Turkey Creek Regional Sewer District

Water Utility
Preliminary Engineering Report
2024

Successful partnerships start with Fluid thinking®

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Engineers

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Executive Summary

This PER evaluates the Turkey Creek Regional Sewer Districts existing drinking water system. It will review and address significant issues that the district has been dealing with for decades. The study area is in Kosciusko County, Indiana; Lake Wawasee, USGS Quadrangle, turkey, Creek Township, section 9, T 34N, R 7E.

The TCRSD Water Utility was first formed as a private entity in the 1960s. The Water Utility became a part of the TCRSD by State Mandate in 1989 as a result of the required acquisition of the Wawasee sewer and water company. The original treatment plant had been constructed in the 1960s to serve the Fascination Place and Enchanted Hills development. The system was a very basic solution to potable water production. Review of the records of the TCRSD Water Utility seems to show that for a great many years very little maintenance had been performed. In 1989, the TCRSD began planning for upgrades that were eventually made in 1996. A new 250 GPM well was installed to satisfy IDEM request starting back in 1984. Additionally, the existing well house was expanded, new phosphate feed equipment was installed, improvements to the chlorine feed system made, and three new 1500-gallon hydro-pneumatic tanks replaced the original single tank. Upgrades were also made to the electrical and control equipment.

The TCRSD Water Utility operates a groundwater, iron and manganese sequestration plant. The plant is a simple structure that houses three hydro-pneumatic tanks, chlorination and phosphate, chemical feed equipment, and associated monitoring and control equipment. The plant houses a small lab and desk for testing. However, all billing information, customer data, and common related information is currently housed and administered in the TCRSD sewer treatment administration building. The Water Utility has approximately 22,200 linear feet of distribution mains and serves approximately 230 customers. The utility does not supply water for firefighting purposes. The scope of this project addresses health and safety concerns, crossflow and backflow concerns, treatment and operational deficiencies and end of useful life items that exist throughout the Utility. The district first studied and reviewed these issues in 2014 to address issues of discoloration of the drinking water and low-pressure issues that were the primary concerns expressed by customers in a TCRSD survey of concerns. At the time of the 2014 study, an income survey was performed for the subset of the water utility, and it was found that approximately 70% of the community served was at or below income thresholds for funding assistance. Currently, the area served likely remains below income thresholds and should easily qualify for assistance under the Disadvantaged Community guidance.

The primary project purpose of this PER is to provide the information and solutions necessary to make changes and improvements for safe, reliable drinking water for future decades. This will require the replacement of the end of life and failing 60-year-old ACP distribution piping, valving, and service lines. Service line review and inventory shows that in many cases, unknown materials and services with tee and wye connections cause both pressure issues and back flow and cross-connection issues. The goals and objectives of the lead service line inventory and replacement is to take services to the home connection point. The district is supportive of this goal and will also include greatly needed water metering to provide revenue and data that has previously been unobtainable.

The Turkey Creek Regional Sewer District, and the Board Members acting as stewards of both the environment and the financial health of the district can not resolve this perfect storm of circumstances… too many needs… too few customers. The water utility started out as a poorly conceived, or at minimum, poorly installed and operated system. The TCRSD was required to take over operations of the utility after twenty-plus years of neglect. The district has done their best to pinch pennies and provide safe drinking water on a shoestring budget. Many of the customers served are struggling at the edges of the economy to make the fixed rate payment of $37.50. These improvements are needed to serve the community and improve and safeguard their health and safety in many critical aspects. Thank you for your help and consideration.

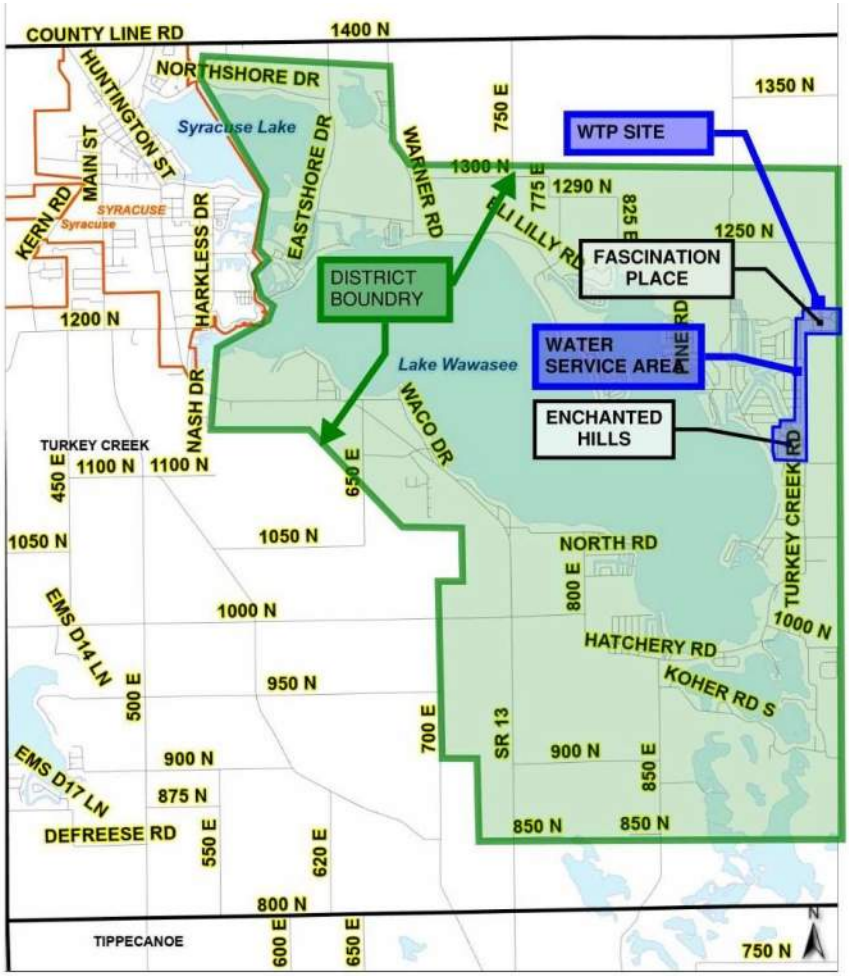

Figure 0.3 – Sewer & Water Territorial Area

A brief history of Turkey Creek Regional Sewer District

The study area is in Kosciusko County, Indiana; Lake Wawasee USGS Quadrangle, Turkey Creek Township, Section 9; T34N, R7E, see Figure 0.1, County Location Map and Figure 0.2 District Location Map. The Turkey Creek Regional Sewer District (TCRSD) was established by the Indiana Stream Pollution Control Board in October 18, 1977. The service area that was defined when the District was established includes Lake Wawasee, Syracuse Lake, Boner Lake, and Papakeechie Lake. The District received requests for service for the eastern and northern portion of Syracuse Lake, see Figure 0.1, District Boundary and Sewer Area Map.

The Turkey Creek Regional Sewer District Water Utility was officially "Born in 1989" as a result of the acquisition of the Wawasee Sewer and Water Company. The original treatment plant had been constructed in the 1960's to serve the Fascination Place and Enchanted Hills development. The system was a very basic solution to potable water production. A review of the early records of the TCRSD Water Utility seemed to show that, for a great many years, very little maintenance had been performed.

The TCRSD had one 12-inch well with a 200 gallon per minute deep well turbine pump. A small Well House enclosed the pump and chlorine rooms, as well as a 2000-gallon hydro-pneumatic storage tank. The well house also contained chlorine and phosphate feed equipment. The basic system served approximately 190 households.

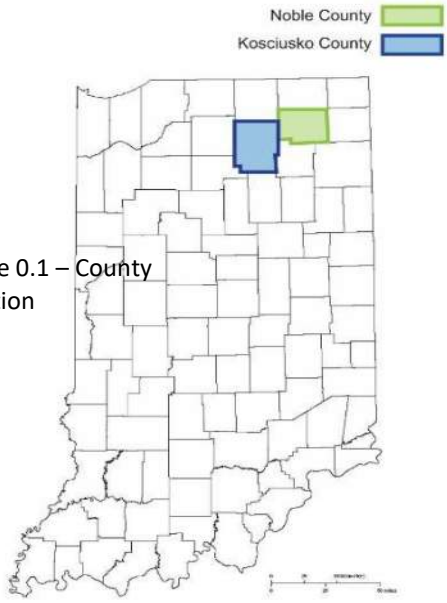

Figure 0.1 – County Location

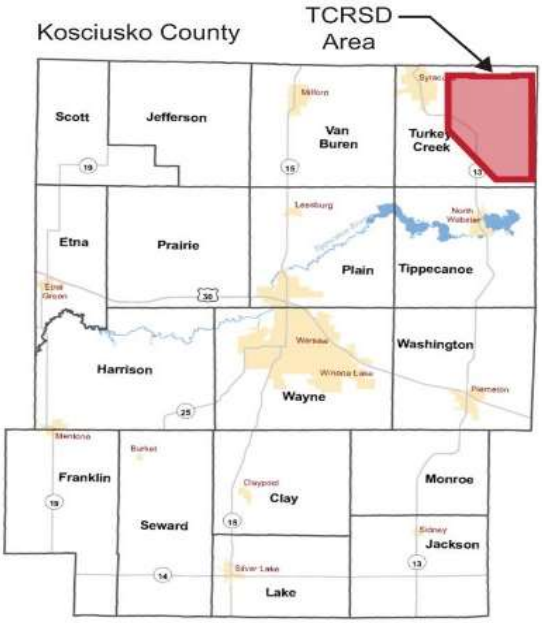

Figure 0.2 – District Location

In 1989, TCRSD began planning for upgrades that were eventually made in 1996. A new 250 gpm well was installed to satisfy IDEM requests dating back to 1984. Additionally, the existing well house was expanded, new phosphate feed equipment was installed, improvements to the chlorine feed system were made, and three new 1500-gallon hydro-pneumatic tanks replaced the original single tank. Upgrades were also made to the electrical and control equipment.

The TCRSD Water Utility obtains its drinking water from the surrounding aquifer. The system utilizes the two wells identified above, which pump to the water treatment plant for chlorination and iron sequestration. The water is then discharged directly to the distribution system. The distribution system does not have any additional storage beyond what is provided by the three 1500-gallon hydro-pneumatic tanks. Due to its small size and minimal elevation changes, the entire distribution system operates in one pressure zone.

The Turkey Creek Regional Sewer District's Water Utility has approximately 22,200 linear feet of distribution mains, two ground water supply wells, three hydro-pneumatic tanks for storage and a water treatment plant that sequesters iron and manganese. The Utility serves approximately 230 customers. Approximately 168 customers are in Fascination Place, 50 customers in Enchanted Hills and 12 customers between the two developments. The customers are primarily year-round residents. The Utility does not supply water for firefighting purposes.

Chapter 1 Current Conditions

Water Treatment Plant

The Water Utility was first formed privately in the 1960s. Overall, the treatment plant has been maintained and improved in very good condition with recent hydro-pneumatic pressure tank and chlorine chemical system improvements and replacements in 2023. The Wells themselves are still in generally good condition. The distribution system is where most of the challenges exist.

a. Supply.

1. That Utility Wells are regularly maintained and rebuilt as needed. While the current supply does not have any known issues or concerns the Utility recognizes a need for a third well.
2. The Wells can meet current needs and capacity; however, the lack of finish water storage is a problem. Additional redundancy and future growth concerns make a third well desirable.
3. The operational problems, experienced by the Utility exist primarily on the distribution side. Supply side operational issues are minor.
4. The utility currently sees no issues with emerging contaminants. Emerging concerns for PFAS and PFOS are relevant for any utility.

b. Treatment

1. The facilities are well-maintained and equipment replacements have been completed as needed with improvements to the hydro-pneumatic pressure tanks, chlorine and phosphorus feed systems, and roof modifications and repairs.
2. The current treatment capacity is adequate for most demands. However, service to mobile homes can result in excess water demand during freezing conditions, resulting from the need to maintain dripping faucets.
3. Operationally, the treatment facility has problems only in the regard that regular and continuous operation is required due to the absence of finished water storage.
4. Emerging contaminants do not currently present concerns for the treatment process. However, the Utility only chlorinates and sequesters with no form of filtration is available to deal with emerging contaminants of concern or other water quality issues. Iron content has always been a concern for the Utility.

c. Storage

The utility has no finished water storage. As a result, the only available capacity lies within the distribution system or the three small pressure tanks. This lack of finished water capacity creates operational problems in the event of a break, or a need to stop or isolate services.

Water Distribution

The Water Utility only provides water to a small portion of the sewer territory. Figure 1.1 shows the current Service Area (Study Area) that is served by the Water Utility.

1. The distribution system is at the end of its useful life. Most of the system was poorly installed as a private utility with limited requirements for service.
2. The distribution system and service lines are undersized, resulting in pressure and flow issues throughout the service area.
3. The distribution system has several dead ends that can result in water age/ quality issues, allowing iron to settle out. Between the dead ends and lack of adequate flushing hydrants, velocity and volume make water quality a concern. The lack of looped mains further contributes to reduced system capacity.

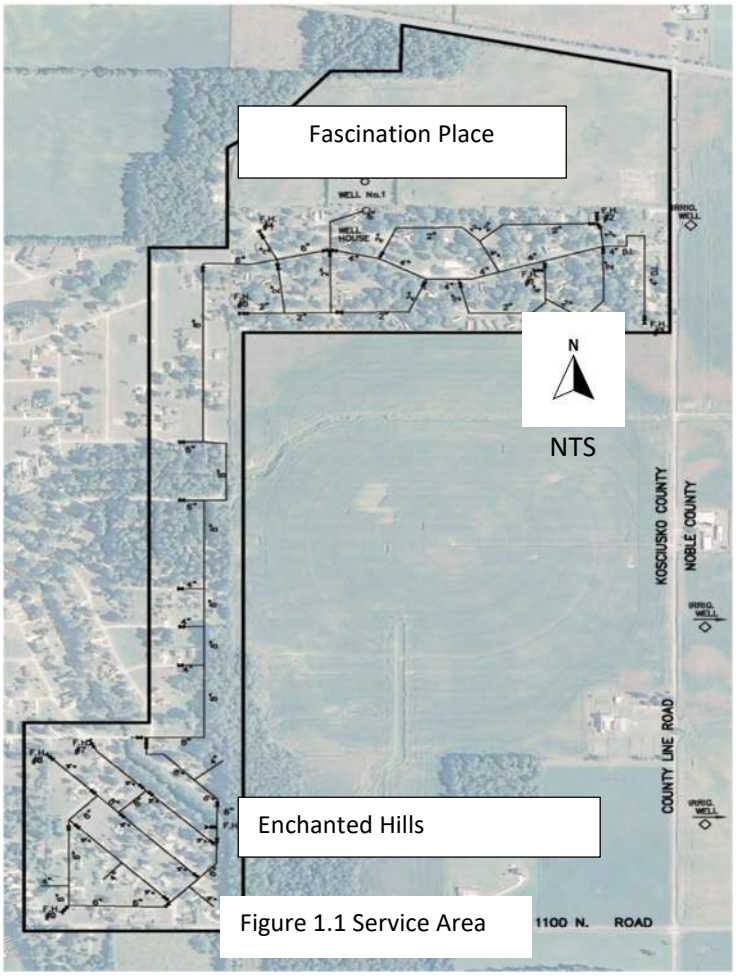

Figure 1.1 Service Area

4. In addition, Asbestos Cement (AC) piping makes adding valves and shut-offs difficult or impossible, severely limiting the ability to isolate parts of the system for repairs. The AC pipe also requires specific SOP guidance for repairs or disposal. Currently, the AC pipe has not had an impact on the utility health insurance premiums.
5. Further, the presence of AC pipe creates issues with regular system maintenance, isolation, and creates concerns for handling and disposal due to negative health effects.
6. The distribution system's service lines have been inventoried, and a report has been provided to the state. While little or no lead service lines have been identified, the distribution system has many unknown service lines and small piping under 3 inches that should be addressed and replaced under the lead service line requirements.
7. New construction in the existing neighborhoods, and even just serving existing homes, creates concerns of adequate pressures and availability. Current and new service lines need water

meters to provide adequate controls and understanding of the water distribution system and water use. Individual service lines and meters would also address the number of homes that have tee or wye connections from an individual tap at the main.

8. Metering would also allow a more effective solution to backflow prevention. Past efforts by the Utility to provide backflow preventers have resulted in stolen or missing components that cannot be continuously monitored or replaced by the Utility.

Chapter 2 Utility Needs

Condition of Existing Facilities

Administrative Facilities

The present condition of the treatment plant shows that care and maintenance have been performed regularly. The building is nearly thirty years old. Most of the equipment was replaced in the last year or two.

As identified earlier, all records, billing, and administrative work is performed at the wastewater plant facility because the water utility building is too small to allow the needed function. However, there are no dedicated office or administrative facilities for the Water Utility. The Water Utility uses office space funded by and constructed for the Wastewater Utility. We recommend an additional 500 square-feet of office be constructed on the existing administrative building for storage of water utility records and office space.

All laboratory analysis for the water utility is performed in the laboratory at the wastewater plant. We reviewed the laboratory facilities and believe the facilities and equipment are sufficient for the current water treatment and distribution system.

Ground Water Supply

The Water Utility is served by two ground Water Supply Wells. Both Wells are located on property owned by the Utility. Well 1 is inside the water treatment plant. Well 2 is immediately north of the existing water treatment plant.

- Well 1 is approximately 72 feet in depth with 11 feet of 10-inch diameter screen. The well pump is currently rated at 200 GPM @ 161-ft. Well 1 was constructed in 1963. In 2023 the well's pump, column, and screen were replaced.
- Well 2 is approximately 78 feet in depth with 15 feet of 12-inch screen. This well currently pumps at 250 GPM @ 164 ft. Well 2 was constructed in 1998. In 2023 this well had a pump and column replaced. Well 2 is normally left as the backup pump since it is the larger of the two pumps and larger than the normal system demands.
- A new replacement well can be constructed on property currently owned by the district that is located north of the Water Treatment Plant

Raw Water Quality:

The Raw Water Supply sees very little temperature variations. It does have iron content ranging from 1.0 PPM to 2.0 PPM.

Controls;

The ground Water Supply Wells pump through the Water Treatment Plant and directly into the distribution system. The wells are set to turn on at 55 PSI and off at 72 PSI as measured in the controls of the Water Treatment Plant. On occasion, both well pumps have run simultaneously. When this happens, the pressure in the distribution system can reach 120 psi or more. We are unsure what the asbestos cement distribution pipe is rated for, but the lowest pressure rating for this type of pipe is 100 psi. We are concerned about damage to the distribution system when the pressures exceed 100 psi, therefore, variable frequency drives (VDFs) were installed on the well pumps and for added safety a 6-in. pressure reducing valve (PRV) was installed on the common pipe discharging from the water plant. The PRV is set for a maximum pressure of 80 psi.

Water Treatment Plant

The TCRSD Water Utility owns and operates a ground water, iron & manganese sequestration plant. The Water Treatment Plant, as previously identified, is a simple structure that houses (3) hydro-pneumatic tanks, chlorination and phosphate chemical feed equipment, and associated monitoring and control equipment. The plant also houses a small lab and desk for testing. All billing information, customer data, and related information is currently housed and administered in the TCRSD Sewer Treatment Administration building.

Figure 2.1 - Well No.1 & Hydro-Pneumatic Tanks

Figure 2.2 - Plant Controls & Sample Sink

The current water facility site is somewhat isolated and not easily monitored. Because the current facility is so small and the utility personnel operate from the Sewer Treatment Administration building, there are relevant security concerns. Ten States Standards recognize a basic need for site security, human and vehicular access control, and facility monitoring. Upgrades to the existing fencing and gate and remote monitoring to a receiver at the Sewer Treatment Administration Building have been done.

The Water Treatment Plant has a design capacity of 200 GPM. The facility includes chemical addition of phosphate to sequester iron and manganese, fluoride (currently not added), and on-site hypochlorite solution generation for disinfection. The ground water

supply wells pump through the Water Treatment Plant into three hydro-pneumatic tanks located in the treatment plant building and then into the system. Figure 2.3 presents a view of the piping and the hydro pneumatic tanks within the Water Treatment Plant.

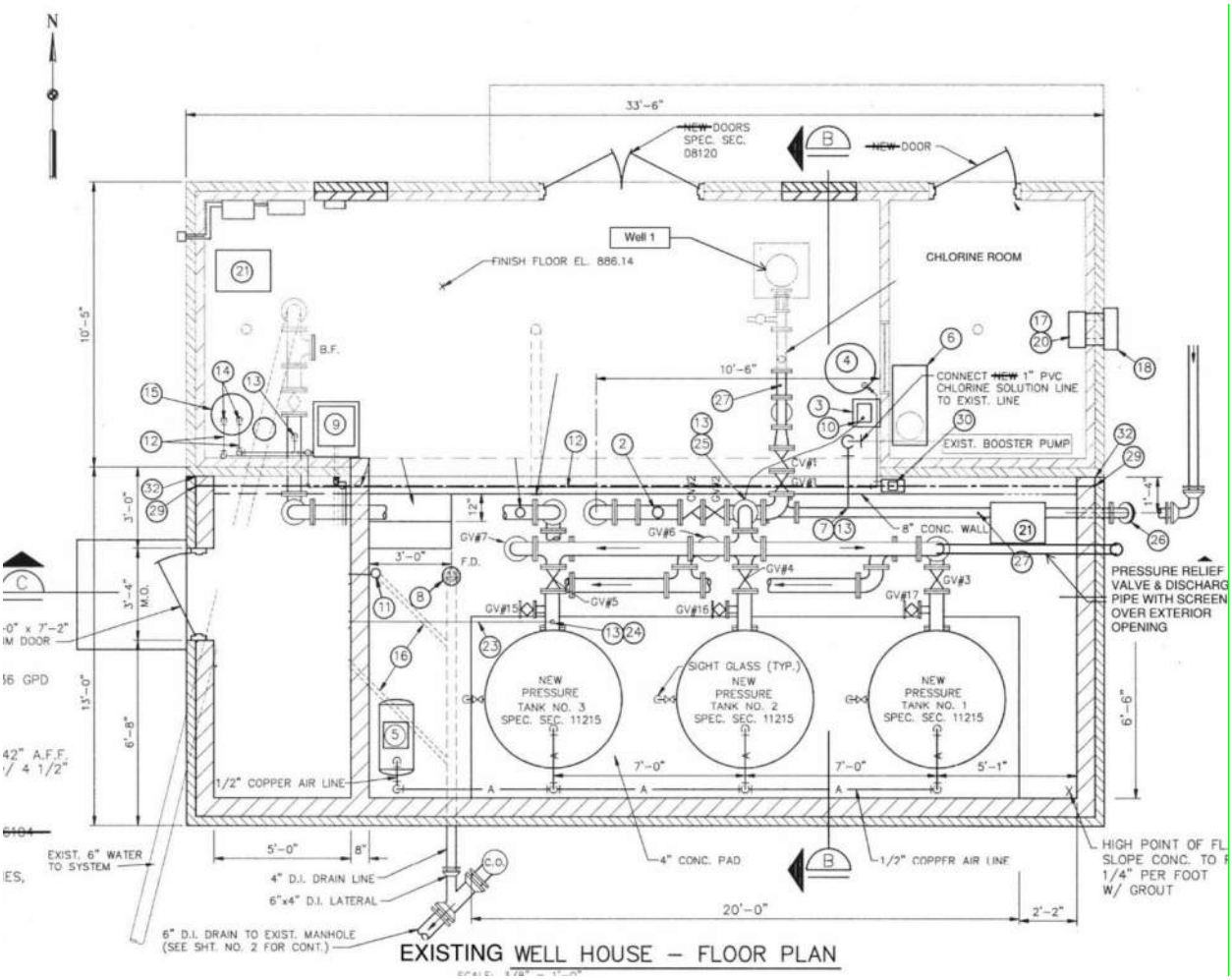

Figure 2.3 – Water Plant Plan View

Chemical Feed Systems.

The Chemical Feed Systems are adequate to meet the demands of the water utility. Iron and manganese are sequestered with a phosphate solution. The finished water has a long retention time within the distribution system, and the age of the water in the distribution system can be up to 72 hours during periods of lower demands, even higher water ages could be experienced at dead end water mains with little or no demands. Higher water age allows chlorine to oxidize the iron and manganese which then drop out of solution and settle in the pipes. The Utility is unable to adequately flush the distribution system, allowing the sequestered contaminants to remain in the pipes. Both iron and manganese are considered secondary contaminants and do not have to be removed, however, IDEM and USEPA both highly recommend iron be removed to levels below 1.0 mg/L. Since the iron

concentrations in the finished water range from 1.0 to 2 ppm, and Ten States Standards states that phosphate sequestration shall not be used when iron concentrations are above 1.0 mg/L, we are recommending that the Water Treatment Plant be modified for iron and manganese removal. Further, phosphate that is added to the drinking water will end up in the wastewater. Over one-third of the phosphorus in the wastewater is due to the addition of phosphate for sequestering iron and manganese at the water plant. The wastewater plant has a discharge limit on phosphorus of 1.0 mg/L, while the average influent concentration of phosphorus to the wastewater plant is ~3.1 mg/L. Phosphorus in the wastewater can lead to algae growth in the receiving streams. The Wastewater Utility adds ferric chloride to remove the phosphorus from the wastewater plant effluent, and the addition of ferric chloride at the wastewater plant reduces the capacity of the wastewater plant by creating more solids and requiring additional final settling, sludge digestion, and farm fields for land application. The proposed removal of iron and manganese with pressure sand filters will eliminate the need to add phosphate for sequestering the iron & manganese. This in turn will reduce the level of phosphorus in the wastewater and improve the performance of the wastewater treatment plant.

Water Storage:

The storage of drinking water for the water utility is provided by three 1,500-gallon hydro-pneumatic tanks. These tanks do not meet current system design standards but are sized correctly based on the capacity of the wells (10 times the rated pumping capacity at 4,500 gallons.) However, Ten States limits the use of hydro-pneumatic tanks to systems serving 150 living units or less; since the system serves 230 living units, ground or elevated storage should be provided. Small distribution systems that utilize hydro-pneumatic tanks are not expected to provide sufficient flows for firefighting purposes. The size and operating range of the hydro-pneumatic tanks results in short cycle times of the well pumps. The higher number of cycles per hour leads to additional wear and tear on the pumps, well screens, tanks, and chemical feed systems.

To better meet demands within the distribution system and to provide sufficient flows for firefighting purposes, the District needs to construct a larger water storage basin. The larger basin can be a clearwell at the water plant site with new high service pumps (with VFD's) or an elevated water tank. If an elevated water tank is constructed, we recommend a 75,000-gallon elevated water tank (actual sizing would be based on projected service area and projected average day demands.) The elevated water tank can be placed within the distribution system or immediately downstream from the Water Treatment Plant. If placed immediately downstream of the water plant the elevated water tank could also serve as a clearwell for further disinfection of the finished water prior to customer use. This option would decrease the system's potential fire flow availability capacity.

Water Use Demands

Jones & Henry installed pressure recording meters at three separate locations within the distribution system and monitored pressures from April 2013 through October 2013. During this period of time, pressures were being recorded every minute. This information was used to calibrate the distribution model and also used to determine cycle times on the ground water supply pumps and to determine the diurnal demand within the system.

The following figure shows the diurnal demand curve that was developed from the pressure recordings.

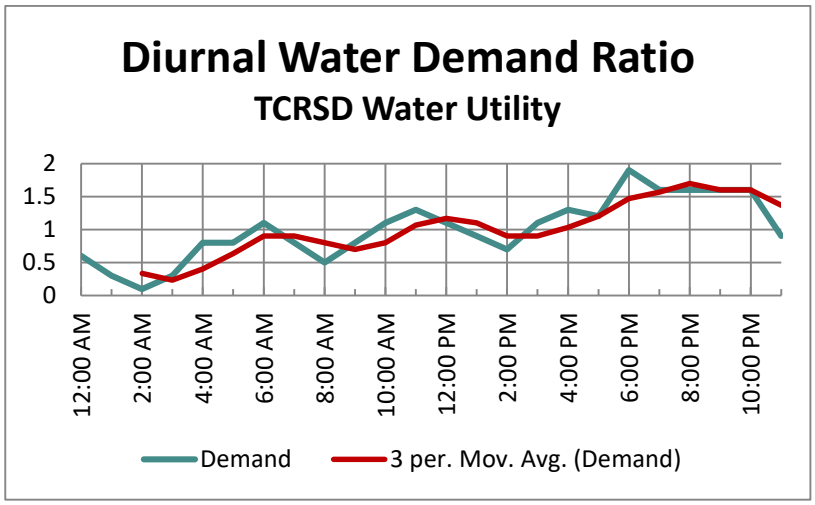

Figure 2.3 – Diurnal Water Demand Ratio

The above information was used in calibrating the model at the time when the model was first developed. The peak hour demands during max day are estimated to be 180 GPM. The system was designed for 200 GPM. The smallest well will provide 200 GPM and the largest well will provide 250 GPM. Therefore, this system is adequately sized to distribute the water to meet demands within the distribution system.

The TCRSD Water Utility currently serves approximately 230 residential customers. The TCRSD Water Utility provided a compilation of records for 2021-2023, as well as the monthly report of operations of the water treatment plant for 2021-2023 for our review.

Table 1
Water Usage

Year	Yearly Total	Daily Averages	Min Day Demands	Monthly Average	Max. Day Demands
2021	13,822,000 gal	37,900 gal	23,000 gal	1,151,833 gal	96,000 gal
2022	14,102,000 gal	42,200 gal	21,000 gal.	1,282,000 gal	87,000 gal
2023	16,077,000 gal	44,000 gal.	29,000 gal.	1,339,750 gal	93,000 gal

Note: Data for January 2022 was not included.

1. Distribution System

The Distribution System has not had any major improvements since its construction in the 1960's. Limited inspection of the distribution system shows the original asbestos-cement pipe to be in generally serviceable condition considering its age and composition. It is generally accepted that asbestos cement does not pose risks to the end user. However, significant concern has been established for workers required to repair or replace AC pipe.

AC pipe has been used extensively throughout the United States with general success. However, studies show that the failure rate for AC pipe increases dramatically with age. After 50 years of use, AC pipe failure rates are about one per year per mile of pipe. The TCRSD water utility distribution system is now approximately 60 years old.

The Distribution System is composed of approximately 22,200 total lineal feet of distribution mains. The distribution mains are comprised of approximately 5,840 feet of 3-inch piping, 5,840 hundred feet of 4-inch piping, 4,350 feet of 6-inch piping and 4,340 feet of 8-inch piping. The system has two fire hydrants and 9 flushing hydrants. The system also has 41 valves of which most are inoperable.

The two additional issues with asbestos cement pipe are corrosion and erosion. Corrosion can be due to soil conditions or from water conveyed within the pipes. Erosion is due to high velocity within the piping system. We had previously taken cores of a wastewater force main composed of asbestos cement pipe that is installed in the same vicinity as the water distribution mains and of similar age. We found that the pipe is in excellent condition with no apparent signs of erosion or corrosion on the interior or exterior. The velocities in the water mains are approximately 25% less than in the force mains cored. Therefore, we have not taken cores of the water distribution system pipes due to the condition of the adjacent force main. The Water Utility has had very few problems with the asbestos cement pipe. Most water main breaks occur in the portion of the distribution system that has cast iron piping. Therefore, we believe the asbestos cement pipe will continue to serve the Water Utility for many years to come.

Over time, sediment deposits can decrease a pipe's internal diameter and cause a drop in flows and capacity throughout the system. These sediment deposits are more common in distribution systems supplied by wells and are of additional concern on cast iron water lines.

Health and Safety Concerns

The primary concerns we were aware of at the beginning of this project are water quality (discoloration) from iron & manganese and inadequate pressures.

1. **Water Discoloration**: The water discoloration issue is due to sequestration of iron and high-water age in the distribution system coupled with chlorination for disinfection. Many customer complaints about poor water quality, iron staining of clothing, taste and odor issues, and a general dissatisfaction with the water quality are on file with the TCRSD, some of which are included in the Appendix of this report.

   Iron and manganese, at lower concentrations, do not cause a health concern, however, they can give water an unpleasant taste, odor, and color. Iron causes reddish-brown stains on laundry, porcelain, dishes, utensils, glassware, sinks, fixtures, and concrete. Manganese causes brownish-

black stains on the same materials. Detergents do not remove these stains. Iron and manganese deposits build up in pipelines, pressure tanks, water heaters, and water softening equipment. These deposits restrict the flow of water and reduce water pressure. More energy is required to pump water through clogged pipes and to heat water if heating rods are coated with mineral deposits. This raises energy and water costs.

2. **Pressure Issues:** The issue with inadequate pressure is primarily due to multiple homes being connected into a common service line. The buildup of iron deposits in the home plumbing may also be a source of low-pressure problems.

   While low pressure issues may not be a direct health and safety concern, it does lead to other potential health and safety issues. Low pressure may result in inadequate operation of plumbing fixtures such as dishwashers, washing machines, toilets, water softeners, etc. The proposed near-term improvements will remove iron from the drinking water and provide adequate pressure up to the residential units.

   Insufficient water pressure due to multiple homes on a single common service can more easily result in a backflow condition. Inadequate services without proper backflow and cross connection protection are a significant hazard. Inadequate backflow protection can create a potentially lethal incident in the distribution system. IDEM has recently updated the Cross Connection and Backflow Prevention Manual 2013 Edition. The roles and responsibilities for Cross Connection Control are clearly defined in the following excerpt from the manual:
   - The water purveyor's responsibility begins at the source of supply and ends at the point of delivery to the consumer's water system. Within those boundaries, the purveyor must provide adequate treatment facilities, public water distribution systems and service piping. In addition, all public water supplies shall be continuously operated and maintained so that water is safe in quality, clean and adequate in quantity, and chemically satisfactory for ordinary domestic consumption.
   - An IDEM summary and excerpts of the 2016 edition Cross Connection & Backflow Prevention Manual are included in the appendix.

Our review of the Water Utility infrastructure revealed other issues that need to be addressed.

3. **Raw Water Supply:** Well no. 1 may not be a reliable backup well due to its age. We suspect Well no.1 is showing signs of screen failure. The design, permitting, and installation of a replacement well can take up to 6 months. The Water Utility would be at great risk operating with only one well coupled with the lack of any significant storage for the 6-months it would take to install a new well. Due to recent rehabilitation of Well no. 1, it is believed that a replacement well won't be needed for another five years.

4. **Distribution System Reliability:** The tie-in of distribution dead end mains (2) will improve water quality slightly in select areas by reducing water age and improving chlorine residual. However, the primary benefit to tying the two dead end mains is to improve reliability. The Water Utility will be able to shut off select areas without shutting down major portions of the distribution system for

repair and maintenance. Additionally, there is currently a single water line that feeds the southern portion of the system. If this line is taken out of service for repairs, the entire southern portion of the system will lose water.

5. **Valves:** The lack of operable valves creates conditions in which the Water Utility must shut off water supply to major sections of the system for repairs and maintenance in the system. This results in boil water orders for days following an event requiring a shut down in the distribution system. The installation of valves will help reduce the extent of distribution system shutdowns. The valves will also improve the utility's ability to better flush the water mains.

6. **Finished Water Storage:** The lack of adequate storage in an elevated water tank or clearwell gives the utility a very narrow window of time if emergency repairs to the wells, treatment plant, or distribution system are needed. The lack of adequate storage limits fire-fighting capabilities, the capacity of the well pumps and the existing undersized water mains. Elevated water storage in the distribution system would allow for the plant to be taken offline for repairs as needed thereby increasing reliability of the water utility. Adequate storage would also allow for the addition of fire hydrants on the 6-inch and larger water mains. The addition of fire hydrants would improve safety by aiding fire protection services in the system.

7. **Asbestos Cement Pipe:** The distribution system is composed of Asbestos Cement pipe. As identified earlier, there is no known hazard to the end user. The TCRSD Water Utility is currently operating under an Asbestos Waiver that is good through December 31, 2019, unless otherwise notified by the IDEM Drinking Water Branch. We have also stated that the asbestos cement pipe should prove for many more years of service however, there is a limited life expectancy to the asbestos cement pipe. Literature indicates the average life expectancy is 70 years and we believe the TCRSD Water Utility can expect a longer life; however, the pipe is now approximately 60 years old.

8. **Fire Flow Availability:** The Districts system is now large enough that fire flow capacity is something the District should provide to is service area. in conjunction with some form of water storage, the District will also need to increase the size of existing water mains. Water mains should be 6- or 8-inch throughout the system. These sized water mains will allow the system to provide sufficient flows throughout the system.

A. System Operations and Maintenance

A review of the distribution system has shown several locations where looping of the existing mains can aid slightly in improved water quality. The looping of the two dead end water mains will primarily allow more effective flushing of the system.

The Operation and Maintenance of the system is hampered by concerns for the asbestos cement pipe and aging infrastructure.

The current conditions of the valves within the distribution system result in an inability to isolate the system. Concerns about breaking the asbestos cement pipes, as has happened in the past, results in an inability to provide proper Operations and Maintenance. The inability to valve-off or isolate service areas is critical to the safe operation and delivery of drinking water. The increased opportunity and need for a boil water advisory or total system loss is amplified by inadequate valve and system control. The distribution system also contains blow-offs and hydrants that need repair or replacement.

The utility personnel responsible for operations and maintenance of the distribution system are subject to all applicable OSHA worker safety regulations.

The Asbestos Cement pipe is reaching an age where historical evidence predicts a significant increase in the frequency of repairs. The need for repair or replacement to a main, valve, hydrant, blow-off valve, or service line could result in hazardous asbestos exposure. Standard operation procedures, as well as training and appropriate equipment for field repairs and maintenance are needed to reduce or eliminate potential hazards. A protocol for O&M of the distribution has been created and reviewed by IDEM. The SOP needs to be periodically updated and proper training provided to TCRSD personnel. Repair of piping and replacement of valves is needed now.

Replacement of existing services with dedicated lines, incorporating backflow prevention and shut offs placed within utility easements is needed for proper O&M.

The water plant and wells are being maintained. The wells are tested annually and cleaned as needed. The hydro-pneumatic tanks are periodically drained to remove sediments. The addition of chemical feed pumps and sand filters to oxidize and remove the iron & manganese will increase the amount of operation and maintenance needed at the water plant. We estimate that routine backwashing of the filters and basic O&M for the plant will require an additional 8 hours of labor per week.

1. Hydraulic Evaluation

A model of the distribution system was developed in EPANET in 2013.This model was imported into WaterCAD, which has additional capabilities, to better model the system. The model was roughly calibrated to account for average day and maximum day demands throughout the system. Field testing and actual water usage data is not available for additional calibration. See Figure 2.4 below for an overview of the modeled system.

The model predicts the distribution system is capable of adequately conveying water throughout the entire service area during maximum day peak hourly demands. The size of the distribution system results in estimated water age on maximum day demands of up to 16 hours at the farthest reach of the distribution system. On lower flow days the water age is up to 72 hours. As previously stated, the higher water age results in oxidizing of the iron and manganese and settling in the distribution system. Appendix X contains an overview of the system's fire flow during maximum day demands and pressure ranges and water age during average day demands.

Due to the water line sizes and the demands in the distribution system results in low velocities throughout the distribution system. This further lends itself towards settling of oxidized Iron and Manganese. The model indicates only several pipes within the distribution system that are at or approaching the recommended 2 feet per second (fps) during peak demands. During normal average day demands the velocities within the distribution are well below 0.5 fps. Increasing water age and further oxidation of the iron and manganese settling within the distribution system.

There are two locations in the northern portion of the distribution system that have extended dead end mains. The dead-end water mains can readily be connected with the installation of approximately 40 feet of pipe at each location. This would then loop the distribution system and improve performance in each local area. We are recommending that additional piping be installed at both of these locations to complete the loops within the distribution system. An alternative to installing autoflushers on the dead ends to improve the water quality along the dead ends and throughout the system.

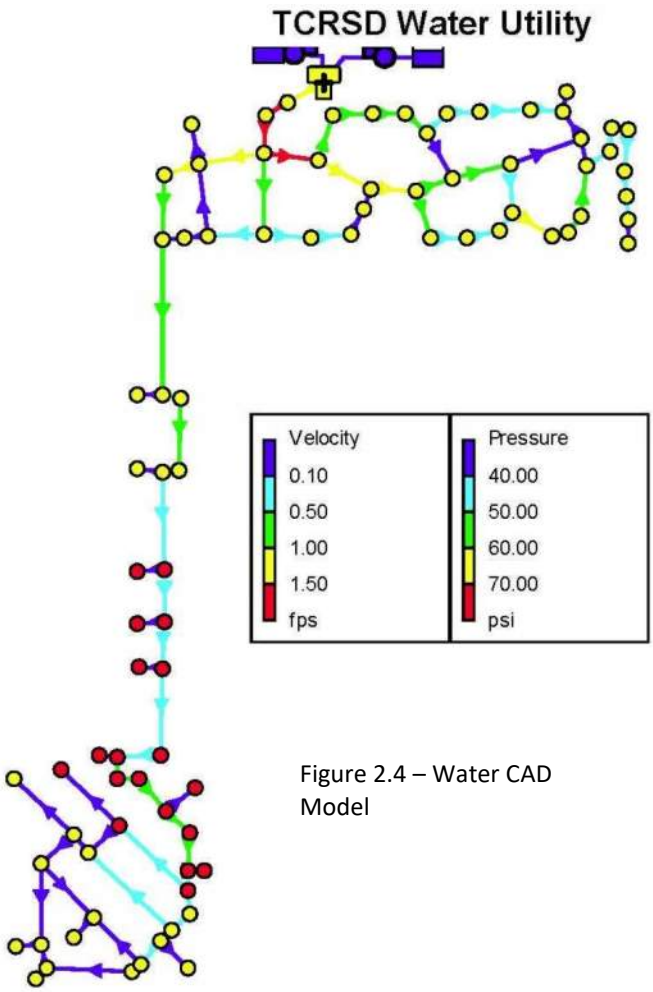

Figure 2.4 – Water CAD Model

The District has two fire hydrants located on 6-inch piping at the southern portion of the distribution system. In general, the southern portion is composed of 4-, 6- and 8-inch water mains. If adequate water storage is provided, additional fire hydrants could be installed on the 6- or 8-inch water mains to meet firefighting demands in the southern portion of the service area. Fire hydrants would not be allowed on the current 3- and 4-inch piping in the northern portion of the distribution system and 6- or 8-inch water mains would be required for this area as well. However, as previously stated, if the District does intend to meet fire demands in the southern portion of the utility's service area an elevated tank or clearwell would be required.

The Water Utility has approximately 41 valves. However, most of these valves are currently inoperable. The Utility is concerned with operating the valves on asbestos cement pipe. The Utility has broken the asbestos cement pipe on multiple occasions by over torquing valves. Therefore, the valves have not been exercised for a number of years. Since most of the valves are inoperable a water main break usually necessitates shutting down water service to a large number of customers. New valves are recommended and necessary for the continued operation of this Utility. We have reviewed the distribution system map and are recommending approximately 62 new valves at 26 different locations.

Iron sequestration and high-water age in the distribution system coupled with chlorination for disinfection results in iron dropping out of suspension in the water mains. Phosphate is added to

sequester the iron and manganese. Chlorine is then added as a disinfectant. Chlorine is an oxidant and over time it will oxidize the iron and manganese and break up the bond that holds the iron and manganese in solution thereby resulting in iron & manganese dropping out of suspension. The high-water age and low velocities allow for the oxidizing and settling of the iron & manganese within the distribution system.

The Water Utility has received a number of complaints from residents concerning discolored water, sand in the water and low pressure. The first two items were previously discussed. The third item (low pressure) is due to multiple homes being served by a single service connection to the water main. The distribution system model shows that the system is adequate for conveying the peak hour maximum day demands with minimal head loss. The water utility is aware that there are multiple homes connected to a single service line at numerous locations within the distribution system. Most service lines do not have shut off valves for isolation or disconnection from the water utility.

Additionally, backflow prevention, and other safety issues need to be addressed to improve both customer safety and satisfaction. TCRSD believes there are numerous places in Fascination Place where supply lines for multiple residences wye into a single service tap on the main line. There are no meters on the service lines or backflow prevention devices. This condition can result in contamination of the drinking water from backflow or back-siphonage of the service line. At the very least, this situation and others result in poor service pressure for the residents. TCRSD also believes, based on experience, that the water service taps in the area are a combination of 3/8, ½, and 5/8-inch services that may not have corps stops at the main.

We are recommending all 160 customers in Fascination Place have their service line replaced from the water main extending to the individual service line, unless only one customer is served off the existing service line. It is an industry standard that all replaced service lines should be replaced and a minimum service line size of 3/4 -inch. All services should have their shutoff valves located in the utility easement or right of way. Simple backflow prevention devices coupled with water meters should also be incorporated into the service line replacements prior to reconnection to customer service.

D. Financial Status

The Turkey Creek Regional Sewer District Sewer Utility has absorbed many of the soft costs of the water utility. The TCRSD Sewer Utility provides office space for personnel, records storage, customer records and data, billing records, and other associated administrative costs. The true monthly and annual expenses to the water utility would be higher if not for the co-op and cost sharing burden carried by the Sewer Utility.

The residential services are charged a flat rate for water consumption. The unmetered system and flat rate billing allow for incidents of abuse and waste of the water resources, resulting in potential

significant additional costs for the water utility. The area currently served by the water utility is economically depressed with a large percentage of residents living below the poverty level. As such, the TCRSD has been reluctant to raise the water rate. Rates have been recently raised, but fiscal responsibility and fair billing highlight the need for metered service. Backflow prevention and dedicated lines are an additional benefit to installing metered service.

Chapter 3 – Evaluation of Alternatives

New Well: We are recommending that the District continue maintaining its existing wells. Well No.1 is approximately 60 years old. Well No. 2 is approximately 26 years old. It is in good condition. Since both wells were refurbished in the last couple of years. We believe the wells to be adequate for the next 5-8 years.

Administration Building Addition: The water utility shares office space, records retention and laboratory space and equipment with the wastewater utility. These facilities were paid for by the wastewater utility customers. Additional space is needed. It is recommended the water utility construct the additional space at a time in the future when the customer base is increased.

Treatment Plant Alternatives: Iron removal is strongly recommended by IDEM and USEPA. Current design standards do not recommend the installation of an iron and manganese sequestration water treatment plant for the TCRSD Water Utility due to the concentration of iron in the raw water. There are two primary feasible alternatives for removal of iron and manganese. In both alternatives the iron and manganese must be oxidized and removed with filters. The two alternatives entail chemical oxidation or induced aeration for oxidation with both alternatives followed by sand filters. The following discusses each alternative.

1. **Chemical Oxidation, with 3 new filter tanks with a building addition**:

Alternative 1, the wells can pump directly through the filters and into the distribution system. The three 5-ft. diameter hydro-pneumatic tanks would be left in place and three 6.5-ft. diameter pressure sand filters installed in a 20-ft. x 15-ft. building addition, Potassium permanganate and chlorine would be added prior to the sand filters. Oxidation is immediate, following thorough mixing.

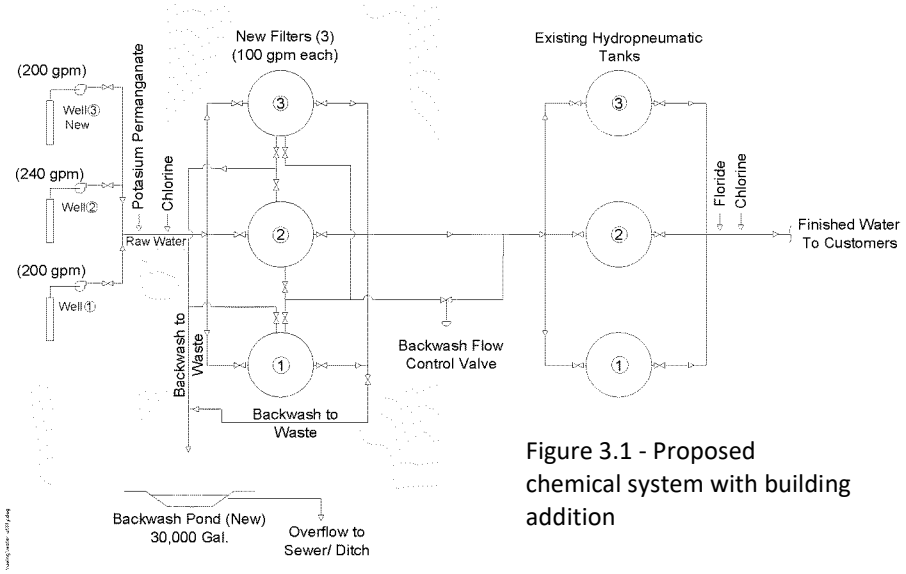

Figure 3.1 - Proposed chemical system with building addition

This Alternative includes 30,000-gallon earthen basin backwash sand filter that would discharge to an overflow to either the sewer system or the adjacent legal drain with an NPDES Permit. District will incur the cost of treating the backwash water at an average volume of ~120,000gal./mo. The additional annual Operation, Maintenance and Replacement (OM&R) Cost for

this alternative is estimated to be $15,000. The annual cost of potassium permanganate for oxidizing the iron and manganese is estimated to be ~$1,000 per year.

2. **Chemical Oxidation, with 1 new filter tank outside**

Alternative 2 is one 8-ft. diameter by 14-ft. long horizontal pressure filter installed in the north outside wall of the existing water plant with head piping inside. Potassium permanganate and chlorine would be added prior to the sand filters. Oxidation is immediate, following thorough mixing.

This Alternative includes 30,000-gallon earthen basin backwash sand filter that would discharge to an overflow to either the sewer system or the adjacent legal drain with an NPDES Permit. District will incur the cost of treating the backwash water at an average volume of ~120,000gal./mo. The additional annual Operation, Maintenance and Replacement (OM&R) Cost for this alternative is estimated to be $15,000. The annual cost of potassium permanganate for oxidizing the iron and manganese is estimated to be ~$1,000 per year.

3. **Induced Aeration for Oxidation**:

In this alternative the wells can pump through the aerator, detention basin and through the sand filters into the clearwell. New high service pumps will be required to pump from the clearwell into the distribution system. The sand filter and clearwell would be constructed outside of the existing plant building so the three hydro-pneumatic tanks can remain. The clearwell would be sized for approximately one hour of detention at peak flow thereby serving as water storage if firefighting capabilities are desired in the distribution system. The following figure shows the schematic for this process.

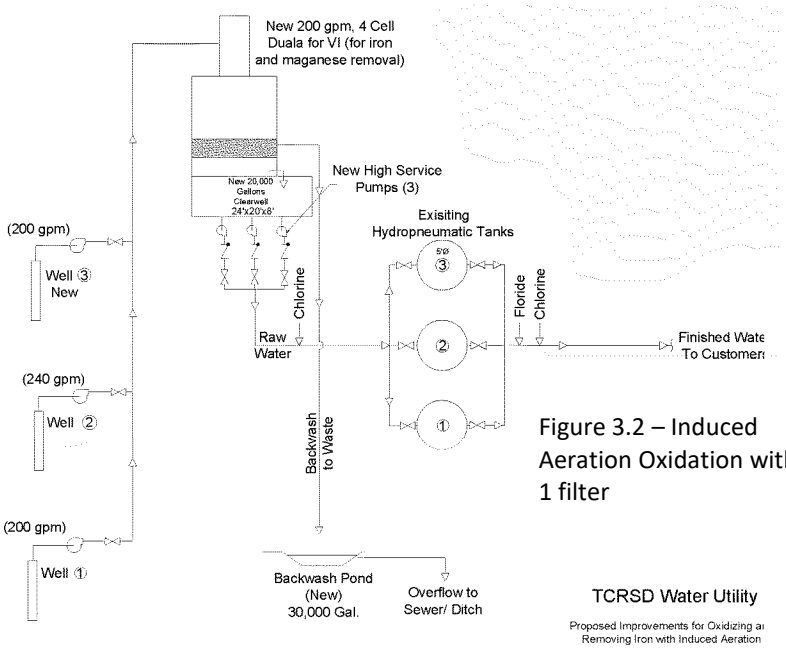

Figure 3.2 – Induced Aeration Oxidation with 1 filter

This alternate will require three new high service pumps at ~15 hp each along with the aerator blower (~5hp). At $0.08/kwhr and average usage the estimated annual power consumption cost is $6,000.

All Alternatives include 30,000-gallon earthen basin backwash sand filter that would discharge to an overflow to either the sewer system or the adjacent legal drain with an NPDES Permit. District will incur the cost of treating the backwash water at an average volume of ~120,000gal./mo. The additional annual Operation, Maintenance and Replacement (OM&R) cost for this is estimated to be $15,000.

Comparison of Water Plant Alternatives

No Action. Doesn't meet current standards.

Alternative 1 – Chemical treatment with Building Expansion

The wells can pump directly through the filters and into the distribution system. The three 5-ft. diameter hydro-pneumatic tanks would be left in place and three 6.5-ft. diameter pressure sand filters installed in a 20-ft. x 15-ft. building addition.

The cost for this alternative with clearwell and backwash basin is: $2,202,000.

Alternative 2 – Chemical treatment outside tank

The wells can pump into one 8-ft. diameter by 14-ft. long horizontal pressure filter installed in the north outside wall of the existing water plant with head piping inside.

The cost for this alternative with clearwell and backwash basin is: $2,120,000.

Alternative 3 – **Induced Aeration for Oxidation**

In this alternative the wells can pump through the aerator, detention basin and through the sand filters into the clearwell. New high service pumps will be required to pump from the clearwell into the distribution system. The sand filter and clearwell would be constructed outside of the existing plant building so the three hydro-pneumatic tanks can remain.

The cost for this alternative with clearwell and backwash basin is: $2,694,000.

Estimates with present worth costs are included in Appendix A.

Distribution System Improvements

As a tool for reviewing, studying, and recommending alternatives, we first developed a computer model of the distribution system in EPANET and imported it into WaterCAD. The computer model is used to simulate normal daily demands, maximum day demands and fire flows in the distribution system. Typically, per Ten State Standards, water distribution systems are normally developed using only 6-inch and larger water mains. However, due the period and design of the system at the time, a larger number of undersized 3- and 4-inch water mains were installed in the system before Turkey Creek took ownership of the system. The model was used to determine the hydraulic constraints within the existing distribution system, and to evaluate the improvements to reduce or eliminate the hydraulic constraints. The model was also used to review and determine water main sizing for future growth based on future demands, storage needs, and plant capacities.

In addition to record drawings, the model was developed utilizing operator knowledge of the condition and operation of the system. Because of the size and economic background of the District water customers, along with the challenges associated with the quality and layout of the system they were required to take over and operate, there are economic issues with the development and improvements of the existing system. The District is efficient and conscientious but has very limited resources at their

disposal. Our goal was to identify, quantify, and prioritize their needs to help them better serve their community.

To simulate worst case situations, we modeled the diurnal conditions (usage patterns) during situations of maximum day demands in the distribution system. Fire flows were also modeled even though the smaller pipe sizes and inadequate storage prevent regulatory approval. Fire flows were modeled with the simultaneous operation of two supply wells. The existing distribution system is capable of supplying fire flows of approximately 460 gpm in the southern area where 6-in. and larger water mains are present. As previously stated, additional storage, and increased water main sizing will be required if firefighting capabilities are desired. Additional storage can be met with an elevated tank or a clearwell. The two alternatives discussed for iron removal utilize both alternatives for additional storage.

1. **Dead End mains:** The system model was used to determine velocities and water age in the distribution system. There are two locations where the 3-in. water mains can readily be connected to loop the water mains. The model did not show significant benefit of connecting the water mains. The velocities and water age improved slightly in select areas. However, the primary benefit of connecting the water mains at both locations is to improve system O&M capabilities. Connecting the water mains at both locations would allow portions of the distribution system to be isolated without stopping service to other select areas. This potential is a benefit to both the Utility and the customers, so we are therefore recommending connection of mains at both locations. The alternative to looping these two mains is to not loop the water mains and we do not believe this is a viable alternative.

2. **Fire hydrants:** When a system is designed to provide firefighting capabilities, regulations require fire hydrants at a spacing of 350 ft. to 600 ft. If the District is interested in providing firefighting capabilities in the southern portion of the service area, 17 fire hydrants would be required. This alternative can only be provided if the water storage is increased by the construction of a clearwell at the water plant or an elevated water tank added to the system.

3. **Valves:** The installation of 62 valves at 26 different locations is recommended. The only alternative is fewer valves or not installing valves. Not installing the valves is not considered an alternative since repair work performed in the distribution system would require a major or complete shutdown of the system.

4. **Service Connections:** The District is aware that multiple homes are connected to the water mains through one service connection. Furthermore, the water services are not metered. Multiple residents have complained of low pressure. The model shows that low pressure is not the result of the distribution system but is most likely the result of multiple homes tapped off a single undersized service connection, see Figure below. This situation is predominated in the

Fascination Place portion of the service area and entails an estimated 168 users. The only alternative to replacing the service connection is to increase the pressure in the distribution system. The distribution system is currently set to provide 55 psi to 72 psi pressure. The asbestos cement pipe is most likely rated at 100 psi. A higher pressure would increase the extent of water main breaks and leaks in the system thus requiring more O&M costs. Therefore, we are recommending the service connections be replaced at all locations in Fascination Place suspected of sharing a common service line (~165 users).

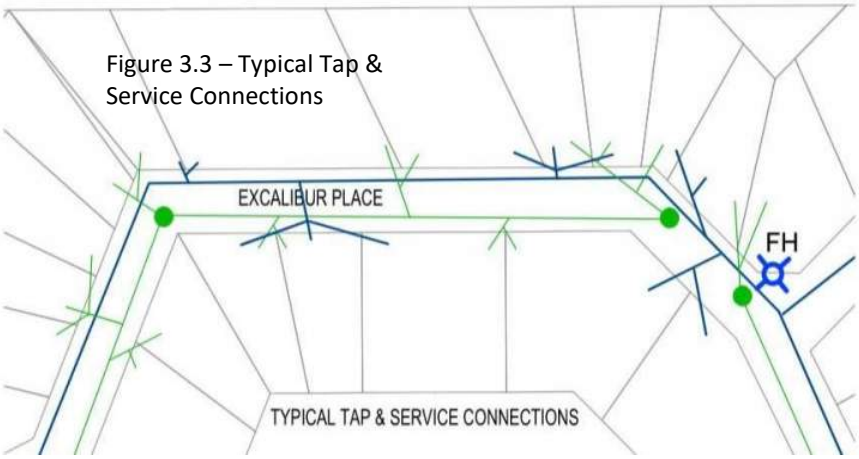

Figure 3.3 – Typical Tap & Service Connections

We believe the installation of meters with backflow prevention devises on the water service lines to each home will reduce water consumption and wastewater discharge. The northern portion of the water service area is predominately manufactured homes. Common practice is to trickle water out of the faucets to prevent freezing. Trickling water at ¼ gpm will result in an additional water consumption of 11,000 gal./month which is almost twice the average usage. In all locations where we know water meters were installed, water consumption has been greatly reduced. We believe there is a benefit to both the water utility and the wastewater utility to install water meters and therefore they are recommended.

Alternative 1 – No Action does not meet current standards.

Alternative 2 – Replace all watermains and service line in the entire system.

The cost for this alternative is: $6,580,000.

The detailed cost estimate for each item is included in the Appendix of this report.

Chapter 4 - Proposed Projects

As identified in earlier sections of this report, the TCRSD Water Works is in a unique geographic and demographic location. Historic growth data and future trends would point to a small and steady growth rate as seen in surrounding townships and counties.

It must be taken into consideration that the micro-communities of Fascination Place and Enchanted Hills are only about 20% built-out. Historically the service areas' growth has been somewhat stagnant, but the potential for easy, and significant growth exists.

Raw Water Supply:

At this time, the two wells are considered adequate for the Utility, so no improvements will be made.

Water Plant Improvements:

The water treatment plant has a design capacity of 200 gpm. The new improvements will include one horizontal pressure dual media filter with 3 individual cells. Each cell is capable of independent operation. Any two cells will provide the design capacity of 200 gpm. Oxidation of the iron & manganese will be provided by chemical addition. Two new chemical feed pumps will be provided with feed lines and a static mixer upstream of the new filter. Two new flow meters will be installed, one on the discharge from the new well and one on the plant discharge. A new pressure reducing valve will be installed on the plant discharge to limit the pressure in the distribution system. A preliminary layout of the improvements is shown on the adjacent figure.

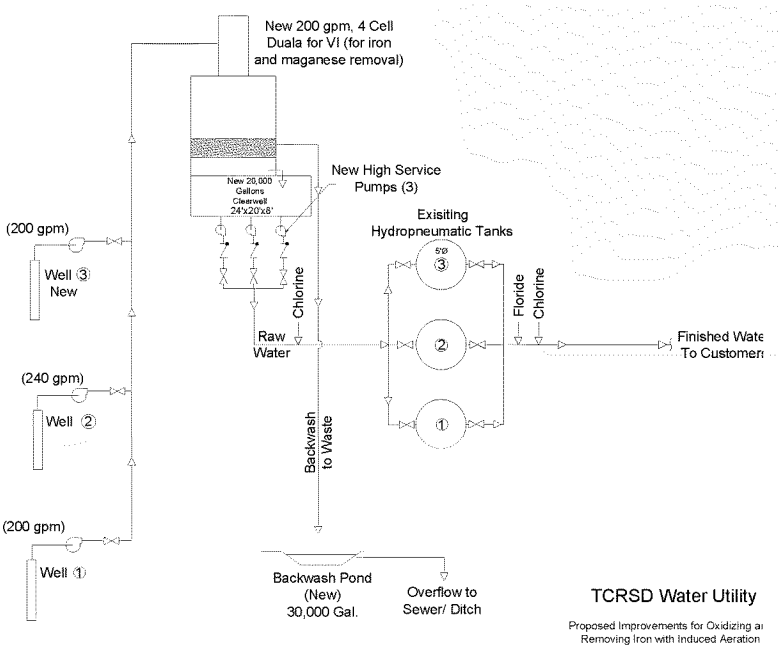

Figure 4.1 – Proposed Aeration Project

The District has options when it comes to improvements to the plant and system treatment.

The actual size of the wet well and submersible pump should be confirmed with a final design based on projected demands, field conditions and other proposed changes in the system.

The Cost of this improvements is $2,694,000.

Distribution Improvements.

The District has options when it comes to improvements to the distribution system. 6-inch and/or 8-inch water mains throughout the system are recommended, See Figure 4.X. This will allow the District to reliably provide fire flow throughout the entire system. The biggest challenge associated with 6-inch, or 8-inch water mains will be increased water age. With increased water main sizes and consistent water usage, the water age will increase, and water quality will decrease. These effects can be offset by flushing throughout the system, this can be accomplished with manual flushing or automatic flushing devices.

To provide additional fire flow capacity there are a couple of options, the District could utilize. Either the addition of a clearwell with additional high service pump or the construction of an elevated tank would increase system capacity.

The actual size of the wet well and submersible pump should be confirmed with a final design based on projected demands, field conditions and other proposed changes in the system.

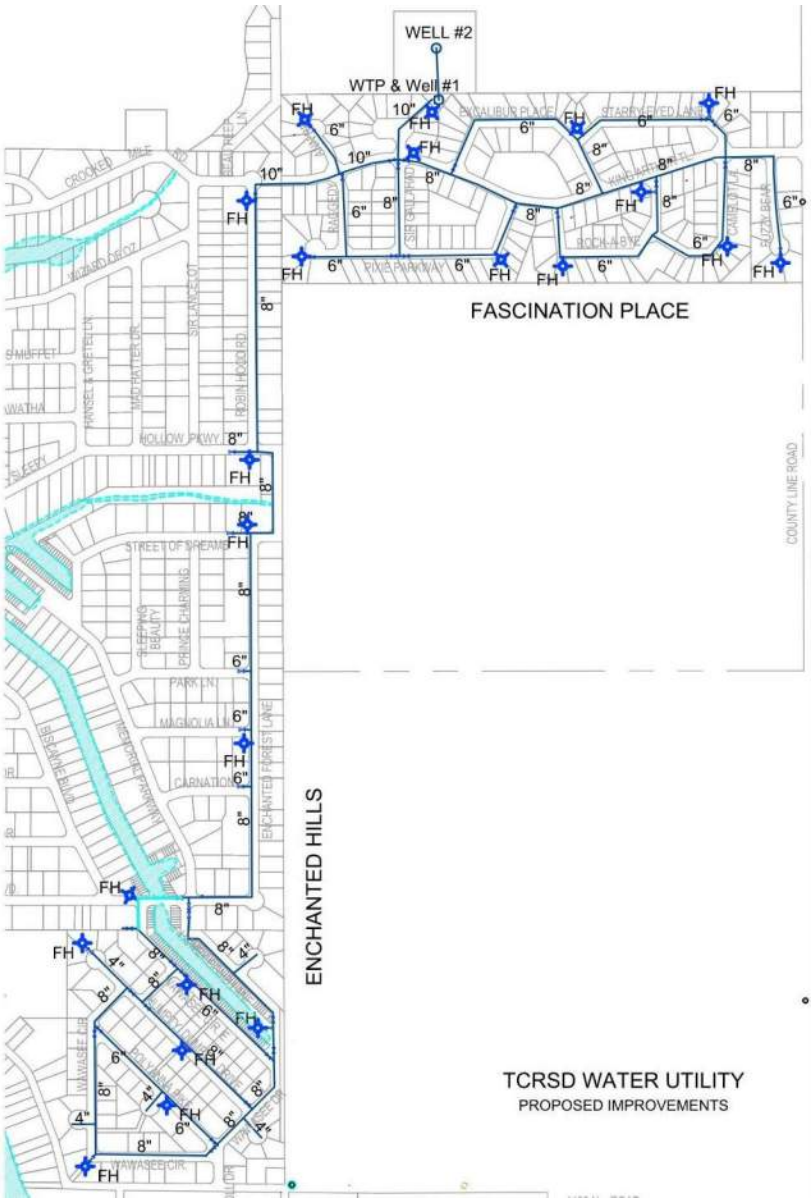

Figure 4.2 – Proposed Watermain Project

The Cost of this improvement for complete replacement of the distribution system is $6,464,000.

Water Tower

An elevated tank would aid in balancing pressure in the mains during normal operation and power failures, minimize pump start and stops, and provide fire protection. Modeled results indicate that an elevated tank in the Enchanted Hills area and properly sized water mains could significantly increase fire flow availability throughout the system.

The Cost of this improvement for the 75.000-gallon water tower is $1,927,000.

Chapter 5 - Evaluation of Environmental Impacts

5.1 Disturbed & Undisturbed Land

All work proposed in this report will be on previously disturbed ground, see Appendix 5, Figure 5.1 Soil Map

5.2. Historic /Architectural Resources

The project will not impact any known historical or architectural resources, see Appendix 5, Figure 5a & b. Interim Report Map and Report. All care will be taken to identify the marker and to protect it. This project will be no closer than 20 feet to the marker.

5.3. Wetlands

No wetlands will be impacted by this project. Any necessary dewater or construction run-off would need to be controlled and filtered during construction and stormwater BMP solutions, see Appendix 5, Figure 5.3 Firm Map

5.4 Surface Waters

No waterway crossings are associated with this project. The project does not impact Outstanding State Resource Waters. Lake Wawasee & Papakeechie Lake are not considered Waters of High Quality, an Exceptional Use Lake, or a Natural Scenic and Recreational water body, see Appendix 5, Figure 5.4 Water and Stream Map

5.5 Groundwater

There should be only temporary impacts on groundwater. Dewatering may be needed for installing the sewer mains and laterals. Any dewatering would be short term, no more than 6-10 feet in depth and limited to the area of pipe installation. No wells should be affected.
There is no sole source aquifer in Region V that is impacted by this project.

5.6 Floodplain

The loan applicant is aware of the hazards of locating structures in area subject to the base flood. The project will not impact floodplains in the area, see Appendix 5, Figure 5.6 Firm Map.

5.7 Plants & Animals

The project has no known negative impact on federally or state listed endangered and non-endangered plant and animal species and their habitats.

No tree removal is expected during this project so potential species or habitat disturbance would be near zero.

The project will be implemented to minimize impact to non-endangered species and their habitat as well. Mitigation Measures that may be cited in comment letters from the Indiana Department of Natural Resources and the US Fish & Wildlife Services should be Implemented.

5.8. Prime Farmland Impacts & Influence of Local Geology

The project will have no impact on Prime Farmlands or local geology.

5.9. Air Quality

There is no direct or long-term impact to air quality. Any issues that could arise from construction equipment can be addressed with ICE mufflers and silencers as a requirement to mitigate impacts. The vacuum sewer alternative would have air emission that the other alternatives do not have. If selected, the vacuum sewer pump station would have odor control equipment installed.

5.10. Open Space & Recreational Opportunities

The project will neither create nor destroy open space and recreational opportunities.

5.11. Lake Michigan Coastal Management

The project is located in the Great Lakes Water Shed, however, it is not located in the Lake Michigan Coastal Zone. The proposed projects will not negatively impact the Lake Michigan Coastal Zone.

5.12. National Natural Landmarks Impact

The construction and operation of the proposed projects will not affect national natural landmarks.

5.13. Secondary Impacts

Growth and future development is a potential negative secondary impact from the proposed project. Growth and development can impact our natural resources and environment. To reduce the negative impacts of growth and development the TCRSD will implement the following:

> *The TCRSD, through the authority of its Trustees, intends to ensure that future collection system or treatment works projects connecting to SRF-funded facilities will not adversely affect wetlands, wooded areas, steep slopes, archaeological/historical/structural resources or other sensitive environmental resources. The TCRSD intends to require new treatment works projects to be constructed within the guidelines of the U.S. Fish and Wildlife Service, IDNR, IDEM, and other environmental review authorities."*

5.14. Mitigation Measures

In order to maintain compliance with all applicable laws regarding contamination and/or proper waste disposal, the TCRSD agrees that:

- If a project site is found to contain any areas used to dispose of solid or hazardous waste. The Office of Land Quality (OLQ) will be contacted at 317-308-3103.
- All solid wastes generated by the project, or removed from the project site, will be taken to a properly permitted solid waste processing or disposal facility.
- If any contaminated soils are discovered during this project, they may be subject to disposal as hazardous waste. The OLQ will be contacted at 317-308-3103.
- If PCB's are found on the project site, the Industrial Waste Section of OWQ will be contacted at 317-308-3103 for information regarding management of any PCB wastes.
- If there are any asbestos disposal issues related to this project, the Industrial Waste Section of OLQ will be contacted at 317-308-3103 for information regarding the management of asbestos waste.
- If the project involves installation or removal of an underground storage tank, or involves contamination from an underground storage tank, the IDEM Underground Storage Tank program will be contacted at 317-308-3039.
- Access for emergency vehicles must be always provided.
- If during the course of construction, evidence of deposits of historical and/or archaeological interest are found, the operator will cease operations and notify the TCRSD. The District will then notify the Indiana DNR. No further disturbance of the deposits will occur until an official from ISHPO has surveyed the find, made a determination of the value of the find and effect of continued construction disturbances, and submitted the results of the determination to the District.
- Any site preparation that will involve earth moving (such as clearing and grubbing) will not begin more than two weeks in advance of the start of excavation. The purpose of this restriction is to prevent the existence of large areas of exposed soil for an extended period of time when construction is not proceeding.
- All motorized construction equipment will be equipped with proper emission control equipment, mufflers, and intake silencers, as appropriate to minimize noise pollution.
- All construction will take place during normal weekdays, daylight working hours, and not on weekends or holidays, unless necessary to resolve an emergency situation.
- Only water or calcium chloride will be used as dust palliative.
- Stockpiled topsoil and fill material shall be protected with erosion control barriers or temporary seeding.
- No fill, topsoil, or heavy equipment shall be stored within 200 feet of a stream bank or within the drip-line of a treed area.
- If, due to weather, final grading cannot be accomplished immediately, mulching and temporary seeding, if feasible, or some type of temporary erosion control measures, must be used within 30 days until long-term restoration can occur.
  Excess soil that is stockpiled must be either removed or regraded within 15 days of the completion of construction.

Chapter 6 – Public Participation and Legal, Financial, Managerial Capability

The following forms will be submitted after appropriate signatures are obtained.

- Resolution for Authorized Representative
- PER Acceptance

The Turkey Creek Regional Sewer District is currently developing and implementing a Fiscal Sustainability Plan (FSP). The Self Certification form for the FSP will be provided after the plans are implemented and appropriate signatures are obtained.

Chapter 7 - Public Participation

To be provided at a later date:

- Publishers Affidavit
- Notification to Contract Customers
- Public Meeting Sign In Sheet
- Public Meeting Minutes
- All Written Comments Received
- Mailing Labels for all Interested Parties
- County Drainage Board comments
- County Health Department comments
- Local Media coverage

Jones & Henry
Engineers

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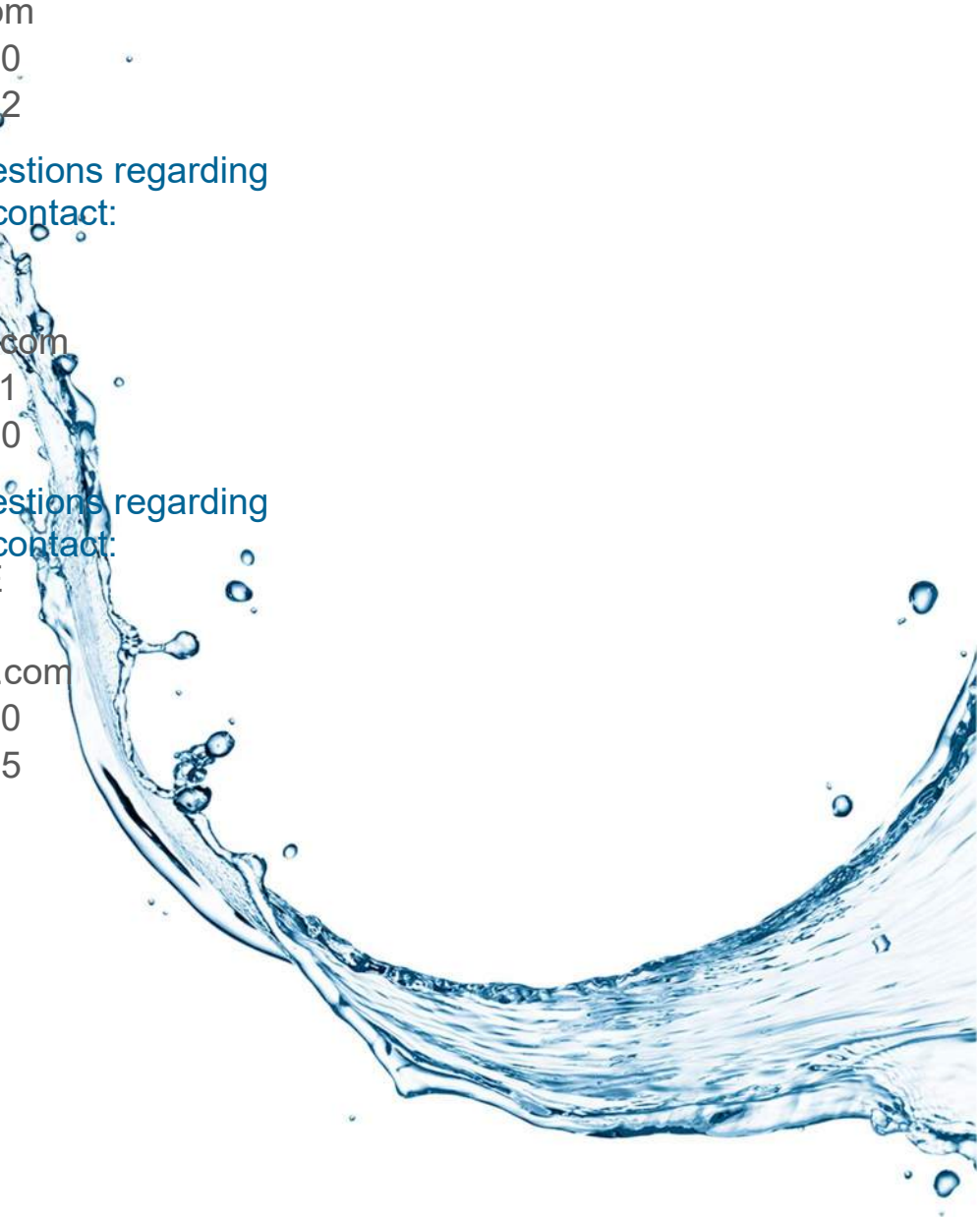

Jones & Henry
ENGINEERS, LTD.

APPENDIX A

ALTERNATE COSTS

Engineers Opinion of Probable Construction Cost - Conceptual					
Project	Water Proposed Well			Date: 25-Mar-24	
Location	TCRSD			Estimator:	
Item	**Item Description**	**Unit**	**Qty**	**Unit Cost**	**Cost**
2	12-in. casing	65	lf	$150	$9,750
3	12-in. st. stl. Screen	20	lf	$300	$6,000
4	Well drilling	80	lf	$150	$12,000
5	Well Development	1	ls	$15,000	$15,000
6	Step Test & Constant Pump Test	27	hrs	$300	$8,100
7	Alignment Test	1	ls	$1,000	$1,000
8	Water Quality Analysis	1	ls	$3,000	$3,000
9	Well Pump	1	ls	$40,000	$40,000
10	6-in. DIP Raw Water Piping	1000	lf	$65	$65,000
14	Electrical	1	ls	$20,000	$20,000
5	Mobilization, Bonding, Insurance & General Requirements (20%)				$35,970
				Subtotal Construction =	$216,000
				Admin and Legal =	$11,000
				Property Acquisition =	$40,000
				Engineering Design =	$26,000
				Engineering Construction Services =	$10,000
				Resident Project Representative =	$64,000
				Contingencies (10%) =	$32,000
				Total Estimated Capital Costs =	$399,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project Water Proposed Well — Date: 25-Mar-24

Location TCRSD — Estimator:

n=20 yr., i=4.0%, Planning Period 20 yrs.,

Item		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
1	Equipment	$ 60,000	15	$ (20,000)		$ 79,217
2	Stuctures	$ 15,750	30	$ 5,250		$ 10,706
3	Piping	$ 65,000	50	$ 39,000		$ 27,528
4	Non Construction Costs	$ 39,100	20	$ -		$ 39,100
					Total Present Worth	$ 156,550

Engineers Opinion of Probable Construction Cost - Conceptual					
Project	Water Plant Alternative 1			Date: 11-Mar-24	
Location	TCRSD			Estimator:	
Item	**Item Description**	**Unit**	**Qty**	**Unit Cost**	**Cost**
1	Chemical Oxidation; three filters	1	LS	$900,000	$900,000
2	Backwash Basin & Discharge	1	LS	$250,000	$250,000
3	Backup Generator	1	LS	$120,000	$120,000
4	Seed & Mulch	1	LS	$8,000	$8,000
5	Mobilization, Bonding, Insurance & General Requirements (20%)				$255,600
				Subtotal Construction =	$1,534,000
				Admin and Legal =	$77,000
				Property Acquisition =	$20,000
				Engineering Design =	$184,000
				Engineering Construction Services =	$77,000
				Resident Project Representative =	$80,000
				Contingencies (10%) =	$230,000
				Total Estimated Capital Costs =	$2,202,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project: Water Plant Alternative 1 | Date: 22-Mar-24

Location: TCRSD | Estimator:

n=20 yr., i=4.0%, Planning Period 20 yrs.,

Item		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
1	Equipment	$ 900,000	15	$ (300,000)		$ 1,188,248
2	Stuctures	$ 250,000	30	$ 83,333		$ 169,931
3	Piping	$ -	50	$ -		$ -
4	Non Construction Costs	$ 668,000	20	$ -		$ 668,000
					Total Present Worth	$ 2,026,179

Engineers Opinion of Probable Construction Cost - Conceptual					
Project	Water Plant Alternative 2			Date: 11-Mar-24	
Location	TCRSD			Estimator:	
Item	**Item Description**	**Unit**	**Qty**	**Unit Cost**	**Cost**
1	Chemical Oxidation; one horizontal pressure filter	1	LS	$850,000	$850,000
2	Backwash Basin & Discharge	1	LS	$250,000	$250,000
3	Backup Generator	1	LS	$120,000	$120,000
4	Seed & Mulch	1	LS	$8,000	$8,000
5	Mobilization, Bonding, Insurance & General Requirements (20%)				$245,600
				Subtotal Construction =	$1,474,000
				Admin and Legal =	$74,000
				Property Acquisition =	$20,000
				Engineering Design =	$177,000
				Engineering Construction Services =	$74,000
				Resident Project Representative =	$80,000
				Contingencies (10%) =	$221,000
				Total Estimated Capital Costs =	$2,120,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project: Water Plant Alternative 2 | Date: 29-Feb-24

Location: TCRSD | Estimator:

1 n=20 yr., i=4.0%, Planning Period 20 yrs.,

Item		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
1	Equipment	$ 850,000	15	$ (283,333)		$ 1,122,235
2	Stuctures	$ 250,000	30	$ 83,333		$ 169,931
3	Piping	$ -	50	$ -		$ -
4	Non Construction Costs	$ 646,000	20	$ -		$ 646,000
					Total Present Worth	$ 1,938,166

Engineers Opinion of Probable Construction Cost - Conceptual					
Project	Water Plant Alternative 3			Date: 20-Mar-24	
Location	TCRSD			Estimator:	
Item	**Item Description**	**Unit**	**Qty**	**Unit Cost**	**Cost**
1	Induced Aeration for Oxidation	1	LS	$1,200,000	$1,200,000
2	Backwash Basin & Discharge	1	LS	$250,000	$250,000
3	Backup Generator	1	LS	$120,000	$120,000
4	Seed & Mulch	1	LS	$8,000	$8,000
5	Mobilization, Bonding, Insurance & General Requirements (20%)				$315,600
				Subtotal Construction =	$1,894,000
				Admin and Legal =	$95,000
				Property Acquisition =	$20,000
				Engineering Design =	$227,000
				Engineering Construction Services =	$94,000
				Resident Project Representative =	$80,000
				Contingencies (15%) =	$284,000
				Total Estimated Capital Costs =	$2,694,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project: Water Plant Alternative 3 | Date: 22-Mar-24

Location: TCRSD | Estimator:

n=20 yr., i=4.0%, Planning Period 20 yrs.,

Item		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
1	Equipment	$ 1,200,000	15	$ (400,000)		$ 1,584,331
2	Stuctures	$ 250,000	30	$ 83,333		$ 169,931
3	Piping	$ -	50	$ -		$ -
4	Non Construction Costs	$ 800,000	20	$ -		$ 800,000
					Total Present Worth	$ 2,554,262

Engineers Opinion of Probable Construction Cost - Conceptual

Project	Water PER	Date:	22-Mar-24
Location	Watermain Replacement	Estimator:	JPM

Item	Item Description	Unit	Qty	Unit Cost	Cost
1	Audio-Video Recording	1	ls	$2,500	$2,500
2	Survey & Staking	1	ls	$2,500	$2,500
3	Stormwater Pollution Prevention	1	ls	$2,000	$2,000
4	Maintenance of Traffic	1	ls	$5,000	$5,000
5	Tap Connection	180	ea	$1,500	$270,000
6	6" sewer lateral	5,400	lf	$40	$216,000
7	Water Service tap	230	ea	$1,000	$230,000
8	5/8 " Service	11,500	lt	$11	$126,500
9	4" PVE watermain	750	ea	$50	$37,500
10	6" PVC watermain	7,381	lf	$65	$479,765
11	8" PVC watermain	11,525	lf	$75	$864,381
12	10: PVC watermain	822	lf	$85	$69,870
13	4" Gate Valve	4	ea	$4,500	$18,000
14	6" Gate Valve	20	ea	$5,000	$100,000
15	8" Gate Valve	24	ea	$5,500	$132,000
16	10" Gate Valve	2	ea	$8,000	$16,000
17	Meter Pit	230	ea	$4,000	$920,000
18	Hydrants	25	ea	$12,000	$300,000
19	Special Backfill	400	cy	$60	$24,000
20	#8 Aggregate Base	250	sy	$60	$15,000
21	Gravel	500	sy	$40	$20,000
22	3" Base Course	15	ton	$300	$4,500
23	1.5" Wearing Course	8	ton	$330	$2,640
24	Seed & Mulch	10,000	sy	$3	$30,000
25	Record Documents	1	ls	$5,000	$5,000
26	Mobilization, Bonding, Insurance & General Requirements (20%)				$778,631

Subtotal Construction =	$4,672,000
Admin and Legal =	$233,000
Property Acquisition =	$60,000
Engineering Design =	$561,000
Engineering Construction Services =	$234,000
Resident Project Representative =	$120,000
Contingencies (10%) =	$700,000
Total Estimated Capital Costs =	$6,580,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project: Watermain Replacement
Location: TCRSD
Date: 22-Mar-24
Estimator: JPM

n=20 yr., i=4.0%, Planning Period 20 yrs.,

Item		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
1	Equipment meters	$ 920,000	15	$ (306,667)		$ 1,214,654
2	Stuctures, valve & hydrants	$ 566,000	30	$ 188,667		$ 384,724
3	Piping	$ 1,451,516	50	$ 870,910		$ 614,722
4	Non Construction Costs	$ 1,734,271	20	$ -		$ 1,734,271
					Total Present Worth	$ 3,948,371

Engineers Opinion of Probable Construction Cost - Conceptual					
Project	Water PER			Date: 20-Mar-24	
Location	75,000-gallon Water Tower			Estimator: JPM	
Item	**Item Description**	**Unit**	**Qty**	**Unit Cost**	**Cost**
1	Foundation	1	LS	$268,500	$268,500
2	Steel	1	LS	$85,000	$85,000
3	Shop Fabrication	1	LS	$267,750	$267,750
4	Shop Blast / Prime	1	LS	$30,000	$30,000
5	Steel Delivery	1	LS	$25,000	$25,000
6	Tank Erection	1	LS	$157,850	$157,850
7	Painting	1	LS	$110,000	$110,000
8	Electrical	1	LS	$94,800	$94,800
9	Electrical Service Allowance	1	LS	$10,000	$10,000
10	SCADTA	1	LS	$15,000	$15,000
11	Cathodic Protection	1	LS	$15,000	$15,000
12	Fencing	1	LS	$12,000	$12,000
13	Final Sitework	1	LS	$8,000	$8,000
15	Mobilization, Bonding, Insurance & General Requirements (20%)				$219,780
				Subtotal Construction =	$1,320,000
				Admin and Legal =	$66,000
				Property Acquisition =	$20,000
				Engineering Design =	$158,000
				Engineering Construction Services =	$66,000
				Resident Project Representative =	$99,000
				Contingencies (15%) =	$198,000
				Total Estimated Capital Costs =	$1,927,000

Engineers Opinion of Probable Construction Cost - Conceptual

Project	75,000-gallon Water Tower	Date:	20-Mar-24
Location	TCRSD	Estimator:	

n=20 yr., i=4.0%, Planning Period 20 yrs.,

1		Capital Cost	Life Exp.	Salvage Value in 20 Years	Annual Cost	20 year Present Worth
2	Equipment	$ 134,800	15	$ (44,933)		$ 177,973
3	Stuctures	$ 779,100	40	$ 389,550		$ 404,810
4	Non Construction Costs	$ 607,000	20	$ -		$ 607,000
					Total Present Worth	$ 1,189,783

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APPENDIX B

SUMMARY COSTS

Project Selection Matrix					
Turkey Creek Regional Sewer District Water System					
	Well	**Plant**	**Distrubution System**	**Storage**	**Totals**
New Well	**$0**				
Plant Chemical w/ Buiding Addation		$2,202,000			
Plant Chemical w/o Buiding Addation		$2,120,000			
Plant Aeration		**$2,694,000**			
Replacement mains, hydrants, valves, services			**$6,580,000**		
75,000-gal Tower				**$1,927,000**	
Selected Project	**$0**	**$2,694,000**	**$6,580,000**	**$1,927,000**	**$11,201,000**

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APPENDIX C

FLOW DATA

Monthly Water Data Pper MROs

	Total Gal	Avg Daily	Min Day	Max Day	Yr Total	Yr AVG	Mo AVG		L
Dec-23	1,343,000	43,300	38,000	50,000				5/1/2022	105.9924
Nov-23	1,573,000	52,000	38,000	56,000					105992.4
Oct-23	1,324,000	42,000	38,000	88,000					
Sep-23	1,387,000	46,000	38,000	93,000					
Aug-23	1,325,000	42,000	36,000	68,000					
Jul-23	1,345,000	43,000	37,000	56,000					
Jun-23	1,918,000	63,000	36,000	74,000					
May-23	1,345,000	43,000	33,000	55,000					
Apr-23	1,056,000	35,200	29,000	55,000					
Mar-23	1,130,000	36,000	31,000	44,000					
Feb-23	1,133,000	45,000	35,000	46,000					
Jan-23	1,198,000	38,000	31,000	44,000	16,077,000	44,047	1,339,750		
Dec-22	1,866,000	60,000	21,000	62,000					
Nov-22	1,182,000	39,000	28,000	50,000					
Oct-22	1,021,000	32,000	21,000	70,000					
Sep-22	1,176,000	39,000	29,000	87,000					
Aug-22	1,286,000	41,000	31,000	54,000					
Jul-22	1,142,000	36,000	29,000	51,000					
Jun-22	1,490,000	49,000	27,000	76,000					
May-22	988,000	31,900	24,000	73,000					
Apr-22	1,085,000	36,000	25,000	75,000					
Mar-22	1,349,000	43,000	40,000	50,000					
Feb-22	1,517,000	54,000	45,000	61,000					
Jan-22					14,102,000	42,222	1,282,000		
Dec-21	1,413,000	45,000	27,000	49,000					
Nov-21	1,260,000	42,000	31,000	48,000					
Oct-21	1,105,000	35,600	30,000	45,000					
Sep-21	1,113,000	37,000	26,000	96,000					
Aug-21	1,046,000	33,700	26,000	44,000					
Jul-21	959,000	30,000	23,000	40,000					
Jun-21	1,144,000	38,000	27,000	78,000					
May-21	1,054,000	34,000	25,000	69,000					
Apr-21	972,000	32,000	26,000	85,000					
Mar-21	1,145,000	36,000	28,000	47,000					
Feb-21	1,386,000	49,500	39,000	60,000					
Jan-21	1,225,000	39,500	35,000	46,000	13,822,000	37,868	1,151,833		

Monthly Water Data Pper MROs

	mg/L Cl	May 21	Feb 21	Jan 21	Oct 21	May 22	Aug 21	Apr 23
Dec-23	5563.334	25	49	40	33	28	32	30
Nov-23	5.563334	29	46	41	30	37	44	36
Oct-23		38	46	45	33	27	33	37
Sep-23		29	43	37	36	27	32	39
Aug-23		27	46	38	33	30	36	32
Jul-23		30	53	37	45	26	42	34
Jun-23		35	56	38	31	24	44	34
May-23		27	50	39	31	32	29	37
Apr-23		30	53	43	34	28	26	34
Mar-23		34	50	39	38	24	27	37
Feb-23		29	50	36	41	30	29	34
Jan-23		69	50	38	37	35	29	32
Dec-22		37	60	38	38	33	30	33
Nov-22		27	39	39	34	35	28	42
Oct-22		33	47	37	30	31	29	35
Sep-22		27	51	35	32	34	42	40
Aug-22		38	53	40	36	28	36	40
Jul-22		33	51	46	43	73	31	33
Jun-22		32	52	39	35	26	28	37
May-22		37	49	36	36	27	38	31
Apr-22		44	53	38	34	26	31	34
Mar-22		37	57	37	33	33	37	33
Feb-22		31	49	35	31	34	43	32
Jan-22		43	49	42	35	31	34	33
Dec-21		29	45	43	43	30	33	29
Nov-21		35	44	40	38	27	36	55
Oct-21		34	47	40	37	30	31	33
Sep-21		30	48	42	36	28	30	33
Aug-21		34	1386	42	37	34	32	30
Jul-21		34	60	40	35	38	43	37
Jun-21		37	39	45	40	42	31	
May-21		1054	49.5	1225	1105	988	1046	1056
Apr-21		34		39.51613	35.64516	31.87097	33.74194	35.2
Mar-21		25		35	30	24	26	29
Feb-21		69		46	45	73	44	55
Jan-21								

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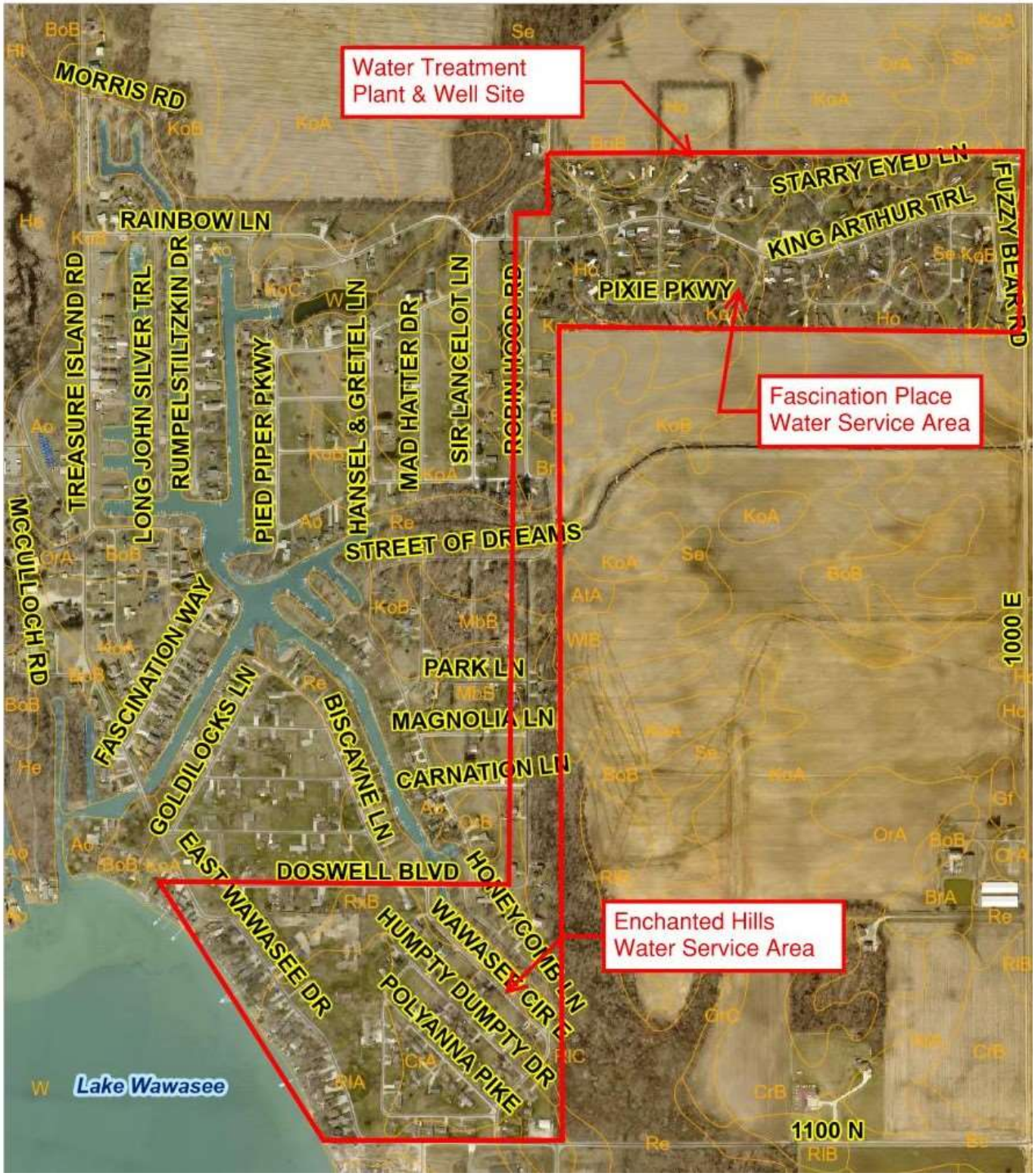
APPENDIX D

ENVIRONMENTAL

EH water soil



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NTS

Figure 5.1
Soils Map

Kosciusko County GIS

Turkey Creek Regional Sewer District
Water PER
February 2024

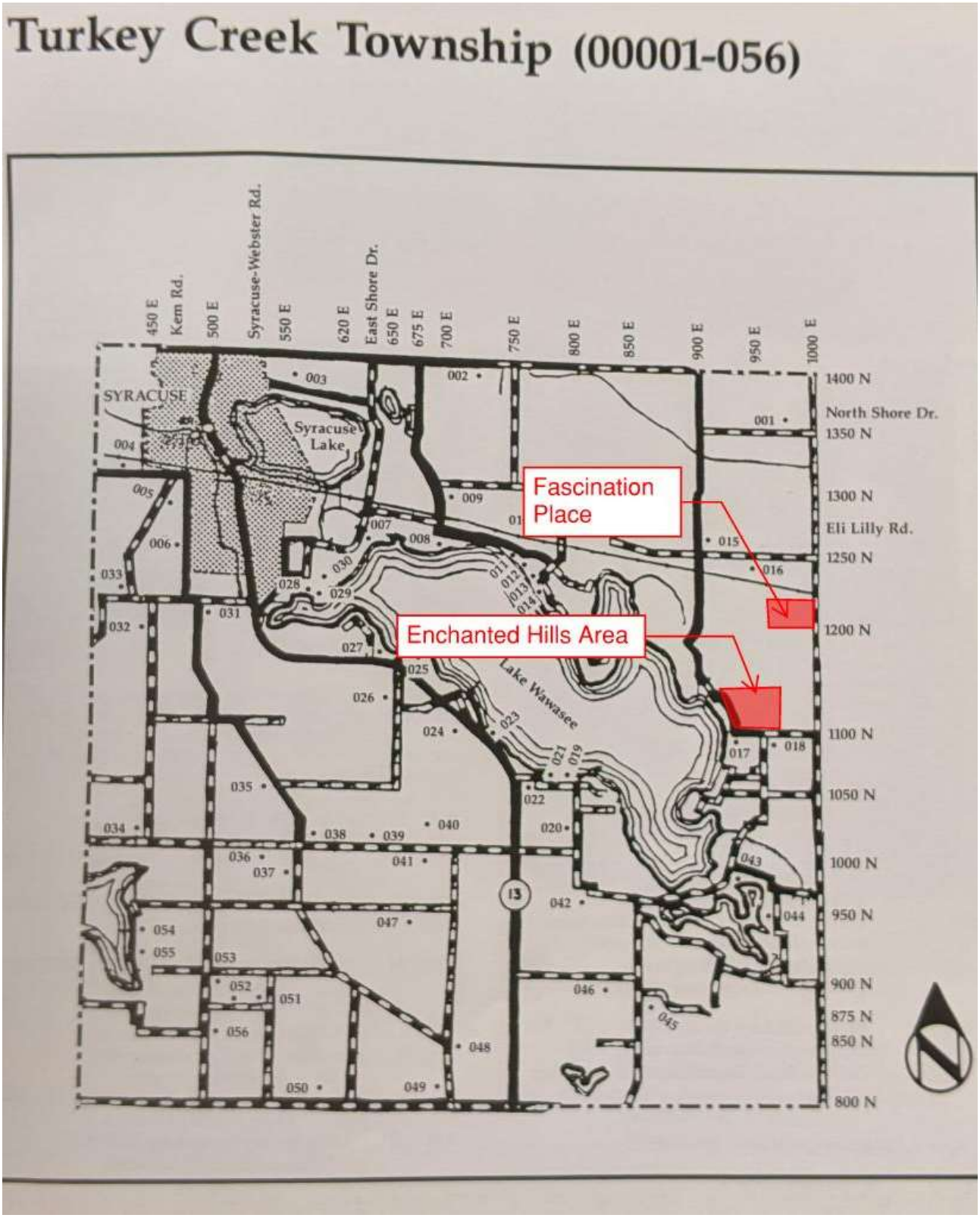

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Figure 5.2
Interim Map & Report
Kosciusko County
Interim Report

Turkey Creek Regional Sewer District
Water PER
February 2024

EH water wetland map

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Figure 5.3
Wetland Map

Kosciusko County GIS

Turkey Creek Regional Sewer District
Water PER

February 2024

EH water floodplan map

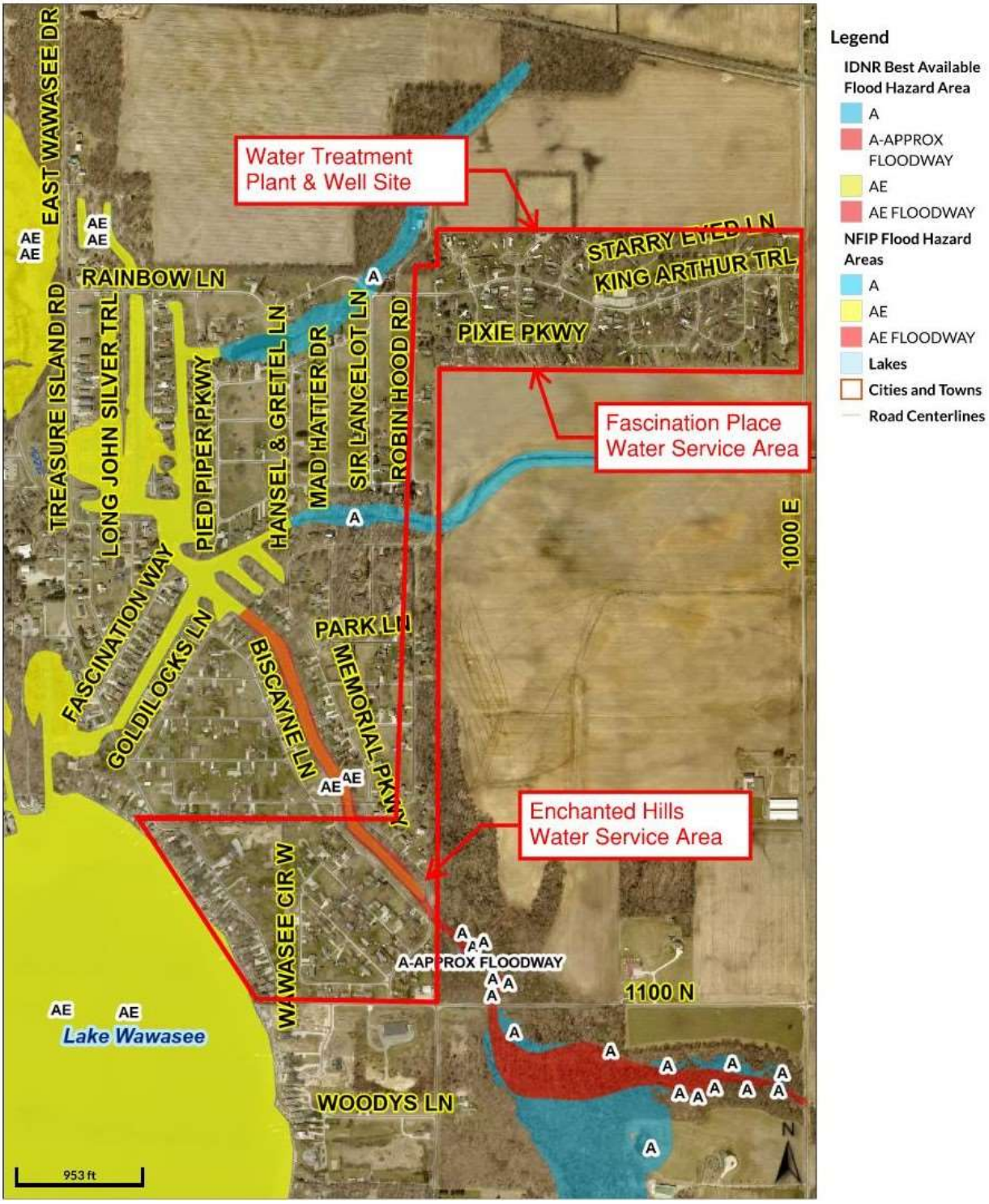

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Figure 5.6
Floodplain Map

Kosciusko County GIS

Turkey Creek Regional Sewer District
Water PER

February 2024

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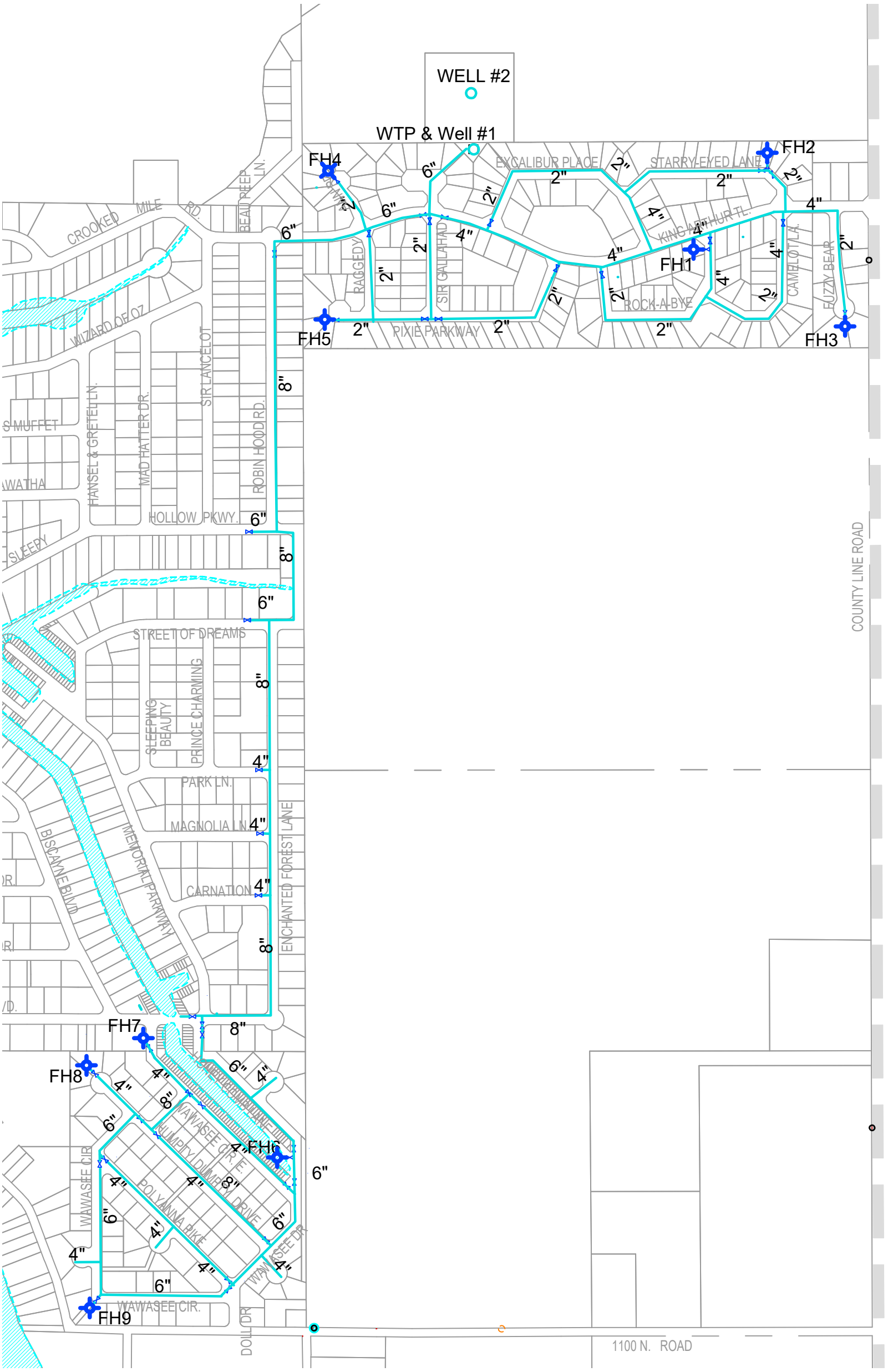
APPENDIX E

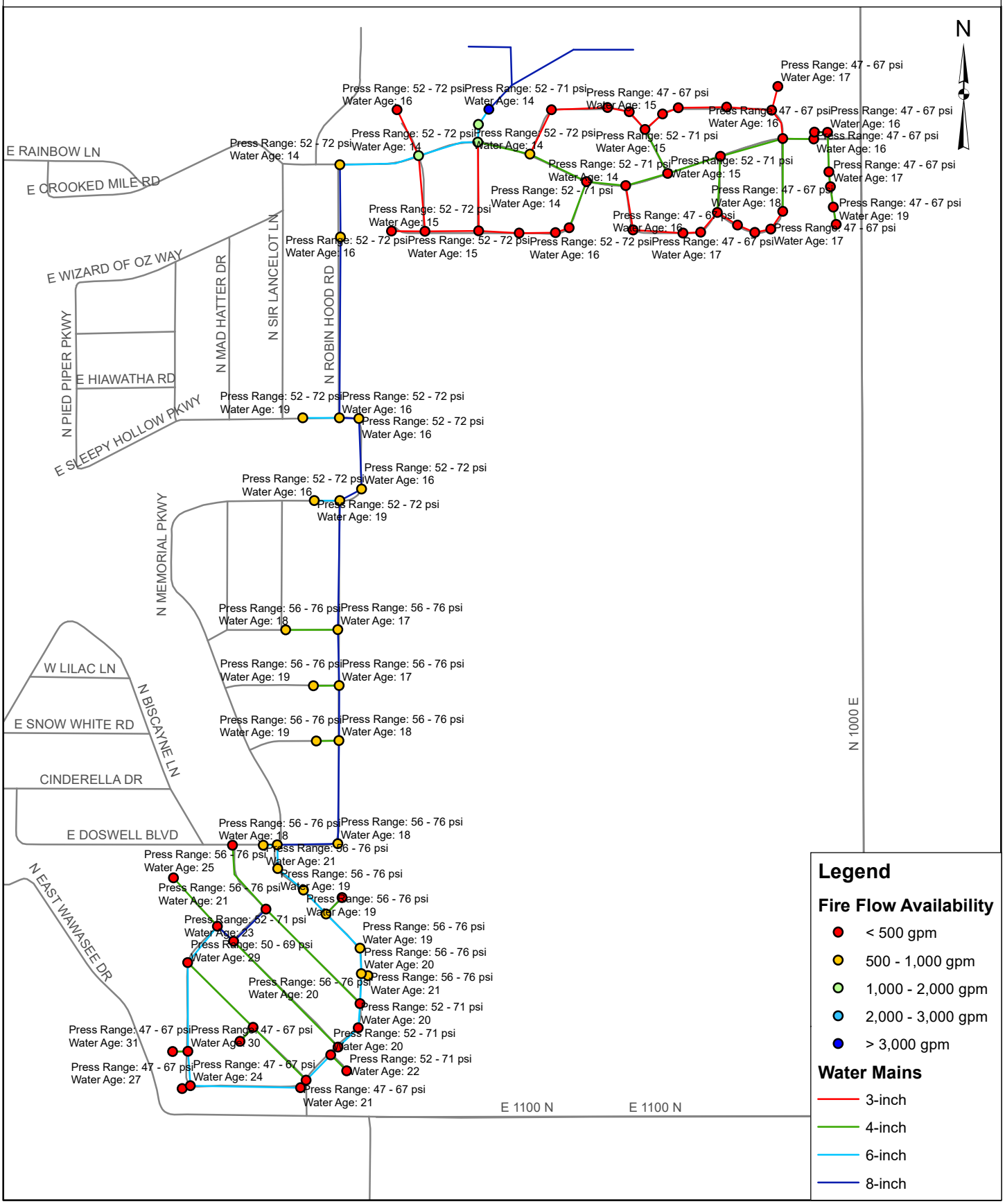
UTILITY MAPS


WELL #2
WTP & Well #1
FH1
FH2
FH3
FH4
FH5
FH6
FH7
FH8
FH9
EXCALIBUR PLACE
STARRY-EYED LANE
KING ARTHUR TL.
CAMELOT LA.
FUZZY BEAR
ROCK-A-BYE
SIR GALLAHAD
RAGGEDY
PIXIE PARKWAY
CROOKED MILE RD.
BEAU REEP LN.
WIZARD OF OZ
MUFFET
WATHA
HANSEL & GRETEL LN.
MAD HATTER DR.
SIR LANCELOT
ROBIN HOOD RD.
HOLLOW PKWY.
SLEEPY
STREET OF DREAMS
SLEEPING BEAUTY
PRINCE CHARMING
PARK LN.
MAGNOLIA LN.
CARNATION
BISCAYNE BLVD
MEMORIAL PARKWAY
ENCHANTED FOREST LANE
COUNTY LINE ROAD
1100 N. ROAD
WAWASEE CIR.
WAWASEE DR.
DOLL DR
JUMPITY DUMPITY DRIVE
POLYANNA PIKE
6"
8"
4"
2"

TCRSD

Turkey Creek Water System

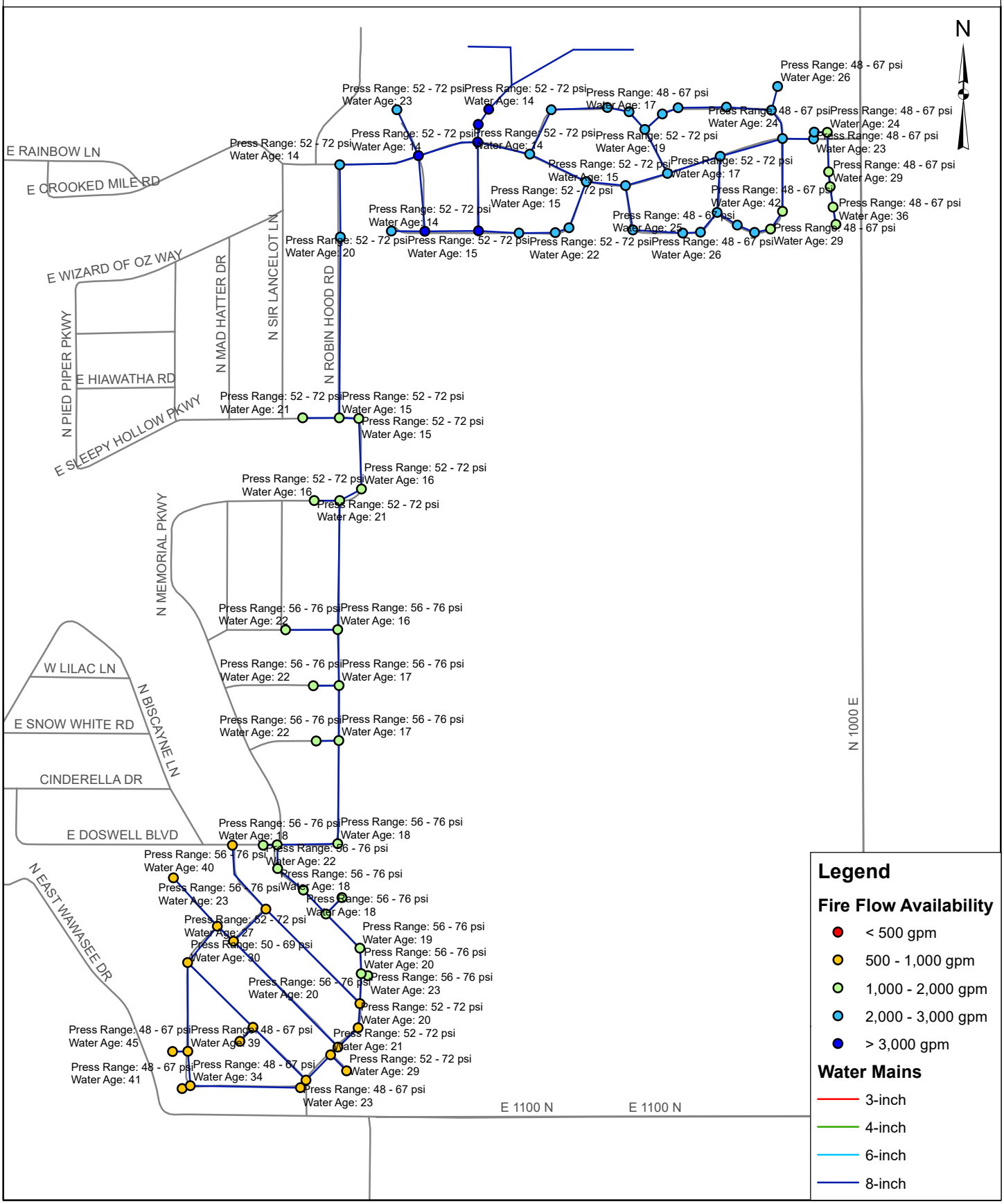
Existing System - Fire Flow, Water Age, Pressures



TCRSD

Turkey Creek Water System

Improved System - Fire Flow, Water Age, Pressures



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APPENDIX F

ASBESTOS PIPE SOP

Turkey Creek Regional Sewer District / TCRSD Water Utility
"Standard Operating Procedures for Working with Asbestos Cement Pipe"

A. PURPOSE:

Turkey Creek Regional Sewer District, aka TCRSD, places the highest value on employee safety. Being consistent in providing a safe and healthy workplace for all employees and to help make fieldwork as safe as possible, the following safe work procedures have been developed for repairing Asbestos-Cement pipe.

These procedures will assist TCRSD to establish itself as a leader in the water industry by providing their employees with training and equipment to protect themselves from hazards and injuries. Once hazards are identified and evaluated, every effort will be made to eliminate or control them through engineering or administrative measures. Good design and engineering practices will be used to eliminate or reduce hazards in the design of facilities and projects. But when hazards cannot be eliminated, Personal Protective Equipment (PPE) will be required.

This policy defines the use of appropriate work practices and PPE necessary to protect employees from hazards associated with working with Asbestos-Cement (AC) pipe.

All employees-managers, supervisors and staff-are responsible for the success of this policy and will be held accountable for deviations. Any violation of the policy will be subject to progressive disciplinary action, up to and including termination of employment.

B. SCOPE:

Repair work involving disturbing and/or removal, of AC Pipe must follow the outlined safety procedures. This procedure applies to Water Utilities crews and contractors. No methods can be used that intentionally cause AC pipe to shatter, crumble, be pulverized, or release asbestos fibers. This means that we are not permitted to sand, power saw, grind, chip or use power tools on AC pipe. By using these methods, Indiana licensed asbestos abatement contractor and worker certification are not required.

C. RESPONSIBILITIES

1. TCRSD will provide support and commitment to furnish affected employees with the appropriate training and equipment to protect themselves from known hazards working with and around AC pipe. Whenever possible, TCRSD will attempt to eliminate hazards of AC pipe by means of engineering controls and design.

2. The TCRSD Staff will provide and document all training and education for employees; and provide Supervisors with assistance and support in the administration and maintenance of the program.

3. The Managers and Supervisors will ensure that these procedures are implemented and ensure compliance within their respective departments and crews. They will also ensure that all equipment necessary for AC pipe work is available and in use whenever working with AC pipe.

4. The Employee is responsible for following the procedures, including utilizing training and equipment provided. Employees who violate this policy will be subject to disciplinary action.

5. Competent Person is capable of identifying existing and predictable hazards in the surroundings or work conditions which are unsanitary, hazardous, or dangerous to employees and has the authority to take prompt corrective measures to eliminate them.

NOTE: It is important to note that the work practices and conditions describe in the policy must exist and be maintained at all times. If there are any deviations in conditions, practices or procedures outside the scope of the policy, a Competent Person must have a higher level of skills and training as outlined in OSHA's 1926.1101 Asbestos Standards and the EPAs 40 CFR 763.92

D. TRAINING

1. All employees involved in AC pipe work must be Asbestos Awareness Trained. The training will include this safe work procedure.

2. Training will be refreshed at least annually or as needed.

3. All training and refresher sessions will be documented. Documentation will be filed with TCRSD Safety File system.

4. For the purpose of these Safe Work Practices, the training module attached will be deemed adequate.

E. <u>SAFETY PROCEDURES:</u>

1. <u>Wet methods</u> will be used to prevent release of airborne asbestos fibers. This requires use of a garden type sprayer with water to be used prior and during all work in AC pipe. The pipe exterior will be sprayed down prior to and during removal or repair work.

2. <u>No power tools</u> will be used on AC pipe. Only various approved hand tools will be used.

3. Approved tools:

a. *Snap cutters* ("squeeze-and pop" equipment) operate by means of cutting wheels mounted in a chair wrapper around the pipe barrel. Hydraulic pressure, applied by means of a remote, pneumatically, or manually operated pump, squeezes the cutting wheel into the pipe wall unit the cut is made. This type of cutting with water sprayed minimizes the release of asbestos fibers.

b. *Roll cutters* that cut the pipe as the cutting edge of the rollers are tightened clown as pressure is applied manually to the cutters as they circle the pipe. This type of cutting with water sprayed on the pipe minimizes the release of any asbestos fibers. Cutting wheels are wiped before use to remove any lubricant that might bond with any fibers and wiped cleaned after use.

c. *Wet Tapping AC Pressure Pipe* for service connects is performed in the trench while the pipe is under pressure. The equipment is affixed to the pipe by means of a chain yoke. A combination boring-and-inserting bar drills and taps the pipe wall and inserts a corporation stop or pipe plug. The pressure chamber, which protects against water leakage, also catches the asbestos-cement chips, so this is essentially a dust-free operation. To minimize fouling of valves, regulators, meters, and other equipment with chips or unnecessary addition of asbestos to drinking water a positive purge or blow-off features should be used on the equipment. (NOTE: There will be no dry AC pipe tapping as only non-A.C pipe is used for new installation or repair). Bolts for all fittings and sleeves should be placed so the nuts are on the non-asbestos side of the pipe, which prevents the AC pipe from being, rubbed by the wrenching and tightening of the bolts.

d. *Bristle Brush* to smooth cutting surface may be used only with copious water spray to suppress any dust.

e. *Use of Cold Chisel and Hammer to remove coupling from AC pipe:* When possible, the intact section would be removed not requiring a coupler to be removed but this is not always possible. AC coupling removal must be done by gradually splitting the coupling lengthwise using a chisel and hammer. After the coupler has been split a crowbar or similar tool is used as a lever to split the bottom of the coupling. The pieces must be bagged in asbestos disposal bag(s).

There are varieties of other fittings that are used to insert the pipe, including various pressure collars, which do not result in damage to the AC pipe.

f. *Safety Equipment:* The AC pipe safety equipment will be available from the Turkey Creek Regional Sewer District before heading to the AC pipe work site. The equipment must include a laminated copy of this SOP, gloves, safety glasses, ear plugs, appropriate polypropylene suits, towels, hand cleaner, yellow disposal bags, clear disposal bags, duct tape, flash light, warning signs and barrier tape.

4. **Required Personal Protective Equipment:**

a. Employee personal protective clothing: To further safeguard our employees' the following PPE is required:

1 Polypropylene or disposable coveralls appropriate for the hazard
2 Rubber boots
3 Gloves with plastic cover hands and canvas back will be worn when working with AC pipe
4 Safety Glasses
5 While testing has shown that proper procedures do not result in any detectable fiber exposure employees have the option of wearing the N-100 disposable dust masks. Since exposure to asbestos occurs primarily through inhalation, the use of respiratory protection is strongly recommended.

NOTE: The use of disposable dust masks (N-100) is NOT an acceptable practice under the OR-OSHA Asbestos Standard (1926.1101). Air-purifying respirators equipped with N-100 cartridges are acceptable. While these procedures recognize airborne exposure to asbestos fibers from non-friable asbestos cement pipe would not pose a hazard, a best practice is to avoid using disposable dust masks (filtering face pieces) and to use air-purifying respiratory protection, even for voluntary use.

b. The rubber gloves will have the tops rolled out 1 —1 ½" to form a cuff that can catch drips, etc. that might normally land on a body part.

c. The coveralls will be secured and sealed to the ankles and wrists by applying duct tape at the cuffs if necessary.

5. **Establish a "Controlled Zone"**

a. A "Controlled Zone" will be established for all work involving AC pipe. The following are guidelines for establishing and maintaining a "Controlled Zone".

1. Establish a perimeter 5-10 feet back from the leading edge of any excavation, hole or trench.

2. Set cones or barricades strategically around the perimeter.

3. Thread "Danger Tape" around the perimeter and attached to the cones or barricades.

4. Set the "Authorized Personnel Only" signs around the outside of the "Controlled Zone".

v. Only authorized and properly outfitted personnel may enter the "Controlled Zone".

vi. Any person and any equipment leaving the "Controlled Zone" must be subjected to decontamination as defined further in this document.

6. **Disposal and Decontamination procedures**

a. The Snap or Roll Cutter tool should be cleaned prior to use to reduce asbestos cement debris which could build-up on the blades during cutting

b. All removed AC pipe and debris will be wetted clown, collected, and placed in asbestos disposal bags. They will be taken to the asbestos disposal area at the main shop.

c. All tools that have been used to remove AC pipe must be wiped clean of debris with disposable cloths while still inside the "Controlled Zone". The cloths will be placed in Asbestos disposal bags and the bags will be sealed as defined above

d. The disposable coveralls and rubber gloves will be placed into the asbestos disposal bag while the workers are still inside the "Controlled Zone".

e. Rubber boots must be washed off removing dirt and debris while in the excavation with the garden sprayer.

f. Proper bagging will consist of placing the AC pipe and debris in a yellow hazardous waste bag and duct taping the top of the bag to seal it. The yellow bag will then be placed inside a clear disposal bag to ensure double-bagging can be verified. The 2nd bag must also have the top sealed with duct tape to ensure a seal.

g. Waterless hand cleaners and water will be available for employee's hand and face cleaning after removing the Personal Protective Equipment.

h. Once wiped clean, clean Snap or Roll Cutter and all other tools used at the shop and restocked on the crew vehicles.

7. ***Periodic Air Re-monitoring***

If there are needed changes to work procedures or the condition of AC pipe is friable and unstable, work must cease immediately and all provisions of 1926.1101 apply. A Competent Person as defined by the Asbestos Standard must re-evaluate the situation to determine what actions are necessary, including air monitoring, respiratory protection, training, or any other required actions. Re-monitoring will be clone when the Competent Person has reason to believe that there has been a change in the operation, which could affect airborne exposure.

8. *Safe Work Procedure Checklist*

The Supervisor and crew mechanic will use, follow, and document safe work procedures on a checklist (attached). Notification to the Safety Office so that Key Performance Indicators can be verified is required.

a. Identify potential AC pipe work needs prior to job site work. This allows crew to ensure they have right equipment and procedures for working on AC pipe.

b. Ensure that crew has asbestos awareness training

c. Assemble basic protective equipment and tools, which is in good repair and clean:
   Disposable coveralls
   Rubber boots
   Rubber gloves
   Safety glasses
   Proper working order and clean tools including Snap or Roll cutters wiped before and after use to reduce and remove any fibers that may be on the cutters.
   Ensure all clean tools are available

d. Assembling Control Equipment
   Garden sprayer with adequate supply of water
   Large wipes for cleaning tools and equipment
   Asbestos Disposable Bags and duct tape
   Waterless hand cleaners
   Warning signs
   Barrier tape

DOCUMENTATION:

All training, refresher sessions, checklists and annual reviews or audits will be documented. Documentation will be filed with the Turkey Creek Regional Sewer District Safety File system.

G. KEY PERFORMANCE INDICATORS:

1. Documentation of training, checklists and audits or reviews.

2. Field audits during actual operations.

H. AUDITS AND REVIEWS

1. Field audits by the safety office or the supervisor will be conducted as opportunities present themselves using the utilizing the established jobsite inspection program.

2. Conduct SOP reviews whenever there is reason to believe or field audits indicate that there is a need to review and/or revise this SOP because of observed deviations and violations of this SOP.

3. Supervisors and safety staff are readily available to address employee concerns, questions, and/or assist with work activities

I. ATTACHMENTS

Safe Work Procedure Checklist

EQUIPMENT:

- O Roll Cutters or similar tool
- O Garden Sprayer w/adequate water reserve
- O Asbestos Disposal Bags and duct tape (yellow and clear bags)
- O Asbestos barrier tape
- O Rubber boots
- O Rubber gloves
- O N100 filtering face pieces
- O Waterless hand cleaner
- O Large wipes for tools & equipment
- O Asbestos Warning Sign
- O Hooded Tyvek disposable coveralls
- O Laminated SOP
- O Safety glasses
- O Pipe, collars, specific tools etc. required for the repair

By my signature, I verify that all the items above are on site or have been reviewed or verified.

Crew mechanic or supervisor: _____
Print name

Address or site of work: _____

Date work conducted: _____

SAFE WORK PROCEDURE CHECKLIST

The crew mechanic or the district supervisor will ensure this checklist is reviewed and completed before any work involving AC pipe commences. This checklist must be fully completed, signed and dated. The completed checklist will be forwarded to the TCRSD Risk Specialist.

Training

- All crew members have been trained to the SOP for AC pipe work. O Yes O No

Crew Members on site for repair **Training Date**

1)

2)

3)

4)

5)

6)

7)

8)

9)