The plant will be disassembled and readied for shipment. The plant will be reassembled on site following site delivery utilizing the contractors crane and supervision by EFI. Foundation is not included, but EFI could design the foundation if your office would like.

Using our best judgement we believe a rough cost for this station will be in the neighborhood of \$1.4M to \$1.85M depending on final design and equipment selection. The footprint will be approximately 44'-0" x 15'-6" with a top hat over the filter section.

This plant will be automatically controlled and operated via EFI PLC/HMI with remote monitoring capabilities.

As sent previously, this video is similar in concept to what we are talking about for Salt Creek, but we are planning to complete in a one width deliverable with a removable roof section, not a two piece wide building like the Butler County video.

<https://app.frame.io/reviews/9eb8a0ea-60c5-414e-b4a6-828db0329508/3881cb58-958b-4b4f-b828-3623cae0838f>

Please don't hesitate to call with any questions if you would like to discuss anything.

Thank you again for the opportunity.

**Tim Hovda**

President

**Engineered Solutions Midwest, Inc.**

5609 W. 74<sup>th</sup> Street

Indianapolis, IN 46278

Office 317-973-1304

Cell 317-409-4116

**[thovda@engineeredolutions.com](mailto:thovda@engineeredolutions.com)**

**[www.engineeredolutions.com](http://www.engineeredolutions.com)**

*\*Engineered Solutions Midwest, Inc. is your source for Engineered Fluid, Inc., Airvac, Lutz-Jesco, Pioneer and Flowserve products.*



## APPENDIX E: ZIPTILITY ASSET MANAGEMENT PLAN



# Salt Creek Services, Inc.

Water and Wastewater System

Capital Improvement Plan

Developed by Bynum Fanyo Utilities & *Ziptility*

## Introduction

“Capital improvements” refer to major, non-recurring physical expenditures for items such as equipment, tanks, structures, and distribution/collection system infrastructure. An asset criticality report and Capital Improvement Plan (CIP) have been developed for Salt Creek to serve as planning tools for determining the prioritization and timing of capital improvements needed over the next 20-year period. With input from Bynum Fanyo Utilities, a recommended annual schedule is provided along with a brief explanation of each proposed improvement project and estimated costs.

## Methodology

A field inventory and condition assessment inspection have been completed for all water and sewer assets at Salt Creek (excluding sewer manholes and mains). These inspection inputs have been logged in Ziptility (GIS system) where each asset also receives a unique criticality rating. Criticality ratings serve as the primary factor in prioritizing your Capital Improvement Plan schedule. The information below is intended to help you understand how a criticality rating was calculated for each asset.

Each asset in your system received a Consequence of Failure (CoF) score and a Probability of Failure (PoF) score. Multiplying these scores together results in a ***Criticality Rating***. The more likely an asset is to fail, and the more consequential that failure would be to your operations and residents, the higher the criticality rating. This rating is also referred to as “Business Risk Exposure”.

### Consequence of Failure (CoF)

CoF scoring is calculated by Ziptility with weighted consideration of the following areas:

- Service, Public Health, Safety and Security
- Financial Impact
- Regulatory Compliance
- Redundancy/Vulnerability

One of the final CoF scores below is applied to each asset’s Ziptility profile.

Consequence of Failure	Score
Insignificant Disruption	1
Minor Disruption	2
Moderate Disruption	3
Major Disruption	4

Catastrophic Disruption	5
-------------------------	---

### Probability of Failure (PoF)

PoF is calculated as a weighted average of an asset's condition assessment score and remaining useful life. The asset's Condition Assessment score accounts for 70% of the final PoF rating and the percentage of useful life remaining accounts for 30%. Assets with an unknown installation date received estimated remaining useful life with input from Bynum Fanyo Utilities.

Asset Condition Input	Score
New/Excellent - Only normal maintenance required	1
Minor Deterioration - Requires minor maintenance	2
Moderate Deterioration - 10-20% requires significant maintenance	3
Significant Deterioration - 20-40% requires renewal/upgrade	4
Unserviceable/End of Useful Life - Over 50% requires replacement	5

Useful Life Remaining Input	Score
80 - 100%	1
60 - 79%	2
40 - 59%	3
20 - 39%	4
0 - 19%	5

### Findings Summary by Jeff Farmer BFU, INC.

#### Water System:

1. Water Treatment Plant: There are three components that need to be addressed in the next 12 months. We feel these items are significant due to the age and instability of the structures. IDEM has identified these items on several inspections over the last few years.
  - Chemical feed building and mixing basin. The current building and mixing chamber is the weakest and most critical link of the water treatment plant. The piping from the lake pumps into the mixing chamber has a temporary repair that could fail at any moment. The mixing chamber is over 50 years old. The electric mixer is no longer in use or available. The exit from the mixer to the Clarifier will not allow flow rates over 25 gpm. I would suggest that a new building, mixer, and chemical feed system be installed. This



building could also house a small office, testing lab, and a restroom. With the proper design, it could house chemicals and have enough square footage for a “Waterboy” treatment system and filter. The overall condition of the building has been brought to our attention by IDEM.

- Remote sampling site within the distribution system. This has been required by IDEM.
  - SCADA system automation of the water treatment plant controls. The well pumps, clear well pumps, and High service pumps should be able to work in harmony with each other. This would simplify the operation of making water and better serve the operations of the water plant. In addition to these pumps, the chemical feed system can be automated to start and stop with these pumps as well. This SCADA system can log run times, chlorine analyzer results, and tank levels as well.
2. Water Distribution System: We have essentially broken down your distribution system into three parts. Water mains/hydrants, water meters, and storage tanks. Recent inspections have shown the water storage tanks are currently in good working condition and sufficient for your needs. The following bullet points are what we suggest for upgrade/replacement:
- We would suggest Main #2 (Emerald Ct.), and Main #3 (Eastgate Dr.) be replaced. We have had several main breaks on these lines in the past and have found that the materials used for this portion of the distribution system was not meant for water distribution. The material appears similar to electrical conduit, very thin and brittle and will continue to cause problems in the future. Even small water leaks in the system put a large strain on your supply. Leaks also bring unplanned costs in the form of leak detection and leak repair services.
  - Water meters: The current metering system is very antiquated. The industry average for meter replacement/rebuilds is between 10-15 years. Your meters are significantly older. As meters age, they lose their ability to accurately track the gallons of water passing through it. We suggest you start a meter replacement program that includes radio read meters. This would allow faster leak detection for each home and accurate system water consumption which is needed to calculate total water loss (an IDEM requirement).

#### Wastewater System:

1. Collection System: The gravity collection system is relatively new and in good working condition. The collection system has three lift stations. We feel the lift stations are in need of upgrades per the last IDEM inspection.
  - Lift station #2 pumps directly into the WWTP. This Lift station’s control panel needs to be replaced first. Of the three, it is in the worst shape and it receives all the flow from the collection system prior to pumping into the WWTP. I would suggest adding Variable Frequency Drives (VFDs) to this lift station panel. This would allow for three phase pumps

to be installed. The VFDs would also give us the ability to adjust the flow into the WWTP and help alleviate solids washouts into the polishing pond in the future.

- Lift station #1 is located near the water plant. This LS's wet well was recently repaired per IDEM instructions. This LS currently has only one working pump and the control panel needs to be replaced.
- Lift station #3 is on Alma St. and currently has only one working pump. The control panel should be replaced on this LS as well.

2. Wastewater Treatment Plant: The WWTP has been cleaned and inspected. The current WWTP lacks an equalization basin. This basin is meant to help equalize incoming flows during peak usage. The lack of an equalization basin is why your polishing pond was full of sludge/solids. Upgrading Lift Station #2 to VFDs will help with washouts. Cleaning the polishing pond on a five year interval is recommended. This is what IDEM required at the time of last inspection. The following items still need attention:

- The WWTP currently does not have a back-up blower in place or on site.
- The current blower and chemical feed building need to be upgraded.
- The flow meter needs to be replaced and moved to the outfall by the receiving stream for proper flow measuring per IDEM's request.
- The current WWTP does not include a sludge storage digester.
- A water hydrant needs to be installed next to the WWTP to allow proper cleaning and routine maintenance.

### **Commentary from Jeff Farmer BFU, INC.**

Not exactly sure where to start! I know there is an ongoing debate about which projects are the most important. This is why a "Capital Improvement Plan" was requested. Treating water at Salt Creek is very time consuming and currently requires approximately 1300 to 1400 man hours per year. Our current rate per man hour on a normal basis is \$125 per hour. If you take  $1400 \times \$125$  that would equal \$175,000 dollars annually. That is close to \$100,000 dollars more than we currently charge. Reducing man hours at SC is obviously beneficial to all of us. The best way to reduce man hours is to upgrade your water treatment plant.

The current status of the WWTP is this: we have cleaned the polishing pond and WWTP. The lagoon should be cleaned no less than every five years. The collection system, excluding the lift stations, is in good condition. All three lift stations need upgrades in terms of control panels, and the addition of pumps to meet the IDEM requirement of two pumps per lift station.

Both treatment plants are at the end of useful life. The attached Spreadsheet shows the recommended order of operations for repairing, upgrading and replacing your equipment.

Salt Creek Services - Water and Sewer Capital Improvement Plan
--

<b>Location of asset maintenance history:</b> Records stored physically in water treatment plant, sewer lift stations, and backed-up digitally on Bynum Fanyo Utilities' server.
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Planning Period: 20 Years

**Growth Related Considerations:** Few lots remain for possible development. The accompanying increase in water and sewer system demands is considered small.

[illegible]

### Salt Creek - Critical Water & Sewer Assets

Asset	Asset type	Year installed	Total expected life	Remaining useful life	Estimated Replacement cost	Condition assessment	Probability of failure	Consequence of failure	Criticality factor (POF x COF)	Criticality rating	Redundancy in place?
High Service Pump 2	Water distribution system	1996	20	-6	\$7,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
Wastewater plant	Wastewater treatment	1976	50	4	\$550,000	4 - Poor condition	4	5	20	17+ (Critical)	No
WWTP Blower	Wastewater treatment	1998	15	-9	\$4,500	4 - Poor condition	4	5	20	17+ (Critical)	No
Chemical building/Mixing Basin	Building	1976	40	-6	\$200,000	4 - Poor condition	4	5	20	17+ (Critical)	No
Filter building	Building	1976	40	-6	\$150,000	4 - Poor condition	4	5	20	17+ (Critical)	No
LS Electric controls 1	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
LS Electric controls 3	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
Lift station #2 pump 4	Wastewater collection system	1998	20	-4	\$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
Lift station #3 pump 6	Wastewater collection system	1998	20	-4	\$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
LS Electric controls 2	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	17	17+ (Critical)	No
Water mains 2 & 3	Water distribution system	Unknown	50	Unknown	\$60,000	4-Poor condition	4	4	16	9-16 (Important)	No
Water meters	Water distribution system	2000	15	-7	\$17,500	4-Poor condition	4	4	16	9-16 (Important)	No
Sample site (Proposed)	Proposed (Water Distribution)	N/A	40	N/A	\$2,700	N/A	N/A	N/A	N/A	N/A	N/A
Water Plant SCADA (proposed)	Proposed (Fleet/Equipment)	N/A	10	N/A	\$15,000	N/A	N/A	N/A	N/A	N/A	N/A
Lagoon Sludge Removal (completed)	Wastewater treatment	2022	5	5	\$23,000	1 - New Condition	1	4	4	1-8 (Not critical)	No



		Salt Creek Services - Water and Wastewater Asset Inventory											
Asset Criticality Key	Asset Type	Asset Detail	Asset category	Year installed	Total expected life	Remaining useful life	Replacement cost	Condition assessment	Probability of failure	Consequence of failure	Criticality factor (POF x COF)	Criticality rating	Redundancy in place?
Critical	Water treatment	Influent Intake Line 2	Water treatment	2019	35	32	\$25,000	3 - Fair condition	3	5	15	9-16 (Important)	No
Important		Sand Filter 2	Water treatment	1976	50	4	15,000	3 - Fair condition	3	4	12	9-16 (Important)	Yes
Not Critical		Sand Filter 1	Water treatment	1976	50	4	\$500	3 - Fair condition	3	4	12	9-16 (Important)	Yes
Proposed		Chemical pump 1 (chemical room)	Water treatment	2014	10	1	\$500	3 - Fair condition	4	4	16	9-16 (Important)	No
		Chemical pump 3 (chemical room)	Water treatment	2014	10	1	\$500	3 - Fair condition	4	4	16	9-16 (Important)	No
		Chemical pump 2 (chemical room)	Water treatment	2014	10	1	\$500	3 - Fair condition	4	4	16	9-16 (Important)	No
		Chemical pump (Filter Room)	Water treatment	2014	10	1	\$500	3 - Fair condition	3	5	15	9-16 (Important)	Yes
		Pump House Electric Controls 5	Water treatment	2012	12	2	\$5,000	4 - Poor condition	3	5	15	9-16 (Important)	No
		Sump Pump Basin 1	Water treatment	2022	1	1	\$4,000	4 - Poor condition	3	4	12	9-16 (Important)	No
		Settling Basin	Water treatment	1995	75	48	\$75,000	2 - Good condition	1	5	5	1-8 (Not critical)	No
		Influent Intake Pump 2	Water treatment	2019	15	17	\$4,200	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
		Influent Intake Pump 1	Water treatment	2019	15	17	\$4,200	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
		Influent Intake Line 1	Water treatment	2019	35	32	\$5,500	1 - New/Excellent condition	1	3	3	1-8 (Not critical)	Yes
		Sump pump 2 (filter room)	Water treatment	2021	10	9	\$500	2 - Good condition	2	3	6	1-8 (Not critical)	Yes
		Sump pump 1 (filter room)	Water treatment	2021	10	9	\$500	2 - Good condition	2	3	6	1-8 (Not critical)	Yes
	Water distribution	High Service Pump 2	Water distribution system	1996	20	-6	\$7,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
		Water main 2	Water distribution system	1970	35	-17	\$30,000	4 - Poor condition	4	4	16	9-16 (Important)	No
		Water main 3	Water distribution system	1970	35	-17	\$30,000	4 - Poor condition	4	4	16	9-16 (Important)	No
		Water main 5	Water distribution system	1970	35	-17	\$20,000	4 - Poor condition	4	3	12	9-16 (Important)	No
		Water main 4	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
		Water main 1	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
		High Service Pump 1	Water distribution system	1996	20	-6	\$7,500	3 - Fair condition	3	4	12	9-16 (Important)	Yes
		Water main 10	Water distribution system	1970	35	-17	TBD	4 - Poor condition	3	3	9	9-16 (Important)	
		Water main 8	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
		Water main 9	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
		Water main 11	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
		Water main 7	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
		Water main 6	Water distribution system	1970	35	-17	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
		Hydrant 1	Water distribution system	1976	40	-6	\$4,200	3 - Fair condition	3	3	9	9-16 (Important)	No
		Hydrant 2	Water distribution system	1976	40	-6	\$4,200	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 1	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 2	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 3	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 4	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 5	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 6	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 7	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 8	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 9	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 10	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 11	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 12	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 13	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 14	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 15	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 16	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 17	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 18	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 19	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 20	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 21	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 22	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 23	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 24	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 25	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 26	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 27	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 28	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 29	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
		Meter 30	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No



	Meter 31	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 32	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 33	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 34	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 35	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 36	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 37	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 38	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 39	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Meter 40	Water distribution system	2000	15	-7	\$350	4 - Poor condition	3	3	9	9-16 (Important)	No
	Sample site (Proposed)		N/A	N/A	N/A	\$2,700	N/A	N/A	N/A	N/A	N/A	N/A
Wastewater treatment	Wastewater plant	Wastewater treatment	1976	50	4	\$550,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Blower	Wastewater treatment	1998	15	-9	\$4,500	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Lagoon	Wastewater treatment	2022	5	5	\$23,000	1 - New/Excellent condition	1	4	4	1-8 (Not critical)	No
Tanks/Storage	Clear well tank	Tank/Storage	1976	75	29	\$100,000	2 - Good condition	2	5	10	9-16 (Important)	No
	Storage tank	Tank/Storage	1976	40	10	\$200,000	3 - Fair condition	2	5	10	9-16 (Important)	No
Buildings	Chemical building/Mixing Basin	Building	1976	40	-6	\$200,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	Filter building	Building	1976	40	-6	\$150,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	WWTP Blower Building	Building	1992	40	-10	\$15,000	4 - Poor condition	4	4	16	9-16 (Important)	No
	Lake pump building	Building	1976	40	-6	\$12,000	3 - Fair condition	3	3	9	9-16 (Important)	No
	Settling basin building	Building	1976	40	10	\$25,000	2 - Good condition	2	3	6	1-8 (Not critical)	No
Wastewater collection	LS Electric controls 1	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	LS Electric controls 3	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	20	17+ (Critical)	No
	Lift station #2 pump 4	Wastewater collection system	1998	20	-4	\$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
	Lift station #3 pump 6	Wastewater collection system	1998	20	-4	\$6,500	4 - Poor condition	5	4	20	17+ (Critical)	Yes
	LS Electric controls 2	Wastewater collection system	1998	20	-4	\$10,000	4 - Poor condition	4	5	17	17+ (Critical)	No
	Lift station 1	Wastewater collection system	1976	35	-11	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station 2	Wastewater collection system	1976	35	-11	TBD	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station 3	Wastewater collection system	1976	35	-11	TBD	4 - Poor condition	3	4	12	9-16 (Important)	No
	Lift station pump 1	Wastewater collection system	1998	20	-4	\$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station pump 3	Wastewater collection system	1998	20	-4	\$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Lift station pump 5	Wastewater collection system	1998	20	-4	\$6,500	3 - Fair condition	3	4	12	9-16 (Important)	No
	Manhole 1	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 2	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 3	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 4	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 5	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 6	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 7	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 8	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 9	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 10	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 11	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 12	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 13	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 14	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 15	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 16	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 17	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 18	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 19	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 20	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 21	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 22	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 23	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 24	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 25	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 26	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 27	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 28	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 29	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No

	Manhole 30	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 31	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 32	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 33	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 33	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 34	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 35	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Manhole 36	Wastewater collection system	1976	75	29	TBD	TBD	3	4	12	9-16 (Important)	No
	Force main 1	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 2	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 3	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Force main 4	Wastewater collection system	1976	50	4	TBD	3 - Fair condition	3	3	9	9-16 (Important)	No
	Gravity main 1	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 2	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 3	Wastewater collection system	2014	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 4	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 5	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 6	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 7	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 8	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 9	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 10	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 11	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 12	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 13	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 14	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 15	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 16	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 17	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 19	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	4	8	1-8 (Not critical)	No
	Gravity main 18	Wastewater collection system	1976	50	40	TBD	2 - Good condition	2	3	6	1-8 (Not critical)	No
	Lift station #1 pump 2	Wastewater collection system	2022	20	20	TBD	2 - Good condition	1	4	4	1-8 (Not critical)	Yes
Fleet/Equipment	Water Tank Level Indicator	Fleet/Equipment	2019	10	7	\$1,200	2 - Good condition	2	3	6	1-8 (Not critical)	No
	Water Plant SCADA (BFU proposed)					\$15,000						

**APPENDIX F: IDEM INSPECTION SUMMARY**  
**03/11/2022**





# Indiana Department of Environmental Management

*We Protect Hoosiers and Our Environment*

100 N. Senate Avenue • Indianapolis, IN 46204

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**Eric J. Holcomb**  
*Governor*

**Brian C. Rockensuess**  
*Commissioner*

March 11, 2022

Mr. Brandon M. Correll  
Salt Creek Services, Inc.  
5024 Stansbury Place  
Spencer, IN 47460

Dear Mr. Correll :

Re: Inspection Summary Letter  
Salt Creek Services, Inc.  
PWSID# IN5253006  
Bloomington, Monroe County

On **Thursday, March 10, 2022**, an IDEM Office of Water Quality representative conducted an inspection of Salt Creek Services, Inc., located in Bloomington, Indiana pursuant to IC 13-14-2-2. For your information, and in accordance with IC 13-14-5, an inspection summary is provided below:

Type of Inspection: Sanitary Survey Inspection  
Primary Inspector: Karla Goodman: [KGoodman@idem.IN.gov](mailto:KGoodman@idem.IN.gov) or 317-417-7138

Results of Inspection: **Significant deficiencies were found during the inspection.**

According to 327 IAC 8-2- 8.2(f), significant deficiencies are conditions found during a sanitary survey that have a potential to cause an immediate health risk or any deficiency that was found during a previous sanitary survey but has not been corrected or the Public Water System is not in compliance with a correction schedule approved by the commissioner. You must respond in writing to deficiencies found during a sanitary survey within forty-five (45) days of receipt of this report indicating they are corrected. If there are circumstances that prevent you from immediately correcting the deficiencies, you may submit a schedule to IDEM, for approval, to correct the deficiencies.

Failure to respond within forty-five (45) days of the receipt of this letter is a violation and may result further action by this office. Please send response to the inspector listed in this report by email or at the address on the letterhead. I can be reached by email or phone as provided below.

Sincerely,

Lucio M. Ternieden  
Chief, Field Inspection Section  
Drinking Water Branch  
Office of Water Quality  
[LTernied@idem.IN.gov](mailto:LTernied@idem.IN.gov)

(317) 234-7461

cc: Monroe County Health Department  
Karla Goodman, IDEM Field Inspector  
File

[brandon\\_correll2003@yahoo.com](mailto:brandon_correll2003@yahoo.com)



# Summary of Deficiencies Identified

Salt Creek Services, Inc. - IN5253006

**1 A Significant deficiency was identified regarding: SWERP not up to date**

The inspector noted: "Deficiency - IC 13-18-16-7.5 The Surface Water Emergency Response Plan (SWERP) has been renamed Surface Water Threat Minimization and Response Plans (SWTMRP) and the 5 year update has not been submitted. IDEM sent a past due notice to the system on 4/20/2021 with no response received. System must submit the updated plan. An annual review needs to be completed and documented with the date and initials of staff completing review. This is a significant deficiency."

**2 A Minor deficiency was identified regarding: Does not prevent unauthorized access**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2 {e}{1}{E} There was a padlock on the intake electrical and meter structure that had been cut open. Operator has a new lock to install. Install lock on building and provide a picture documenting completion and send to Kgoodman@idem.in.gov."



**3 A Minor deficiency was identified regarding: Chemical storage is not adequate**

The inspector noted: "10 States Standards 5.1.9, 5.1.10, & 5.1.11 Label contents of the sodium hypochlorite day tank."

**4 A Minor deficiency was identified regarding: Treatment process(es) not adequately sealed**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(2)(H) The top of the sump pit that holds the filtered water must have all openings sealed. Additionally, this pit has significant metal deterioration that is contributing to turbidity issues. This pit must be repaired or replaced."



**5 A Minor deficiency was identified regarding: Cross connection(s) in the treatment process**

The inspector noted: "Deficiency - 327 IAC 8-10 There must be an approved backflow prevention assembly or air gap installed for the backwash water pit that is directly connected to the sanitary sewer."

**6 A Minor deficiency was identified regarding: System does not have a cross connection policy in effect**

The inspector noted: "Deficiency - 327 IAC 8-10-2 The system does not have in place a plan to identify or control cross connections. The system is to draft and implement a program that will prevent cross-connections from occurring and a mechanism to eliminate them."

**7 A Minor deficiency was identified regarding: Pumps and facilities are not properly maintained**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(5)(B)(ii) The sump pit has significant metal deterioration that is contributing to turbidity issues. This pit must be repaired or replaced."





- 8 A Minor deficiency was identified regarding: Daily free and total chlorine residual measurements are not being made at the plant and in the distribution system**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(6)(D) Daily chlorine residuals must be taken DAILY in the distribution system and documented on the Monthly Report of Operation (MRO)."

- 9 A Minor deficiency was identified regarding: MROs are not properly documented and submitted on time**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(6)(F) MROs are being submitted. Operator must replace the chemical header names on the MRO form to match what is being used at the treatment plant. For example, there is no ALUM being used at the plant, this column header must be changed to reflect the actual chemical being used."

- 10 A Minor deficiency was identified regarding: ERP not available or up to date**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(7)(B) The emergency response plan must be updated annually."

**11 A Minor deficiency was identified regarding: Sufficient operation and maintenance records are not being kept**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(7)(E)(i)

The overall condition of the Water Treatment Plant is significantly deteriorating. This plant was built in 1961, and little has been done since that time to improve the existing facility. 327 IAC 8-2-8.2(7)(E) states, in substance that it is the responsibility of the public water system (PWS) to operate and maintain the water system in a manner to ensure providing water that meets the requirements of the Safe Drinking Water Act (SDWA) and IC 13-18-16-6. Measures to meet these requirements must include having and implementing a written or otherwise documented approach that includes maintaining a record of system components, including information necessary to operate, maintain and repair system components. Also to insure system components are operated and maintained to meet the requirements of the SDWA and provide water that is suitable for ordinary domestic consumption. You are to develop and implement such an approach for maintaining your system."



**12 A Minor deficiency was identified regarding: Routine maintenance schedules are not established or adhered to**

The inspector noted: "Deficiency - 327 IAC 8-2-8.2(e)(7)(E)(i) Spare water lines, meter covers and pits, and hose appurtenances must be stored under roof and not outside."



**13 A Minor deficiency was identified regarding: Personnel not adequately trained**

The inspector noted: "Deficiency - 327 IAC 8-11-1(a) A letter needs to be sent to IDEM on Salt Creek letterhead, signed by the board president, stating who the new operators are with their certification numbers."



**14 A Recommendation** deficiency was identified regarding: **System does not have a storage maintenance schedule in place and records kept**

The inspector noted: "327 IAC 8-2-8.2(e)(7)(E)(i) It is recommended that storage tanks be inspected every three to five years. The system did not know when the storage tank was last inspected."

**15 A Recommendation** deficiency was identified regarding: **Testing facilities and equipment are not adequate**

The inspector noted: "327 IAC 8-2-8.2(e)(6)(A) It is recommended that sampling stations be installed in two locations in the distribution system for sanitary purposes when collecting bacte samples."

**16 A Recommendation** deficiency was identified regarding: **No provisions to warn operators of treatment failures**

The inspector noted: "327 IAC 8-2-8.2(e)(2)(C) There are minimal controls to warn of treatment failures. The only notifications are if the storage tank levels drop. System need to consider installing SCADA controls."

***-The rest of this page is intentionally left blank-***



## Public Water System Sanitary Survey Report

PWS ID: IN5253006 PWS Name: SALT CREEK SERVICES, INC.

Source Type: SW	System Type: C	Population: 90	Service Connections	Operating Category
County: MONROE	City: BLOOMINGTON		45	DST4

### Active Water System Facilities

Active WS Facilities Type Name	WS Facility ID	Active Sample Point Name
DISTRIBUTION SYSTEM	DS001	SP001,MXT001-TP01,HAA-1,THM-1
LAKE MONROE	IN001-6406	TOCRAW-TP01
PUMPING FACILITY #1 - RAW WATER	PF001	
PUMPING FACILITY #2 - FINISHED WATER	PF002	
PUMPING FACILITY #3 - FILTERED WATER	PF003	
STORAGE TANK #1	ST001	
CLEAR WELL #1	ST002	
TREATMENT PLANT	TP001	TOCFN-TP01,EP001,CL001

### Treatment Processes

Active Treatment Plant Name	Objective Name	Process Name	Process Number
TREATMENT PLANT	7-NAOH FEED	PH ADJUSTMENT, POST	741
TREATMENT PLANT	6-POST DISINFEC	HYPOCHLORINATION, POST	421
TREATMENT PLANT	4-PRE DISINFECT	HYPOCHLORINATION, PRE	423
TREATMENT PLANT	2B-MIXING BASIN	COAGULATION	240
TREATMENT PLANT	8-FILTRATION	FILTRATION, RAPID SAND	345
TREATMENT PLANT	3-SLOW MIX	FLOCCULATION	360
TREATMENT PLANT	5-SEDIMENTATION	SEDIMENTATION	660
TREATMENT PLANT	8-FILTRATION	FILTRATION, RAPID SAND	345
TREATMENT PLANT	3-SLOW MIX	FLOCCULATION	360
TREATMENT PLANT	5-SEDIMENTATION	SEDIMENTATION	660
TREATMENT PLANT	8-FILTRATION	FILTRATION, RAPID SAND	345
TREATMENT PLANT	3-SLOW MIX	FLOCCULATION	360
TREATMENT PLANT	5-SEDIMENTATION	SEDIMENTATION	660
TREATMENT PLANT	2B-MIXING BASIN	COAGULATION	240
TREATMENT PLANT	8-FILTRATION	FILTRATION, RAPID SAND	345
TREATMENT PLANT	3-SLOW MIX	FLOCCULATION	360
TREATMENT PLANT	2B-MIXING BASIN	RAPID MIX	600
TREATMENT PLANT	5-SEDIMENTATION	SEDIMENTATION	660

### Unresolved Deficiencies

CODE (NAME)	Visit Date	Identified Date	WSF	Category	Severity
OC01	3/10/2022	3/11/2019		OC	MIN
SO18	3/10/2022	3/11/2019	LAKE MONROE	SO	MIN
DS09	3/10/2022	3/11/2019	DISTRIBUTION SYSTEM	DS	MIN
FW08	3/10/2022	3/11/2019	STORAGE TANK #1	FW	MIN
SM01	3/10/2022	3/11/2019		SM	MIN
SM06	3/10/2022	3/11/2019		SM	MIN
SM11	3/10/2022	3/11/2019		SM	MIN
TR10	3/10/2022	3/11/2019	TREATMENT PLANT	TR	MIN

### Finished Water Storage

Type	Comments	Construction Material	Coating Material
Standpipe		Steel	Approved paint
Underground	Mostly underground b/w the plant and sedimentation basin		



# Sanitary Survey Report

## Sources

### LAKE MONROE

1 Is the source(s) sufficient in quantity?



2 Is the source(s) adequate in quality for the primary drinking water standards?



If not, does the have adequate treatment installed?

Yes

Not  
Evaluated

No

Not  
Evaluated

Not  
Evaluated

17 Are there measures put into place to prevent unauthorized access to intakes or wells?



Deficiency - 327 IAC 8-2-8.2 {e}{1}{E}

There was a padlock on the intake electrical and meter structure that had been cut open. Operator has a new lock to install. Install lock on building and provide a picture documenting completion and send to Kgoodman@idem.in.gov.

SO18

Does not prevent unauthorized access

MIN  
Deficiency



18 Is the source metered?



19 Have intake works been properly protected from ice buildup and siltation?



20 If infiltration galleries are used is yield sufficient during all season



## Treatment

### TREATMENT PLANT

1 **Is chemical storage adequate?**

10 States Standards 5.1.9, 5.1.10, & 5.1.11

Label contents of the sodium hypochlorite day tank.

TR01

Chemical storage is not adequate



MIN  
Deficiency

2 **Are chemical feeders and pumps operable in good condition and being properly calibrated and maintained?**



3 **Are instrumentation and controls adequate for the process being utilized and in proper working order?**



4 **Are treatment processes covered and adequately sealed?**

Deficiency - 327 IAC 8-2-8.2(e)(2)(H)

The top of the sump pit that holds the filtered water must have all openings sealed. Additionally, this pit has significant metal deterioration that is contributing to turbidity issues. This pit must be repaired or replaced.

TR04

Treatment process(es) not adequately sealed



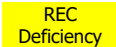














MIN  
Deficiency









5 **Are adequate safety devices available and precautions observed (dust mask safety goggles protective clothing)?**








6	<b>Is there secondary containment where needed and adequate?</b>	
7	<b>Are there provisions to warn operators of treatment failures?</b> 327 IAC 8-2-8.2(e)(2)(C) There are minimal controls to warn of treatment failures. The only notifications are if the storage tank levels drop. System need to consider installing SCADA controls. TR07                      No provisions to warn operators of treatment failures	 
9	<b>Is there restricted access to any unauthorized personnel from any portion of the treatment process?</b>	
10	<b>Do all the chemical additives used in the treatment process have ANSI/NSF approval?</b>	
11	<b>Was the treatment process free from uncontrolled cross connections and are backflow prevention devices installed at all appropriate locations?</b> Deficiency - 327 IAC 8-10 There must be an approved backflow prevention assembly or air gap installed for the backwash water pit that is directly connected to the sanitary sewer. TR11                      Cross connection(s) in the treatment process	 
13	<b>Is the Floc appearance acceptable (visual appearance, sheen on water, other observations)?</b>	
14	<b>Are Baffles in good condition?</b>	
16	<b>Is the frequency of Jar Testing adequate?</b>	
17	<b>Is the disinfection equipment, including UV light, being operated and maintained properly?</b>	
18	<b>Are critical spare parts on hand?</b>	
20	<b>Is the disinfection adequate, residuals maintained, etc.?</b>	
22	<b>If gas chlorination is used, are adequate safety precautions being followed?</b>	
23	<b>Is the treatment(s) sufficient to meet all of the NPDWS?</b>	








24	<b>Does the system meet 4-log virus inactivation at/or before the first customer?</b>	
25	<b>Filtration: Does the filter backwash go to a sanitary sewer?</b>	
	Yes	True
	No	False
	The system has a NPDES Permit.	Not Evaluated
	The system does not have a NPDES Permit.	Not Evaluated
26	<b>Filtration: Are filters ripened before going back into service?</b>	
27	<b>Filtration: Does the system have the proper filter inspection records?</b>	
28	<b>Filtration: Is the filter(s) and/or clearwell(s) free from any drain line passing through?</b>	
29	<b>Filtration: Is the Turbidity effluent of each filter and combined satisfactory?</b>	

## Distribution






### DISTRIBUTION SYSTEM


1	<b>Are pressures and flows adequate throughout the system under all conditions of flow? (excluding maintenance, system failures, and fireflow)</b>	
2	<b>Are plans of the water system available and current?</b>	
3	<b>Is there a regular flushing program?</b>	
4	<b>Are all services metered?</b>	
6	<b>Is there a valve maintenance and replacement program in place?</b>	

- |    |   |   |  |
|----|---|---|--|
| 7  | <b>Does the facility have a cross connection ordinance or policy in effect?</b><br><br>Deficiency - 327 IAC 8-10-2<br>The system does not have in place a plan to identify or control cross connections. The system is to draft and implement a program that will prevent cross-connections from occurring and a mechanism to eliminate them.<br><br>DS07                      System does not have a cross connection policy in effect |   |  |
|    |   |   | <div style="background-color: orange; padding: 2px; border: 1px solid black; font-size: 0.8em;">MIN<br/>Deficiency</div> |
| 8  | <b>Is the installation, testing, and inspection of cross connection control devices conducted in accordance to 327 IAC 8-10?</b>  |  |  |
| 9  | <b>Was the distribution system free from uncontrolled cross connections and are backflow prevention devices installed at all appropriate locations?</b>   |  |  |
| 10 | <b>Does the system have less than 25% water loss based on a 1 year average?</b>   |  |  |
| 11 | <b>Is the system free from issues with secondary drinking water standards?</b><br><br>If so, are there customer complaints?<br><br>No<br><br>Yes  |  |  |

**Finished Water Storage**

**STORAGE TANK #1**

- |   |   |   |  |
|---|---|---|--|
| 1 | <b>Are storage reservoirs located above ground water level?</b> |  |  |
| 2 | <b>Are the storage reservoirs protected against flooding?</b>   |  |  |
| 3 | <b>Are treated water storage reservoirs covered?</b>            |  |  |
| 4 | <b>Are storage reservoirs secure?</b>                           |  |  |
| 5 | <b>Is the storage reservoir structurally sound?</b>             |  |  |

6	<p><b>Is a storage maintenance schedule in place and records kept?</b></p> <p>327 IAC 8-2-8.2(e)(7)(E)(i)</p> <p>It is recommended that storage tanks be inspected every three to five years. The system did not know when the storage tank was last inspected.</p> <p>FW06                      System does not have a storage maintenance schedule in place and records kept</p>	  <div style="background-color: yellow; padding: 2px; border: 1px solid black;">REC Deficiency</div>
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7	<p><b>Does surface run-off and underground drainage drain away from the storage structure?</b></p>	
---	--	---

8	<p><b>Are all pipes, air vents, and related appurtenances appropriately constructed and located?</b></p>	
---	--	---

9	<p><b>Is access restricted where necessary to prevent contamination?</b></p>	
---	--	---


**CLEAR WELL #1**


1	<p><b>Are storage reservoirs located above ground water level?</b></p>	
---	--	---


2	<p><b>Are the storage reservoirs protected against flooding?</b></p>	
---	--	---

3	<p><b>Are treated water storage reservoirs covered?</b></p>	
---	---	---

4	<p><b>Are storage reservoirs secure?</b></p>	
---	--	---

5	<p><b>Is the storage reservoir structurally sound?</b></p>	
---	--	---

6	<p><b>Is a storage maintenance schedule in place and records kept?</b></p>	
---	--	---

7	<p><b>Does surface run-off and underground drainage drain away from the storage structure?</b></p>	
---	--	---









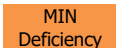

8	<p><b>Are all pipes, air vents, and related appurtenances appropriately constructed and located?</b></p>	
---	--	---

9	<p><b>Is access restricted where necessary to prevent contamination?</b></p>	
---	--	---





**MR Data Verification**

1	<p><b>Is the system free from any current monitoring and/or reporting violations?</b></p>	
---	---	---



2	<b>Are the daily chemical tests being performed properly?</b>	
3	<b>Are testing facilities and equipment adequate?</b> 327 IAC 8-2-8.2(e)(6)(A) It is recommended that sampling stations be installed in two locations in the distribution system for sanitary purposes when collecting bacti samples. MR03                      Testing facilities and equipment are not adequate	 
4	<b>Do reagents used have an unexpired shelf life?</b>	
5	<b>Are records of all daily test results and compliance monitoring results being maintained?</b>	
6	<b>Are daily free and total chlorine residual measurements being made at the plant and in the distribution system?</b> Deficiency - 327 IAC 8-2-8.2(e)(6)(D) Daily chlorine residuals must be taken DAILY in the distribution system and documented on the Monthly Report of Operation (MRO). MR06                      Daily free and total chlorine residual measurements are not being made at the plant and in the distribution system	 
7	<b>Are accurate records being maintained (amount of water treated, amount of chemical usage, etc)?</b>	
8	<b>Are MROs properly documented and submitted to IDEM on time?</b> Deficiency - 327 IAC 8-2-8.2(e)(6)(F) MROs are being submitted. Operator must replace the chemical header names on the MRO form to match what is being used at the treatment plant. For example, there is no ALUM being used at the plant, this column header must be changed to reflect the actual chemical being used. MR08                      MROs are not properly documented and submitted on time	 
11	<b>Are the TOC and Alkalinity levels at raw and finished satisfactory based on percentage removal?</b>	

#### Management and Operation

1	<b>Is an emergency response plan available and up to date?</b> Deficiency - 327 IAC 8-2-8.2(e)(7)(B) The emergency response plan must be updated annually. SM01                      ERP not available or up to date	 
2	<b>Are supplies and maintenance parts inventories adequate?</b>	
3	<b>Is the financing and budget satisfactory?</b>	

4

#### Are sufficient operation and maintenance records being kept?



Deficiency - 327 IAC 8-2-8.2(e)(7)(E)(i)

The overall condition of the Water Treatment Plant is significantly deteriorating. This plant was built in 1961, and little has been done since that time to improve the existing facility. 327 IAC 8-2-8.2(7)(E) states, in substance that it is the responsibility of the public water system (PWS) to operate and maintain the water system in a manner to ensure providing water that meets the requirements of the Safe Drinking Water Act (SDWA) and IC 13-18-16-6. Measures to meet these requirements must include having and implementing a written or otherwise documented approach that includes maintaining a record of system components, including information necessary to operate, maintain and repair system components. Also to insure system components are operated and maintained to meet the requirements of the SDWA and provide water that is suitable for ordinary domestic consumption. You are to develop and implement such an approach for maintaining your system.

SM04

Sufficient operation and maintenance records are not being kept

MIN  
Deficiency



5

#### Are permits being obtained for all repairs and construction?



6 **Are routine maintenance schedules established and adhered to?**

Deficiency - 327 IAC 8-2-8.2(e)(7)(E)(i)

Spare water lines, meter covers and pits, and hose appurtenances must be stored under roof and not outside.

SM06

Routine maintenance schedules are not established or adhered to



MIN  
Deficiency



7 **Is there a current site sampling plan available and on file with IDEM?**



8 **For service interruptions lasting greater than 8 hours, are notifications being made to the customers?**



9 **Are all direct and indirect additives certified for conformance to American National Standards Institute(ANSI)/National Sanitation Foundation (NSF) International Standard 60/61?**



10 **Are all Turbidity monitors properly calibrated or verified?**



11 **Is the Surface Water Emergency Response Plan up to date?**

Deficiency - IC 13-18-16-7.5

The Surface Water Emergency Response Plan (SWERP) has been renamed Surface Water Threat Minimization and Response Plans (SWTMRP) and the 5 year update has not been submitted. IDEM sent a past due notice to the system on 4/20/2021 with no response received. System must submit the updated plan. An annual review needs to be completed and documented with the date and initials of staff completing review. This is a significant deficiency.

SM11

SWERP not up to date



SIG  
Deficiency

12 **Is the labeling, painting, and directional flow of the piping adequate at the plant?**



13 **Does the system have a water conservation plan?**



Yes

True

Not  
Evaluated

No

False

Not  
Evaluated

15 **Inspection completed on time?**



**Operator Compliance**

1 **Are personnel adequately trained and/or certified?**

Deficiency - 327 IAC 8-11-1(a)

A letter needs to be sent to IDEM on Salt Creek letterhead, signed by the board president, stating who the new operators are with their certification numbers.

OC01

Personnel not adequately trained



MIN  
Deficiency

2 **Are there sufficient personnel?**



**Pumps**

**PUMPING FACILITY #1 - RAW WATER**

3 **Are there low suction cut off switches on all pumps?**



4 **Are pumps & facilities operated and maintained properly?**



5 **The pumping station does not have materials stored that have the potential to contaminate the water or pose safety risks to the operators?**



8 **Are the pressure and check valves, blow off valves, and other pump system appurtenances maintained and operating properly?**



**PUMPING FACILITY #2 - FINISHED WATER**



- 3 Are there low suction cut off switches on all pumps?
- 4 Are pumps & facilities operated and maintained properly?
- 5 The pumping station does not have materials stored that have the potential to contaminate the water or pose safety risks to the operators?
- 8 Are the pressure and check valves, blow off valves, and other pump system appurtenances maintained and operating properly?



#### PUMPING FACILITY #3 - FILTERED WATER

- 3 Are there low suction cut off switches on all pumps?



- 4 Are pumps & facilities operated and maintained properly?

Deficiency - 327 IAC 8-2-8.2(e)(5)(B)(ii)

The sump pit has significant metal deterioration that is contributing to turbidity issues. This pit must be repaired or replaced.

PU04

Pumps and facilities are not properly maintained



MIN  
Deficiency



- 5 The pumping station does not have materials stored that have the potential to contaminate the water or pose safety risks to the operators?
- 8 Are the pressure and check valves, blow off valves, and other pump system appurtenances maintained and operating properly?



-End of Report-

## **APPENDIX G: EFI SOLUTIONS PACKAGED TREATMENT PLANT INFORMATION**

# UNITIZED TREATMENT SYSTEM (UTS™)

 **TONKA WATER™**  
a Kurita brand



Robust Process



Packaged Surface  
Water Treatment



Customizable  
Configurations



Enhancements  
Available

Kurita America's Unitized Treatment System™ (UTS) combines flocculation, sedimentation and media filtration into a single packaged gravity treatment unit. This conventional treatment process is ideal for surface water sources, removing turbidity and suspended solids; as well as for complex groundwaters requiring advanced treatment with coagulants or polymers. We offer a variety of options and design features to accommodate your specific treatment needs.

## KURITA AMERICA ADVANTAGE



### TARGETED INDUSTRIES

- Agriculture
- Biofuels
- Food & Beverage
- General Manufacturing
- Mining
- Municipal Drinking Water
- Power Generation

### THE UTS PROVIDES:

- Surface water treatment
- Modular packaged system design
- Flocculation, sedimentation, and media filtration
- Gravity flow
- Settling with plates or tubes
- Mechanical solids removal option
- Simul-Wash™ combined air/water backwash available

### Robust Process

The addition of flocculation and sedimentation to media filtration provides a robust process, buffering upsets in source water quality, and ideal for difficult waters that benefit from extended reaction time. The settling of solids reduces filter loading, extending run lengths and minimizing backwash frequency.

### Packaged Surface Water Treatment

The UTS is ideal for treating surface water sources, whether for use as reliable process water or to meet primary drinking water standards. Flocculation and sedimentation accommodate the addition of coagulant chemicals to agglomerate turbidity and clarify the water, while media filtration provides the removal of finer particles.

### Customizable Configurations

Kurita America customizes each UTS around design parameters specific to your application, like number of flocculation stages, residence time, settling rise rate, and filter loading rate. A single unit can treat up to 1 MGD or more, and overall unit dimensions are adjustable to accommodate your desired floorplan.

### Enhancements Available

We offer enhancement options for each of the three process components to provide a range of treatment capability at different price points. Flocculation can be improved by adding a rapid mix step or by tapering through multiple stages in series. Our Uni-Pac™ inclined plates can be implemented to maximize settling area, complemented by our MechVac™ mechanized solids removal system for more efficient purging of concentrated solids. Simul-Wash combined air/water backwash provides optimal filter cleaning while minimizing waste volumes.



## APPENDIX H: NET PRESENT WORTH

Net Present Worth Alternatives Compared to Selected			
	Selected Alternative 1	Alternative 2	Alternative 3
<b>Capital Cost</b>	\$3,107,800.00	\$6,204,900.00	\$9,550,660.00
<b>O&amp;M Cost</b>	\$3,001,083.49	\$2,632,297.66	\$212,853.86
<b>O&amp;M Present Worth Cost</b>	\$2,994,683.49	\$2,625,897.66	\$212,613.86
<b>Salvage Value</b>	\$602,052.78	\$1,960,750.00	\$4,326,833.33
<b>Salvage Value Present Worth</b>	\$394,460.10	\$1,319,528.54	\$2,911,834.80
<b>Net Present Worth</b>	\$5,863,423.40	\$7,666,669.12	\$6,856,439.06
<b>NPW Compared to Selected Alternative</b>	<b>100.00%</b>	<b>130.75%</b>	<b>116.94%</b>

This Net Present Worth (NPW) analysis compares all construction costs, operations and maintenance costs over a 20-year study period, and salvage value of all tangible and mechanical items within each alternative to understand the full cost of constructing and operating each option over time. The selected or recommended alternative of plant replacement has the lowest NPW. The next best option for recommendation is Alternative 2, plant replacement, due to the reduced cost of operation and construction over time. A no-action alternative was also considered; however, a Net Present Worth did not apply, as this alternative was not feasible given the condition of the system. Regionalization was also considered in this evaluation but proves to be a costly solution due to the distance of regionalization and boring under Lake Monroe. NPW evaluations for each alternative are provided in the following sections.

**Construction of WTP Rehabilitation  
20-Year Life Cycle Cost Summary - Alternative 1**

Year of Proposed Construction (Year):	2025
Study Period (years):	20
Yearly Power Cost Increase:	3.50%
Yearly Labor Cost Increase:	2.42%
Discount Rate Use:	2.00%

Notes:	
1	Construction based on today's costs using average inflation of 3% per year
2	Yearly power cost increase based on EIA 9-year Industrial Electric Power Rates for 2022: <a href="https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3">https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3</a>
3	Yearly Labor Cost increase based on BLS: Employment Cost Index: Total Compensation for Private Industry workers in Natural resources, construction, and maintenance 2010-2020: <a href="https://fred.stlouisfed.org/series/CIU2010000400000I">https://fred.stlouisfed.org/series/CIU2010000400000I</a>
4	Real Discount rate taken from Appendix C of OMB circular Dated December 2022

Construction of WWTP Replacement	
Item	2024 Present Worth
Construction and Capital Costs	\$3,107,800.00
Power Costs	\$149,000.00
Yearly Electrical Maintenance Costs	\$13,000.00
Capital Improvement Costs	\$2,988,083.49
Salvage Value	\$394,460.10
Total Year 2024 Net Present Worth:	\$5,863,423.40

Notes:	
1	Costs in 2024 using the yearly increase rates for construction, power, and labor for construction, power and O&M respectively. Positive values indicate costs.

**Alternative 1 - Water Treatment Plant Rehabilitation**  
**Capital Improvements Costs (Replacement in 2024 Dollars)**  
**Replacement/Maintenance Schedule**

### Replacement/Maintenance Schedule

Year after Construction	Work Done	2024 Cost	F/P <sup>2024</sup> Factor 1	Future Dollars	P <sup>2024</sup> /F Factor2	2024 Present Worth
1	Operations Labor	\$123,760	1.02	\$126,749.21	0.98	\$124,263.93
1	Chemicals	\$1,700	1.02	\$1,741.06	0.98	\$1,706.92
1	Repairs	\$15,000	1.02	\$15,362.30	0.98	\$15,061.08
2	Operations Labor	\$123,760	1.05	\$129,810.62	0.96	\$124,769.92
2	Chemicals	\$1,700	1.05	\$1,783.11	0.96	\$1,713.87
2	Repairs	\$15,000	1.05	\$15,733.35	0.96	\$15,122.40
3	Operations Labor	\$123,760	1.07	\$132,945.98	0.94	\$125,277.96
3	Chemicals	\$1,700	1.07	\$1,826.18	0.94	\$1,720.85
3	Repairs	\$15,000	1.07	\$16,113.36	0.94	\$15,183.98
4	Operations Labor	\$123,760	1.10	\$136,157.06	0.92	\$125,788.08
4	Chemicals	\$1,700	1.10	\$1,870.29	0.92	\$1,727.86
4	Repairs	\$15,000	1.10	\$16,502.55	0.92	\$15,245.81
5	Operations Labor	\$123,760	1.13	\$139,445.70	0.91	\$126,300.27
5	Chemicals	\$1,700	1.13	\$1,915.46	0.91	\$1,734.89
5	Repairs	\$15,000	1.13	\$16,901.14	0.91	\$15,307.89
6	Operations Labor	\$123,760	1.15	\$142,813.78	0.89	\$126,814.55
6	Chemicals	\$1,700	1.15	\$1,961.73	0.89	\$1,741.96
6	Repairs	\$15,000	1.15	\$17,309.36	0.89	\$15,370.22
7	Operations Labor	\$123,760	1.18	\$146,263.20	0.87	\$127,330.92
7	Chemicals	\$1,700	1.18	\$2,009.11	0.87	\$1,749.05
7	Repairs	\$15,000	1.18	\$17,727.44	0.87	\$15,432.80
8	Operations Labor	\$123,760	1.21	\$149,795.94	0.85	\$127,849.39
8	Chemicals	\$1,700	1.21	\$2,057.64	0.85	\$1,756.17
8	Repairs	\$15,000	1.21	\$18,155.62	0.85	\$15,495.64
9	Operations Labor	\$123,760	1.24	\$153,414.01	0.84	\$128,369.98
9	Chemicals	\$1,700	1.24	\$2,107.34	0.84	\$1,763.32
9	Repairs	\$15,000	1.24	\$18,594.13	0.84	\$15,558.74
10	Operations Labor	\$123,760	1.27	\$157,119.46	0.82	\$128,892.68
10	Chemicals	\$1,700	1.27	\$2,158.23	0.82	\$1,770.50
10	Repairs	\$15,000	1.27	\$19,043.24	0.82	\$15,622.09
10	Replace Chlorine Analyzer	\$14,000	1.27	\$17,773.69	0.82	\$14,580.62
10	TSS Analyzer	\$14,000	1.27	\$17,773.69	0.82	\$14,580.62
11	Operations Labor	\$123,760	1.30	\$160,914.41	0.80	\$129,417.51
11	Chemicals	\$1,700	1.30	\$2,210.36	0.80	\$1,777.71
11	Repairs	\$15,000	1.30	\$19,503.20	0.80	\$15,685.70
12	Operations Labor	\$123,760	1.33	\$164,801.03	0.79	\$129,944.49
12	Chemicals	\$1,700	1.33	\$2,263.75	0.79	\$1,784.95
12	Repairs	\$15,000	1.33	\$19,974.27	0.79	\$15,749.57
13	Operations Labor	\$123,760	1.36	\$168,781.52	0.77	\$130,473.60
13	Chemicals	\$1,700	1.36	\$2,318.43	0.77	\$1,792.22
13	Repairs	\$15,000	1.36	\$20,456.71	0.77	\$15,813.70
14	Operations Labor	\$123,760	1.40	\$172,858.15	0.76	\$131,004.87
14	Chemicals	\$1,700	1.40	\$2,374.43	0.76	\$1,799.52
14	Repairs	\$15,000	1.40	\$20,950.81	0.76	\$15,878.10
15	Operations Labor	\$123,760	1.43	\$177,033.24	0.74	\$131,538.30
15	Chemicals	\$1,700	1.43	\$2,431.78	0.74	\$1,806.84
15	Repairs	\$15,000	1.43	\$21,456.84	0.74	\$15,942.75
16	Operations Labor	\$123,760	1.43	\$177,033.24	0.74	\$131,538.30
16	Chemicals	\$1,700	1.47	\$2,490.51	0.73	\$1,814.20
16	Repairs	\$15,000	1.47	\$21,975.09	0.73	\$16,007.67
17	Operations Labor	\$123,760	1.47	\$181,309.18	0.73	\$132,073.91
17	Chemicals	\$1,700	1.50	\$2,550.66	0.71	\$1,821.59
17	Repairs	\$15,000	1.50	\$22,505.87	0.71	\$16,072.85
18	Operations Labor	\$123,760	1.50	\$185,688.39	0.71	\$132,611.70
18	Chemicals	\$1,700	1.54	\$2,612.27	0.70	\$1,829.01
18	Repairs	\$15,000	1.54	\$23,049.46	0.70	\$16,138.29
19	Operations Labor	\$123,760	1.54	\$190,173.38	0.70	\$133,151.67
19	Chemicals	\$1,700	1.57	\$2,675.37	0.69	\$1,836.45
19	Repairs	\$15,000	1.57	\$23,606.18	0.69	\$16,204.01
20	Operations Labor	\$123,760	1.57	\$194,766.69	0.69	\$133,693.85
20	Chemicals	\$1,700	1.61	\$2,739.99	0.67	\$1,843.93
10	Replace Chlorine Analyzer	\$14,000	1.27	\$17,773.69	0.82	\$14,580.62
10	TSS Analyzer	\$14,000	1.27	\$17,773.69	0.82	\$14,580.62
20	Repairs	\$15,000	1.61	\$24,176.34	0.67	\$16,269.99
Capital Improvements 2024 Present Worth:						\$2,988,083.49



**Construction of WTP Replacement  
20-Year Life Cycle Cost Summary - Alternative 2**

Year of Proposed Construction (Year):	2025
Study Period (years):	20
Yearly Power Cost Increase:	3.50%
Yearly Labor Cost Increase:	2.42%
Discount Rate Use:	2.00%

**Notes:**

1	Construction based on today's costs using average inflation of 3% per year
2	Yearly power cost increase based on EIA 9-year Industrial Electric Power Rates for 2022: <a href="https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3">https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3</a>
3	Yearly Labor Cost increase based on BLS: Employment Cost Index: Total Compensation for Private Industry workers in Natural resources, construction, and maintenance 2010-2020: <a href="https://fred.stlouisfed.org/series/CIU20100004000001">https://fred.stlouisfed.org/series/CIU20100004000001</a>
4	Real Discount rate taken from Appendix C of OMB circular Dated December 2022

**Construction of WWTP Replacement**

Item	2024 Present Worth
Construction and Capital Costs	\$6,204,900.00
Power Costs	\$149,000.00
Yearly Electrical Maintenance Costs	\$13,000.00
Capital Improvement Costs	\$2,619,297.66
Salvage Value	\$1,319,528.54
Total Year 2024 Net Present Worth:	\$7,666,669.12

**Notes:**

1	Costs in 2024 using the yearly increase rates for construction, power, and labor for construction, power and O&M respectively. Positive values indicate costs.
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Alternative 2 - Water Treatment Plant Replacement	
Capital Improvements Costs (Replacement in 2024 Dollars)	
Replacement/Maintenance Schedule	

Year after Construction	Work Done	2024 Cost	F/P <sub>2024</sub> Factor 1	Future Dollars	P <sub>2024</sub> /F Factor2	2024 Present Worth
1	Operations Labor	\$123,760	1.02	\$126,749.21	0.98	\$124,263.93
1	Chemicals	\$1,700	1.02	\$1,741.06	0.98	\$1,706.92
2	Operations Labor	\$123,760	1.05	\$129,810.62	0.96	\$124,769.92
2	Chemicals	\$1,700	1.05	\$1,783.11	0.96	\$1,713.87
3	Operations Labor	\$123,760	1.07	\$132,945.98	0.94	\$125,277.96
3	Chemicals	\$1,700	1.07	\$1,826.18	0.94	\$1,720.85
4	Operations Labor	\$123,760	1.10	\$136,157.06	0.92	\$125,788.08
4	Chemicals	\$1,700	1.10	\$1,870.29	0.92	\$1,727.86
5	Operations Labor	\$123,760	1.13	\$139,445.70	0.91	\$126,300.27
5	Chemicals	\$1,700	1.13	\$1,915.46	0.91	\$1,734.89
6	Operations Labor	\$123,760	1.15	\$142,813.78	0.89	\$126,814.55
6	Chemicals	\$1,700	1.15	\$1,961.73	0.89	\$1,741.96
7	Operations Labor	\$123,760	1.18	\$146,263.20	0.87	\$127,330.92
7	Chemicals	\$1,700	1.18	\$2,009.11	0.87	\$1,749.05
8	Operations Labor	\$123,760	1.21	\$149,795.94	0.85	\$127,849.39
8	Chemicals	\$1,700	1.21	\$2,057.64	0.85	\$1,756.17
9	Operations Labor	\$123,760	1.24	\$153,414.01	0.84	\$128,369.98
9	Chemicals	\$1,700	1.24	\$2,107.34	0.84	\$1,763.32
10	Operations Labor	\$123,760	1.27	\$157,119.46	0.82	\$128,892.68
10	Chemicals	\$1,700	1.27	\$2,158.23	0.82	\$1,770.50
11	Operations Labor	\$123,760	1.30	\$160,914.41	0.80	\$129,417.51
11	Chemicals	\$1,700	1.30	\$2,210.36	0.80	\$1,777.71
12	Operations Labor	\$123,760	1.33	\$164,801.03	0.79	\$129,944.49
12	Chemicals	\$1,700	1.33	\$2,263.75	0.79	\$1,784.95
13	Operations Labor	\$123,760	1.36	\$168,781.52	0.77	\$130,473.60
13	Chemicals	\$1,700	1.36	\$2,318.43	0.77	\$1,792.22
14	Operations Labor	\$123,760	1.40	\$172,858.15	0.76	\$131,004.87
14	Chemicals	\$1,700	1.40	\$2,374.43	0.76	\$1,799.52
15	Operations Labor	\$123,760	1.43	\$177,033.24	0.74	\$131,538.30
15	Chemicals	\$1,700	1.43	\$2,431.78	0.74	\$1,806.84
16	Operations Labor	\$123,760	1.47	\$181,309.18	0.73	\$132,073.91
16	Chemicals	\$1,700	1.47	\$2,490.51	0.73	\$1,814.20
17	Operations Labor	\$123,760	1.50	\$185,688.39	0.71	\$132,611.70
17	Chemicals	\$1,700	1.50	\$2,550.66	0.71	\$1,821.59
18	Operations Labor	\$123,760	1.54	\$190,173.38	0.70	\$133,151.67
18	Chemicals	\$1,700	1.54	\$2,612.27	0.70	\$1,829.01
19	Operations Labor	\$123,760	1.57	\$194,766.69	0.69	\$133,693.85
19	Chemicals	\$1,700	1.57	\$2,675.37	0.69	\$1,836.45
20	Operations Labor	\$123,760	1.61	\$199,470.95	0.67	\$134,238.23
20	Chemicals	\$1,700	1.61	\$2,739.99	0.67	\$1,843.93
Capital Improvements 2024 Present Worth:						\$2,619,297.66

**Construction of Regionalization  
20-Year Life Cycle Cost Summary - Alternative 3**

Year of Proposed Construction (Year):	2025
Study Period (years):	20
Yearly Power Cost Increase:	3.50%
Yearly Labor Cost Increase:	2.42%
Discount Rate Use:	2.00%

Notes:	
1	Construction based on today's costs using average inflation of 3% per year
2	Yearly power cost increase based on EIA 9-year Industrial Electric Power Rates for 2022: <a href="https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3">https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_3</a>
3	Yearly Labor Cost increase based on BLS: Employment Cost Index: Total Compensation for Private Industry workers in Natural resources, construction, and maintenance 2010-2020: <a href="https://fred.stlouisfed.org/series/CIU20100004000001">https://fred.stlouisfed.org/series/CIU20100004000001</a>
4	Real Discount rate taken from Appendix C of OMB circular Dated December 2022

Construction of Regionalization	
Item	2024 Present Worth
Construction and Capital Costs	\$9,550,660.00
Power Costs	\$5,000.00
Yearly Electrical Maintenance Costs	\$0.00
Capital Improvement Costs	\$212,613.86
Salvage Value	\$2,911,834.80
Total Year 2024 Net Present Worth:	\$6,856,439.06

Notes:	
1	Costs in 2024 using the yearly increase rates for construction, power, and labor for construction, power and O&M respectively. Positive values indicate costs.

Alternative 3 - Regionalization  
Capital Improvements Costs (Replacement in 2024 Dollars)  
Replacement/Maintenance Schedule

Year after Construction	Work Done	2024 Cost	F/P <sub>2024</sub> Factor 1	Future Dollars	P <sub>2024</sub> /F Factor2	2024 Present Worth
10	Chlorine Shed Replacement	\$100,000	1.27	\$126,954.96	0.82	\$104,147.29
20	Chlorine Shed Replacement	\$100,000	1.61	\$161,175.62	0.67	\$108,466.57
Capital Improvements 2024 Present Worth:						\$212,613.86