Asset Management Plan
&
Capital Improvements Plan

for

Water System Improvements

prepared for

SPEEDWAY WATER WORKS
SPEEDWAY, INDIANA

WESSLER ENGINEERING
More than a Project™

October 2021

Wessler Project No. 232720.01.001

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EXECUTIVE SUMMARY

Introduction

This Asset Management Plan (AMP) and Capital Improvements Plan (CIP) is prepared for the Town of Speedway, Indiana (Speedway) to outline water system needs, priorities and improvements over a 20-year planning period. Results of this AMP evaluation were utilized to determine the criticality and condition of various assets, systems, and processes to provide recommendations for priority capital improvements. Findings were incorporated into a Capital Improvements Plan (CIP) to identify the major needs of the water utility. Addressing these needs will enable Speedway to continue to provide clean and reliable drinking water to its customers.

The improvements included in this CIP have been developed based on a combination of a capacity assessment and a Business Risk Exposure (BRE) analysis. A capacity assessment was completed using current and anticipated demands provided by Speedway. The capacity of the existing facilities was then evaluated against these projected demands to assess if future needs can be met. The BRE analysis evaluated existing water system components that are valued at $5,000 or more or any components which are critical to the utility's operation. Each asset was analyzed to determine its probability of failure and consequence of failure. Assets each received a calculated BRE rating based on these two criteria and asset redundancy. This asset data collection information has been provided to the Speedway Waterworks and Clerk Treasurers office. It is recommended that these asset lists be continually updated as equipment is replaced or new assets are installed. Third-party software is available to manage these assets, as well as the entire Town's assets for the addition and retirement of equipment.

The primary need identified in this report can be categorized under five groups:

- Source capacity (groundwater wells)
- Distribution valves
- Lead service lines
- Aging infrastructure
- Operations and security

Process Assets – Results Summary

Assets located at the Groundwater Treatment Plant (GWTP), The Surface Water Treatment Plant (SWTP), wells, the 16th Street Elevated Storage Tank, and the Meadowood Elevated Storage Tank are considered process assets and were evaluated in the BRE analysis.

Process assets at these facilities include pumps, motors, valves, wells, chemical feed systems, electrical, controls, buildings, tanks and related items. BRE rating results are plotted, using their probability of failure and consequence of failure, as shown on **Chart 1**. All assets are shown in this manner to provide a general illustration of the range of asset BRE ratings for the system.

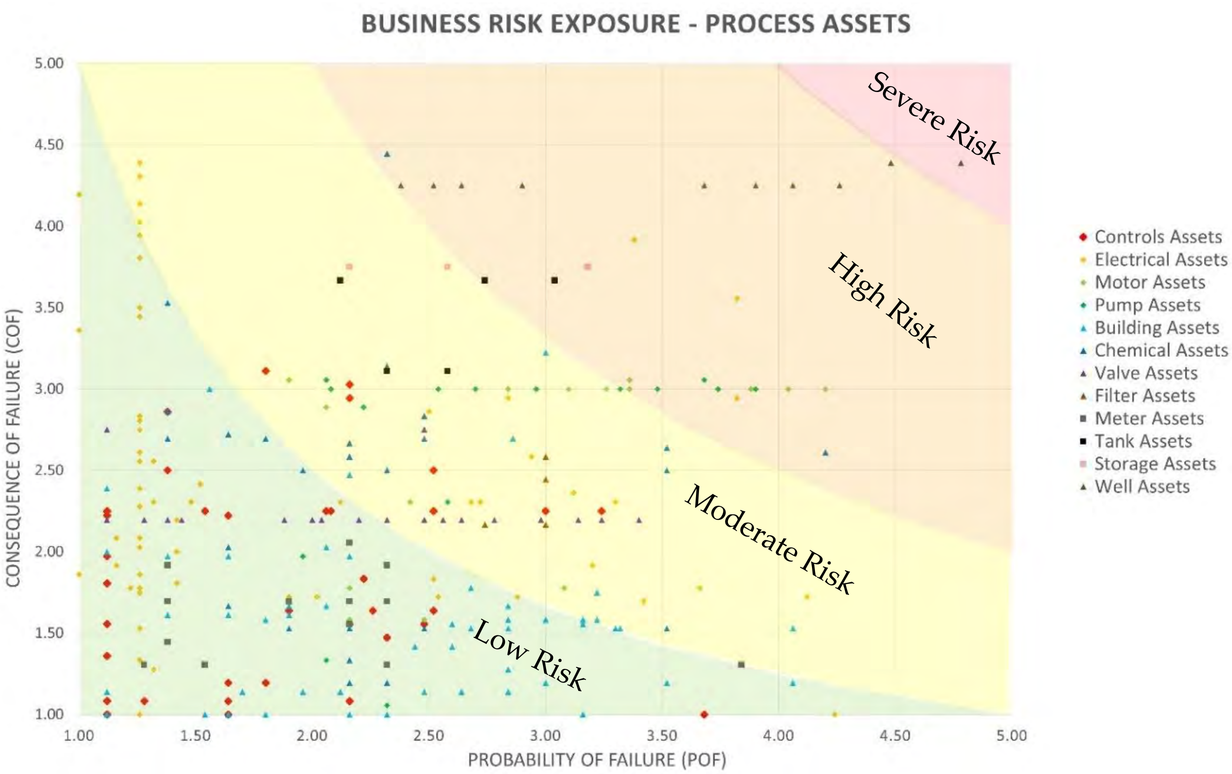


Chart 1: Process Assets' BRE Ratings

A review of the BRE scores shows 23 assets scored as high risk and 2 assets were rated as severe. In general, the wells had the highest BRE scores. The consequence of failure was high because of their important contribution to source capacity and the probability of failure was high due to their age and operational condition. In recent years, the capacity of the wells has decreased dramatically. The wells are significantly underperforming and are operating at a capacity less than half their rating.

BRE scores and capacity assessment reveal a need to increase source capacity by improving wells and changing the operational strategy to allow the SWTP to operate all-year round. Maintenance to the aging facilities and replacement of assets beyond their useful life are also needed.

To meet existing and projected demands, various operational strategies and combinations thereof were evaluated with respect to providing sufficient source of supply and treatment capacity. The most viable solutions considered included maximizing SWTP production, utilizing an interconnect with CEG, or maintaining existing well capacity. By maximizing the SWTP output, the remaining capacity needed is minimized. Ultimately, these options were narrowed down to two options as follows:

- *Option 1 – Surface Water + Groundwater:* Operate the SWTP year-round and supplement additional capacity needs with GWTP. This option requires the implementation of an aggressive regularly scheduled well cleaning and maintenance plan. This option also considers replacing wells that have exceeded their life expectancy.
- *Option 2 – Surface Water + Purchase Water:* Operate the SWTP year-round and supplement additional capacity needs with purchased water from Citizens Energy Group (CEG) and abandon the GWTP and all wells. This option requires that Speedway switch disinfection practices and implement a chloramine feed system, rather than operate on a free chlorine residual. A metered and valved interconnect would be installed between water systems.

Based on the capital needs for both options and the need to purchase water in Option 2, the estimated probable cost of Option 1 and 2 were almost identical for a 5-year capital plan and the overall all 20-year capital plan. Option 1 has been selected.

Table 1 on the following page summarizes the capital projects identified in this report taking into consideration the existing and future demands and improvements that need to be completed over the 20-year plan and sorts them by category for *Option 1*. In Chapter 6.0, this table is broken down into a 5-year and 6 to 20-year capital plan.

Table 1. 20-Year Project Summary- Process Assets

Project Category	*Project Name*	*Estimated Total*
System-Wide	System Wide Cellular Communications	$ 102,000
	Arc-Flash Study	$ 25,000
	CodeRed Alert System	$ 30,000
Wells	Well Rehabilitation	$ 509,000
	Install VFDs for Well Pumps	$ 203,000
	Groundwater Well Replacement Program	$ 4,557,000
GWTP	Aerator Inspection and Improvements	$ 36,000
	Detention Tank Access Hatch Replacement	$ 25,000
	Rebuild HSP No. 2 and 3	$ 40,000
	Replace HSP Motors and Install VFD	$ 430,000
	Pressure Filter Rehabilitation	$ 692,000
	Replace GWTP Filter Pipe and Valves	$ 290,000
	GWTP Building and Facility Improvements	$ 694,000
SWTP	Low Head Dam Improvements	$ 298,000
	Raw Water Intake Structure Cover	$ 128,000
	Flocculation/Sedimentation Basin Structural Improvements	$ 72,000
	Flocculation/Sedimentation Basin Internal Improvements	$ 119,000
	Filter Rehabilitation	$ 384,000
	High Service Pumps VFD Installation	$ 102,000
	Residual Pumps Replacement	$ 35,000
	Valve & Actuator Replacement	$ 197,000
	Building Upper-Level West End Renovations	$ 440,000
	SWTP Building and Facility Improvements	$ 598,000
	SWTP Operational Strategy Modification Pilot Study	$ 350,000
Chemical	Switch to Bulk Bleach	$ 498,000
	Switch to HSF	$ 325,000
	Alum Equipment Replacement	$ 200,000
	Phosphate Addition	$ 120,000
Site	WTP Construct Garage	$ 1,013,000
	WTP Fill Storage Bays	$ 254,000
	WTP Pavement and Parking	$ 193,000
	WTP Security	$ 158,000
Tanks	16th St. Tank Improvements	$ 2,223,000
Equipment	New Equipment	$ 697,500

Distribution Assets - Results Summary

Water mains, valves, hydrants, and service lines are considered distribution assets and were analyzed to develop an annual replacement program.

Water mains were ranked based on probability of failure and consequence of failure. The criteria contributing to the probability of failure include age, material type, and recent main breaks. The criteria contributing to the consequence of failure include pipe size and input from the Town on the replacement priority of different areas. These scores were then combined to develop BRE ratings.

To address "Severe Risk" and "High Risk" segments in the distribution system, a water main, valve and hydrant replacement program is needed. This program should be structured to replace approximately 0.5% of water mains each year, which corresponds to 1,700 lineal feet of main and 5 hydrants. Because of the distribution valve conditions create a significant problem related to system maintenance, an annual replacement program of 3% (20 valves) per year is recommended. Existing service lines in the system include lead services and upcoming regulatory requirement will place additional emphasis on their removal from the system. Because of this, a 5% annual replacement (53 lines) of lead service lines per year is needed.

Table 2 shows the project priorities and estimated total project costs for each proposed project.

Table 2: Distribution Assets Project Summary

Project Category	*Project Name*	*Estimated Total Project Cost*
Distribution	Annual Water Main Replacement (0.5%)	$ 701,000
	Annual Lead Service Replacement (5%)	$ 255,000
	Lead Service Line Mapping	$ 18,000
	Annual Valve Replacement (3%)	$ 84,000
	Annual Hydrant Replacement (1%)	$ 30,000
	Annual Water Loss Program	$ 7,000
	Annual Meter Replacement Program (10%)	$ 90,000

Project Prioritization

High priority projects focus on maintaining and increasing source capacity, replacing distribution system valves, replacing lead service lines, and upgrading aging assets. Constructing a storage garage to protect Speedway Water Works equipment is also a priority.

Improvement projects were developed and prioritized based on Speedway's needs. Projects that resulted from a review of BRE ratings and capacity assessment results were developed to improve and expand Speedway's system as needed to meet future demand, while maintaining the current system at an acceptable level of service.

Annual Rehabilitation and Maintenance

In addition to the projects that were developed for treatment and distribution assets, development of an annual maintenance plan is included. These plans and the costs associated with them were developed to include regular maintenance of pumps, filters, elevated storage tanks, and chemical feed equipment. Annual costs for these items are shown in **Table 3**.

Table 3: Annual Rehabilitation and Maintenance Summary

Project Category	*Project Name*	*Estimated Total Project Cost*
O&M	Annual Tank Inspections	$ 10,000
	Annual Well Inspections, Cleaning, and Maintenance	$ 120,000
	Pump Inspection, Cleaning, and Maintenance	$ 18,000
	Filter Media Inspections	$ 5,000
	Chemicals and Chemical System Maintenance	$ 155,000

Capital Improvements Project: Plan and Schedule

Upon review and concurrence of the capital projects with the Waterworks department, Town Council, and Clerk/Treasurer, a sequence and schedule of project for the first 5 years of plan implementation is shown in **Table 4.**

Table 4: 5-Year Capital Projects Summary

Project Category	*Cost Table Number*	*Project Name*	*Estimated Total Project Cost*
System-Wide	B-49	System Wide Cellular Communications	$ 102,000
		Arc-Flash Study	$ 25,000
Wells	B1-B9	Well House and Equipment Rehabilitation	$ 509,000
	B-10	Well Pump VFD Installation	$ 203,000
	B-11	New Well - Jr High School	$ 900,000
GWTP		Aerator Inspection and Improvements	$ 36,000
		Detention Tank Access Hatch Replacement	$ 25,000
	B-26	Rebuild HSP No. 2 and 3	$ 40,000
SWTP	B-31	Low Head Dam Improvements	$ 298,000
	B-32	Raw water Intake Structure Cover	$ 128,000
		Operational Strategy Pilot Study	$ 350,000
Chemical	B-41	Switch to Bulk Bleach	$ 498,000
	B-42	Switch to Bulk liquid fluoride	$ 325,000
	B-44	Phosphate Addition	$ 120,000
Site	B-45	WTP Construct Garage	$ 1,013,000
	B-48	WTP Security	$ 158,000
Tanks	B-50	16th St. Tank Improvements	$ 242,000
Equip.		Pull Behind Vac Machine w/ Valve Turner	$ 92,500
		Hydra Valve Equipment	$ 60,000
Distr. Assets	B-51	Water Main Replacement (0.5%/ yr)	$ 3,505,000
	B-51	Lead Service Replacement (5% / yr)	$ 1,273,000
	B-51	Lead Service Line Mapping	$ 18,000
	B-51	Valve Replacement (3% / yr)	$ 420,000
	B-51	Hydrant Replacement	$ 150,000
		Water Loss Audit	$ 7,000
	B-51	Meter Replacement Program (10% / yr)	$ 450,000
Process Assets	B-52	Tank Inspections	$ 50,000
	B-52	Well Inspections and Maintenance	$ 600,000
	B-52	Pump Inspection, Cleaning, and Maintenance	$ 90,000
	B-52	Filter Media Inspections	$ 25,000
	B-52	Chemical System Maintenance	$ 775,000
		Total 5-Year Projects (rounded)	$ **$13,040,00**

1.0 WATER DEMANDS

1.1 Existing Water Production and Usage

1.1.1 Current Population

The United States Census Bureau estimates the 2019 population of Speedway to be 12,193 residents, which is assumed to be the current population for purposes of this report.

1.1.2 Water Use

The total number of meters in Speedway's system is 4,201. Service connections and water use (as plant pumpage) per customer type from 2020 data is illustrated in **Table 1.1**.

Table 1.1: Service Connections and Water Use Breakdown

Customer Type	*Percent of Demand*
Residential	27%
Commercial/Industrial	73%
Total (rounded)	**100%**

All service lines are metered. Unbilled and unmetered water use includes filter backwash at the treatment plants and hydrant flushing within the distribution system. There are government buildings within Speedway that are metered, but unbilled. The largest water users in Speedway are Heritage Crystal Clean, Praxair, Allison Transmission, Legend at Speedway Apartments, and Darby Courts Apartments. Note, the Indianapolis Motor Speedway is normally a top water user, but the Speedway was closed to the public most of 2020 due to Covid-19 and consumed less water use than normal.

Based on current water rates, the monthly cost for a 5/8" meter using 4,000 gallons is $17.74. This rate was introduced in 2011. There is also a monthly fire protection charge which is $1.81 for 5/8" meters. Rate structure information is included in **Appendix C Attachment 1**.

1.2 Speedway Water Treatment Plants Pumping

Speedway operates two water treatment plants, a groundwater treatment plant (GWTP) rated at 9.5 MGD and a surface water treatment plant (SWTP) rated at 3.0 MGD. Typically, the groundwater treatment plant is operated year-round while the surface water treatment plant operates during the "summer" months of April to October. This operational procedure gives the groundwater wells time to rest during the dry weather period while demand is heavily reliant on the SWTP. In the winter during the wet weather period, the demand is reliant on only the GWTP while the SWTP is out of operation. The SWTP goes out of operation in the winter to avoid freezing issues and to reduce labor forces and the number of WT5 plant operators needed.

1.2.1 Total Water Pumping Data

The total water pumping data is the sum of the GWTP and SWTP pumping data. The average day demand from 2016 to 2020 has stayed consistent around 2.1 MGD as seen in **Table 1.2. Table 1.3** and **Table 1.4** summarize the available pumping data from the 2016 to 2020 Monthly Report of Operations (MROs). The average day demand is an average of the available pumping data from the time frame. The maximum day demand is an average of the highest 5 days of demand from the same time frame. Typically, two years is a sufficient timeframe to evaluate average and maximum water demands. This data shows that average day demands have stayed relatively consistent for the past 5 years, while maximum day demands have varied greatly. It is believed that many of these discrepancies are due to the impacts of Covid-19. To account for these irregularities, a longer timeframe was evaluated to capture the current average day and maximum day demands. The peaking factor is calculated by dividing the maximum day demand by the average day demand for the analysis period.

Table 1.2: Existing Average Day Demand by Year (2016-2020)

Year	*Average Day Demand (MGD)*	*Average Day Demand (gpm)*
2016	2.17	1,500
2017	2.00	1,400
2018	2.02	1,400
2019	2.10	1,460
2020	2.15	1,500
Average	**2.10**	**1,460**

Table 1.3: Maximum Day Demand (2016-2020)

Date	*Max Day Demand (MGD)*	*Max Day Demand (gpm)*
5/29/2016	4.74	3,290
6/20/2016	4.31	2,990
5/12/2018	4.15	2,880
5/27/2018	4.15	2,880
5/11/2018	3.96	2,750
Average	**4.30**	**2,990**

Table 1.4: Existing Water Demand Summary (2016-2020)

<table>
<tr><th>Average Day Demand</th><th>Maximum Day Demand</th><th>Peaking Factor</th></tr>
<tr><td>2.1 MGD</td><td>4.3 MGD</td><td rowspan="2">2.04</td></tr>
<tr><td>1,460 gpm</td><td>2,960 gpm</td></tr>
</table>

The current per capita average day demand is approximately 46 gallons per day (gpd), based on the 2019 population of 12,193 residents and average residential demand of 27% of the 2.1

MGD (572,400 gallons). The per capita maximum day demand is 94 gpd, using the calculated peaking factor of 2.04.

1.2.2 GWTP and SWTP Pumping Data

Table 1.5, Table 1.6, and Table 1.7 summarize the available pumping data from 2016 to 2020 Monthly Report of Operations (MROs) broken down by plant. The GWTP pumping data is further broken down into "summer" and "winter" operations to compare the average and maximum days when the SWTP is in operation vs. out of operation.

Table 1.5: Maximum SWTP Day Demand (2016-2020)

Date	*Water Use (MGD)*	*Water Use (gpm)*
5/28/2016	2.94	2,040
7/25/2016	2.66	1,850
5/31/2016	2.66	1,850
7/27/2016	2.66	1,850
5/27/2018	2.65	1,840
Average	**2.72**	**1,890**

Table 1.6: Maximum Summer GWTP Day Demand (2016-2020)

Date	*Water Use (MGD)*	*Water Use (gpm)*
5/13/2018	3.50	2,430
6/19/2016	3.49	2,420
5/9/2018	3.49	2,420
5/12/2018	3.46	2,400
5/3/2018	3.43	2,380
Average	**3.47**	**2,400**

Table 1.7: Maximum Winter GWTP Day Demand (2016-2020)

Date	*Water Use (MGD)*	*Water Use (gpm)*
4/18/2018	2.96	2,060
4/26/2018	2.92	2,030
4/12/2018	2.85	1,980
4/19/2018	2.84	1,970
4/10/2018	2.83	1,960
Average	**2.88**	**2,000**

The GWTP maximum days all occur in the summer months, but when the SWTP is out of operation due to any number of reasons. Only running the GWTP during the summer is not typical and should not be relied on due to a lack of sustainable aquifer capacity to allow the GWTP to meet demands. More information regarding the aquifer capacity can be found in **Section 2.1.**

Table 1.8 below summarizes the average and maximum days at the SWTP and GWTP by season.

Table 1.8: Existing Water Demand Summary (2016-2020)

	Average Summer Day Demand	*Average Winter Day Demand*	*Maximum Summer Day Demand*	*Maximum Winter Day Demand*
GWTP	1.2 MGD	2.0 MGD	3.5 MGD	2.9 MGD
SWTP	1.9 MGD	N/A	2.7 MGD	N/A

Water demand is highest in the summer, especially around the Indy 500 event in May. During these high demand periods over the summer months, the SWTP heavily supplements the GWTP. On average, the GWTP pumps less water in the summer than it does in the winter. However, the maximum days of the GWTP are higher in the summer than the winter when the SWTP is out of operation for any number of reasons. The GWTP is relied on to meet these peak day demands. Note that the maximum day demands shown above do not occur on the same day and differ from the maximum day demands discussed for the system as a whole in earlier sections. These demand summaries shown per treatment plant and per operational period are important when considering aquifer capacity and seasonal demands on the water system.

1.2.3 Water Loss and Non-Revenue Water

Water losses affect water demand. *Indiana Code* requires that water utilities complete a Water Loss Audit annually, with an independent validation perform every other year. A Water Loss Audit was completed for Speedway in 2020 and the non-revenue water as a percent of water supplied was recorded as 23.5%. Non-revenue water is water that is treated and pumped to the distribution system but is not metered for revenue. Speedway's cost to produce this non-revenue water is $46,030/year and corresponds to 22 gallons per service connection per day. The data validation score was a 69 out of 100. This score reflects the current state of water loss control planning in the system. The full water loss audit can be seen in **Appendix C Attachment 2**.

Indiana Administrative Code (327 IAC 8-2-8.2) states that water loss greater than 25% is considered a deficiency. Potential sources for non-revenue water include master meter errors, unmetered water use (hydrant flushing, fire protection), unauthorized consumption, errors in records, water main breaks, and water main leaks.

Speedway currently replaces approximately 100 meters per year, which includes residential, commercial, and industrial meters with either internal workforce or contracted services. Speedway has approximately 2,500 meters to replace in its system. Recommended meter replacement for residential meters is every 10 years. Based on the current annual budget of $75,000, it will take about 11.6 years to replace the remaining 2,500 meters.

2.0 EXISTING SITUATION

The following is a summary of the current state of Speedway's Water Works, which includes wells, water treatment, water storage, the distribution system, as well as an analysis of the aquifer capacity and current operating capacities of the process system.

As part of this analysis, the Managerial Capabilities of Speedway's Water Works was compiled. The Managerial Capabilities section is required for State Revolving Fund (SRF) submission. If Speedway chooses to apply for a SRF funding opportunities, this section can be utilized for that application submittal. This report is located in **Appendix E.**

2.1 Wells

The Speedway water system currently operates thirteen (13) groundwater wells. All thirteen wells feed the GWTP. **Appendix A, Figure A-1** shows the locations of the existing wells. All well communicates with the GWTP via radio. The wells do not have level transducers to record and trend water levels, and groundwater levels are measured manually.

2.1.1 Aquifer Analysis

A groundwater capacity analysis was performed by Eagon & Associates, Inc. in 2021 as part of this CIP development. A copy of the report can be found in **Appendix C Attachment 3**. The report concluded the information in the following paragraphs.

The wells are located within the Eagle Creek and Little Eagle Creek valleys which are filled with inter-till sand and gravel deposits. Speedway can be divided into two aquifer systems: The Tipton Till Plain Aquifer System and the White River and Tributaries Outwash Aquifer System. The Tipton Till Aquifer System has an expected yield of 50 to 100 gpm and the White River and Tributaries Outwash Aquifer System has an expected yield of 250 to 500 gpm.

The recharge rate for the groundwater aquifer is 2.5 MGD during normal weather and 1.9 MGD during a drought condition. The recharge rates are generally equal to the available continuous capacity of the aquifer. The Speedway GWTP is not the only entity that has wells drawing water from the aquifer. Other users have existing wells and draw around 0.7 MGD in capacity. Subtracting this demand from the overall aquifer capacity leaves 1.8 MGD in normal weather conditions and 1.2 MGD in drought conditions available for drinking water from the groundwater sources. These values represent the upper limit on what can be pulled from the aquifer. However, Speedway is limited by what their wells can actually draw from the aquifer.

2.1.2 Well Capacities and Operating Conditions

The rated and operating capacities of each of the wells are summarized below in **Table 2.1**.

Table 2.1: Existing Wells Capacity Summary

Well No.	*Year Installed*	*Rated Capacity (gpm)*	*Operating Capacity (gpm)*				
			2021	**2019**	**2018**	**2016**	**2012**
2	1935	700	184	448	373	373	584
3	1941	400	216	401	299	228	335
4	1941	350	160	205	234	215	302
6	1950	500	319	413	346	233	402
7R	1991	300	82	82	82	82	94
8R	2014	225	76	136	136	200	100
9	1971	300	146	261	164	205	195
10R	1991	300	76	76	76	96	99
11R	2014	375	276	346	285	351	145
12	1972	500	350	185	257	393	430
13	1972	503	195	237	310	310	314
14R	1999	500	284	372	496	330	402
15	2014	250	217	258	152	225	-
Total Capacity (gpm)		**5,203**	**2,581**	**3,262**	**3,210**	**3,241**	**3,402**
(MGD)		**7.49**	**3.72**	**4.92**	**4.62**	**4.67**	**4.90**
FIRM Capacity (gpm)		**4,503**	**2,231**	**2,972**	**2,714**	**2,848**	**2,818**
(MGD)		**6.49**	**3.21**	**4.28**	**3.91**	**4.10**	**4.06**

**Operating capacities listed for Wells 8R and 11R in 2012 are based on the operating capacities of the wells that were online prior to the new well installations. Operating capacity of Well 7R was carried forward from 2016 and operating capacity for 10R was carried forward from 2018. These two wells were recommended for abandonment in those years and were not tested again in 2021. FIRM capacity is the system capacity with the largest producing unit out of service.*

The capacities shown in **Table 2.1** were measured using short duration pump tests and are not reflective of the long term, sustainable pumping capacity of the wells. Based on this short-term capacity, in 2021 the wells can achieve a firm capacity of approximately 3.21 MGD. However, the adjusted groundwater capacity for 180 days of continuous pumping is approximately 1.2 MGD. During drought conditions, this value drops to 0.8 MGD. Because of their placement and condition, the existing wells operated by Speedway are not able to fully utilize the aquifer's available capacity.

Table 2.2 below summarizes the long-term, sustainable aquifer and well capacities.

Table 2.2 Aquifer and Well Capacities

	Aquifer Capacity Available to Speedway Water Works (MGD)	*Well Capacity (MGD)*
Long-Term Wet Weather	1.8	1.2
Long-Term Dry Weather	1.2	0.8

The difference between the aquifer capacity at Speedway's wells (1.3 MGD normal weather / 0.8 MGD drought) and the total aquifer capacity (1.8 MGD normal weather / 1.2 MGD drought) is small, considering the distribution of the existing wells throughout the aquifer. Based on this, it is not reasonable to conclude that Speedway will increase its groundwater capacity above the values that have been achieved in the past. The focus should be on maintaining current rated capacity and improving operational capacity by replacing existing wells.

As mentioned in **Chapter 1**, the typical operational procedure for the treatment plants is to allow the GWTP to "rest" in the "summer" months of April to October. Usually, the SWTP heavily supplements the GWTP during the "summer" months. During the winter when the SWTP is off and demands are met with groundwater, the groundwater well pumping is occurring during what is typically wet weather. This seasonal wet weather has a higher-than-average recharge, allowing the aquifer to meet the winter maximum groundwater demand (2.7 MGD) that is higher than what the aquifer can continuously sustain in normal weather conditions (1.3 MGD). This seasonal data also confirms the operational philosophy of the water system operations, in that the wells are ran during the winter but allowed to "rest" during the summer months while the burden is shifted to the SWTP.

In 2018, the groundwater wells were not given as much time to "rest" during the summer months as they were previously. This was the result of operational changes made by department personnel at that time. Since then, the well operations have been restored to their former strategy. On days that the GWTP was in operation between 2016 and 2020, four of the five maximum days occurred in the summer of 2018, indicating that the GWTP was not "resting" during these times and the aquifer may not have had time to sufficiently recharge. The GWTP maximum day for 2016-2020 was 3.5 MGD and the FIRM operating capacity of the wells in 2021 was 3.21 MGD. Because of the continued decline in performance, the GWTP maximum day cannot currently be met by the well capacity. This change in operation has lowered the aquifer levels significantly in the past few years. As such, several of the wells are "vortexing", suggesting that the wells are not in good condition. Vortexing occurs when the pumping water level is too close to the pump intake, allowing air entrainment and exposing the pump to cavitation and sever erosion. There is also potential that the aquifer water level could be dangerously close to the well pump suctions indicating local transmissivity issues.

Bastin Logan Water Services Inc. (Bastin Logan) completed well tests/inspections in 2016, 2018, 2019, and 2021. A summary of the well inspection results is included in **Table 2.3** below.

Table 2.3 Summary of Recommendations from Well Inspections

Well No.	Year Installed	2016 Recommendation	2018 Recommendation	2019 Recommendation	2021 Recommendation
2	1935	Chemical clean, possible pump repair	Not listed	Pump and well are OK	Vortexing; clean or decommission to prevent damage
3	1941	Chemical clean	SWL[1] 20′ lower	Well and Pump are OK	Vortexing; clean or decommission to prevent damage; packing box bearing & top shaft bad
4	1941	Ok	SWL[1] 10′ lower, pump repairs needed	Pump and well need attention	Vortexing; clean or decommission to prevent damage
6	1950	Chemical clean	Pump repairs needed	Pump and well are OK	Ok
7R	1991	Decommission	Not listed	Decommission	Decommission
8R	2014	Ok	SWL[1] 14′ lower, Well and pump maintenance needed	Original SWL was 13.8. Pump is off by 100 gpm. Pump was replaced.	Vortexing; should be cleaned or decommission to prevent damage
9	1971	Ok	Well and pump maintenance needed	Well is OK, pump needs attention. Pump was replaced.	Ok
10R	1991	Mechanical clean	SWL[1] 13′ lower	Decommission	Decommission
11R	2014	Concrete repairs	2019 maintenance	Pump is OK.	Ok
12	1972	Re-test in 6 months	SWL[1] 14′ lower, Pump repairs needed	Well and pump are OK.	Chemical clean
13	1972	Ok	SWL[1] 12′ lower, Well and pump maintenance needed	Well and pump are OK.	Vortexing; clean or decommission to prevent damage
14R	1999	Mechanical clean, pump inspection	Ok	Well and pump are OK.	Ok
15	2014	Monitor for maintenance	Well and pump maintenance needed	Not Listed.	Ok

[1]*SWL – Static Water Level*

Overall, the well casings/ boreholes and pumps are aging and need major improvements. It was indicated in the 2021 Bastin Logan report that wells 2, 3, 4, and 6 were "vortexing" and wells 8R and 9 were severely underperforming. Wells will need to be replaced during the study period to continue to meet requirements. The capacity required from the wells is assumed to be the maximum day for the GWTP taken from the MROs between 2016 and 2020 which is 3.5 MGD. This short-term capacity is limited by the well performance. A detailed discussion surrounding the gap between needed and available capacity during the study period is included in **Section 3.1.3.**

2.1.3 Well 2

Well 2 was constructed in 1935. The well has a casing diameter of 26 inches and a gravel pack of 50 inches and is approximately 78 feet deep. It has exceeded the expected 70-year useful life of sand and gravel wells and has been lined twice since it was installed. It was last rehabilitated in 2016 and it was chemically cleaned in 2018. Well 2 does not meet regulatory site setback criteria from existing pavement, so replacing the well at its current location is not a viable option. Well 2 is located on the site of the Speedway Streets Department and Police Station. Redevelopment plans in this area mean this well should be replaced with a new well in another location.

This well has a vertical turbine pump manufactured by Layne, rated for 700 gpm at 200' total dynamic head (TDH). The pump is equipped with a 60 HP, 230/460 V, 1190 RPM, 3-phase US Motors motor. The motor is not inverter-duty rated and is not equipped with a VFD. Bastin Logan performed well testing in 2021 and found that Well 2 was only pumping 184 gpm at 280' TDH. Flow rates higher than this caused vortexing. The well should be shut off or throttled to below 184 gpm to prevent damage until it is cleaned.

Well 2 Pump and Motor

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 450 gpm). Specific capacity is the ratio between the well's operating rate and the drawdown. High specific capacities are an indication of a strong producing well. Specific capacity changes over time are an indication of deterioration of the well, surrounding aquifer, or both. By reviewing specific capacity at equivalent flowrate, flow is normalized and impacts of drawdown are highlighted. Selected data is shown in **Table 2.4**.

Table 2.4 Historic Specific Capacities for Well No. 2

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	26.3	448
2018 Testing	28.2	480
2019 Testing	16.0	448
2021 Testing	11.5	184[1]

[1]184 gpm was the only flow rate reported for 2021 due to vortexing.

Well performance has generally declined since it's specific capacity of 54.5 in 1997. Specific capacity can decrease for various reasons, such as a clogged or dirty well screen, issues with the aquifer, or a larger problem in well performance. This can be restored with regular well maintenance, mechanical cleaning, and chemical cleaning, although it is difficult to fully restore specific capacity to its original value after periods without maintenance.

Well 2 House

Well 2 Underground Room

The well is enclosed in a masonry brick structure. The existing well house is original to the 1935 construction and is showing signs of aging and disrepair such as weathered and failing door/frame, chipping and pealing pipe coatings, and superficial cracks on the concrete structure. There are no site security features around the well house. Some of the piping and valves are located next to the building in an underground room. The valves are very old and are not in good physical or operational condition.

The existing electrical equipment for Well 2 is past its useful life. The environmental conditions in the well house are unsuitable for the electrical equipment and all metal enclosures and terminals are showing signs of corrosion. Personnel safety is the greatest concern when electrical equipment is at the end of its useful life. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option.

The well is not equipped with a standby power generator and does not have provisions for a portable standby without directly wiring into the existing electrical panel which is a significant safety concern. The unit heaters in the well house are not operational.

2.1.4 Well 3

Well 3 was constructed in 1941. The well has a casing diameter of 10 inches and a gravel pack diameter of 42 inches and is approximately 63 feet deep. Well 3 has exceeded the expected 70-year useful life of sand and gravel wells and has been lined at least once. The well is located on the levee of Eagle Creek near the WTP site.

The vertical turbine pump was manufactured by Layne and is rated for 400 gpm at an unknown TDH and is equipped with a 30 HP, 230/460 V, 1760 RPM, 3-phase US Motors Motor. The motor is not inverter-duty rated and is not equipped with a VFD. Bastin Logan performed well testing in 2021 and found that Well 3 was only pumping 216 gpm at 212' TDH. Flow rates higher than this caused vortexing. The well should be shut off or throttled to below 216 gpm to prevent damage until it is cleaned.

Well 3 Pump and Piping

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 285 gpm). Selected data is shown in **Table 2.5**.

Table 2.5 Historic Specific Capacities for Well No. 3

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*27.1*	*271*
2018 Testing	*23.9*	*299*
2019 Testing	*23.9*	*285*
2021 Testing	*21.6*	*216*

Well 3 specific capacity have declined since 1982. The well is underperforming compared to its rated operating point.

Well 3 House

The well is enclosed in a masonry brick structure. The existing well house is original to the 1941 construction and is showing signs of aging and disrepair such as superficial cracks on the structure. The door to the well house was recently replaced and is in good condition. There are security and vandalism concerns with this well house. The well is located outside the fence for the WTP property and does not have any security features. The valves are old and are not in good physical or operational condition.

The existing electrical equipment for Well 3 is in good condition. Because Well 3 is on the site of the water treatment plants, the electrical equipment is located inside the GWTP and was replaced in 2014. Since this well's electrical is connected to the GWTP, it has a backup generator to support operation. There is a unit heater located inside the well house, which is past its useful life. There is not an existing flow meter for Well 3.

2.1.5 Well 4

Well 4 was constructed in 1941. The well has a casing diameter of 18 inches and a gravel pack diameter of 42 inches and is approximately 69 feet deep. Well 4 has exceeded the expected 70-year useful life of sand and gravel wells. Well 4 has been lined. The well was last rehabilitated and cleaned in 2019. Well 4 does not meet the site setback criteria from sanitary so replacing the well at its current location is not a viable option.

The vertical turbine pump was manufactured by Simmons and is rated for 350 gpm at 150' TDH. The pump is equipped with a 20 HP, 230/460 V, 1775 RPM, 3-phase US Motors Motor. The motor is not inverter-duty rated and is not equipped with a VFD. Bastin Logan performed well testing in 2021 and found that Well 2 was only pumping 160 gpm at 141' TDH and at flow rates higher than this it was vortexing. The well should be shut off or throttled to below 160 gpm to prevent damage until it is cleaned.

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 285 gpm). Selected data is shown in **Table 2.6.**

Table 2.6 Historic Specific Capacities for Well No. 4

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*32.1*	*302*
2018 Testing	*13.9*	*278*
2019 Testing	*14.3*	*295*
2021 Testing	*6.5*	*160*[1]

[1]160 gpm was the only flow rate reported for 2021 due to vortexing.

The well is underperforming compared to its rated operating point.

Well 4 House

Well 4 Pump and Motor

The well is enclosed in a masonry brick structure. The existing well house is original to the 1941 construction and is showing signs of aging and disrepair such as superficial cracks on the structure. The well is located within the security fencing for the WTP site. The valves are old and are not in good physical and operational condition.

Similar to Well 3, the existing electrical equipment for Well 4 is in good condition. Because Well 4 is on the site of the water treatment plants, the electrical equipment is located inside the GWTP and was replaced in 2014. Since this well's electrical is connected to the GWTP, it does have a backup generator to support operation. The well house has a unit heater, but it is past its useful life.

Well 4 has an existing flow meter but it is not operational.

2.1.6 Well 6

Well 6 was constructed in 1950. The well has a casing diameter of 18 inches and a gravel pack diameter of 42 inches and is approximately 71 feet deep. Well 6 has exceeded the expected 70-year useful life of sand and gravel wells. Well 6 has been lined at least once. Well 6 does not meet the site setback criteria from existing buildings so replacing the well at its current location is not a viable option. Well 6 is currently located on the site of the Speedway Streets Department and Police Station. Speedway plans to redevelop this area in the next 20 years resulting in the need to relocate this well.

The vertical turbine pump was manufactured by Simmons and is rated for 500 gpm at 213' TDH. The pump is equipped with a 40 HP, 230/460 V, 1770 RPM, 3-phase US Motors motor.

The motor is not inverter-duty rated and is not equipped with a VFD. Flow tests done by Bastin Logan in 2021 indicate that the operating capacity of the pump is 319 gpm at 210' TDH which is below the rated capacity.

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 345 gpm). Selected data is shown in **Table 2.7.**

Table 2.7 Historic Specific Capacities for Well No. 6

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*17.2*	*328*
2018 Testing	*13.8*	*346*
2019 Testing	*22.6*	*295*
2021 Testing	*19.9*	*319*

The original specific capacity of the well was 31.5 gpm/ft and it has generally been declining since then.

Well House 6

Well 6 Pump and Motor

The well is enclosed in a masonry building. The existing well house is original to the 1950 construction and is showing signs of aging and disrepair such as weathered and failing door/frame, chipping and pealing of pipe coatings, and superficial cracks on the concrete structure. The well is located on the Police Department Property but does not have specific security features for the well. The valves are old and are not in good physical or operational condition.

The existing electrical equipment for Well 6 is past its useful life. The environmental conditions in the well house are unsuitable for the electrical equipment and all metal enclosures and terminals are showing signs of corrosion. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option.

The well is not equipped with a standby power generator and does not have provisions for a portable standby without directly connecting to the existing electrical panel which is a significant safety concern. The well house is equipped with a unit heater that is inoperable. The well does not have an existing meter.

2.1.7 Well 7R

Well 7R was constructed in 1991. The well has a diameter of 16 inches and is approximately 69 feet deep. It is located in Leonard Park. The submersible pump is rated at 300 gpm.

Well 7R was tested at rates as high as 240 to 350 gpm between 1992 and 1997. Drawdowns at those rates was in the range of 30 to 35 feet. Specific capacities were 8.0 to 10 gpm/ft. The 2016 Well Test and Inspection report recommended that the well be abandoned because it pumps very little water. It had a specific capacity of 2.2 at 82 gpm in 2016.

Well 7R House

Well 7R Platform and Fence

Well 7R is located on a platform surrounded by a security fence, both of which are in fair condition. There is also a well house near well 7R that is mostly empty but houses electrical equipment. The well house is showing signs of aging and disrepair such as weathered and failing door/frame, chipping and pealing coatings, and superficial cracks on the concrete structure. The well house does not have any security features. The valves are not in good physical or operational condition. Because of its location, a replacement well for 7R will not meet regulatory setback requirements.

The environmental conditions in the well house are unsuitable for the electrical equipment and all metal enclosures and terminals are showing signs of corrosion. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option. This well is not equipped with a standby power generator and does not have provisions for a portable standby without directly connecting to the existing electrical panel which is a significant safety concern.

2.1.8 Well 8R

Well 8R was constructed in 2017. The well has a diameter of 16 inches and is approximately 57 feet deep. Well 8R is located on the levee of Eagle Creek, north of the WTP site. A submersible pump manufactured by Hydroflo Model No. 7835724C rated for 225 gpm at 72' TDH was installed in 2019. The pump is equipped with a 7.5 HP, 3480 RPM, 240V, 3-phase Grundfos motor. The motor is not inverter-duty rated and is not equipped with a VFD. The well was chemically cleaned in 2019. Bastin Logan performed well testing in 2021 and found that Well 8R was only pumping 76 gpm at 112' TDH and at flow rates higher than this it was vortexing. The well should be shut off or throttled to below 76 gpm to prevent damage until it is cleaned. Bastin Logan does not believe that there is sufficient water volume at this location on the levee, and a replacement well at this location should be evaluated against the low production capacity of Well 8R, which is a new asset.

Well 8R Pump and Piping

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 150 gpm). Selected data is shown in **Table 2.8.**

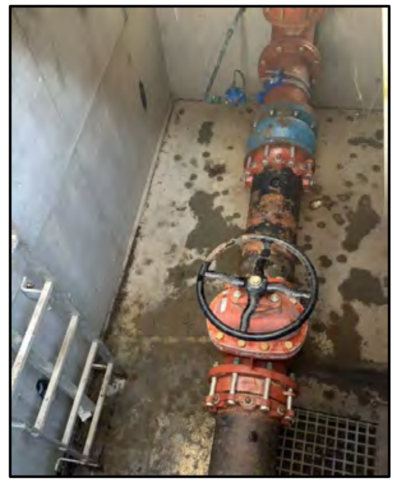
Table 2.8 Historic Specific Capacities for Well 8R

	Specific Capacity	Flowrate (gpm)
2016 Testing	10.8	200
2018 Testing	11.3	136
2019 Testing	11.9	171
2021 Testing	5.5	76[1]

[1]76 gpm was the only flow rate reported for 2021 due to vortexing.

The well specific capacity decreased significantly in 2021.

Well 8R Fence



Well 8R Piping in Vault

The well is enclosed in a security fence and located on a concrete pedestal. The security fence is in good condition however this well is subject to theft and vandalism due to it's remote location. There is a security light located at this facility. A portion of the piping is in an underground vault which is also in good condition. The access hatch to the vault does not have any safety features. The valves in this well are only 5 years old, but their physical and operational condition are deteriorated.

The existing electrical equipment for Well 8 is in fair condition with the starter installed in 2009. The well is not equipped with a standby power generator and does not have provisions for a portable standby without directly connecting to the existing electrical panel which is a significant safety concern. Well 8R has an existing insert meter, but is not connected to SCADA.

2.1.9 Well 9

Well 9 was constructed in 1971. The well has a casing diameter 18 inches and a gravel pack diameter of 36 inches and is approximately 64 feet deep. Well 9 is located on the levee of Eagle Creek, north of the WTP site. A vertical turbine pump was manufactured by Simmons and is rated for 300 gpm at 90' TDH was installed in 2019. The pump is equipped with a 10 HP, 230/460V, 1765 RPM, 3-phase US Motors motor. The motor is not inverter-duty rated and is not equipped with a VFD. The well was chemically cleaned in 2019. 2021 flow tests indicate the operating capacity of the well is 146 gpm at 82′ TDH which is below its rated capacity. Bastin Logan does not believe that there is sufficient water volume at this location on the levee, and a replacement well at this location should be evaluated against the low production capacity of Well 9.

Well 9 Pump and Motor

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 175 gpm). Selected data is shown in **Table 2.9.**

Table 2.9 Historic Specific Capacities for Well No. 9

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*22.7*	*205*
2018 Testing	*9.4*	*164*
2019 Testing	*26.0*	*182*
2021 Testing	*11.1*	*211*

Well performance in 2019 was restored to near the upper end of the well performance range after the pump was repaired, but significantly declined again when tested in 2021.

Well 9 Fence

Well 9 Piping in Vault

The well is enclosed in a security fence and located on a raised platform. The security fence is in good condition. However, this well is subject to theft and vandalism due to its remote location. There is a security light located at this facility. Some of the piping is located in an underground vault which is also in good condition. The valves are old and in poor physical and operational condition.

The existing electrical equipment for Well 9 is in fair condition with the starter installed in 1998 and is reaching the end of its useful life.

The well is not equipped with a standby power generator and does not have provisions for a portable standby without directly connecting to the existing electrical panel which is a significant safety concern. Well 9 does not have an existing flow meter.

2.1.10 Well 10R

Well 10R was constructed in 1991. The well has a diameter of 16 inches and is approximately 64 inches deep. The vertical turbine pump was manufactured by Layne and is rated for 300 gpm at 90′ TDH. The pump is equipped with a 20 HP, 230/460V, 1765 RPM, 3-phase US Motors motor. The motor is not inverter-duty rated and is not equipped with a VFD. Well 10R is producing at a very low capacity and is at a low level performance. As of 2018, the well was producing 76 gm at 90′ TDH which is well below the rated capacity. The 2019 inspection report by Bastin Logan recommended that Well 10R be shut off. The assets at this location should be demolished and the well hole abandoned.

Well 10R Pump and Piping

To evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 80 gpm). Selected data is shown in **Table 2.10.**

Table 2.10 Historic Specific Capacities for Well No. 10R

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*3.2*	*96*
2018 Testing	*2.8*	*76*

The specific capacity of Well 10R was very low in both 2016 and 2018.

Well 10R Fence

Well 10R Piping in Vault

The well is enclosed in a security fence and located on a raised platform. The security fence is in good condition. However, this well is subject to theft and vandalism There is a security light located at this facility Some of the piping is located in an underground vault which is also in good condition. The access hatch to the vault does not have any safety features. The valves are old and not in good physical or operational condition.

The existing electrical equipment for Well 10R is past its useful life. The metal enclosures and terminals are showing signs of corrosion. Personnel safety is the greatest concern when electrical equipment is at the end of its useful life. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option.

The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern.

Well 10R has an existing insert flow meter, but it is not connected to SCADA.

2.1.11 Well 11R

Well 11R was constructed in 2014. The well has a diameter of 16 inches and is approximately 55 feet deep. Well 11R is located on the levee of Eagle Creek, north of the WTP site. The vertical turbine pump was manufactured by Layne and is rated for 375 gpm at 87' TDH. The pump is equipped with a 15 HP, 230/460V, 1780 RPM, 3-phase motor. The motor is inverter-duty rated and is not equipped with a VFD. Flow tests done by Bastin Logan in 2021 indicate that the operating capacity of the well is 276 gpm at 74' TDH which is below its rated capacity.

Well 11R Pump and Motor

In order to evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 400 gpm). Selected data is shown in **Table 2.11.**

Table 2.11 Historic Specific Capacities for Well No. 11R

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*15.8*	*305*
2018 Testing	*20.6*	*285*
2019 Testing	*17.4*	*292*
2021 Testing	*20.4*	*276*

The specific capacity of Well 11R has stayed relatively consistent between 2016 and 2021.

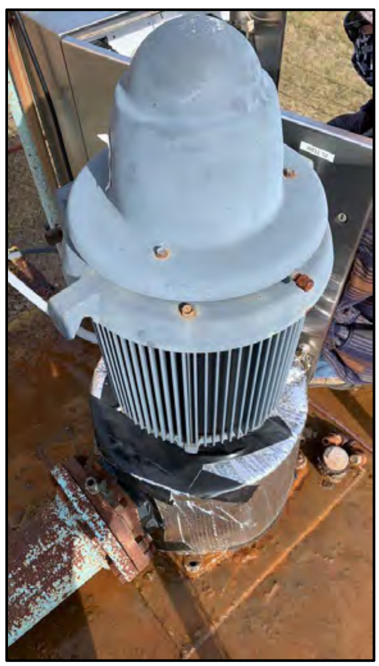
Well 11R

Well 11R is enclosed in a security fence and located on a concrete pedestal. The security fence is in good condition. However, this well is subject to theft and vandalism due to it's remote location. There is a security light located at this facility. Some of the process piping is located in an underground vault, but it was not able to be opened. It is unknown if the access hatch to the vault has any safety features. The valves are seven years old, but are showing signs of deterioration.

The existing electrical equipment for Well 11R is in good condition with the starter installed in 2013. The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern. The well has an existing insert flow meter, but it is not connected to SCADA.

2.1.12 Well 12

Well 12 was constructed in 1972. The well has a casing diameter of 18 inches and a gravel pack diameter of 36 inches and is approximately 63 feet deep. Well 12 is located on the levee of Eagle Creek, north of the WTP site. The vertical turbine pump was manufactured by L&B and is rated for 500 gpm at 74' TDH. The pump is equipped with a 15 HP, 230/460V, 1780 RPM, 3-pase US Motors motor. The motor is not inverter-duty rated and is not equipped with a VFD. The well was last rehabilitated and chemically cleaned in 2019.



Well 12 Pump and Motor

In order to evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 400 gpm). Selected data is shown in **Table 2.12.**

Table 2.12 Historic Specific Capacities for Well No. 12

	Specific Capacity	Flowrate (gpm)
2016 Testing	21.8	393
2018 Testing	28.3	406
2019 Testing	28.2	480
2021 Testing	23.2	437

The results from flow tests in 2018 and 2019 fall within the upper range of results from 1982 through 1997.

In February 2021, Well 12 experienced major damage and has since been repaired. The bottom plate on the casing had rusted through, allowing gravel to fill up the screen. Bastin Logan repaired the well screen and cleaned the well which will now operate at 300-400 gpm.

Well 12

Well 12 Piping Inside Vault

Well 12 is enclosed in a security fence and located on a raised platform. The security fence is in fair condition, however this well is subject to theft and vandalism due to its remote location. There is a security light located at this facility. Some of the piping is located in an underground vault which is in good condition. Valve vault access lid does not have any safety features to protect from falls. The valves are old and are not in good physical or operation condition.

The existing electrical equipment for Well 12 has reached the end of its useful life and is not in good physical condition. The metal enclosures and terminals are showing signs of corrosion. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option.

The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern.

Well 12 has an existing flow meter, but it is not connected to SCADA.

2.1.13 Well 13

Well 13 was constructed in 1972. The well has a diameter of 16 inches and is approximately 59 feet deep. Well 13 cannot be replaced in its original location due to setback criteria requirements from buildings. The vertical turbine pump was manufactured by Layne and is rated for 503 gpm at 92′ TDH. The pump is equipped with a 15 HP, 230/460V, 1770 RPM, 3-phase US Motors motor. The motor is not inverter-duty rated and is not equipped with a VFD. Flow tests done by Bastin Logan in 2021 indicate that the well is operating at 195 gpm at 96′ TDH which is below its rated capacity.

Well 13 Pump and Piping

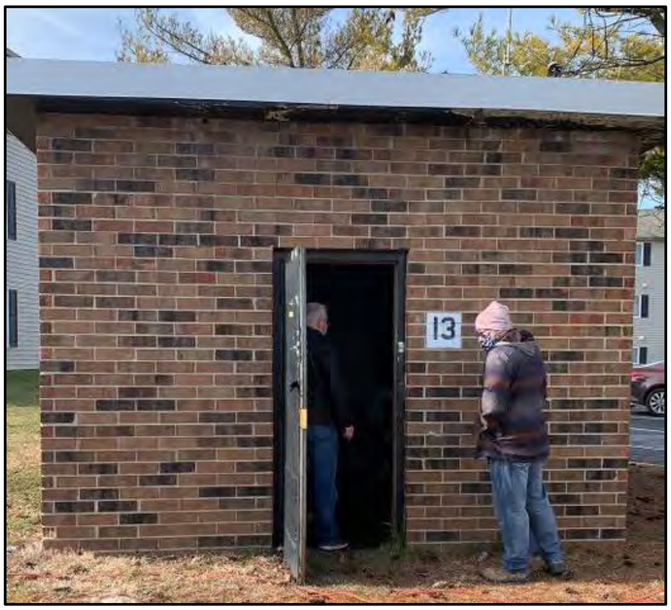
In order to evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 310 gpm). Selected data is shown in **Table 2.13.**

Table 2.13 Historic Specific Capacities for Well No. 13

	Specific Capacity	Flowrate (gpm)
2016 Testing	10.6	329
2018 Testing	11.0	310
2019 Testing	8.9	305
2021 Testing	7.2	195[1]

[1]The well was not tested above 195 gpm.

Well performance from 2018 and 2019 are generally in the middle of the range of results from 1982 through 1997. Well performance continued to decrease in 2021.



Well 13 House

Well 13 House Roof

Well 13 is enclosed in a masonry building. The existing well house is original to the 1972 construction. The existing well house is original to the 1950 construction and is showing signs of aging and disrepair such as weathered and failing door/frame, and superficial cracks on the concrete structure. The roof is in very poor condition with concrete failures exposing the rebar support structure. This well house is located in an apartment complex but is not equipped with security features. The valves are old and are not in good physical or operational condition.

The existing electrical equipment for Well 13 is past its useful life. The conditions in the well house are not ideal for the electrical equipment and all metal enclosures and terminals are showing signs of corrosion. Spare parts for the equipment are also no longer available and if an item were to fail, complete replacement is the only option. Well 13 is equipped with a unit heater, but it is past its useful life. The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern.

The well does not have an existing meter.

2.1.14 Well 14R

Well 14R was constructed in 1999. The well has a diameter of 30 inches and is approximately 62 feet deep. Well 11R is located on the levee of Eagle Creek, north of the WTP site. The vertical turbine pump was manufactured by Layne and is rated for 500 gpm at 110′ TDH. The pump is equipped with a 25 HP, 230/460V, 1775 RPM, 3-phase motor. The motor is not inverter-duty rated and is not equipped with a VFD. Well 14 is consistently one of the best performing wells. Flow tests done by Bastin Logan in 2021 indicate that the well is operating at 284 gpm at 132′ TDH which is below its rated capacity.

Well 14R Pump and Piping

In order to evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 450 gpm. Selected data is shown in **Table 2.14.**

Table 2.14 Historic Specific Capacities for Well No. 14R

	Specific Capacity	*Flowrate (gpm)*
2016 Testing	*25.0*	*448*
2018 Testing	*29.1*	*446*
2019 Testing	*24.8*	*448*
2021 Testing	*28.1*	*456*

The specific capacity of Well 14R has stayed relatively consistent between 2016 and 2021.

Well 14R

Well 14R Piping Inside Vault

Well 14R is enclosed in a security fence and located on a raised platform. The security fence is in good condition, However, this well is subject to theft and vandalism due to it's remote location. There is a security light located at this facility. Some of the piping is located in an underground vault which is also in good condition. The access hatch to the vault does not have any safety features. The valves are not in good physical or operational condition.

The existing electrical equipment at Well 14 is in fair condition with the starter being installed in 2003. The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern.

The well has an existing flow meter, but it is not connected to SCADA.

2.1.15 Well 15

Well 15 was constructed in 2014. The well has a diameter of 16 inches and is approximately 54 feet deep. The submersible pump is rated for 250 gpm at 74′ TDH. Flow tests done by Bastin Logan in 2021 indicate that the operating capacity of the well is 217 gpm at 73′ TDH which is near the rated capacity.

Well 15 Piping

In order to evaluate well performance, specific capacities were evaluated at similar flowrates over time (around 450 gpm). Selected data is shown in **Table 2.15.**

Table 2.15 Historic Specific Capacities for Well No. 15

	Specific Capacity	Flowrate (gpm)
2016 Testing	15.8	185
2018 Testing	12.2	177
2019 Testing	12.9	189
2021 Testing	12.3	173

The specific capacities remained relatively consistent between 2016 and 2019 at maximum pumping rates in the range of about 260 to 280 gpm.

Well 15

Well 15 Piping Inside Vault

Well 15 is enclosed in a security fence and is located on a concrete pad. The security fence is in good condition, however this well is subject to theft and vandalism due to its remote location. There is a security light located at this facility. Some of the piping is located in a vault. The access hatch to the vault does not have any safety features. The valves are only 5 years old, but are showing signs of deterioration.

The existing electrical equipment at Well 15 is in very good condition. The well is not equipped with a standby power generator and does not have provisions for a portable standby, without directly connecting to the existing electrical panel which is a significant safety concern. There is an Endress Hauser Mag Meter in the vault, but it is not operational.

2.2 Water Treatment Plants

Speedway currently operates two (2) water treatment plants – the Surface Water Treatment Plant (SWTP) and the Groundwater Treatment Plant (GWTP). Both treatment plants are located at 5700 West 10th St., Speedway, IN. The location of the treatment plants can be seen in **Appendix A, Figure A-1.** Both treatment plants produce a free chlorine for disinfection.

2.2.1 Capacity Overview

Based on the *Recommended Standards for Water Works,* the firm capacity of the plant is defined as the additive total of individual capacities with the largest capacity piece of equipment out of service. At the GWTP, the filters are the limiting treatment component, at an assumed filter loading rate of 3 gpm/ft^2. This results in a firm GWTP treatment capacity of 9.5 MGD. In the SWTP, the UV systems are the limiting treatment component, with a rated/operating firm capacity of 3.0 MGD. **Table 2.16** shows the current total and firm capacities of both WTPs.

Table 2.16 Treatment Capacities

Treatment Facility	*Total Rated Capacity MGD (gpm)*	*Firm Rated Capacity MGD (gpm)*	*Max. Day Demand MGD (gpm)*
GWTP	11.4 (7,920)	9.5 (6,500)	4.3 (2,960)
SWTP	4.7 (3,260)	3.0 (2,080)	
Total	16.1 (11,180)	12.5 (8,680)	

Typically, a plant is considered at capacity if operating at 90% of its firm capacity. The firm operating capacity of the GWTP alone meets the maximum day demand. The additional capacity of the SWTP furthers exceeds the maximum day demand. The treatment capacity is not an issue. The WTPs can handle more flow than they are currently seeing on maximum demand days. While the GWTP firm capacity is 9.5 MGD, the plant flowrate is severely restricted by the flowrate of the wells.

2.2.2 Treatment Plant Site

The site of the WTPs is surrounded by a security fence with two gated entrances, neither of which are fitted with automatic gate closers, security cameras, or an access control system. Both gates are left open during normal business hours, and the public often parks within the fence to access the levee and Eagle Creek. Easement research was not conducted as part of this study. Restricting access to the WTP site is recommended for safety and security reasons.

A 500 kW, 277/480V MTU OnSite Energy Model DS00500D6SRAH1484 provides standby power to both treatment plants.

The site also has a storage garage that houses extra equipment. The garage is showing signs of aging and disrepair such as weathered and failing door/frame and structural cracks on the block walls and concrete structure. The storage garage should be demolished.

Stone, sand, and gravel are stored in various areas on the WTP site. These materials is used for water main and water service repairs. During wet weather conditions, the material becomes wet and is not able to be installed as backfill until it dries. Additionally, during cold weather seasons, this wet material becomes frozen and is not able to be utilized until it thaws and dries out.

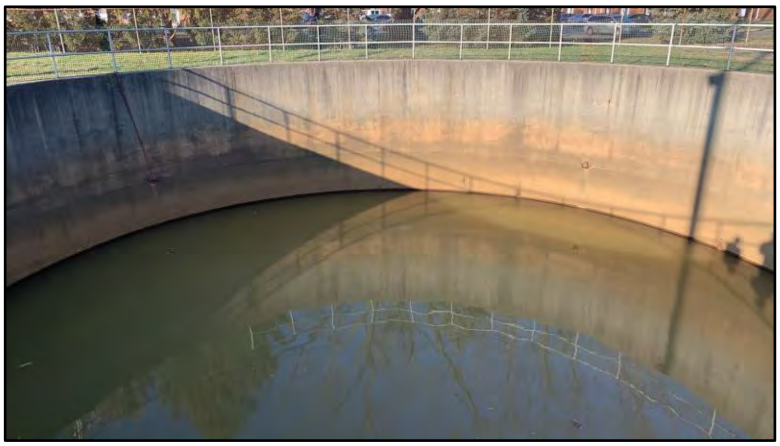
The site has two (2) concrete holding tanks. A converted clarifier is used for intermediate holding of backwash from the GWTP. A surge tank used to store residuals from the sedimentation basins and backwash from both treatment plants. Neither of these tanks were inspected in the last 10 years and their structural conditions are unknown.

The concrete clarifier was constructed with the original GWTP construction in 1972. It is 50 feet in diameter. The clarifier takes backwash water from the GWTP and holds it for a period of time before it gravity flows to the surge tank or directly to the sanitary sewer.

The concrete surge tank was constructed in 1975. It is 60 feet in diameter and has a depth of approximately 16.5 feet deep giving it a volume of approximately 24,800 gallons.

There are two (2) submersible residuals pumps located at a lift station near the surge tank. After holding, the lift station pumps the residuals to the sanitary sewer or to a loading station where a waste truck hauls the residuals off site.

Clarifier



Surge Tank

2.2.3 Groundwater Treatment Plant

The GWTP contains a reaction/detention basin partially below the plant floor, six (6) high service pumps, six (6) pressure filters, control valves, chemical metering and feed equipment, electrical and telemetry equipment, and associated piping. Outside the plant building are four (4) induced draft aerators. A process diagram of the GWTP is included in **Appendix A, Figure A-2.**

GWTP Building

2.2.3.1 Water Quality

Iron and manganese test results from the GWTP are shown in **Table 2.17**. Both the iron and manganese finished water levels are below the EPA Secondary Maximum Contaminant Level (SMCL) of 0.3 mg/L and 0.05 mg/L, respectively.

Table 2.17: GWTP Water Quality Data

	Raw Water (mg/L)	*Finished Water (mg/L)*	*SMCL (mg/L)*
GWTP Iron	0.72	0.02	0.3
GWTP Manganese	0.13	0.02	0.05

Raw water ammonia levels were recorded in 2019, and ranged from 0.27 to 0.66 mg/L. Ammonia is not a regulated water quality parameter but does have a significant chlorine demand. Based on the chlorine doses discussed later in the report, it appears that the ammonia is oxidized in the filters. No other unusual or unexpected constituents have been noted in the raw or finished water.

2.2.3.2 Aeration

Four (4) aluminum induced draft aerators are located on top of the below grade detention tank. The rated capacity of the aerators and blower is not documented. Based on the aerator footprint, approximately 10'x10', they are estimated to be rated at 2,500 gpm each. These aerators were installed with the original plant construction in 1971, are beyond their useful lives, and have not been inspected in the past 10 years. Salvaged intake hoods from another water utility were installed in 2019.

GTWP Aerators

2.2.3.3 Detention

There are two (2) concrete raw water detention tanks, connected by a 20" sluice gate, located partially beneath the interior floor of the GWTP and beneath the filters and aerators outside.

The total tank capacity is 95,000 gallons. The tank was part of the original plant construction in 1971. The interior of the tanks are in good physical condition for their age. The tanks are drained, cleaned and inspected every 3 or 4 years. The exterior surface of the concrete tank roof is spalling and needs repair. The access hatches do not include any safety or security features.

Detention Tank Roof

The detention tanks provide 12 minutes of detention time at the total plant capacity of 11.4 MGD and 14 minutes of detention at the firm operating rate of the GWTP of 9.5 MGD. However, at the existing maximum day for the GWTP (3.5 MGD), the tanks provide 39 minutes of detention time. According to the *Recommended Standards for Water Works,* a minimum of 30 minutes of detention time is required to ensure the oxidation reactions are as complete as possible.

2.2.3.4 High Service Pumps

There are six (6) high service pumps (HSP) at the GWTP. Each pump is a Layne vertical turbine pump, rated at 1,600 gpm and equipped with a 100 HP motor. The pumps were installed with the original GWTP construction in 1971 and are past their useful lives. The motors are not inverter-duty and are also past their useful lives. Pumps 2 and 3 impeller stages are not in good condition and will need to be replaced in the next 5-10 years. The HSPs are in the filter gallery and draw water from the detention tanks. The high service pumps are equipped with soft motor starters, they do not have VFDs. The pumps are normally operated in pairs.

High Service Pump 1

To evaluate the current operating capacities of the pumps, each pump was ran individually and flow was measured at the effluent flow meter after the filters. Operating TDH was not able to be determined because discharge pressure gauges were not installed. Instead, flow was recorded under normal operating conditions (effluent valve closed 50%) and with the effluent valve open all the way. System pressure, detention tank levels, and Meadowood Park Tank level was also recorded. The flow rate information for each of the pumps is summarized in **Table 2.18** below.

Table 2.18 High Service Pump Operating Capacities

HSP	*Flowrate at 50% open (gpm)*	*Flowrate at 100% open (gpm)*
1	1,405	1,556
2	1,250	1,446
3	1,350	1,444
4	1,333	1,597
5	1,270	1,549
6	1,396	1,583

The rated capacity of the pumps is 1,600 gpm. Pumps 1, 4, 5, and 6 are all able to achieve close to this flowrate. Pumps 2 and 3 are under performing. The typical operating scheme of the GWTP is to run the high service pumps against a partially closed (50%) effluent valve to decrease the plant flowrate. Manipulating flowrate by utilizing a valve is not energy efficient, but is common practice when variable frequency drives (VFDs) are not installed.

2.2.3.5 Filtration

There are six (6) steel horizontal pressure filters. Each is 10 feet in diameter and 44 feet in length. The filter faces and face piping are located inside of the GWTP building and the remainder of the filter vessels are located outside of the building above the detention tanks. Each of the filters are two-cell units and are believed to be rated at 1,320 gpm (1.9 MGD) at a filtration rate of 3 gpm/ft^2. Chlorine is not fed before the filters, but those provisions are in place. It is suspected that the filters are also perform a biological function to reduce ammonia in the raw water based on the raw water ammonia levels, chlorine dose, and free chlorine residual. The filters are backwashed using water from the distribution system, resulting in irregular backwash flowrates and flow reversal in the distribution system neat the GWTP.

According to the *Recommended Standards for Water Works,* the filters shall be capable of providing the maximum demand of the system with any filter out of service. The firm rated capacity of the filters is 6,600gpm (9.5 MGD) with one filter out of service, which sufficiently covers the current maximum day demand of GWTP 2,430 gpm (3.5 MGD) and the wells operating capacity of 3.21 MGD.

Pressure filters will experience failure in the coatings and steel on the interior of the vessel before showing signs of deterioration on the outside. This is due to the media within the filter wearing against the failing coating, exposing the metal filter walls and allowing water to corrode the vessel. The interior condition of the vessels is unknown. The filter wall leaks where the filter vessel enters the building. The filter media has not been inspected or replaced in the last 10 years. Typically filter media has a lifespan of 10-15 years, but this range is highly dependent on how the filter is operated and maintained. The access hatches to the interior of the filter are not able to be opened. The exterior of the filter vessels are beginning to show signs of coating failure and corrosion.

Filter Vessel Outside

2.2.3.6 Chemical Feed Systems

Chlorine

The GWTP feeds chlorine gas as their method of disinfection. Chlorine gas is hazardous and potentially lethal if it leaks from a storage container. The existing facilities are near residential and commercial properties which could be impacted by gas leak.

The GWTP is equipped to feed chlorine to the pre-filtration and the effluent line post-filtration. Chlorine gas equipment is stored in a separate room in the GWTP that is accessed from the exterior of the building. The room houses the 150 lb. gas cylinders, scales, chlorine gas detector, injectors, vacuum gas regulators, chlorine gas and liquid chlorine solution plumbing, and observation window, and an exhaust fan. The chlorine room does not contain a chlorine gas scrubber or emergency gas shutoff system, both required by the *Recommended Standards for Water Works*. A scrubber would safely neutralize the chlorine gas in the event of a system failure. Currently, the GWTP feeds an average of 30 lbs. of chlorine gas each day (ppd). With the anticipated demand described in **Chapter 3**, the chlorine demands will also increase, which will impact operation of the chlorine system. This may increase the frequency at which the chlorine gas cylinders will need to be changed. The changing of the cylinders is not only labor intensive but is also the most dangerous of the typical operations in the plant. Increasing the frequency that the gas cylinders are changed puts the operators at risk. While chlorine disinfection is a regulatory requirement, there are other forms of chlorine available that should be considered.

Chlorine Gas Cylinders

<u>Fluoride</u>

The GWTP feeds sodium fluoride to promote dental health in customers. It is fed at an average of 12.7 lbs. of Fluoride per day (ppd). Fluoride feed equipment is stored in a separate room in the GWTP. The room houses two (2) fluoride day tanks equipped with mixers and (2) chemical feed pumps. The equipment is in good operational condition.

Fluoride Room

2.2.3.7 Process Piping, Valves, and Actuators

Process piping in the pipe gallery is welded steel pipe in poor condition. Located inside the GWTP, each filter consists of two (2) 10-inch backwash water valves, two (2) 8-inch raw water valves, one (1) 12-inch filtered water valve, and one (1) 4-inch drain valve. These actuators were replaced with Rotork pneumatic actuator in 2021, but the valves are original to the 1971 construction. The valves in the pipe gallery are in poor operational condition. The filter face valves at the GWTP are wafer type. This means that the valves do not have flanges to secure the valve to the pipes, instead the valve relies on being "sandwiched" or compressed between the pipe flanges. These types of butterfly valves are typically not preferred and generally less robust than their flanged counterparts. New pneumatic actuators were installed on the high service pump discharges in 2014. New pneumatic actuators on the discharge/filter piping were installed in 2021. Many of the valves do not properly seal when closed.

Filter Face Piping

2.2.3.8 Electrical and Controls Equipment

The GWTP has a 480V, 800A motor control center (MCC) as its main power distribution center and was installed in 2014. The MCC appears to be in good condition and is operating without problems. Mission SCADA has been commissioned to control pumping based on the level in the Meadowood Tank. The backwash control panel was installed with the original construction in 1971. It is outdated and operating past its useful life.

Precision Controls of Indianapolis has replaced various SCADA components around the Speedway Ground and Surface water plants, completed in 2019. There are no additions required to the plant SCADA system at the time of this report.

2.2.3.9 Building and Miscellaneous

The coatings on the interior floors, walls, and ceilings of the GWTP are failing. The masonry privacy walls surrounding the aerators and filters are in poor condition. Doors and windows at the plant are aging, drafty and energy inefficient. Air compressors and dehumidifier were installed with the original construction and are now past their useful lives. The wall where the pressure filter face comes into the building is leaking and this construction joint requires attention. The concrete roof of the reaction basin tank (located under the aerators and filters) outside the GWTP is beginning to spall and requires attention. There is a large window and double door located on the south side of the building that is rarely used, glass is damaged, and the steel lintel is beginning to corrode. The office space in the GWTP is outdated and appears to be original to the WTP construction.


Outside Wall


Window and Door at GWTP

2.2.4 Surface Water Treatment Plant

The Speedway SWTP was originally constructed in 1964 and underwent major improvements in 2002 and 2014.


SWTP Building

The SWTP consists of a raw water intake and pumping station, rapid mix, flocculation and sedimentation basins, four (4) mono-media gravity filters, a clearwell underneath the floor, three (3) transfer pumps, three (3) high service pumps, control valves, chemical metering and feed equipment, electrical and telemetry equipment, UV reactors, and associated piping. A process diagram of the SWTP is included in **Appendix A, Figure A-3.**

2.2.4.1 Water Quality

A review of IDEM records shows that Speedway water has not exceeded any regulated water quality parameters in the past 15 years. No other unusual or unexpected constituents have been noted in the raw water in the Speedway system.

2.2.4.2 Low Head Dam

Raw water for the SWTP is drawn from Eagle Creek just west of the water treatment plant site. To enhance the water supply, there is a low head dam located across Eagle Creek. The Low Head Dam was constructed of sheet pile and cast-in-place concrete in 1962 – 1963 in conjunction with the construction of the SWTP. A 2018 report evaluated the structural condition of the low head dam and proposed repairs. This report can be found in **Appendix C, Attachment 4**. The two primary issues regarding the Low Head Dam are the bank erosion on the west side of the creek and water by-passing around the west end of the dam. Impounded water is by-passing the west end of the dam. This is not a new issue, but one that has developed over time. The presence of a large tree, lodged on the dam near the west bank, aggravates the issue by directing flow toward the bank causing further erosion of the stream bank. The west downstream concrete slope wall has been undermined by the creek by-passing the west end of the dam. The creek bank above the concrete slope wall has been eroded and continues to be eroded by high creek flows. Tree roots and an undercut into the existing bank are visible.

Low Head Dam West Bank

2.2.4.3 Raw Water Intake and Pumping

The raw water intake structure is located on the levee of Eagle Creek and outside the WTP site security fence. A new structure intake structure was installed in 2014. The structure consists of submerged filter screens and a 3-inch discharge maintenance sump pump. The intake structure is not fenced in and is part of the Eagle Creek Trail System. The handrail on the steps leading to the intake have been stolen multiple times. The intake is vulnerable due to the ease of access to this facility.

According to the DNR Significant Withdrawal Facilities database, the SWTP is permitted to withdraw 2,100 gpm (3.02 MGD).

Raw Water Intake Structure

The raw water pumping station is located inside the levee, opposite the intake structure and inside the WTP site security fence. This station was constructed in 2014. The station consists of a bar screen and three (3) raw water intake pumps. The intake pumps are American Marsh Pumps Model 13XS rated at 1,100 gpm at 33’ TDH. The pumps are not covered and are inoperable during cold weather conditions. The pumps have not been inspected since installation and pump performance is unknown. The pumps are equipped with 15 HP motors and VFDs. There is one raw water influent flow meter that is located inside the SWTP. This facility experience issues during extreme cold weather conditions that causes the water to freeze, which obstructs flow to the SWTP.

Raw Water Pumping Station and Screens

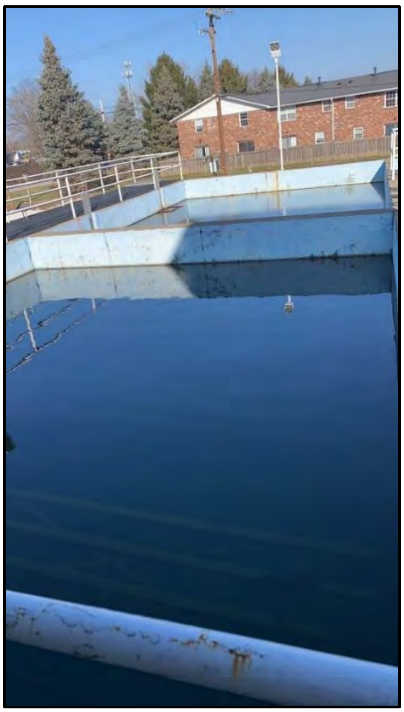
2.2.4.4 Rapid Mix

The SWTP is equipped with two (2) rapid mixing tanks. The purpose of the rapid mixing tanks is to mix the alum and carbon before the raw water enters the flocculation and sedimentation basins. The motors are original to the SWTP construction in 1964. The motors are 1 HP, 1730 RPM, 2240/440V, 3-phase General Electric Triclad Induction Motors Model #5K182HG593. The rapid mixers have not been inspected within the last 10 years.

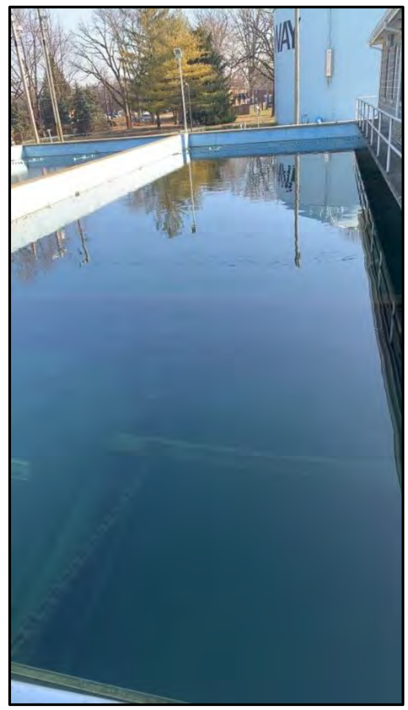
Rapid Mixers

2.2.4.5 Flocculation & Sedimentation Basins

The SWTP is equipped with two (2) flocculation basins and (2) sedimentation basins The flocculator paddles are original to the SWTP construction in 1964 and are well past their useful life. They are not in good physical condition. The sedimentation basins are equipped with four (4) USFilter chain and scraper sludge collectors. The USFilter chain and scraper sludge collectors provide one (1) drive unit for each of the two (2) longitudinal collectors and one (1) for each of the cross collectors. The units consist of sludge flights and a paddle wheel and chain. The drivers and motors for these systems are currently sitting in the walkway between the flocculation and sedimentation basins making it difficult and inconvenient to maneuver around and pose a safety concern regarding a tripping hazard.



Flocculation Basins



Sedimentation Basins

The basin concrete walls are in deteriorating condition. The concrete is spalling and the common wall with the filter building leaks in the lower level. The coating system on the concrete walls is failing. The handrail coating is failing.

The chains and sprockets for the flocculation basins are in a separate room. The chain and sprockets were replaced in 2020 by the Utility. The chain and sprocket room is in poor condition and is a safety concern. The concrete walls are in poor condition, exhibiting pop-outs and cracking with exposed rebar. The floor of the room is slick from grease, access is narrow, and lighting is not present. The sprocket and chain system lacks safety guards.

Exposed Rebar in Chain and Sprocket Room

2.2.4.6 Filtration

The SWTP consists of four (4) mono-media gravity filters. The filter basins are 15 feet by 18 feet. Each filter is believed to be rated at 810 gpm (1.17 MGD) assuming a filtration rate of 3 gpm/ft^2. According to the *Recommended Standards for Water Works,* the filters shall be capable of providing the maximum demand of the system with any filter out of service. The firm rated capacity of the filters is 2,430 gpm (3.5 MGD) with one filter out of service, which sufficiently covers the current maximum day demand of the SWTP of 1,900 gpm (2.7 MGD). The filter media was replaced with new anthracite media and gravel support base in 2012. The filter underdrains appear to be original to the WTP construction. Based on original construction drawings, the underdrain system is believed to be a Wheeler Block type. While an older type of underdrain system, Wheeler Blocks are very durable and long lasting. There is a leak present, between filter basin 3 and filter basin 4. The leak appears to be in the common wall at the backwash troughs. The filters are backwashed with water from the onsite ground storage tank. Each filter cell is filled with a level sensor to monitor filter head-loss.

Filter Room

2.2.4.7 Clearwell

A concrete clearwell is located underneath the bottom floor of the SWTP and serves as a buffer between the filters and ground storage tank. The clearwell is approximately 35 ft x 24 ft with an interior wall height of approximately 8 ft, holding 50,000 gallons. An inspection was completed in 2012 and improvements to address deficiencies were made in 2014. The tank is in good condition.

2.2.4.8 Transfer Pumps

There are three (3) transfer pumps at the SWTP. Each pump is rated at 1,200 gpm at 62′ TDH and equipped with a 25 HP, 1770 RPM, 230/460V, 3-phase US Motors motor. The pumps are American Marsh pumps Model #13MC. The transfer pumps are located in the east basement and pump water from the clearwell through the UV system, into the ground storage reservoir. The transfer pumps and motors were replaced in 2015 and VFDs were added.

Transfer Pump 1 and Piping

2.2.4.9 *UV system*

Two (2) Trojan Swift UV reactors were installed in 2014 to meet the EPA LT2 Enhanced SWT Rule and Stage 2 DPB Rule. Each UV reactor is rated at 3 MGD with a design dose is 40 mJ/cm^2. The reactors operate in a duty/standby configuration.

UV Reactors

2.2.4.10 High Service Pumps

There are three (3) high service pumps (HSPs) at the SWTP. Each Pentair vertical split-case pump is rated at 1,200 gpm at 155' TDH and equipped with an invert-duty 75 HP, 1780 RPM, 460V, 3-phase Marathon motor. The HSPs are in the east basement and were replaced in 2014. These pumps have soft starters and are not equipped with VFDs.

High Service Pump 1

2.2.4.11 Chemical Feed Systems

Algaecide

Speedway feeds EarthTec Algaecide after the raw water intake to prevent algal growth and reduce turbidity in the sedimentation and flocculation basins. The algaecide equipment is housed in a fiberglass building. The equipment consists of a 250-gallon bulk tank, a 50-gallon day tank, and a peristaltic metering pump. On days that algaecide is fed, the average is 22.7 pounds per day (ppd).

Inside Algaecide Building

Carbon (PACL)

Powdered activated carbon is fed into the rapid mix tanks to control taste/odor issues. The carbon equipment is stored in a separate room in the SWTP. The carbon room houses a Merrick volumetric feeder, a motor, a scale, a feed monitor, and an oxygen monitor. The room is also equipped with a unit heater and exhaust fan. The carbon equipment was replaced in 2014 and is in good condition. On days that carbon is fed, the average feed rate is 35 lbs/day.

Alum

Alum (Hyper+Ion 1957) is fed as a coagulant for flocculation. The alum is fed before the rapid mix tanks from equipment is housed in the west basement. The alum equipment consists of two (2) 2,000-gallon bulk tanks, two (2) 50-gallon day tanks, one (1) transfer pump, and two (2) chemical feed pumps. The bulk tanks were installed in 1964 with the original SWTP construction and are past their useful lives. On days that alum is fed, the average is 833 lbs. Bulk deliveries of alum are made by a tanker truck. Bulk deliveries are currently completed within the basement of the SWTP.

Alum Bulk Storage Tank

Alum Feed Pumps

Chlorine Gas

Speedway feeds chlorine gas at the SWTP as their method of secondary disinfection. An evaluation of the existing chlorine feed systems at the SWTP and GWTP was completed in 2016 but no modifications have been implemented. This full study can be found in **Appendix C, Attachment 5.** Chlorine gas is hazardous and potentially lethal if it leaks from a storage container. The existing facilities are in close proximity to residential and commercial properties which could be impacted by gas leak. The facility is not equipped with a scrubber that would be required if a chlorine gas facility was constructed today due to its proximity to residential housing. A scrubber would safely neutralize the chlorine gas in the event of a system failure.

The SWTP is equipped to feed chlorine gas at several points in the treatment process. The chlorination facilities consist of a lower-level gas storage room and an upper-level chlorinator equipment room. The gas storage room contains two 1-ton chlorine containers scales, readout gauge, A/D signal converter, chlorine gas detector, vacuum gas regulators, chlorine gas plumbing, an intake louver, and an exhaust fan. The room is accessed from the exterior of the building. The room does not contain an observation window, emergency shutoff system, or chlorine gas scrubber. The chlorinator room contains four chlorinators, chlorine gas injectors, gas detection equipment, an observation window, exhaust fan, and plumbing for chlorine gas and liquid chlorine solution. This room is also accessed from the exterior of the building and does not contain a chlorine gas scrubber. Facilities that store more than 1,500 pounds of chlorine gas fall under regulatory requirements of the Risk Management Program included in the Federal Clean Air Act which requires annual training and documentation by water works personnel.

Currently, the SWTP feeds an average of 79 lbs. of chlorine gas each day (ppd). With the anticipated demand described in **Chapter 3**, the chlorine demands will also increase, which will impact operation of the chlorine system. This may increase the frequency at which the ton cylinders will need to be changed. The changing of the cylinders is not only labor intensive but is also the most dangerous of the typical operations in the plant. Increasing the frequency that the gas containers are changed puts the operators at risk.

Chlorine Room

Fluoride

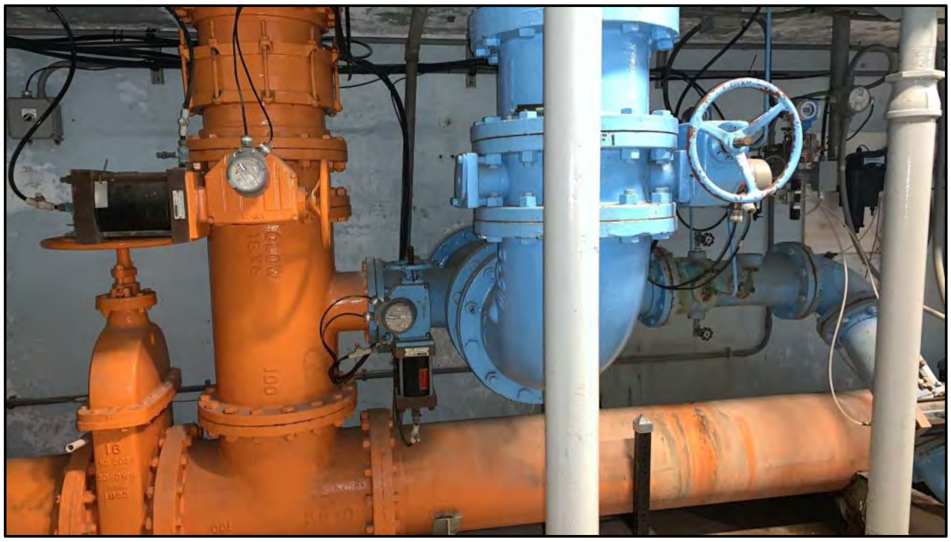
Speedway feeds fluoride post-filtration to promote dental health within the community. The fluoride feed system includes a Merrick Model No. 100V2 Volumerik Volumetric feeder, pump and motor, and scale. The fluoride feed system is located on the first floor of the building and is not contained in an isolated room. The existing fluoride system is not in good physical or operational condition. The system was replaced in 2002. The volumetric feeder is meant to feed silica fluoride, but is being used to feed sodium fluoride which could contribute to operational issues.

Fluoride Feed System

2.2.4.12 Process Piping, Valves, and Actuators

New 8-inch butterfly valves and pneumatic actuators were installed on the high service pump discharges in 2014. New 8-inch butterfly and check valves were installed on the transfer pump discharges in 2014 as well.

Underneath the filters in the basement of the SWTP in the pipe gallery, each filter includes a 12-inch filter influent butterfly valve, a 3-inch surface wash butterfly valve, an 8-inch effluent control butterfly valve, an 8-inch filter to waste butterfly valve, a 14-inch washwater supply valve, and a 16-inch washwater drain valve. These valves and actuators were installed with the 2002 improvements. Each filter also includes a loss of head gauge, a flow meter, and a turbidimeter. These valves and actuators were replaced with the 2002 improvements, but are aging and deteriorating towards poor physical and operational condition.



Filter 1 Pipe Gallery

2.2.4.13 Electrical and Controls

The SWTP has a 480V, 600A motor control center (MCC) as its main power distribution center. The MCC was replaced with the 2014 improvements project. The MCC appears to be in good condition and is operating without problems. Mission SCADA has been commissioned to control pumping based on the level in the Meadowood Tank.

Precision Controls of Indianapolis has replaced various SCADA components around the Speedway Ground and Surface water plants, completed in 2019. There are no additions required to the plant SCADA system at the time of this report.

2.2.4.14 Building and Miscellaneous

General exterior and interior coating work is needed. Windows and doors are aging, drafty, not energy efficient, and need replacement. Air compressors and dehumidifier are past their useful lives. Some safety features need to be added to the facility to protect employees from slips, trips, and falls. Exterior wood trim, fascia and similar items need re-coated. Furnishing, cabinets and fix

The upper level of the building serves several purposes that should be separated, including the control room, lab, superintendent's office, records storage, meter and tool storage, fluoride feed equipment, break room, restrooms, main electrical equipment, and control panels. Relocation of the fluoride feed equipment, meter and tool storage and covering the rapid mix tanks would improve the environmental conditions for plant personnel and sensitive equipment. Renovations of personnel spaces, including offices, breakrooms and the lab are also needed.

The main entrance steps to the SWTP are in poor condition, exhibiting cracking and spalling. The entrance steps are not ADA accessible. Current restroom and locker room facilities are in poor condition and not adequately sized. The facility does not have any female restroom facilities for employees or guests. There is no formal break or meeting room for employees and guests. Office space is also limited, resulting in employees sharing an office.

There currently is not any designated parking in front of the facility, which is used as the main office, therefore employees and guests park on the road or grass/mud. The lack of designated parking spaces also causes sight issues and maneuverability issues.

Basement Walls in SWTP

2.2.5 Water Treatment Plants Operational Strategy Evaluation

According to the *Recommended Standards for Water Works,* the groundwater source capacity must be able to meet or exceed the design maximum day demand with the largest producing well (Well No. 2) out of service. The design maximum day is 4.3 MGD. When comparing the existing system maximum day demands to the system capacity, the existing system can meet existing demands when considering the combined capacity of the groundwater and surface water sources. Neither system can meet the total maximum day demand requirements on its own. **Table 2.19** below summarizes the system demand and the existing capacity.

Table 2.19: Existing Demand and Capacity Summary

	Average Day Demand (MGD)	*Maximum Day Demand (MGD)*	*Sustainable Long-Term Existing System Capacity*	*Short-Term Existing System Capacity*
GWTP (summer)	1.2	3.5	0.8	3.2
GWTP (winter)	2.0	2.9	0.8	3.2
SWTP (summer)	1.9	2.7	3.0	3.0
Total (year-round)	**2.1**	**4.3**	**3.8**	**6.2**

The short-term, maximum day demand (4.3 MGD) can be met with the short-term well capacity (3.2 MGD) and SWTP firm capacity (3.0 MGD) and average day demand (2.7 MGD) can be met with the sustainable long-term capacity of the wells (0.8 MGD) and the SWTP capacity (3.0 MGD). However, comparing the maximum day demand of the GWTP (3.5 MGD) to the short-term existing capacity of the wells (3.2 MGD), there is a shortfall and capacity cannot meet demand.

2.3 Elevated Water Storage Tanks

There are two (2) elevated water storage tanks and one (1) ground storage reservoir in the system. See **Appendix A, Figure A-1** for their locations.

According to the *Recommended Standards for Water Works*, the minimum storage capacity (or equivalent capacity) for systems not providing fire protection shall be equal to the average day consumption. This requirement may be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands of the system. Speedway's storage capacity is greater than the current average day demand of the system, therefore, the utility is able to sufficiently supply water for peak demands and fire events. **Table 2.20** summarizes the water storage capacity.

Table 2.20: Storage Tank Summary

	Ground Storage Reservoir	*16th St. Tank*	*Meadowood Tank*
Tank Type	Ground Storage	Torrus-bottom, spherical-roof	Elevated pedestal spheroid
Capacity (gallons)	1,000,000	1,500,000	500,000

2.3.1 Ground Storage Reservoir

The ground storage reservoir was constructed with the original SWTP construction in 1964. The tank was last taken out of service in 2014 when the new connection from the UV system was made. The tank has a capacity of 1.0 million gallons. The storage tank is located on the site of the water treatment plants, and water from the reservoir is pumped to the distribution system by the SWTP HSPs. The exterior of the tank is in good physical condition. The ground storage reservoir is the backwash water source for the SWTP.

Groundwater Storage Reservoir

2.3.2 16th Street Elevated Storage Tank

Speedway owns an elevated water storage tank located within an existing, permanent utility easement on Indianapolis Motor Speedway property. The tank is located approximately 1,300 feet from the intersection of 16th Street and Olin Avenue. The tank was constructed in 1969 and has a capacity of 1.5 million gallons.

The tank currently floats on the system, without any provisions to monitor tank levels remotely or control pumping based on this tank level. Level in the tank is currently hand calculated based on the reading of an analog pressure gauge tapped off the tank riser pipe. This tank cannot currently be used as a control basis for the WTP HSPs.

The tank was inspected in August 2020 by Tank Industry Consultants (TIC). The results from the inspection as summarized below. The full tank inspection report can be seen in **Appendix C, Attachment 6.**

- The coatings on the exterior, interior dry, and interior wet portions of the tank were in good overall condition at the time of this evaluation and should not require painting for 5 to 7 years.

- If aesthetics are a concern, the tank exterior could be high pressure washed to remove dirt and mildew.
- ANSI/OSHA and Safety-Related Deficiencies
    - The valve vault and riser pit access rung widths are too small,
    - Valve vault and riser pit access rung toe rooms are too small,
    - Spacing between access rungs in the valve vault and is the riser pit exceed the maximum allowed spacing intervals,
    - The valve vault access rungs were not designed to prevent the climber's feet from sliding off the sides of the rungs,
    - Conduit attached to the access ladder could interfere with the unrestricted use of the side rails by the climber,
    - The minimum head clearances on the dry riser, access tube, and interior container ladders were dimensionally too small, and
    - The access opening in the transition cone safety railing was not equipped with a self-closing gate.
- AWWA and Operational Deficiencies
    - The flanged and bolted roof manhole was not locked,
    - There was a gap between the vent neck and vacuum pallet, and
    - Interior overflow pipe is susceptible to accelerated rates of corrosion and ice damage.

16th Street Elevated Storage Tank

2.3.3 Meadowood Elevated Storage Tank

Speedway owns a 500,000-gallon elevated spheroid water storage tank located on Town owned property, approximately 180 feet west of the intersection of School Drive and Beauport Road. The tank was constructed in 1959 and was last rehabilitation in 2018, which included:

- Removing the existing coatings and repainting the exterior portion of the tank
- Removing the existing coatings and repaint the wet interior portion of the tank
- Remove the existing coatings and repaint the dry interior portion of the tank
- Replace overflow pipe
- Address safety-related and OSHA deficiencies
- Address sanitary and AWWA deficiencies
- Replace site fencing
- Replaced tank isolation valves
- Site grading to slope grade away from the tank foundation
- Install an active mixing system.

Meadowood Elevated Storage Tank

2.4 Distribution System

Speedway's water distribution system contains approximately 63 miles (331,000 feet) of water mains, 487 hydrants, and 664 valves. The water mains south of Crawfordsville Rd. are older and are mainly cast iron pipe with bell and spigot and some bolted ball and spigot joints.

Other newer areas are ductile iron pipe with some plastic pipe. Mains range in size from 4-inch and smaller up to 20-inch. A map of the distribution system service area is provided in **Appendix A**, **Figure A-4**.

The distribution system experiences frequent breaks. So far in 2021 alone, more than 20 main breaks have been reported and repaired. This frequent repair is a disruption to other operation and maintenance needs of the system. Personnel working to fix the breaks often struggle finding valves that work to isolate the break and estimate that approximately 50% of the distribution valves are not operational. A water main replacement program, valve exercising program, and hydrant maintenance program are in place. A lead service line replacement program is not currently in place.

Recently, the system has experienced hydraulic issues with the new Founders Square Development coming online (discussed in **Chapter 3**). Hydrant flushing caused several restaurants nearby including Chipotle, Burger King, and Chicago's to experience low water pressure. In addition, Merell Brother's is located adjacent to the Speedway Wastewater Treatment Plant. The facility pulls a significant amount of water from an undersized water main and experiences low water pressure.

According to input from Speedway Water Works personnel, approximately 25% of the 4,201 services lines are lead or have lead goosenecks. All of these service lines are believed to be south of Crawfordsville Road. There are three main areas with old water mains that are known to consist of some lead service lines. The first area is bounded by Lynhurst Dr., 16th St., Main St., and 10th St. The second area is bounded by Speedway Ave., Lynhurst Dr., 16th St., and Main St. The third area is bounded by Speedway Dr., Cunningham Rd., 10th St., and Lynhurst Dr.

The distribution system was recently added to a Geographic Information System (GIS). Utility personnel are actively adding data to this system, including hydrant information, break locations, inoperable valves, and related information. This GIS system will be an important data source as the utility continues to document the conditions in the distribution system.

There are no interconnects with neighboring water system. An interconnect to Indianapolis Water existing on the eastern portion of the system until the 1950's when it was disconnected. Since then, then hydraulic grade of the Indianapolis system has changed at this location, making reinstatement of the interconnect without the addition of a booster station impractical. Also, Speedway utilizes free chlorine for disinfection, while Citizens Water (Indianapolis) used chloramines. These two disinfectants are incompatible for long-term mixing in a distribution system.

3.0 FUTURE SITUATION

During the 20-year study period, water demand is projected to increase while groundwater supply is projected to decrease. The following section estimates the water demand at the end of the study period based on population change and development compared to future groundwater, treatment, and storage capacities.

3.1 Projected Water Demands

3.1.1 Population Projection

This study is based on a 20-year planning period, from 2020 to 2040. The United States Census Bureau conducts the census each decade. **Table 3.1** summarizes the populations of Marion County and Speedway as well as the percent of the Marion County population that lives in Speedway. Marion County's population projection for 2040 was taken from STATS Indiana. The median percent of Marion County's Population in Speedway (1.34%) was used to project the population of the Town of Speedway to 2040.

Table 3.1: Population Projection for the Town of Speedway

Year	Marion County	Speedway Population	% of County
1930	422,666	1,420	0.34
1940	460,926	2,325	0.50
1950	551,777	5,498	1.00
1960	697,567	9,624	1.38
1970	793,769	14,523	1.83
1980	765,233	12,461	1.63
1990	797,159	13,092	1.64
2000	860,454	12,881	1.50
2010	903,393	11,812	1.31
2019	954,670	12,193	1.27
2040	**1,033,719**	**13,889**	**1.34**

The estimated 2040 population is expected to be 13,889. Using the residential per capita demand of 46 gpd calculated in **Chapter 1**, an increase of 0.08 MGD in average day is expected. Using a peaking factor is 2.04, the projected population will increase the maximum day demand by 0.16 MGD.

3.1.2 20-Year Design Demands

In addition to population changes, it is important to consider where development and redevelopment is likely to occur to anticipate future water use. In Spring of 2019, Speedway published its Economic Development Strategic Plan. This plan highlighted three main areas for development and redevelopment. Redevelopment was assumed to be a net zero water use change unless the land use classification was changing. A map showing these areas can be seen in **Appendix A, Figure A-5.**

Development Area 1: East of 465 off the intersection of N High School Road and Crawfordsville Road. Plans for the undeveloped space include a Hampton Inn, Senior Housing, Aldi Grocery Store, and Crew Carwash. As of March 2021, there are still four lots in the space available, which are expected to be mixed-use. This new area is called "Founders Square."

Development Area 2: Redevelopment of the Speedway Shopping Center off of Crawfordsville Road. Multiple concepts for this area are under consideration, but mostly include new tenants of the same classification making future water use unchanged. The addition of a hotel and multi-family residential buildings or mixed-use/ retail and office areas are also expected, which result in additional water use compared to the existing tenants in the space.

Development Area 3: Redevelopment of the area east of Leonard Park on Lynhurst Drive. The area is currently home to the Speedway Police Department and Street Department. The redevelopment includes town homes and an aging in place / mixed-use complex. There is also a vacant building on the corner of 16th St. and Lynhurst Drive that will be redeveloped. It was assumed that this would be mixed-use. All of these areas would result in additional water use compared to the existing tenants.

Water demands were estimated on a demand per unit, with demand types estimated based on expected development type. **Table 3.2** shows the projected increase in demand over the 20-year study period.

The following assumptions from the *Water System Design Manual* were used to calculate the average flow of each area:

- Hampton Inn: 50 gpd/room; 100 rooms/hotel
- Car wash: 120 gal/ car; 400 cars/day
- Aldi Grocery Store: 400 gpd/toilet room; 10 toilet rooms
- Senior Housing: 50 gpd/resident; 1 resident/unit; 100 units
- Mixed-Use: 400 gpd/toilet room; 100 toilet rooms
- Hotel: 50 gpd/room; 100 rooms/hotel
- Multi-family residential: 50 gpd/resident; 3 people/unit; 100 units
- Town Homes: 50 gpd/resident; 3 people/unit; 15 units
- Aging-in-place / mixed-use: 50 gpd/resident; 2 residents per unit; 200 units

Table 3.2. Projected 20-Year Demand Increase

Area	*Type of Development*	*Area (acres)*	*Average Day Demand (gpd)*	*Peaking Factor*	*Max Day Demand (gpd)*
1	Hampton Inn	3.6	5,000	2.05	10,250
1	Crew Carwash	1.4	48,000	2.05	98,400
1	Aldi Grocery Store	1.4	4,000	2.05	8,200
1	Senior Housing	1.8	5,000	2.05	10,250
1	Mixed-Use	7	40,000	2.05	82,000
2	Hotel	3.8	5,000	2.05	10,250
2	Multi-Family Residential	3.5	15,000	2.05	30,750
3	Town Homes	1.8	2,250	2.05	4,613
3	Aging In Place / Mixed-Use Complex	3.2	20,000	2.05	41,000
	TOTAL (rounded)		144,000		295,000

The redevelopment demand increases were added to the population demand to estimate the total anticipated water demand increase for 2040. A summary is provided in **Table 3.3**.

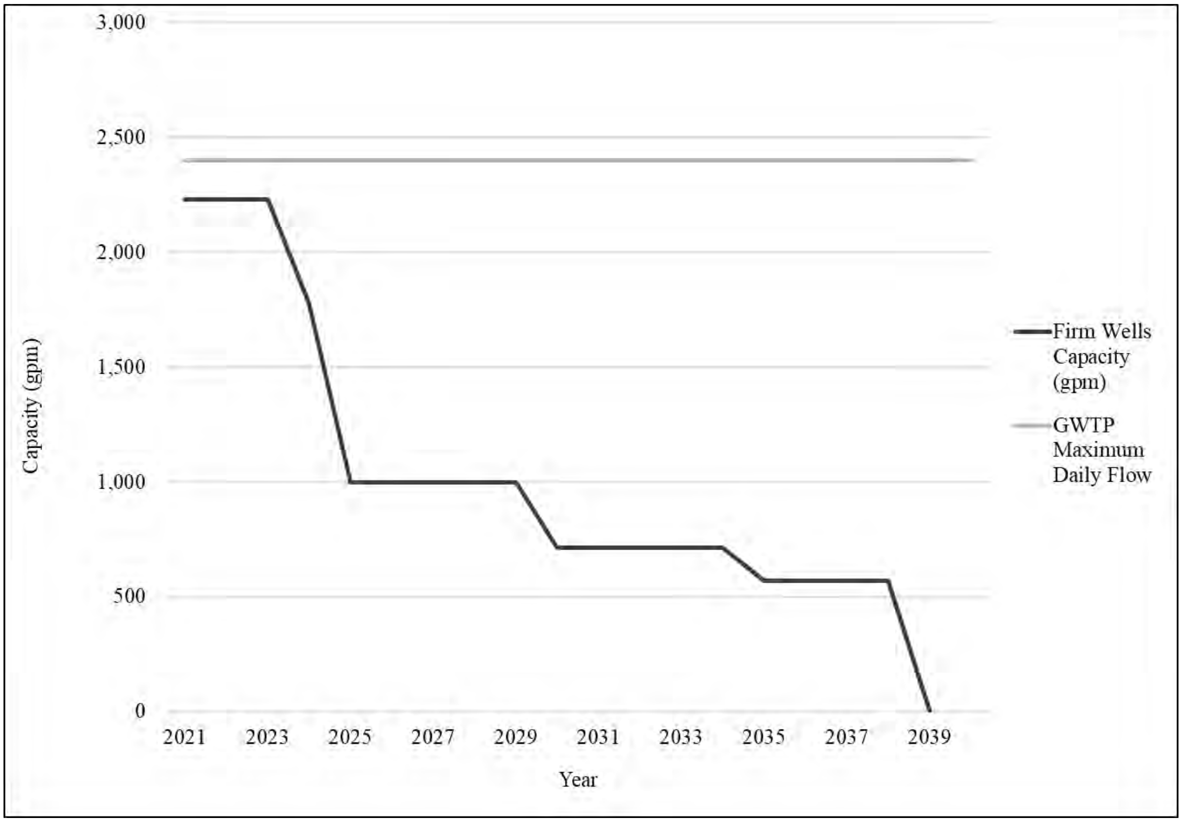
Table 3.3. Projected 2040 System Demand Summary

	Existing 2020 Demand	*Anticipated Residential Increases*	*Anticipated Commercial & Industrial Increases*	*2040 Total*
Average Day	2.1 MGD	0.08 MGD	0.14 MGD	2.3 MGD
Maximum Day	4.3 MGD	0.16 MGD	0.30 MGD	4.7 MGD

3.1.3 Projected Groundwater Capacity

There is a significant chance that the existing wells will fail during the 20-year study period if nothing is done. From 2018 to now, there was approximately a 30% decrease in water pumping from the existing wells. Bastin Logan preliminarily predicts that after 10 years there will be at least a 50% reduction in well capacity and after 20-years well capacity will be completely compromised. **Chart 3.1** shows a prediction of the well failure timeline based on the well's current operating capacity and the water department's input.

Chart 3.1 Predicted Well Failure Timeline



Without any improvements to the wells, by the end of the 20-year study period the wells will provide no capacity to meet the Town's required demands. **Table 3.4** below compares the projected demands and capacities. The Projected Source Capacity is the combined capacity of the groundwater wells and SWTP. The operating capacity of the wells does not meet existing GWTP demands.

Table 3.4 Projected Demand and Capacities

	Existing 2020 Demand (MGD)	*Projected 2040 Demand (MGD)*	*Projected 2040 Well Capacity (MGD)*	*Projected Source Capacity (MGD)*
Average Day	2.1	2.3	0	3.0
Maximum Day	4.3	4.7		

These projections give a strong indication that well improvements are urgently needed.

Since the aquifer is at its capacity limit, the focus needs to be on improving existing well capacity to be able to hit the historical GWTP maximum day (3.5 MGD). To improve existing well capacity and meet projected demands, existing groundwater wells need to be replaced. Not all of the wells can be replaced at the location they are currently at because of site setback criteria. In the event that a new well is installed, potential well sites have been identified.

Section 5.1 details each potential location. In addition to replacing existing wells, operational and maintenance procedures must be improved. Operationally, the GWTP needs to go back to being allowed to "rest" in the summer months so that the aquifer has sufficient time to recharge. Improvements to the SWTP are important to ensure that it can be heavily relied on during the summer. Well maintenance needs to be a priority to extend the lifetime of the wells until new wells can be installed. Immediate well cleaning is necessary to restore well capacity and meet demands for May 2021.

3.1.4 Treatment Capacity

According to the *Recommended Standards for Water Works*, firm treatment capacity shall be designed for the maximum day demand.

Table 3.5 Water Treatment Capacity Summary

Year	*Maximum Day Demand (MGD)*	*Existing Firm Treatment Capacity (MGD)*	*Meets Recommended Standards Requirements*
2020	4.3	12.5	Yes
2040	4.7		Yes

The existing treatment capacity is sufficient to meet the projected maximum day demand.

3.1.5 Storage Capacity

According to the *Recommended Standards for Water Works,* the minimum storage capacity (or equivalent capacity) shall be equal to the average day consumption. This requirement may be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands of the system.

For this analysis, the average day demand is used to determine the storage capacity requirements for the system. **Table 3.6** summarizes the water storage requirements.

Table 3.6 Average Day Water Storage Requirements

Year	*Average Day Volume*	*Existing Storage Capacity*	*Meets Requirements*
2020	2.1 MGD	3.0 MG	Yes
2040	2.3 MGD	3.0 MG	Yes

By determining the required storage requirements using the method above, the Town has adequate storage capacity to meet the projected average daily water usage. Additional storage capacity is not required.

3.2 Anticipated Regulatory Requirements

Several regulatory requirements are anticipated during the study period. Each of these is discussed in the following sections.

3.2.1 Water Loss Audits

Water Loss Audits evaluate how much a water utility pumps and sells. Water utilities experience two types of water losses: apparent and real. Apparent water losses occur when customer water use is not properly measured or billed. Real water losses occur when there are leaks in water mains. The benefit of water loss audits is to identify losses and address them to save money.

Each water utility must complete an AWWA M36 water loss audit annually. In even numbered years, beginning in 2020, the audit must be validated by a certified independent third party. With the results provided to the IFA by August 1st of that year. The IFA then in turn must provide a report to the Legislature by December 15th of that year.

In the 2020 Water Loss Audit, Speedway received a water audit validity score of 69 out of 100 putting them in Level III. There are specific recommendations to improve their score and they are discussed in **Section 5.9.**

3.2.2 Risk and Resiliency Assessment (RRAs)

The EPA states that "each community water system serving a population of greater than 3,300 persons shall assess the risks to, and resilience of, its system. Such an assessment should include:

1. The risk to the system from malevolent acts and natural hazards;
2. The resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
3. The monitoring practices of the system;
4. The financial infrastructure of the system;
5. The use, storage, or handling of various chemicals by the system; and
6. The operation and maintenance of the system.

The assessment may include an evaluation of capital and operational needs for risk and resilience management for the system."

This RRA is due on June 30, 2021. The RRA will need to be completed every 5 years.

3.2.3 Emergency Response Plan (ERP) Update

The EPA states that "No later than six months after certifying completion of its risk and resilience assessment, each system must prepare or revise, where necessary, an emergency response plan that incorporates the findings of the assessment. The plan shall include:

1. Strategies and resources to improve the resilience of the system, including the physical security and cybersecurity of the system;

2. Plans and procedures that can be implemented, and identification of equipment that can be utilized, in the event of a malevolent act or natural hazard that threatens the ability of the community water system to deliver safe drinking water;
3. Actions, procedures and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and the safety and supply of drinking water provided to communities and individuals, including the development of alternative source water options, relocation of water intakes and construction of flood protection barriers; and
4. Strategies that can be used to aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of the system.

Community water systems shall to the extent possible coordinate with local emergency planning committees established under the Emergency Planning and Community Right-To-Know Act of 1986 when preparing or revising an assessment or emergency response plan under the AWIA. Further, systems must maintain a copy of the assessment and emergency response plan for five years after certifying the plan to the EPA."

Once the ERP is completed it is a valuable tool for Speedway to utilize during emergency or threat situations to ensure safety to the public and town employees. ERP's should be updated annually, or when major changes occur in personnel, assets, or processes to ensure this document is updated for implementation.

3.2.4 Cyber-Security Plan

Cyber-attacks are an increasing concern for water utilities and can compromise the ability to provide safe water to customers. All water utilities need to be examined for vulnerabilities in their cybersecurity and develop a risk management program. The Cyber-Security Plan is required as part of the ERP update.

This plan is required to be completed by Speedway and it is recommended to include internal and external contracted IT Managers, I&C system integrators, Third Party Vendors that store sensitive town, employee, or customer information to ensure that this vital information is not at risk.

3.2.5 Risk Management Plan Updates and Compliance Audits

According to the EPA "Section 112(r) of the Clean Air Act amendments requires EPA to publish regulations and guidance for chemical accident prevention at facilities that use certain hazardous substances. These regulations and guidance are contained the Risk Management Plan (RMP) rule. The RMP rule requires facilities that use extremely hazardous substances to develop a Risk Management Plan which:

- Identifies the potential effects of a chemical accident,
- Identifies steps the facility is taking to prevent an accident, and
- Spells out emergency response procedures should an accident occur."

Risk management plan updates and compliance audits are required annually.

3.2.6 Lead Service Line Replacement

As of December 2020, EPA finalized revisions to the Lead and Copper Rule (LCR) to include a suite of actions to reduce lead exposure in drinking water where it is needed the most. The final rule identifies the most at-risk communities to ensure systems have plans in place to rapidly respond by taking actions to reduce elevated levels of lead in drinking water. The main source of lead in drinking water is associated with lead service lines and poses a health risk when consumed by children, individuals which health risks, patients on dialysis, and older populations.

The final LCR maintains the current Maximum Contaminant Level Goal (MCLG) of zero and the Action Level of 15 ppb. The rule requires a more comprehensive response at the action level and introduces a trigger level of 10 ppb that requires more proactive planning in communities with lead service lines. The revisions also include requirements for water systems to prepare an inventory of known lead service lines and to make the inventory publicly available. The final LCR takes a proactive and holistic approach to improving the current rule -- from testing to treatment to telling the public about the levels and risks of lead in drinking water. This approach focuses on the following six key areas: 1) identifying areas most impacted; 2) strengthening treatment requirements; 3) replacing lead service lines; 4) increasing sampling; 5) improving risk communication; and 6) protecting children in schools.

4.0 ASSET MANAGEMENT EVALUATION

Speedway's water system is comprised of hundreds of assets. For the purpose of this report, an asset was considered to be any item related to the operation of the water system exceeding $5,000 in value, or critical to the treatment process. The condition and operation of these assets greatly impact the level of service Speedway can provide to its customers. If the assets are not actively managed, operation and maintenance (O&M) costs continue to increase and can exceed affordable levels. To assist with making decisions on which assets require replacement or maintenance, Wessler completed an asset management evaluation for Speedway's water system. The asset management evaluation identifies assets that are of highest risk to Speedway.

4.1 Methodology

Existing water infrastructure was evaluated to identify areas of concern and risk to the utility. Two methods were used for this evaluation: Business Risk Exposure and System Capacity Evaluation. The system capacity evaluation is discussed in Chapter 3.

To assist with making decisions on which assets pose a high risk, an asset management evaluation was completed for Speedway's water system. The evaluation includes two categories of assets: process and distribution. Process assets include assets at all wells, the water treatment plants, and storage tanks. Distribution assets include water mains, hydrants, valves, and services. This evaluation is considered a "bottom up" approach since it considers individual assets and the effect of a failure on the system.

Field investigations were completed at the Groundwater Treatment and Surface Water Treatment Plants, all wellfield locations, the 16th Street Water Tower, and the Meadowood Water Tower. While conducting field investigations, information was gathered that included physical condition, operational condition, installation year, and photographs of assets. For record keeping purposes, manufacturers, model numbers, and other related data were documented for each asset where possible. Refer to **Appendix D** for asset inventory information.

4.1.1 Business Risk Exposure

A probability of failure and consequence of failure rating was developed for each asset. In addition, the process assets included a redundancy score to indicate the importance of the asset for the utility to meet an acceptable level of service for the community. Using the probability of failure rating, consequence of failure rating, and redundancy score, a business risk exposure (BRE) rating was calculated. The BRE rating has a range of 0 to 25 where the higher the BRE rating, the higher the risk associated with that asset's failure. Different asset index and grading criteria were developed for the process and distribution piping assets. **Chart 4.1** shows the areas of varying risk based on the probability of failure and consequence of failure.

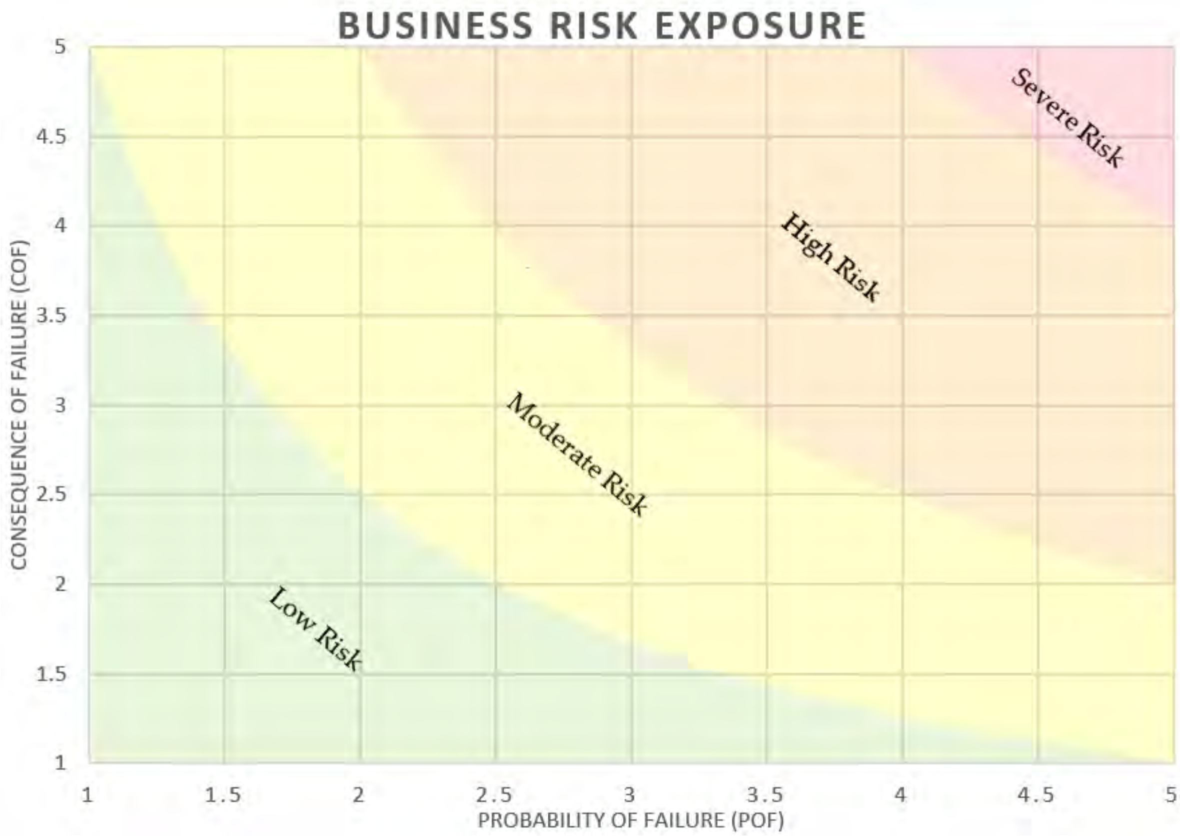


Chart 4.1: BRE Rating Scale Chart

Categories for BRE rating ranges are listed in **Table 4.1.**

Table 4.1: BRE Rating Scale

BRE Rating	*Risk Category*	*Action*
20-25	Severe	Rehabilitate/Replace
10-20	High	
5-10	Moderate	Routine Maintenance
0-5	Low	

4.1.2 Process Asset Ranking

4.1.2.1 Asset Index and Grading Criteria

An asset index and grading criteria was developed for process assets. The grading criteria determine probability of failure, consequence of failure, and redundancy score values needed to determine the asset's BRE rating.

4.1.2.2 Probability of Failure

The probability of failure is the overall rating of weighted criteria for an asset's likelihood of failure. The criteria contributing to the probability of failure include physical condition, age, O&M protocols, repair history, and operational condition. A weight was given to each criterion, with input from Frankfort, to identify the most important criteria. The probability of failure is the weighted average of the criteria ratings.

- **Physical Condition Rating**: The physical condition rating of an asset is based upon the visual inspection, input from the utility on the asset, and historical information such as inspection reports.
- **Age Factor Rating**: The age factor rating is calculated from the age and effective life of the asset. The percentage of its useful life is used to determine the age factor rating. The effective life for each asset is based on the EPA's rating for water assets and previous experience for typical effective life for the assets in Indiana.
- **O&M Protocol Rating**: The O&M protocol rating takes into account whether or not O&M manuals are complete, written or online, and if they are easily accessible.
- **Repair History Rating**: The repair history rating is determined by the number of repairs required for an asset over the past 10 years.
- **Operational Condition Rating**: The operational condition rating evaluates the asset on how well it functions and whether the asset needs to be rebuilt or upgraded. The operational condition received the highest weight factor for the probability of failure criteria.

Table 4.2: Probability of Failure Criteria

Criteria	*Rating*					*Weighting Factor*
	5	*4*	*3*	*2*	*1*	
Physical Condition	Very Poor	Poor	Fair	Good	Very Good	0.8
Age Factor	Greater than 80% of useful life	Between 60%-80% of useful life	Between 40%-60% of useful life	Between 20%-40% of useful life	Age less than 20% of useful life	1.3
O&M Protocols	None	Written/ online, but not complete, not current or location unknown	Written/ online, but not complete, not current or not easily accessible	Complete, written/online, current, but not easily accessible	Complete, written/online, current, and easily accessible	0.3
Repair history	Very Poor (Repaired more than 15 times in the last 10 years)	Poor (Repaired 10 to 15 times in the last 10 years)	Moderate (Repaired 5 to 10 times in the last 10 years)	Good (Repaired 1 to 5 times in the last 10 years)	Very Good (Not repaired in the last 10 years)	1.1
Operational Condition	Not operational and not repairable	Operational but needs to be rebuilt or upgraded	Operational but needs some restoration	Operational with minimal problems	No operational problems	1.5

4.1.2.3 Consequence of Failure

The consequence of failure is the overall rating of weighted criteria for the effect of failure an asset poses to the utility. The criteria included for the consequence of failure are process, financial impact, safety, IDEM compliance, community disruption, and required response time. A weight was given to each criterion, with input from Speedway, to identify the most important criteria. The consequence of failure is the weighted average of the criteria ratings.

- **Process Rating**: The process rating considers how critical the asset is to complete the effective treatment and delivery of clean drinking water.
- **Financial Impact Rating**: The financial impact rating considers the impact of the failure of an asset on the utility's budget.
- **Safety Rating**: The safety rating takes into account the effect of an asset failure on the health of personnel. Safety received the highest weight factor for the consequence of failure criteria.
- **IDEM Compliance Rating**: The IDEM compliance rating evaluates the importance of the asset and whether or not failure of the asset would result in enforcement by IDEM.
- **Community Disruption Rating**: The community disruption rating provides a rating on the area of the community's service interrupted by the failure of the asset.
- **Required Response Time Rating**: The required response time rating considers how quickly Speedway's personnel need to address the issue in the event of an asset failure.

Table 4.3: Consequence of Failure Criteria

Criteria	*Rating*					*Weighting Factor*
	5	*4*	*3*	*2*	*1*	
Process	Mission Critical	Process shut-down	Loss of Redundancy	Potential process	No impact on process	1.17
Financial Impact	May require new borrowing or impact rates	May require transfer from reserves	Absorbed within current budget	Absorbed within applicable line item	Budgeted expense	0.83
Safety	Loss of life	Severe Injury to employees or public	Minor injury requiring treatment off-site or lost time	Minor injury requiring no medical treatment with no lost time	No injury	1.67
IDEM Compliance	Enforcement action by IDEM	Major issue but no enforcement action	Localized issue	Minimal Issue	100% compliance	0.33
Disruption to the community	Long term impact; area wide disruption	Short term impact but substantial disruption	Sporadic service disruptions	Minor disruption	No disruption	1.5
Required response time	1/2 hour	1/2 to 2 hours	2 to 4 hours	4 to 8 hours	> 8 hours	0.5

4.1.2.4 Redundancy Score

The redundancy score is a value from zero to one which accounts for multiple assets of the same type above the required amount for system operation. The redundancy score is calculated by dividing the number of required assets by the total number of assets. For example, if two pumps are required but there are three pumps available, the redundancy score would be 0.67.

4.1.3 Water Distribution Ranking

4.1.3.1 Asset Index and Grading Criteria

An asset index and grading criteria was developed for distribution assets. These assets include water mains, hydrants, and valves. The grading criteria determine probability and consequence of failure score values that are needed to determine the asset's BRE rating.

4.1.3.2 Probability of Failure

The probability of failure is the overall rating of weighted criteria for an asset's likelihood of failure. The criteria contributing to the probability of failure include age, material type, and recent main breaks. Each of these criteria were weighted based on their importance with regard to replacement priorities. The probability of failure is calculated using the matrix described in **Table 4.4**.

Table 4.4: Probability of Failure Criteria

Criteria	Ranking Categories	Probability of Failure Score	Weight
Material Rating	Cast Iron	4	0.30
	Ductile Iron	2	
Age Rating	1939 or earlier	5	0.50
	From 1940 to 1959	4	
	From 1960 to 1979	3	
	From 1989 to 1999	2	
	After 2000	1	
Recent Breaks Rating	Yes	5	0.20
	No	3	

4.1.3.3 Consequence of Failure

The consequence of failure represents the effect of failure an asset poses to the utility. The criteria contributing to the consequence of failure include pipe size and input from the Town on the replacement priority of different areas. The consequence of failure is calculated using the matrix described in **Table 4.4**.

Table 4.4: Consequence of Failure Criteria

Criteria	Ranking Categories	Probability of Failure Score	Weight
Prioritization Rating	Yes	5	0.15
	No	2	
Size Rating	14″ or more	5	0.85
	10″ to 12″	4	
	8″	3	
	4″ to 6″	2	
	3″ or less	1	

4.2 Results

The asset grading of individual criteria resulted in a BRE rating for each asset. To determine the assets that need to be rehabilitated or replaced as a part of the Capital Improvements Plan, the BRE rating was used.

It is important to recognize the that almost all of Speedway's treatment assets produced BRE ratings lower than 10. However, it is evident that there is a need for more groundwater capacity and the groundwater wells had high BRE scores.

Business risk results have been compiled for all assets. The top 25 highest BRE scores have been compiled for process assets and the top 25 highest BRE scores for distribution assets, and are available in the following tables, organized by asset type. For a complete list of all asset inventory results, refer to **Appendix D.**

4.2.1 Process Asset Results

Table 4.5. Top 25 Highest BRE Process Assets

Asset Description	Probability of Failure	Consequence of Failure	Redundancy Score	BRE
Well Assets				
Well 2 Casing	4.78	4.39	1.00	20.98
Well 6 Casing	4.78	4.39	1.00	20.98
Well 7R Casing	4.48	4.39	1.00	19.66
Well 10R Casing	4.48	4.39	1.00	19.66
Well 3 Casing	4.26	4.25	1.00	18.11
Well 4 Casing	4.26	4.25	1.00	18.11
Well 13 Casing	4.06	4.25	1.00	17.26
Well 9 Casing	3.90	4.25	1.00	16.58
Well 12 Casing	3.68	4.25	1.00	15.64
Well 8R Casing	2.90	4.25	1.00	12.33
Well 14R Casing	2.64	4.25	1.00	11.22
Well 11R Casing	2.52	4.25	1.00	10.71
Well 10R Casing	4.08	3.00	0.85	10.36
Well 15 Casing	2.38	4.25	1.00	10.12
Electrical Assets				
Well 2 Disconnect	3.82	3.56	1.00	13.58
Well 2 Motor Starter (RVSS)	3.38	3.92	1.00	13.24
Well 6 Disconnect	3.82	2.94	1.00	11.25
Storage Assets				
16th St. Tank	3.18	3.75	1.00	11.92
Tank Assets				
Sedimentation Tanks	3.04	3.67	1.00	11.15
Flocculation Tanks	3.04	3.67	1.00	11.15
Chemical Assets				
SWTP Fluoride powder volumetric feeder	4.20	2.61	1.00	10.97
SWTP Chlorine Rate Tube Distribution	2.32	4.44	1.00	10.31
SWTP Chlorine Injector Distribution	2.32	4.44	1.00	10.31
SWTP Chlorine Solenoid Distribution	2.32	4.44	1.00	10.31
Building Assets				
Low Head Dam	3.42	5.00	1.00	17.10

There were two process assets that produced BRE ratings in the severe risk category (well 2 and 6) and twenty-four that produced BRE ratings in the high-risk category. The process assets that are of high risk include the rest of the groundwater wells, well electrical assets, flocculation and sedimentation basins and chains and sprockets, GWTP clearwell, SWTP fluoride and chlorine feed systems, and the 16th St. Elevated Storage Tank.

4% of process assets are in the high-risk category.

The rest of the assets scored in the moderate or low categories. Low scored assets can be attributed to the redundancy that having two water treatment plants as part of the system.

As discussed in **Chapter 2**, the groundwater wells are aging and deteriorating. They are in poor condition and not producing at rated capacity (6.5 MGD firm rated vs. 3.2 MGD firm operated). The operational issues and needed repairs coupled with the importance of the groundwater wells have led to the high BRE scores. Wells will need to be replaced over the course of the 20-year study period. Proposed alternatives to need these needs are discussed further in **Chapter 5**.

Many of the other high-risk assets are past their useful life and need replacement or rehabilitation including the tanks and chemical assets listed in **Table 4.5.**

4.2.2 Distribution Asset Results

The COF and POF of the distribution system can be seen graphically in **Appendix A, Figures A-6 and A-7.** BRE results for the distribution system can be seen graphically in **Appendix A, Figure A-8.** Results are also summarized in **Chart 4.2, Chart 4.3, and Chart 4.4**.

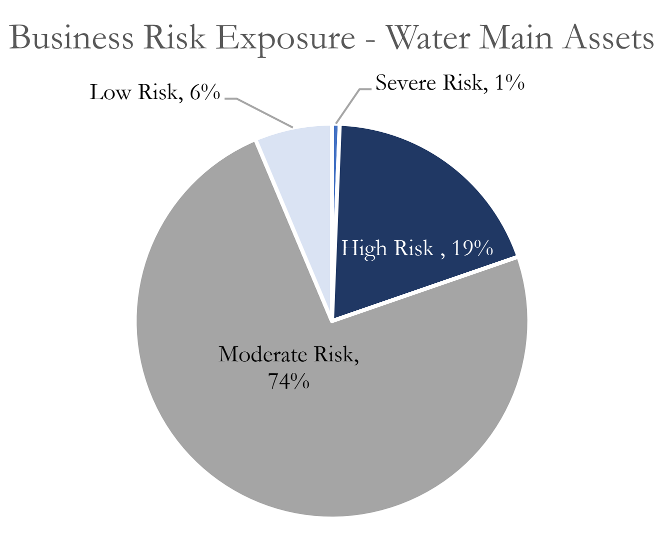


Chart 4.2: Business Risk Exposure Results – Water Main Assets

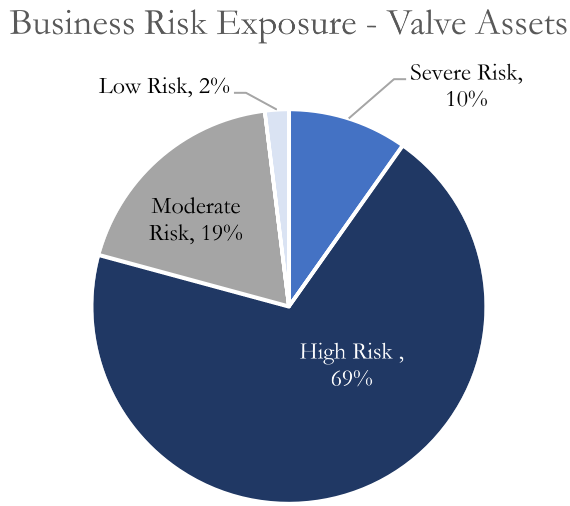


Chart 4.3: Business Risk Exposure Results – Valve Assets

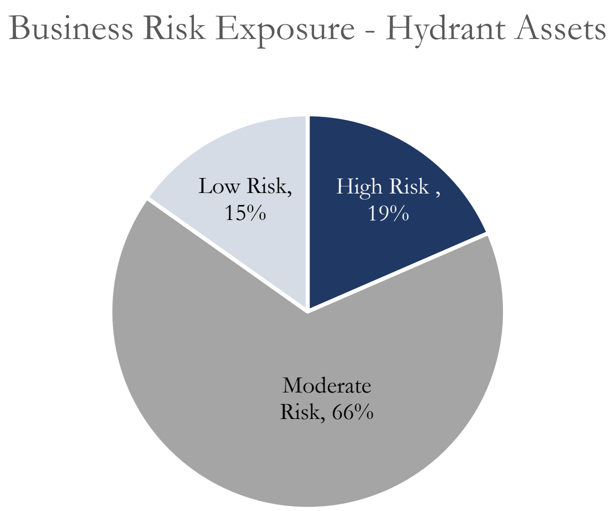


Chart 4.4: Business Risk Exposure Results – Valve Assets

20% of the water mains, 79% of the valves, and 19% of the hydrants in the system were considered "high" or "severe" risk. These mains, valves, and hydrants scored higher as a result of their age, material, size, and lack of looping. Speedway's water main replacement program will prioritize the replacement of these higher-risk areas over the 20-year planning period.

Areas were identified that potentially contain lead water service lines on the utility owned as well as customer owned water service line are identified as "high" risk and are to be prioritized for replacement in the 20-year plan. This area contains an estimated 1,050 lead service lines or service lines with lead goosenecks.

5.0 EVALUATION OF ALTERNATIVES

Once the assets were assigned a BRE score, improvements were developed using a combination of asset inventory information and capacity need information. Since the BRE rating and capacity criteria are based upon a set of objective and quantitative components, the subjective input for the development of projects is minimized. As a result, the BRE rating and capacity assessments allow improvements to be developed and prioritized based upon risk and need for Speedway.

The recommended improvements, resulting from studying the capacity needs and business risks of the utility, have been grouped into projects for the Capital Improvements Plan and are described in this chapter.

5.1 Water Supply Improvements

Alternative WS0: No Action

As stated in **Chapter 2**, the capacity of the groundwater wells in 2018 was limited to 3.5 MGD. However, due to recent (over the past three years) operational strategy changes with the wells, this capacity has been further reduced to 3.2 MGD. Recent operational changes to the wells has overstressed the aquifer, lowered static water levels in many cases, and contributed to mechanical equipment degradation at the wells. If a no action alternative is pursued, the maximum demand for the GWTP will not be able to be provided. For these reasons, the no action alternative will not be considered. As such, an alternative evaluating less dependance on the groundwater source was considered as well as alternatives to upkeep and improve existing groundwater capacity.

Alternative WS1: Operate SWTP Year-Round

This alternative considers an operational change only, increasing the amount of runtime on the SWTP and decreasing the runtime on the GWTP, and resultantly the wells. The firm rated capacity of the SWTP is 3.0 MGD, however it typically operates at 1.9 MGD. The existing maximum day demand is 4.3 MGD, and the projected maximum day demand is 4.7 MGD. As the WTP's are operated now, the GWTP typically carries 1.6 MGD and SWTP typically carries 1.9 MGD. This alternative maximizes the usage of the SWTP, essentially operating it 365 day a year, 24 hours a day. By operating the SWTP at its firm capacity, the SWTP can handle the projected average day and the GWTP and wells would only be required to produce 1.7 MGD of the projected maximum day demand. This capacity is much more feasible with today's physical conditions of the aquifer and groundwater wells.

Historically, this operational strategy has been met with resistance, primarily driven by operational concerns of the WTP freezing and personal staffing. Freezing has been an issue at the intake and intake pumps. This is being addressed with Alternative SR2, by enclosing the pumps and protecting them from harsh weather conditions. Staffing also must be considered, as the operation of the SWTP requires premium salaried employees, with a WT5 Operators Certification. Preliminary discussions with Operators indicate that an additional

2-3 WT5 Certified Operators would be required to run the SWTP 365 days a year, 24 hours a day.

This alternative should be evaluated further to understand the operational differences and financial impacts compared to the existing operational strategy. A pilot test to run the SWTP all year should be started this winter. Each operational strategy presents unique expenses and savings to the bottom line. The existing operational scheme (maximizing GWTP capacity) requires significant capital and maintenance investment over the planning period, to increase and sustain existing well capacity. On the other side, maximizing SWTP capacity requires significant staffing expenses and increased maintenance in the SWTP.

The estimated cost of this alternative is **$350,000**.

Alternative GS1: Well Cleaning

Speedway must immediately proceed with cleaning of all wells to maintain current well capacity. For wells with potential vortexing flow conditions, throttling well flow rate or removal from service may be necessary before cleaning to prevent damage to existing wells. Refer to the 2021 Bastin Logan inspection report in **Appendix C, Attachment 7** for specific details. Historically, wells have been cleaned on a 3-year rotating schedule. For the next few years, the water department should perform enhanced well cleaning until the well capacity is restored, then evaluate if a return to the historic well cleaning process is appropriate. An estimate budget of **$120,000** per year should be considered for the near term well cleaning and repairs.

Alternative GS2: Rehabilitate Existing Groundwater Wells

The work in this alternative consists of rehabilitation of all existing wells except for wells 7R, 10R, 2 and 6. Wells 7R and 10R were recommended by Bastin Logan to be shut off due to insufficient water production. Wells 2 and 6 will be abandoned when redevelopment of the site occurs within 20-year study period. This rehabilitation will replace assets that are past their useful lives or in poor operational condition, will increase safety, and provide operators with more information (i.e. flow and groundwater levels) to make more informed decisions about which wells should be running.

Existing well rehabilitation includes:

- Well House/Platform Improvements
- Installing flow meters connected to SCADA
- Replacing heating units (for wells in houses)
- Enhancing security lighting
- Adding safety features for access hatches into manholes and vaults
- Replacing all valves
- Level sensors to measure groundwater level
- Door replacement (for Well Houses 4 and 13)

Wells 3, 4, and 13 are located in well houses while wells 8R, 9, 11R, 12, 14R, and 15 are located on platforms and surrounded by security fences.

The estimated cost of this alternative is **$509,000**. A detailed cost estimate for each well being rehabilitated under this alternative is included in **Appendix B, Tables B-1** through **B-9**.

Alternative GS3: Install VFDs on Well Pumps

The work in this alternative consists of installing VFDs at all wells except 2, 6, 7R, and 10R and replacing the motor, if it is not inverter-duty rated. The value of installing VFDs is that if the Town sees the water levels dropping (as measured by a new submersible level sensor, installed in Alternative GS2), rather than shut off a well, they could lower the flow rate until the groundwater levels stabilize. This would allow the Town to maximize aquifer output while preventing strain or over pumping. Installing VFDs would increase the operational flexibility of the groundwater system.

The wells that do not have inverter-duty rated motors and would need to be replaced are:

- Well 3
- Well 4
- Well 8R
- Well 9
- Well 10R
- Well 12
- Well 13
- Well 14R
- Well 15

The estimated cost of this alternative is **$203,000**. A detailed cost estimate for each well being rehabilitated under this alternative is included in **Appendix B, Table B-10**

Alternative GS4: Replace Groundwater Wells

As discussed in Chapter 3, wells are likely to fail during the 20-year study period. If capacity is not replaced, there will be a gap between the required capacity for the GWTP and the capacity the wells are capable of providing.

Existing wells need to be replaced to improve capacity. Wells 2, 4, 6, 7R, and 13 cannot be replaced at their original location due to site setback criteria so additional new well locations were identified. In addition, it is not recommended to replace wells 7R, 8R, 9, 10R because a lack of groundwater capacity in the area as seen by the performance of the existing wells. Existing locations of wells 3, 11R, 12, 14R and 15 were all evaluated for new wells. Wells 11R, 12, and 14R are located in the same vicinity and were grouped as one site called "Eagle Creek Levee North." Wells 3 and 4 are both located on the WTP site and were grouped as one site called "WTP Property." A map showing these well locations is included in **Appendix A, Figure A-9.** The locations were ranked based on the distance to the raw water main, predicted water quality, predicted water quantity, available property, site constraints, and the potential for installing multiple wells on the site. The ranking criteria and resulting scores can be seen below in **Table 5.1.**

The construction work for each well location option in this alternative consists of:

- Test/production well drilling
- Well Pump, VFD, Motor, Drop Pipe & Appurtenances
- Well Structure (either wellhouse, platform, or below grade vault)
- Generator, Electrical & Controls
- 8-inch Raw Water Main, Valves, Water Meter, Sample Station, Level Sensor
- Asphalt Entrance Drive, Site Fencing & Gates

Table 5.1 Criteria for Well Site Evaluation

Criteria	*Ranking Categories*	*Ranking Scores*
Well Capacity	Predicted low well capacity (<100 gpm)	1
	Predicted medium well capacity (100 – 199 gpm)	3
	Predicted high well capacity (>200 gpm)	5
Water Quality	Confirmed constituent of concern	1
	Suspected constituent of concern	3
	No known constituent of concern	5
Available Property	Need to condemn property	1
	Town does not own, but can obtain	3
	Town owns property	5
Site Constraints	Not feasible	Site Eliminated
	Doesn't meet setback now, but could with site modifications	3
	Meets setback requirements	5
Distance to Raw Water Main	>2,000 feet from raw water main	1
	Between 500 and 2,000 feet from raw water main	3
	<500 feet from raw water main	5
Potential for Multiple Wells	Only one well feasible	1
	Multiple wells feasible	5

Table 5.2 Well Site Scores

Site Selection	Well Capacity	Water Quality	Available Property	Site Constraints	Distance to Raw Water Main	Potential for Multiple Wells	Total Score
(1) Junior HS	5	5	5	5	3	5	28
(2) WTP Property	3	5	5	3	5	5	26
(3a) South of B&O Trail	5	5	3	5	3	5	26
(3b) Whitcomb Ave. & Cunningham Rd.	3	5	3	5	5	5	26
(3c) Eagle Creek Levee North	5	5	1	5	5	5	26
(6a) HS / Fire Dept.	5	3	5	5	1	5	24
(6b) Well 15 Property	3	5	1	5	5	5	24
(6c) Cadillac Triangle Property	1	5	5	5	3	5	24
(9) South of 16th St. & Cunningham Rd.	1	5	3	5	3	5	22
(10) Meadowood Park	5	1	5	3	1	5	20
(11) Carriage House West	1	5	1	3	5	1	16

The rankings for each well location are discussed in more detail in the following sections as well as the next steps the Town needs to take to install a new groundwater well and the advantages and disadvantages of each well site are discussed in the following sections. Generally, the steps to be taken at each site consist of:

1. Coordinate with Property Owner for access/permission. Secure options to purchase.
2. Field locate the proposed test well, considering utility locates and setback requirements.
3. Contract with a well driller and drill preliminary test wells at sites and test water quality.
4. Take water quality samples.
5. Conduct a water quality and treatment analysis to determine if the existing GWTP can treat the water, or if additional treatment processes are necessary.
6. Update cost estimates listed in this report to account for variations in water quality, aquifer conditions, and expected well capacity.
7. Re-confirm that the site remains viable.
8. Proceed with land acquisition.

9. Drill Test/production wells.
    a. Complete a New Well Site Survey.
    b. Obtain any local permits
    c. Determine production well casing size and drill production well.
    d. Perform well performance testing.
    e. Determine well yield, aquifer influence and establish pump design parameters.
10. Design and permit the site for a new production well (and raw water mains, as needed).
11. Construction new well, raw water mains, and appurtenances.

Some sites, such as the Meadowood Park and locations of existing wells already and sufficient data to proceed to steps beyond step 1. Confirmation of existing well site status and individual starting point is recommended for each location. The cost estimate for Meadowood Park reflects drilling two wells because it was further studied than the other locations. The cost estimates for the other potential well sites include drilling one well.

5.1.1.1 Site Selection 1: Junior High School

The Junior High School well site is near existing wells 2 and 6 which have historically been two of Speedway's best performing wells. This indicates that a new well site will likely have good capacity and quality. Since it is near wells 2 and 6, this well site is located near the raw water main allowing a short amount of water main to be installed to connect the new well. The site is school property owned by the Town. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot buffer can be seen in **Appendix A, Figure A-10.**

The estimated cost of this alternative is approximately **$900,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-11**.

5.1.1.2 Site Selection 2: WTP Property

These well sites are located on the property of the water treatment plants near existing well 4. Wells 3 and 4 provide capacity in the middle range of the wells and have adequate water quality. It is assumed that new wells at this site will be similar. This site is preferable because it is already owned by Speedway and is adjacent to the WTPs. There would need to be some modifications to meet well setback requirements including relocating sanitary sewers. There is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-11.**

The estimated cost of this alternative is approximately **$753,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-12**.

5.1.1.3 Site Selection 3a: South of B&O Trail

This well site is located near existing wells 2 and 6 and the raw water main. Wells 2 and 6 are two of Speedway's best performing wells, indicating that this new well site will have good capacity and quality. The Town of Speedway does not own the property and it would need to be purchased. Tree clearing would be needed in this area. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-12.**

The estimated cost of this alternative is **$994,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-13**.

5.1.1.4 Site Selection 3b: Whitcomb Ave. & Cunningham Rd.

This well site is located between Wells 13, 10R, and 7R and the raw water main. Well 13 produces in the middle range of capacities for Speedway's wells while 7R and 10R produce on the low end of capacities. All these existing wells provide adequate water quality. It is assumed that the capacity of this well site will fall in between 13 and 7R/10R. The potential well site is privately owned and would need to be purchased by the Town. Tree clearing would be required at this site. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-13.**

The estimated cost of this alternative is **$1,168,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-14**.

5.1.1.5 Site Selection 3c: Eagle Creek Levee North

This well site is located where wells 11R, 12, and 14R are located. These wells produce close to the upper end of capacities and have adequate water quality. The property is owned by the Flood Board of Indianapolis. There have been difficulties in the past working with the Flood Board to obtain land to drill more wells. There is enough space on this site to meet setback criteria and the potential to install multiple replacement wells. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-14.**

The estimated cost of this is **$742,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-15**.

5.1.1.6 Site Selection 6a: High School / Fire Department

This well site is not near any existing wells making it far from the existing raw water main. It is located near where preliminary test wells were drilled at Meadowood Park. It is predicted that the well capacity will be good, but the quality may not be. It is located near the Coca-Cola Bottling Factory which could potentially contaminate the groundwater in the area. The site is located on school property. The preferred well location would be west of the track and practice fields. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-15.**

The estimated cost of this alternative is **$2,333,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-16**.

5.1.1.7 Site Selection 6b: Well 15 Lot

These well sites are located on the same property as Well 15. That said, raw water main piping required would be minimal. Well 15 provides capacity on the lower end of the range for Speedway's wells but provides adequate water quality. It can be assumed that new wells in this area would provide the same. This area is not within the Speedway corporate limits and there has been difficulties working with the Indianapolis Flood Board to get access to this land to drill test wells. Setback requirements could easily be met at this site. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-16.**

The estimated cost of this alternative is **$785,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-17**.

5.1.1.8 Site Selection 6c: Cadillac Triangle Property

This well site is located near existing well 10R and the raw water main. Well 10R provides very little capacity, but has adequate water quality. It is assumed that this well site will be similar. The Town of Speedway already owns the property so it would be easy to gain access to place a well here. Tree clearing would be needed in this area. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-17.**

The estimated cost of this alternative is **$949,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-18**.

5.1.1.9 Site Selection 9: South of 16th & Cunningham

This well site is located near existing Well 7R and the raw water main. Well 7R provides very little capacity, but has adequate water quality. It is assumed that this well site will be similar. Wells were drilled in this area before and they were all silted in. The property is private and would need to be bought from the homeowners. Tree clearing would be needed in this area. Based on the size of the property, there is potential to install multiple wells on this site. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-18.**

The estimated cost of this alternative is **$862,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-19**.

5.1.1.10 Site Selection 10: Meadowood Park

The Meadowood Park well location has already been preliminarily evaluated. Preliminary test borings and water quality testing at two sites in Meadowood Park were conducted. Test well locations can be seen in **Appendix A, Figure A-19.** Wessler Engineering completed a Groundwater Wells Summary and Meadowood Park Evaluation in 2018. The full technical memorandum is included in **Appendix C, Attachment 8.**

The technical memorandum anticipated a capacity of up to 1,000 gpm with two wells on the site. Meadowood Park is in close proximity to the Coca-Cola Bottling Factory which has the potential to contaminate the groundwater in the area. The Meadowood well sites were found to have arsenic in the water. The proposed well sites are not near any existing wells; thus they are not close to the existing raw water mains. The property is located within a public park so the property would be convenient for the Town.

Two alternatives for these new wells were developed. Maps showing these two alternatives are included in **Appendix A, Figures A-20 and A-21.**

Detailed cost estimates for both alternatives are included in **Appendix B, Table B-20 and B-21.** Alternative 1 consists of new groundwater wells constructed in Meadowood Park and a raw water main to pump untreated raw water to the existing GWTP. The estimated project cost of this alternative is **$3,147,000.** Alternative 2 consists of new groundwater wells and a package treatment plant all constructed in Meadowood Park. The estimated cost of this alternative is **$3,779,000.**

5.1.1.11 Site Selection 11: Carriage House West Apartments

This well site is located near existing Well 7R and the raw water main. Well 7R provides very little capacity, but has adequate water quality. It is assumed that this well site will be similar. The property is outside of the Town of Speedway corporate limits on private property, so it will be difficult to get approval to put a well here. Site setbacks could be achieved but the existing playground on the site would need to be removed. Only one well could be installed on this site due to limited area. The potential well sites with a 50-foot and 100-foot setback radius can be seen in **Appendix A, Figure A-22.**

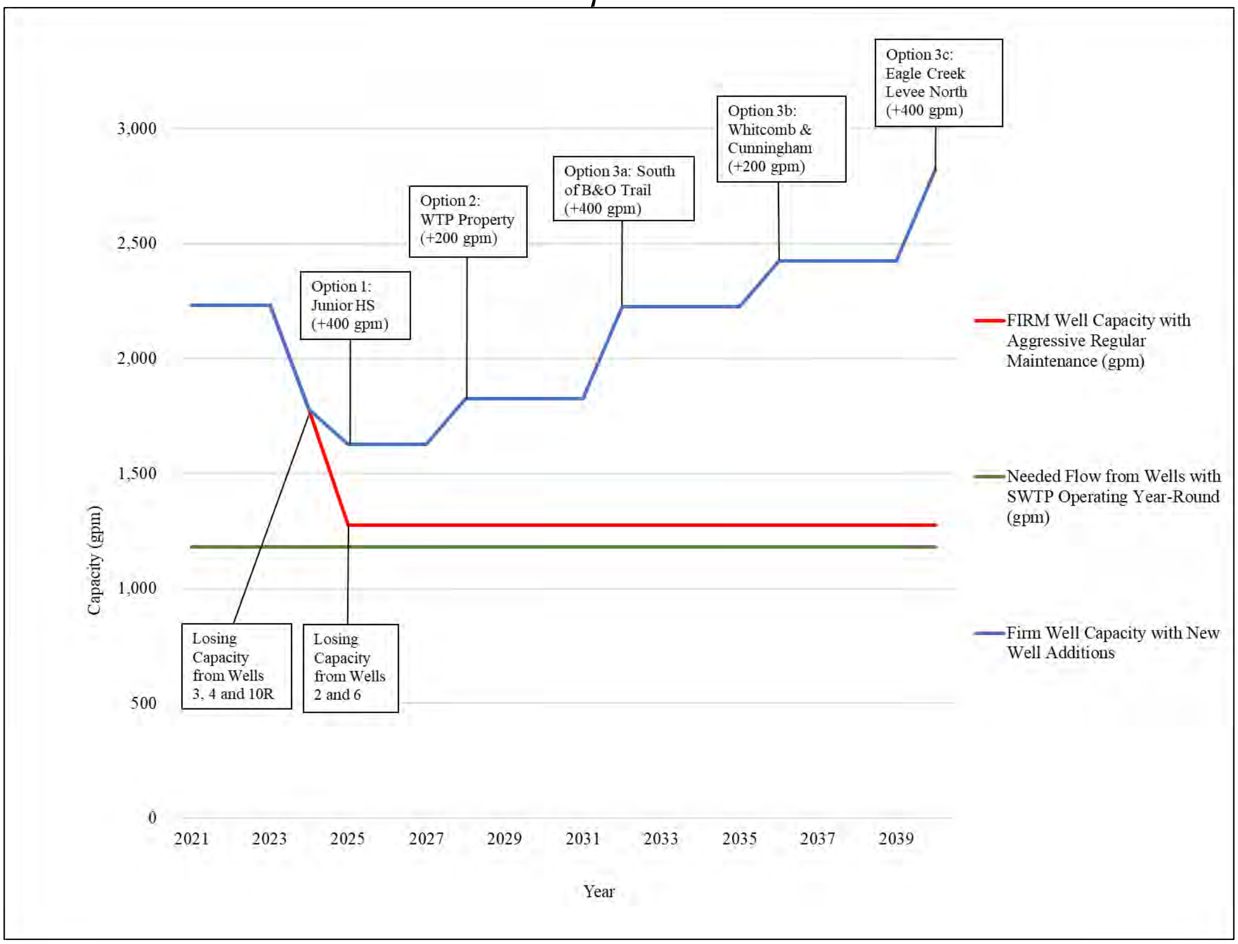
The estimated cost of this alternative is **$763,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-22**.

5.1.1.12 Well Replacement Timeline

With the aggressive, regular maintenance described in Alternative GS1, it is predicted that the current well capacity can be maintained. Wells 2, 3, 4, and 6 are past their 70-year useful lives and predicted to be put out of service during the 20-year study period. In addition, Wells 2, 6, and 10R need to be relocated due to re-development that will be occurring at their locations. Well 10R is also predicted to be put out of service during the 20-year study period. Based on this prediction, by 2025 the well firm operating capacity will drop from 3.2 MGD to 1.8 MGD. With the SWTP operating at its capacity of 3.0 MGD all year round, the GWTP would need to be able to provide 1.7 MGD to meet the projected maximum day of 4.7 MGD. New wells should be drilled to build up the GWTP capacity enough to create more robustness within the water system and eventually allow the SWTP to return to seasonal operation if preferred. Chart 5.1 below depicts a timeline for when new wells should be drilled. It is recommended that 5 new wells are drilled during the 20-year study period.

For proposed well sites 5.1.1.1 through 5.1.1.5, these wells are including in the 20-year capital plan due to ranking high in the site selection list in **Table 5.2**. For proposed well sites, 5.1.1.6 through 5.1.1.11, these well sites are not included in the 20-year capital improvement probable cost list, however are additional potential well locations in case the other options are not available or do not produce the anticipated flow rates.

Chart 5.1 Well Replacement Timeline



[1]The new well capacities are assumed to reflective of the existing, adjacent wells 2021 operating capacities.
[2]Well site implementation is dictated by site selection priority.
[3]Assumes additional new wells will be added by site selection priority, as demand and capacity dictates.

Alternative GS5: Citizens Energy Group Interconnect

There is need for an emergency water source in if Speedway experiences a high demand day over the summer and the SWTP goes down or a high demand day over the winter and there are issues with the biggest producing wells. An interconnect with Citizens Energy Group could provide this additional source of water.

Before discussing potential locations, water quality must first be understood. Speedway operates the distribution system with a free chlorine residual, while Citizens Water utilizes chloramines to maintain distribution system disinfection residual. Introducing chloramine water to a free chlorine system will drastically decrease the free chlorine residual. As such, an interconnect with CEG should only be utilized in an emergency when demands exceed available WTP capacity or other hydraulic conditions. While the interconnect would provide an emergency supply (quantity) of water, the quality would be less than desirable.

Potential locations for interconnects with Citizens Water were discussed with operators and locations selected based on Speedway/Citizens Water distribution water main sizes and proximity to each other. Preliminary locations are identified in **Table 5.2** and can be seen in **Appendix A, Figure A-23.** These locations are:

Table 5.2 Potential Interconnect Locations

No.	*Description*	*Speedway Main Size*	*CEG Main Size*	*Favorable Hydraulic Grades?*
1	High School Road – South	8″	12″	Yes
2	High School Road - North	8″	8″	Yes
3	Georgetown Rd	12″	12″	Yes
4	16^{th} & Olin Ave	16″	16″	Not likely
5	10^{th} & Olin Ave	12″	12″	Not likely

The first step in evaluating each interconnect location was determining if hydraulic grades (HGL) were in Speedway's favor (i.e. HGL of Citizens Water is higher than HGL of Speedway). This means that the interconnect would convey emergency flows via gravity (supplied by Citizens Water 's elevated storage tank height) rather than having to construct a pump station. Preliminary evaluation suggests that both locations No. 4 and 5 do not have favorable HGL's, as such a pump station would be required to convey flows from Citizens Water into the Speedway Water System. For this reason, locations No. 4 and 5 were not considered further.

Locations No. 1 through 3 were further evaluated to understand level of effort required to construct an interconnect. While these locations appear feasible at this level, each location must be further evaluated to understand the flowrate that will be conveyed and capture other hydraulic conditions which could restrict available flow. The construction work required will likely be very similar between the three feasible locations. The greatest difference in feasibility and costs between the locations is largely the quantity of pipe required. The following items will likely be required at each interconnect location:

- Tapping valves - Speedway & Citizens Water side
- Below grade concrete valve vault
- Interconnect valve, actuator, and bypass
- Instrumentation, Electrical, Controls, Programming

- Pavement/Surface restoration

In addition to the work above, land acquisition must also be considered. The installation of an interconnect will likely require a permanent easement be acquired or land be purchased, should existing right of way not be available.

The cost of each interconnect option is provided in **Table 5.3** below. A detailed cost estimate for each of the options is included in **Appendix B, Table B-23 through B-25** The differences in costs are based on the size of the water mains at the connections and the ease of constructability.

Table 5.3 Interconnect Costs

Option	*Estimated Cost*
Option 1: High School Road - South	$343,000
Option 2: High School Road - North	$305,000
Option 3: Georgetown Road	$552,000

Option 3, Georgetown Road Interconnect presents the highest capital costs. The cost difference between Option 1 and 2 is relatively minor. The main factor increasing the cost of Option 3 is the length of water main required to complete the interconnect. While Option 3 is the costliest option, it will likely be able to convey more flow than the other locations. This was determined by the size of water mains and the proximity of this interconnect to the IMS. Because the IMS has a large impact on the maximum day demand, Georgetown Road should be considered as the first interconnect to implement.

These locations were evaluated to understand which option would be most feasible to pursue. However, there is value to having multiple points of connection to a neighboring water system. By having multiple interconnects, smaller portions Speedway's system could be supplied by Citizens Water and isolated. Operators will have increased flexibility to open whichever interconnect is close to a distribution system problem that may arise. Considering the volatility of the groundwater supply and inconsistency in SWTP operations, and emergency interconnect is critical for the water utility.

Development of a purchase agreement with Citizens Water is also needed as part of this alternative.

After further investigation, this alternative is not going to be considered.

5.2 Groundwater Treatment Plant Improvements

The GWTP was constructed in 1971 and is 50 years old. Many assets within the plant were installed with the original construction, are past their useful lives and need replaced. The following sections go through GWTP process asset project alternatives.

5.2.1 Aerators

Alternative GA1: No Action

Should a no action alternative be pursued, the Town will continue to operate an aeration system that is beyond its useful life, in unknown condition. The aerators appear to be in good physical condition, however, have not been inspected in the past 10 years, therefore the operational condition is unknown. Overtime, aerator internals can become "loaded" with iron deposits, reducing aeration efficiency. For these reasons, a no action alternative was eliminated from consideration.

Alternative GA2: Aerator Inspection & Needed Improvements

An inspection of all four aerators located at the GWTP is needed to identify operational or physical deficiencies that require attention. The location of these aerators can be seen in Appendix A, **Figure A-24**. The work in this alternative includes inspection of four existing aerators and any addressing any deficiencies identified. Aerator inspections typically consist of evaluating the distributor box, nozzles, moisture separating baffles, supports, hardware and blower. The cost to inspect all four aerators is estimated to be $6,000.

The scope of the aerator improvements was estimated based on the engineer's experience and typically includes replacing aeration tubes/slats, and miscellaneous support repairs. The preliminary estimated cost for this work is approximately $7,500 per aerator.

The estimated cost for this alternative is **$36,000**.

Aerator improvement scope should be revisited after the aerators are inspected and the report is reviewed by the Owner/Engineer.

5.2.2 Detention Tank

Alternative GD1: No Action

Should a no action alternative be pursued, the concrete roof of the detention tank will continue to spall and access into the detention tank will continue to be unsafe or secure. While the detention tank is regularly drained and cleaned (every 3 or 4 years), it has not been inspected for structural deficiencies. For these reasons, a no action alternative was eliminated from consideration.

Alternative GD2: Detention Tank Inspection & Needed Improvements

There are a total of six (6) existing access hatches into the detention tank, none of which are locked nor have any safety provisions (safety grating, ladder up devices, etc.). The location of the detention tank can be seen in Appendix A, **Figure A-24**. The estimated cost to replace all existing access hatches with OSHA approved and lockable hatches is **$25,000.**

Structural or superficial deficiencies have not been captured in the scope of this alternative. Structural or superficial rehabilitation should be included with this alternative, after deficiencies are identified during inspection. Spalling on the concrete roof should be addressed, once the interior of the tank is inspected.

Detention tank improvement scope should be revisited after the detention tank are inspected and the report is reviewed by the Owner/Engineer.

The location of the detention tank can be seen in **Appendix A, Figure A-24.**

5.2.3 High Service Pumps

Alternative GH1: No Action

Should a no action alternative be pursued, the Town will continue to operate a pumping system that is beyond its useful life and operates inefficiently. HSP No. 2 and HSP No. 3 will continue to perform below their rated capacity. If no action is taken, the GWTP HSPs will continue to pump against a partially closed valve, wasting energy. For these reasons, a no action alternative was eliminated from consideration.

Alternative GH2: Rebuild HSP No. 2 & 3

The work for this alternative includes rehabilitating HSP No. 2 and 3 in place to restore them to their original rated operating capacity of 1,600 gpm. This includes pulling the pump, inspection, and replacing all rotating components.

The estimated cost of this alternative is **$40,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-26**.

Alternative GH3: Replace HSP Motors and Install VFDs

The work for this alternative would include replacing all HSP motors and installing VFDs and pressure gauges on all 6 HSPs. Premium efficiency inverter-duty rated motors would need to be installed to be compatible with the VFDs. Installing VFDs on the HSPs would allow the pumps to run at varying fractions of their capacities increasing efficiency and lowering overall energy consumption. VFDs would provide more operational flexibility and eliminate the need for the use of the throttling valve on the effluent line.

At the plant there is nowhere a VFD will fit. They cannot be installed in the MCC because it is unsafe and will overheat. Electrical and HVAC improvements will need to be completed in conjunction with VFD installation.

The estimated cost of this alternative is **$430,000** A detailed cost estimate for this alternative is included in **Appendix B, Table B-27**.

5.2.4 Pressure Filters

Alternative GF1: No Action

Should a no action alternative be pursued, the pressure filters will continue to have issues with aging filter media, physical condition of the filter interior will remain unknown and the access hatches will continue to be inoperable. The filters have not been inspected in the past 10 years, therefore the interior condition is unknown. The filter media is also approaching its useful life. For these reasons, a no action alternative was eliminated from consideration.

Alternative GF2: Filter Rehabilitation

Considering the age of the filter media, apparent physical condition of the vessels, and need for manway improvements, rehabilitation is recommended. The filters could be inspected to determine if interior coatings or media replacement is necessary, however this would likely be a wasted expense. Without removing the media and supporting gravel from the vessels, the true condition of the interior cannot be captured. In addition, cutting and welding in larger functional manways would require the filter media be partially or completely removed. In lieu of an inspection, complete rehabilitation is recommended.

The scope of pressure filter rehabilitation was developed based on the engineer's experience from projects of similar vintage and scope and includes:

- Media and support gravel replacement
- Exterior coatings
- Interior coatings
- New larger manways (6 each filter)
- Spot and seam welding

The estimated cost for filter improvements is **$692,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-28.**

Filter rehabilitation scope should be revisited during media replacement when the entire interior is accessible. Spot and seam welding or additional metals repair should be completed at this time.

5.2.5 Process Piping, Valves and Actuators

Alternative GV1: No Action

The valves and piping in the filter pipe gallery are aging and are showing signs of deterioration. They are not in good physical or operational condition. Should a no action alternative be pursued, the valves and pipes will continue to deteriorate. For these reasons, a no action alternative was eliminated from consideration.

Alternative GV2: Replace Valves and Actuators

The work in this alternative includes replacing all the valves in the filter pipe gallery. As discussed in **Chapter 2**, the existing filter face valves are "wafer" type butterfly valves, and the pipe is welded steel. Discussions with operators indicate that wafer type butterfly valves are not desired for new valves. Wafer type valves rely on surrounding pipe flanges to make a watertight seal, and are typically lesser quality of materials. It is recommended that standard flanged butterfly valves be installed when replacing valves. Flanged butterfly valves will facilitate easier replacement in the future and provide more reliable service when compared to wafer butterflies. For each of the six (6) filters, valves to be replaced include:

- 8″ Cell 1 Raw Water Valve
- 8″ Cell 2 Raw Water Valve
- 10″ Cell 1 Backwash Valve
- 10″ Cell 2 Backwash Valve
- 12″ Finished Water Valve
- 4″ Manual Backwash Drain Valve

The filter pipe gallery also includes:

- 12″ Manual Valve Splitting Filters 1, 2, 3 and 4, 5, 6

This alternative also includes replacing the 20″ effluent valve on the effluent line and adding an electric actuator.

As the existing valves are wafer type, and new valves will be flanged, there will be conflicting lay lengths (the new valve is longer than the existing valve). To account for this, the welded steel pipe could be cut back, and new flange welded. This approach would be very labor intensive and would leave the WTP with original, aging piping. In lieu of modifying the existing piping, it is recommended to replace completely with flanged ductile iron pipe. The new pipe would facilitate the installation of the new valves, allow for easier replacement in the future, and most importantly, allow the GWTP to change the backwash scheme. By replacing the filter face piping, the HSPs will be able to provide backwash water through in-service filters, greatly simplifying the process. Process piping replacement includes all pipe in the filter pipe gallery from the point where the two HSP discharge headers come together until the pipe leaves the building. This includes approximately:

- 90 LF of 4″ Ductile Iron Pipe
- 30 LF of 8″ Ductile Iron Pipe
- 170 LF of 10″ Ductile Iron Pipe
- 80 LF of 12″ Ductile Iron Pipe
- 25 LF of 14″ Ductile Iron Pipe
- 60 LF of 18″ Ductile Iron Pipe
- 50 LF of 20″ Ductile Iron Pipe

The estimated cost of this alternative is **$290,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-29**.

5.2.6 Building and Facility

Alternative GB1: GWTP Building and Facility Improvements

There are several building and facility improvements that are recommended for implementation during the study period. These include:

- Replacement of the existing dehumidifier in-kind
- Replacement of HVAC system
- General coating/painting of floors, walls, ceilings
- Replacing all doors and windows
- Replacing entrance door and window with new tinted window, removing the existing steel lentil, and replacing water treatment plant lettering with new window decal
- Repairing a leak in the wall where the pressure filter face comes into the building
- Replace the exterior walls next to the aerators
- Replacing the backwash control panel
- Rehabilitating office space

The estimated cost of this alternative is **$694,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-30**.

5.3 Surface Water Supply Improvements

The following sections detail project alternatives for the surface water treatment plant supply at Eagle Creek.

5.3.1 Low Head Dam

Alternative SD1: No Action

Should no improvements be made to the low head dam, the west creek bank will continue to erode and water will continue to by-pass the west end of the dam leading to less available water to withdraw for the SWTP. If the dam fails, Speedway will not be able to withdraw water from the creek. For these reasons, a no action alternative was eliminated from consideration.

Alternative SD2: Low Head Dam Improvements

To maintain the intended function of the dam and minimize erosion potential of the west creek bank, the following improvements are proposed:

- Remove the large tree and other vegetation debris presently lodged on the west end of the dam.
- Place concrete/grout behind the undermined concrete slope wall and at the west end of the dam.
- Rebuild and armor the existing west bank above the concrete slope wall at the site of the bank erosion. This will include demolition of a small existing concrete slope wall which may then be used as additional armor for the bank after it is fragmented into smaller pieces. It is anticipated rock, 12”-24” large, as well as smaller riprap, angular in shape, will be necessary for armoring and reinforcing the bank.

- Armor the existing west bank, beyond the limits of the existing bank erosion, to approximately fifteen feet upstream of the dam. Again, large rock is required in combination with smaller riprap.
- Rebuild the drainage swale for the existing concrete pipe outfall located approximately fifteen feet above the toe of the west bank. The drainage swale reconstruction is in conjunction with rebuilding and armoring the west bank.

The location of these improvements can be seen in Appendix A, **Figure A-24**.

The estimated cost for this alternative is **$298,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-31.**

See **Appendix C Attachment 4** for the full low head dam evaluation completed in 2018 by Wessler Engineering which includes a discussion on constructability and permitting.

5.3.2 Raw Water Intake Structure

Alternative SR1: No Action

Should a no action alternative be pursued, the raw water pumps will continue to be exposed to harsh temperatures, making them inoperable during cold weather. Handrails around the intake structure will likely be stolen again and need to be replaced. For these reasons, a no action alternative was eliminated from consideration.

Alternative SR2: Raw Water Intake Structure Cover

The work in this alternative consists of adding a 26'x 30' steel building over the raw water pumps and intake screens. The building will consist of two double doors, 3 roof hatches with skylights for access to pull pumps, electrical service, and sidewalk replacement.

The location of these improvements can be seen in Appendix A, **Figure A-24**.

The estimated cost for this alternative is **$128,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-32.**

5.4 Surface Water Treatment Plant Improvements

5.4.1 Flocculation and Sedimentation Basins

Alternative SB1: No Action

The flocculation and sedimentation basins are past their useful life and replacement parts are difficult to find. The basins have several structural issues that need repair. The internal components of the flocculation and sedimentation basins are also past their useful life and are not in good physical or operational condition. The motor drivers for the sludge collection systems are currently located on the walkway between the flocculation and sedimentation basins and pose a trip hazard. Should a no action alternative be pursued these problems will continue to persist. For these reasons, a no action alternative was eliminated from consideration.

Alternative SB2: Floc & Sed Structural Improvements

The work in the alternative consists of addressing several structural issues with the flocculation and sedimentation basins. They are the following:

- Spider crack repairs
- Tank/Building Common Wall Leak Repairs
- Tank/Building Common Wall Crack Repairs
- Construction Joint Repair

The estimated cost for this alternative is **$72,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-33.**

Alternative SB3: Internal Component Replacement

The work in the alternative consists of addressing issues with the internal mechanical components of the flocculation and sedimentation basins. They are the following:

1. Flocculation Sprocket and Chain Replacement
2. Flocculator Paddle Replacement
3. Relocate Motor Drivers for Sludge Collection System

The estimated cost for this alternative is **$119,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-34.**

5.4.2 Filters

Alternative SF1: No Action

Should a no action alternative be pursued, the gravity filters will continue to have issues with aging filter media, and there will continue to be leaking between filter basins 3 and 4. The filters have not been inspected in the past 10 years, so it is unknown if it has any interior deficiencies that need to be addressed. Regular filter media inspection and upkeep is paramount to produce quality water. For these reasons, a no action alternative was eliminated from consideration.

Alternative SF2: Filter Interior Inspection & Rehabilitation

An inspection of the gravity filters is needed to identify deficiencies that require attention. Gravity filter inspections typically include a lab analysis of the media, looking for constituent deposits, wear, flattening, or fining. In addition to media analysis, inspections will include isolating a section of the filter and removing the media. This allows for sampling of media that is deep in the bed, and allows for visual inspection of the underdrain. Work included in this alternative is an inspection of the filters, addressing deficiencies identified during inspection, and repairing the leak between filters 3 and 4.

The scope of the gravity filter improvements was estimated based on the engineer's experience from projects of similar vintage and scope and includes:

- Media and support gravel replacement
- Filter basin wall coatings
- Replacing rotating components on surface washers
- Underdrain thimble resetting and Wheeler block grouting

Rehabilitation would also address the leaking backwash trough between filters 3 and 4 by means of epoxy injection.

The estimated cost for filter improvements is **$384,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-35.** This cost does not include filter inspections, which have been captured in the annual process asset maintenance and upkeep in **Section 5.10**.

Gravity filter improvement scope should be revisited after the filters are inspected and the report is reviewed by the Owner/Engineer.

5.4.3 High Service Pumps

Alternative SH1: No Action

The HSPs were installed with the 2014 improvements. They are thought to be in good condition, but could not be tested to determine their operating capacity due to the SWTP being out of operation. That being said, it is unknown whether or not the HSPs are performing near their rated capacity. For these reasons, a no action alternative was eliminated from consideration.

Alternative SH2: High Service Pumps VFD Installation

The work for this alternative would include installing VFDs and pressure gauges on all three of the HSPs. Installing VFDs on the HSPs would allow the pumps to run at varying fractions of their capacities increasing efficiency and lowering overall energy consumption. VFDs would provide more operational flexibility allowing the flowrate of the WTP to match system water demands.

At the plant there is nowhere a VFD will fit. They cannot be installed in the MCC because it is unsafe and will overheat. Electrical and HVAC improvements will need to be completed in conjunction with VFD installation.

The estimated cost of this alternative is **$102,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-36**.

5.4.4 Residuals Pumps

Alternative SS1: No Action

The residuals pumps are past their useful lives. They were installed with the surge tank in 1975. If a no action alternative should be pursued, the physical condition of the residuals pumps will continue to deteriorate, and operational issues will persist. For these reasons, a no action alternative was eliminated from consideration.

Alternative SS2: Residual Pumps Replacement

The work in this alternative includes replacing the residuals pumps.

The estimated cost of this alternative is **$35,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-37**.

5.4.5 Process Piping, Actuators & Valves

Alternative SV1: No Action

The valves and actuators in the filter pipe gallery are showing signs of deterioration. They are not in good physical or operational condition. Should a no action alternative be pursued, the valves and actuators will continue to deteriorate. For these reasons, a no action alternative was eliminated from consideration.

Alternative SV2: Valves and Actuators Replacement

The work in this alternative includes replacing all the valves and actuators in the filter pipe gallery. For each of the four (4) filters includes:

- 12″ Filter Influent Butterfly Valve and Actuator
- 3″ Surface Wash Butterfly Valve and Actuator
- 8″ Effluent Flow Control Butterfly Valve and Actuator
- 8″ Filter-to-Waste Butterfly Valve and Actuator
- 14″ Washwater Supply Butterfly Valve and Actuator
- 16″ Washwater Drain Butterfly Valve and Actuator

The filter pipe gallery also includes:

- 16″ Main Washwater Supply Butterfly Valve and Actuator

This alternative also includes replacing the 16″ groundwater storage tank isolation butterfly valve on the effluent line and adding an electric actuator.

The estimated cost of this alternative is **$197,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-38**.

5.4.6 Upper Upper-Level West End Renovations

Alternative SU1: No Action

There is potential to utilize the first-floor space more efficiently. It currently contains a men's locker room (no women's), a meter shop area, a conference room, and the existing fluoride feed equipment. For these reasons, a no action alternative was eliminated from consideration.

Alternative SU2: Upper-Level West End Renovations

The garage proposed in **Section 5.6.1** and new chemical feed systems in **Section 5.5** will make more space available on the first floor. This area will include 2 offices, a conference room, a female restroom, and closing off the corner where the flash mix is located.

The plan for the upper-level renovations can be seen in **Appendix A, Figure A-25**.

The estimated cost of this alternative is **$440,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-39**.

5.4.7 Building and Facility

Alternative SBF1: SWTP Building and Facility Improvements

There are several Building and facility improvements that are recommended for implementation during the study period. These include:

- Replacement of the existing dehumidifier in-kind
- Replacement of existing air compressors in-kind
- General coating/painting of floors, walls, ceilings
- Replacing all doors and windows
- Installing central air
- Installing doors/gates at the top of the two interior staircases
- Repairing the entry steps and making them ADA accessible

The estimated cost of this alternative is **$598,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-40**.

5.5 Treatment Plant Chemical Feed System Improvements

A site plan of all of the proposed chemical improvements can be seen in **Appendix A, Figure 26.**

5.5.1 Chlorine Feed System

Alternative CL1: No Action

A no construction alternative would require the that the Town continue with the existing chlorination system and associated Risk Management Plan (RMP) regulatory requirements. The facility is not equipped with emergency gas shutoffs or chlorine gas scrubbers. Chlorine gas is hazardous and potentially lethal if it leaks from its storage container, without these safety features, the chlorination facilities are creating risk to operators and the neighboring community. For these reasons, a no action alternative was eliminated from consideration.

Alternative CL2: Switch to Bulk Bleach

An evaluation of the existing chlorine feed systems at the SWTP and GWTP was done in 2016 and the report includes an evaluation of a bulk bleach system at the SWTP. This report is included in **Appendix C, Attachment 5**.

This alternative includes the removal of the existing chlorine gas equipment from the SWTP and GWTP and replacing them with a bulk bleach chlorine system. The bulk tanks will be located in the existing SWTP chlorine storage room and the day tanks will be housed in the existing SWTP chlorine feed room and the existing GWTP chlorine room. There will be a transfer line from the bulk tank at the SWTP to the day tank at the GWTP. The bulk bleach chlorine system will include:

- Bulk bleach fill station located in the SWTP chorine storage room
- Two (2) 1,600-gallon double wall bulk bleach storage tank and instrumentation
- Secondary containment partition and coating in SWTP chlorine storage room
- Two (2) transfer pumps (one to SWTP bleach day tank, one to GWTP bleach day tank)
- 120-gallon day tank and scale (SWTP)
- 65-gallon day tank and scale (GWTP)
- Seven (7) Bleach feed pumps (5 in SWTP, 2 in GWTP)
- Electrical, SCADA and plumbing improvements

Regular deliveries of bleach would be required and the operating costs of this system are higher compared to operating the chlorine gas system. However, this alternative improves the current situation by removing the chlorine gas system and associated risk of a chlorine gas release. Storage of bulk bleach can also be hazardous to plant personnel, especially considering other chemicals that are delivered to the site, however this risk can be mitigated. When considering liquid chemical feed systems, one of the largest risks to mitigate is the delivery process. To decrease the risk of the proposed bleach system, one bulk delivery point is being proposed, located at the SWTP. A single bulk tank would supply day tanks at each WTP. Permits for the new feed system are required.

Compared to on-site generation of chlorine, the capital cost of bulk bleach is lower. However, when comparing annual O&M costs, on-site generation has a lower cost.

The estimated cost of this alternative is **$498,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-41**.

5.5.2 Fluoride Feed System

Alternative FL1: No Action

The fluoride feed systems at both the SWTP and GWTP are currently both feeding powder sodium fluoride. The system at the SWTP consists of a volumetric feeder that is meant to feed silica fluoride and is not in good operational condition. The system at the GWTP is in good physical and operational condition. Hydrofluorosilicic acid is less complicated to feed than powder fluoride and is generally preferred from an operations simplicity standpoint. Speedway has started working with Water Solutions to switch to HSF. For these reasons, a no action alternative was eliminated from consideration.

Alternative FL2: Switch to HSF

The work in this alternative consists of the removal of the existing powder feed systems at the SWTP and GWTP and switching to a hydrofluorosilicic acid (HSF) system. The HSF bulk equipment will be housed in the existing maintenance and storage room in the west basement of the SWTP. The SWTP fluoride day tank and feed pumps will also be located in this room. The GWTP day tank and feed pumps will be located in the existing GWTP fluoride room. There will be a transfer line from the bulk tank in the SWTP to the day tank at the GWTP.

Th HSF system consists of:

- 500-gallon double wall bulk tank and instrumentation
- Fill Station & Containment
- Two (2) 20-galon day tanks (one in SWTP, one in GWTP)
- Four (4) feed pumps (one in SWTP, one in GWTP, two spare)
- Two (2) Transfer pumps (one in SWTP, one in GWTP)
- Electrical, SCADA and plumbing improvements

As with the proposed chlorination alternatives, this chemical feed system will be consolidated. There will only be one bulk tank for both WTPs, consolidating delivery points and simplifying operations.

Speedway has already started working with Water Solutions to obtain hydrofluorosilicic acid equipment. Permits for the new feed system are required.

The estimated cost of this alternative is **$325,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-42**.

5.5.3 Alum Feed System

Alternative A1: No Action

The alum feed system includes two (2) bulk tanks, two (2) day tanks, a transfer pump, and two (2) feed pumps. All of the components in the current feed system are past their useful lives. The components of the feed system are in fair physical and operational condition, but are beginning to show signs of deterioration.

Alternative A2: Alum Equipment Replacement

The work included in this alternative consists of replacement of all the alum feed equipment in-kind. That includes:

- Two (2) 2,000-gallon fiberglass bulk tanks
- One (1) transfer pump
- Two (2) 50-gallon double walled polyethylene day tanks
- Two (2) feed pumps
- Demolish and rebuild containment around bulk tanks (in order to bring in new tanks)
- New bulk tank fill connection

This alternative would route the bulk fill connection to be outside. It is currently located within the basement of the WTP, requiring delivery drivers to enter the plant to access. The estimated cost of this alternative is **$200,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-43**.

5.5.4 Phosphate Feed System

Alternative PH1: No Action

The Town of Speedway experiences corrosion issues in their water mains. This is especially evident in the fact that many of the valves in the distribution system are not operational. In the situation where Speedway has lead service lines, phosphate coats the pipes and helps prevent lead from leaching into the water. With the new lead and copper rule, this could assist Speedway in ensuring their lead levels are below the threshold of 10 ppb. For these reasons, a no action alternative was eliminated from consideration.

Alternative PH2: Phosphate Addition

Phosphate is used to inhibit corrosion of water mains. The work in this alternative includes adding phosphate feed systems at both the SWTP and GWTP. The feed systems consist of:

- 250-gallon double walled tank (for SWTP)
- 120-gallon double walled tank (for GWTP)
- Two (2) feed pumps (one for SWTP, one for GWTP)

Separate phosphate feed systems were evaluated for the GWTP and SWTP. Prior to phosphate blend selection, the source water should be tested and recommendation made by chemical supplier. If the recommended phosphate blend is the same for both WTP's, the phosphate feed system could be consolidated to mirror the approach of the proposed bleach and fluoride alternatives. Permits for the new feed system are required. The cost below is reflective of separate feed systems.

The estimated cost of this alternative is **$120,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-44**.

5.6 Treatment Plant Site Improvements

The location of these improvements can be seen in Appendix A, **Figure A-24**.

5.6.1 WTP Garage /Storage Building

Alternative G1: No Action

Currently, the Town of Speedway's trucks and miscellaneous equipment are stored outside. Being outside, the vehicles and equipment are subject to theft, vandalism, and harsh weather conditions which could deteriorate equipment faster. If the equipment had an indoor space to be stored it would provide employees more value-added time to complete other water related tasks instead of preparing their equipment for the day, storing items at the end of the day, and faster response time to water emergencies. For these reasons, a no action alternative was eliminated from consideration.

Alternative G2: Garage Construction

The work in this alternative consists of building a new storage garage. The building is estimated to be between 6,000 and 9,100 square feet. The garage will be metal sided and garage door bays will be 20'x15' to accommodate existing and future proposed equipment. The garage will be illuminated with LED lights.

To construct the garage, various locations were evaluated. For one location, the existing clarifier that is currently used for backwash holding from the GWTP would need to be re-routed. The backwash from the GWTP would need to be re-routed directly to the surge tank that currently receives the backwash and sludge from the SWTP and will perform the same process as the backwash holding tank. Due to the additional cost to demolish the backwash tank and re-route existing piping, this location was not selected.

Various other locations on the WTP site were evaluated. The final location of the garage will be determined based on the needs of the water utility and the garage will be likely be built in phases over time.

The location of these improvements can be seen in Appendix A, **Figure A-24**.

The estimated cost for this alternative is **$1,013,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-45.**

5.6.2 WTP Fill Storage Bays

Alternative B1: No Action

Currently, stone, sand, and gravel are stored in various areas on the WTP Property. This materials is used to make water main and water service repairs. During wet weather conditions, the soil becomes wet and is not able to be applied correctly for repairs until it dries. Additionally, during cold weather seasons, this wet material becomes frozen and is not able to be utilized until it thaws and dries out.

Alternative B2: Install New Fill Storage Bay

The work proposed in this alternative is to build a 3 bay, 3-sided, covered storage building to store the gravel, sand, and soil on the northwest corner of the property. This would protect these materials from the elements and allow for these materials to be readily available during any weather season. The bay will be located on a concrete base to separate dirt from the crushed stone drive. The three sides of the bay will be 6 feet tall.

A crushed stone drive will also be constructed in order for trucks to be able to turn around. The existing garage on-site will need to be demolished.

The location of these improvements can be seen in Appendix A, **Figure A-24**.

The estimated cost for this alternative is **$254,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-46.**

5.6.3 WTP Pavement and Parking Lot

Alternative P1: No Action

The existing pavement at the WTP site is in fair condition with some cracks in the pavement. There is not a sufficient amount of convenient parking at the site for employees and/or guests. Should a no action alternative be pursued, the existing pavement will continue to deteriorate and parking will continue to be potentially hazardous or contribute to bodily injury or property damage. For these reasons, a no action alternative was eliminated from consideration.

Alternative P2: Replace Pavement and Construct New Parking Lot

The work proposed in this alternative consists of milling and resurfacing all existing pavement on the WTP site and adding a new parking lot in front of the SWTP. The location of these improvements can be seen in Appendix A, **Figure A-24**.

The estimated cost for this alternative is **$193,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-7.**

5.6.4 WTP Security

Alternative S1: No Action

The WTP site currently has issues with security and vandalism. Well House 3 is outside the fencing for the WTP site and is frequently subject to graffiti and vandalism. The raw water intake structure is also outside the fencing for the WTPs and the handrails are frequently stolen. The gate to the WTP site is usually open and the public can drive through the site providing little privacy and security. If a no action alternative is pursued, the WTP site will continue to be at risk of vandalism, theft, and pose a vulnerability threat to these facilities. For these reasons, a no action alternative was eliminated from consideration.

<u>Alternative S2: Security Improvements</u>

Site security improvements consist of replacing all of the fencing around the site. This replacement includes 2,100 LF of fencing, the relocation of the electric slide gate, and the installation of a new electric slide gate.

This alternative also includes the replacement of the handrails around the raw water intake structure and along the stairs with heavy-duty gauged welded steel.

The location of these improvements can be seen in Appendix A, **Figure A-24**. The estimated cost for this alternative is **$158,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-48.**

5.6.5 Electrical

<u>Alternative SE1: No Action</u>

At the treatment plants and well sites, there are currently little safety protocols in place for electrical equipment that could pose hazards to personnel when interacting with it. PPE is currently not required when working with electrical equipment. Should a no action alternative be pursued, treatment plant personnel will continue to be at risk. For these reasons, a no action alternative was eliminated from consideration.

<u>Alternative SE2: Arcflash Study</u>

An Arc Flash Study looks at how much incident energy an employee working with a specific piece of electrical equipment would be exposed to. The study would determine the amount of PPE required when working with a specific piece of electrical equipment and other safety protocols that should be required. The work involved in this alternative includes field data collection, input into the software, analysis and reporting, and printing and installing labels for electrical assets to inform personnel.

The estimated cost of this alternative is **$15,000** for both plants and **$10,000** for all well sites.

5.6.6 SCADA

The Speedway Water Treatment Plant currently utilizes a remote telemetry system that contains established frequency band radios to communicate between the remote sites (wells and tanks) and the two water treatment facilities. This system is currently experiencing intermittent communication issues with this system. The owner reports outages that cause loss communications to these remote sites on occasion, and often lasting hours in length.

<u>Alternative SC1: Radio Diagnostics</u>

Contract a third-party communications company to diagnose the issues occurring with the existing telemetry system. A company specializing in radio frequency communications technology should be able to further diagnose the system, and aid in countermeasures that the owner would need to take to resolve these issues. Currently, Wessler Engineering does not have these services in-house.

Alternative SC2: System Wide Cellular Communications

The second option that was discussed between Wessler and the Owner was the trial and eventual use of cellular communications devices located at each of the remote sites, and one at the plant. This option would require the owner to purchase one cellular LTE router for each location and carry residual monthly costs to facilitate cellular communication among these sites. On behalf of the owner, Wessler Engineering contacted Verizon Wireless technologies to obtain estimated pricing for this option. The estimated service cost is $30/month per location for 17 locations ($510/month total). For this option, further System Integration is required to set up the initial communications for these sites, along with demolition of existing equipment and installation of new hardware. The estimated cost of this alternative is **$102,000**. A detailed cost estimate for this alternative is included in **Appendix B, Table B-49.**

Alternative SC3: Fiber Optic

The most reliable option in terms of connectivity would be the installation of fiber optic cabling to each of the remote sites. Due to the complexity and amount of effort required for this option, the Owner would need to support planning for these costs and activities. This option would require an additional study and a Preliminary Engineering Report to evaluate the estimated construction costs. Wessler Engineering does provide these services at the request of the Owner if this option is preferred.

5.7 16th St. Elevated Tank Improvements

Alternative T1: Do Nothing

The 16th St. Elevated Tank is past its useful life. It had an inspection in 2020 and corrective actions were recommended. These improvements need to be done to maintain this tank from an operational standpoint. In addition, the 16th St. Tank without floats on the system without any provisions to monitor tank levels remotely or control pumping based on this tank level. Level in the tank is currently hand calculated based on the reading of an analog pressure gauge tapped off the tank riser pipe. In the event that the Meadowood Tank is taken off-line, personnel would not have a reference point in SCADA to signal the pumps to start or stop within the plant. For these reasons, a no action alternative was eliminated from consideration.

Alternative T2: 16th St. Tank Improvements

This work from this alternative consists of addressing the physical, operations, and safety related deficiencies. The deficiencies that were listed in the tank inspection report are listed below:

- The coatings on the exterior, interior dry, and interior wet portions of the tank were in good overall condition at the time of this evaluation and should not require painting for 5 to 7 years.
- If aesthetics are a concern, the tank exterior could be high pressure washed to remove dirt and mildew.
- ANSI/OSHA and Safety-Related Deficiencies
    - The valve vault and riser pit access rung widths are too small,
    - Valve vault and riser pit access rung toe rooms are too small,
    - Spacing between access rungs in the valve vault and is the riser pit exceed the maximum allowed spacing intervals,
    - The valve vault access rungs were not designed to prevent the climber's feet from sliding off the sides of the rungs,
    - Conduit attached to the access ladder could interfere with the unrestricted use of the side rails by the climber,
    - The minimum head clearances on the dry riser, access tube, and interior container ladders were dimensionally too small, and
    - The access opening in the transition cone safety railing was not equipped with a self-closing gate.
- AWWA and Operational Deficiencies
    - The flanged and bolted roof manhole was not locked,
    - There was a gap between the vent neck and vacuum pallet, and
    - Interior overflow pipe is susceptible to accelerated rates of corrosion and ice damage.

The estimated cost of this alternative is **$2,223,000.** A detailed cost estimate for this alternative is included in **Appendix B, Table B-50.** These costs include a complete list of repairs that were recommended in the report. The report also identifies which of these items the Engineer believes to be the minimum to properly maintain this tank from an operational standpoint throughout the duration of the study period.

5.8 Distribution System Improvements

Alternative DS1: Water Main, Valve and Hydrant Replacement Program

Speedway plans to replace **1%** (approximately 3,310 LF) of their water mains, 10 hydrants, along with 3% of system valves (approximately 20 valves), each year starting in 2022. A summary of the costs for the annual distribution system rehabilitation and upkeep is shown in **Table 5.4.** Lead Service Line Mapping, Lead Service Line Replacement, and Meter Replacement are discussed in **Sections 5.8.3, 5.8.4**, and **5.8.6** respectively.

Table 5.4 Annual Distribution and Upkeep Costs

Item	*Cost*
Annual Water Main Replacement (0.5%)	$ 701,000
Annual Lead Service Replacement (5%)	$ 255,000
Lead Service Line Mapping[1]	$ 18,000
Annual Valve Replacement (3%)	$ 84,000
Annual Hydrant Replacement	$ 30,000
Annual Meter Replacement Program	$ 90,000

[1]Lead Service Line Mapping will be a one-time cost, not annual

A detailed cost estimate can be seen in **Appendix B, Table B-51.**

As mentioned in **Chapter 2**, there are three main areas in Speedway that are a major concern for old pipes and lead service lines. The water mains and lead service lines in these areas will be replaced simultaneously and be the priority during the 20-year study period. The areas are described in more detail below:

- Priority 1 - Area 1: bounded by Lynhurst Dr., 16th St., Main St., and 10th St.
- Priority 2 - Area 2: bounded by Speedway Ave., Lynhurst Dr., 16th St., and Main St.
- Priority 3 - Area 3: bounded by Speedway Dr., Cunningham Rd., 10th St., and Lynhurst Dr.

In terms of linear feet, Area 1 makes up 16% of the system, Area 2 makes up 9% of the system, and area 3 makes up 10% of the system for a total of 35%. With an annual replacement program consisting of replacing 1% of water mains per year, replacing water mains in all three of these areas would take 35 years. Should these areas need to be replaced during the 20-year study period, the annual water main replacement budget would need to be increased.

Alternative DS2: Valve and Hydrant Exercise/Maintenance Programs

To extend the useful life of newly installed valves, a valve exercising program needs to be implemented. The Town currently does not have a valve exercising program and it is unknown which valves are in proper operating condition, making it very difficult and time consuming to repair water main leaks and breaks. It is recommended that the practices outlined in *AWWA M44 Distribution Valves; Selection, Installation Field Testing and Maintenance* be implemented within a valve exercising program. See **Appendix C Attachment 9** for general guidelines on proper valve exercising maintenance. Department personnel plan to exercise valves by sections in Town. As they pull up the valves, they will also add notes to the GIS system to make it as accurate as possible.

In addition to valves, hydrants also need to be properly maintained. A strategic approach could be taken to optimize the flushing process (recording data from each flushing, starting from the central point in the system and working outwards, measuring flows during flushing, etc.). For short term corrosion control, it is recommended that the Town flush hydrants more frequently to prevent excessive sediment buildup and improve water quality to customers. It is recommended that the practices outlined in *AWWA M17 Installation, Field Testing and*

Maintenance of Fire Hydrants be implemented within a hydrant flushing program. See **Appendix C Attachment 9** for general guidelines on proper hydrant flushing and maintenance. Once the Speedway Water Works personnel completes valve exercising on all line and tie in valves south of Crawfordsville Road, they will go back and exercise hydrant valves by neighborhood as well as perform maintenance on the hydrants.

Costs for this program are expected to be operational and not included in this report.

Alternative DS3: Lead Service Line Mapping

Under the New Lead and Copper Rule provided on the Federal Registry, water systems are required to identify and make public the locations of lead service lines. This transparency of information where lead service lines exist help communities make informed decisions to reduce lead exposure. Additionally, residents with a known or unknown lead service line are to be included and will be required to be notified and receive information about steps they can take to reduce their exposure to lean in drinking water.

Speedway will be required to identify all known lead service lines. Lines that they are not able to determine the service line material make-up will be considered Unknown and need to be published as such until the service line material confirmed. Methods for implementation include:

- Review property record cards
- Send out mailing to property owners to identify their service line material and report to the department
- Physical inspection
- Potholing on the physical water service lines on both sides of the control point.

Initial Lead Service Line Mapping will be conducted by investing property record cards and conducting physical inspections during meter reading activities. The estimated cost to develop a Lead Service line Map is **$18,000**. Potholing to confirm the actual physical material will be conducted during the lead service line replacement program and costs for this work will be included in the Lead Service Line Replacement Program. If a service line is confirmed the replacement of that line will occur at that time.

Alternative DS4: Lead Service Line Replacement Program

Lead service line replacement was also evaluated as part of the annual distribution system replacement program. The total amount of lead service lines was estimated to be 1,050. Speedway plans to replace 5% of the lead service lines in the system each year.

The alternative includes the replacement of all existing lead service lines within a 10-year project planning period. Assuming $3,200 per individual service line replacement, the annual estimated construction cost to replace lead service lines in the distribution system is **$254,600 per year.** This cost does not include lead service line replacement for customer owned service lines.

This program will take significant effort on the part of water utilities to conduct.

As mentioned in Alternative DS1, water mains and lead service lines will be replaced simultaneously. The priority areas will be those that were mentioned in Alternative DS1.

Maintenance budget will be funded from the Speedway Water Works budget and from annual revenue. A detailed cost estimate of the proposed budget dollars for the distribution system maintenance is included in **Appendix B**, **Table B-51**.

Alternative DS5: Water Loss Program

To improve the efficiency of the water system, reduce non-revenue water and enhance the water loss control planning, a water loss control program should be developed and include the following:

- Plot all billed addressed in the water system GIS (residential, commercial, industrial, fire protection and irrigation). Include information on meter type, age and size.
- Develop a process to alert the billing department when a high or low consumption threshold is encountered.
- Field verify that fire protection bypass lines are off. Install indicator posts on all fire protection systems.
- Require that customers with fire protection system report annual testing data, leaks, and repairs.
- Calibrate plant meters and production meters annually.
- Establish a program for customer meter accuracy testing, active leakage controls and infrastructure monitoring
- Conduct annual meter testing and calibration. Replace meters outside an acceptable accuracy limit.
- Purchase and install meters on unmetered accounts.
- Establish a goal for long-term apparent and real loss reductions (10+ year horizon)
- Develop a business case for long-term needs based on non-revenue water data.
- Refine computerized data collection and archives to include hourly production meter data. Review on a weekly basis to detect anomalies and gaps.
- Monitor meter innovations for more accurate, less expensive flow meters.
- Assess cost-effectiveness of automatic metering infrastructure (AMI)
- Link GIS and asset management databases.
- Continue to perform an WWA M36 water loss audit on an annual basis. Review the audit results with personnel from distributions, operations, and billing teams.
- Review and updated the water loss control program on an annual basis.

Costs for this program are expected to be operational and not included in this report. Should the department contract this work to a vendor, the estimated annual cost is $7,000.

Alternative DS6: Meter Replacement Program

Speedway currently has an annual meter replacement program, replacing on average 100 meters per year. Based on the annual budget of $75,000 with an estimated 2,500 meters to replace, Speedway in on pace to replace their remaining length of service meters in 11.6 years.

Recommended meter replacement for residential meters is every 10 years. It is recommended that the annual budget be increased to **$90,000** per year to complete the meter replacements within a 10-year period of time.

5.9 General Operations and Maintenance

Alternative OM1: Equipment

The water department plans to begin a valve exercising and replacement program using department staff. Personnel will continue to perform the pavement patching from water main leaks and valve replacement to save on costs that are required to contract the work out. Contracting the work costs around $3,000 to $8,000 dollars, depending on road closures while self-perform the work reduces the cost to $2,000 or below. For department personnel to replace valves themselves and repair pavement, equipment purchase is needed. This equipment includes:

- Pull Behind Vac Machine with Valve Turner **($92,500**)
- Hydra Valve Insert Equipment **($60,000**)
- Vac Truck **($450,000**)
- Vac Trailer **($60,000)**
- Hot Box- **($10,000**)
- Small Roller - **($13,000**)
- Milling Head - **($12,000**)

Alternative OM2: CodeRED Alert System

The Town of Speedway has a need to push out mass alerts to residents in the event of emergency situations such as water main breaks where boil water advisories are recommended. The Town currently does not have a good communication system to do this. The CodeRED Alert System would allow residents to receive notifications via phone and text alerts on a smart device if they download the free CodeRED application or when customers or residents provide the Water department a cell phone number for text alerts. See **Appendix C, Attachment 10** for more information about the CodeRED Application.

Annual cost for the CodeRED system for a water utility is around **$6,000** per year for items such as water outages and boil water orders. Additional features can be added to include Lone Worker, shut of notifications, water disconnects, and risk intelligence.

The CodeRED system can also be expanded for the entire town for the Town to utilize for large town events, Indianapolis Motor Speedway communications (traffic, road closures, detours, natural events or malevolent acts. With this expanded system, the Town Police department, Street Department, and Wastewater department could also use this application to alert residents of an active shooter situation, road closures, road projects, and sanitary issues. The cost for this expanded service can range from $15,000 to $18,000 per year.

5.10 Annual Process Asset Maintenance

Alternative PA1: Critical Facility Inspections

As a part of maintenance and upkeep for the treatment system over the 20-year planning period the following has been budgeted: annual tank inspections and maintenance, annual well inspections and required maintenance, annual high service pump inspections and required maintenance, and annual chemical costs and maintenance. Additionally, budget has been included for filter media replacement in the filters at some point during the 20-year period. The budget represents the annual cost that should be dedicated towards maintenance and inspection based on the interval that the maintenance and inspection needs to be completed. The budget accounts for:

- Tank Inspections should occur every 5 years. Tanks include 16th St Elevated Storage Tank, Meadowood Elevated Storage Tank, Ground Storage Reservoir, Surge Tank, SWTP Clearwell, GWTP detention tank, Flocculation Basins, and Sedimentation Basins.
- A handful of the existing 13 wells are inspected each year and it rotates which wells are inspected every year. See Alternative GS0 for well cleaning recommendations.
- Pump Inspections should occur every 5 years. Pumps include GWTP HSPs, SWTP HSPs, SWTP Transfer Pumps, and SWTP Raw Water Pumps.
- Filter Media Inspection should occur every 5-10 years. The budget includes 1 additional filter inspection for each filter in addition to recommendations in Alternatives GF2 and SF2.
- Chemical and Chemical System Maintenance for Chlorine, Fluoride, Carbon, Alum, and Algaecide.

Table 5.5 summarizes the inspection costs and intervals.

Table 5.5 Annual Process Asset Maintenance and Upkeep

Item	Inspection Interval (years)	Annual Cost Over 20-Year Study Period
Annual Tank Inspections	5	$10,000
Annual Well Inspections	1	$120,000
Pump Inspections	5	$18,000
Filter Media Inspections	10	$5,000
Chemical System Maintenance	1	$155,000

This maintenance budget will be funded from the Speedway Water Works budget and from annual revenue. A detailed cost estimate of the probable maintenance costs for the treatment assets is included in **Appendix B**, **Table B-52**.

6.0 CAPITAL IMPROVEMENTS PLAN SUMMARY

The proposed improvements were determined after evaluation of probable costs, feasibility of construction, need for improvements, and prioritization of benefits to the City. The proposed improvements consist of the following components separated into short term (first 5 years) and long term (next 15 years) needs. Refer to **Table 6.1.1** for the near-term projects and **Table 6.1.2** for the long-term projects.

Table 6.1. Short-Term Project Summary (5-year program)

Project Category	*Cost Table Number*	*Project Name*	*Estimated Total Project Cost*
System-Wide	B-49	System Wide Cellular Communications	$ 102,000
		Arc-Flash Study	$ 25,000
Wells	B1-B9	Well House and Equipment Rehabilitation	$ 509,000
	B-10	Well Pump VFD Installation	$ 203,000
	B-11	New Well - Jr High School	$ 900,000
GWTP		Aerator Inspection and Improvements	$ 36,000
		Detention Tank Access Hatch Replacement	$ 25,000
	B-26	Rebuild HSP No. 2 and 3	$ 40,000
SWTP	B-31	Low Head Dam Improvements	$ 298,000
	B-32	Raw water Intake Structure Cover	$ 128,000
		Operational Strategy Modifications Pilot Study	$ 350,000
Chemical	B-41	Switch to Bulk Bleach	$ 498,000
	B-42	Switch to Bulk HSF	$ 325,000
	B-44	Phosphate Addition	$ 120,000
Site	B-45	WTP Construct Garage	$ 1,013,000
	B-48	WTP Security	$ 158,000
Tanks	B-50	16th St. Tank Improvements	$ 242,000
Equip.		Pull Behind Vac Machine w/ Valve Turner	$ 92,500
		Hydra Valve Equipment	$ 60,000
Distr. Assets	B-51	Water Main Replacement (0.5%)	$ 3,505,000
	B-51	Lead Service Replacement (5%)	$ 1,273,000
	B-51	LSLR Mapping	$ 18,000
	B-51	Valve Replacement (3%)	$ 420,000
	B-51	Hydrant Replacement	$ 150,000
		Water Loss Audit	$ 7,000
	B-51	Meter Replacement Program	$ 450,000

Table 6.1. Short-Term Project Summary (5-year program) (continued)

Project Category	*Cost Table Number*	*Project Name*	*Estimated Total Project Cost*
Process Assets	B-52	Tank Inspections	$ 50,000
	B-52	Well Inspections and Maintenance	$ 600,000
	B-52	Pump Inspection, Cleaning, and Maintenance	$ 90,000
	B-52	Filter Media Inspections	$ 25,000
	B-52	Chemical System Maintenance	$ 775,000
		Total Probable Construction Cost	**$ 13,040,000**

Table 6.2. Long-Term Project Summary (Years 6-20)

Project Category	*Cost Table Number*	*Project Name*	*Estimated Total Project Cost*
System-Wide		Code-Red Alert System	$ 30,000
Wells	B-12	New Well - WTP Property	$ 753,000
	B-13	New Well - South of B&O	$ 994,000
	B-14	New Well - Whitcomb Ave. & Cunningham Rd.	$ 1,168,000
	B-15	New Well - Eagle Creek Levee North	$ 742,000
GWTP	B-27	Replace HSP Motors and install VFD	$ 430,000
	B-28	Pressure Filters Rehabilitation	$ 692,000
	B-29	Replace GWTP Filter Pipe and Valves	$ 290,000
	B-30	GWTP Building and Facility Improvements	$ 694,000
SWTP	B-33	Flocculation/Sedimentation Basin Structural Improvements	$ 72,000
	B-34	Flocculation/Sedimentation Basin Internal Improvements	$ 119,000
	B-35	Filter Rehabilitation	$ 384,000
	B-36	High Service Pumps VFD Installation	$ 102,000
	B-37	Residual Pumps Replacement	$ 35,000
	B-38	Valve & Actuator Replacement	$ 197,000
	B-39	Building Upper-Level Renovations	$ 440,000
	B-40	SWTP Building and Facility Improvements	$ 598,000
Chemical	B-43	Alum Equipment Replacement	$ 200,000
Site	B-46	WTP Fill Storage Bays	$ 254,000
	B-47	WTP Pavement and Parking	$ 193,000
Tanks	B-50	16th St. Tank Improvements	$ 1,980,000

Table 6.2. Long-Term Project Summary (Years 6-20) (Continued)

Project Category	*Cost Table Number*	*Project Name*	*Estimated Total Project Cost*
Equip.		Vac-Truck	$ 450,000
		Vac Trailer	$ 60,000
		Asphalt Hot Box	$ 10,000
		Small Pavement Roller	$ 13,000
		Milling Head	$ 12,000
Distr. Assets	B-51	Water Main Replacement (1%)	$ 20,490,000
	B-51	Lead Service Replacement (10%)	$ 7,635,000
	B-51	Valve Replacement (3%)	$ 1,260,000
	B-51	Hydrant Replacement	$ 900,000
	B-51	Meter Replacement Program	$ 1,350,000
Process Assets	B-52	Tank Inspections	$ 150,000
	B-52	Well Inspections and Maintenance	$ 1,800,000
	B-52	Pump Inspection, Cleaning, and Maintenance	$ 270,000
	B-52	Filter Media Inspections	$ 75,000
	B-52	Chemical System Maintenance	$ 2,325,000
		Total Probable Construction Cost	**$ 32,926,000**

APPENDIX A

FIGURES

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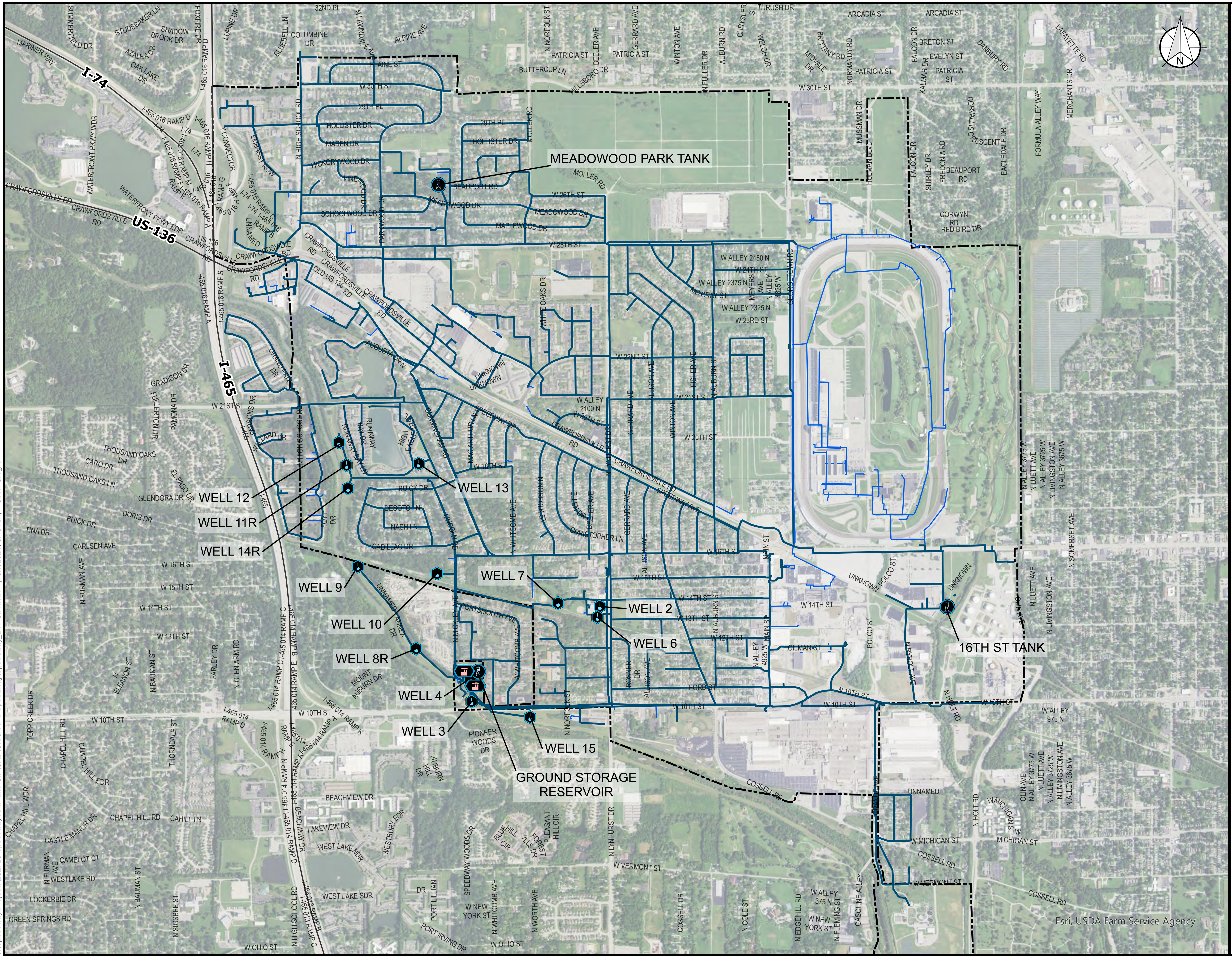


WESSLER ENGINEERING
More than a Project™

Legend
- Water Mains
- Private Water Lines
- Wells
- Treatment Plant
- Water Tanks
- Highways
- Corporate Limits

0 500 1,000 2,000 FT

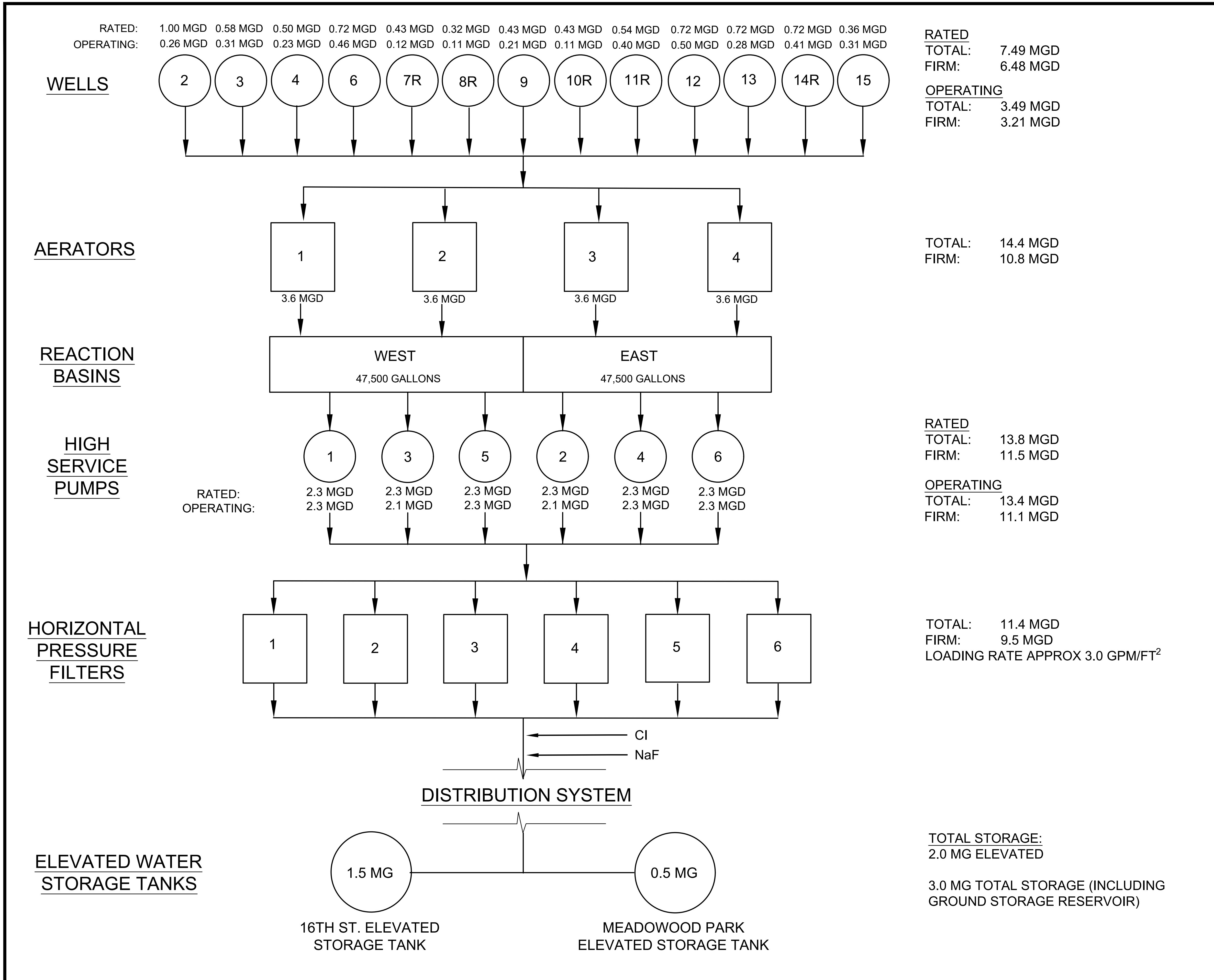
FIGURE A-1

WATER SYSTEM OVERVIEW

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

J:\Speedway\Projects\232720 Speedway AMP and CIP\CAD\GIS\MAPS\Speedway\Speedway_DW-CIP.aprx (10/7/2021 8:10 AM) User: GregN



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LEGEND

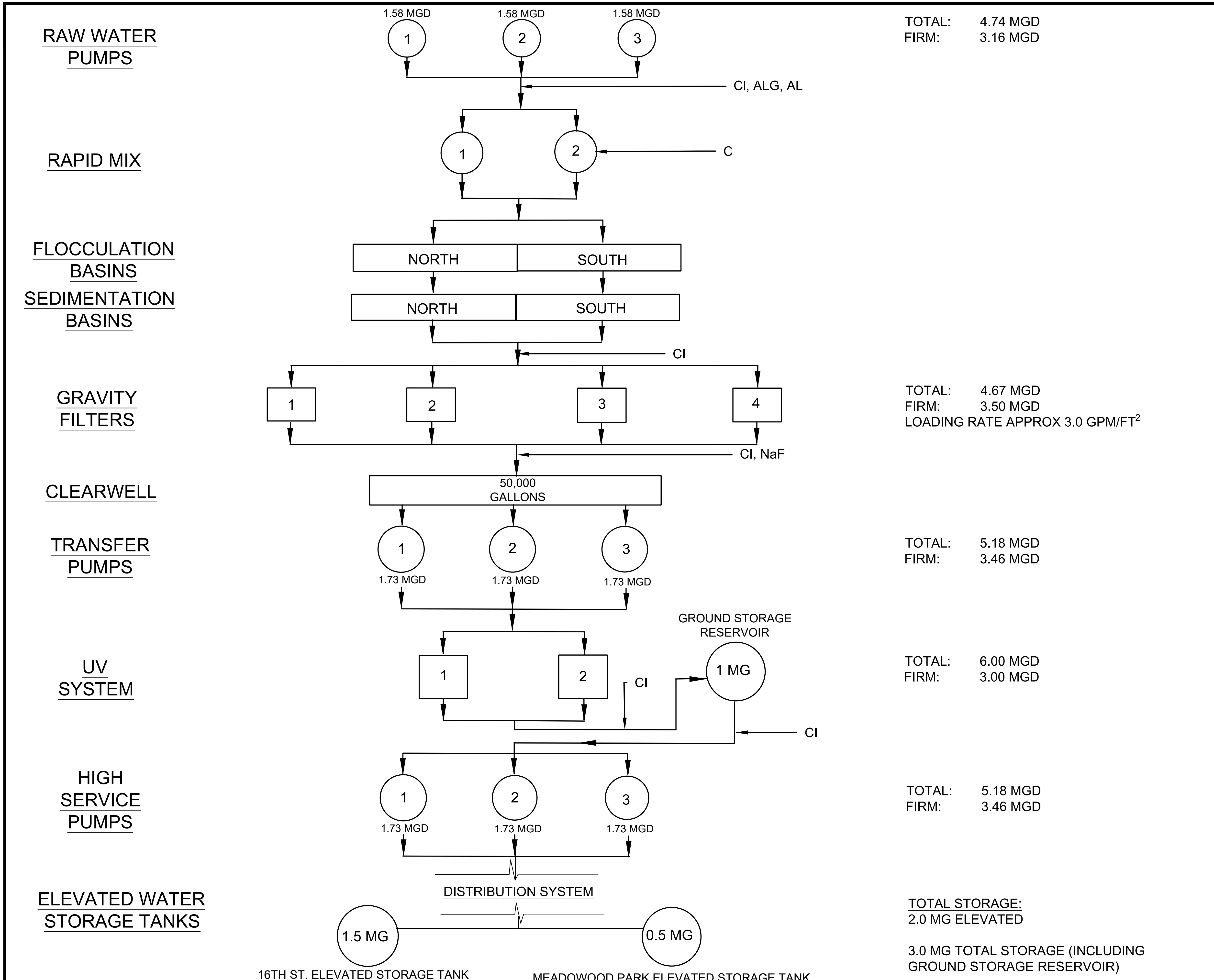
CI	CHLORINE INJECTION POINT
NaF	FLOURIDE INJECTION POINT

TOTAL PLANT CAPACITY
TOTAL: 11.4 MGD
FIRM: 9.5 MGD

FIGURE A-2
EXISTING GWTP
PROCESS DIAGRAM

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001



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LEGEND

CI	CHLORINE INJECTION POINT
ALG	ALGAECIDE INJECTION POINT
C	CARBON INJECTION POINT
AL	ALUM INJECTION POINT
NaF	FLUORIDE INJECTION POINT

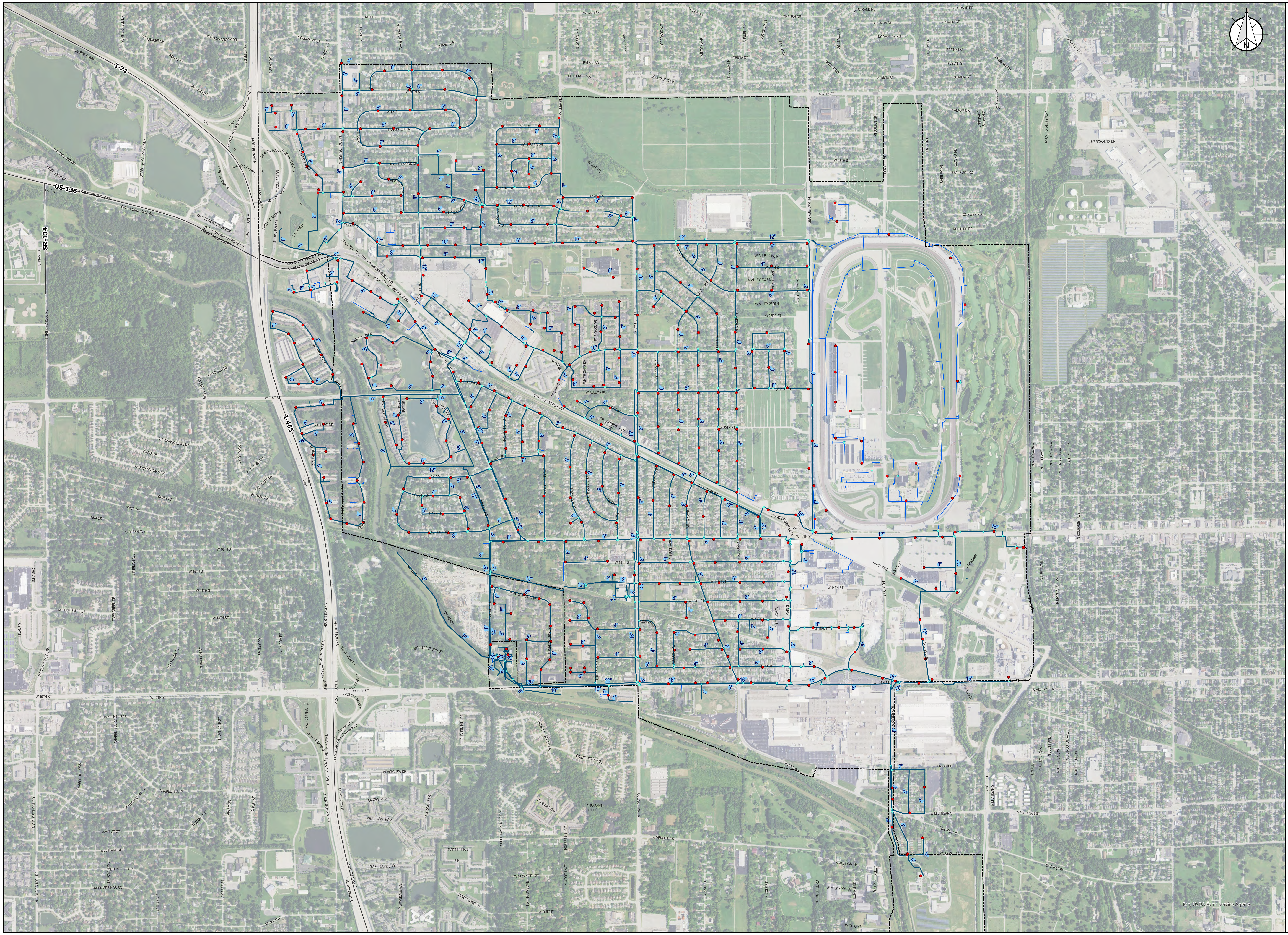
TOTAL PLANT CAPACITY
TOTAL: 4.67 MGD
FIRM: 3.00 MGD

NOTE: SWTP INTAKE WITHDRAW LIMIT FROM EAGLE CREEK IS 3.0 MGD

FIGURE A-3
EXISTING SWTP
PROCESS DIAGRAM

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001



WESSLER
ENGINEERING
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Legend
- Water Mains
- Private Water Lines
- Hydrants
- Valves
- Highways
- Corporate Limits

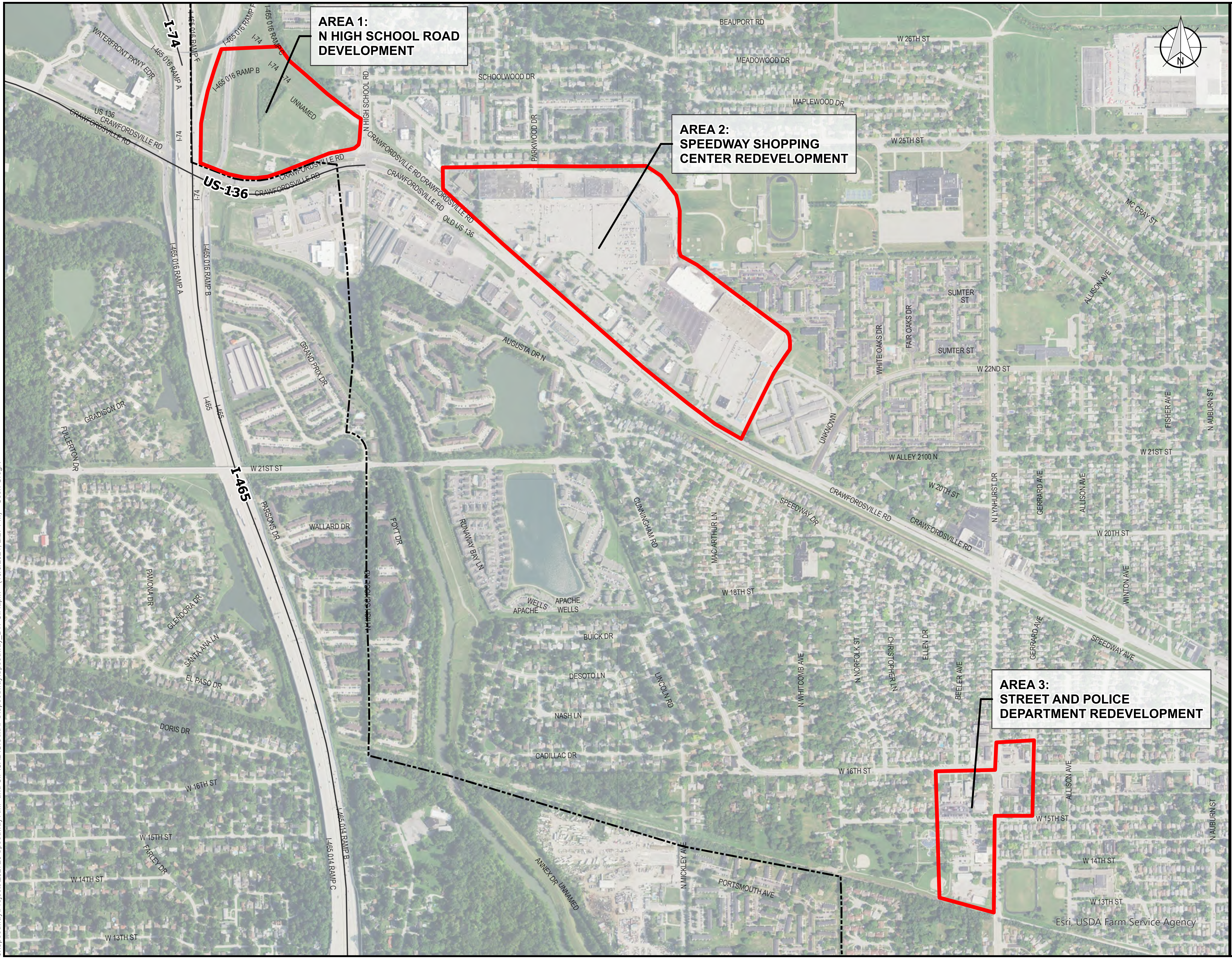
0 400 800 1,600 FT

FIGURE A-4

WATER DISTRIBUTION SYSTEM MAP

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER ENGINEERING

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Legend

- Redevelopment Areas
- Highways
- Corporate Limits

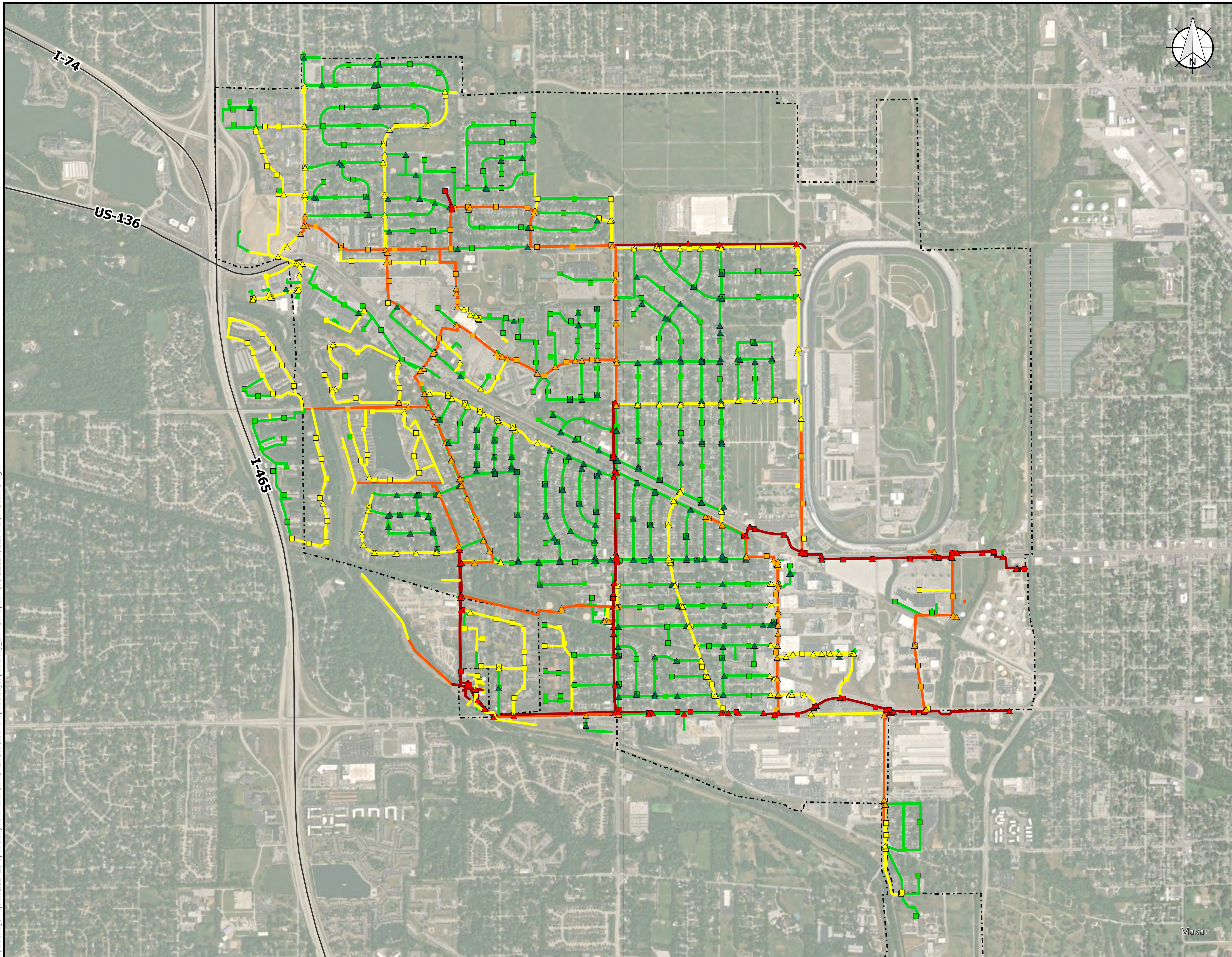
0 410 820 1,640 FT

FIGURE A-5

REDEVELOPMENT AREAS

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



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More than a Project™

Legend

Valve COF Score
- ▲ ≤ 2
- ▲ 2.1 - 3
- ▲ 3.1 - 4
- ▲ 4 .1 - 5

Hydrant COF Score
- ■ ≤ 2
- ■ 2.1 - 3
- ■ 3.1 - 4
- ■ 4.1 - 5

Main COF Score
- ≤ 2
- 2.1 - 3
- 3.1 - 4
- 4.1 - 5
- Corporate Limits
- Highways

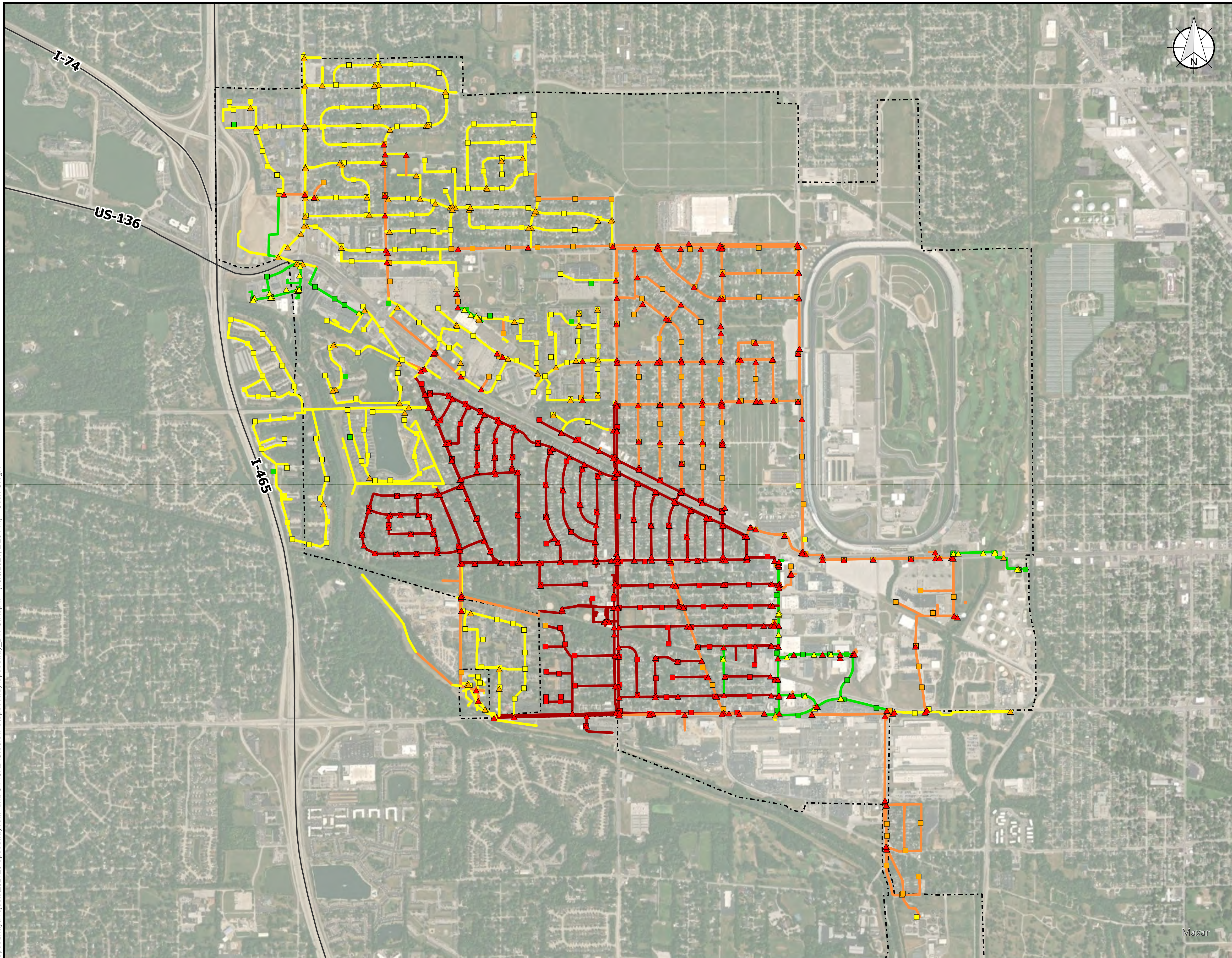
0 500 1,000 2,000 FT

FIGURE A-6

DISTRIBUTION SYSTEM COF

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER ENGINEERING

More than a Project™

Legend

Valve POF Scope
- ≤ 2
- 2.1 - 3
- 3.1 - 4
- 4.1 - 5

Hydrant POF Scope
- ≤ 2
- 2.1 - 3
- 3.1 - 4
- 4.1- 5

Main POF Score
- ≤ 2
- 2.1 - 3
- 3.1 - 4
- 4.1 - 5

Corporate Limits

Highways

0 500 1,000 2,000 FT

FIGURE A-7

DISTRIBUTION SYSTEM POF

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

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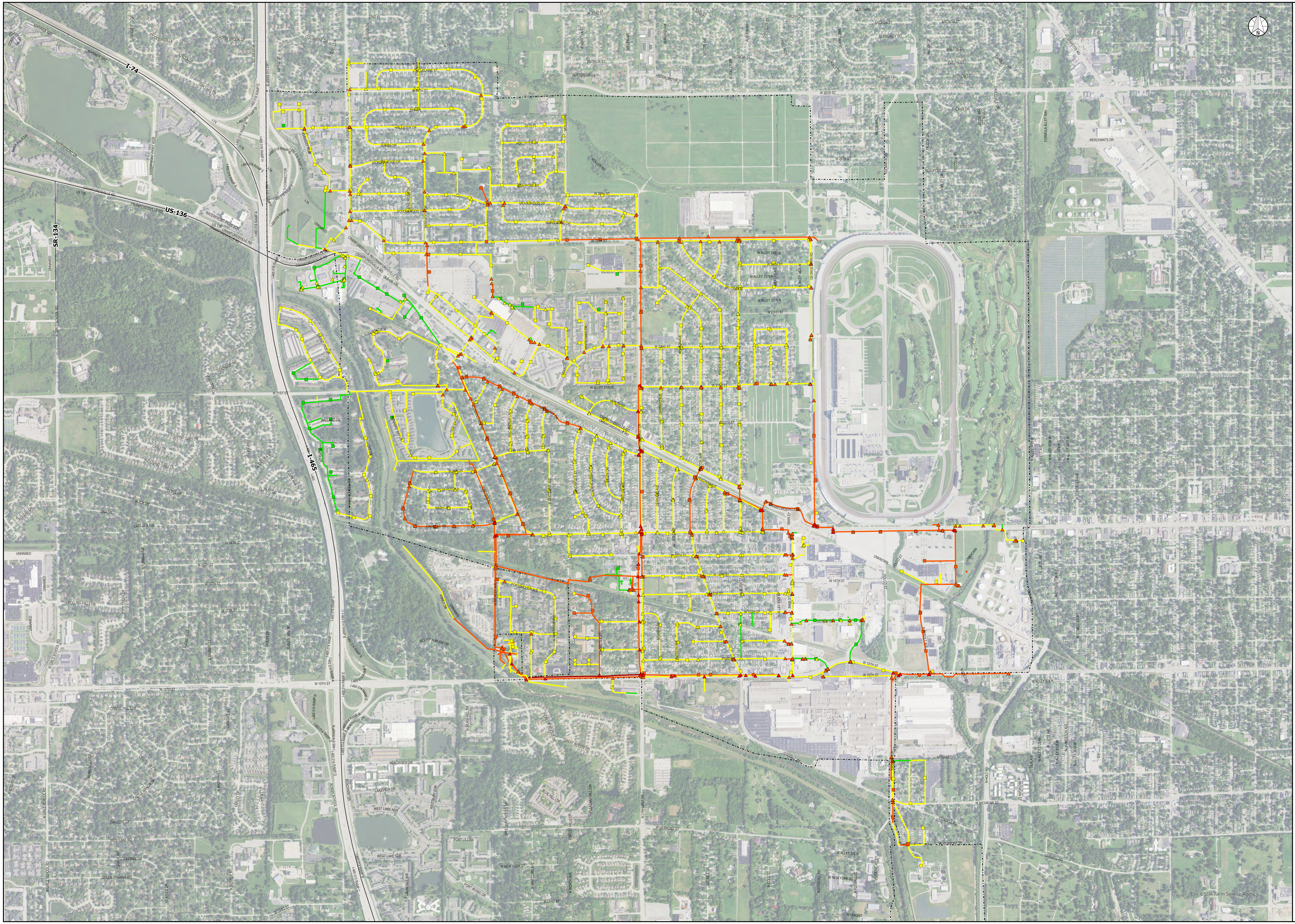

WESSLER ENGINEERING

More than a Project™

Legend

Valve BRE Score
- ≤ 5
- 5.1 - 10
- 10.1 - 20
- 20.1 - 25

Hydrant BRE Score
- ≤ 5
- 5.1 - 10
- 10.1 - 20

Main BRE Score
- ≤ 5
- 5.1 - 10
- 10.1 - 20
- > 20.1

Corporate Limits

Highways

0 400 800 1,600 FT

FIGURE A-8

DISTRIBUTION SYSTEM BRE SCORES

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

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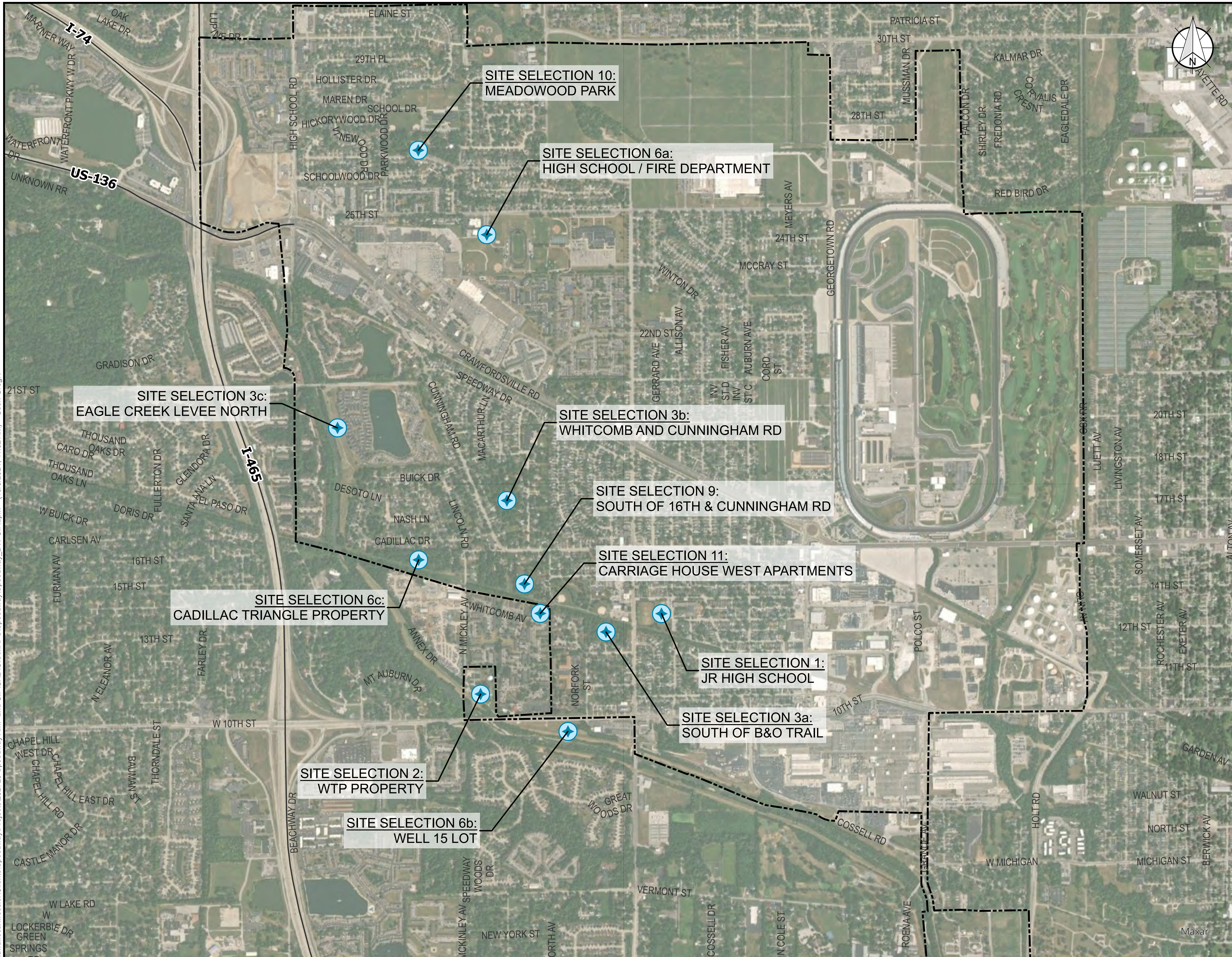
232720-01-001



WESSLER
ENGINEERING
More than a Project™

Legend

- Groundwater Well Locations
- Corporate Limits
- Highways
- DWCIP_ProjectInfo

0 500 1,000 2,000 FT

FIGURE A-9

NEW GROUNDWATER
WELL LOCATIONS

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

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WESSLER
ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Storm Water
- Sanitary Sewer
- Parcel Lines

0 30 60 120 FT

FIGURE A-10

JUNIOR HIGH SCHOOL
WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

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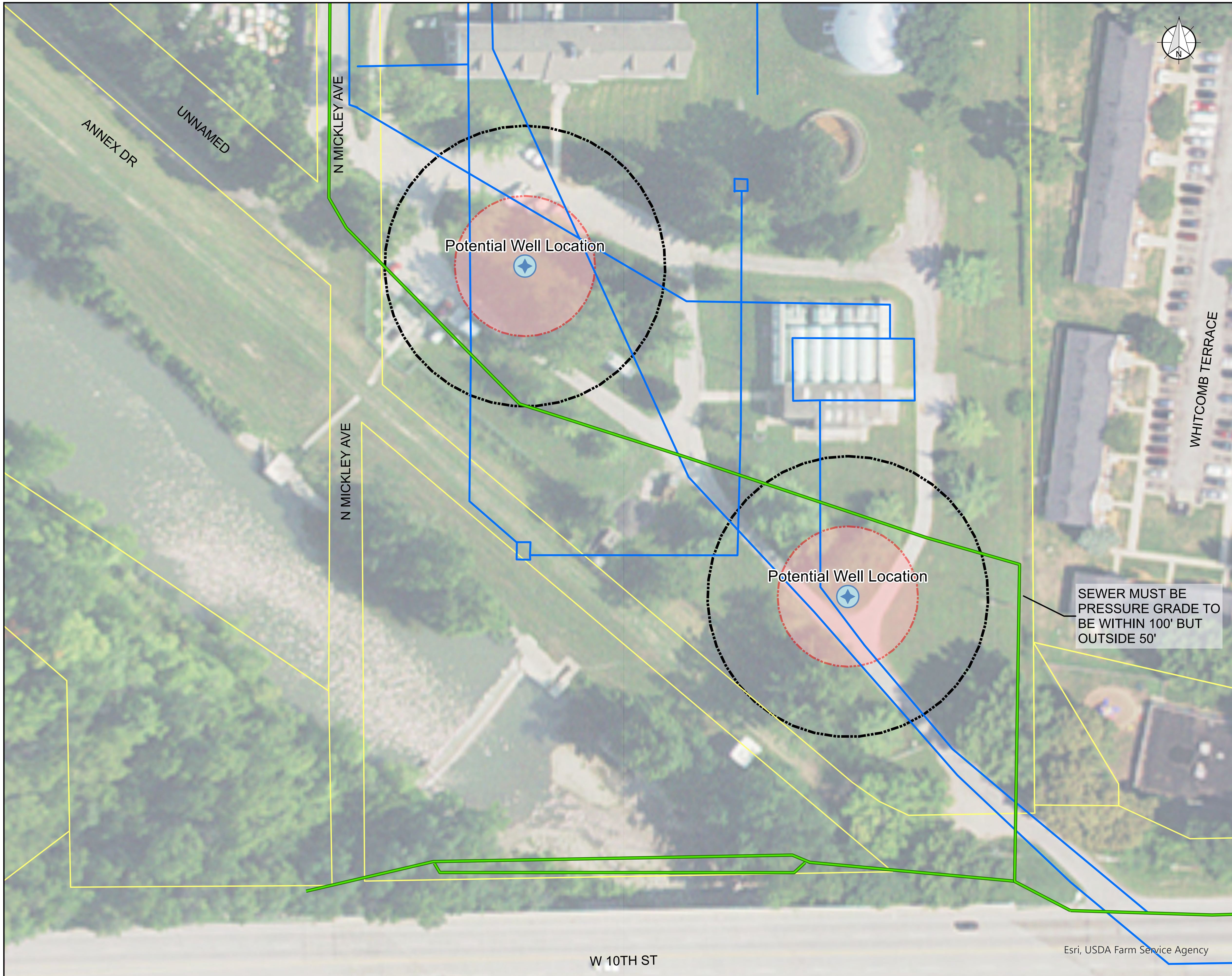
232720-01-001



WESSLER ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Storm Water
- Sanitary Sewer
- Parcel Lines

0 30 60 120 FT

FIGURE A-11

WTP PROPERTY WELL SITES

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

WESSLER
ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

0 30 60 120 FT

FIGURE A-12
SOUTH OF B&O TRAIL
WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

WESSLER
ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

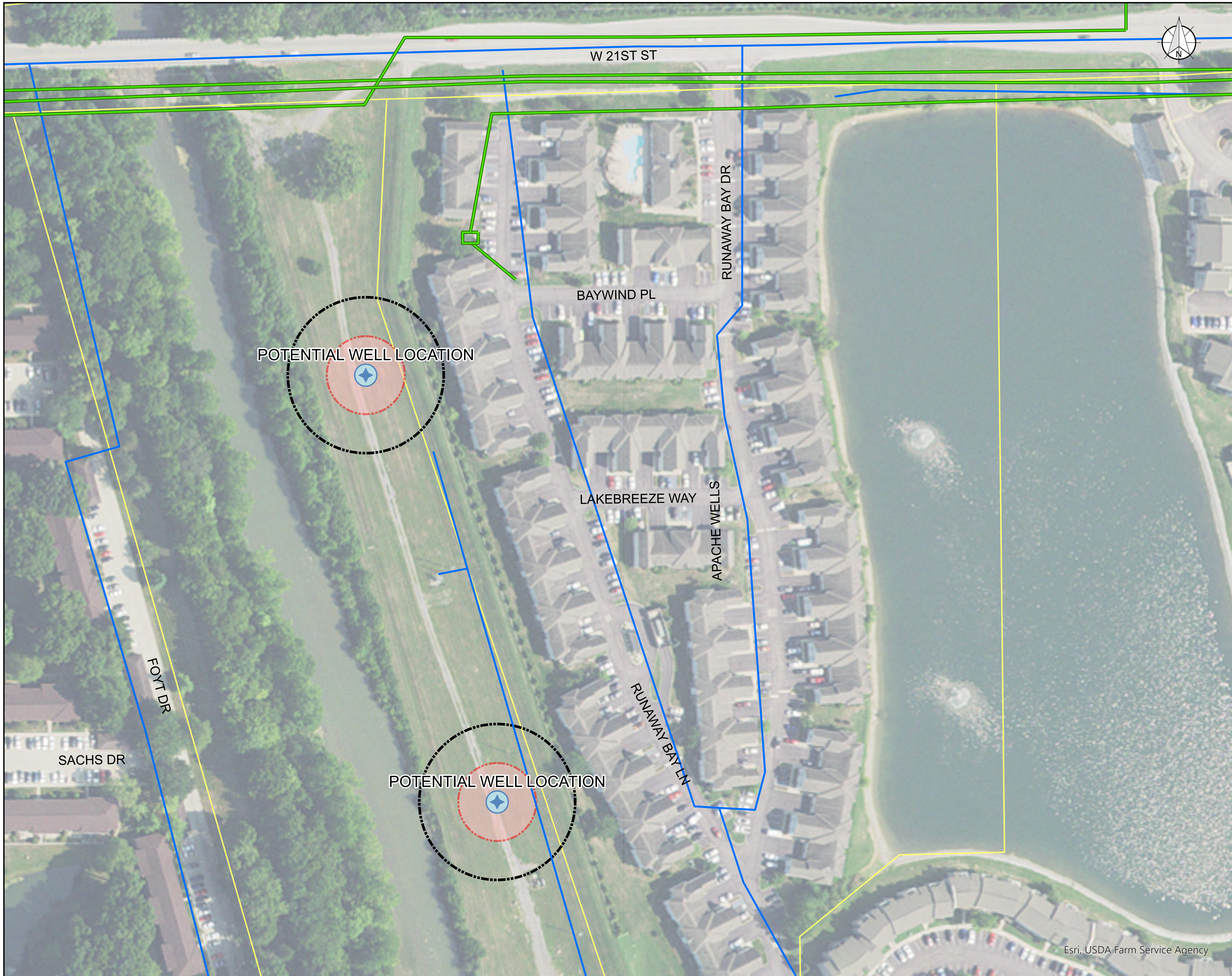
0 50 100 200 FT

FIGURE A-13

WHITCOMB AND
CUNNINGHAM RD WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER ENGINEERING

More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

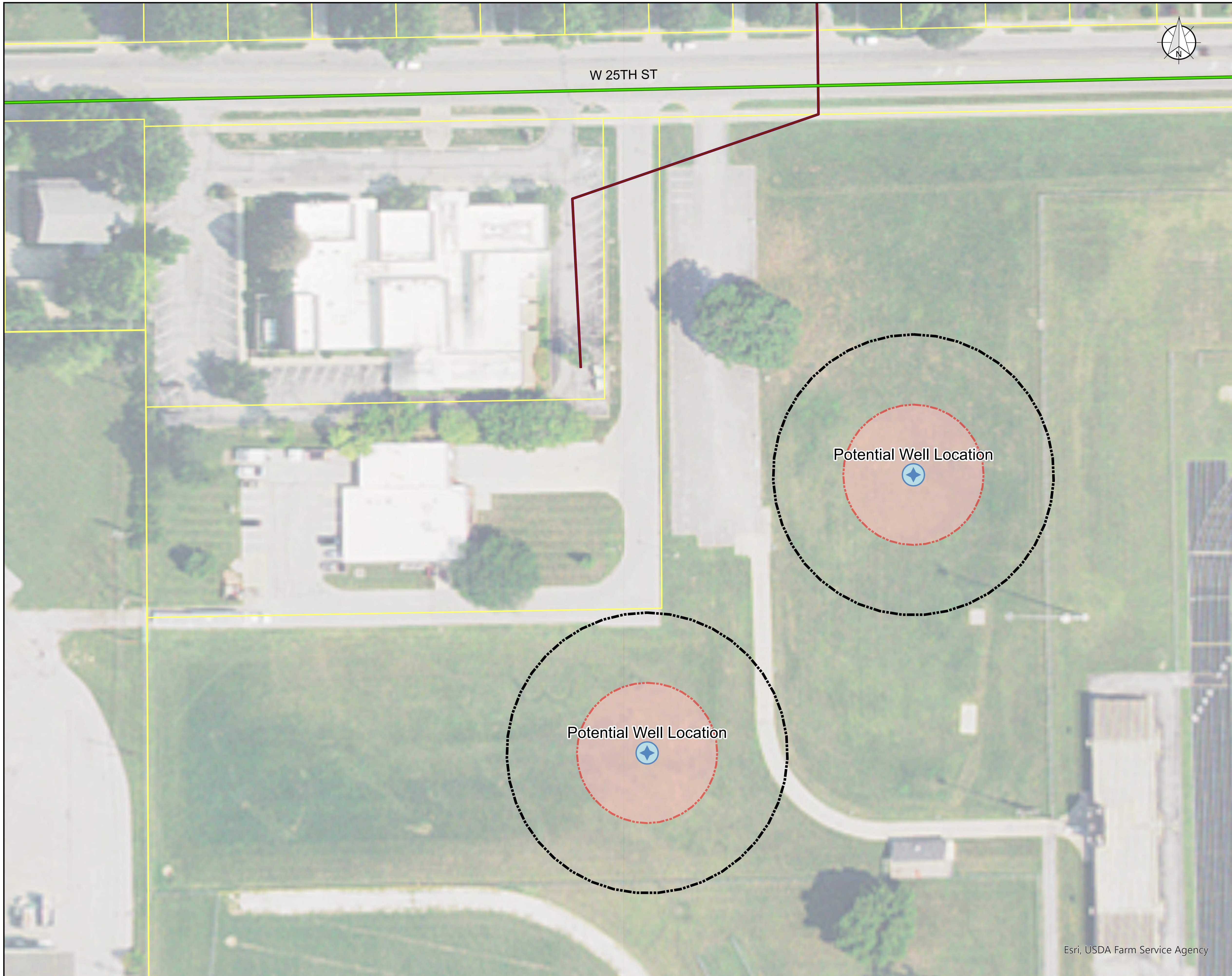
0 60 120 240 FT

FIGURE A-14

EAGLE CREEK LEVEE
NORTH WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER ENGINEERING

More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Storm Water
- Sanitary Sewer
- Parcel Lines

0 30 60 120 FT

FIGURE A-15

HIGH SCHOOL / FIRE DEPARTMENT WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

WESSLER ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Storm Water
- Sanitary Sewer
- Parcel Lines

0 30 60 120 FT

FIGURE A-16

WELL 15 LOT WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

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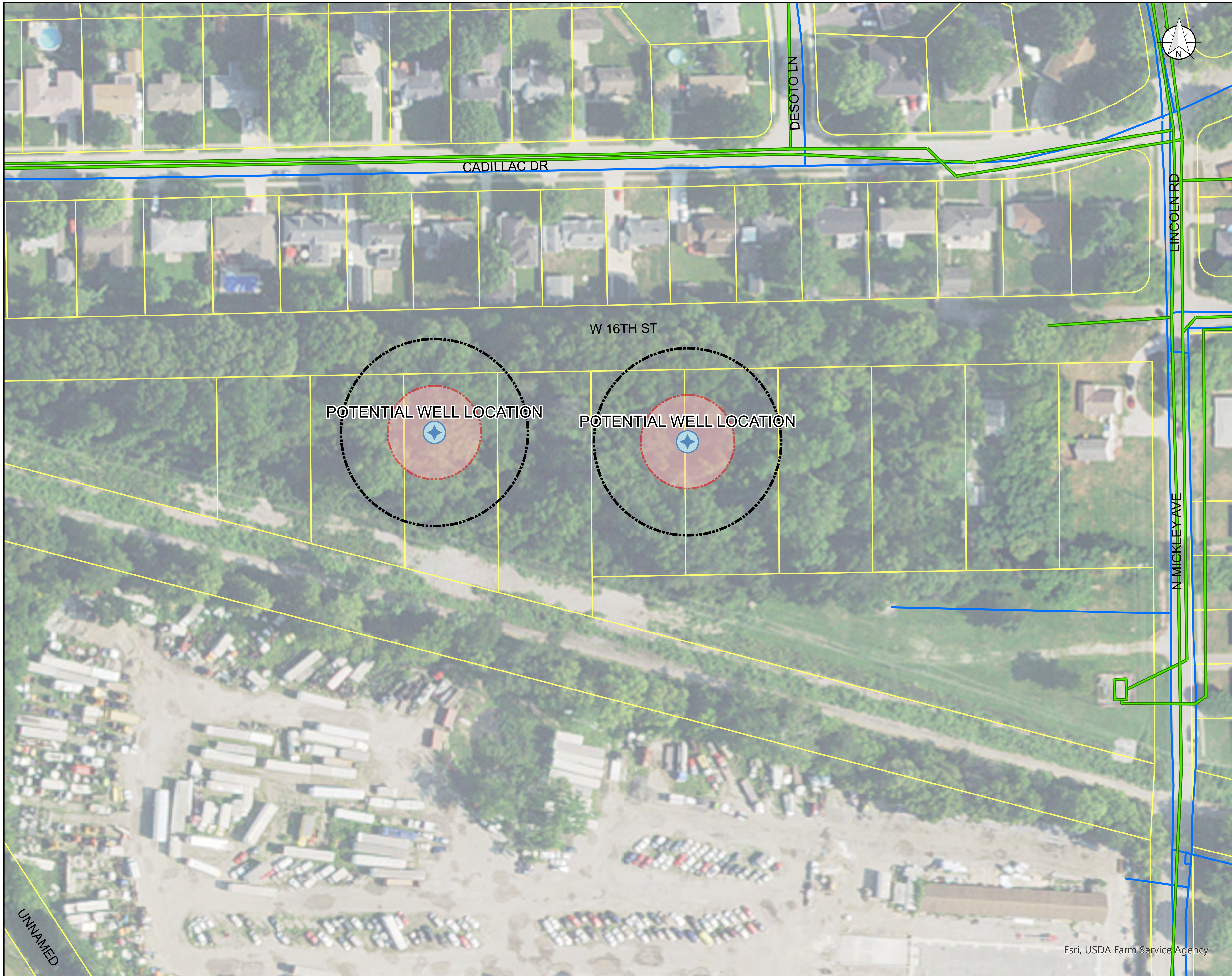


WESSLER ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

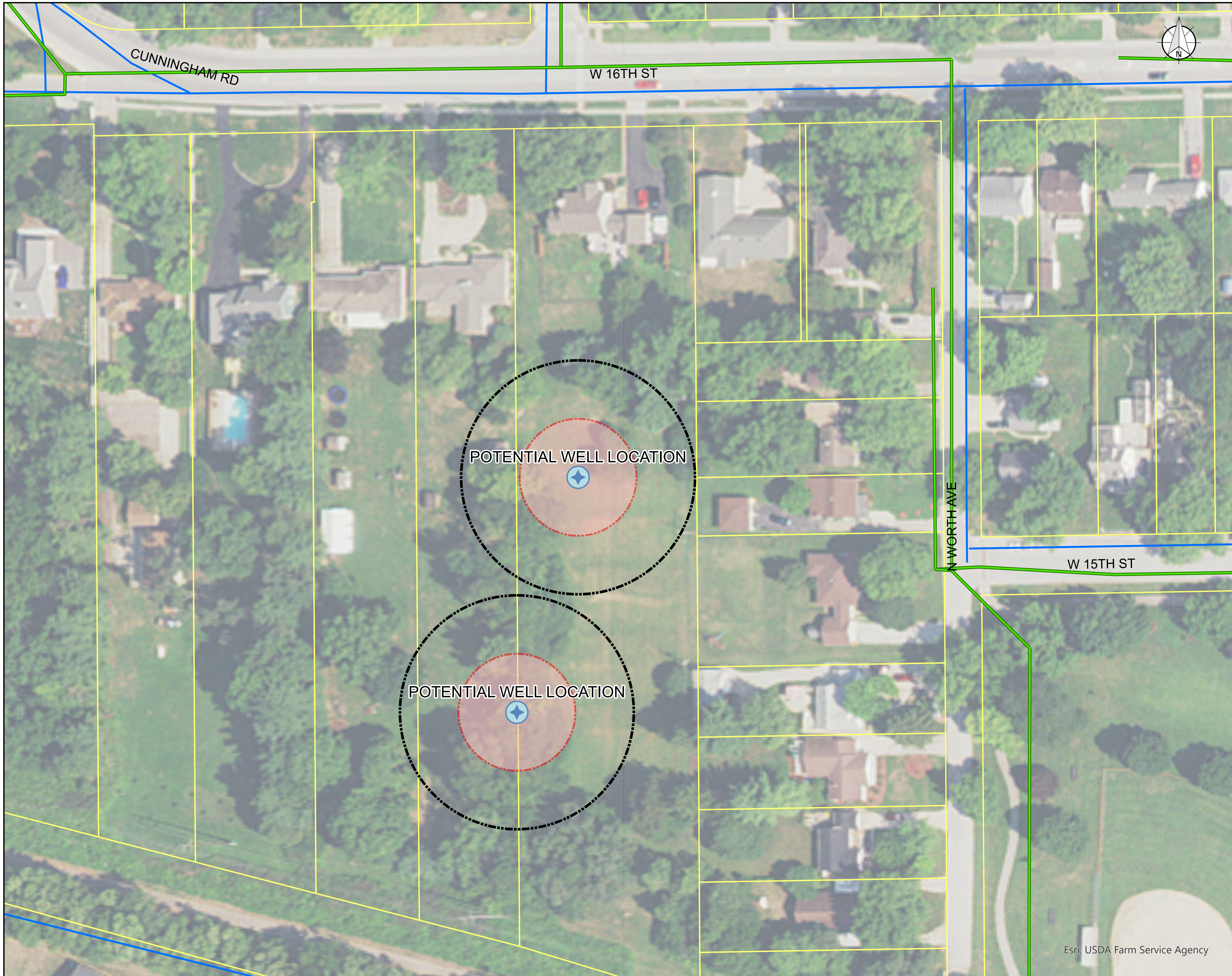
0 50 100 200 FT

FIGURE A-17

CADILLAC TRIANGLE
PROPERTY WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER
ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (2)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

0 40 80 160 FT

FIGURE A-18

SOUTH OF 16TH &
CUNNINGHAM RD WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

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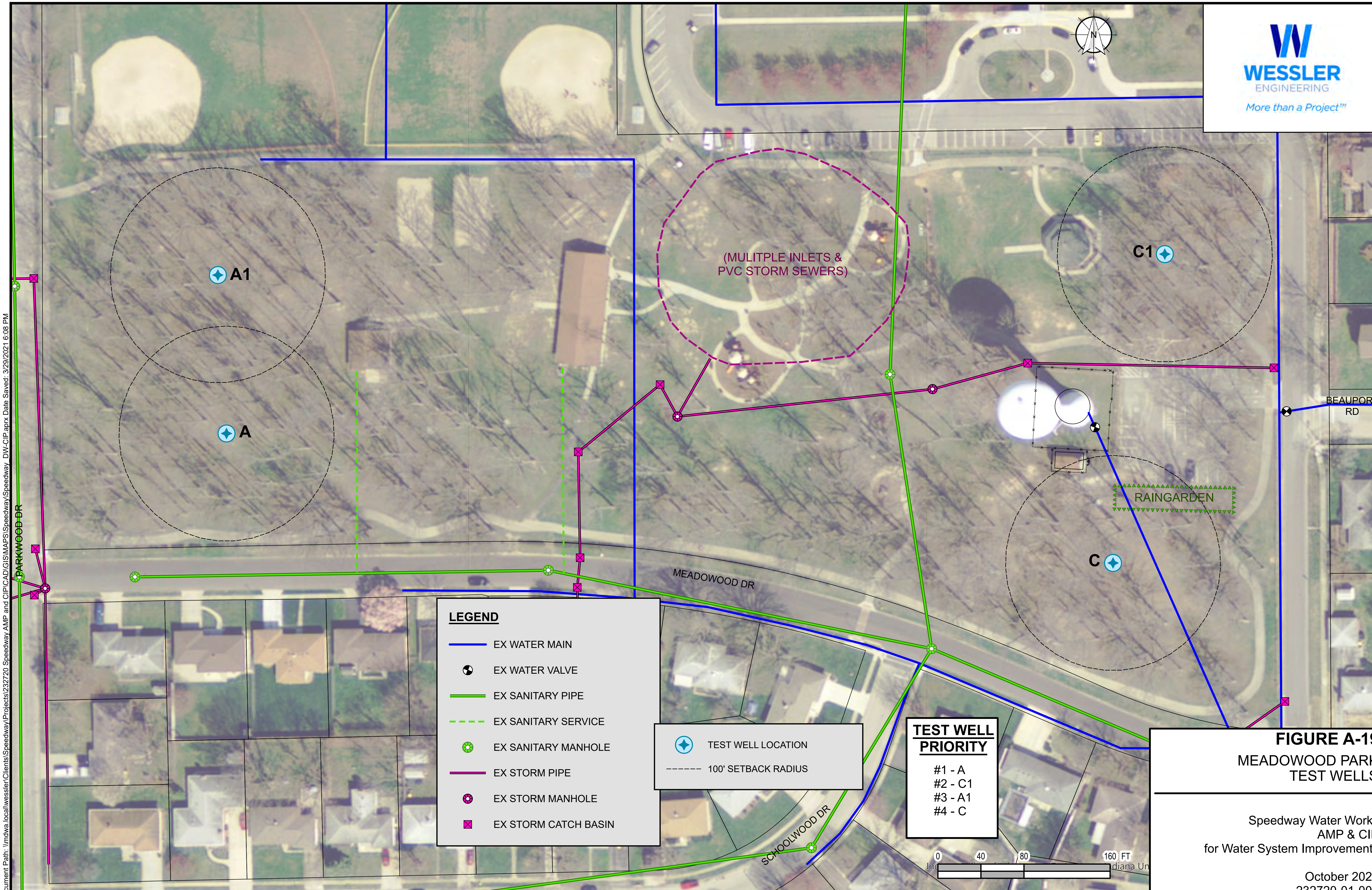

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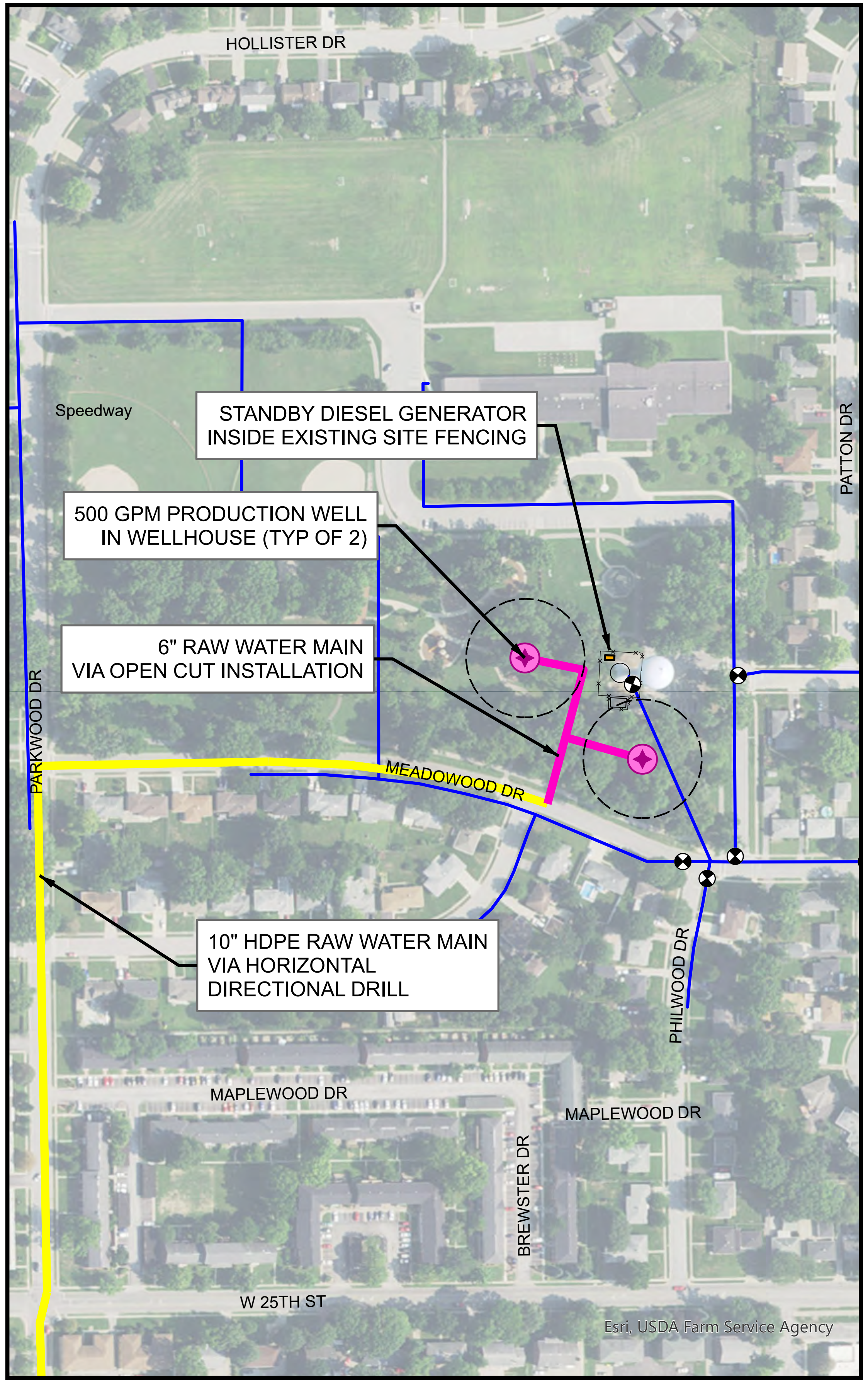
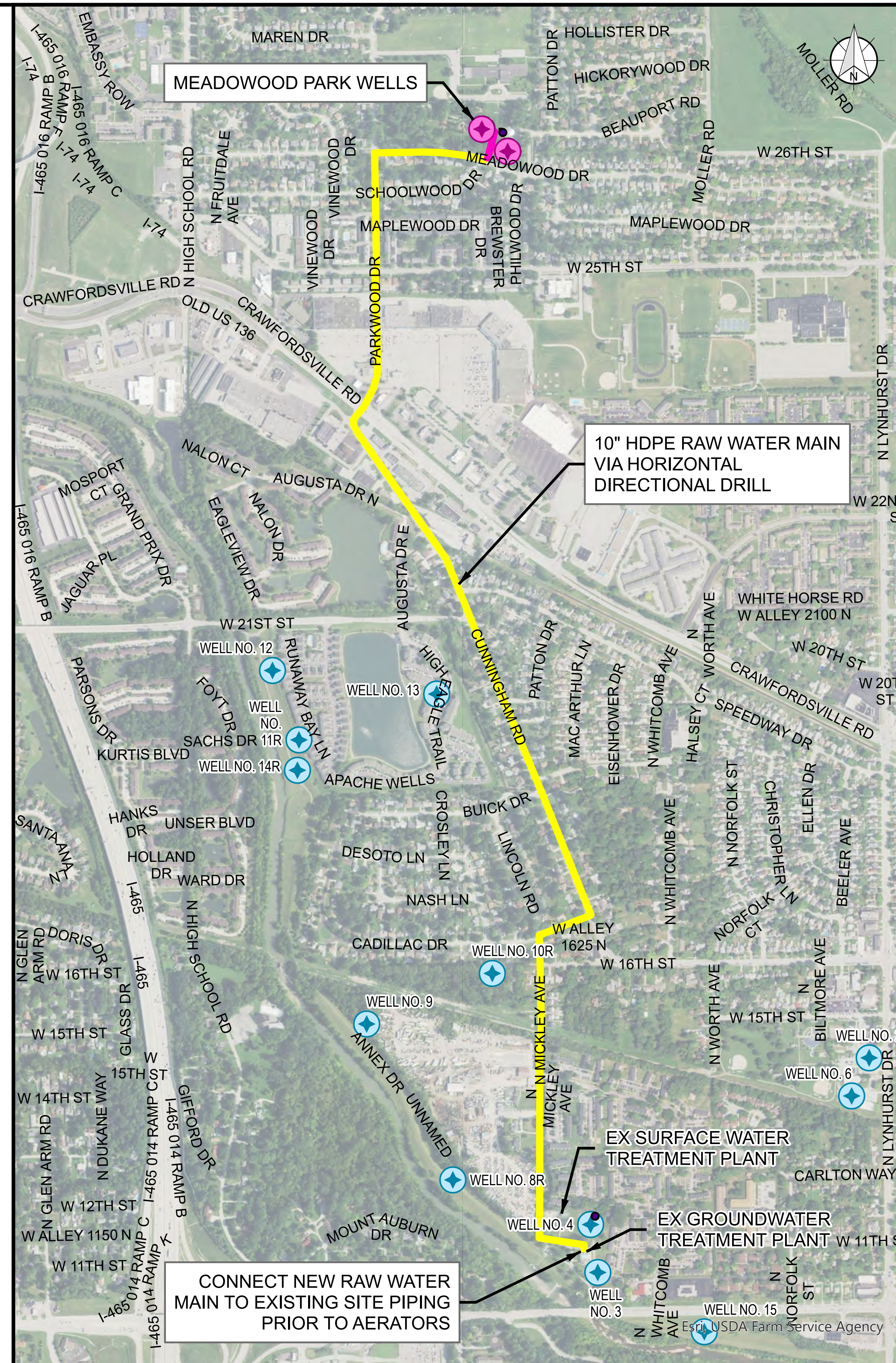


MEADOWOOD PARK WELLS

0 125 250 500 FT



0 500 1,000 2,000 FT

WESSLER ENGINEERING

More than a Project™

LEGEND

- EXISTING WELL
- 500 GPM PRODUCTION WELL
- 100' WELL RADIUS
- STANDBY DIESEL GENERATOR
- 10" HDPE RAW WATER MAIN
- 6" RAW WATER MAIN

FIGURE A-20

MEADOWOOD PARK
ALTERNATIVE 1

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

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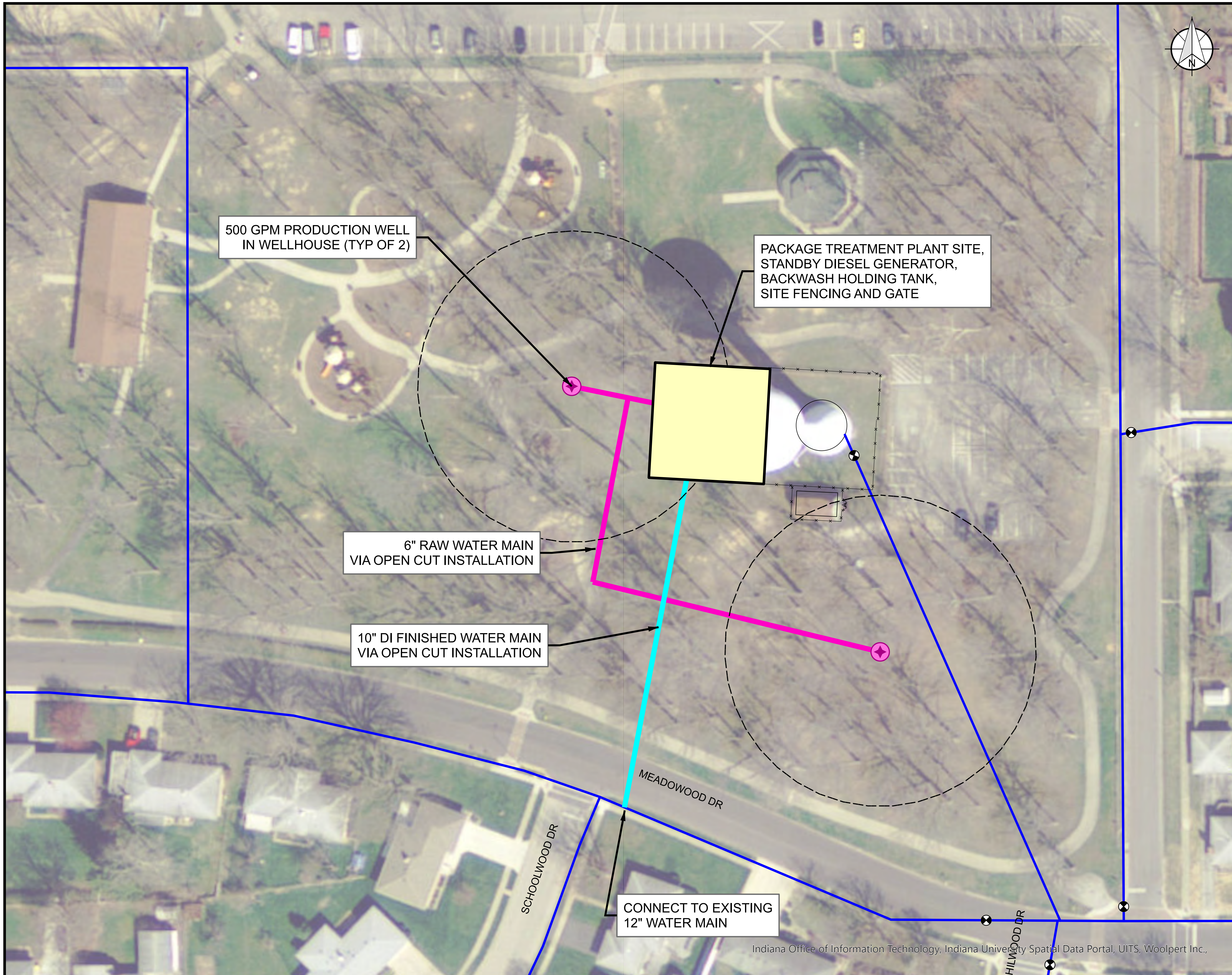

WESSLER ENGINEERING

More than a Project™

Legend

- EX WATER MAIN
- EX WATER VALVE
- 500 GPM PRODUCTION WELL
- 100' WELL RADIUS
- TREATMENT PLANT SITE
- 6" RAW WATER MAIN
- 10" DI FINISHED WATER MAIN

0 30 60 120 FT

FIGURE A-21

MEADOWOOD PARK
ALTERNATIVE 2

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

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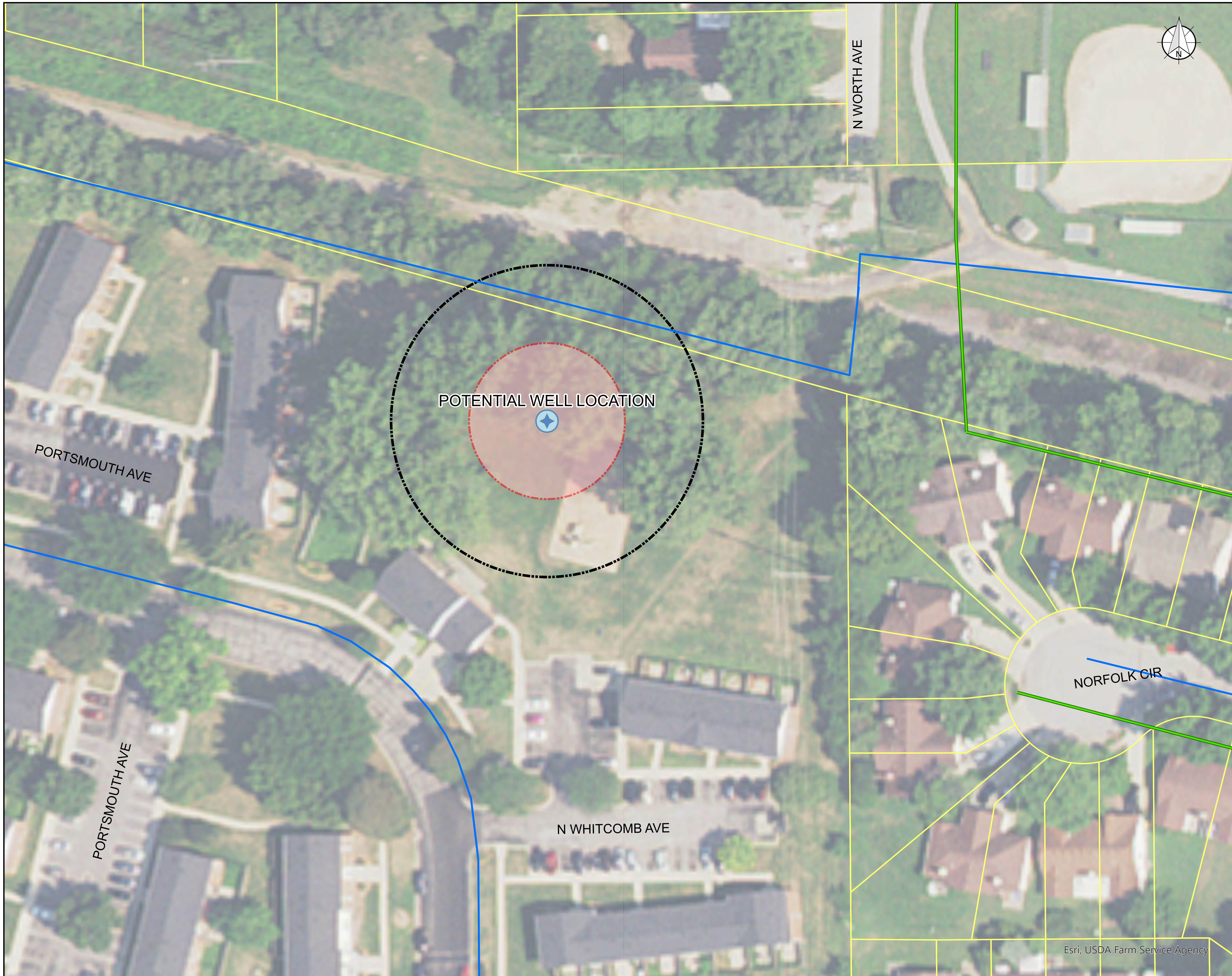


WESSLER ENGINEERING
More than a Project™

LEGEND

- Potential Well Location (1)
- 50ft Buffer
- 100ft Buffer
- Water
- Sanitary Sewer
- Parcel Lines

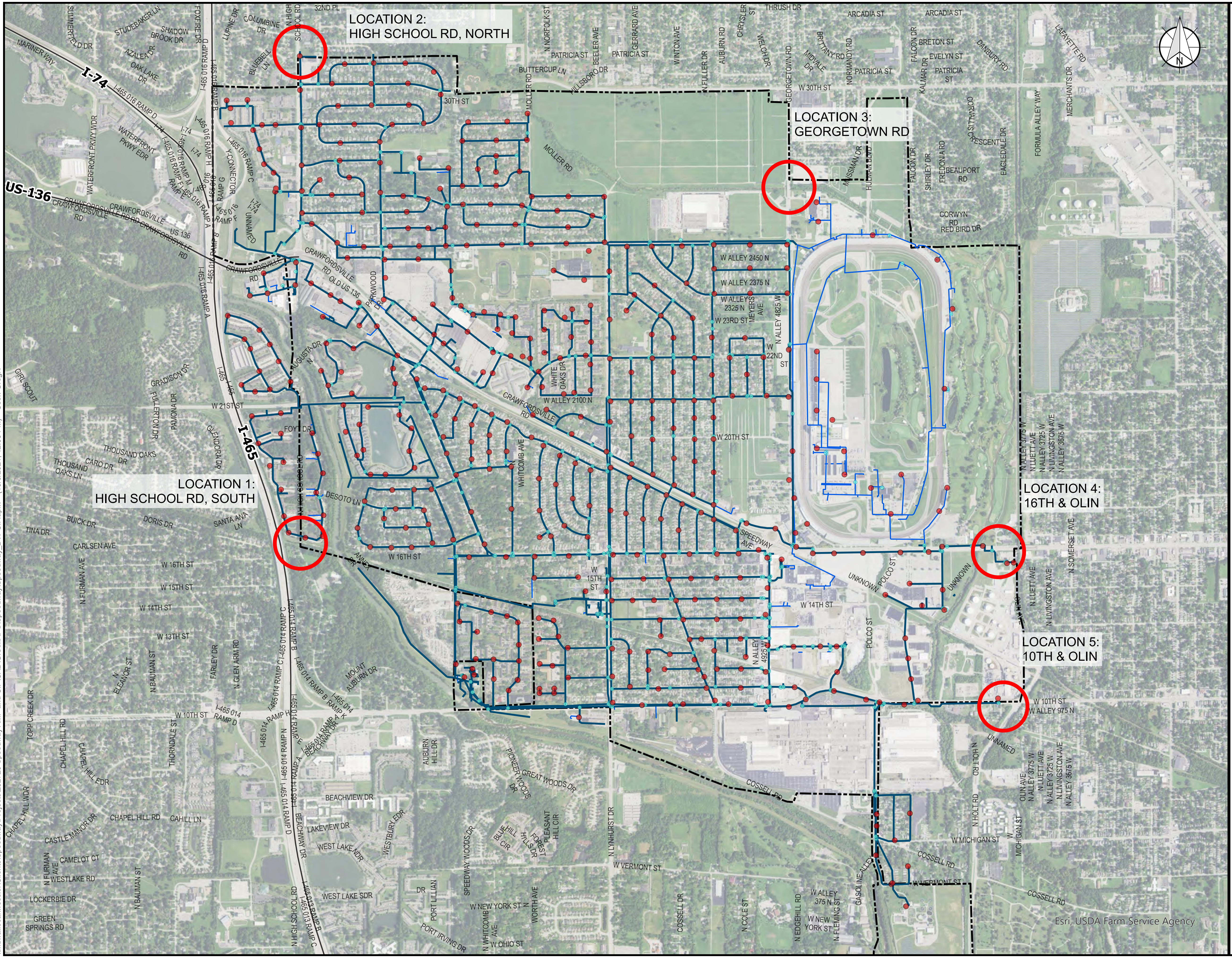
0 30 60 120 FT

FIGURE A-22

CARRIAGE HOUSE WEST APARTMENTS WELL SITE

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001



WESSLER
ENGINEERING
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Legend
- Interconnect Location
- Hydrants
- Valves
- Water Mains
- Private Lines
- Highways
- Corporate Limits

FIGURE A-23

EMERGENCY CEG
INTERCONNECT LOCATIONS

Town of Speedway, Indiana
Speedway Water Works
AMP & CIP
for Water System Improvements

October 2021
232720-01-001

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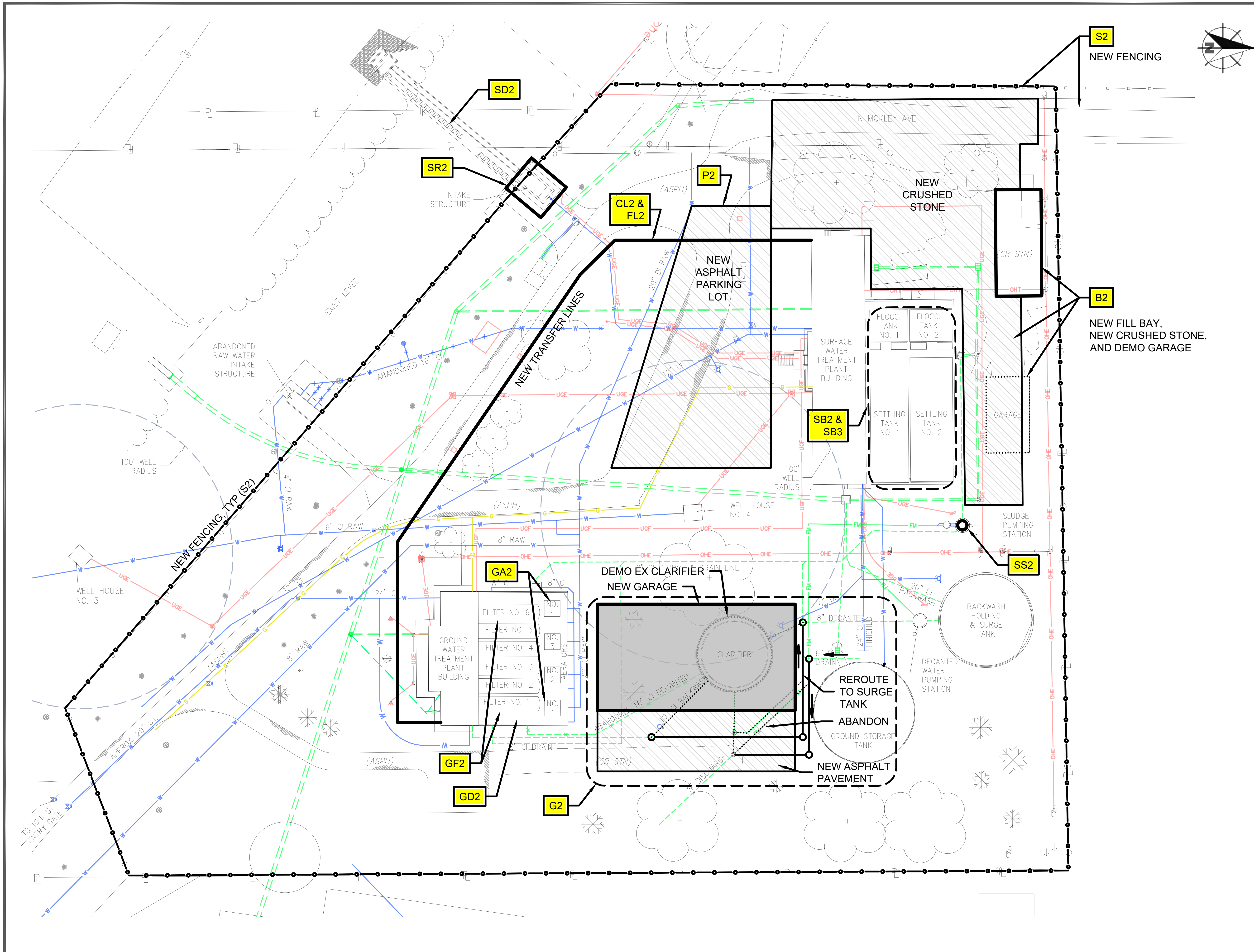

WESSLER ENGINEERING

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LEGEND:

EXISTING UTILITIES:

- WATER
- SEWER
- ELECTRIC / COMM
- GAS

PROPOSED ALTERNATIVES:

ALT G2: Construct new storage garage, parking, demolition, site work

ALT B2: Construct new three bay fill storage and pavement improvements

ALT P2: Pavement Replacement and Improvements

ALT S2: Security Improvements

ALT SD2: Low Head Dam Improvements

ALT SR2: Install Cover over Raw Water Pumps

ALT SB2** and SB3**: Floc and Sed tanks structural repairs and internal component repairs

ALT SS2: Replace Residuals Pumps

ALT GA2: Aerator inspection and Improvements

ALT GD2: Detention tank inspection and improvements

ALT GF2: GWTP filter rehabilitation

ALT CL2: Switch to Bulk Bleach. Refer to Figure A-26 for Floor Plans

ALT FL2: Switch to HSF. Refer to Figure A-26 for Floor Plans

**NOTE: Interior WTP Improvement alternatives not shown for clarity

0 30 60 120'

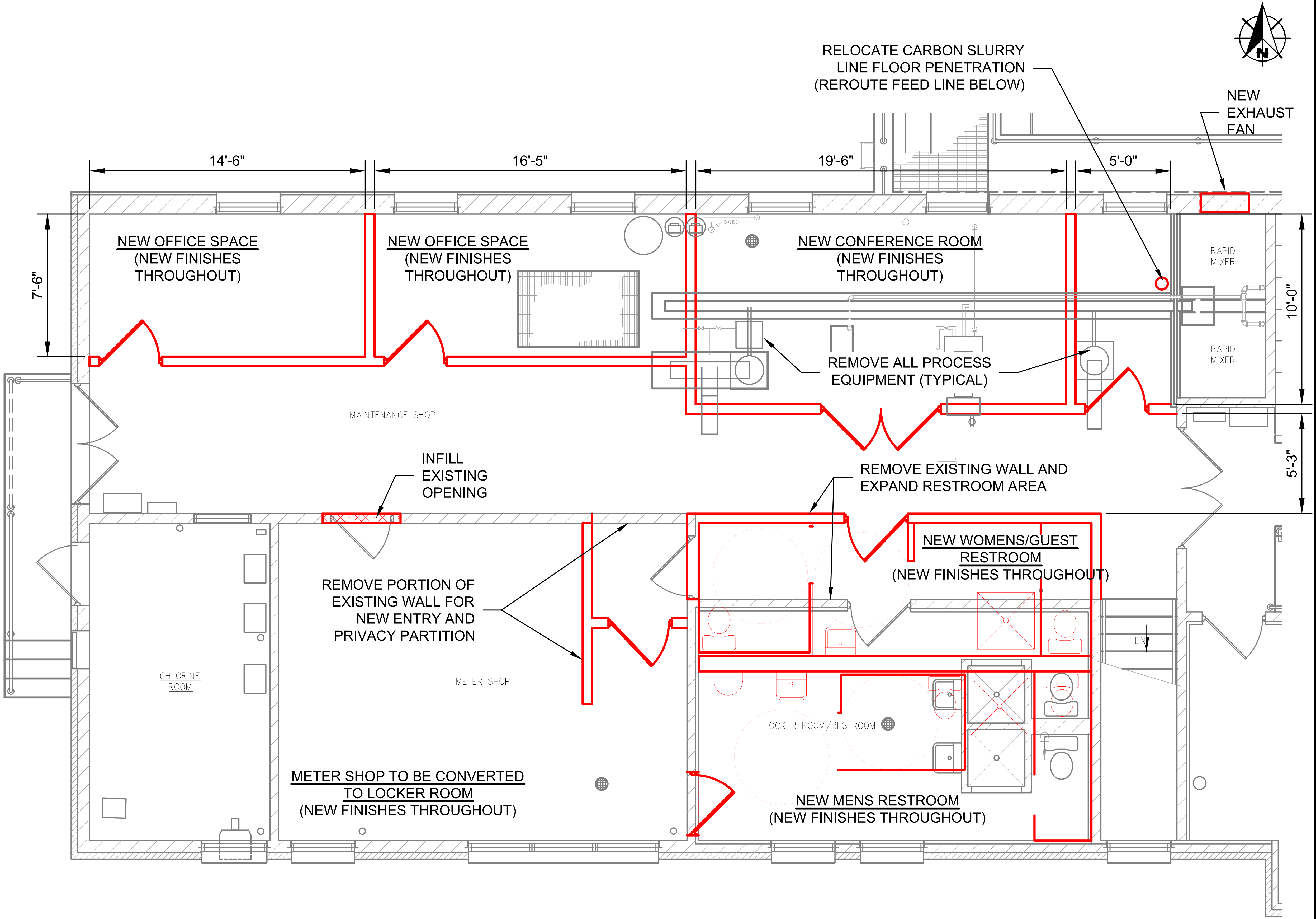
1"=60'

FIGURE A-24
PROPOSED SITE PLAN

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001

Drawing: J:\Speedway\Projects\232720 Speedway AMP and CIP\CAD\DWG\Exhibit\232720 EXH-DWCIP-SITE.dwg | Layout: 1 | Plotted: 10/06/21 @ 10:55:15 | LastSavedBy: michelleE



WESSLER ENGINEERING

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0 4 8 12 FT

3/16"=1'-0"

FIGURE A-25

SWTP UPPER LEVEL WEST END RENOVATIONS

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001

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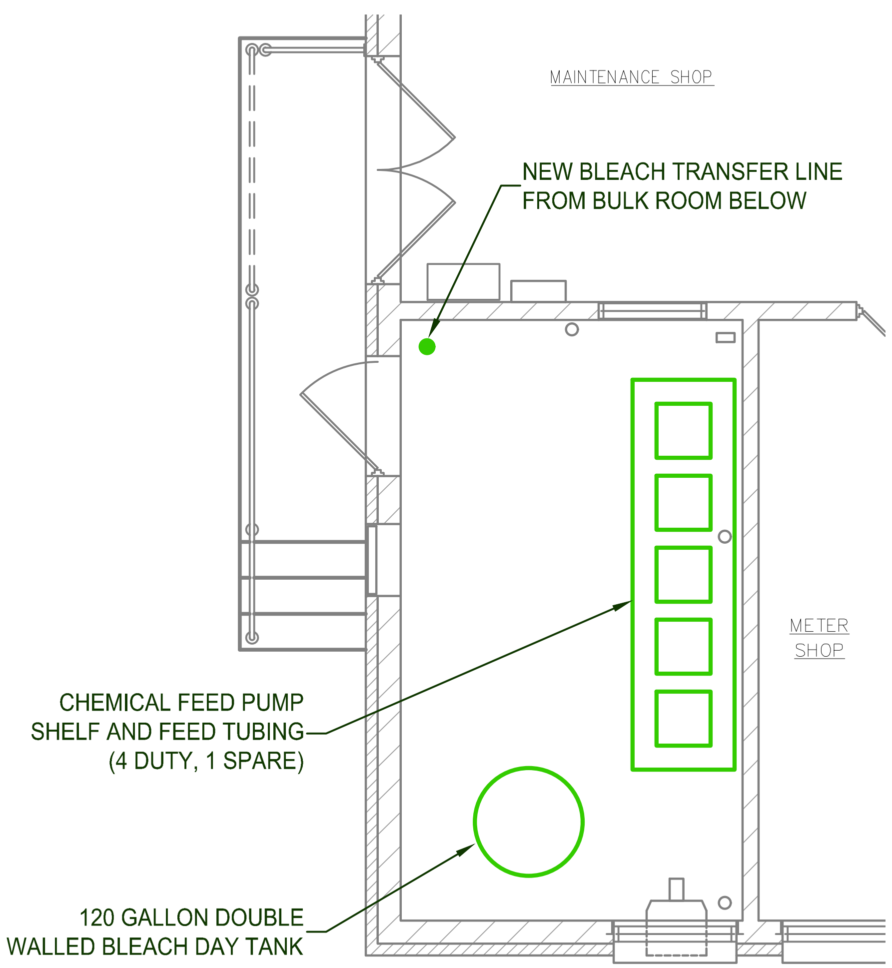
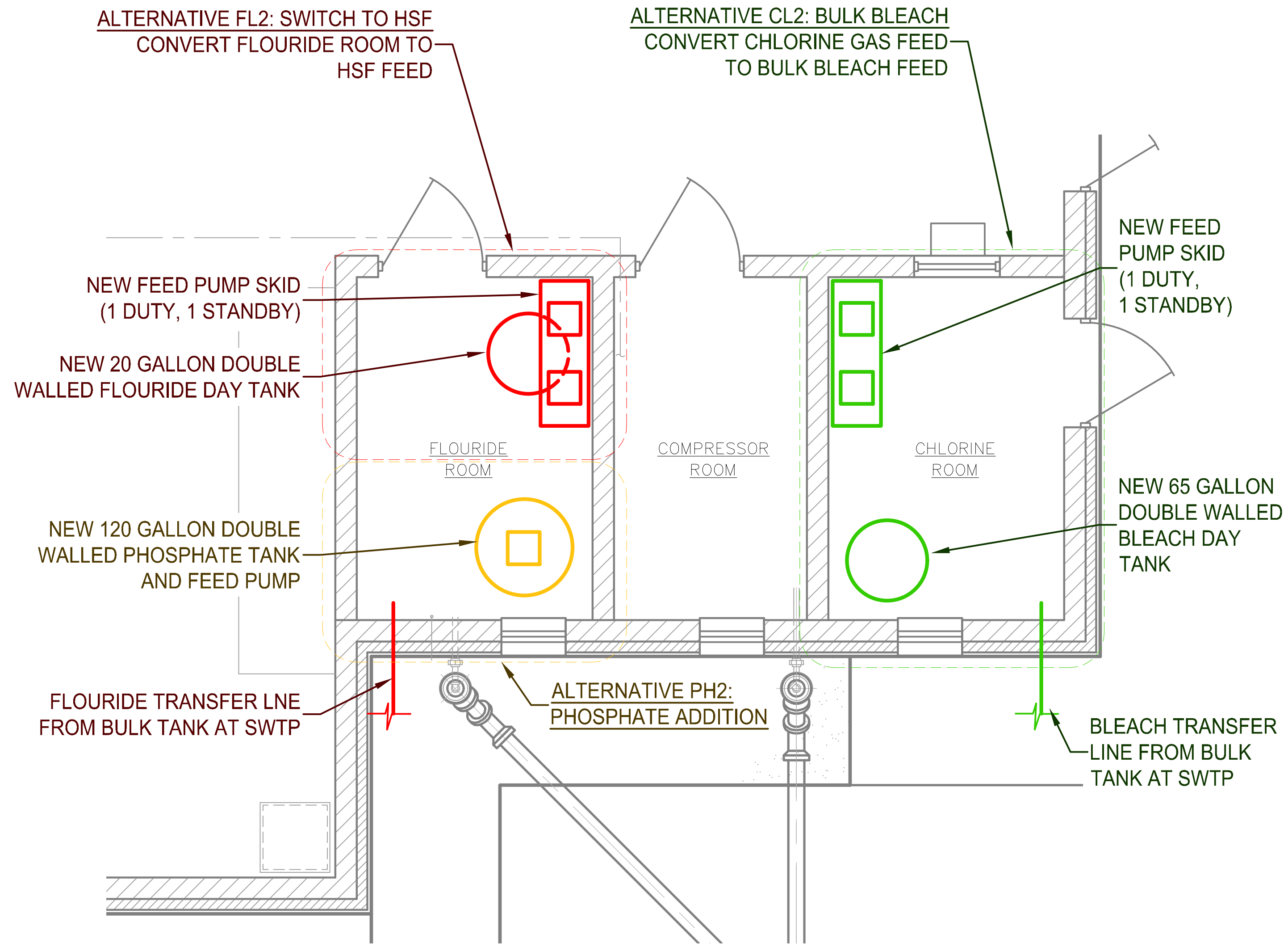


SWTP CHLORINE FEED ROOM CONVERSION



GWTP CHEMICAL FEED IMPROVEMENTS

WESSLER
ENGINEERING
More than a Project™

LEGEND:

- ALTERNATIVE CL2: SWITCH TO BULK BLEACH
- ALTERNATIVE FL2: SWITCH TO HSF
- ALTERNATIVE A2: ALUM EQUIPMENT REPLACEMENT
- ALTERNATIVE PH2: PHOSPHATE EQUIPMENT REPLACEMENT

NOTES:

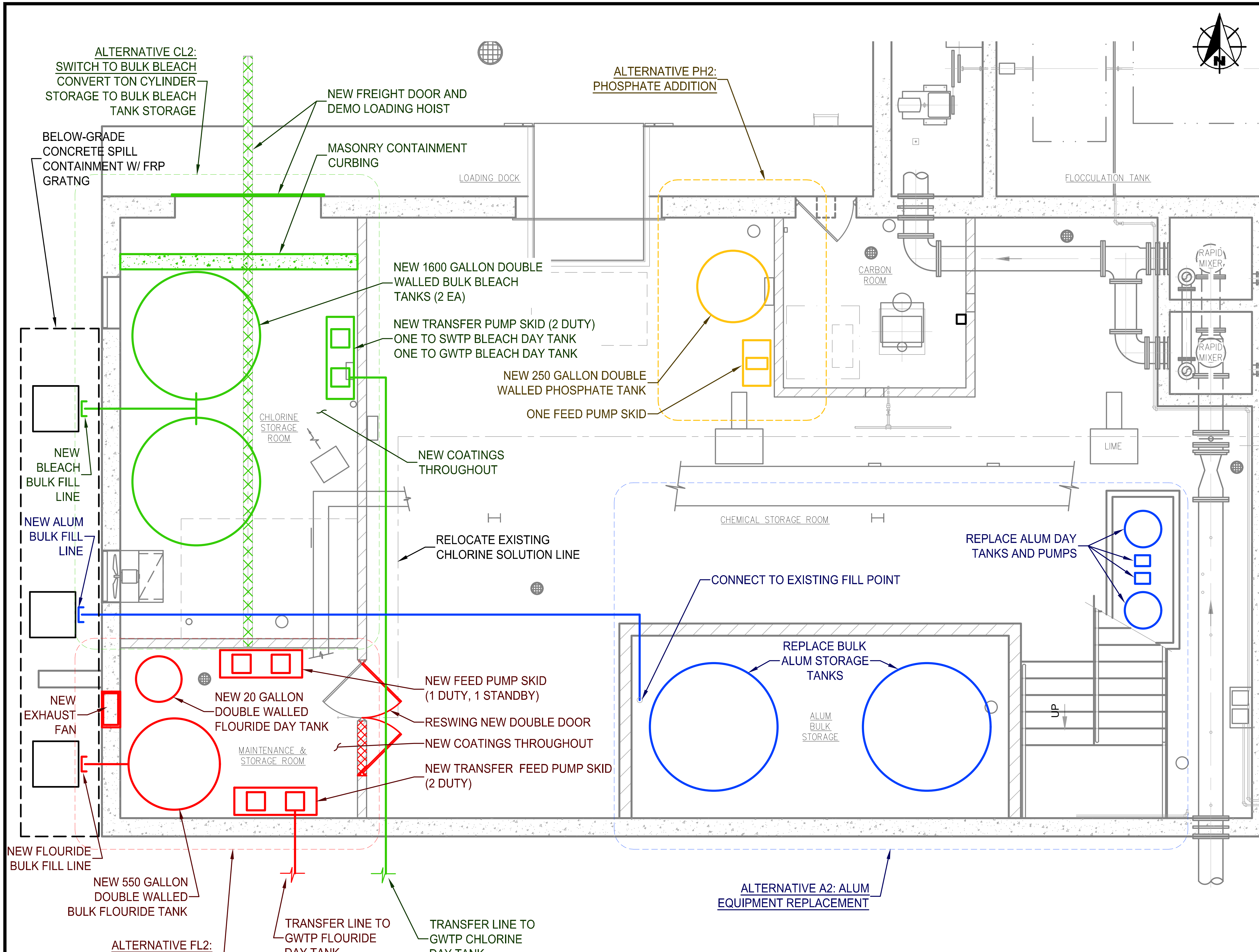
1. REMOVE ALL EXISTING CHLORINE GAS, FLOURIDE, AND ALUM FEED EQUIPMENT.
2. REPLACE ALL FEED TUBING TO INJECTION POINT.

0 4 8 12 FT
3/16"=1'-0"

FIGURE A-26
TREATMENT PLANT CHEMICAL FEED SYSTEM IMPROVEMENTS

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001



SWTP CHEMICAL FEED IMPROVEMENTS

WESSLER ENGINEERING
More than a Project™

LEGEND:

- ALTERNATIVE CL2: SWITCH TO BULK BLEACH
- ALTERNATIVE FL2: SWITCH TO HSF
- ALTERNATIVE A2: ALUM EQUIPMENT REPLACEMENT
- ALTERNATIVE PH2: PHOSPHATE EQUIPMENT REPLACEMENT

NOTES:

1. REMOVE ALL EXISTING CHLORINE GAS, FLOURIDE, AND ALUM FEED EQUIPMENT.
2. REPLACE ALL FEED TUBING TO INJECTION POINT.

0 4 8 12 FT
3/16"=1'-0"

FIGURE A-26
TREATMENT PLANT CHEMICAL FEED SYSTEM IMPROVEMENTS

Town of Speedway, Indiana
Speedway Water Works
CIP & AMP for
Water System Improvements

October 2021
Project No. 232720-01-001

APPENDIX B

COST ESTIMATES

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B-1	Alt. GS2 – Well 3 Rehabilitation
B-2	Alt. GS2 – Well 4 Rehabilitation
B-3	Alt. GS2 – Well 8R Rehabilitation
B-4	Alt. GS2 – Well 9 Rehabilitation
B-5	Alt. GS2 – Well 11R Rehabilitation
B-6	Alt. GS2 – Well 12 Rehabilitation
B-7	Alt. GS2 – Well 13 Rehabilitation
B-8	Alt. GS2 – Well 14R Rehabilitation
B-9	Alt. GS2 – Well 15 Rehabilitation
B-10	Alt. GS3 – Install VFDs on Well Pumps
B-11	Alt. GS4 – New Groundwater Well at Junior High School
B-12	Alt. GS4 – New Groundwater Well at WTP Property
B-13	Alt. GS4 – New Groundwater Well South of B&O Trail
B-14	Alt. GS4 – New Groundwater Well at Whitcomb Ave. & Cunningham Rd.
B-15	Alt. GS4 – New Groundwater Well at Eagle Creek Levee North
B-16	Alt GS4. – New Groundwater Well at High School / Fire Department
B-17	Alt. GS4 – New Groundwater Well at Well 15 Property
B-18	Alt. GS4 – New Groundwater Well at Cadillac Triangle Property
B-19	Alt. GS4 – New Groundwater Well South of 16th & Cunningham
B-20	Alt. GS4 – New Groundwater Well at Meadowood Park Alt. 1
B-21	Alt. GS4 – New Groundwater Well at Meadowood Park Alt. 2
B-22	Alt. GS4 – New Groundwater Well at Carriage House West
B-23	Alt GS5 – Emergency Interconnect at High School Rd. (North)
B-24	Alt GS5 – Emergency Interconnect at High School Rd. (South)
B-25	Alt. GS5 – Emergency Interconnect at Georgetown Rd.
B-26	Alt. GH2 – GWTP Rebuild HSP No. 2 & 3
B-27	Alt GH3 – GWTP Replace HSP Motors and Install VFDs
B-28	Alt GF2 – GWTP Filter Rehabilitation
B-29	Alt GV2 – Replace GWTP Filter Pipe and Valves
B-30	Alt GB1 – GWTP Building and Facility Improvements
B-31	Alt SD2 – Low Head Dam Improvements
B-32	Alt SR2 – Raw Water Intake Structure Cover
B-33	Alt SB2 – Floc & Sed Structural Improvements
B-34	Alt SB3 – Floc & Sed Internal Component Replacement

Table B-1: GS2 - Well 3 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well House Structural and Superficial Repairs	1	LS	$ 10,000	$ 10,000
2	Well House Exterior/Interior Coating	1	LS	$ 12,000	$ 12,000
3	6" Magnetic Flow Meter Installation	1	EA	$ 6,000	$ 6,000
4	Replace Unit Heater	1	EA	$ 3,500	$ 3,500
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	6" Gate Valve	1	EA	$ 2,300	$ 2,300
7	6" Check Valve	1	EA	$ 2,700	$ 2,700
8	Security Lighting	1	LS	$ 1,000	$ 1,000
9	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 3,000	$ 3,000
10	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
11	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 46,000**
				20% Contingency	$ 10,000
				Probable Construction Costs (rounded)	**$ 56,000**
				Non-Construction Costs (25%)	$ 14,000
				Total Probable Project Cost	**$ 70,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-2: GS2 - Well 4 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well House Structural and Superficial Repairs	1	LS	$ 10,000	$ 10,000
2	Well House Exterior/Interior Coating	1	LS	$ 12,000	$ 12,000
3	6" Magnetic Flow Meter Installation	1	EA	$ 6,000	$ 6,000
4	Replace Unit Heater	1	EA	$ 3,500	$ 3,500
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	6" Gate Valve	1	EA	$ 2,300	$ 2,300
7	6" Check Valve	1	EA	$ 2,700	$ 2,700
8	Security Lighting	1	LS	$ 1,000	$ 1,000
9	Door Replacement	1	EA	$ 4,000	$ 4,000
10	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 3,000	$ 3,000
11	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
12	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 50,000**
				20% Contingency	$ 10,000
				Probable Construction Costs (rounded)	**$ 60,000**
				Non-Construction Costs (25%)	$ 15,000
				Total Probable Project Cost	**$ 75,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-3: GS2 - Well 8R Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Pedestal Coating	1	LS	$ 2,000	$ 2,000
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 30,000**
				20% Contingency	$ 6,000
				Probable Construction Costs (rounded)	**$ 36,000**
				Non-Construction Costs (25%)	$ 9,000
				Total Probable Project Cost	**$ 45,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-4: GS2 - Well 9 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Platform Coating	1	LS	$ 3,500	$ 3,500
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 32,000**
				20% Contingency	$ 7,000
				Probable Construction Costs (rounded)	**$ 39,000**
				Non-Construction Costs (25%)	$ 10,000
				Total Probable Project Cost	**$ 49,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-5: GS2 - Well 11R Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Pedestal Coating	1	LS	$ 2,000	$ 2,000
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 30,000**
				20% Contingency	$ 6,000
				Probable Construction Costs (rounded)	**$ 36,000**
				Non-Construction Costs (25%)	$ 9,000
				Total Probable Project Cost	**$ 45,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-6: GS2 - Well 12 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Platform Coating	1	LS	$ 3,500	$ 3,500
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 32,000**
				20% Contingency	$ 7,000
				Probable Construction Costs (rounded)	**$ 39,000**
				Non-Construction Costs (25%)	$ 10,000
				Total Probable Project Cost	**$ 49,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-7: GS2 - Well 13 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well House Structural and Superficial Repairs	1	LS	$ 10,000	$ 10,000
2	Well House Exterior/Interior Coating	1	LS	$ 12,000	$ 12,000
3	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
4	Replace Unit Heater	1	EA	$ 3,500	$ 3,500
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	8" Gate Valve	1	EA	$ 3,400	$ 3,400
7	8" Check Valve	1	EA	$ 4,000	$ 4,000
8	Security Lighting	1	LS	$ 1,000	$ 1,000
9	Door Replacement	1	EA	$ 4,000	$ 4,000
10	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 3,000	$ 3,000
11	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
12	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 54,000**
				20% Contingency	$ 11,000
				Probable Construction Costs (rounded)	**$ 65,000**
				Non-Construction Costs (25%)	$ 17,000
				Total Probable Project Cost	**$ 82,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-8: GS2 - Well 14R Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Pedestal Coating	1	LS	$ 3,500	$ 3,500
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 32,000**
				20% Contingency	$ 7,000
				Probable Construction Costs (rounded)	**$ 39,000**
				Non-Construction Costs (25%)	$ 10,000
				Total Probable Project Cost	**$ 49,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-9: GS2 - Well 15 Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Well Pedestal Coating	1	LS	$ 2,000	$ 2,000
2	8" Magnetic Flow Meter Installation	1	EA	$ 7,500	$ 7,500
3	8" Gate Valve	1	EA	$ 3,400	$ 3,400
4	8" Check Valve	1	EA	$ 4,000	$ 4,000
5	Level Sensor	1	EA	$ 3,000	$ 3,000
6	Security Lighting	1	LS	$ 3,000	$ 3,000
7	Access Hatch Safety Features	1	LS	$ 3,000	$ 3,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
9	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
10	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 30,000**
				20% Contingency	$ 6,000
				Probable Construction Costs (rounded)	**$ 36,000**
				Non-Construction Costs (25%)	$ 9,000
				Total Probable Project Cost	**$ 45,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

Table B-10: GS3 - Install VFDs for Well Pumps

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Install VFDs	9	EA	$ 5,000	$ 45,000
2	20 HP Premium Efficiency Inverter Duty Rated Motor	1	EA	$ 10,000	$ 10,000
3	30 HP Premium Efficiency Inverter Duty Rated Motor	1	EA	$ 10,000	$ 10,000
4	7.5 HP Premium Efficiency Inverter Duty Rated Submersible Mo	2	EA	$ 8,000	$ 16,000
5	10 HP Premium Efficiency Inverter Duty Rated Motor	1	EA	$ 8,000	$ 8,000
6	15 HP Premium Efficiency Inverter Duty Rated Motor	3	EA	$ 8,000	$ 24,000
7	25 HP Premium Efficiency Inverter Duty Rated Motor	1	EA	$ 10,000	$ 10,000
8	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 7,000	$ 7,000
9	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
10	Final Cleanup & Restoration	1	LS	$ 3,000	$ 3,000
				Subtotal	**$ 135,000**
				20% Contingency	$ 27,000
				Probable Construction Costs (rounded)	**$ 162,000**
				Non-Construction Costs (25%)	$ 41,000
				Total Probable Project Cost	**$ 203,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *Assumes existing electrical systems do not require replacement or rehabilitation for VFD installation*

Table B-11: GS4 - New Groundwater Well at the Junior High School

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	950	LF	$ 100	$ 95,000
8	Granular Backfill	475	LF	$ 20	$ 9,500
9	Pavement Restoration	475	LF	$ 50	$ 23,750
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 5,000	$ 5,000
15	Erosion & Sediment Control	1	LS	$ 6,000	$ 6,000
16	Final Cleanup & Restoration	1	LS	$ 12,000	$ 12,000
				Subtotal	**$ 600,000**
				20% Contingency	$ 120,000
				Probable Construction Costs (rounded)	**$ 720,000**
				Non-Construction Costs (25%)	$ 180,000
				Total Probable Project Cost	**$ 900,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- a *Costs do not include wellfield study*
- b *There is sufficient available RW along water main alignment*
- c *No major unforeseen utility conflicts*
- d *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- e *No State Road/INDOT crossings per IndianaMap*
- f *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- h *Isolation valves installed every 1/4 mile along raw water main*
- i *No hydrants installed on raw water main*

Table B-12: GS4 - New Groundwater Well at WTP Property

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	100	LF	$ 100	$ 10,000
8	Granular Backfill	50	LF	$ 20	$ 1,000
9	Pavement Restoration	50	LF	$ 50	$ 2,500
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 24,000	$ 24,000
15	Erosion & Sediment Control	1	LS	$ 5,000	$ 5,000
16	Final Cleanup & Restoration	1	LS	$ 10,000	$ 10,000
				Subtotal	**$ 501,000**
				20% Contingency	$ 101,000
				Probable Construction Costs (rounded)	**$ 602,000**
				Non-Construction Costs (25%)	$ 151,000
				Total Probable Project Cost	**$ 753,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-13: GS4 - New Groundwater Well South of B&O Trail

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	1,200	LF	$ 100	$ 120,000
8	Granular Backfill	600	LF	$ 20	$ 12,000
9	Pavement Restoration	600	LF	$ 50	$ 30,000
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 31,000	$ 31,000
15	Erosion & Sediment Control	1	LS	$ 7,000	$ 7,000
16	Final Cleanup & Restoration	1	LS	$ 13,000	$ 13,000
				Subtotal	**$ 662,000**
				20% Contingency	$ 133,000
				Probable Construction Costs (rounded)	**$ 795,000**
				Non-Construction Costs (25%)	$ 199,000
				Total Probable Project Cost	**$ 994,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-14: GS4 - New Groundwater Well at Whitcomb & Cunningham

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	2,000	LF	$ 100	$ 200,000
8	Granular Backfill	1,000	LF	$ 20	$ 20,000
9	Pavement Restoration	1,000	LF	$ 50	$ 50,000
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 36,000	$ 36,000
15	Erosion & Sediment Control	1	LS	$ 8,000	$ 8,000
16	Final Cleanup & Restoration	1	LS	$ 15,000	$ 15,000
				Subtotal	**$ 778,000**
				20% Contingency	$ 156,000
				Probable Construction Costs (rounded)	**$ 934,000**
				Non-Construction Costs (25%)	$ 234,000
				Total Probable Project Cost	**$ 1,168,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-15: GS4 - New Groundwater Well at Eagle Creek Levee North

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	50	LF	$ 100	$ 5,000
8	Granular Backfill	25	LF	$ 20	$ 500
9	Pavement Restoration	25	LF	$ 50	$ 1,250
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 23,000	$ 23,000
15	Erosion & Sediment Control	1	LS	$ 5,000	$ 5,000
16	Final Cleanup & Restoration	1	LS	$ 10,000	$ 10,000
				Subtotal	**$ 494,000**
				20% Contingency	$ 99,000
				Probable Construction Costs (rounded)	**$ 593,000**
				Non-Construction Costs (25%)	$ 149,000
				Total Probable Project Cost	**$ 742,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-16: GS4 - New Groundwater Well at the High School / Fire Dept.

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	7,300	LF	$ 100	$ 730,000
8	Granular Backfill	3,650	LF	$ 20	$ 73,000
9	Pavement Restoration	3,650	LF	$ 50	$ 182,500
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Treatment Feasibility Study	1	LS	$ 5,000	$ 5,000
14	Water Main Route Study	1	LS	$ 5,000	$ 5,000
15	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 72,000	$ 72,000
16	Erosion & Sediment Control	1	LS	$ 15,000	$ 15,000
17	Final Cleanup & Restoration	1	LS	$ 29,000	$ 29,000
				Subtotal	**$ 1,555,000**
				20% Contingency	$ 311,000
				Probable Construction Costs (rounded)	**$ 1,866,000**
				Non-Construction Costs (25%)	$ 467,000
				Total Probable Project Cost	**$ 2,333,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-17: GS4 - New Groundwater Well at Well 15 Property

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	250	LF	$ 100	$ 25,000
8	Granular Backfill	125	LF	$ 20	$ 2,500
9	Pavement Restoration	125	LF	$ 50	$ 6,250
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 25,000	$ 25,000
15	Erosion & Sediment Control	1	LS	$ 5,000	$ 5,000
16	Final Cleanup & Restoration	1	LS	$ 10,000	$ 10,000
				Subtotal	**$ 523,000**
				20% Contingency	$ 105,000
				Probable Construction Costs (rounded)	**$ 628,000**
				Non-Construction Costs (25%)	$ 157,000
				Total Probable Project Cost	**$ 785,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-18: GS4 - New Groundwater Well at Cadillac Triangle Property

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	1,000	LF	$ 100	$ 100,000
8	Granular Backfill	500	LF	$ 20	$ 10,000
9	Pavement Restoration	500	LF	$ 50	$ 25,000
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 30,000	$ 30,000
15	Erosion & Sediment Control	1	LS	$ 6,000	$ 6,000
16	Final Cleanup & Restoration	1	LS	$ 12,000	$ 12,000
				Subtotal	**$ 632,000**
				20% Contingency	$ 127,000
				Probable Construction Costs (rounded)	**$ 759,000**
				Non-Construction Costs (25%)	$ 190,000
				Total Probable Project Cost	**$ 949,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-19: GS4 - New Groundwater Well South of 16th & Cunningham

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	600	LF	$ 100	$ 60,000
8	Granular Backfill	300	LF	$ 20	$ 6,000
9	Pavement Restoration	300	LF	$ 50	$ 15,000
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 27,000	$ 27,000
15	Erosion & Sediment Control	1	LS	$ 6,000	$ 6,000
16	Final Cleanup & Restoration	1	LS	$ 11,000	$ 11,000
				Subtotal	**$ 574,000**
				20% Contingency	$ 115,000
				Probable Construction Costs (rounded)	**$ 689,000**
				Non-Construction Costs (25%)	$ 173,000
				Total Probable Project Cost	**$ 862,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-20: GS4 - New Groundwater Well at Meadowood Park Alt. 1

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Production Well (Drill, Test, Install Pump)	2	EA	$ 148,400	$ 296,800
2	Well House (Masonry Building)	2	EA	$ 25,600	$ 51,200
3	Well House Foundations	2	EA	$ 10,300	$ 20,600
4	Electrical & Controls	1	LS	$ 76,800	$ 76,800
5	Standby Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	6-inch DI Raw Water Main (Open Cut)	525	LF	$ 55	$ 28,875
7	10" HDPE Raw Water Main (HDD)	10,800	LF	$ 100	$ 1,080,000
8	6-inch Gate Valve & Box	2	EA	$ 1,100	$ 2,200
9	10-inch Gate Valve & Box	8	EA	$ 1,900	$ 15,200
10	Connect to Existing Main	1	EA	$ 5,000	$ 5,000
11	Pavement Restoration	2,000	LF	$ 50	$ 100,000
12	Granular Backfill	2,225	LF	$ 20	$ 45,527
13	Additional Water Quality Testing	2	EA	$ 1,500	$ 3,000
14	Treatment Feasibility Study	1	LS	$ 5,000	$ 5,000
15	Water Main Route Study	1	LS	$ 5,000	$ 5,000
16	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 90,500	$ 90,500
17	Erosion & Sediment Control	1	LS	$ 54,300	$ 54,300
18	Maintenance of Traffic	1	LS	$ 54,300	$ 54,300
19	Final Cleanup & Restoration	1	LS	$ 90,500	$ 90,500
				Subtotal	**$ 2,097,000**
				20% Contingency	$ 420,000
				Probable Construction Costs (rounded)	**$ 2,517,000**
				Non-Construction Costs (25%)	$ 630,000
				Total Probable Project Cost	**$ 3,147,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *g* *Four Major Intrastate petroleum pipeline crossings (Buckeye, CEG, Texas, Marathon Pipelines)*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-21: GS4 - New Groundwater Well at Meadowood Park Alt. 2

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Production Well (Drill, Test, Install Pump)	2	EA	$ 148,400	$ 296,800
2	Well House (Masonry Building)	2	EA	$ 25,600	$ 52,000
3	Well House Foundations	2	EA	$ 10,300	$ 21,000
4	Electrical & Controls (Wells Only)	1	LS	$ 76,800	$ 77,000
5	Standby Generator (400 kW)	1	LS	$ 153,500	$ 154,000
6	6-inch DI Raw Water Main (Open Cut)	400	LFT	$ 56	$ 23,000
7	8-inch DI Finished Water Main (Open Cut)	250	LFT	$ 72	$ 18,000
8	6-inch Gate Valve & Box	2	EA	$ 1,100	$ 3,000
9	10-inch Gate Valve & Box	1	EA	$ 1,900	$ 2,000
10	H-3 Hydrant Assembly	1	EA	$ 5,700	$ 6,000
11	Excavation/ Backfill	1	LS	$ 122,800	$ 123,000
12	Connect to Existing Water Main	1	EA	$ 4,100	$ 5,000
13	1,000 gpm Package Treatment Unit	1	LS	$ 460,400	$ 461,000
14	1,000 gpm High Service Pump	2	EA	$ 41,000	$ 82,000
15	Air Compressor	1	LS	$ 7,200	$ 8,000
16	Process Piping & Valves	1	LS	$ 30,700	$ 31,000
17	Chlorine Feed Piping & Equipment	1	LS	$ 51,200	$ 52,000
18	Chlorine Analyzer	1	LS	$ 15,400	$ 16,000
19	HVAC	1	LS	$ 25,600	$ 26,000
20	Electrical (MCC, conduit, wire, and lighting)	1	LS	$ 153,500	$ 154,000
21	SCADA Equipment	1	LS	$ 122,800	$ 123,000
22	SCADA Programming & Startup Support	1	LS	$ 102,400	$ 103,000
23	Masonry Treatment Building	1,550	SQ FT	$ 205	$ 318,000
24	Backwash Tank - 50,000 gallon - Concrete	1	LS	$ 112,600	$ 113,000
25	Backwash Pumps	2	EA	$ 7,700	$ 16,000
26	Miscellaneous Metals	1	LS	$ 20,500	$ 21,000
27	Coatings - Package Unit & Piping	1	LS	$ 25,600	$ 26,000
28	WTP Site Fencing & Gates	300	LFT	$ 50	$ 15,000
29	Sidewalk	1	LS	$ 5,200	$ 6,000
30	Pavement Restoration	1	LS	$ 5,200	$ 6,000
31	Granular Backfill	250	LFT	$ 20	$ 5,000
32	Additional Water Quality Testing	2	EA	$ 1,500	$ 3,000
33	Treatment Feasibility Study	1	LS	$ 5,000	$ 5,000
34	Water Main Route Study	1	LS	$ 5,000	$ 5,000
35	Mobilization, Demob,, Bonds, & Insurance	1	LS	$ 71,000	$ 71,000
36	Erosion & Sediment Control	1	LS	$ 12,000	$ 12,000
37	Maintenance of Traffic	1	LS	$ 12,000	$ 12,000
38	Final Cleanup & Restoration	1	LS	$ 48,000	$ 48,000
				Subtotal	**$ 2,519,000**
				20% Contingency	$ 504,000
				Probable Construction Costs (rounded)	**$ 3,023,000**
				Non-Construction Costs (25%)	$ 756,000
				Total Probable Project Cost	**$ 3,779,000**

Notes:

1 *All probable construction costs are based upon 2018 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

a *Costs do not include wellfield study*

b *Adjacent sanitary sewer does not have sufficient capacity, backwash holding tank is required. Backwash water pumped to sanitary sewer.*

Table B-22: GS4 - New Groundwater Well at Carriage House West

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Test Well and Water Quality Testing	1	LS	$ 15,000	$ 15,000
2	Well Drilling, Development, Testing	1	LS	$ 80,000	$ 80,000
3	Well Pump, VFD, Motor, Drop Pipe & Appurtenances	1	LS	$ 50,000	$ 50,000
4	Well Structure	1	LS	$ 50,000	$ 50,000
5	Generator (200 kW)	1	LS	$ 71,700	$ 71,700
6	Valves, Water Meter, Sample Station	1	LS	$ 15,000	$ 15,000
7	8-inch Raw Water Main	150	LF	$ 100	$ 15,000
8	Granular Backfill	75	LF	$ 20	$ 1,500
9	Pavement Restoration	75	LF	$ 50	$ 3,750
10	Electrical & Controls	1	LS	$ 76,800	$ 76,800
11	Asphalt Entrance Drive	416	SYS	$ 60	$ 24,975
12	Site Fencing & Gates	800	LF	$ 75	$ 60,000
13	Water Main Route Study	1	LS	$ 5,000	$ 5,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 24,000	$ 24,000
15	Erosion & Sediment Control	1	LS	$ 5,000	$ 5,000
16	Final Cleanup & Restoration	1	LS	$ 10,000	$ 10,000
				Subtotal	**$ 508,000**
				20% Contingency	$ 102,000
				Probable Construction Costs (rounded)	**$ 610,000**
				Non-Construction Costs (25%)	$ 153,000
				Total Probable Project Cost	**$ 763,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *The project area was not reviewed for compliance with ADA guidelines. Construction costs for ADA curb ramps and other ADA facilities are not included in these cost estimates.*

3 *All work is assumed to occur within existing rights-of-way and easements. Non-construction costs for property research and land acquisition are not included in these cost estimates.*

4 *Assumptions*

- *a* *Costs do not include wellfield study*
- *b* *There is sufficient available RW along water main alignment*
- *c* *No major unforeseen utility conflicts*
- *d* *Penn Central RR and B&O RR are abandoned per IndianaMap and do not require a permit to cross.*
- *e* *No State Road/INDOT crossings per IndianaMap*
- *f* *No Floodway/plan, wetlands, waterway crossings per IndianaMap*
- *h* *Isolation valves installed every 1/4 mile along raw water main*
- *i* *No hydrants installed on raw water main*

Table B-23: GS5 - Emergency Interconnect at Highschool Rd (North)

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Hydraulic Feasibility Study	1	LS	$ 12,000	$ 12,000
2	8" DI Water Main (Open Cut)	100	LFT	$ 110	$ 11,000
3	Connect to CEG System	1	LS	$ 7,500	$ 7,500
4	Connect to Speedway System	1	LS	$ 7,500	$ 7,500
5	Valve Vault (Structure)	1	LS	$ 60,000	$ 60,000
6	Control Valve and Electric Actuator	1	LS	$ 15,000	$ 15,000
7	Bypass Piping and Valves	1	LS	$ 10,000	$ 10,000
8	8" Magnetic Flowmeter	1	LS	$ 7,500	$ 7,500
9	Instrumentation	1	LS	$ 6,000	$ 6,000
10	Control Panel	1	LS	$ 15,000	$ 15,000
11	Programming	1	LS	$ 10,000	$ 10,000
12	Electrical	1	LS	$ 10,000	$ 10,000
13	Pavement Restoration (assumed)	1	LS	$ 15,000	$ 15,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 10,000	$ 10,000
15	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
16	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 203,000**
				20% Contingency	$ 41,000
				Probable Construction Costs (rounded)	**$ 244,000**
				Non-Construction Costs (25%)	$ 61,000
				Total Probable Project Cost	**$ 305,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *Land Acquisition or Permanent Easements are likely required. Location of interconnect to be determined during Feasibility Study.*

Table B-24: GS5 - Emergency Interconnect at Highschool Rd (South)

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Hydraulic Feasibility Study	1	LS	$ 12,000	$ 12,000
2	12" DI Water Main (Open Cut)	200	LFT	$ 130	$ 26,000
3	Connect to CEG System	1	LS	$ 10,000	$ 10,000
4	Connect to Speedway System	1	LS	$ 7,500	$ 7,500
5	Valve Vault (Structure)	1	LS	$ 60,000	$ 60,000
6	Control Valve and Electric Actuator	1	LS	$ 15,000	$ 15,000
7	Bypass Piping and Valves	1	LS	$ 11,000	$ 11,000
8	12" Magnetic Flowmeter	1	LS	$ 11,000	$ 11,000
9	Instrumentation	1	LS	$ 6,000	$ 6,000
10	Control Panel	1	LS	$ 15,000	$ 15,000
11	Programming	1	LS	$ 10,000	$ 10,000
12	Electrical	1	LS	$ 10,000	$ 10,000
13	Pavement Restoration (assumed)	1	LS	$ 15,000	$ 15,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 11,000	$ 11,000
15	Erosion & Sediment Control	1	LS	$ 3,000	$ 3,000
16	Final Cleanup & Restoration	1	LS	$ 5,000	$ 5,000
				Subtotal	**$ 228,000**
				20% Contingency	$ 46,000
				Probable Construction Costs (rounded)	**$ 274,000**
				Non-Construction Costs (25%)	$ 69,000
				Total Probable Project Cost	**$ 343,000**

Notes:

1 *All probable construction costs are based upon 2021 dollars, and estimated project costs will likely increase with time. Construction costs are volatile and have increased significantly in recent years, due primarily to costs of fuel and raw materials. In providing these cost estimates, Wessler Engineering has no control over the costs of labor, equipment, and materials, or the contractors' methods of pricing. The cost estimates were made without the benefit of design plans and specifications and are provided on the basis of the Engineer's qualifications and experience. Wessler Engineering makes no warranty, expressed or implied, as to the accuracy of such cost estimates as compared to bids or actual costs.*

2 *Land Acquisition or Permanent Easements are likely required. Location of interconnect to be determined during Feasibility Study.*

Table B-25: GS5 - Emergency Interconnect at Georgetown Road

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Hydraulic Feasibility Study	1	LS	$ 12,000	$ 12,000
2	16" DI Water Main (Open Cut)	1,000	LFT	$ 150	$ 150,000
3	Connect to CEG System	1	LS	$ 10,000	$ 10,000
4	Connect to Speedway System	1	LS	$ 10,000	$ 10,000
5	Valve Vault (Structure)	1	LS	$ 60,000	$ 60,000
6	Control Valve and Electric Actuator	1	LS	$ 15,000	$ 15,000
7	Bypass Piping and Valves	1	LS	$ 12,000	$ 12,000
8	16" Magnetic Flowmeter	1	LS	$ 14,000	$ 14,000
9	Instrumentation	1	LS	$ 6,000	$ 6,000
10	Control Panel	1	LS	$ 15,000	$ 15,000
11	Programming	1	LS	$ 10,000	$ 10,000
12	Electrical	1	LS	$ 10,000	$ 10,000
13	Pavement Restoration (assumed)	1	LS	$ 15,000	$ 15,000
14	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 17,000	$ 17,000
15	Erosion & Sediment Control	1	LS	$ 4,000	$ 4,000
16	Final Cleanup & Restoration	1	LS	$ 7,000	$ 7,000
				Subtotal	**$ 367,000**
				20% Contingency	$ 74,000
				Probable Construction Costs (rounded)	**$ 441,000**
				Non-Construction Costs (25%)	$ 111,000
				Total Probable Project Cost	**$ 552,000**

Notes:

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2 *Land Acquisition or Permanent Easements are likely required. Location of interconnect to be determined during Feasibility Study.*

Table B-26: GH2 - GWTP Rebuild HSP No. 2 and 3

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	High Service Pumps Rotating Assay Rebuild	2	EA	$ 15,000	$ 30,000
2	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
3	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 33,000**
				20% Contingency	$ 7,000
				Total Probable Project Cost	**$ 40,000**

Notes:

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Table B-27: GH3 - GWTP Replace HSP Motors and Install VFDs

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	100 HP Premium Efficiency Inverter Duty Rated Motor	6	EA	$ 20,000	$ 120,000
2	VFD Installation	6	EA	$ 16,500	$ 99,000
3	Pressure Gauge	6	EA	$ 300	$ 1,800
4	Electrical Updates for VFDs	1	LS	$ 30,000	$ 30,000
5	SCADA Modifications for VFDs	1	LS	$ 15,000	$ 15,000
6	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 14,000	$ 14,000
7	Final Cleanup & Restoration	1	LS	$ 6,000	$ 6,000
				Subtotal	**$ 286,000**
				20% Contingency	$ 58,000
				Probable Construction Costs (rounded)	**$ 344,000**
				Non-Construction Costs (25%)	$ 86,000
				Total Probable Project Cost	**$ 430,000**

Notes:

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Table B-28: GF2 - GWTP Filter Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Filter Media & Support Gravel Replacement	6	EA	$ 20,000	$ 120,000
2	Replace Filter Access Hatches (6 per Filter)	36	EA	$ 5,500	$ 198,000
3	Filter Interior Prep & Coatings	6	EA	$ 25,000	$ 150,000
4	Filter Exterior Prep & Coatings	6	EA	$ 10,000	$ 60,000
5	Spot & Seam Welding	1	LS	$ 10,000	$ 10,000
6	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 27,000	$ 27,000
7	Final Cleanup & Restoration	1	LS	$ 11,000	$ 11,000
				Subtotal	**$ 576,000**
				20% Contingency	$ 116,000
				Total Probable Project Cost	**$ 692,000**

Notes:

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Table B-29: GV2 - Replace GWTP Filter Pipe and Valves

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	12" Butterfly Valve	7	EA	$ 2,200	$ 15,400
2	10" Butterfly Valve	12	EA	$ 1,800	$ 21,600
3	8" Butterfly Valve	12	EA	$ 1,700	$ 20,400
4	4" Butterfly Valve	6	EA	$ 1,200	$ 7,200
5	20" Butterfly Valve and Electric Actuator	1	EA	$ 12,000	$ 12,000
6	Demolish Existing Welded Steel Pipe	1	LS	$ 20,000	$ 20,000
7	4" Ductile Iron Pipe	90	LF	$ 65	$ 5,850
8	8" Ductile Iron Pipe	30	LF	$ 80	$ 2,400
9	10" Ductile Iron Pipe	170	LF	$ 120	$ 20,400
10	12" Ductile Iron Pipe	80	LF	$ 145	$ 11,600
11	14" Ductile Iron Pipe	25	LF	$ 170	$ 4,250
12	18" Ductile Iron Pipe	60	LF	$ 220	$ 13,200
13	20" Ductile Iron Pipe	50	LF	$ 260	$ 13,000
14	20" Butterfly Valve and Electric Actuator	1	EA	$ 12,000	$ 12,000
15	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 9,000	$ 9,000
16	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 193,000**
				20% Contingency	$ 39,000
				Probable Construction Costs (rounded)	**$ 232,000**
				Non-Construction Costs (25%)	$ 58,000
				Total Probable Project Cost	**$ 290,000**

Notes:

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Table B-30: Alt. GB1 - GWTP Building and Facility Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Backwash Control Panel Replacement	1	LS	$ 30,000	$ 30,000
2	Dehumidifier	1	LS	$ 15,000	$ 15,000
3	HVAC	1	LS	$ 20,000	$ 20,000
4	General Coating/Painting	1	LS	$ 35,000	$ 35,000
5	Replace All Doors and Windows In Kind	1	LS	$ 143,000	$ 143,000
7	Entrance Window Storefront Improvements	1	LS	$ 64,000	$ 64,000
8	Replace Exterior Wall	1	LS	$ 72,050	$ 72,050
9	Pressure Filter Wall Leak Repair	1	LS	$ 10,000	$ 10,000
10	Air Compressor	1	LS	$ 12,000	$ 12,000
11	Office Renovations	1	LS	$ 24,000	$ 24,000
12	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 22,000	$ 22,000
13	Erosion & Sediment Control	1	LS	$ 5,000	$ 5,000
14	Final Cleanup & Restoration	1	LS	$ 9,000	$ 9,000
				Subtotal	**$ 462,000**
				20% Contingency	$ 93,000
				Probable Construction Costs (rounded)	**$ 555,000**
				Non-Construction Costs (25%)	$ 139,000
				Total Probable Project Cost	**$ 694,000**

Notes:

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2 *Storefront improvemetns line item assumes that all existing windows have been replaced in kind, with the exception of the storefronts.*

Table B-31: SD2 - Low Head Dam Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	General Conditions	3	MO	$ 6,200	$ 18,600
2	Temporary Access Road - includes clearning, removal, and	1	LS	$ 12,300	$ 12,300
3	Maintenance of Traffic	1	LS	$ 10,300	$ 10,300
4	Coffer Dam	36	CYD	$ 600	$ 21,600
5	Tree & Vegetation Removal from Dam	1	LS	$ 5,200	$ 5,200
6	Remove Debris From Embankment Erosion Area	1	LS	$ 5,200	$ 5,200
7	Place Filter Fabric and Stone in Bank Erosion Area	375	TONS	$ 200	$ 75,000
8	Armor West Stream Bank	15	TONS	$ 300	$ 4,500
9	Extend Swale for Existing Storm Drain	20	LF	$ 200	$ 4,000
10	Prepare Existing Concrete Slope Wall & West End of Dam	1	LS	$ 3,100	$ 3,100
11	Concrete Grouting of Slope Wall and End of Dam	27	CYD	$ 600	$ 16,200
12	Concrete Grouting of Armored Surface Upstream of Dam	10	CYD	$ 600	$ 6,000
13	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 10,000	$ 10,000
14	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
15	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 198,000**
				20% Contingency	$ 40,000
				Probable Construction Costs (rounded)	**$ 238,000**
				Non-Construction Costs (25%)	$ 60,000
				Total Probable Project Cost	**$ 298,000**

Notes:

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Table B-32: SR2 - Raw Water Intake Structure Cover

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Excavation	1	LS	$ 3,000	$ 3,000
2	26'x30' Steel Building	1	LS	$ 12,000	$ 12,000
3	Building Foundation and Floor Slab	1	LS	$ 18,000	$ 18,000
4	Double Doors (2)	1	LS	$ 28,000	$ 28,000
5	Demolition	1	LS	$ 3,000	$ 3,000
6	Sidwalk Replacement	1	LS	$ 1,800	$ 1,800
7	Roof Hatches	3	EA	$ 2,500	$ 7,500
8	Electrical/Lighting	1	LS	$ 4,000	$ 4,000
9	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 4,000	$ 4,000
10	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
11	Final Cleanup & Restoration	1	LS	$ 2,000	$ 2,000
				Subtotal	**$ 85,000**
				20% Contingency	$ 17,000
				Probable Construction Costs (rounded)	**$ 102,000**
				Non-Construction Costs (25%)	$ 26,000
				Total Probable Project Cost	**$ 128,000**

Notes:

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Table B-33: SB2 - Floc & Sed Structural Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Sed & Floc Basin Spider Crack Repair	1	LS	$ 10,000	$ 10,000
2	Tank/Bldg Common Wall Leak Repair	1	LS	$ 25,000	$ 25,000
3	Tank/Bldg Common Wall Crack Repair	1	LS	$ 4,000	$ 4,000
4	Construction Joint Repair	1	LS	$ 3,000	$ 3,000
5	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 3,000	$ 3,000
6	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
7	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 47,000**
				20% Contingency	$ 10,000
				Probable Construction Costs (rounded)	**$ 57,000**
				Non-Construction Costs (25%)	$ 15,000
				Total Probable Project Cost	**$ 72,000**

Notes:

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Table B-34: SB3 - Floc & Sed Internal Component Replacement

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Flocculation Sprocket & Chain Replacement	1	LS	$ 32,000	$ 32,000
2	Flocculator Paddle and Baffles Replacement	1	LS	$ 14,700	$ 40,000
3	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 4,000	$ 4,000
4	Erosion & Sediment Control	1	LS	$ 1,000	$ 1,000
5	Final Cleanup & Restoration	1	LS	$ 2,000	$ 2,000
				Subtotal	**$ 79,000**
				20% Contingency	$ 16,000
				Probable Construction Costs (rounded)	**$ 95,000**
				Non-Construction Costs (25%)	$ 24,000
				Total Probable Project Cost	**$ 119,000**

Notes:

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Table B-35: SF2 - SWTP Filter Rehabilitation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Epoxy Injection Crack Repair (Backwash Trough)	1	LS	$ 6,000	$ 6,000
2	Filter Operating Floor Crack Repair	1	LS	$ 1,500	$ 1,500
2	Media and Support Gravel Replacement	1	LS	$ 200,000	$ 200,000
3	Filter Basin Wall Coatings	1	LS	$ 40,000	$ 40,000
4	Surface Washer Rebuild	1	LS	$ 32,000	$ 32,000
5	Misc. Underdrain Repairs	1	LS	$ 20,000	$ 20,000
6	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 15,000	$ 15,000
7	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
8	Final Cleanup & Restoration	1	LS	$ 3,000	$ 3,000
				Subtotal	**$ 320,000**
				20% Contingency	$ 64,000
				Total Probable Project Cost	**$ 384,000**

Notes:

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2 *Repairs are assumed to include thimble setting and wheeler block joint grouting. Complete wheeler block replacement was not included as this exceeds typical scope expected from this age and type of underdrain system.*

Table B-36: SH2 - SWTP High Service Pumps VFD Installation

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	VFD Installation	3	EA	$ 12,000	$ 36,000
2	Electrical Updates for VFDs	1	LS	$ 15,000	$ 15,000
3	SCADA Modifications for VFDs	1	LS	$ 10,000	$ 10,000
4	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 4,000	$ 4,000
5	Final Cleanup & Restoration	1	LS	$ 2,000	$ 2,000
				Subtotal	**$ 67,000**
				20% Contingency	$ 14,000
				Probable Construction Costs (rounded)	**$ 81,000**
				Non-Construction Costs (25%)	$ 21,000
				Total Probable Project Cost	**$ 102,000**

Notes:

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Table B-37: SS2 - Residual Pumps Replacement

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Submersible Pump	2	EA	$ 13,000	$ 26,000
2	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 2,000	$ 2,000
3	Final Cleanup & Restoration	1	LS	$ 1,000	$ 1,000
				Subtotal	**$ 29,000**
				20% Contingency	$ 6,000
				Total Probable Project Cost	**$ 35,000**

Notes:

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2 *Assumes pumps will be replaced in kind.*

Table B-38: SV2 - SWTP Valves & Actuators Replacement

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	12" Butterfly Valve	4	EA	$ 2,200	$ 8,800
2	3" Butterfly Valve	4	EA	$ 1,100	$ 4,400
3	8" Butterfly Valve	8	EA	$ 1,700	$ 13,600
4	14" Butterfly Valve	4	EA	$ 2,900	$ 11,600
5	16" Butterfly Valve	5	EA	$ 2,700	$ 13,500
6	Install Actuators	1	LS	$ 100,000	$ 100,000
7	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 8,000	$ 8,000
8	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 164,000**
				20% Contingency	$ 33,000
				Total Probable Project Cost	**$ 197,000**

Notes:

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2 *Install Actuators does not consider air line, compressor, solenoid panel, or other appurtenance replacement. Costs includes are for actuators only.*

Table B-39: SU2 - SWTP Upper Level West End Renovations

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	New Single Door	6	EA	$ 5,500	$ 33,000
2	New Double Door	1	EA	$ 14,700	$ 14,700
3	Infill Existing Door Openings	1	LS	$ 6,000	$ 6,000
4	New Walls	1	LS	$ 193,000	$ 193,000
5	Restroom Furnishings (Men's & Women's RR's)	1	LS	$ 15,000	$ 15,000
6	Re-route Carbon Supply Line	1	LS	$ 7,500	$ 7,500
7	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 14,000	$ 14,000
8	Erosion & Sediment Control	1	LS	$ 3,000	$ 3,000
9	Final Cleanup & Restoration	1	LS	$ 6,000	$ 6,000
				Subtotal	**$ 293,000**
				20% Contingency	$ 59,000
				Probable Construction Costs (rounded)	**$ 352,000**
				Non-Construction Costs (25%)	$ 88,000
				Total Probable Project Cost	**$ 440,000**

Notes:

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2 *The costs do not include furnishing the locker room.*

3 *The costs for doors include new cross aluminum doors and frames plus the installation and demolition of existing.*

4 *The cost for new walls assume new metal stud walls with drywall, electrical/lighting and new ceiling. Existing walls furred out drywall.*

Table B-40: Alt SBF1 - SWTP Building and Facility Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Entry Step Repair	1	LS	$ 10,000	$ 10,000
2	Concrete ADA Ramp	1	LS	$ 60,000	$ 60,000
3	Dehumidifier Replacement	1	LS	$ 15,000	$ 15,000
4	Air Compressor Replacement	1	LS	$ 7,000	$ 7,000
5	Central Air Conditioning	1	LS	$ 30,000	$ 30,000
6	Door/Window Replacement	1	LS	$ 153,000	$ 153,000
7	Stair Safety Gate Installation	2	EA	$ 1,000	$ 2,000
8	Interior Coating/Painting	1	LSUM	$ 90,000	$ 90,000
9	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 19,000	$ 19,000
10	Erosion & Sediment Control	1	LS	$ 4,000	$ 4,000
11	Final Cleanup & Restoration	1	LS	$ 8,000	$ 8,000
				Subtotal	**$ 398,000**
				20% Contingency	$ 80,000
				Probable Construction Costs (rounded)	**$ 478,000**
				Non-Construction Costs (25%)	$ 120,000
				Total Probable Project Cost	**$ 598,000**

Notes:

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Table B-41: CL2 - Switch to Bulk Bleach

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Demolition - Existing Feed Equipment	1	LS	$ 12,000	$ 12,000
2	Demolition - hoist, walls, doors, penetration cores	1	LS	$ 10,000	$ 10,000
3	1,600 Gallon Double Walled Bulk Tank & Instrumentation	2	EA	$ 25,000	$ 50,000
4	120 Gallon Double Walled Day Tank (SWTP) & Scale	1	EA	$ 13,000	$ 13,000
5	65 Gallon Double Walled Day Tank (GWTP) & Scale	1	EA	$ 12,000	$ 12,000
6	Transfer Pumps	2	EA	$ 5,000	$ 10,000
7	Feed Pumps	7	EA	$ 7,500	$ 52,500
8	Fill Station & Containment Tank	1	LS	$ 12,000	$ 12,000
9	Transfer Line between SWTP & GWTP	1	LS	$ 25,000	$ 25,000
10	Chemical Feed Lines (SWTP)	1	LS	$ 10,000	$ 10,000
11	Chemical Feed Lines (GWTP)	1	LS	$ 5,000	$ 5,000
12	Protective Coatings	1	LS	$ 12,000	$ 12,000
13	Bulk Room Containment Curbing	1	LS	$ 5,000	$ 5,000
14	Doors	1	LS	$ 15,000	$ 15,000
15	Control Panel (per WTP)	2	EA	$ 15,000	$ 30,000
16	Programming	1	LS	$ 20,000	$ 20,000
17	Electrical	1	LS	$ 10,000	$ 10,000
18	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 16,000	$ 16,000
19	Erosion & Sediment Control	1	LS	$ 4,000	$ 4,000
20	Final Cleanup & Restoration	1	LS	$ 7,000	$ 7,000
				Subtotal	**$ 331,000**
				20% Contingency	$ 67,000
				Probable Construction Costs (rounded)	**$ 398,000**
				Non-Construction Costs (25%)	$ 100,000
				Total Probable Project Cost	**$ 498,000**

Notes:

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Table B-42: FL2 - Switch to HSF

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Demolition - Existing Feed Equipment & Core penetrations	1	LS	$ 7,500	$ 7,500
2	Demolition - walls & core penetrations	1	LS	$ 5,000	$ 5,000
3	500 Gallon Double Walled Bulk Tank & Instrumentation	1	EA	$ 15,000	$ 15,000
4	20 Gallon Double Walled Day Tank & Scale	2	EA	$ 6,000	$ 12,000
5	Transfer Pumps	2	EA	$ 5,000	$ 10,000
6	Feed Pumps	4	EA	$ 7,500	$ 30,000
7	Fill Station & Containment Tank	1	LS	$ 12,000	$ 12,000
8	Transfer Line between SWTP & GWTP	1	LS	$ 25,000	$ 25,000
9	Chemical Feed Lines (SWTP)	1	LS	$ 5,000	$ 5,000
10	Chemical Feed Lines (GWTP)	1	LS	$ 3,000	$ 3,000
11	Protective Coatings (SWTP Bulk room)	1	LS	$ 5,000	$ 5,000
12	Control Panel (per WTP)	2	EA	$ 15,000	$ 30,000
13	Programming	1	LS	$ 20,000	$ 20,000
14	HVAC (SWTP Bulk room)	1	LS	$ 10,000	$ 10,000
15	Electrical	1	LS	$ 10,000	$ 10,000
16	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 10,000	$ 10,000
17	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
18	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 216,000**
				20% Contingency	$ 44,000
				Probable Construction Costs (rounded)	**$ 260,000**
				Non-Construction Costs (25%)	$ 65,000
				Total Probable Project Cost	**$ 325,000**

Notes:

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Table B-43: A2 - Alum Equipment Replacement

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	2,000 Gallon Fiberglass Tank & Instrumentation	2	EA	$ 30,000	$ 60,000
2	Transfer pump	1	EA	$ 5,000	$ 5,000
3	Feed pump	2	EA	$ 7,500	$ 15,000
4	50 Gallon Double Walled Day Tank & Scale	2	EA	$ 7,000	$ 14,000
5	Fill Station & Containment Tank	1	LS	$ 12,000	$ 12,000
6	Chemical Feed Lines	1	LS	$ 5,000	$ 5,000
7	New Bulk Fill Line & Core Penetration	1	LS	$ 5,000	$ 5,000
8	Programming	1	LS	$ 5,000	$ 5,000
9	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 7,000	$ 7,000
10	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
11	Final Cleanup & Restoration	1	LS	$ 3,000	$ 3,000
				Subtotal	**$ 133,000**
				20% Contingency	$ 27,000
				Probable Construction Costs (rounded)	**$ 160,000**
				Non-Construction Costs (25%)	$ 40,000
				Total Probable Project Cost	**$ 200,000**

Notes:

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2 *Assumes new Chlorine or Fluoride Control Panel has been installed at this point. Utilize Spare I/O.*

Table B-44: PH2 - Phosphate Addition

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	250 Gallon Double Walled Bulk/Day Tank & Scale	2	EA	$ 14,000	$ 28,000
2	120 Gallon Double Walled Bulk/Day Tank & Scale	1	EA	$ 13,000	$ 13,000
3	Feed pump	2	EA	$ 7,500	$ 15,000
4	Chemical Feed Lines (SWTP)	1	LS	$ 5,000	$ 5,000
5	Chemical Feed Lines (GWTP)	1	LS	$ 5,000	$ 5,000
6	Programming	1	LS	$ 7,500	$ 7,500
7	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 4,000	$ 4,000
8	Final Cleanup & Restoration	1	LS	$ 2,000	$ 2,000
				Subtotal	**$ 80,000**
				20% Contingency	$ 16,000
				Probable Construction Costs (rounded)	**$ 96,000**
				Non-Construction Costs (25%)	$ 24,000
				Total Probable Project Cost	**$ 120,000**

Notes:

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2 *Assumes new Chlorine or Fluoride Control Panel has been installed at this point. Utilize Spare I/O.*

Table B-45: G2 - Garage Construction

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Metal Building Envelope (130'x70')	1	LS	$ 230,000	$ 230,000
2	Foundations and Floor Slab	310	CYS	$ 350	$ 108,500
3	Garage Bays (20'x15')	4	EA	$ 12,000	$ 48,000
4	Floor Trench Drain	1	EA	$ 10,000	$ 10,000
5	Electrical	1	LS	$ 25,000	$ 25,000
6	Plumbing	1	LS	$ 8,000	$ 8,000
7	Garage Radiant Heat System	1	LS	$ 35,000	$ 35,000
8	Demolishing Existing Clarifier	1	LS	$ 45,000	$ 45,000
9	Relocating Underground Pipes	1	LS	$ 20,000	$ 20,000
10	Parking Lot	1	LS	$ 78,200	$ 78,200
11	Landscape Buffer	1	LS	$ 15,000	$ 15,000
12	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 32,000	$ 32,000
13	Erosion & Sediment Control	1	LS	$ 7,000	$ 7,000
14	Final Cleanup & Restoration	1	LS	$ 13,000	$ 13,000
				Subtotal	**$ 675,000**
				20% Contingency	$ 135,000
				Probable Construction Costs (rounded)	**$ 810,000**
				Non-Construction Costs (25%)	$ 203,000
				Total Probable Project Cost	**$ 1,013,000**

Notes:

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2 *Clarifier demolition includes leaving the structyre in the ground and removing the walls 3 feet below grade and filling holes in the bottom of the tank with granular backfill.*

Table B-46: B2 - Install New Fill Storage Bay

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Fill Storage Bay	1	LS	$ 30,000	$ 30,000
2	Concrete Floor	35	CYS	$ 350	$ 13,000
3	Concrete Walls	20	CYS	$ 350	$ 7,000
4	Crushed Stone Drive	1	LS	$ 100,000	$ 100,000
5	Demolition of Existing Garage	1	LS	$ 5,000	$ 5,000
6	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 8,000	$ 8,000
7	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
8	Final Cleanup & Restoration	1	LS	$ 4,000	$ 4,000
				Subtotal	**$ 169,000**
				20% Contingency	$ 34,000
				Probable Construction Costs (rounded)	**$ 203,000**
				Non-Construction Costs (25%)	$ 51,000
				Total Probable Project Cost	**$ 254,000**

Notes:

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Table B-47: P2 - Replace Pavement and Construct New Parking Lot

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	New Pavement	1	LS	$ 37,000	$ 37,000
2	Mill and Resurface Existing Pavement	1	LS	$ 80,000	$ 80,000
3	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 6,000	$ 6,000
4	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
5	Final Cleanup & Restoration	1	LS	$ 3,000	$ 3,000
				Subtotal	**$ 128,000**
				20% Contingency	$ 26,000
				Probable Construction Costs (rounded)	**$ 154,000**
				Non-Construction Costs (25%)	$ 39,000
				Total Probable Project Cost	**$ 193,000**

Notes:

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Table B-48: SC2 - Security Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Vinyl Coated Fencing with Barbed Wire	2,100	LF	$ 45	$ 94,500
2	New Electric Slide Automatic Gate	1	EA	$ 15,000	$ 15,000
3	Relocate Existing Electric Slide Automatic Gate	1	EA	$ 10,000	$ 10,000
4	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 6,000	$ 6,000
5	Erosion & Sediment Control	1	LS	$ 2,000	$ 2,000
6	Final Cleanup & Restoration	1	LS	$ 3,000	$ 3,000
				Subtotal	**$ 131,000**
				20% Contingency	$ 27,000
				Total Probable Project Cost	**$ 158,000**

Notes:

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Table B-49: SC2 - System Wide Cellular Communications

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Demo Existing Radios and Install New Cell Equipment	17	EA	$ 2,000	$ 34,000
2	Connect 16th St. Tank to Cellular	1	EA	$ 3,000	$ 3,000
3	SCADA Hardware for Cellular Telemetry	1	LS	$ 20,000	$ 20,000
4	System Integration	1	LS	$ 10,000	$ 10,000
				Subtotal	**$ 67,000**
				20% Contingency	$ 14,000
				Probable Construction Costs (rounded)	**$ 81,000**
				Non-Construction Costs (25%)	$ 21,000
				Total Probable Project Cost	**$ 102,000**

Notes:

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Table B-50: T2 - 16th St. Tank Improvements

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Spot Clean and Top Coat	1	LS	$ 760,000	$ 760,000
2	Power Wash Exterior	1	LS	$ 12,000	$ 12,000
3	Clean and Paint Interior Dry	1	LS	$ 30,000	$ 30,000
4	Clean and Paint Exterior Wet	1	LS	$ 530,000	$ 530,000
5	Grout Repair	1	LS	$ 2,000	$ 2,000
6	Foundation Repair	1	LS	$ 2,000	$ 2,000
7	Repair/Replace Valve Vault Sump Pump	1	LS	$ 500	$ 500
8	Replace Valve Vault and Riser Put Rungs	1	LS	$ 2,000	$ 2,000
9	Install Sump and Pump in Riser Pit	1	LS	$ 1,000	$ 1,000
10	Install Elastomeric Check Valve on Overflow Pipe	1	LS	$ 8,000	$ 8,000
11	Install Lock on Flanged and Bolted Roof Manhole	1	LS	$ 500	$ 500
12	Equip Dry Bowl Manhole with Hinge and Chains	1	LS	$ 1,000	$ 1,000
13	Install Self-Closing Gate on Interior Safety Railing	1	LS	$ 3,000	$ 3,000
14	Relocate Overflow Pipe	1	LS	$ 15,000	$ 15,000
15	Install Head Deflectors at Ladders	1	LS	$ 1,000	$ 1,000
16	Remove Interior Wet Ladders	1	LS	$ 2,000	$ 2,000
17	Mobilization, Demob., Bonds, & Insurance	1	LS	$ 69,000	$ 69,000
18	Erosion & Sediment Control	1	LS	$ 14,000	$ 14,000
19	Final Cleanup & Restoration	1	LS	$ 28,000	$ 28,000
				Subtotal	**$ 1,481,000**
				20% Contingency	$ 297,000
				Probable Construction Costs (rounded)	**$ 1,778,000**
				Non-Construction Costs (25%)	$ 445,000
				Total Probable Project Cost	**$ 2,223,000**

Notes:

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2 *Scope of improvements and associated costs as provided by Tank Industry Consultants. Costs above are reflective of all scheduled maintenance items.*

Table B-51: Distribution System Rehabilitation and Upkeep

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Unit	Unit Price	Total Price
1	Replace 0.5% of Water Main Per Year	1700	LF	$ 275	$ 467,500
2	Replace 5% of Lead Services Per Year	53	EA	$ 3,200	$ 169,600
3	LSLR Mapping	1	EA	$ 15,000	$ 15,000
4	Annual Valve Replacement (3%)	20	EA	$ 3,500	$ 70,000
5	Annual Hydrant Replacement (1%)	5	EA	$ 5,000	$ 25,000
6	Annual Meter Replacement	1	LS	$ 90,000	$ 90,000
7	Annual Water Loss Audit	1	LS	$ 7,000	$ 7,000
				Subtotal	**$ 845,000**
				20% Contingency	$ 169,000
				Probable Construction Costs (rounded)	**$ 1,014,000**
				Non-Construction Costs (25%)	$ 192,000
				Total Probable Project Cost	**$ 1,206,000**

Notes:

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Table B-52: Annual Process Asset Maintenance and Upkeep

I. Engineer's Preliminary Opinion of Probable Construction Costs

Item	Description	Est Qty	Inspection Interval (years)	Unit Price	Total Cost Per Inspection / Maintenance	Annual Cost Over 20-year Study Period
1	Annual Tank Inspections	8	5	$ 5,000	$ 40,000	$ 8,000
2	Annual Well Inspections	1	1	$ 100,000	$ 100,000	$ 100,000
3	Pump Inspection, Cleaning, and Maintenance	15	5	$ 5,000	$ 75,000	$ 15,000
4	Filter Media Inspections	10	10	$ 7,000	$ 70,000	$ 3,500
5	Chemical System Maintenance	1	1	$ 130,000	$ 130,000	$ 130,000
					Subtotal	**$ 257,000**
					20% Contingency	$ 52,000
					Total Probable Project Cost	**$ 309,000**

Notes:

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Table B-53: Cost Summary

I. Engineer's Preliminary Opinion of Probable Costs

Project Category	Project Name	Estimated Total
System-Wide	System Wide Cellular Communications	$ 102,000
	Emergency Interconnect at Georgetown Road	$ 552,000
	Arc-Flash Study	$ 25,000
	CodeRed Alert System	$ 30,000
Wells	Well Rehabilitation	$ 509,000
	Install VFDs for Well Pumps	$ 203,000
	Groundwater Well Replacement Program	$ 4,557,000
GWTP	Aerator Inspection and Improvements	$ 36,000
	Detention Tank Access Hatch Replacement	$ 25,000
	Rebuild HSP No. 2 and 3	$ 40,000
	Replace HSP Motors and Install VFD	$ 430,000
	Pressure Filter Rehabilitation	$ 692,000
	Replace GWTP Filter Pipe and Valves	$ 290,000
	GWTP Building and Facility Improvements	$ 694,000
SWTP	Low Head Dam Improvements	$ 298,000
	Raw Water Intake Structure Cover	$ 128,000
	Flocculation/Sedimentation Basin Structural Improvements	$ 72,000
	Flocculation/Sedimentation Basin Internal Improvements	$ 119,000
	Filter Rehabilitation	$ 384,000
	High Service Pumps VFD Installation	$ 102,000
	Residual Pumps Replacement	$ 35,000
	Valve & Actuator Replacement	$ 197,000
	Building Upper-Level West End Renovations	$ 440,000
	SWTP Building and Facility Improvements	$ 598,000
	SWTP Operational Strategy Modification Pilot Study	$ 350,000
Chemical	Switch to Bulk Bleach	$ 498,000
	Switch to HSF	$ 325,000
	Alum Equipment Replacement	$ 200,000
	Phosphate Addition	$ 120,000
Site	WTP Construct Garage	$ 1,013,000
	WTP Fill Storage Bays	$ 254,000
	WTP Pavement and Parking	$ 193,000
	WTP Security	$ 158,000
Tanks	16th St. Tank Improvements	$ 2,223,000
Equipment	New Equipment	$ 697,500
	Total Probable Cost	**$ 16,589,500**

II. Annual Distribution System Rehabilitation and Upkeep

Item	Description		Total Price
1	Annual Water Main Replacement (0.5%)	$	701,000
2	Annual Lead Service Replacement (5%)	$	254,600
3	LSLR Mapping	$	18,000
4	Annual Valve Replacement (3%)	$	84,000
5	Annual Hydrant Replacement	$	30,000
6	Annual Meter Replacement Program	$	90,000
7	Annual Water Loss Audit	$	7,000
	Total Probable Cost	**$**	**1,184,600**

III. Annual Process Asset Maintenance and Upkeep

Item	Description		Total Price
1	Annual Tank Inspections	$	10,000
2	Annual Well Inspections	$	120,000
3	Pump Inspection, Cleaning, and Maintenance	$	18,000
4	Filter Media Inspections	$	5,000
5	Chemical System Maintenance	$	155,000
	Total Probable Cost	**$**	**308,000**

Notes:

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