

Wastewater Facility Plan

February 2020

Joplin, Missouri



ALLGEIER, MARTIN and ASSOCIATES, INC.

Consulting Engineers

CERTIFICATION PAGE

The paragraphs and sections to be authenticated by my seal are limited to:

- Paragraph I.A.3.
- Paragraph I.A.4b.
- Section V.



By: Dean A. Willis, P.E.

Allgeier, Martin and Associates, Inc.

The paragraphs and sections to be authenticated by my seal are limited to:

- Paragraph I.A.1.
- Paragraph I.A.2.
- Paragraph I.A.4a.
- Section II.
- Section III.
- Section IV.



By: John T. Briggs, P.E.

Allgeier, Martin and Associates, Inc.

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I. EXECUTIVE SUMMARY

A. Summary of Recommendations & Costs

1. Wastewater Collection System Improvements

The wastewater collection system is a critical component of City infrastructure and continuing to replace and renovate sanitary sewer lines is crucial in continuing to meet the citizen's needs. The 2026 I&I Abatement Activities Program (Section III.B.4, pages III-16 to III-18) outlines the steps recommended for addressing existing infrastructure needs. Completing this work will reduce extraneous inflow and infiltration (I&I) and extend the useful life of the collection system infrastructure, lift stations, and wastewater treatment facilities. It's recommended that the City continue to budget money on an annual basis for the activities identified in this program.

Along with the continuance of the 2026 I&I Abatement Activities Program, the City must also address hydraulic deficiencies within the collection system. The most pressing recommended collection system improvements are recommended to be completed within the next five years and are outlined in Table I-1 on page I-4, with more detailed information included in Section III.D of this Facility Plan. Estimated project costs provided include construction, contingency, engineering design and construction phase, and resident project representation costs. Figure I-1 on page I-5 presents a map of these recommended years 0 – 5 improvements.

A system-wide hydraulic model was created as phase 2 of the City of Joplin's Inflow and Infiltration Strategic Plan in November of 2018 (See Appendix B). Additional recommended improvements for the elimination of the remaining miscellaneous hydraulic restrictions, identified by the hydraulic computer model, are anticipated to be completed between years 6 – 20 and are outlined in Table I-2 on page I-6. Estimated project costs provided include construction, contingency, engineering design and construction phase, and resident project representation costs. For more detailed information on these recommended improvements, refer to Section III.D of this Facility Plan. Figure I-2, page I-7, presents a map of these recommended years 6 – 20 improvements.

2. Lift Station Improvements

Proper operation and maintenance of the lift station facilities is required to ensure public safety and to minimize sanitary sewer overflows and surcharging of lines. After careful evaluation and analysis of the existing lift station facilities and projected flows, existing deficiencies and projected future deficiencies have been identified and quantified. Recommended lift station improvements for years 0 – 5 are outlined in Table I-1 and recommended lift station improvements for years 6 – 20 are outlined in Table I-2, on pages I-4 and I-6, respectively. Estimated project costs provided include construction, contingency, engineering design and construction phase, and resident project representation costs. Figure's I-1 and I-2, located on pages I-5 and I-7 respectively, present a map of these recommended lift station improvements. A detailed evaluation of each of these lift stations has been included in Section IV of this report.

Within the Lift Station section of this report, an evaluation of numerous lift station consolidation options is discussed (refer to Section IV.C). From those evaluations, it is

recommended that the City begin to eliminate the Country Club, Crane Road, and Arbor Hills II lift stations in the near future (Section IV.C.1, page IV-52). All three of these lift stations are located within the Tanyard Hollow tributary of Shoal Creek; which means, interceptor sewer lines can convey wastewater flow from each lift station, by gravity, to the Filmore Bridge lift station. Beginning this project within the next five years eliminates the recommended improvements for these individual lift stations and would save the future operation, maintenance, and replacement of these facilities. The cost of this project has been included in Table I-1 and shown on Figure I-1 on pages I-4 and I-5, respectively.

3. Wastewater Treatment Facilities Improvements

As environmental regulations become more stringent and wastewater flows and loads continue to increase, improvements to the wastewater treatment facilities are necessary. Recommended treatment plant improvements for the next five years are outlined in Table I-1, page I-4 and recommended treatment plant improvements for years 6 – 20 are outlined in Table I-2, page I-6. Estimated project costs provided in the tables include construction, contingency, engineering design and construction phase, and resident project representation costs.

a. Turkey Creek Wastewater Treatment Facility

The most pressing treatment facility issue, is the Turkey Creek trickling filter media replacement. It is recommended that this work be completed as soon as possible. The current tertiary filter renovation project at the Turkey Creek facility should greatly reduce the frequency of discharges from the storage lagoon. Any discharge from the storage lagoon is considered a bypass and must be reported to the State. To further reduce bypass potential, the additional capacity provided by the proposed activated sludge and disinfection facilities is required. These facilities will also be needed to meet future flows and loads and have been included in the years 6 – 20 recommendations.

b. Shoal Creek Wastewater Treatment Facility

The Shoal Creek treatment plant would benefit from additional clarification capacity. This would reduce the load to the tertiary filters during high flow events and problems associated with that scenario. This work should be completed within the first five years. To meet future flows and loads, it is anticipated that additional aeration in the existing activated sludge basins will be needed in conjunction with an additional screen and modifications at the headworks. This work has been included in the years 6 – 20 recommendations.

4. Personnel Recommendations

a. Employees for Wastewater Collection and Lift Station Facilities

Currently the City utilizes six full-time employees and three shared employees for the operation and maintenance of the wastewater collection system and lift station facilities. A review of EPA publications yielded a recommended staff of 15 full-time employees; however, technological advances since the publication of those guides could produce a reduction from those numbers.

Although Section III.E of this report recommended that three additional personnel be added to the wastewater collection and lift station staff, the additional maintenance mechanic position identified for the collection system could be shared with the WWTP staff recommendations. That position has been included in the following WWTP personnel recommendations in paragraph b of this section. The following personnel are recommended to be added to the wastewater collection and lift station staff to improve operations.

1) One Asset Management Tech whose primary purpose is to update sanitary and storm sewer maps, record asset management information (cleaning and inspection dates, pipeline and structure ratings, material types, customer complaints, etc.), and maintain maintenance records.

2) One Heavy Equipment Operator whose primary purpose would be to assist in the repair and replacement of sanitary sewer mains.

b. Employees for Wastewater Treatment Facilities

As described in Section V.C.3, pages V-37 and V-38, following published methodology for estimating staff levels at WWTP's would require 16 employees for the Shoal Creek WWTP and 27 employees at the Turkey Creek WWTP (43 total). Following a review of these recommendations and discussions with existing operating personnel, it's recommended that an additional 6 staff members be added which would bring the total number of personnel to 40 people. The following personnel should be added:

1) One Equipment Operator at the Shoal Creek WWTP whose primary purpose is to dispose of waste biosolids. Also dedicate a sludge truck to this plant site.

2) One Laborer to assist with issues created by industrial discharges to the system.

3) One Electrician to serve both treatment facilities.

4) Three additional Maintenance Mechanics to improve maintenance of aging equipment at both plants. One of these positions should also be available to assist in the operation and maintenance of the City's lift station facilities.

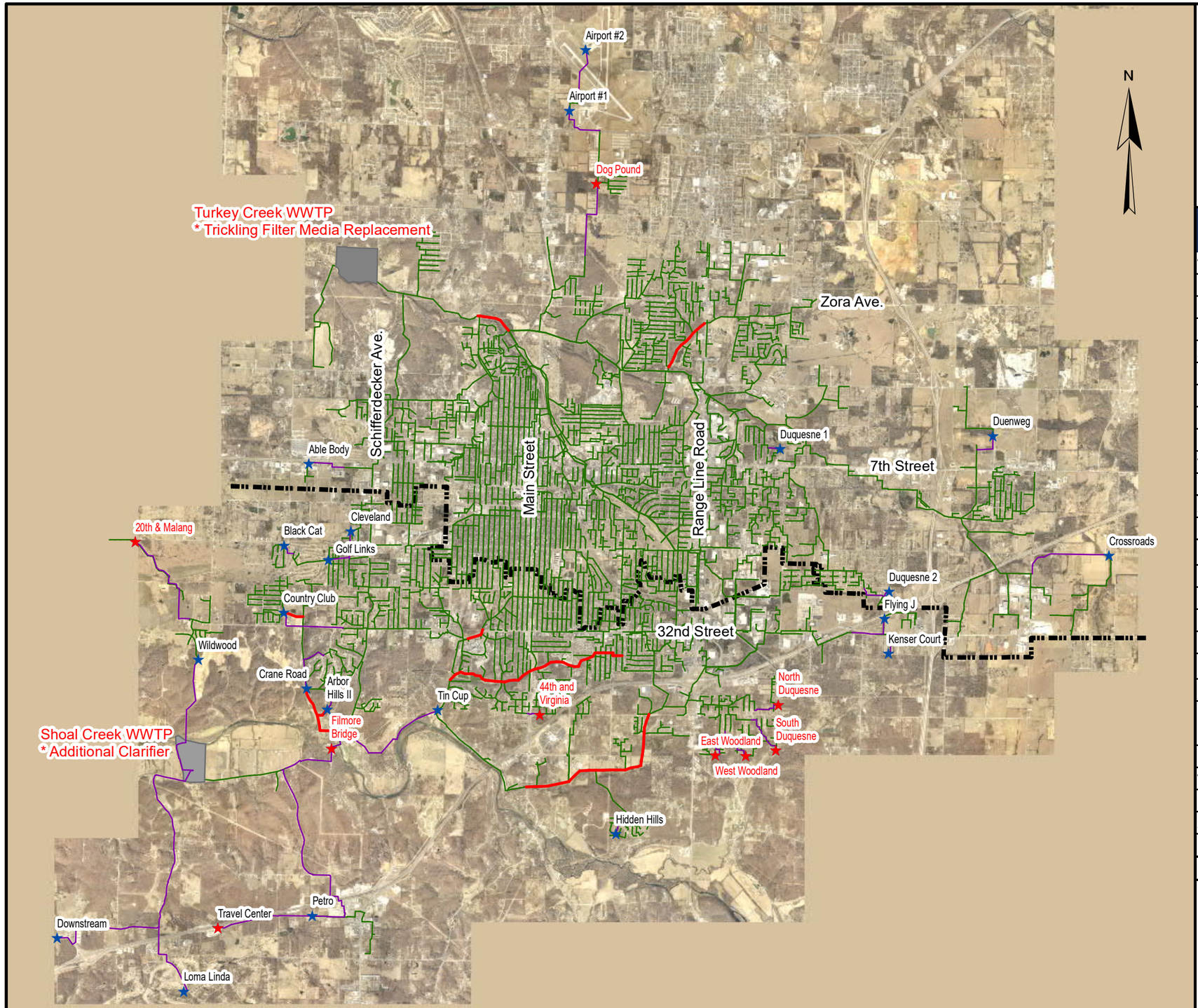
TABLE I-1. RECOMMENDED IMPROVEMENTS YEARS 0 – 5

DESCRIPTION	ESTIMATED COST
Turkey Creek Basin Wastewater Collection System Improvements	
Joplin Creek Interceptor Sewer Replacement	$2,500,000
East Royal Heights Interceptor Sewer Replacement	$905,000
Subtotal	**$3,405,000**
Shoal Creek Basin Wastewater Collection System Improvements	
Glendale Interceptor Sewer Replacement	$2,850,000
Freeman (32nd Street) Interceptor Sewer Replacement	$525,000
I-44 (Tin Cup South) Interceptor Sewer Replacement	$2,900,000
Subtotal	**$6,275,000**
Turkey Creek Lift Station Improvements	
Dog Pound Lift Station **Subtotal**	**$275,000**
Shoal Creek Lift Station Improvements	
Filmore Bridge Lift Station	$170,000
44th and Virginia Lift Station	$310,000
North Duquesne (Silver Creek B) Lift Station	$34,500
South Duquesne (Silver Creek C) Lift Station	$34,500
East Woodland (Silver Creek D) Lift Station	$34,500
West Woodland (Silver Creek E) Lift Station	$34,500
20th and Malang Lift Station	$300,000
Travel Center Lift Station	$80,000
*Country Club/Crane Road/Arbor Hills II Lift Station Elimination	$1,200,000
Subtotal	**$2,198,000**
Turkey Creek Wastewater Treatment Facility Improvements	
Trickling Filter Media Replacement **Subtotal**	**$5,220,000**
Shoal Creek Wastewater Treatment Facility Improvements	
Additional Clarifier **Subtotal**	**$2,200,000**
****Total Recommended Improvements for Years 0 – 5**	**$19,573,000**

*The Country Club/Crane Road/Arbor Hills II Lift Station Elimination recommendation eliminates approximately $1,880,000 of lift station improvement costs.

**Detailed cost estimates for wastewater collection system and lift station projects identified above have been included in Appendices C and E, respectively.

Note: Estimated project costs provided in the tables include construction, contingency, engineering design and construction phase, and resident project representation costs.



Legend

- Existing Lift Stations
- Recomended Lift Station Improvements
- Recomended Improvements
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

Recommended Improvements Years 0 - 5 Description	Cost
Turkey Creek Basin Collection System Improvements	
Joplin Creek Interceptor Sewer Replacement	$2,500,000
East Royal Heights Interceptor Sewer Replacement	$905,000
Subtotal	**$3,405,000**
Shoal Creek Basin Collection System Improvements	
Glendale Interceptor Sewer Replacement	$2,850,000
Freeman (32nd St.) Interceptor Sewer Replacement	$525,000
I-44 (Tin Cup South) Interceptor Sewer Replacement	$2,900,000
Subtotal	**$6,275,000**
Turkey Creek Basin Lift Station Improvements	
Dog Pound Lift Station	**$275,000**
Shoal Creek Basin Lift Station Improvements	
Filmore Bridge Lift Station	$170,000
44th and Virginia Lift Station	$310,000
North Duquesne (Silver Creek B) Lift Station	$34,500
South Duquesne (Silver Creek C) Lift Station	$34,500
East Woodland (Silver Creek D) Lift Station	$34,500
West Woodland (Silver Creek E) Lift Station	$34,500
20th and Malang Lift Station	$300,000
Travel Center Lift Station	$80,000
Country Club/Crane Road/Arbor Hills II Lift Station Elimination	$1,200,000
Subtotal	**$2,198,000**
Turkey Creek Treatment Facility Improvements	
Trickling Filter Media Replacement	**$5,220,000**
Shoal Creek Treatment Facility Improvements	
Additional Clarifier	**$2,200,000**
Total Recommended Improvements for Years 0-5	**$19,573,000**

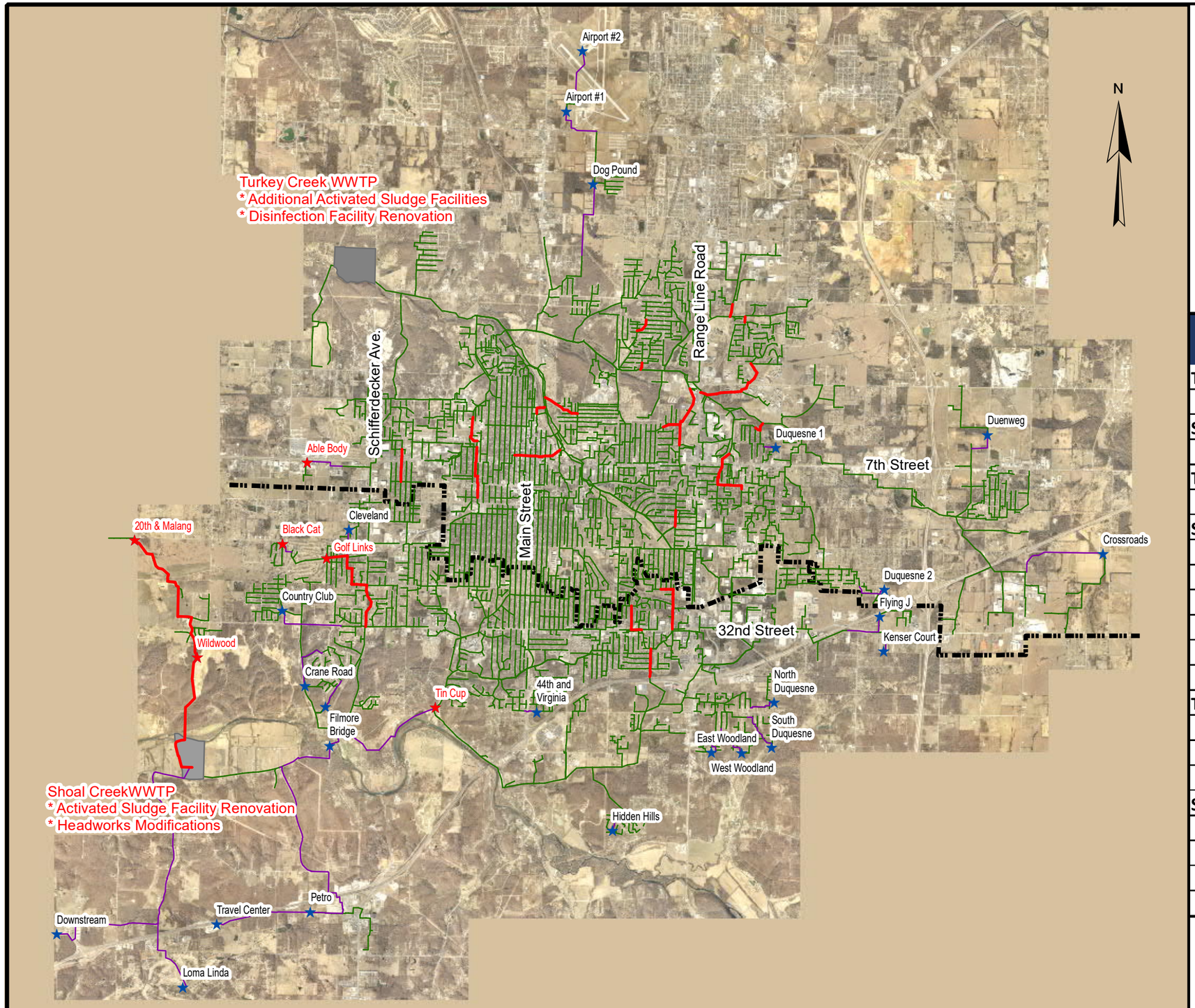
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Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, Mo. 64804

Recomended Improvements Years 0-5
Figure I-1

TABLE I-2. RECOMMENDED IMPROVEMENTS YEARS 6 – 20

DESCRIPTION		ESTIMATED COST
Turkey Creek Basin Wastewater Collection System Improvements		
Eliminate Hydraulic Deficiencies	**Subtotal**	**$10,000,000**
Turkey Creek Basin Wastewater Collection System Improvements		
Eliminate Hydraulic Deficiencies	**Subtotal**	**$3,500,000**
Turkey Creek Lift Station Improvements		
Able Body Lift Station	**Subtotal**	**$140,000**
Shoal Creek Lift Station Improvements		
20th and Black Cat Lift Station		$60,000
Golf Links Lift Station		$275,000
Tin Cup Lift Station		$700,000
20th and Malang Lift Station		$3,170,000
Wildwood Lift Station		$200,000
	Subtotal	**$4,405,000**
Turkey Creek Wastewater Treatment Facility Improvements		
Additional Activated Sludge Facilities		$11,900,000
Disinfection Facility Renovation		$800,000
	Subtotal	**$12,700,000**
Shoal Creek Wastewater Treatment Facility Improvements		
Activated Sludge Facility Renovation		$1,450,000
Headworks Modifications		$1,260,000
	Subtotal	**$2,710,000**
Total Recommended Improvements for Years 6 – 20		**$33,455,000**

Note: Estimated project costs provided in the tables include construction, contingency, engineering design and construction phase, and resident project representation costs.



Legend

- Existing Lift Stations
- Recomended Lift Station Improvements
- Recomended Improvements
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

Recommended Improvements Years 6 - 20 Description	Cost
Turkey Creek Basin Collection System Improvements	
Eliminate Hydraulic Deficiencies	**$10,000,000**
Shoal Creek Basin Collection System Improvements	
Eliminate Hydraulic Deficiencies	**$3,500,000**
Turkey Creek Basin Lift Station Improvements	
Able Body Lift Station	**$140,000**
Shoal Creek Basin Lift Station Improvements	
20th and Black Cat Lift Station	$60,000
Golf Links Lift Station	$275,000
Tin Cup Lift Station	$700,000
20th and Malang Lift Station	$3,170,000
Wildwood Lift Station	$200,000
Subtotal	**$4,405,000**
Turkey Creek Treatment Facility Improvements	
Additional Activated Sludge Facilities	$11,900,000
Disinfection Facility Renovation	$800,000
Subtotal	**$12,700,000**
Shoal Creek Treatment Facility Improvements	
Activated Sludge Facility Renovation	$1,450,000
Headworks Modifications	$1,260,000
Subtotal	**$2,710,000**
Total Recommended Improvements for Years 6-20	**$33,455,000**

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Recomended Improvements Years 6-20
Figure I-2

II. GENERAL

The City of Joplin is home to a population of 50,657 residents according to a 2018 US Census Bureau estimate. The corporate limits are located in parts of Jasper and Newton Counties in the southwest corner of the State of Missouri. Joplin is a Home Rule Charter city, operating under a council-manager plan. There are eleven incorporated areas adjacent to the City of Joplin within the Shoal Creek and Turkey Creek drainage basins having a combined population of approximately 5,523.

The City is situated at the crossroads of two major interstate highways, I-44 and I-49; making it a regional hub to many of the surrounding communities and rural areas located within the four-state area. Joplin has a four-year university with approximately 6,000 faculty and students, a Christian college campus with approximately 700 faculty and students, and is a broad-based medical community, including two major hospitals and a medical school campus. The City also has a significant industrial base that represents a major portion of the wastewater requiring treatment by the City. The Joplin metropolitan area, which includes several smaller cities and villages outside the drainage basins served by Joplin's wastewater collection and treatment system, has an estimated population of over 200,000.

A. Background

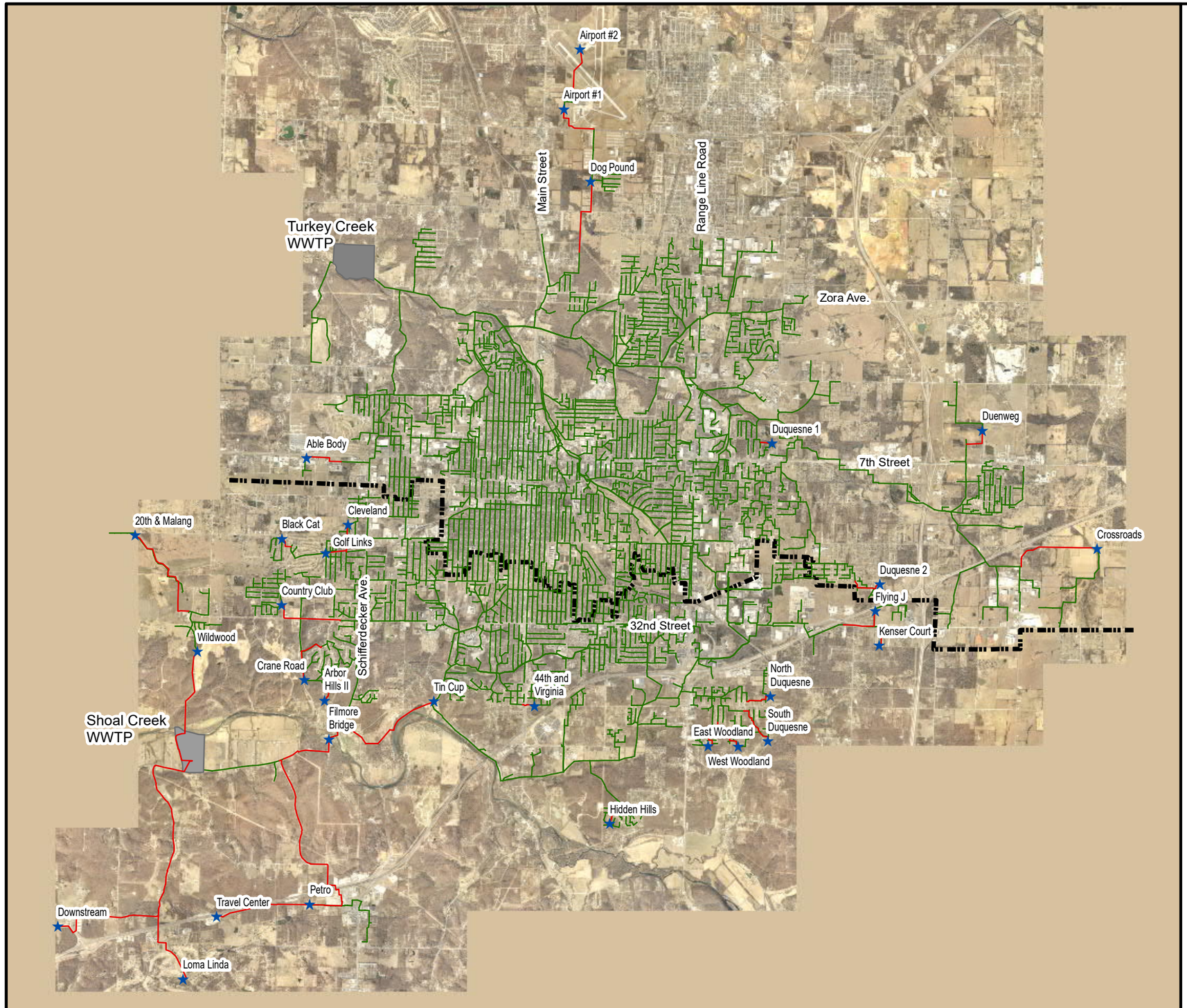
The City of Joplin operates a sewage collection system and two wastewater treatment plants under Missouri State Operating Permits No. MO-0103349 (Turkey Creek Basin) and MO-0023256 (Shoal Creek Basin). Copies of the new MDNR draft permits for each of these facilities have been included in Appendix F.

The permits establish limits and monitoring requirements for discharge of treated wastewaters from the City's treatment facilities and for disposal of biosolids that result from the treatment process. Another objective of the operating permit(s) requires the City to "develop and/or implement a program for maintenance and repair of the collection system." One of the objectives of this portion of the permit is to reduce the number of sanitary sewer overflows (SSOs) through the reduction of inflow and infiltration (I&I).

The locations of the City's two wastewater treatment facilities are shown on Figure II-1, along with a delineation of those areas served by each facility.

1. Wastewater Collection System

For a number of years, the City of Joplin has been working towards the goal of rejuvenating their wastewater collection system infrastructure, thus, reducing the volume of I&I and minimizing SSO events. Smoke testing and closed-circuit television (CCTV) inspection of sewer lines, as well as visual manhole inspections, have provided the City with a multitude of information that can be utilized in managing the assets of the wastewater collection system. Based on the results of these evaluations and inspections, the City has consistently funded the renovation and replacement of sewer lines and manholes within the system.



Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

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Location Map
Figure II-1

As alluded to previously, the wastewater collection system and treatment facilities are divided into two drainage basins. The Turkey Creek drainage basin serves nearly two-thirds of the north side of the community, including Duenweg, parts of Duquesne, and the City's Crossroads Industrial Park. The Shoal Creek drainage basin serves the remaining southern portion of the City, including the Town of Loma Linda, parts of Duquesne, commercial development along the I-44 corridor, and a large hotel/casino resort located just across the state line in Oklahoma.

2. Lift Stations

The City also operates a total of 25 lift stations (not including lift stations in the towns of Loma Linda, Duquesne, and Duenweg) in order to convey wastewater through the collection system and into the treatment facilities. Five (5) lift stations are located within the Turkey Creek drainage basin, while the remaining 20 lift stations are located within the Shoal Creek drainage basin.

Furthermore, many of these lift stations convey wastewater to another lift station's collection system requiring raw sewage to be pumped again. Only seven of the existing lift stations pump raw sewage into interceptor sewer lines that feed directly into the treatment facilities.

3. Turkey Creek WWTF

In 1985, the City of Joplin completed construction of the Turkey Creek WWTF, located on the northwest side of town adjacent to Turkey Creek. The plant underwent a major expansion in 1996 to allow for the demolition of the old Lone Elm wastewater treatment plant, and to provide the advanced treatment necessitated by a reclassification of Turkey Creek by the Missouri Clean Water Commission. In 2013, major improvements to the sludge handling facilities were completed. The Turkey Creek WWTF provides for treatment of all sewage flows that are generated in the Turkey Creek drainage basin, including the towns of Duenweg and parts of Duquesne, and the Crossroads Industrial Park.

4. Shoal Creek WWTF

In 1987, the City of Joplin completed construction of the Shoal Creek WWTF, located on the southwest side of town adjacent to Shoal Creek. In 2015 the treatment plant underwent a significant expansion that added activated sludge treatment facilities, aerobic sludge digestion, tertiary filtration, and ultraviolet disinfection to the existing treatment components. The Shoal Creek WWTP provides for treatment of all sewage flows that are generated in the Shoal Creek drainage basin, including the town of Loma Linda, parts of Duquesne, commercial development along the I-44 corridor, a hotel/casino resort, and a growing development on the southwest side of the community.

B. Scope

The following report is intended to provide the City of Joplin with recommendations for wastewater collection and treatment facility improvements to meet the City's wastewater needs through the year 2040.

The comprehensive engineering evaluation set forth herein analyzes the City's entire wastewater system, including the Turkey Creek and Shoal Creek collection systems, lift stations, and treatment facilities. A review of previous facility plans, engineering reports, inflow and infiltration reports, and hydraulic modeling reports will be conducted to compile system information and previous planning concepts.

Current and design year 2040 wastewater flows are estimated based on existing flow meter data, lift station run times, and projected city growth. Existing wastewater collection system and lift station capabilities are compared to these projected flows to analyze hydraulic capacity. Based on these results, recommendations and opinion of probably costs for wastewater collection system and lift station improvements are presented.

Coupled with the current and projected future flows, wastewater loads for the year 2040 will be estimated so that the capacities of the existing wastewater treatment facilities can be analyzed. Trends in NPDES limits for effluents and sludges will be weighed so that alternative treatment processes can be established. Preliminary design of plant components for the various alternates are evaluated. Opinions of capital and operation and maintenance costs of alternative wastewater treatment systems are provided and recommendations of the preferred alternatives are set forth.

C. Environmental

1. Geology

The geology of the planning area is pertinent to the water quality of the area. The outcrops of bedrock and the rock that would be exposed if the soil were removed are predominantly Mississippian Age, including the Keokuk-Burlington limestones and the Warsaw limestone. The younger Keokuk-Burlington Formation caps the ridge lines, in general with the older Warsaw Formation found in the center part of the planning area. Mineralization in the form of lead and zinc ores occurred in the Mississippian rocks and the discovery of these ores in the 1800s led to major mining activities in the area. While mining activity has ceased, the remnants of past mining activities remain.

The Mississippian Age formations lend themselves to sinkholes and solution cavities or caves. Several small or moderately small caves are located in the Joplin area. In some cases, the lead and zinc ores were deposited, or more properly, redeposited, in the solution cavities or crevices of the area. The deposition of coal and very heavy shallow oil occurs in the Pennsylvanian Age formations. The limited presence of these formations result in little or no evidence of organic-carbon deposits in the study area.

The only major structural feature of the area is the southwestern prolongation of the Ozark Dome. Much of the lead and zinc ore was related to this structure. No major faults are present in the area, although fracturing and cracking are common. These tectonic effects are, in all probability, related to the faulting nearby, including the Ritchey, Seneca, and Chesapeake faults. The rather extensive faulting and cracking penetrates deep enough in the area to allow communication with the aquifers.

2. Topography

The planning area generally includes the Turkey Creek and Shoal Creek drainage areas, located in the Springfield Plateau region of the Ozarks. This is an area of relatively low

relief, descending gradually to the northwest. Specifically, the planning area is a series of generally east-west trending, dissected ridge lines. The area is cut by Shoal Creek, which flows generally westward across the southern part of the area, and Turkey Creek, which flows generally northwestward across the northern portion of the area. The western part of the planning area is dissected by Short Creek and its tributaries, which originate near the center of the west corporate limits and flow generally westward.

The relatively older age of Shoal Creek is indicated by the rather abrupt limestone bluffs that form the banks of the stream in much of the area. These bluffs constitute the greatest relief in the planning area. The elevations across the area vary from just above 1,160 feet above sea level in the south part of the area to just below 820 feet above sea level in the northwest area.

In summary, the topography of the planning area may be described as being a plateau, rolling in nature, cut by stream valleys generally oriented on an east-west axis. The relative elevations vary approximately three hundred fifty feet across the planning area. The lower elevations are found in the stream valleys near the western boundary of the study area and the higher elevations occur on the ridge lines along the southern border. The ridge lines to the north are generally fifty to sixty feet lower in elevation than those to the south.

3. Climate

Precipitation in the Joplin area has seen an increasing trend in the last fifty years or so, and the average annual precipitation for the area is approximately is 47 inches. The normal monthly precipitation for the area is as follows:

TABLE II-1. AVERAGE PRECIPITATION FOR THE CITY OF JOPLIN

Month	Precipitation (in.)	Month	Precipitation (in.)
January	2.05	July	3.82
February	2.32	August	3.35
March	3.43	September	4.96
April	4.49	October	4.02
May	5.71	November	3.78
June	5.87	December	2.83

The majority of the precipitation occurs during the spring, summer, and fall months, with the winter months being relatively dry. The spring, summer, and fall precipitation usually comes in the form of showers or thunderstorms. The thunderstorms usually produce very heavy intense rains. Such storms will occur on about fifty days per year on the average. Other forms of measurable precipitation occur also on an average of fifty days per year. Most of the winter precipitation is rain, freezing rain, or short-lived snow, with snow cover rarely lasting more than a few days.

The temperature is relatively mild in the area, however, sudden changes in temperature are common. Generally, winters are cold and summers are hot, however, prolonged periods of either extreme are rare. Periods of cool, dry weather occur during the predominantly hot, humid summers, and periods of mild, above-freezing temperatures

occur during the cold, dry winters. Averages indicate that on about forty days per year, the temperature rises above ninety degrees, and on one or two days the temperature will exceed one hundred degrees. During an average year, the temperature will fall below freezing on about one hundred days, with this condition usually occurring at night. The average winter temperature does not typically fall below zero; however, when it does occur, it is usually on only two or three days per year. The first freeze at the average elevations in the planning area normally occurs in the last week of October, while the last freeze usually occurs during the second week of April.

D. Population Projection

Future conditions of the Joplin Study Area were analyzed for a plan year of 2040. The future conditions analysis documents the anticipated conditions of the Joplin Study Area during the planning horizon. Evaluation of the future conditions used the 1-year, 6-hour level of service for the pipe network and a 5-year, 6-hour level of service for the manholes. The evaluation was performed using the calibrated model, with a projected population for the given planning year.

The City of Joplin agreed upon a 0.9% population increase across the City annually. This additional population was applied across the modeled subcatchments by applying the 2018 percent of total population to the 2040 total population. These equivalent populations have been assigned to each applicable subcatchment for analyzing probable future sewer use. The value for the future population in 2040 is 64,699. This equated to an additional 11,575 people contributing to the sewer system in the City of Joplin in 2040.

E. System Metals Issues

Extensive efforts were recently made by the City of Joplin and several consultants to compose and compile documentary evidence to support the submission of a Water Quality Variance (Variance) application to the Missouri Department of Natural Resources (Department). The Variance requested a time-limited effluent concentration for total recoverable zinc discharged from the Turkey Creek Wastewater Treatment Plant (NPDES Permit MO-0103349). The Variance established a ten-year zinc effluent limit that provides Joplin the time and flexibility to make incremental water quality improvements.

Through these efforts, it was determined that the City request a variance based on “human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place” [40 CFR 11.10(g)(3); Factor 3]. Historically, Joplin’s Turkey Creek WWTP had difficulty meeting zinc effluent limits consistently due to the ubiquitous presence of zinc throughout the Joplin area from past mining practices. In addition to direct contamination of soil, groundwater, and surface water by mine wastes, in the past, the City used mine tailings, or “chat”, as bedding material for its wastewater collection lines.

During this Variance’s tenure, the effluent limits that would typically be based on the zinc water quality criteria were replaced with limits based on the highest attainable conditions met at the Turkey Creek WWTP. It was established that the Variance should require total recoverable zinc effluent limit concentrations of 396 µg/L (daily maximum) and 228 µg/L (monthly average) be met. In addition, Joplin is required to follow a Zinc Minimization Plan to ensure reductions in future zinc pollution loadings.

Based upon the efforts of the team and the Department's recommendations, Missouri's Clean Water Commission granted Joplin the Variance for total recoverable zinc on January 9, 2020. This is the State of Missouri's first successful Factor 3 Water Quality Variance.

III. WASTEWATER COLLECTION SYSTEM

A. Current Collection System

1. General

a. Turkey Creek Basin

The Turkey Creek basin wastewater collection system serves nearly two-thirds of the north side of the community; which contains approximately 28 square miles and an estimated 19,175 residential, commercial, and industrial customers. This includes the communities of Duenweg and parts of Duquesne. Furthermore, the Turkey Creek drainage basin can be subdivided into four major drainage basins: Crossroads Parallel, Joplin Creek, Lone Elm, and Perkins. Figure III-1 depicts the Turkey Creek collection system and major drainage basins.

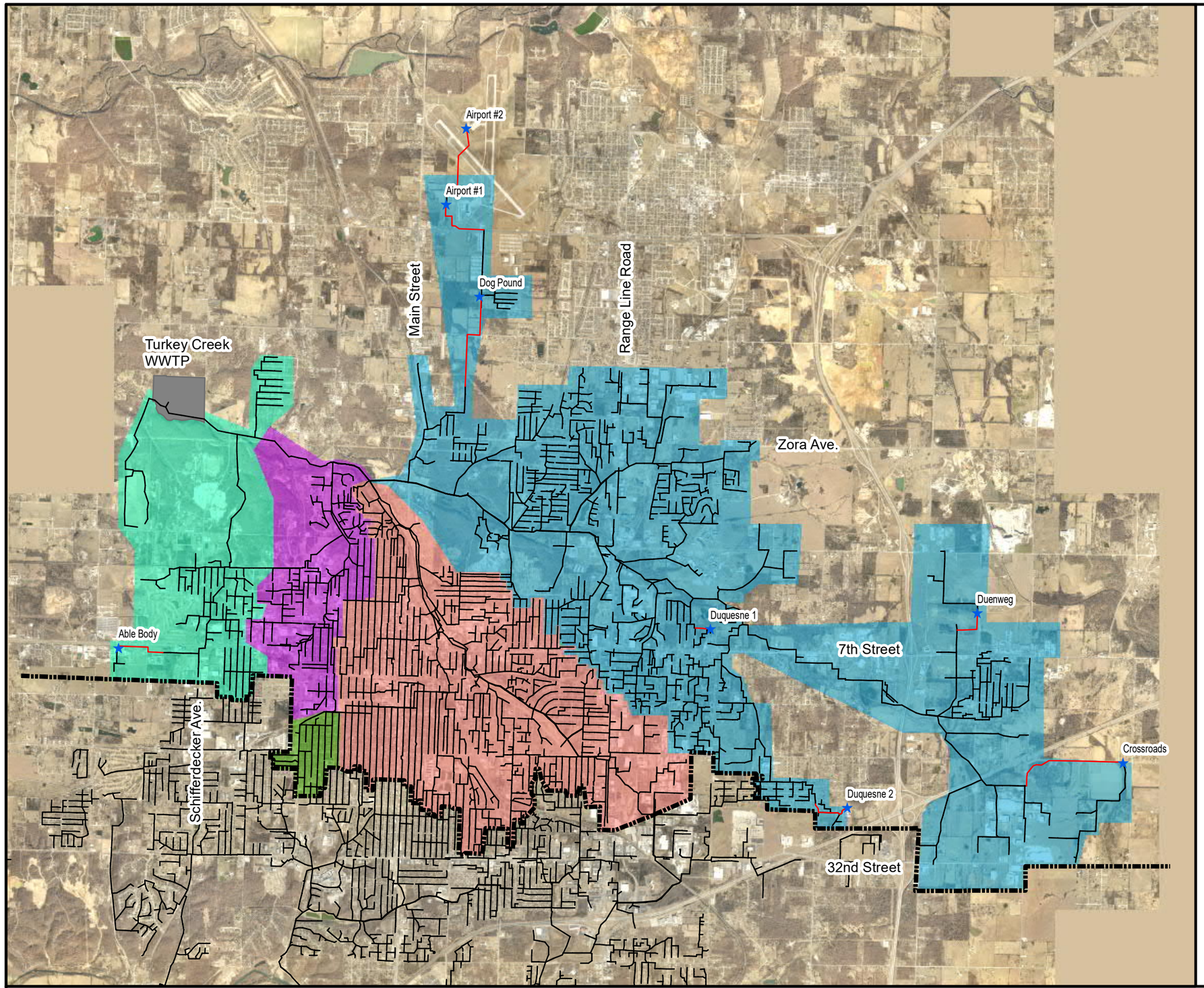
The existing public collection system serving the Turkey Creek basin consists of approximately 238 miles of gravity sewers and 3.8 miles of pressure sewers, ranging in size from 4-inch through 60-inch diameter. The system is primarily gravity-flow, with the exception of five lift stations and pressure sewer lines. These lift stations are discussed in more detail in Section IV of this report.

The older parts of the gravity system are comprised primarily of vitrified clay and concrete pipe, while newer gravity sewer lines are generally of plastic construction. The five pressure sewer lines are PVC. Additionally, the City has actively been renovating existing gravity sewer lines since 2010 with cured-in-place pipe (CIPP), which now represents approximately 18% of sewer line material in the Turkey Creek basin. Figures III-2 and III-3 document the Turkey Creek wastewater collection system's line sizes and material make-up.

Significant amounts of extraneous water enter the Turkey Creek collection system as I&I, resulting in high flows of weak sewage during wet weather periods. This was evidenced in a flow monitoring report, titled "Inflow and Infiltration Strategic Plan", completed by Allgeier, Martin and Associates, Burns and McDonnell, and TREKK Design Group in 2017. A total of 38 flow meters were placed throughout the Turkey Creek basin to record wastewater flow data for a period of four months. It was noted that the average 5-year wet weather peaking factor for all 38 basins was 24. Based on the Missouri Department of Natural Resources' (MDNR) Design Guide, design wet weather peaking factors are typically between 2.5 and 4.0, depending on the population served.

b. Shoal Creek Basin

The Shoal Creek basin collection system serves the remaining south one-third of the community, or approximately 18 square miles and an estimated 4,624 residential, commercial, and industrial customers. This includes commercial development along the I-44 corridor and parts of the town of Duquesne. This doesn't include the town of Loma Linda or a large hotel/casino resort in northeast



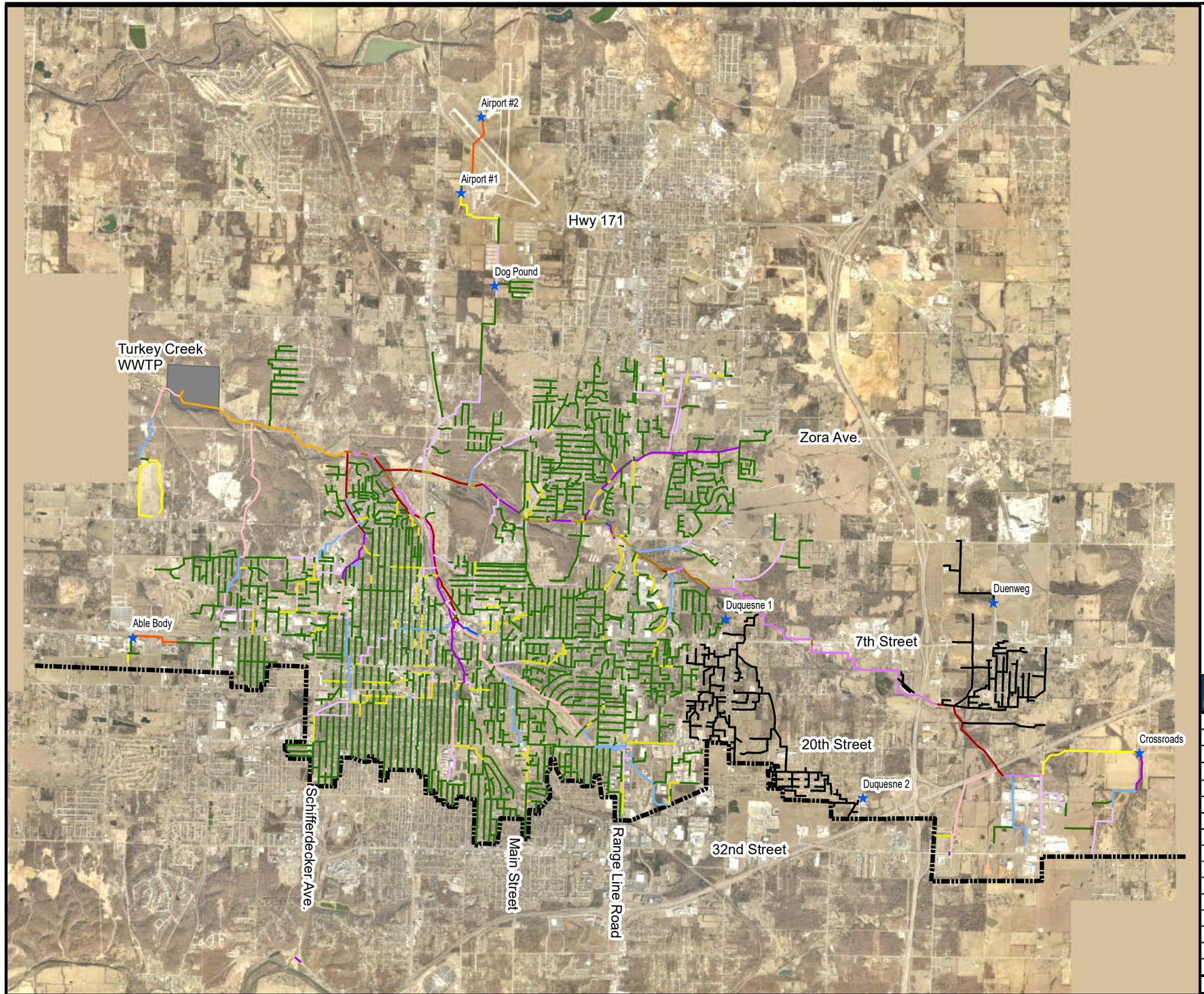
Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Crossroads Drainage Basin
- Joplin Creek Drainage Basin
- Joplin Creek / Lone Elm Shared Drainage Basin
- Lone Elm Drainage Basin
- Perkins Drainage Basin
- Turkey Creek / Shoal Creek Basin Boundary Line

N

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Turkey Creek Major Drainage Basins
Figure III-1



Legend

- ★ Existing Lift Stations

Diameter

- 4"
- 6"
- 8"
- 10"
- 12"
- 15"
- 16"
- 18"
- 21"
- 24"
- 27"
- 30"
- 36"
- 42"
- 48"
- 54"
- 60"
- Non City Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

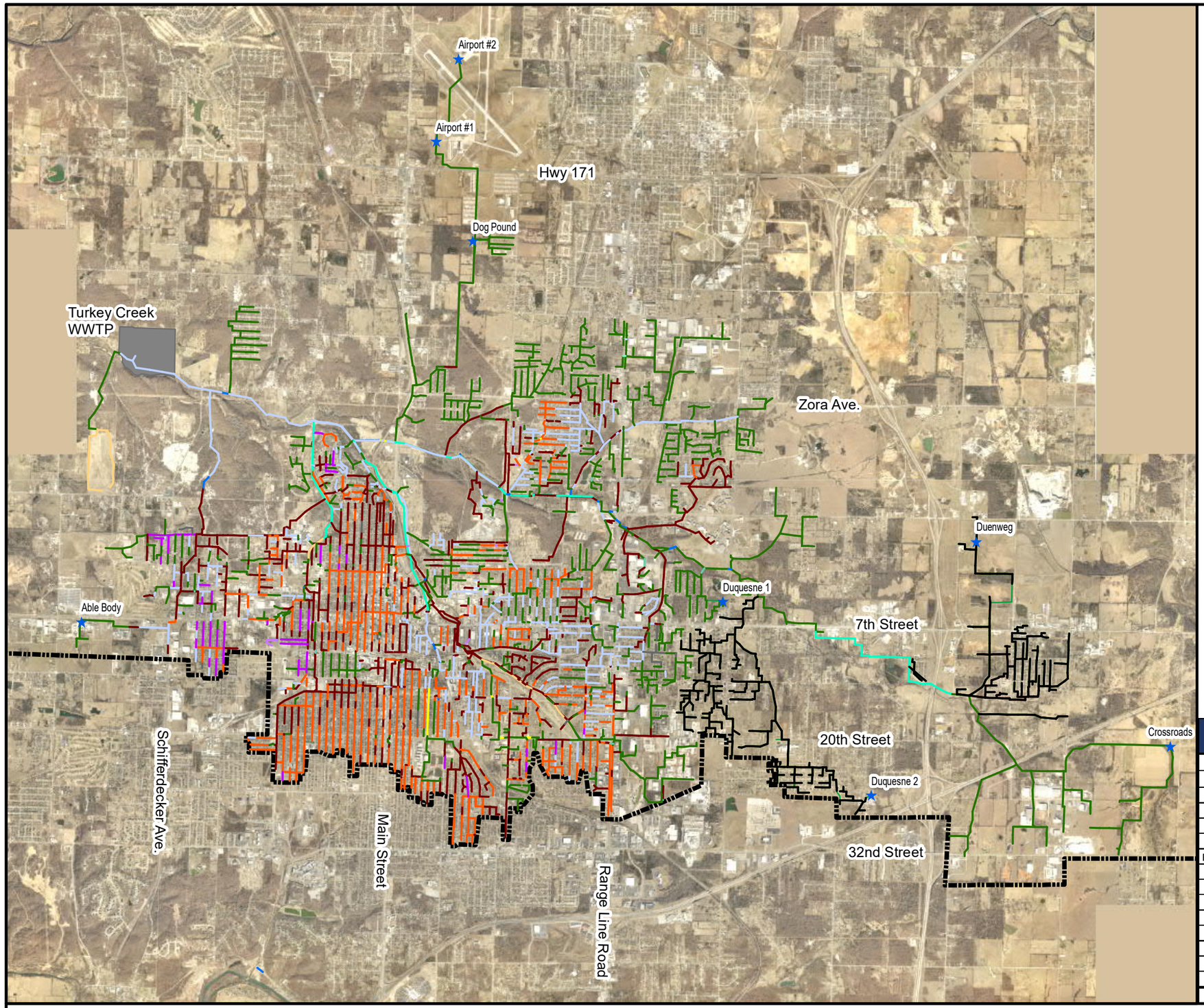
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Gravity Sewers		
Pipe Dia. (in)	Pipe Length (ft)	% of Basin
6"	8,358	0.65%
8"	894,641	69.97%
10"	74,256	5.81%
12"	78,162	6.11%
15"	44,066	3.45%
16"	392	0.03%
18"	44,187	3.46%
21"	2,196	0.17%
24"	28,128	2.20%
27"	206	0.02%
30"	24,770	1.94%
36"	27,136	2.12%
42"	8,269	0.65%
48"	13,985	1.09%
54"	125	0.01%
60"	9,708	0.76%
Total	1,258,585	98.43%

Pressure Sewers		
Pipe Dia. (in)	Pipe Length (ft)	% of Basin
4"	5,855	0.46%
6"	8,908	0.70%
8"	5,274	0.41%
Total	20,037	1.57%

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Turkey Creek Basin Sewer Line Pipe Sizes
Figure III-2



Legend

- ★ Existing Lift Stations

Sewer Line Material

- Cast Iron
- Cured-In-Place
- Cured-In-Place/PVC
- Corrigated Metal
- Concrete
- Ductile Iron
- Fiberglass Reinforced
- Polyethylene
- Polypropylene
- Closed Profile PVC
- PVC
- Steel
- Truss Pipe
- VCP
- Unknown
- Not City Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Gravity Sewers		
Pipe Material	Pipe Length (ft)	% of Basin
Cast Iron	1,363	0.11%
Cured-In-Place	230,220	18.01%
Cured-In-Place/PVC	442	0.03%
Corrigated Metal	184	0.01%
Concrete	178,988	14.00%
Ductile Iron	6,634	0.52%
Fiberglass Reinforced	29,228	2.29%
Polyethylene	3,322	0.26%
Polypropylene	13,228	1.03%
Closed Profile PVC	34,481	2.70%
PVC	442,226	34.59%
Steel	423	0.03%
Truss Pipe	8,866	0.69%
VCP	307,118	24.02%
Unkown	1,862	0.15%
Total	1,258,585	98.43%

Pressure Sewers		
Pipe Material	Pipe Length (ft)	% of Basin
PVC	20,037	1.57%
Total	20,037	1.57%

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Turkey Creek Basin Sewer Line Materials
Figure III-3

Oklahoma; wastewater flows from these two contributors are pumped directly to the Shoal Creek WWTF. The Shoal Creek drainage basin can be subdivided into four major drainage basins: Filmore Bridge, Tin Cup North, Tin Cup South, and Petro. Figure III-4 depicts the Shoal Creek collection system and major drainage basins.

The existing public collection system serving the Shoal Creek basin consists of approximately 139 miles of gravity sewers and 15 miles of pressure sewers, ranging in size from 4-inch through 42-inch diameter. The Shoal Creek collection system utilizes 20 lift stations (not including Loma Linda) in order to convey wastewater to the Shoal Creek WWTF. These lift stations are discussed in more detail in Section IV of this report.

Since the Shoal Creek collection system is generally younger than the Turkey Creek collection system, the use of concrete pipe was limited to larger diameter interceptor sewers. Concrete and vitrified clay pipe make up approximately 25% of the pipe material in the basin. Newer construction, as well as pressure sewer lines, are generally of plastic construction. Again, the City has actively been renovating older gravity sewer lines with the installation of CIPP, which now represents approximately 11% of sewer line material. Figures III-5 and III-6 document the Turkey Creek collection system's line sizes and material make-up.

Although I&I is still prevalent within the Shoal Creek basin, the average peaking factor is much less than that of the Turkey Creek basin. The previously described I&I report established an average peaking factor of approximately 6.0 from 13 flow meters placed throughout the basin. Again, typical design peaking factors are typically between 2.5 and 4.0, depending on population served.

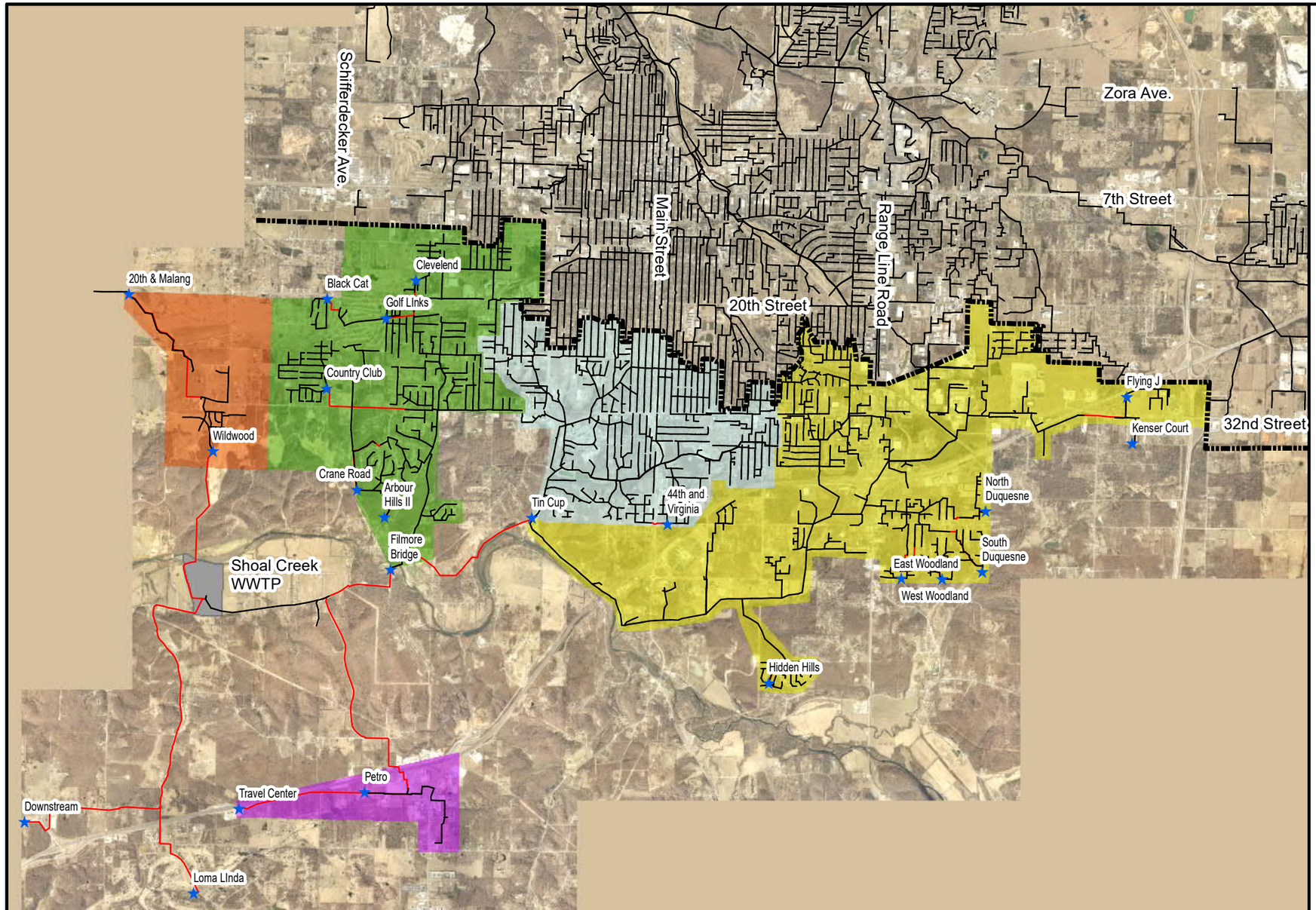
2. Recent Collection System Work

In 2010, the City began a program to aggressively clean, evaluate, and repair collection system components through the use of a project that is bid to general contractors on a 2- to 3-year cycle. The City's "toolbox" project, more specifically titled, *Evaluation and Rehabilitation of Wastewater Collection System* is a large collection of unit prices for various techniques utilized in the evaluation, rehabilitation, and replacement of sewer lines and manholes. As areas of work have been identified, sewer lines and manholes have been inspected and smoke tested to identify their condition and locate sources of I&I. Based on these evaluations, the City is able to select the proper construction technique in order to make the repair.

Additionally, after the unfortunate 2011 tornado tore through Joplin, the City was able to secure a Community Development Block Grant (CDBG) for Disaster Recover (DR). Over the next several years, the City was able to spend nearly $21 million in grant funds for the renovation and replacement of collection system components within the designated DR area.

a. Acoustic Sounding and Smoke Testing

Acoustic sounding and smoke testing are both cost effective techniques utilized by the City to identify potential sewer line maintenance issues and I&I sources.



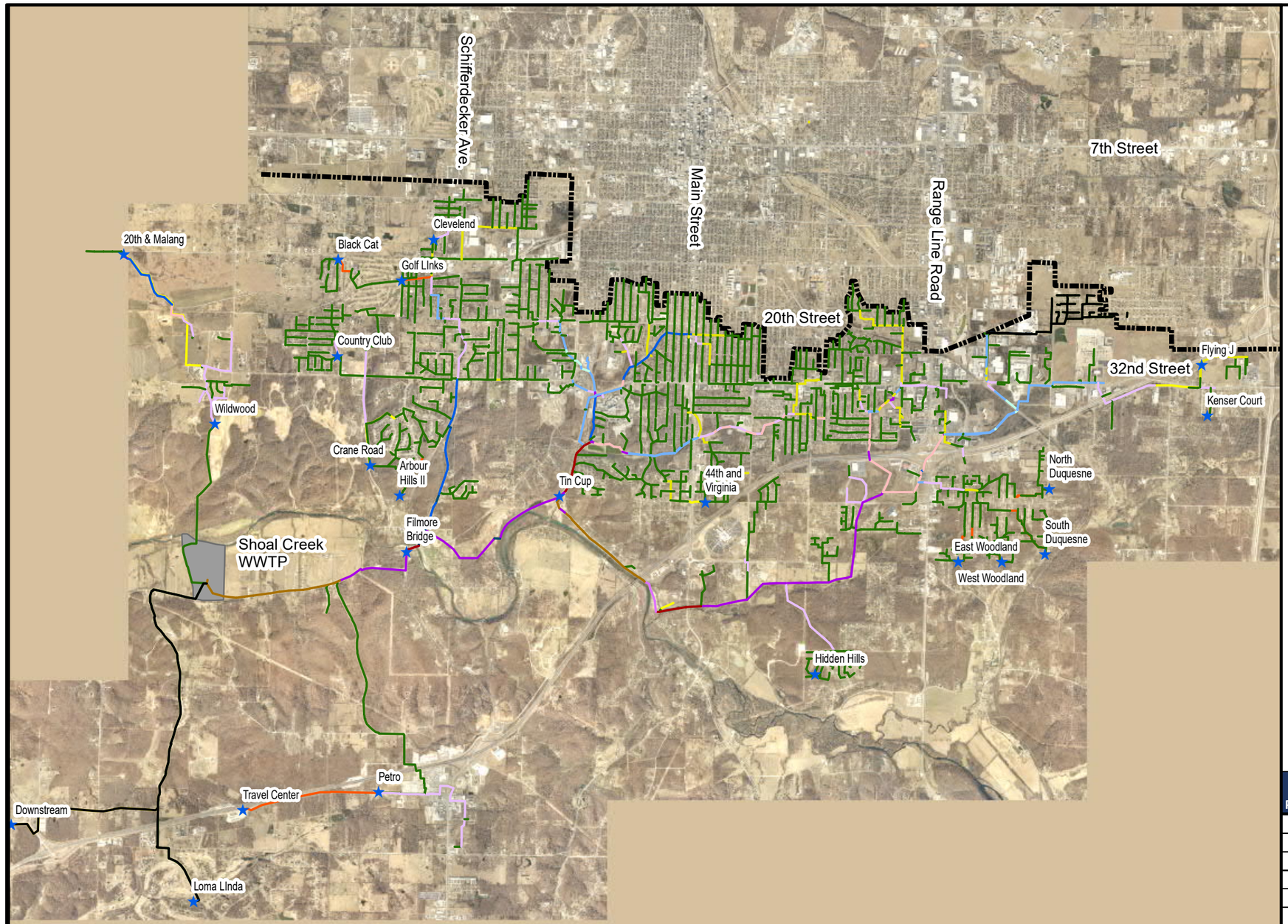
Legend

- Existing Lift Stations
- Existing Gravity Sewer Line
- Existing Pressure Sewer Line
- Filmore Drainage Basin
- Petro Drainage Basin
- Tin Cup LS North Drainage Basin
- Tin Cup LS South Drainage Basin
- Wildwood Ranch Drainage Basin
- Turkey Creek / Shoal Creek Basin Boundary Line

N

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Shoal Creek Major Drainage Basins
Figure III-4



Legend

- ★ Existing Lift Stations

Sewer Line Diameter

- 4"
- 6"
- 8"
- 10"
- 12"
- 15"
- 16"
- 18"
- 20"
- 21"
- 24"
- 30"
- 36"
- 42"
- Not City Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

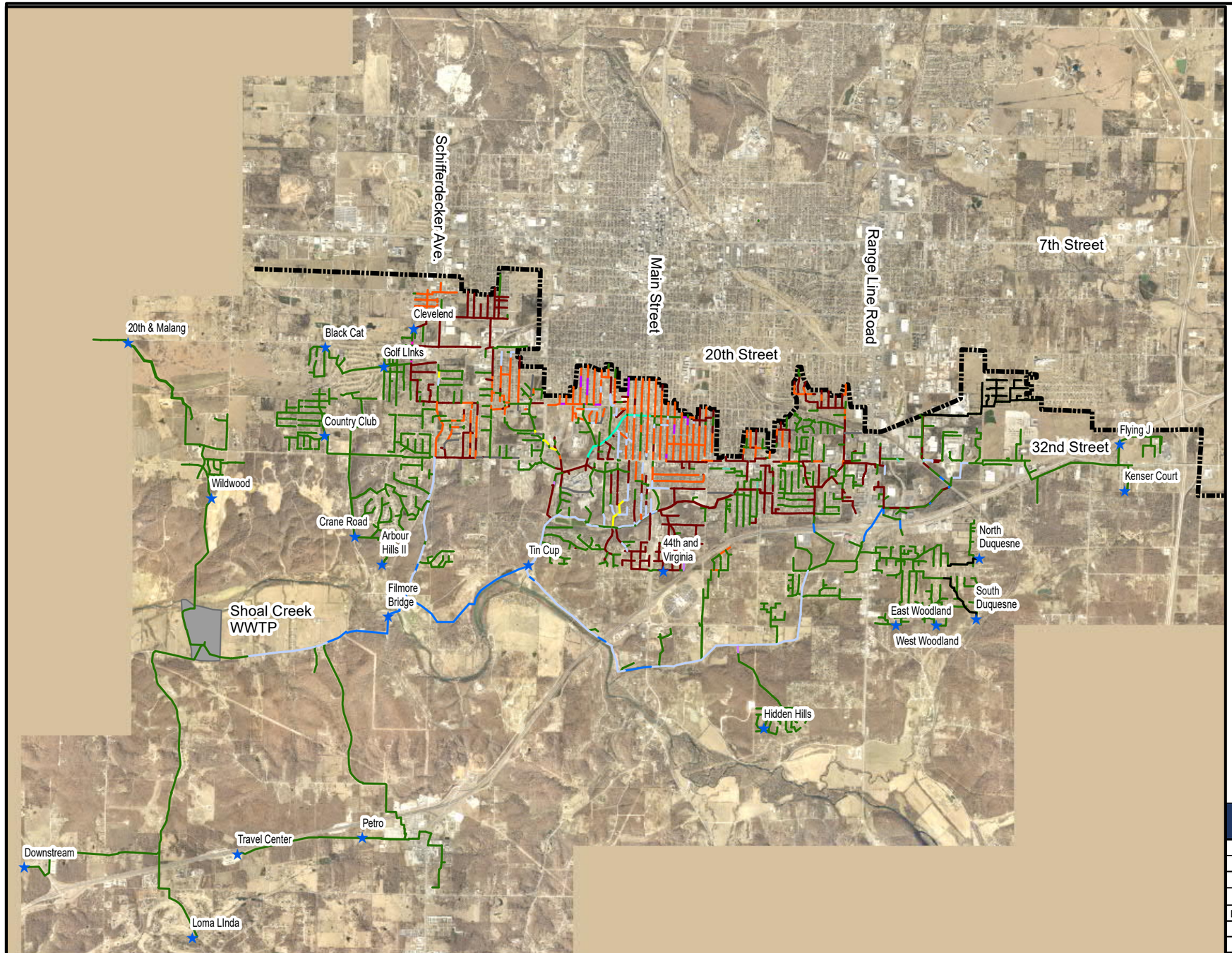
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Gravity Sewers		
Pipe Dia. (in)	Pipe Length (ft)	% of Basin
6"	573	0.07%
8"	546,138	67.06%
10"	31,522	3.87%
12"	53,775	6.60%
15"	33,359	4.10%
16"	1,937	0.24%
18"	17,977	2.21%
20"	1,550	0.19%
21"	15,872	1.95%
24"	13,986	1.72%
30"	5,407	
36"	1,503	0.18%
42"	11,718	1.44%
Total	735,317	89.62%

Pressure Sewers		
Pipe Dia. (in)	Pipe Length (ft)	% of Basin
4"	22,073	2.71%
6"	14,668	1.80%
8"	27,405	3.36%
10"	1,723	0.21%
20"	253	0.03%
24"	13,016	1.60%
Total	79,138	9.72%

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Shoal Creek Basin Sewer Line Pipe Sizes
Figure III-5



Legend

- Existing Lift Stations

Sewer Line Material

- Cast Iron
- Cured-In-Place
- Concrete
- Closed Profile PVC
- Ductile Iron
- Fiberglass Reinforced
- Polyethylene
- PVC
- Truss Pipe
- VCP
- Transite
- Unknown
- Not City Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Gravity Sewers		
Pipe Material	Pipe Length (ft)	% of Basin
Cast Iron	1,021	0.13%
Cured-In-Place	91,866	11.28%
Concrete	53,250	6.54%
Ductile Iron	8,190	1.01%
Fiberglass Reinforced	4,440	0.55%
Polyethylene	2,817	0.35%
Closed Profile PVC	4,057	0.50%
PVC	410,120	50.36%
Truss Pipe	10,326	1.27%
VCP	148,385	18.22%
Unkown	845	0.10%
Total	735,317	90.28%

Pressure Sewers		
Pipe Material	Pipe Length (ft)	% of Basin
Ductile Iron	13,270	1.63%
PVC	64,145	7.88%
Transite	1,723	0.21%
Total	79,138	9.72%

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Shoal Creek Basin Sewer Line Materials
Figure III-6

Acoustic sounding is utilized to identify lines that may have a diminished capacity or blockage. Smoke testing is utilized to identify potential I&I source locations.

Although the use of acoustic sounding has not been done to a great extent within the collection system, the use of smoke testing has been used for decades. Through the use of the "toolbox" project, the City has been increasing the use of smoke testing the last few years. A few sewer basins and one interceptor sewer have been smoke tested recently and nearly 537 defects have been identified. Of the total defects identified, approximately 215 have been on the public side sewer system, while the other 322 have been on the private side sewer system.

While many of the public side sewer defects have been repaired or are scheduled for repair, most of the identified private side defects remain. Private side defects identified through smoke testing include uncapped cleanouts, leaky sewer lateral lines, sump pumps, foundation drains, and downspout connections, just to name a few. Many of these private side sewer defects remain because the City does not yet have a policy in place that would allow them to be repaired or reported to the customer. For additional information and recommendations for private side sewer repairs, refer to Section III.B.3 of this facility plan.

b. Recent CCTV Efforts

Since 2012, nearly 1.6 million feet of gravity lines have been cleaned and evaluated as part of the "toolbox" projects or the CDBG DR project. This represents nearly 76% of the gravity sewer collection system. More specifically even, nearly 161 miles of sewer lines within the Turkey Creek basin (67%) and 78 miles of sewer lines within the Shoal Creek basin (49%) have been cleaned and inspected.

These inspections are conducted utilizing Pipeline Assessment and Certification Program (PACP) standards which are then added to the City's GIS mapping system. PACP guidelines were developed to standardize the methods in which pipeline conditions are identified, evaluated, and managed. Having these pipeline ratings available in a GIS map has enabled the City to more effectively manage collection system assets.

Figure III-7 shows the sewer lines that have been CCTV inspected in the Turkey Creek and Shoal Creek sewer basins.

c. Renovated and Replaced Sewer Lines

Following the acoustic sounding, smoke testing, and CCTV inspection of sewer lines, the City has been proactively renovating and replacing failing and defective sewer lines throughout the collection system. Predominately, sewer lines that have been renovated have been so through the trenchless installation of cured-in-place pipe (CIPP). This has proven to be a cost-effective method for renovating existing sewer lines while also minimizing costs associated with digging up streets and alleyways.

Additionally, CDBG DR funds allowed for the renovation and replacement of nearly 110,000 feet of sewer lines within the designated disaster area. Many of the existing 8" and 10" diameter gravity sewer lines within the disaster area were

renovated with the trenchless installation of CIPP. Also, five interceptor sewer lines, ranging in size from 15" to 21" in diameter, were removed and replaced as a part of the CDBG DR project.

Figure III-8 shows the sanitary sewer collection system lines that have been renovated or replaced since 2010.

B. Inflow and Infiltration Program

1. 2017 Inflow and Infiltration Strategic Plan (Phase I)

In 2017, an engineering team consisting of Allgeier, Martin and Associates, Burns and McDonnell, and TREKK Design Group finalized a report titled *Inflow and Infiltration Strategic Plan* for the City of Joplin. The objective of the first phase of the study was to identify I&I and metal contaminants within various sanitary sewer drainage basins by means of flow metering, sampling, and rainfall monitoring. The culmination of the study provided the City with a prioritized list of areas for I&I reduction and the subsequent removal of metals from the wastewater collection system. A copy of the executive summary for this report has been included as Appendix A.

In the Spring of 2017, the City's wastewater collection system was divided into 51 flow meter catchments and 56 water quality sampling locations. Additionally, six rain gauges were placed throughout the City to record the volume of rainfall over the length of the study period. For nearly four months (March 2017 through June 2017), data was collected from each flow meter, sample location, and rainfall gauge for the use in estimating the wastewater collection systems reaction to rainfall and metals concentrations. During this period approximately 35 rainfall events totaling over 25 inches of rain were recorded, which provided excellent data for the analysis of the collection system.

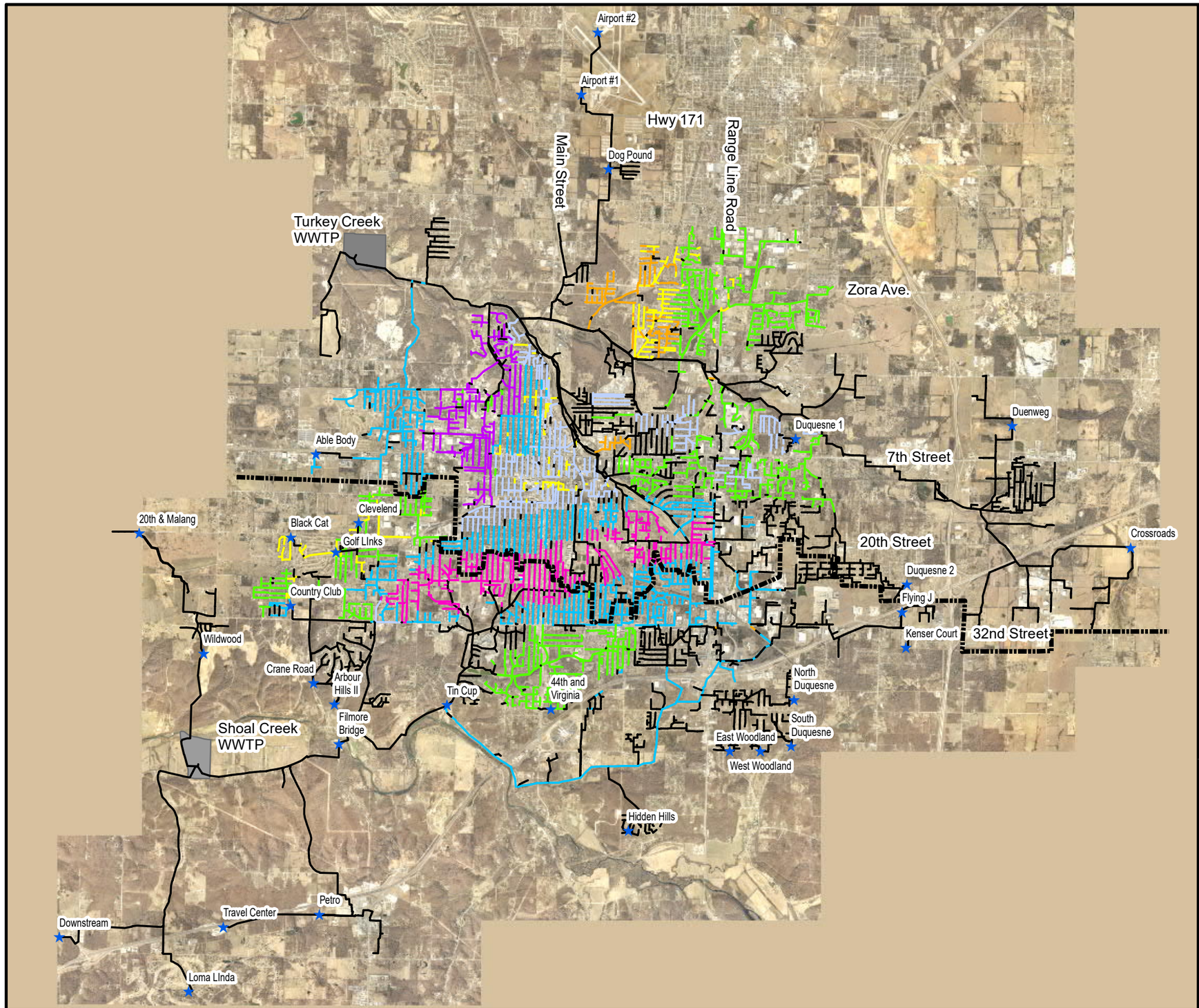
Analyzing the data for each sewer drainage basin provided the City with estimated average daily dry-weather flow (ADDF), peak daily dry-weather flow (PDDF), and a volume of I&I from many different rainfall events. The volume of I&I was standardized for each basin and a priority ranking of the sewer drainage basins was presented. The top five basins for the contribution of I&I are presented below. It should also be noted that 47 of the 51 metered sewer basins were found to have infiltration rates that exceed established EPA recommended guidelines.

TABLE III-1. TOP 5 RANKED TOTAL I&I METER CATCHMENTS

Meter Catchment	Collection System/WWTP	Combined I&I Ranking	Combined Inflow Ranking	Combined Infiltration Ranking	Overall Rank
P08-220B	Turkey Creek	1	1	1	1
M10-340	Turkey Creek	2	4	2	2
K12-170	Turkey Creek	5	5	4	3
M09-315	Turkey Creek	6	7	5	4
*M09-235	Turkey Creek	3	2	16	5
*M09-255	Turkey Creek	3	2	16	5

*Meter catchments M09-235 and M09-255 were installed on parallel sewer lines to establish a single sewer drainage basin.

Refer to Figure III-9 for a map of the top 5 meter catchments with excessive I&I.



Legend

- Existing Lift Stations
- Existing Pressure Sewer Lines

CCTV Inspection by Year

- No CCTV Inspection
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- Turkey Creek / Shoal Creek Basin Boundary Line

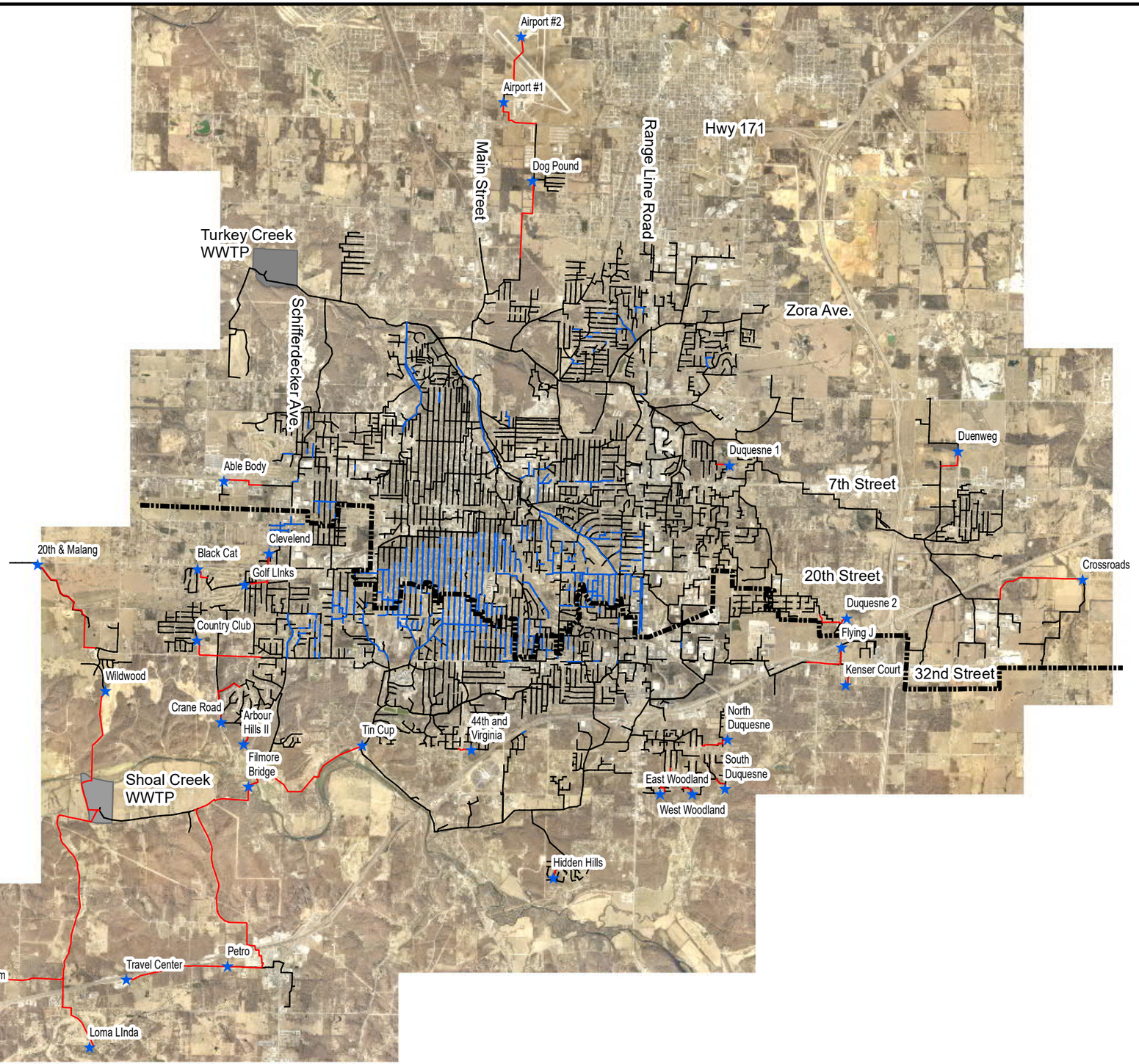
N

Sewer Collection System CCTV

CCTV Year	Pipe Length (ft)	% of System
2012	145,014	6.83%
2013	97,112	4.58%
2014	373,698	17.61%
2015	173,261	8.17%
2016	348,424	16.42%
2017	78,186	3.68%
2018	51,607	2.43%
2019	16,013	0.75%
Total	1,283,315	60.48%

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Sewer Line Cleaning & CCTV Inspection
Figure III-7



Legend

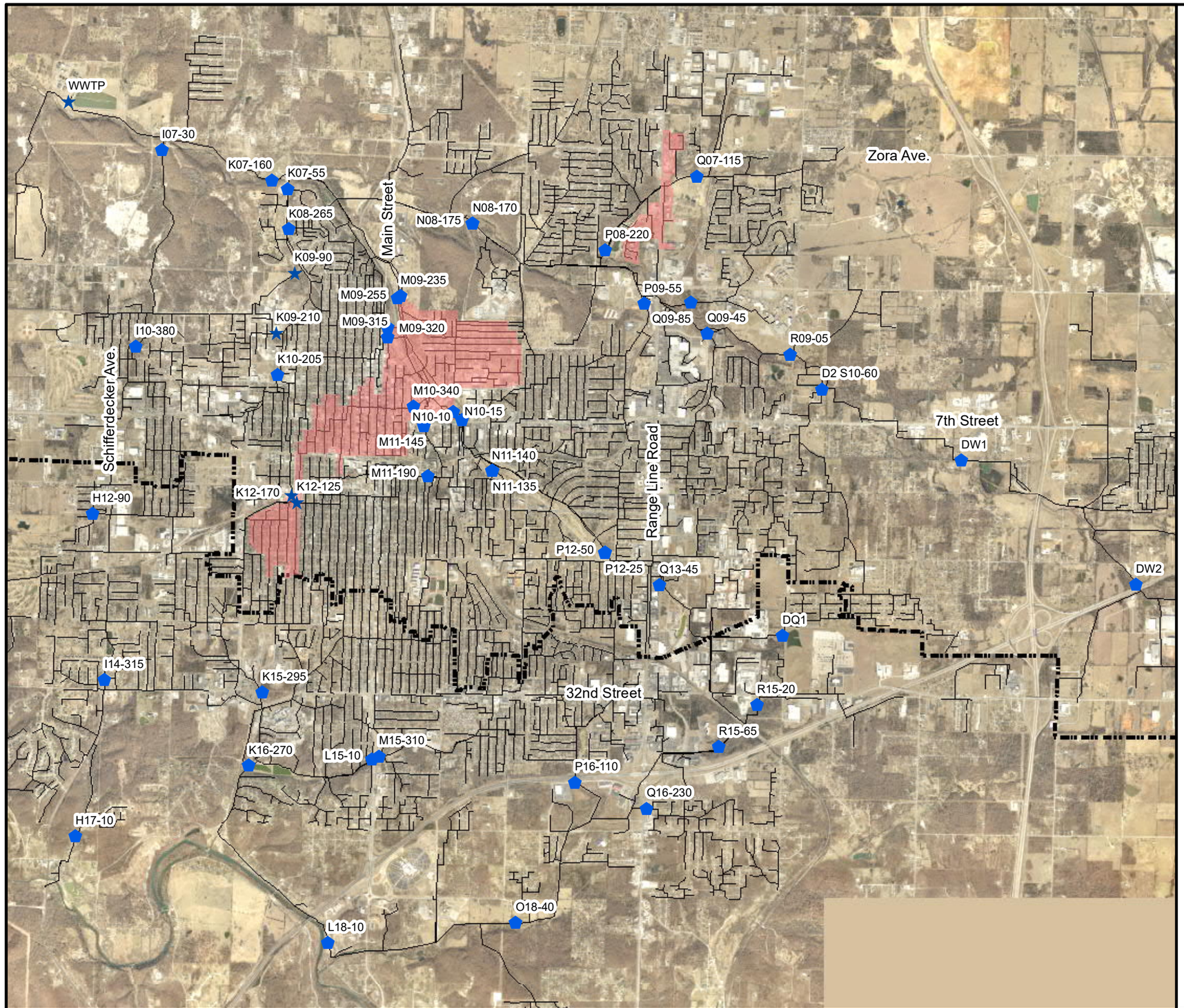
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Renovated / Replaced Last 10-Years
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Sewer Collection System Renovation	
Length of Pipe Renovated Last 10 Years (ft)	% of System
331,588	15.63%

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Renovated & Replaced Sewer Lines, Previous 10 Years
Figure III-8



Legend

- Flow Meters
- Existing Gravity Sewer Lines
- Tier 1
- Turkey Creek / Shoal Creek Basin Boundary Line

N

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Top 5 Meter Catchments with Excessive I&I
Figure III-9

2. 2018 Joplin Sewer Model Study (Phase II)

On the heels of the 2017 Inflow and Infiltration Strategic Plan (Phase I), the same engineering team of Allgeier, Martin and Associates, Burns and McDonnell, and TREKK Design Group completed Phase II of the strategic plan in a report titled *Joplin Sewer Model Study* in November 2018. This study utilized the data obtained during the Phase I portion of the plan in creating and calibrating a hydraulic computer model of the City's wastewater collection system. The report then summarizes the data gap analysis, model calibration and verification, existing wastewater collection system capacity, and the evaluation of three alternatives for improvements to the system. A copy of the Executive summary of this report has been included as Appendix B.

First and foremost, based on the rainfall data and flow metering data obtained in the Phase I report, the City standardized on a design level of service for gravity sewer lines during a 1-year, 6-hour storm event and a design level of service for manholes during a 5-year, 6-hour storm event. In other words, gravity sewer lines shall be designed to convey the wastewater generated during a 1-year, 6-hour storm event without surcharging (depth of flow greater than diameter of pipe) the pipes and manholes shall be designed to contain the wastewater generated during a 5-year, 6 hour storm event without overflowing (sanitary sewer overflow or SSO).

Next, the report established a Base Alternative that included the upsizing of any sewer line within the system that didn't meet the design criteria above. This Base Alternative was utilized to evaluate the cost-effectiveness of the following evaluated alternatives. Alternative 1 evaluated a 30% I&I reduction throughout the wastewater collection system without any increase in pipe size. Alternative 2 evaluated a 30% I&I reduction systemwide along with several other system improvements that would allow the collection system to meet the design criteria. Lastly, Alternative 3 evaluated an identical plan to Alternative 2, but with the inclusion of additional wastewater storage capacity in two locations.

Opinions of probable costs were developed for each alternative to determine the most cost-effective approach for improving the City's wastewater collection system capacity. In the end, Alternative 2 was selected as the most cost-effective approach. Although Alternative 1 would be the least costly alternative, it would not provide the City with the established design level of service, and as such, shall not be considered on its own. The opinions of probable construction costs found in the *Joplin Sewer Model Study* have been presented below:

TABLE III-2. JOPLIN SEWER MODEL STUDY ALTERNATIVE COST ESTIMATES

Alternative	Description	Opinion of Probable Construction Cost
*Base Alternative	Upsize Gravity Sewer Lines to Meet Design Flow	$91,638,000
Alternative 1	30% Reduction of I&I	$10,707,000
*Alternative 2	30% Reduction of I&I and Additional Gravity Sewer Improvements	$41,757,000
*Alternative 3	30% Reduction of I&I, Additional Gravity Sewer Improvements, and additional wastewater storage capacity within the collection	$109,972,000

*Does not include costs for increased pumping capacities at the lift stations or WWTP capacities.

3. Private Side I&I

a. General

Many utilities throughout the United States have successfully implemented infiltration and inflow (I&I) reduction programs. Traditionally, these programs primarily included public sector defects and have included minimal focus on private sector sources due to political resistance and/or the utilities ability to fund private sector reduction. Analyses performed as part of these programs has often concluded that much of the I&I entering the collection system comes from the private sector and in many cases is more cost-effective to eliminate than public sector sources. Due to increase regulatory pressure and cities desire to implement the most cost-effective reduction program, private I&I reduction programs have become more prevalent in recent years.

b. Private Sector Flows

According to a 2006 Water Environment Research Foundation (WERF) paper, the contribution of private I&I sources to total I&I in the wastewater system ranges from 7% up to 80%, with a mean of 40% based on a survey of 26 participating agencies. These numbers are very similar to many regional and national cities that are currently conducting private I&I reduction programs that are similar to Joplin in size and age of sewer systems. As part of Kansas City's long-term control plan, the City completed pilot studies in three (3) separate sewer basins to evaluate the contribution of I&I originating from the private sector. Pre- and post-rehabilitation/disconnection flow monitoring was conducted and compared. Results varied from as little as 15% to as much as 70% of the total I&I being reduced through private I&I removal. Based on these and additional references and studies, the impact of private sector I&I has been shown to be significant in separate sanitary sewers and can generally be characterized as being in the range of 30% to 70% of the total I/I contributions.

c. Private Sector I&I Removal

Many municipalities are now establishing cost-effective I&I reduction programs that include both public and private sector rehabilitation. Cost-effective I&I reduction includes eliminating sources that are less costly to remove than to transport and treat and does not distinguish between those sources that are in the public versus the private sectors of the system. Many of these municipalities have often concluded that much of the I&I entering the collection system comes from the private sector and in many cases is more cost-effective to eliminate than public sector defects. Due to increased regulatory pressure and cities desire to implement the most cost-effective reduction programs, private sector I&I reduction programs have become more prevalent in recent years.

Several successful public and private I&I reduction programs are currently being conducted in the state of Missouri. "Get the Rain Out" is St. Louis MSD's initiative to remove private sector storm water connections to the wastewater sewer in separate sewer areas as part of their long-term agreement with the U.S. EPA. As of March 2018, approximately 51,000 properties had been inspected in the Lemay

Service Area. Of these inspections, 4,500 properties had cost-effective sources disconnected from the wastewater system. The cost ratio of construction costs versus amount of I&I removed ranged from $0.17/gpd to $0.65/gpd.

In 2010, Kansas City, Missouri entered into a Consent Decree with the U.S. EPA to reduce the volume and frequency of overflows in the sewer system. As part of the City's 25-year Smart Sewer program, the City is investing $250 million in a public and private I&I reduction strategy to achieve a targeted goal of approximately 50% reduction in targeted separate sewer areas. "Keep out the Rain" is the City's program focused on finding and removing private sector illicit storm water connections from the separate sanitary sewer. As of September 2019, 5 years into the program, over 40,000 properties have been evaluated with over 5,300 cost-effective sources have been identified. With a cost ratio of $0.63/gpd to evaluate and disconnect sources, private I&I reduction is approximately 25% of the costs to remove public I&I sources.

The City of Springfield launched their Private Sewer Repair Program with a goal of eliminating sewer overflows and basement backups caused by storm water entering the wastewater collection system via sewer lines on private property. To date, the program has achieved a 42% reduction in I&I flow into the sanitary sewer. The City has found that for every dollar spent on repairing and tightening up the lines on private property, the City avoids spending $11 in future capacity improvements at the wastewater treatment plants. That is an 11 to 1 return on the investment.

4. Joplin's 2026 I&I Abatement Activities Program

As a culmination of the results of the *Inflow and Infiltration Strategic Plan*, *Joplin Sewer Model Study*, and the private side I&I program recommendations, an I&I Abatement Program was created for the City of Joplin through the year 2026. The program establishes a timeline of recommended I&I abatement activities with estimated renovation quantities aimed at reducing the number of SSO's within the wastewater collection system.

Within the program, many activities are recommended, from evaluation, to rehabilitation, to program performance evaluations, all in an effort to provide the City with a cost-effective strategy for reducing I&I. As outlined within the *Joplin Sewer Model Study*, a 30% reduction in I&I was demonstrated to be the most cost-effective measure. A reduction in I&I less than 30% would require more expensive upgrades to pipe sizes and other infrastructure; while a reduction in I&I greater than 30% wouldn't offset the rapidly growing costs required in obtaining large I&I reductions. Of course, as the program progresses, the cost effectiveness of I&I abatement may be adjusted upwards or downwards in an effort to maintain cost-effectiveness.

Figures III-10 and III-11 are copies of Joplin's 2026 I&I Abatement Activities Program as submitted to the MDNR. The quantities presented in Figure III-11 are estimates. These quantities are not based on evaluated and identified I&I sources and are subject to change; however, this will be used as a general guideline for the City's area of focus moving forward.

THE CITY OF JOPLIN'S 2026 ACTIVITIES PLAN of its SYSTEM RENEWAL & SSO REDUCTION PROGRAM

ACTIVITY	YEARS									
	-2 2017	-1 2018	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024	7 2025	8 2026
Flow Monitoring	All Basins		Facilities Plan Update & Rate Study					Rate Study		
Hydraulic Modeling		All Basins								
Smoke Testing [1]			Priority 2 Basins / Priority 2 Basins	Priority 3 Basin	Priority 4 Basin	Priority 5 Basin	Priority 6 Basin	Priority 7 Basin	Priority 8 Basin	
Other Public I&I Evaluation [1]		Priority 1 Basins	Priority 1 Basins	Priority 2 Basins	Priority 3 Basin	Priority 4 Basin / Priority 4 Basin	Priority 5 Basin / Priority 5 Basin	Priority 6 Basin / Priority 6 Basin	Priority 7 Basin / Priority 7 Basin	Priority 8 Basin / Priority 8 Basin
Service Lateral Launches/Investigation			Priority 1 Basins	Priority 2 Basins	Priority 3 Basin	Priority 4 Basin / Priority 4 Basin	Priority 5 Basin / Priority 5 Basin	Priority 6 Basin / Priority 6 Basin	Priority 7 Basin / Priority 7 Basin	Priority 8 Basin / Priority 8 Basin
Evaluate Potential for Joint Stormwater Improvement Project [2]			Priority 1 Basins	Priority 2 Basins	Priority 3 Basin	Priority 4 Basin	Priority 5 Basin	Priority 6 Basin	Priority 7 Basin	Priority 8 Basin
Implementation of Public Sewer Rehabilitation Methods [3]			Priority 1 Basins	Priority 2 Basins	Priority 3 Basin	Priority 4 Basin / Priority 4 Basin	Priority 5 Basin / Priority 5 Basin	Priority 6 Basin / Priority 6 Basin	Priority 7 Basin / Priority 7 Basin	Priority 8 Basin / Priority 8 Basin
Post Rehabilitation Flow Metering			Priority 1 Basins	Priority 1 Basins / Priority 2 Basins	Priority 2 Basins / Priority 3 Basin	Priority 3 Basin / Priority 4 Basin	Priority 4 Basin / Priority 5 Basin	Priority 5 Basin / Priority 6 Basin	Priority 6 Basin / Priority 7 Basin	Priority 7 Basin / Priority 8 Basin
Private-side I&I Program Development [4]			All Basins							
Private I&I Program Implementation (if warranted)				Priority 1 Basins	Priority 1 Basins / Priority 2 Basins	Priority 2 Basins / Priority 3 Basin	Priority 3 Basin / Priority 4 Basin	Priority 4 Basin / Priority 5 Basin	Priority 5 Basin / Priority 6 Basin	Priority 6 Basin / Priority 7 Basin
Evaluate Program Performance [5]					Priority 1 Basins / Priority 1 Basins	Priority 1 Basins / Priority 2 Basins	Priority 2 Basins / Priority 3 Basin	Priority 3 Basin / Priority 4 Basin	Priority 4 Basin / Priority 5 Basin	Priority 5 Basin / Priority 6 Basin
Peak Flow Management Improvements (if necessary) [6,7]						Priority 1 Basins		Priority 2 Basins	Priority 3 Basin	
Ongoing System Renewal Program	All Basins									
MDNR Meeting to Discuss Program Implementation		All Basins	All Basins	All Basins	All Basins	All Basins	All Basins	All Basins	All Basins	All Basins
Update Hydraulic Model						All Basins				

Notes:

A. "Priority Basins" above are for illustrative purposes only. Prioritization of basins shall be determined based on the results of hydraulic modeling and cost-effective analysis, in conjunction with other factors and/or improvement obligations within the City's annual expenditures.

B. Program implementation will progress based upon adaptive evaluations to identify the areas that will deliver the greatest benefits from the public dollars invested.

Footnotes:

1. Smoke testing, manhole inspections, dyed-water testing, and CCTV inspections are examples of I&I evaluations that can be performed within that part of the sanitary sewer system that is owned and maintained by the City.
2. The purpose of this activity is to evaluate the potential for coordinated stormwater improvement projects in an effort to maximize the effectiveness of I&I reduction efforts.
3. Best efforts will be made to implement a cost-effective approach for rehabilitation of public side sanitary sewer lines.
4. The development of a Private-side I&I program must first be approved by the Joplin City Council. The schedule for implementation will be adjusted accordingly, once approved.
5. Program evaluation occurs after any private-side I/I work is done in any given basin, using post-rehabilitation flow data to determine if the impact of the improvements met the program's objectives and goals.
6. Examples of peak flow management improvements include relief sewers, upsizing pipes, increased pumping capacities, or off-line storage.
7. In certain basins, it may be appropriate to construct peak flow management infrastructure after completing rehabiliation and program evaluation in the larger basin.

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2026 I&I Abatement Activities Plan-System Renewal & SSO Reduction Program
Figure III-10

ADDITIONAL DETAILS of THE CITY OF JOPLIN'S 2026 ACTIVITIES PLAN
of its
SYSTEM RENEWAL & SSO REDUCTION PROGRAM

Estimates of targeted rehabilitation quantities for the years of the Program are indicated below. These numbers are preliminary and actual performance will likely vary from year to year. Over the life of the Program the goals are expected to be met.

Basins selected in any given year are subject to change; see notes "A" and "B" on page 1.

Year 1 - 2019

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 2 Basins)	Lateral Launches (EA)
Cleveland (H12-90)	11 *	3,700	90	15	23,500	110
Roanoke 30 (K08-265)	20 *					

* These basins were smoke tested in previous years, and were thus chosen as Early Action Areas.

Year 2 - 2020

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 3 Basin)	Lateral Launches (EA)
West Joplin (K12-170)	3	3,700	90	15	19,500	300
East Highland (N10-15)	9					

Year 3 - 2021

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 4 Basins)	Lateral Launches (EA)
Willow Branch (M10-340)	2	3,700	90	15	17,000	300

Year 4 - 2022

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 5 Basin)	Lateral Launches (EA)
Priority 4 Basin	4	2,300	80	13	26,000	275

Year 5 - 2023

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 6 Basin)	Lateral Launches (EA)
Priority 5 Basin	7	2,300	80	13	26,000	275

Year 6 - 2024

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 7 Basin)	Lateral Launches (EA)
Priority 6 Basin	8	2,300	80	13	26,000	275

Year 7 - 2025

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF) (For Year 8 Basin)	Lateral Launches (EA)
Priority 7 Basin	5	2,300	80	13	26,000	275

Year 8 - 2026

Basin(s)	I/I Basin Rank	CIPP or New PVC (LF)	Lateral Connection Repairs (EA)	Manhole Rehab (EA)	Smoke Testing (LF)	Lateral Launches (EA)
Priority 8 Basin	10	2,300	80	13	-	275

C. Evaluation of Collection System

1. Turkey Creek Basin

Over the last decade, the City has aggressively been replacing and renovating gravity sewer lines throughout the Turkey Creek sewer basin. This is demonstrated by looking at the percentage of sewer line materials in the basin (Figure III-3). Nearly 55% of the Turkey Creek collection system is either PVC or CIPP. However, approximately 38% of the basin still consists of old concrete and vitrified clay pipe.

When completing cleaning and inspection work, concrete and vitrified clay pipe continually exhibit failures and visual sources of I&I. In fact, in 2018 cleaning and inspection work was completed on a small section of concrete pipe within the Turkey Creek Basin (specifically the East Highland neighborhood). The inspections revealed numerous defects that needed to be addressed and a renovation project was fashioned. By the time a Contractor was ready to install CIPP, many portions of the concrete sewer lines had already failed and needed emergency point repairs prior to their renovation with CIPP. During this approximate 6-month period, the existing concrete pipes went from acceptable but with numerous defects to failures requiring emergency repairs.

Additionally, large volumes of I&I are entering the Turkey Creek collection system during and after rain events. This was evidenced in the City's 2017 *Inflow and Infiltration Strategic Plan*. During and after rain events, this large volume of I&I is overloading the hydraulic capacity in various locations throughout the Turkey Creek collection system. These locations were originally shown in the 2018 *Joplin Sewer Model Study*.

Through the years, critical portions of the interceptor sewer lines within the basin have been constructed as funding or necessity has allowed. This has caused larger diameter interceptor sewer lines to discharge to smaller diameter interceptor sewers in a few locations within the collection system. These reductions in diameters also contribute to the hydraulic deficiencies within the Turkey Creek collection system.

Coupled with a projected population increase for the year 2040 of over 11,000 people, it's clear that the hydraulic capacity of the collection system must be addressed. As a part of this report, the City's hydraulic computer model was updated with these projected flows, as well as an estimated 30% reduction in I&I, in order to identify hydraulic restrictions. These hydraulic restrictions are shown on Figure III-12.

2. Shoal Creek Basin

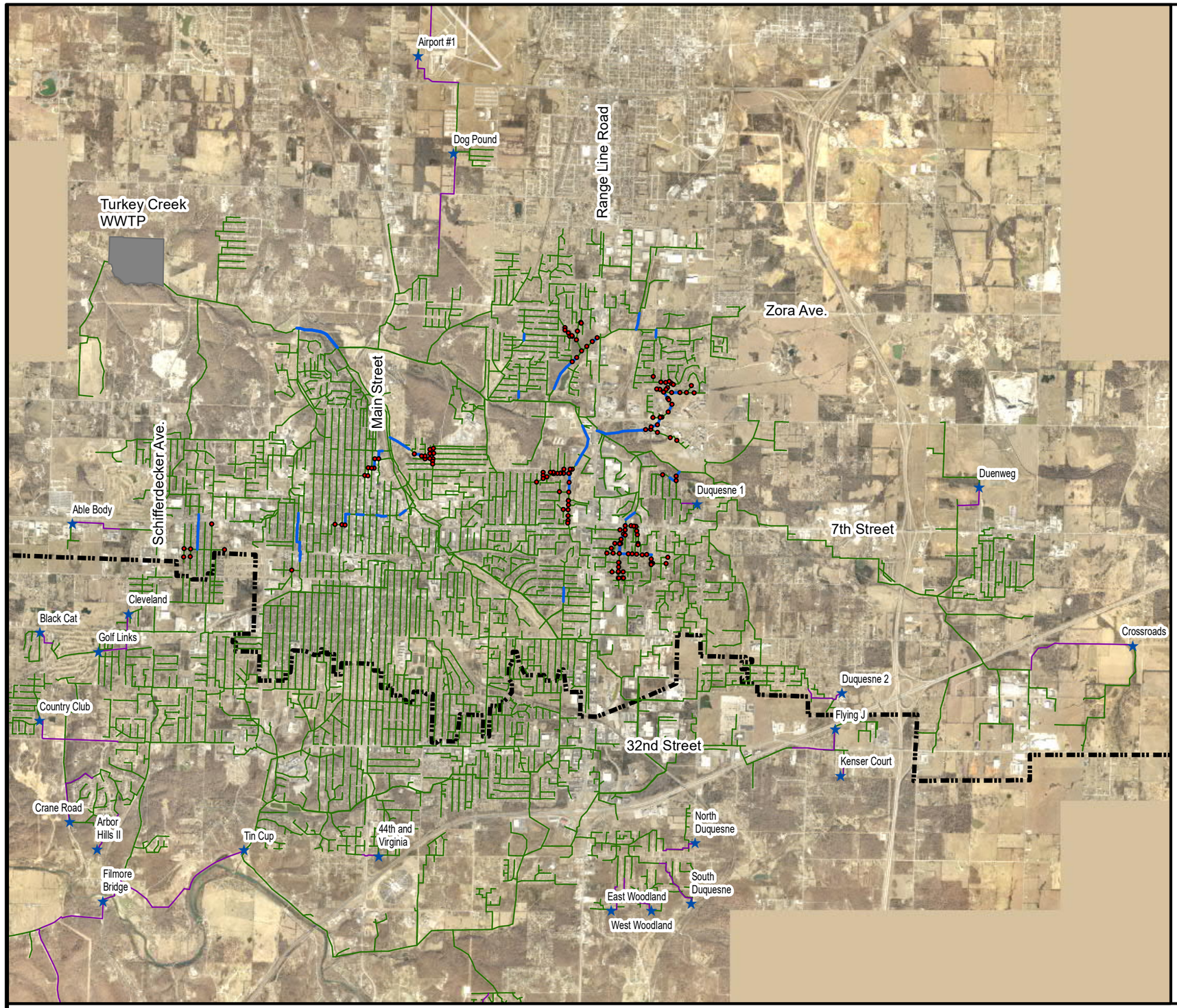
Overall, the Shoal Creek basin is thought of as being the "newer" collection system basin. Again, Figure III-6 provided a breakdown of the different materials throughout the basin and it shows that PVC and CIPP make up approximately 62% of the Shoal Creek collection system. It also has a much smaller percentage of concrete sewer lines and most of these are from the larger diameter interceptor sewers that were constructed in the 1980s.

Although not to the same extreme as the Turkey Creek basin, the Shoal Creek Basin also exhibits large volumes of I&I related flows during and after rain events (Inflow and Infiltration Strategic Plan, 2017). Once more, previous computer modeling of the collection system demonstrates a lack of hydraulic capacity during and after rain events (Joplin Sewer Model Study, 2018).

Unique to the Shoal Creek collection system is the large number of sewage lift stations pumping to various portions of the collection system. When these lift station become overwhelmed, the wastewater level (hydraulic grade) within the collection system rises, even though the gravity sewer lines might have adequate capacity.

This is best demonstrated in the I-44 interceptor sewer line connected to the Tin Cup lift station (Tin Cup South major drainage basin). During peak wastewater flow events, the Tin Cup lift station and force main lack the necessary capacity to keep wastewater levels from rising within the lift station and thus, the I-44 interceptor sewer. If the wastewater level rises high enough at the Tin Cup lift station, SSO's occur along the I-44 interceptor sewer, even though the interceptor sewer has adequate capacity to convey the modeled peak flow.

The City's hydraulic computer model was updated with the projected year 2040 design flows, as well as a 30% reduction in I&I, in order to identify hydraulic restrictions. All restrictions originating at lift stations have been removed. Lift station evaluations and recommendations can be found in Section IV of this report. Refer to Figure III-13 for a map of hydraulic restrictions within the Shoal Creek collection system.



Legend

- Existing Lift Stations
- Manhole LofS Deficiency (5yr-6hr. Storm)
- Sewer Line LofS Deficiency (1yr-6hr. Storm)
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

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Turkey Creek Basin Level of Service Deficiency
Figure III-12

Legend

- Existing Lift Stations
- Manhole LofS Deficiency (5yr-6hr. Storm)
- Sewer Line LofS Deficiency (1yr-6hr. Storm)
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Schifferdecker Ave.
Main Street
Range Line Road
32nd Street
Able Body
Cleveland
20th & Malang
Black Cat
Golf Links
Country Club
Wildwood
Crane Road
Arbor Hills II
Tin Cup
Filmore Bridge
44th and Virginia
Duquesne 1
Duquesne 2
Flying J
Kenser Court
North Duquesne
South Duquesne
West Woodland
East Woodland
Hidden Hills
Shoal Creek WWTP
Petro
Travel Center
Downstream
Loma Linda

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Shoal Creek Basin Level of Service Deficiency
Figure III-13

D. Collection System Recommendations and Associated Costs

It's crucial that the City continue to replace and renovate sanitary sewer lines as a part of the 2026 I&I Abatement Activities Program. Not only will this program reduce extraneous I&I, it also extends the useful life of the sewer system infrastructure. Working through the activities identified, in a logical order, will keep the focus on the most pressing areas of the collection system in need of renovation and replacement.

As always suspected, the initial activities of the program have verified that the City must focus a large portion of renovation and replacement efforts on the concrete pipe within the collection system. The concrete pipe continues to exhibit sources of I&I, as well as structural failures of the pipe wall.

The costs and quantities of the activates identified within the program will be highly variable. As the evaluation activities progress, the actual quantities for work within each sewer basin are being compiled. Not only are the evaluations noting potential sources of I&I that are easily and cheaply eliminated, they are noting many structural pipe defects that must be addressed to avoid failure of the pipeline. Not only do pipeline failures lead directly to SSO events, but in many cases, they lead to sewer backups that affect customers directly.

1. Turkey Creek Basin

Along with the continuance of the 2026 I&I Abatement Activities Program, the City must also address the areas with hydraulic deficiencies as described previously in this Facility Plan and the 2018 *Joplin Sewer Model Study*.

In many of these cases, the direct replacement of an existing sewer line with a single larger sewer line will sufficiently address the deficiency. In other cases, additional interconnecting pipes between already existing parallel pipe systems are all that's needed to effectively utilize the existing hydraulic capacity.

a. Year's 0 – 5

The two most pressing sewer improvements required within this basin include the replacement of the downstream branch of the Joplin Creek interceptor sewer and the East Royal Heights interceptor sewer. Over the past 15 years, improvements have been made to the upper end of the Joplin Creek interceptor sewer and the Crossroads Parallel interceptor sewer that have resulted in four large diameter sewer lines discharging into parallel 36" and 42" diameter interceptor sewer lines. At this time, its recommended that the 42" diameter line remain but the 36" diameter interceptor be replaced with a larger 48" diameter line. At the pipe slopes shown on the original as-built construction plans, parallel 42" and 48" diameter interceptor sewer lines would be able to convey approximately 50 MGD without surcharging.

The existing East Royal Heights interceptor sewer is comprised of a 10" diameter vitrified clay sewer line and a parallel 24" diameter concrete sewer line. Due to the poor condition of both existing sewer lines, its recommended that these two lines be replaced with a single larger 27" diameter interceptor sewer line.

A map of the recommended Turkey Creek basin collection system improvements is shown on Figure III-14.

TABLE III-3. COLLECTION SYSTEM RECOMMENDATIONS TURKEY CREEK BASIN YEARS 0 – 5

Description	Estimated Project Cost
Joplin Creek Interceptor Sewer Replacement	$2,500,000
East Royal Heights Interceptor Sewer Replacement	$905,000
Estimated Total Cost	$3,405,000

b. Years 6 – 20

Numerous other sewer line upgrades are also recommended within the Turkey Creek collection system basin. These remaining recommendations are all aimed at eliminating hydraulic restrictions within the basin. Although the City may have funds available to complete some of these additional recommendations within the next five years, we've conservatively assumed that these remaining improvements could be completed 6 to 20 years after the completion of this Facility Plan.

A map of the recommended Turkey Creek basin collection system improvements is shown on Figure III-14. Since the City most likely won't be undertaking these projects within the next 5 years, a detailed project cost estimate hasn't been prepared. Instead, the following table presents an opinion of estimated constructed costs based on a unit price of $15.82 per inch-diameter per linear foot of sewer line construction. This unit price was established after reviewing numerous bid tabulations from sewer line construction in and around Joplin in previous years. This is also the same unit price utilized in the 2018 *Joplin Sewer Model Study*.

TABLE III-4. COLLECTION SYSTEM RECOMMENDATIONS TURKEY CREEK BASIN YEARS 6 – 20

Pipe Diameter	Length (feet)	Unit Cost (per L.F)	Extended Total
10"	7,750	$160	$1,240,000
12"	8,250	$190	$1,567,500
15"	6,250	$240	$1,500,000
18"	9,250	$285	$2,636,250
24"	1,900	$380	$722,000
Construction Subtotal			$7,665,750
Contingency (10%)			$766,575
Engineering			$1,533,200
Estimated Total Cost			**$9,965,525**

2. Shoal Creek Basin Improvements

Similar to the Turkey Creek basin improvements, many of the recommendations within this basin are geared toward elevating the hydraulic restrictions identified previously and shown on Figure III-13 of this report. Other recommendations include upsizing smaller

diameter receiving sewer lines, as well as, replacing aging concrete interceptor sewer lines.

a. Years 0 – 5

Four of the overall recommendations within the Shoal Creek basin should be completed within the next 5 years. These projects include the replacement of the Glendale interceptor sewer lines, the 32nd Street sewer line in front of Freeman Hospital, the Country Club lift station receiving sewer line, and an upper stretch of the I-44 (Tin Cup South) interceptor sewer line.

Not only do the parallel Glendale interceptor sewer lines present a hydraulic restriction within the basin, these sewer lines are aging and in need of replacement. It's recommended that the most downstream section of 30" concrete pipe and single 18" diameter pipe be replaced with a similar 30" diameter followed by a 24" diameter line. It's also recommended that the newer 18" diameter sewer line from the east side of the flow equalization basins to the east side of Main Street remain in place but the older 15" diameter concrete sewer line be replaced with a new 18" diameter parallel sewer line. From the east side of Main Street, it's recommended that the parallel interceptor sewer lines be replaced with a single 21" diameter sewer line, reducing in size to the east as estimated wastewater flows reduce.

Adjacent to 32nd Street, between Jackson Avenue and McIntosh Circle Drive, a short section of 15" and 18" diameter gravity sewer line receives wastewater flow from a larger 21" diameter sewer line. In this area, it's recommended that the existing smaller diameter sewer line be replaced with a 21" diameter gravity sewer. In years past, a 24" diameter sewer line was constructed from McIntosh Circle Drive to the east, approximately 280', in preparation for this recommended extension.

Next, the Country Club lift station has a firm pumping capacity of 500 gpm; while the receiving 8" diameter gravity sewer line has one manhole to manhole segment capable of carrying a maximum of 385 gpm without surcharging. It's recommended that approximately 1,100 feet of 10" diameter gravity sewer be installed along the south side of 32nd Street from the intersection with Schifferdecker Road to the west.

The last recommendation within the first five years deals with replacing an upper stretch of the existing I-44 (Tin Cup South) interceptor sewer line from Highway 86 (Main Street) east and north to 44th Street. The existing interceptor sewer line was constructed in 1988 and consists of concrete pipe ranging in size from 24" to 30" in diameter. Since it's construction, a number of additional wastewater sources have been added to this section of concrete pipe, including Mercy Hospital, Joplin South Middle School, and the Village of Silver Creek.

A map of the recommended Shoal Creek basin collection system improvements is shown on Figure III-15.

TABLE III-5. COLLECTION SYSTEM RECOMMENDATIONS
SHOAL CREEK BASIN YEARS 0 – 5

Description	Estimated Project Cost
Glendale Interceptor Sewer Replacement	$2,850,000
Freeman (32nd Street) Interceptor Sewer Replacement	$525,000
Country Club Lift Station Receiving Sewer Replacement	$175,000
I-44 (Tin Cup South) Interceptor Sewer Replacement	$2,900,000
Estimated Project Cost	**$6,450,000**

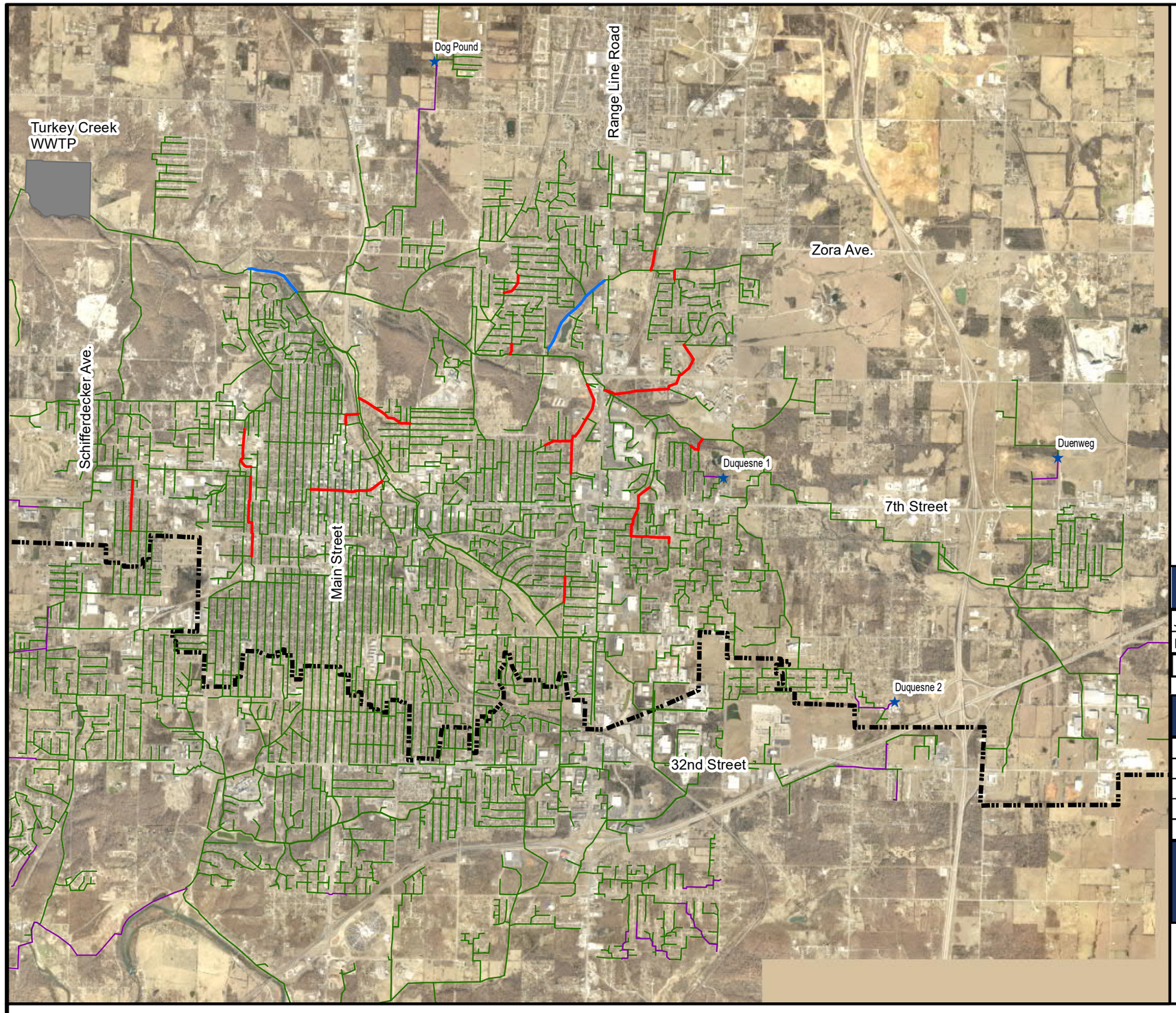
b. Years 6 – 20

Numerous other sewer line upgrades are also recommended within the Shoal Creek collection system basin. These remaining recommendations are all aimed at eliminating hydraulic restrictions within the basin. Although the City may have funds available to complete some of these additional recommendations within the next five years, we've conservatively assumed that these remaining improvements could be completed 6 to 20 years after the completion of this Facility Plan.

A map of the recommended Shoal Creek basin collection system improvements is shown on Figure III-15. Since the City most likely won't be undertaking these projects within the next five years, a detailed project cost estimate hasn't been prepared. Instead, the following table presents an opinion of estimated constructed costs based on a unit price of $15.82 per inch-diameter per linear foot of sewer line construction. This unit price was established after reviewing numerous bid tabulations from sewer line construction in and around Joplin in previous years. This is also the same unit price utilized in the 2018 *Joplin Sewer Model Study*.

TABLE III-6. COLLECTION SYSTEM RECOMMENDATIONS
SHOAL CREEK BASIN YEARS 6 – 20

Pipe Diameter	Length (feet)	Unit Cost (per L.F)	Extended Total
10"	2,200	$160	$352,000
12"	4,200	$190	$798,000
15"	3,600	$240	$864,000
18"	1,700	$285	$484,500
24"	1,800	$380	$684,000
Construction Subtotal			$3,182,500
Contingency (10%)			$318,250
Engineering			$637,000
Estimated Project Costs			**$3,500,750**



Legend

- Existing Lift Stations
- Recomended Improvements (Yr 0-5)
- Recomended Improvements (Yr 6-20)
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

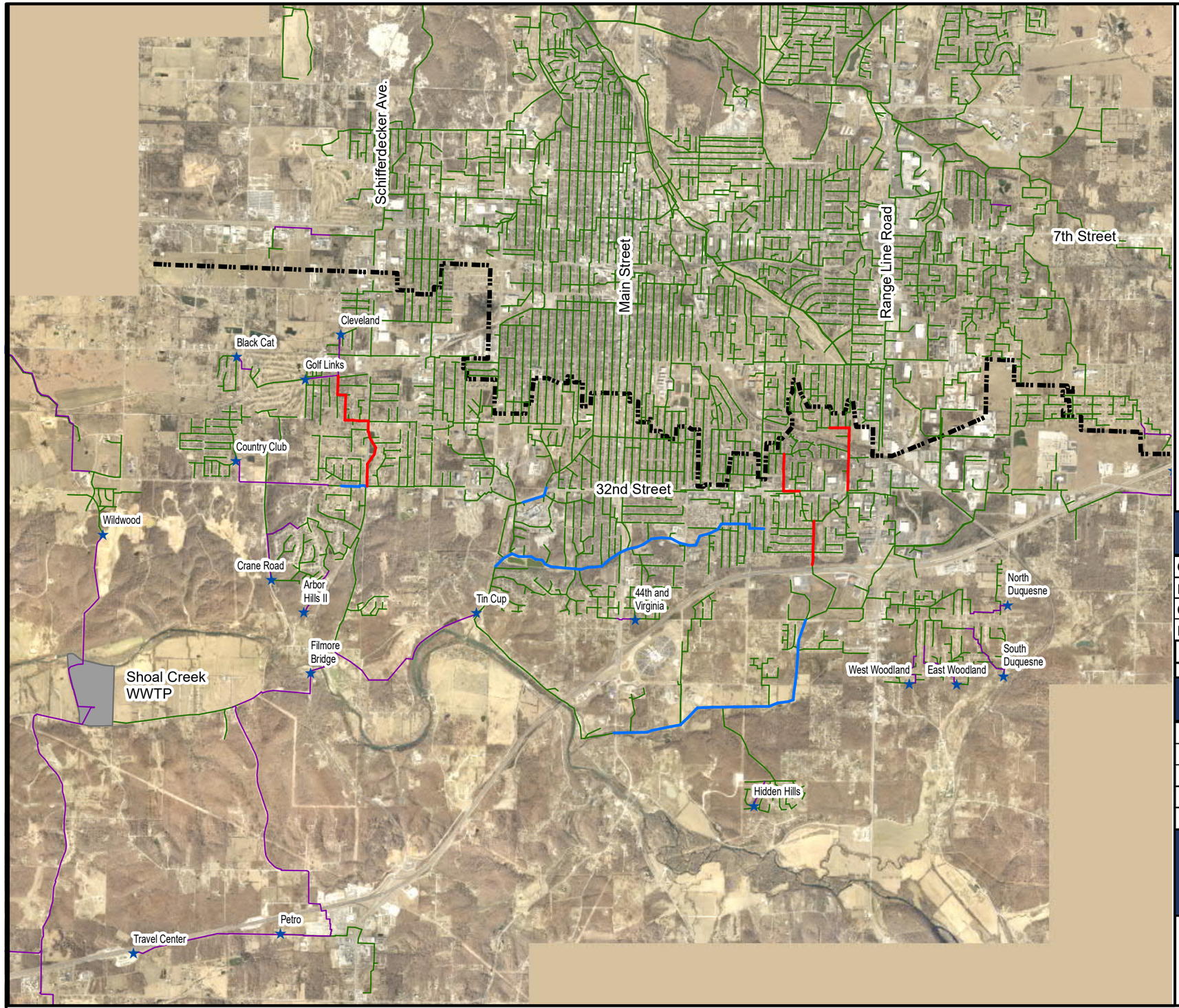
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Turkey Creek Wastewater Collection System Recommendations - Years 0-5	
Description	Project Cost
Joplin Creek Interceptor Sewer Replacement	$2,500,000
East Royal Heights Interceptor Sewer Replacement	$905,000
Estimated Total Cost	**$3,405,000**

Turkey Creek Wastewater Collection System Recommendations - Years 6-20			
Pipe Diameter	Length	Unit Cost	Extended Total
10"	7,750	$160	$1,240,000
12"	8,250	$190	$1,567,500
15"	6,250	$240	$1,500,000
18"	9,250	$285	$2,636,250
24"	1,900	$380	$722,000
	Construction Total		$7,665,750
	Contingency (10%)		$766,575
	Engineering (20%)		$1,533,200
	Estimated Total Cost		**$9,965,525**

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Turkey Creek Basin Collection System Improvements
Figure III-14



Legend

- Existing Lift Stations
- Recomended Improvements (Yr 0-5)
- Recomended Improvements (Yr 6-20)
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Shoal Creek Wastewater Collection System Recommendations - Years 0-5

Description	Project Cost
Glendale Interceptor Sewer Replacement	$2,850,000
Freeman Interceptor Sewer	$525,000
Country Club Lift Station Receiving Sewer	$175,000
I-44/Tin Cup South Interceptor Sewer Replacement	$2,900,000
Estimated Total Cost	**$6,450,000**

Shoal Creek Wastewater Collection System Recommendations - Years 6-20

Pipe Diameter	Length	Unit Cost	Extended Total
10"	2,200	$160	$352,000
12"	4,200	$190	$798,000
15"	3,600	$240	$864,000
18"	1,700	$285	$484,500
24"	1,800	$380	$684,000
	Construction Total		$3,182,500
	Contingency (10%)		$318,250
	Engineering (20%)		$637,000
	Estimated Total Cost		**$3,500,750**

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Shoal Creek Basin Collection System Improvements
Figure III-15

3. Personnel

a. Current Personnel

The City of Joplin currently has six full-time employees and three shared employees available for wastewater collection system and lift station operation and maintenance. Generally, the six full-time wastewater collection system employees are headquartered at the Public Works Center located at 1301 W. 2nd Street. The three shared employees responsible for lift station operation and maintenance are the same maintenance personnel responsible for both WWTP's and they are headquartered at the Turkey Creek WWTP.

The personnel currently employed by the City for wastewater collection system and lift station operations are summarized as follows:

TABLE III-7. CURRENT WASTEWATER COLLECTION SYSTEM AND LIFT STATION PERSONNEL

Position	Turkey Creek WWTP Personnel
Infrastructure Supervisor	1
Equipment Operator	5
Chief of Maintenance	1
Maintenance Mechanic	2

b. Recommended Additional Personnel

A review of the infrastructure maintenance department staffing, with regard to the wastewater collection system, has been undertaken in an effort to ensure that adequate resources are available to maintain the many miles of sewer lines and lift stations without sacrificing the level of service that the City provides customers. Additionally, adequate staffing is one of the keys to protecting public health, water quality, and unnecessary property damage.

Although somewhat dated, in 1973 the EPA published a guide titled *Manpower Requirements for Wastewater Collection Systems in Cities and Towns up to 150,000 in population*, which outlines the staff requirements for Cities of similar size to Joplin. Technology advances, particularly the advent of SCADA systems, has reduced the level of staffing needed to operate lift stations when compared to this guide.

In 2005, the EPA published a guide entitled *Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*, which is becoming a heavily referenced manual, not only for regulatory agencies, but also sanitary sewer system owners and operators. Portions of this guide have been utilized in evaluating the City of Joplin's staffing requirements with regard to the wastewater collection system and lift stations.

Utilizing each of these references results in a recommendation for a total of 15 employees for the wastewater collection system. The City currently employs 9

people as shown in the previous table. Following a review of the existing and recommended personnel, it is recommended that the following personnel be added to the staff to improve operations.

1) One Asset Management Tech whose primary purpose is to update sanitary and storm sewer maps, record asset management information (cleaning and inspection dates, pipeline and structure ratings, material types, customer complaints, etc.), and maintain maintenance records.

2) One Heavy Equipment Operator, which could be utilized to create two crews, each capable of utilizing three operators to improve maintenance response times. Additionally, one crew of four operators could be created for maintenance and repair tasks, while one crew of two operators could be designated for cleaning and inspection tasks.

3) One Maintenance Mechanic designated to the operation of lift stations, with the secondary task of assisting staff at either WWTP.

With the addition of 3 employees, the wastewater collection system and lift station staff would increase to 12 people, compared to the 15 staff members estimated when utilizing the EPA guides.

IV. LIFT STATIONS

A. Evaluation of Current Lift Stations

1. General

In order to evaluate current wastewater flow rates for each lift station in the City's wastewater system, pump run times were analyzed for a 13-month period from August 2018 through August 2019. The documented pump run times were multiplied by the available pumping capacity and averaged in order to determine the current average daily wastewater flow within each lift station basin. From the current average daily wastewater flow rate, a peaking factor was applied to estimate the peak wastewater flow rate. The peaking factor is based on the MDNR Design Guide recommended equation $\frac{18+\sqrt{(Population\ in\ Thousands)}}{4+\sqrt{(Population\ in\ Thousands)}}$.

This approach was used for 18 of the City's 25 lift stations (excluding the Loma Linda lift station) that are connected to a Supervisory Control and Data Acquisition (SCADA) system. The SCADA system allows for the remote monitoring, control, and reporting (including pump starts, stops, and run times) of information for 20 lift stations.

The current wastewater flow rate for two additional lift stations (Filmore Bridge and Tin Cup), also connected to the SCADA system, were computed using data obtained from the 2017 *Inflow and Infiltration Strategic Plan*. These two facilities serve very large wastewater basins; therefore; the 2017 study placed flow meters upstream of each pump structure to record average daily dry weather wastewater flow (ADDF) rates. From the measured ADDF, a peak factor of 4 was applied to each lift station to estimate the peak wastewater flow rate.

The current wastewater flow rates for the remaining five lift stations, not connected to the SCADA system, are estimated based on the drainage area they serve. In general terms, these five lift stations are small and serve small drainage basins within the collection system. Next a peaking factor, based on the above MDNR equation, was applied to estimate the current peak wastewater flow rate for each lift station.

To project the future 2040 wastewater flow, the same 0.9% per year increase in population was applied to the current lift station flow rates. This equates to an increase of 18% over the next 20 years.

2. Turkey Creek Basin

a. Airport #2 Lift Station

Airport #2 lift station, as the name suggests, is located on the City's regional airport property in the extreme north part of the community. The lift station facility is a duplex submersible lift station with 7.5-horsepower (Hp) pumps, a 5' diameter by 15' deep wet well, and a 6' diameter valve vault. The facility was constructed in 2007 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-1.

This lift station only serves the Airport's terminal building. A 4" diameter force main, approximately 3,283-feet long, carries the pumped flow south to the Airport #1 lift station's collection system.

Since the Airport #2 lift station only serves the Airport's Terminal Building, the current and projected 2040 peak wastewater flow rates are estimated to be in the 20 gpm range. Unless changes or renovations are made to the Terminal Building, or other facilities are connected to the lift station, an increase in the peak wastewater flow for this facility is not anticipated. With a firm pumping capacity (capacity with largest pump out of service) of 146 gpm, its capacity is more than adequate. A pump flow rate of 146 gpm provides a scour velocity of 3.7 feet per second (fps) through the existing 4" force main. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

The facility doesn't currently have an emergency generator in the event of a power outage. Instead, the existing wet well can store nearly 147 gallons of wastewater per foot of depth. This equates to a storage volume of 1,910 gallons (with 2-feet of freeboard), or enough storage capacity for 1.6 hours at the estimated peak wastewater flow rate or approximately 32 hours at the average daily wastewater flow rate (average daily flow rate is estimated to be 1 gpm or 1,440 gallons per day).

Although the lift station structures appear to be in acceptable condition, the existing discharge piping and valves exhibit minor surface corrosion. On the other hand, the existing sewage pumps and pressure sewer line are noted as being in good condition and sized appropriately.

b. Airport #1 Lift Station

Airport #1 lift station is located in the southwest corner of the City's regional airport, in the extreme north part of the community. The lift station facility is a duplex submersible lift station with 10-Hp pumps, an 8' diameter by 22' deep wet well, a 7' diameter valve vault, and a 40-kW emergency generator. The facility was constructed in 1999 and connected to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-1.

The lift station generally serves a small collection system of approximately 2,014 feet of 8" diameter gravity sewer pipe. The collection system basin serves existing facilities on the airport property. The Airport #1 lift station's collection system also receives wastewater flow from the Airport #2 lift station. A nearly 3,105 foot, 6" force main carries the wastewater from the lift station to the Dog Pound lift station's collection system.

The Airport #1 lift station has a firm pumping capacity of 270 gpm, which provides a scour velocity of 3.1 fps in the 6" force main. This is more than adequate to pump the estimated current and future wastewater flow rates of 128 gpm and 150 gpm, respectively. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

The Airport #1 lift station structures, piping, and valves all appear to be in adequate condition. Although the existing discharge piping, valves, and fittings exhibit surface corrosion, there doesn't appear to be any deep pitting of the pipe wall and the fasteners appears to be in acceptable condition. The existing pumps and force main are also noted as being in good condition and appropriately sized.

c. Dog Pound Lift Station

The next lift station in the Turkey Creek basin is the Dog Pound lift station, located to the south of the Airport lift stations, but still in the northern portion of the community. The lift station facility is a duplex submersible lift station with 20-Hp pumps, a 7' diameter by 20' deep wet well, a 5' diameter valve vault, and an 80-kW emergency generator. The facility was constructed in 1997 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-2.

The lift station serves a collection system basin with nearly 11,390 feet of 8" through 12" diameter gravity sewer line. The lift station also receives wastewater from the Airport #1 lift station through its gravity collection mains. The force main for this lift station is 8" diameter and approximately 5,274 feet long. Wastewater is pumped south into the Turkey Creek wastewater collection system basin (Crossroads Parallel major drainage basin).

The Dog Pound lift station has a firm pumping capacity of 300 gpm, which provides a scour velocity of 1.9 fps through the existing 8" force main. Based on the estimated peak wastewater flow rate, this lift station could be considered undersized. This is primarily due to the 270 gpm being pumped from the Airport #1 lift station to the Dog Pound collection system. A peak wastewater capacity of only 30 gpm (300 gpm – 270 gpm) is available for customers within the Dog Pound collection system basin, while the Airport #1 lift station is running.

On the other hand, it should be recognized that the wastewater flow from the Airport #1 lift station is only received during pump on cycles for short bursts lasting for minutes, not hours. During these periods, the excess flow is buffered or equalized within the existing Dog Pound collection system or both Dog Pound lift station pumps operate simultaneously to avoid overflows or backups. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Wastewater operators have noted that the existing Dog Pound lift station pumps are in poor condition. Additionally, when you consider the estimated year 2040 peak wastewater flow rate of 377 gpm and the questionable scour velocity from the existing pumps, these pumps should be upgraded. Additionally, the existing discharge piping, fittings, and valves appear to be heavily corroded and nearing the end of their useful life.

d. Able Body Lift Station

The Able Body lift station is located on the west side of Joplin and on the south side of 7th Street. The lift station facility is a duplex submersible lift station with 7.5-Hp pumps, a 6' diameter by 13.5' deep wet well, and a 4' diameter valve vault. The

facility was constructed in 1990 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-3.

The lift station generally serves a small industrial area on the south side of 7th Street. The collection system is comprised of approximately 1,806 feet of 8" diameter gravity sewer pipe. The 4" diameter force main is approximately 2,571 feet and delivers flow to the Turkey Creek wastewater collection system basin (Perkins major drainage basin) east of the Lift Station.

The Able Body lift station has a firm pumping capacity of 125 gpm, which provides a scour velocity of 3.2 fps. This is adequate when considering the currently estimated peak wastewater flow rate of 119 gpm, but when the projected year 2040 peak wastewater flow rate of 140 gpm is considered, it is deficient. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

In general, the existing lift station structures, piping, and valves appear to be in acceptable condition; however, the discharge piping and valves within the valve vault are deep and appear to be partially covered with debris/dirt making their evaluation difficult. The existing pumps are noted to be in poor condition, as well as undersized considering projected future flow rates. Additionally, the Able Body lift station does not include an emergency generator in case of power outages.

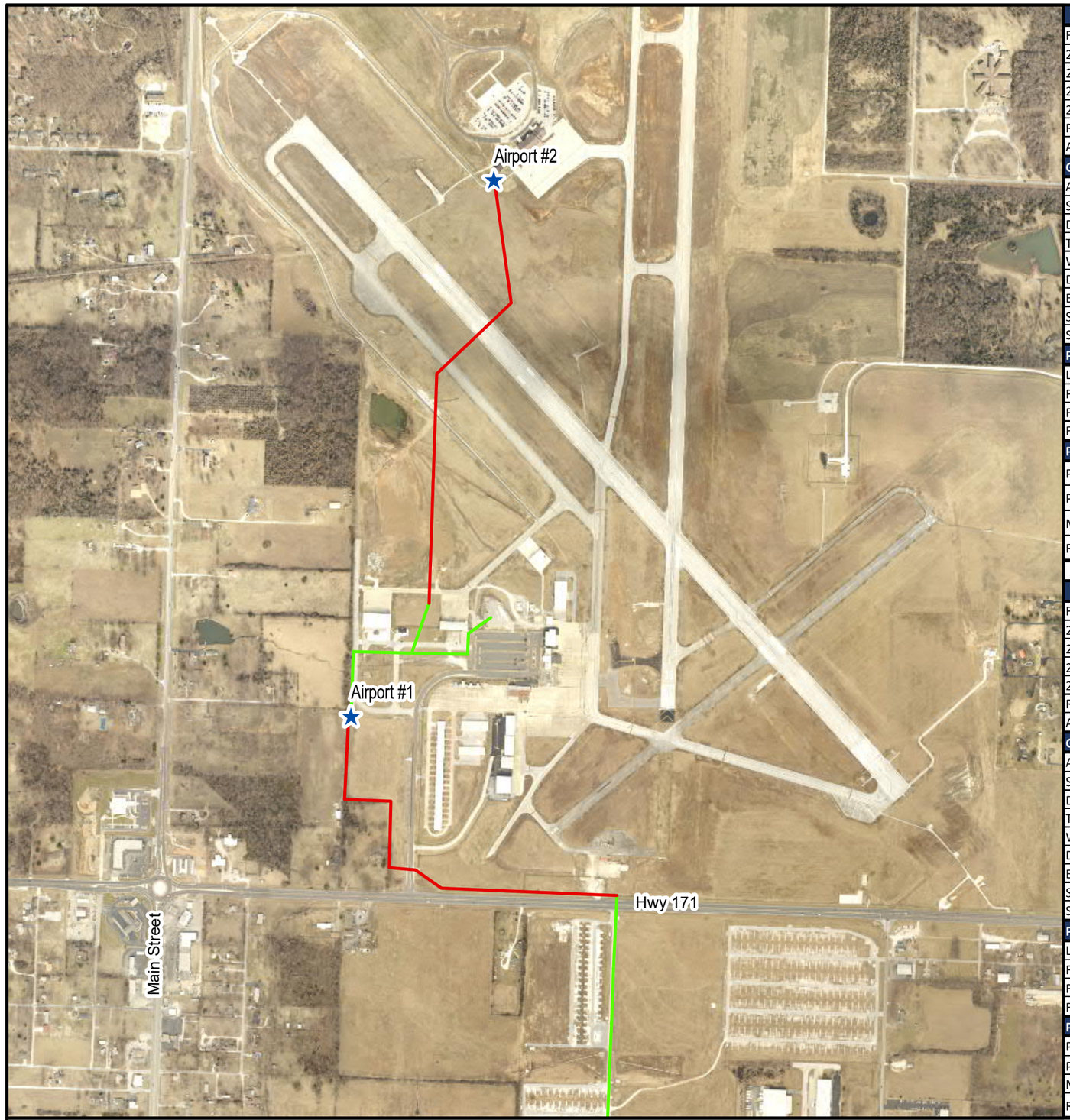
e. Crossroads Lift Station

The Crossroads lift station is located in the southeast corner of the City of Joplin and more specifically in the Crossroads Industrial Park. The lift station facility is a duplex submersible lift station with 30-Hp pumps, a 6' diameter by 19' deep wet well, a 5' diameter valve vault, and a 125-kW emergency generator. The facility structures and force main were installed in 2007/2008; however, the pumps, controls, and generator were not installed until 2017/2018. The Crossroads lift station was also added to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-4.

The lift station is located within one of the City's larger Industrial area's and has the potential to serve large wastewater customers. The current collection system contains approximately 9,889 feet of 8" through 24" diameter gravity sewer pipe. Wastewater is pumped through a 5,803 foot, 6" diameter force main to the west and into the Turkey Creek wastewater collection system basin (Crossroads Parallel major drainage basin).

The lift station currently has a pumping capacity of 290-gpm, which provides a scour velocity of 3.3 fps through the 6" force main. This pumping capacity is adequate when considering the currently estimated peak flow rate of 269 gpm and is very close to the estimated year 2040 projected peak wastewater flow rate of 313 gpm. However, it should be noted that this lift station serves very large industrial tracts that have yet to develop. If a single large industrial tract is developed, this lift station wouldn't be able to handle the wastewater generated. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Even though this is a rather new lift station facility, the concentration and strength of the wastewater being pumped has caused numerous issues with the existing pumps and controls. Although the structure, discharge piping, and valves haven't been affected to this point, the City should closely monitor their condition over the next few years.



Airport Lift Station Number 1	
Firm Pumping Capacity (gpm)	270
2018 Average Daily Wastewater Flow	32
2018 Peak Wastewater Flow (gpm)	128
2040 Average Daily Wastewater Flow	38
2040 Peak Wastewater Flow (gpm)	150
Remaining Capacity After 2040	44%
Adequate Capacity	Yes
General Lift Station Information	
Address	5202 Dennis Weaver
Sewer Basin	Turkey Creek
Downstream Discharge Destination	Dog Pound LS
Type	Duplex - Submersible
Wet Well	8' Dia.
Depth (ft)	22
Electrical Service	3 Phase - 480V - 200 Amp
Standby Emergency Generator	40 kW
SCADA Equipped	Yes
Pipeline Information	
Length of Collection System Served (ft)	2,104
Force Main Size (in)	6
Force Main Length (ft)	3,105
Force Main Material	SDR 21 PVC

Pump Information	Pump 1	Pump 2
Pump Make	Myers	Myers
Pump Model	4V100M4-43	4V100M4-43
Motor Size (Hp)	10	10
Rated Pump Capacity	270 gpm @ 70' TDH	270 gpm @ 70' TDH

Airport Lift Station Number 2	
Firm Pumping Capacity (gpm)	146
2018 Average Daily Wastewater Flow	1
2018 Peak Wastewater Flow (gpm)	20
2040 Average Daily Wastewater Flow	1
2040 Peak Wastewater Flow (gpm)	20
Remaining Capacity After 2040	86%
Adequate Capacity	Yes
General Lift Station Information	
Address	5500 N. Dennis Weaver
Sewer Basin	Turkey Creek
Downstream Discharge Destination	Airport LS #1
Type	Duplex - Submersible
Wet Well	5' Dia.
Depth (ft)	15
Electrical Service	3 Phase - 480V - 70 Amp
Standby Emergency Generator	No
SCADA Equipped	Yes
Pipeline Information	
Length of Collection System Served (ft)	Terminal Bldg. Only
Force Main Size (in)	4
Force Main Length (ft)	3,283
Force Main Material	SDR 21 PVC

Pump Information	Pump 1	Pump 2
Pump Make	Myers	Myers
Pump Model	4VH75M-43-30	4VH75M4-43-30
Motor Size (Hp)	7.5	7.5
Rated Pump Capacity	146 gpm@ 69' TDH	146 gpm@ 69' TDH

Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

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Airport #1 & Airport #2 Lift Stations
Figure IV-1



N

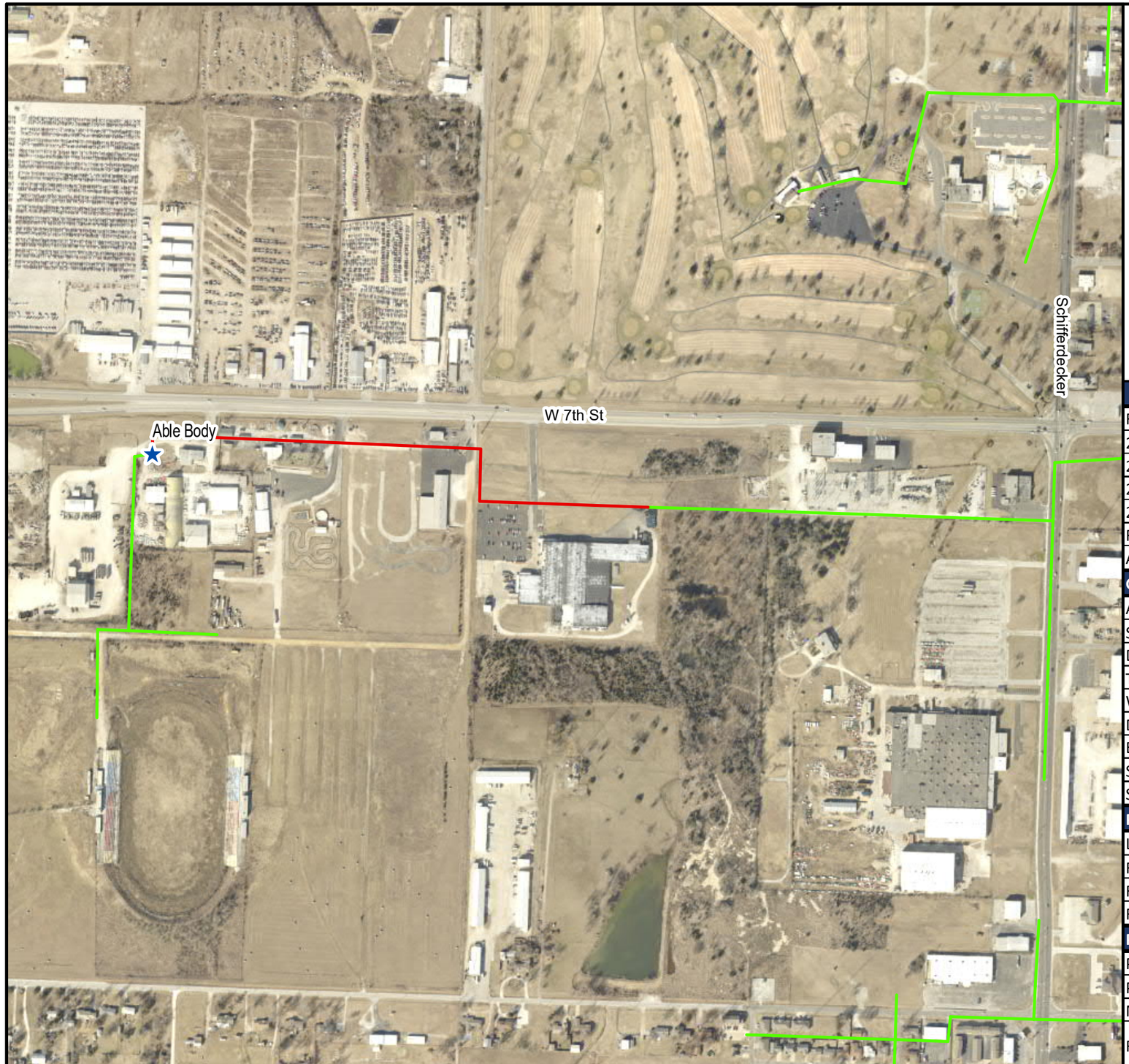
Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

Dog Pound Lift Station		
Firm Pumping Capacity (gpm)	300	
2018 Average Daily Wastewater Flow	87	
2018 Peak Wastewater Flow (gpm)	324	
2040 Average Daily Wastewater Flow	102	
2040 Peak Wastewater Flow (gpm)	377	
Remaining Capacity After 2040	-26%	
Adequate Capacity	No	
General Lift Station Information		
Address	4202 Swede Lane	
Sewer Basin	Turkey Creek	
Downstream Discharge Destination	Gravity Sewer	
Type	Duplex Submersible	
Wet Well	7' Dia.	
Depth (ft)	20	
Electrical Service	3 Phase - 230V - 400 Amp	
Standby Emergency Generator	80 kW	
SCADA Equipped	Yes	
Pipeline Information		
Length of Collection System Served (ft)	11,390	
Force Main Size (in)	8	
Force Main Length (ft)	5,274	
Force Main Material	SDR 26 PVC	
Pump Information	**Pump 1**	**Pump 2**
Pump Make	KSB	KSB
Pump Model	KRT F100-316	KRT F100-316
Motor Size (Hp)	20	20
Rated Pump Capacity	300 gpm @ 65' TDH	300 gpm @ 65' TDH

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Dog Pound Lift Station
Figure IV-2



Legend

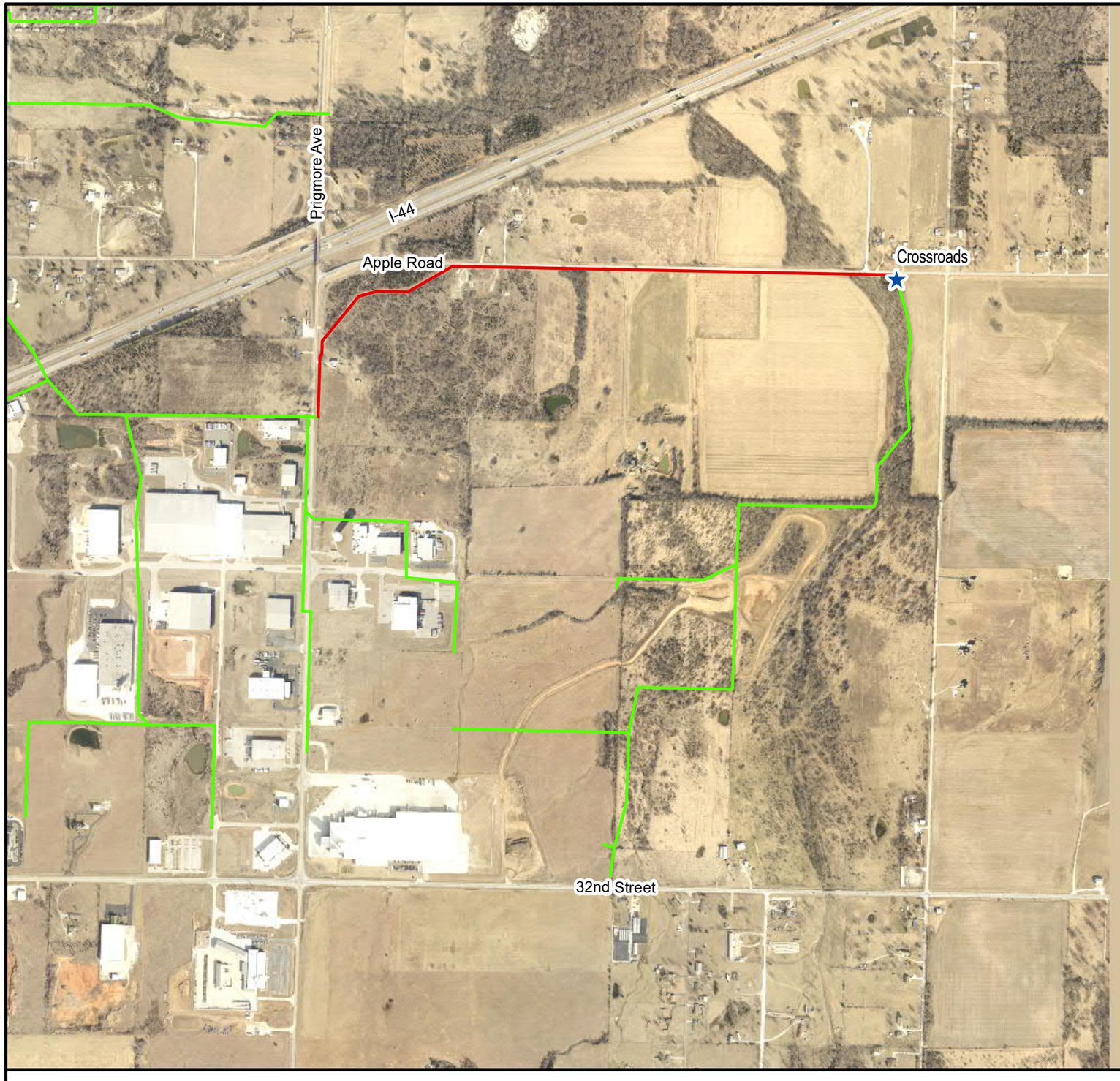
N

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

Able Body Lift Station		
Firm Pumping Capacity (gpm)	125	
2018 Average Daily Wastewater Flow	30	
2018 Peak Wastewater Flow (gpm)	119	
2040 Average Daily Wastewater Flow	35	
2040 Peak Wastewater Flow (gpm)	140	
Remaining Capacity After 2040	-12%	
Adequate Capacity	No	
General Lift Station Information		
Address	3620 W. Seventh St.	
Sewer Basin	Turkey Creek	
Downstream Discharge Destination	Gravity Sewer	
Type	Duplex Submersible	
Wet Well	6' Dia.	
Depth (ft)	13.5	
Electrical Service	3 Phase - 230V - 100 Amp	
Standby Emergency Generator	No	
SCADA Equipped	Yes	
Pipeline Information		
Length of Collection System Served (ft)	1,806	
Force Main Size (in)	4	
Force Main Length (ft)	2,571	
Force Main Material	SDR 26 PVC	
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Barnes	Barnes
Pump Model	4XSE7534A	4SXE7534A
Motor Size (Hp)	7.5	7.5
Rated Pump Capacity	125 gpm @ 55' TDH	125 gpm @ 55' TDH

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Able Body Lift Station
Figure IV-3



Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Crossroads Lift Station		
Firm Pumping Capacity (gpm)		290
2018 Average Daily Wastewater Flow (gpm)		71
2018 Peak Wastewater Flow (gpm)		269
2040 Average Daily Wastewater Flow (gpm)		84
2040 Peak Wastewater Flow (gpm)		313
Remaining Capacity After 2040		-8%
Adequate Capacity		No
General Lift Station Information		
Address		Apple Road
Sewer Basin		Turkey Creek
Downstream Discharge Destination		Gravity Sewer
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		19
Electrical Service		3 Phase - 480V - 200 Amp
Standby Emergency Generator		125 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		9,889
Force Main Size (in)		6
Force Main Length (ft)		5,803
Force Main Material		SDR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	KSB	KSB
Pump Model	KRT F80-250/214XG	KRT F80-250/214XG
Motor Size (Hp)	30	30
Rated Pump Capacity	280 gpm @ 99' TDH	280 gpm @ 99' TDH

Allgeier, Martin and Associates, Inc.
Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, Mo. 64804

Crossroads Lift Station
Figure IV-4

3. Shoal Creek Basin

a. 17th and Cleveland Lift Station

The Cleveland lift station is located on the west side of Joplin at the north end of the Cleveland Terrace cul-de-sac. The lift station facility is a duplex submersible lift station with 36-Hp pumps, an 8' diameter by 21' deep wet well, an 8' by 9' overflow basin, a 6' diameter valve vault, and a 100-kW emergency generator. The facility was originally constructed in 1959 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-5.

The lift station predominately serves residential subdivisions, although a mix of commercial and industrial customers are being served along Schifferdecker Avenue and 20th Street. The collection system is comprised of approximately 37,880 feet of 8" diameter through 12" diameter gravity sewer pipe. The 10" diameter force main is approximately 1,723 feet and delivers flow to the Filmore Bridge lift station basin to the south of this facility.

The 17th and Cleveland lift station has a firm pumping capacity of 300 gpm. This only provides a scour velocity of 1.2 fps within the existing 10" force main. The capacity is adequate when considering both the estimated current and year 2040 peak wastewater flow rates of 195 gpm and 277 gpm, respectively. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Historically, this lift station has been troublesome for City operators due to the large volumes of I&I during wet weather. However, recent renovation work within this lift station basin appears to have mitigated the peak wastewater flow inrush seen at the onset of heavy rain events. The lift station structures, piping, and valves are in acceptable condition. The existing submersible pumps are noted as being in good condition; however, the lack of scour velocity through the 10" diameter force main could be problematic.

b. 20th and Black Cat Lift Station

The next lift station in the Shoal Creek basin is the 20th and Black Cat lift station. This lift station is also located on the west side of the community on the southwest corner of the 20th Street and Black Cat Road intersection. The lift station facility is a duplex submersible lift station with 3-Hp pumps, a 5' diameter by 12.5' deep wet well, a 5' diameter valve vault, and an 18-kW emergency generator. An original date for the construction of this facility has not been found. The facility was connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-6.

The lift station serves a collection system basin with approximately 4,840 feet of 8" diameter sewer line. The force main is 4" in diameter and approximately 992 feet long. Wastewater is pumped to the east and into the Golf Links lift station basin.

The 20th and Black Cat lift station has a firm pumping capacity of 90 gpm, which provides a scour velocity of 2.3 fps through the existing 4" force main. The capacity

is adequate when considering both the estimated current and year 2040 peak wastewater flow rates of 73 gpm and 87 gpm, respectively. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Wastewater operators have noted that the existing submersible pumps are in poor condition. The existing structures are in an acceptable condition; however, the discharge piping, valves, and fittings exhibit heavy corrosion and are in need of replacement.

c. Golf Links Lift Station

Golf Links lift station is also located on the west side of the community at 2204 Golf Links Road. The lift station facility is a duplex submersible lift station with 15-Hp pumps, a 6' diameter by 13' deep wet well, a 6' diameter by 13' deep overflow basin, a 4' diameter valve vault, and an 80-kW emergency generator. The facility was constructed in 1992 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-7.

The lift station serves a collection system basin with nearly 14,664 feet of 8" diameter sewer line. The lift station also receives wastewater flow from the 20th and Black Cat lift station through its gravity collection mains. The force main for this lift station is 4" in diameter and approximately 1,434 feet long. Wastewater is pumped east into the Filmore Bridge lift station basin.

Golf Links lift station has a firm pumping capacity of 200 gpm, which provides a scour velocity of 5.1 fps through the existing 4" force main. Based on the estimated peak wastewater flow rate of 228 gpm, this lift station should be considered at capacity. The deficiency in pumping capacity is even greater when the projected year 2040 peak wastewater flow of 265 gpm is considered. Additionally, with a flow velocity of 5.1 fps in the existing 4" diameter force main, it should also be considered at capacity. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

The existing lift station structures, valves, and piping appear to be in adequate condition. Additionally, the existing submersible pumps have recently been replaced and are in good condition; however, they should be upgraded along with the existing force main in the future.

d. Country Club Lift Station

The Country Club lift station is located in the southwest corner of the community on the west side of Country Club Drive, just north of 32nd Street. The lift station facility is a duplex submersible lift station with 20-Hp pumps, a 6' diameter by 16' deep wet well, and a 5-foot diameter valve vault. The facility was constructed in 1997 and connected to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-8.

The lift station generally serves residential areas and consists of approximately 22,019 feet of 8" through 12" diameter pipe. An 8" diameter force main,

approximately 4,656-foot long, carries the wastewater from the lift station east into the Filmore Bridge lift station basin.

The Country Club lift station has a firm pumping capacity of 500 gpm, which provides a scour velocity of 3.2 fps in the 8" diameter force main. A Sanitary Sewer Study completed by Olsson Associates, Inc., in 2019 estimated current average day and peak wastewater flow rates to be 66 gpm and 263 gpm, respectively. If the remaining undeveloped lots are included in the estimated flow rates, the projected 2040 average and peak wastewater flow rates increase to 90 gpm and 359 gpm, respectively. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

This lift station facility isn't equipped with an emergency generator. With a currently estimated peak wastewater flow rate of 263-gpm and a small 6' diameter by 16' deep wet well, wastewater storage capacity would only last for roughly 11 minutes before overflowing. Considering the projected 2040 peak flow rate of 359 gpm, storage capacity would be reduced to lasting just over 8 minutes.

The Country Club lift station structures appear to be in satisfactory condition; however, the site security fence needs to be replaced. The existing isolation valves on the discharge piping appear to have recently been replaced but the existing check valves and discharge piping exhibit heavy corrosion and are in need of renovation or replacement. The existing submersible pumps are noted as being in poor condition.

e. Crane Road Lift Station

The Crane Road lift station is located in southwest Joplin on the east side of South Crane Drive. The lift station facility is a duplex submersible lift station with 50-Hp pumps, a 6.5' by 6.5' by 13' deep wet well, a 6.5' by 6.5' by 13' overflow basin, a 6' diameter valve vault, and a 130-kW emergency generator. The facility was constructed in 1998 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-9.

The lift station generally serves residential areas and consists of approximately 20,648 feet of 8" through 12" diameter gravity sewer pipe. An approximately 3,436-foot, 6" diameter force main carries flow from the lift station north and into the Filmore Bridge lift station basin.

The firm pumping capacity of this lift station is 300 gpm, which provides a scour velocity of approximately 3.4 fps in the 6" force main. Wastewater flow for this lift station was also determined within the 2019 Olsson Report. The estimated average and peak wastewater flow rates were listed as 25 gpm and 101 gpm, respectively. If the remaining drainage basin were to develop, the projected 2040 average and peak wastewater flow rates would increase to 93 gpm and 370 gpm, respectively. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

With such high-head pumps (approximately 180-feet of total dynamic head), this lift station has previously given City operators' difficulties. However, the current pumps are noted to be in good condition. The structures are in acceptable

condition. The existing discharge piping, valves, and fittings exhibit minor surface corrosion.

f. Arbor Hills II Lift Station

Arbor Hills II lift station is located in the southwest side of the community at the south end of Notting Hill Circle, approximately 0.4 miles north of Shoal Creek. The lift station facility is a duplex submersible lift station with 15-Hp pumps, an 8' diameter by 25.5' deep wet well, an 8' diameter by 25.5' deep overflow basin, and an 8' diameter valve vault. The facility was constructed in 2005 and connected to the City's SCADA system in 2018. A location map, including lift station information, has been shown on Figure IV-10.

This lift station serves a very small drainage area, primarily only those lots on the south end of Notting Hill Circle, within the Arbor Hills subdivision. Currently, five residential structures are connected to this lift station's drainage basin. The current lift station collection system is comprised of 1,461 feet 8" diameter gravity sewer. A 4" diameter force main, approximately 2,014-feet long, carries sewage north and into the Filmore Bridge lift station basin.

The firm pumping capacity of the Arbor Hills II lift station is approximately 80 gpm. This provides a scour velocity of approximately 2.0 fps through the existing force main. A Sanitary Sewer Study completed by Olsson Associates, Inc., in 2019 estimated that the fully developed drainage basin could yield a peak wastewater flow rate of approximately 30 gpm. The current pumping capacity should be considered adequate for the full development of the lift station drainage basin.

The lift station facility doesn't have an emergency generator, instead an 8' diameter overflow basin provides additional storage capacity. When considering the wet well storage and overflow basin storage capacities (with 2-feet of freeboard at the top of the structures) and a future peak flow rate of 30 gpm, this lift station facility could store wastewater for approximately 9.8 hours.

The lift station structures, piping, and valves appear to be in acceptable condition. Additionally, the existing sewage pumps and force main are noted as being in good condition and sized appropriately.

g. Filmore Bridge Lift Station

The Filmore Bridge lift station is located in the southwest side of the community. More specifically, the lift station facility is located on the southwest side of the intersection of Coyote Drive (Schifferdecker Road) and Shoal Creek. This lift station facility is best described as a tri-plex, wet well/dry well type facility with flooded pump suction lines and a 250-kW emergency generator.

The wet well and dry well are an integral concrete structure that has inside dimensions of approximately 24'-4" wide by 24' long by 33' deep. The wet well portion of the structure is 4' wide by 24' long by 33' deep. The pumps, valves, and electrical controls are all mounted within the dry well portion of the structure. The facility was constructed in 1988 but the pumps and controls were updated more recently in 2016. The facility was also connected to the City's SCADA system in

2018. A location map of this facility, including lift station information, has been shown on Figure IV-11.

Three 8" diameter suction lines deliver flow from the wet well to each dry pit mounted pump. The 8" diameter discharge line of each pump connects to a common 12" diameter header. The header exits the facility and connects to a 24" diameter force main. The existing 24" diameter force main is a common pipe that also conveys the flow from the Tin Cup lift station. The common force main carries the wastewater flow from the Filmore Bridge lift station west to the point of discharge into the 42" diameter Shoal Creek interceptor sewer line. The City currently has a project underway to install a parallel 24" diameter force main from this facility to the point of discharge into the Shoal Creek interceptor sewer.

It's important to evaluate the capacity of this facility jointly with the capacity of the Tin Cup facility, since they share a common 24" diameter force main and eventually the parallel 24" pipes. When operating simultaneously with the Tin Cup lift station, the recent installation of three new 75-Hp dry pit application pumps have upgraded the firm pumping capacity of this facility from 1,700 gpm (2.45 MGD) to 2,400 gpm (3.46 MGD). Once the parallel 24" diameter force main is operational, the firm pumping capacity of the facility should increase to approximately 3,300 gpm (4.75 MGD). This nearly doubles the pumping capacity of this facility from the original design of 1,700 gpm.

Data obtained and analyzed in the City's 2017 *Inflow and Infiltration Strategic Plan* indicated that this facility had an average daily dry weather wastewater flow rate (ADDF) of approximately 0.9 MGD. Applying a peaking factor of 4 would yield a current peak wastewater flow rate of 3.6 MGD. Projecting these estimated flows into the year 2040 yields an estimated average and peak wastewater flow rate of 1.06 MGD and 4.25 MGD, respectively.

Although the pumps, piping, and valves are in acceptable condition, the lift station site is subject to flooding during heavy and prolonged rain events. Modifications to the lift station site and structure should be completed to provide an increased level of flood protection. Additionally, the firm pumping capacity (with Tin Cup operating) of this facility should be verified after construction of the parallel 24" diameter force main.

h. Kenser Court Lift Station

The Kenser Court lift station is located at the south end of Kenser Court on the southeast side of the community. The lift station facility is a duplex submersible lift station with 5-Hp pumps, a 7' by 7' by 22' deep square wet well, a 6' diameter valve vault, and a 40-kW emergency generator. The facility was constructed in 2010. A location map, including lift station information, has been shown on Figure IV-12.

This lift station serves a very small residential development along the south end of Kenser Court. The collection system consists of approximately 854 feet of 8" diameter gravity sewer line. Sewage is pumped through a 4" diameter force main, approximately 974 feet long, to the north and into the Flying J lift station basin (Tin Cup South major basin).

Currently 10 duplex units are tied into this lift station's collection system; however, the development has a potential for nearly 20 duplex or multifamily housing units. It's estimated that the current average daily wastewater flow rate from the 10 duplex units is approximately 6,000 gpd (10 units * 6 people/unit * 100 gpcd). With a peak factor of 4, the estimated peak wastewater flow rate would be 24,000 gpd or approximately 17 gpm. If the area fully develops, the projected year 2040 average and peak wastewater flow rates would be 8 gpm and 33 gpm, respectively.

The firm pumping capacity of this lift station is 90 gpm, which provides a scour velocity of 2.3 fps in the existing 4" diameter force main. The capacity of the existing lift station should be considered adequate for current and projected wastewater flows. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Since this lift station facility is less than 10 years old, the structures, piping, and valves within the station are in good condition. Also, the submersible pumps were noted as being in good condition.

i. Flying J Lift Station

The Flying J lift station is located on the east side of Serene Lane between I-44 and 32nd Street on the southeast side of Joplin. The facility was constructed in 1995 and connected to the City's SCADA system in 2018. It's a duplex lift station with 10-Hp submersible pumps, a 7' diameter by 16' deep wet well, a 4' diameter valve vault, and a 30-kW emergency generator. A location map and additional lift station information have been shown on Figure IV-13.

This lift station serves a mixed residential and commercial zone along 32nd Street between I-44 and I-49/Highway 249. The collection system is comprised of approximately 5,832 feet of 8" and 10" diameter gravity sewer line. A 6" diameter force main carries flow to the west and into the Tin Cup South major drainage basin.

The Flying J lift station has a firm pumping capacity of 265 gpm, which provides a scour velocity of 3.0 fps within the 6" force main. Based on the pump run times from 2018/2019, the current average daily wastewater flow rate was estimated to be 40 gpm. This equates to a peak wastewater flow rate of 157 gpm. Furthermore, it's projected that the year 2040 average and peak wastewater flow rates will increase to 47 gpm and 184 gpm, respectively. Unless large commercial tracts are added within this lift station basin, its existing capacity is adequate.

The structures, piping, and valving are considered to be in adequate condition. The submersible pumps are noted to be in fair condition. Lastly, the emergency generator is in poor condition; however, the City currently has a plan underway that will move the existing 60-kW emergency generator from the Wildwood Ranch lift station to the Flying J lift station.

j. North Duquesne (Silver Creek B) Lift Station

The North Duquesne lift station is located in southeast Joplin on the east side of Duquesne Road approximately ½ mile south of I-44 in what used to be the Village of Silver Creek. The lift station was constructed for the Village of Silver Creek in 2010 with a designation of Lift Station B. The City of Joplin subsequently annexed the Village of Silver Creek in 2012 and now refers to the facility as the North Duquesne lift station. The facility is a duplex lift station with 5-Hp submersible pumps, a 6' diameter by 13' deep wet well, 5' diameter valve vault, and the site typically stores an 80-kW portable emergency generator. A location map and additional lift station information have been shown on Figure IV- 14.

The lift station serves a very small residential area on the west side of Duquesne Road from Silver Creek drive north. The collection system is comprised of approximately 4,402 feet of 8" diameter gravity sewer. Sewage is carried through a 4" diameter force main, approximately 1,891 feet long, to the west and into the Tin Cup South major drainage basin.

The North Duquesne lift station has a firm pumping capacity of 90 gpm, which provides a scour velocity of 2.3 fps in the 4" force main. Currently, there are approximately 20 residential structures being served by this lift station. With an assumed 3 people/residence using 100 gpcd, the current average daily flow can be estimated to be 4 gpm. Applying a peaking factor of 4, yields an estimated peak wastewater flow rate of 17 gpm.

Although there is some development potential within this lift station basin that could affect future wastewater flow rates, the projected year 2040 wastewater flows have only been increased by the projected 18% population increase referenced previously in this report. An 18% increase in population would result in projected year 2040 average daily and peak daily wastewater flow rates of 5 gpm and 20 gpm, respectively. The capacity of this lift station is adequate.

This lift station is relatively young (approximately 10 years old) and as such, its structures, piping, and valving are considered to be in adequate condition. On the other hand, the existing submersible pumps have been designated to be in fair condition.

k. South Duquesne (Silver Creek C) Lift Station

The South Duquesne lift station is located in southeast Joplin on the west side of Duquesne Road near the southeast corner of Joplin's corporate limits. This lift station was constructed for the Village of Silver Creek in 2010 with the designation Lift Station C. The City of Joplin subsequently annexed the Village of Silver Creek in 2012 and is now referred to as the South Duquesne lift station facility. The facility is a duplex type lift station with 20-Hp submersible pumps, a 6' diameter by 14' deep wet well, a 5' diameter valve vault, and a 50-kW emergency generator. A location map and additional lift station information have been shown on Figure IV-15.

The lift station generally serves a residential development to the northwest of the facility. The collection system is comprised of approximately 7,639 feet of 8"

diameter gravity sewer line. Sewage is carried through a 4" diameter force main, approximately 2,949 feet long, to the northwest and into the Tin Cup South major drainage basin.

The South Duquesne lift station has a firm pumping capacity of 90 gpm, which provides a scour velocity of 2.3 fps in the 4" force main. Currently, there are 33 residential structures being served by this lift station. With an assumed 3 people/residence using 100 gpcd, the current average daily wastewater flow was estimated to be 7 gpm. Applying a peaking factor of 4, yields an estimated peak wastewater flow rate of 28 gpm.

For the most part, this residential area is fully developed; however, there is some potential for growth. The 18% increase in population should also be considered for the future 2040 wastewater flows. The resulting 2040 average daily and peak daily wastewater flow rates are estimated to be 8 gpm and 33 gpm, respectively. The capacity of this lift station is adequate.

Again, this is a relatively new (approximately 10 years old) facility and the structures, piping, and valves are considered to be in good condition. Similar to the North Duquesne lift station, the existing submersible pumps have been designated to be in fair condition.

I. East Woodland (Silver Creek D) Lift Station

The East Woodland lift station is also located in what used to be referred to as the Village of Silver Creek. More specially the facility is located at 3300 East Woodland Drive. This lift station was previously designated as Lift Station D for the Village of Silver Creek when it was constructed in 2010. The City of Joplin subsequently annexed the Village of Silver Creek in 2012 and is now refers to the facility as the East Woodland lift station. The facility is a duplex type lift station with 15-Hp submersible pumps, a 6' diameter by 14' deep wet well, a 5' diameter valve vault, and a 40-kW emergency generator. A location map and additional lift station information have been shown on Figure IV- 16.

The lift station generally serves a residential development to the north of the lift station. The collection system is comprised of approximately 9,818 feet of 8" diameter gravity sewer line. Sewage is carried through a 4" diameter force main, approximately 2,693 feet long, to the northwest and into the Tin Cup South major drainage basin.

The East Woodland lift station has a firm pumping capacity of 90 gpm, which provides a scour velocity of 2.3 fps in the 4" force main. Currently, there are approximately 59 residential structures being served by this lift station. With an assumed 3 people/residence using 100 gpcd, the current average daily wastewater flow can be estimated to be 12 gpm. Applying a peaking factor of 4, yields an estimated peak wastewater flow rate of 49 gpm.

Generally, this residential area is also fully developed; however, there could be room for future population growth. The 18% increase in population should also be considered for the 2040 wastewater flows. The resulting 2040 average daily and

peak daily wastewater flow rates are estimated to be 15 gpm and 58 gpm, respectively. The capacity of this lift station is adequate.

Similar to the previous Silver Creek lift stations, its structures, piping, and valving are considered to be in adequate condition. The existing submersible pumps have been designated to be in fair condition.

m. West Woodland (Silver Creek E) Lift Station

The West Woodland lift station is located in southeast Joplin within the previous corporate limits of the Village of Silver Creek. The facility is more specifically located at 3110 W. Woodland Drive. This lift station was also originally constructed for the Village of Silver Creek in 2010 with the designation of Lift Station E. The City of Joplin subsequently annexed the Village of Silver Creek in 2012 and the facility is now referred to as the West Woodland lift station facility. The facility is a duplex type lift station with 15-Hp submersible pumps, a 6' diameter by 15' deep wet well, 5' diameter valve vault, and a 40-kW emergency generator. A location map and additional lift station information have been shown on Figure IV-16.

The lift station serves a small residential area to the west and north of the facility. The collection system is comprised of approximately 4,379 feet of 8" diameter gravity sewer line. Sewage is carried through a 4" diameter force main, approximately 1,752 feet long, to the north and into the Tin Cup South major drainage basin.

The West Woodland lift station has a firm pumping capacity of 90 gpm, which provides a scour velocity of 2.3 fps in the 4" force main. Currently, there are approximately 27 residential structures being served by this lift station. With an assumed 3 people/residence using 100 gpcd, the current average daily wastewater flow rate can be estimated to be 6 gpm. Applying a peaking factor of 4, yields an estimated peak wastewater flow rate of 23 gpm.

Although there is some development potential within this lift station basin that could affect future wastewater flow rates, the projected year 2040 wastewater flows have only been increased by the projected 18% population increase referenced previously in this report. An 18% increase in population would result in projected 2040 average daily and peak daily wastewater flow rates of 7 gpm and 27 gpm, respectively. The capacity of this lift station is adequate.

Similar to the previous Silver Creek lift stations, its structures, piping, and valving are considered to be in adequate condition. The existing submersible pumps have been designated to be in fair condition.

n. Hidden Hills Lift Station

Hidden Hills lift station is located on the south side of the community in the Hidden Hills subdivision and more specifically at 6208 S. Scenic Avenue. The lift station facility is a duplex type lift station with 15 Hp submersible pumps, a 6' diameter by 19' deep wet well, a 5' diameter valve vault, and a 40-kW emergency generator. The facility was constructed in 2006 and connected to the City's SCADA system

in 2018. A location map, including lift station information, has been shown on Figure IV-17.

This lift station serves a very small residential area within the Hidden Hills development. The gravity sewer collection system is comprised of 3,991 feet of 8" diameter gravity sewer. Wastewater is pumped from the lift station through a 4" diameter force main approximately 1,142 feet to the north and into the Tin Cup South major drainage basin.

Previous pump run times have indicated that the current average wastewater flow rate is roughly 3 gpm with a resulting peak wastewater flow rate estimated to be nearly 15 gpm. Furthermore, the projected 2040 average daily wastewater flow rate is estimated to be 4 gpm with a peak flow rate of 17 gpm. The firm pumping capacity of this lift station is 200 gpm, with a scour velocity through the 4" force main of 5.1 fps. The capacity of this lift station is more than adequate.

This is also a newer lift station facility and as such, the structures, piping, and valves are in acceptable condition. The submersible sewage pumps and controls are also noted to be in good condition.

o. 44th and Virginia Lift Station

The 44th and Virginia lift station is located in south-central Joplin, just to the east of the intersection of 44th Street and Virginia Avenue. The lift station facility is a wet well/dry well type flooded pump suction setup. The wet well is approximately 4' long by 9' wide by 9' deep. The dry well structure is housed in a concrete block building that sits adjacent (south) to the wet well. A 4" diameter suction line delivers sewage from the wet well to the 10-Hp dry pit application pumps in the basement of the block building. The facility also utilizes a 50-kW emergency generator. This is one of the older lift station facilities in the City and was originally constructed in 1961 and connected to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-18.

The lift station generally serves a residential area but there is a small run of gravity sewer line that serves commercial customers along Main Street, including an elementary school. The lift station collection system consists of approximately 9,435 feet of 8" and 10" diameter gravity sewer. The City is currently replacing the old 6" diameter class 150 transite force main with a new 880-foot, 6-inch diameter PVC force main. The force main carries the flow to the west into the Tin Cup North major drainage basin.

The 44th and Virginia lift station has a firm pumping capacity of 200 gpm, which provides a scour velocity of 2.3 fps in the 6" force main. The current average daily wastewater flow rate has been estimated to be 60 gpm, which yields an estimated peak flow rate of 231 gpm. The projected 2040 average daily and peak wastewater flow rates are estimated to be 71 gpm and 269 gpm, respectively. Both the estimated current and projected peak wastewater flow rates exceed the firm pumping capacity of this lift station. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

Although the 44th and Virginia block building shows its age, the structure appears to be is acceptable condition. In the interior of the facility, the existing ladder into the basement is in need of replacement. Additionally, the existing dry pit application pumps should be replaced with larger capacity pumps that can meet the projected 2040 peak wastewater flow rate.

p. Tin Cup Lift Station

The Tin Cup lift station facility is located on the south side of the community adjacent to Shoal Creek. More specifically, the address of the facility is 1801 W. Glendale Road. Tin Cup lift station is a very large wet well/dry well type facility that receives flow from a 30" diameter interceptor sewer from the north and a 42" diameter interceptor sewer from the southeast.

The wet well structure consists of two basic levels with a total depth of approximately 34'. Wastewater from the interceptor sewer lines enters the facility and is directed into an open concrete channel and through a mechanical bar screen and into a 16' square chamber. Wastewater from the 16' square chamber can then be directed into two wet well chambers each connected to a different set of dry pit application pumps. Normally, wastewater flows equally into the separate wet well chambers and the entire 16' square chamber and both wet well chambers operate as a single wet well. Flow control valves do exist that would allow either one of the separate wet well chambers to be taken out of service for maintenance purposes.

The dry well structure is a four-level facility that houses the motor control center on the second floor (from the surface). Stairs lead down through the remaining levels to the bottom floor (4th floor) where two separate rooms house a total of 5 dry pit application pumps. One room contains three 40-Hp dry pit application sewage pumps while the remaining room houses two larger 100-Hp dry application sewage pumps.

The three 40-Hp pumps connect to a common 16" diameter header pipe that exits this room and enters the other pump room. The 16" header pipe then increases in size to a 20" diameter header, where the remaining two 100-Hp pumps also connect. The common 20" diameter header pipe then exits the building where it increases to a 24" diameter force main.

The 24" diameter force main generally runs west from the Tin Cup lift station to the Filmore Bridge lift station site. At this site, wastewater flow from the Filmore Bridge lift station connects to this now common 24" diameter force main. The common force main continues to the south and west to the point of discharge into the 42" diameter Shoal Creek interceptor sewer. A location map of this facility, including lift station information, has been shown on Figure IV-19.

As mentioned previously, the City currently has a construction project underway to install a parallel 24" diameter force main from the Filmore Bridge lift station to the 42" diameter Shoal Creek interceptor sewer. Additionally, the City is currently developing a project to continue the installation of the parallel 24" diameter force main from Filmore Bridge back to Tin Cup lift station.

Due to the sharing of a common 24" diameter force main from Filmore Bridge to the point of discharge, it's important to consider the capacity of the Tin Cup lift station while the Filmore Bridge lift station is operating. Under this scenario, it's estimated that the Tin Cup facility has a firm pumping capacity of approximately 5,400 gpm (7.78 MGD).

Data obtained and analyzed in the City's 2017 *Inflow and Infiltration Strategic Plan* indicated that this facility had an ADDF of approximately 3.3 MGD. Unfortunately, the data obtained during wet weather events didn't accurately depict the volume of flow being delivered to the Tin Cup facility. Instead, the peak wastewater flow to this facility has been estimated to be 4 times the ADDF or 13.2 MGD. Projecting these estimated flows into the year 2040 yields an estimated average and peak wastewater flow rate of 3.9 MGD and 15.6 MGD, respectively.

When looking at the estimated peak wastewater flow rates that this facility may be seeing, it's clear that additional capacity is required. The installation of the parallel 24" diameter force main from Filmore Bridge lift station to the Shoal Creek interceptor will certainly increase the pumping capacity of Tin Cup lift station, but it's recommended that the parallel installation of the additional 24" force main from Filmore lift station to Tin Cup lift station be completed as soon as possible. Additionally, recent improvements may allow for the City to begin recording the influent wastewater flow rate through the SCADA system, and if that's the case, the flow rate should be monitored to begin recording actual flow data.

Recent improvements to this facility, including pump replacements, have extended the design life of the facility. However, after the installation of the mechanical bar screen, operators have had issues dealing with large volumes of grease. Immediately after rain events, the volume of grease within the wastewater overwhelms the bar screen and auger system (used to convey the screenings to a trash receptacle) causing the equipment to fail or blind off until operators are able to manual clean and remove the built-up grease.

This facility also utilizes a 150-kW emergency generator. The City has already purchased a 250-kW emergency generator as a replacement. To date, the new generator has yet to be installed but it scheduled to be complete within the next year.

q. 20th and Malang (Wildwood Ranch) Lift Station

The 20th and Malang (Wildwood Ranch) lift station is located on the southwest side of the community within the Wildwood Ranch development. The lift station is more specifically located on the south side of 20th Street near the intersection of 20th Street and Malang Road. The lift station facility is a duplex submersible lift station with 25-Hp pumps, an 8' diameter by 29.5' deep wet well, a 6' diameter valve vault, and a 100-kW emergency generator. The facility was recently constructed and connected to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-20.

Currently the collection system is comprised of approximately 7,236 feet of 8" through 24" diameter gravity sewer line. The 6" diameter force main is

approximately 7,297 feet long and conveys wastewater south and into the Wildwood lift station basin.

The Wildwood Ranch development is a fast growing residential and commercial development, with future plans for the addition of an industrial park, on the west side of Joplin. A lift station evaluation report completed in 2018 by Allgeier, Martin and Associates estimated the current average daily wastewater flow to the 20th and Malang lift station to be roughly 40 gpm with a peak wastewater flow rate of 155 gpm.

Furthermore, the 2018 report evaluated the complete lift station drainage basin and the potential for a large 600 home residential development. If the complete 600 home development occurs, it would push the estimated peak wastewater flow rate to approximately 679 gpm. Additionally, the drainage basin could serve an additional 667 acres of undeveloped land. The report further estimated that development of nearly 40% of the undeveloped land could occur in the next 20 years, pushing the projected peak wastewater flow rate as high as 1,642 gpm.

The Wildwood Ranch lift station currently has a firm pumping capacity of 200 gpm, which provides a scour velocity of 2.3 fps in the 6" force main. The continued development of the planned 600 home subdivision will render the existing lift station inadequate. Not to mention the potential growth remaining in the undeveloped portions of the drainage basin. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

This is a newly constructed facility, and as such, the condition of the existing components should be considered adequate.

r. Wildwood Lift Station

Wildwood lift station is also located on the southwest side of the community within the Wildwood Ranch development. More specifically, the lift station is located at 3502 Antelope Road (S. Central City Road). The lift station facility is a duplex submersible lift station with 30-Hp pumps, an 8' diameter by 14' deep wet well, an 8' diameter by 13' deep overflow storage basin, a 6' diameter valve vault, and a 60-kW emergency generator. The facility was constructed in 2011 and connected to the City's SCADA system in 2018. A location map of this facility, including lift station information, has been shown on Figure IV-21.

Currently the collection system is comprised of approximately 13,243 feet of 8" and 12" diameter gravity sewer line. The 8" diameter force main is approximately 8,572 feet long and conveys wastewater south to the Shoal Creek WWTF.

As referenced in the previous 20th & Malang lift station paragraph, a lift station evaluation report completed in 2018 estimated the current average daily and peak wastewater flow rates for this lift station as well. From that report, the estimated current average daily wastewater flow rate was approximately 261 gpm with a peak flow rate of 433 gpm (200 gpm are from the 20th and Malang lift Station). Furthermore, the previous report estimated that nearly 70% of the remaining undeveloped land within the Wildwood lift station basin could develop within the next 20 years, which could increase the peak wastewater flow rate to 904 gpm.

The Wildwood lift station currently has a firm pumping capacity of 625 gpm, which provides a scour velocity of 4.3 fps in the 8" force main. Depending on how the development progresses within this basin, as well as the 20th and Malang lift station basin, the existing capacity could be exceeded within the next 20 years. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

After the initial construction of this lift station, maintenance issues persisted for this facility. A change in pumping capacity (increase from 570 gpm to 625 gpm) seems to have minimized these problems and the existing pumps should be considered to be in good condition. Also, the City has a current project underway that will install a larger 150-kW emergency generator from the Filmore Bridge lift station. The existing structures, piping, and valves appear to be in acceptable condition.

s. Travel Center (MoDOT Welcome Center) Lift Station

This lift station is located west of Joplin at the MoDOT Welcome Center located on the south side of I-44. As the name suggests, this lift station only serves the MoDOT Welcome Center facility. The Travel Center lift station contains duplex submersible 5-Hp pumps, a 4' diameter by 16' deep wet well, and a 5' diameter valve vault. The lift station was constructed in 2010. A location map of this facility, including lift station information, has been shown on Figure IV-22.

A 6" diameter sewer lateral line delivers wastewater from the Welcome Center to this lift station. A 4" diameter force main, approximately 6,194 feet long, carries the flow to the east and into the Petro lift station basin.

This lift station is not connected to the City's SCADA system; therefore, information regarding current pump run times and wastewater flow rates aren't available. Instead, previous information compiled during the design of the lift station facility anticipated an average daily wastewater flow rate of 2,500 gpd with an estimated peak flow rate of up to 20 gpm. Additional wastewater flow from this lift station facility isn't to be expected within the next 20-years, unless improvements or renovations to the Welcome Center are completed. The existing firm pumping capacity of 90-gpm, which produces a scour velocity of 2.3 fps within the existing 4" diameter force main, is adequate. Lift Station system curves containing flow rates, total dynamic head, and pump curves are included in Appendix D.

The lift station facility also doesn't have an emergency generator in the event of a power outage. Instead, the existing wet well can store just over 1,300 gallons of wastewater in the event of power failure. This would allow the storage of nearly 13 hours of wastewater at the estimated average flow rate and slightly over 1 hour at the estimated peak flow rate.

The lift station structures and piping appear to be in acceptable condition. Additionally, the existing sewage pumps and force main are noted as being in good condition.

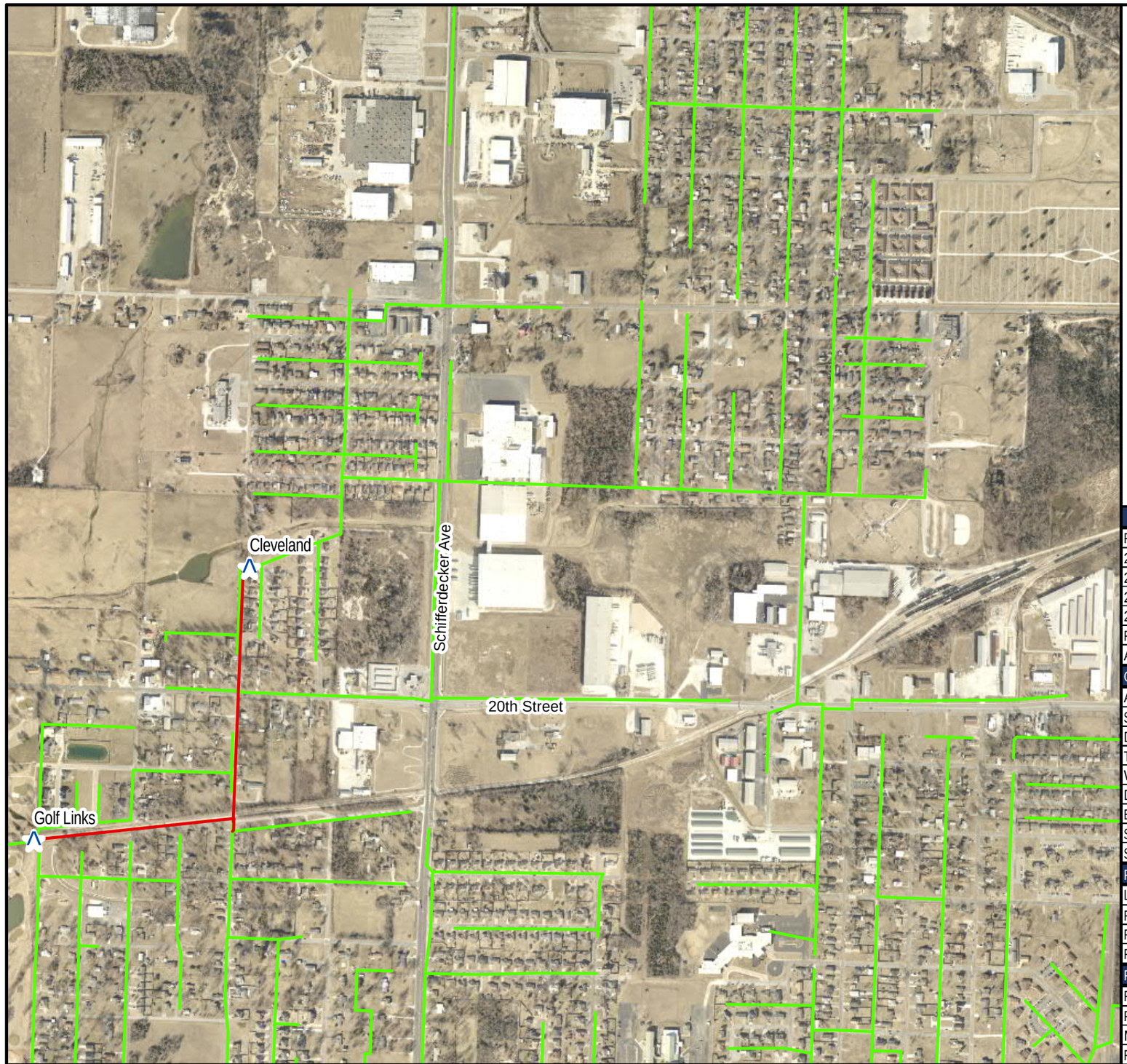
t. Petro Lift Station

The Petro lift station is located in the southwest corner of the community on the north side of West Cedar Drive. The facility was constructed in 2010 and connected to the City's SCADA system in 2018. It's a duplex submersible type lift station with 25-Hp pumps, a 10' diameter by 12.5' deep wet well, a 6' diameter valve vault, and a 120-kW emergency generator. A location map and additional lift station information have been shown on Figure IV-23.

This lift station serves a commercial district with a few residential customers on the south side of I-44 along Highway 43. The collection system is comprised of approximately 7,808 feet of 8" and 12" diameter gravity sewer line. An 8" diameter force main, approximately 14,203 feet long, carries the flow to the northwest and into the 42" diameter Shoal Creek interceptor sewer line.

The Petro lift station has a firm pumping capacity of 440 gpm, which provides a scour velocity of 2.8 fps in the 8" diameter force main. Based on the pump run times from 2018/2019, the current average daily wastewater flow rate was estimated to be 58 gpm. This equates to a peak flow rate of 223 gpm. Furthermore, it's projected that the year 2040 average and peak wastewater flow rates will increase to 68 gpm and 260 gpm, respectively.

The structures, piping, and valving are considered to be in adequate condition. The submersible pumps are noted to be in good condition.



Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

Cleveland Lift Station		
Firm Pumping Capacity (gpm)		300
2018 Average Daily Wastewater Flow (gpm)		50
2018 Peak Wastewater Flow (gpm)		195
2040 Average Daily Wastewater Flow (gpm)		59
2040 Peak Wastewater Flow (gpm)		227
Remaining Capacity After 2040		24%
Adequate Capacity		Yes
General Lift Station Information		
Address		1816 Cleveland Terrance
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Fillmore LS
Type		Duplex Submersible
Wet Well		8' Dia.
Depth (ft)		21
Electrical Service		3 Phase - 480V - 200 Amp
Standby Emergency Generator		100 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		37,880
Force Main Size (in)		10"
Force Main Length (ft)		1,723
Force Main Material		Transite
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Barnes	Barnes
Pump Model	6SE36044L	6SE36044L
Motor Size (Hp)	36	36
Rated Pump Capacity	300 gpm @ 60' TDH	300 gpm @ 60' TDH

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17th and Cleveland Lift Station
Figure IV-5



Legend

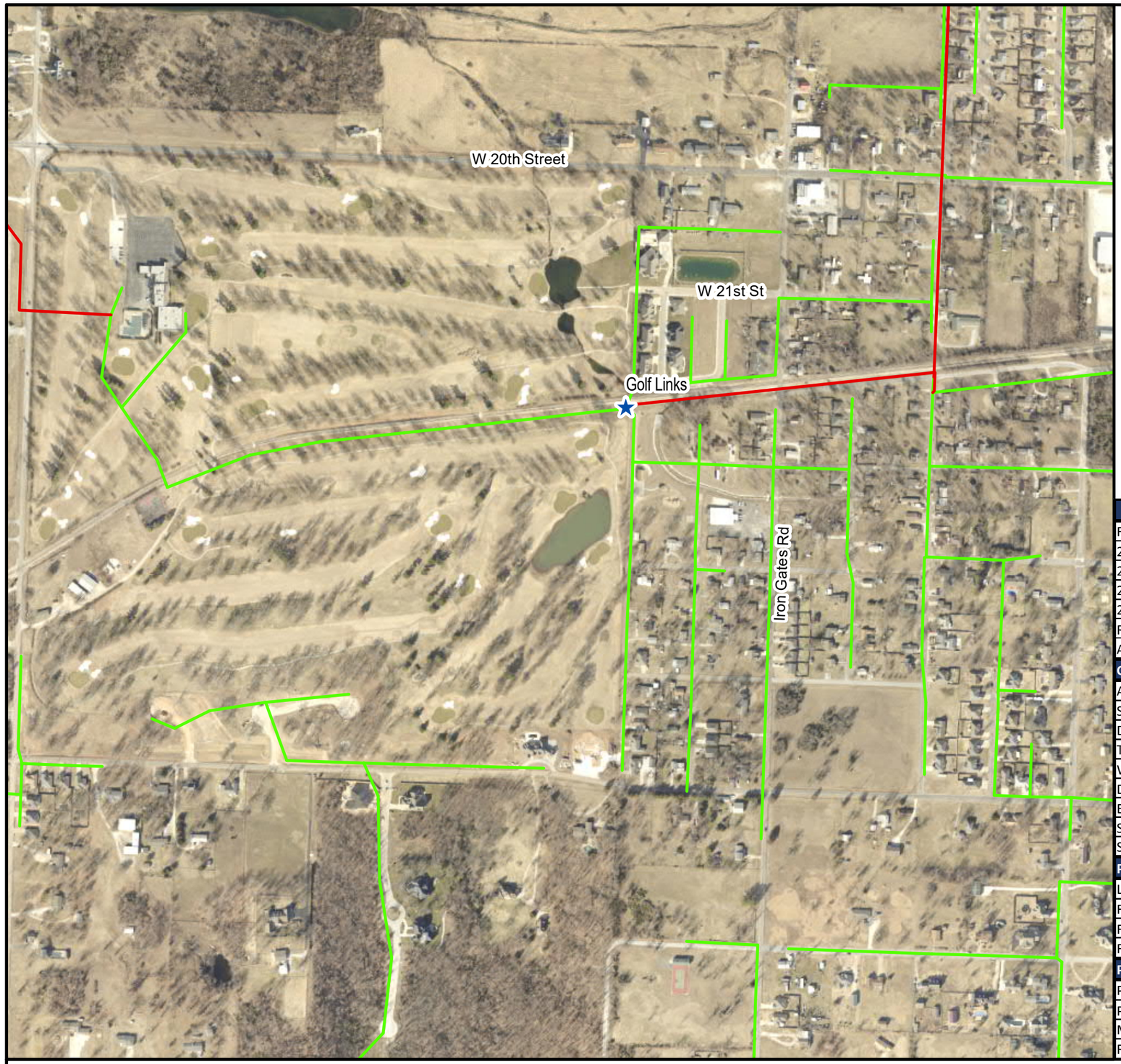
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Black Cat Lift station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		18
2018 Peak Wastewater Flow (gpm)		73
2040 Average Daily Wastewater Flow (gpm)		22
2040 Peak Wastewater Flow (gpm)		87
Remaining Capacity After 2040		3%
Adequate Capacity		Yes
General Lift Station Information		
Address		2002 Black Cat Rd.
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Golf Links LS / Filmore LS
Type		Duplex Submersible
Wet Well		5' Dia.
Depth (ft)		12.5
Electrical Service		3 Phase - 240V - 100 Amp
Standby Emergency Generator		18
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		4,840
Force Main Size (in)		4
Force Main Length (ft)		992
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Goulds	Goulds
Pump Model	3SD52H3BA	3SD52H3BA
Motor Size (Hp)	3	3
Rated Pump Capacity	90 gpm @ 60' TDH	90 gpm @ 60' TDH

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20th and Black Cat Lift Station
Figure IV-6



Legend

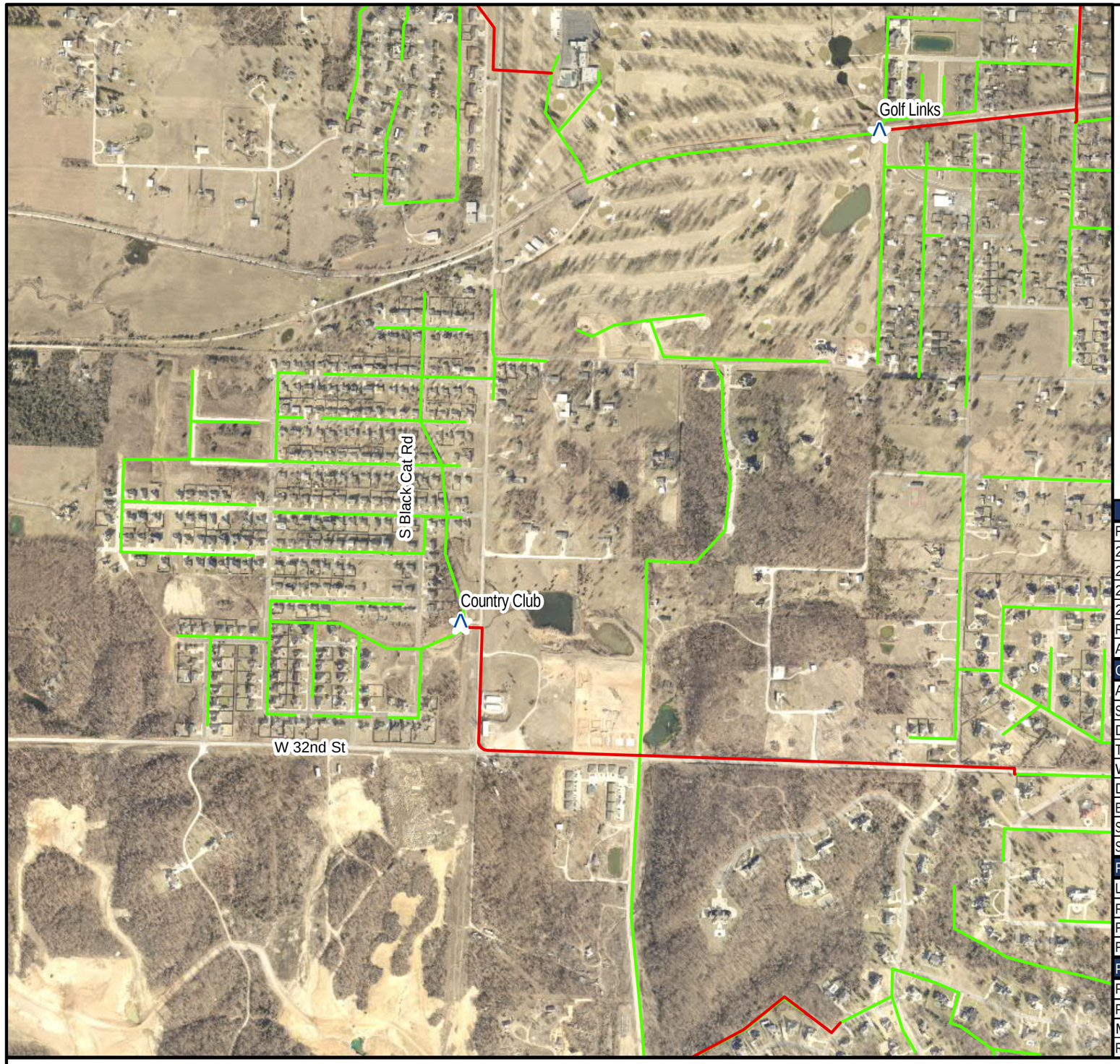
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Golf Links Lift Station		
Firm Pumping Capacity (gpm)		200
2018 Average Daily Wastewater Flow (gpm)		59
2018 Peak Wastewater Flow (gpm)		228
2040 Average Daily Wastewater Flow (gpm)		70
2040 Peak Wastewater Flow (gpm)		265
Remaining Capacity After 2040		-33%
Adequate Capacity		No
General Lift Station Information		
Address		2204 Golf Links
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Fillmore LS
Type		Duplex Submersible
Wet Well		2 - 6' Dia.
Depth (ft)		13
Electrical Service		3 Phase - 480V - 200 Amp
Standby Emergency Generator		80 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		14,664
Force Main Size (in)		4
Force Main Length (ft)		1,434
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4VC150M4-43	4VC150M4-43
Motor Size (Hp)	15	15
Rated Pump Capacity	200 gpm @ 65' TDH	200 gpm @ 65' TDH

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Golf Links Lift Station
Figure IV-7



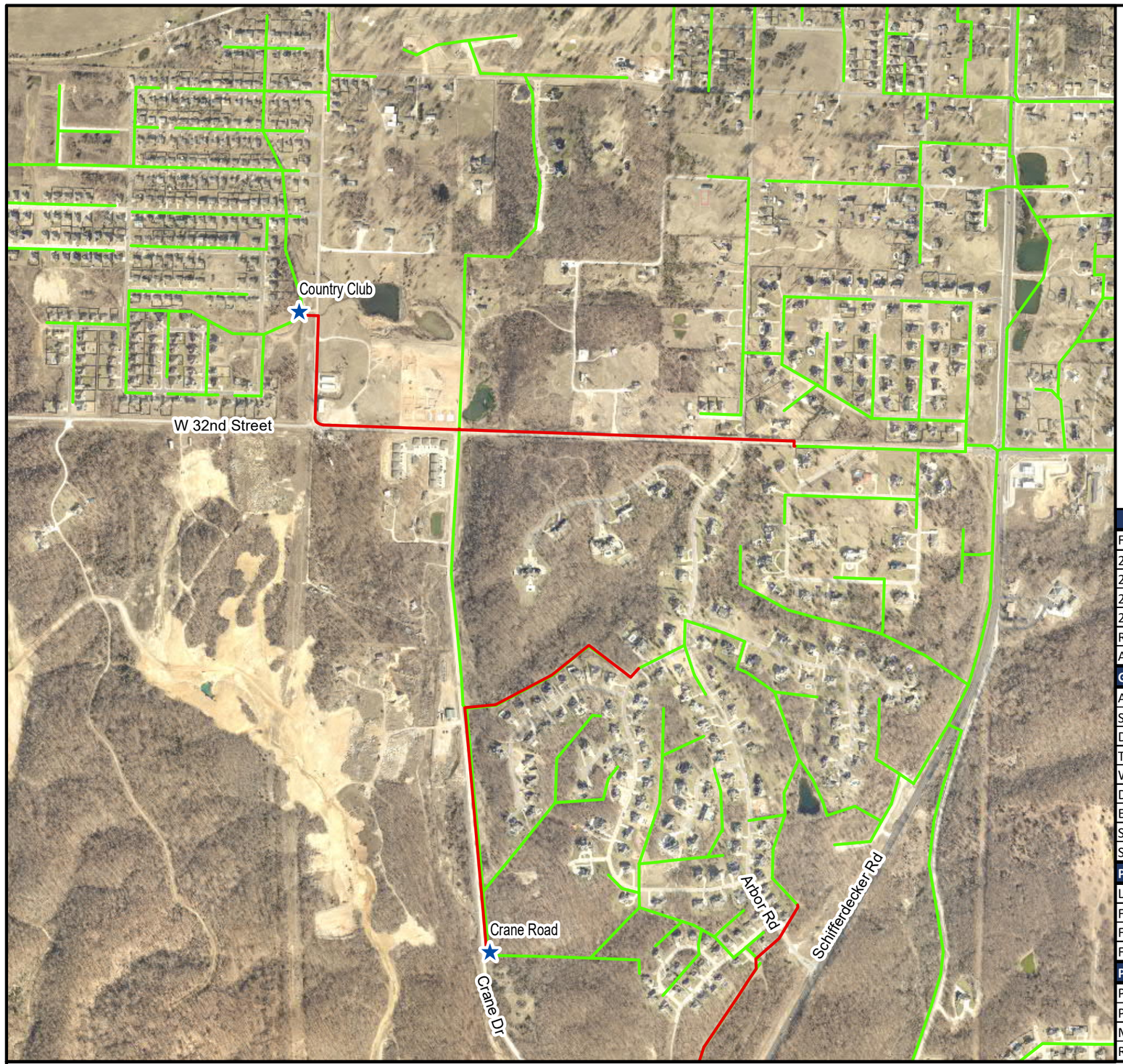
Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

County Club Lift Station		
Firm Pumping Capacity (gpm)		500
2018 Average Daily Wastewater Flow (gpm)		66
2018 Peak Wastewater Flow (gpm)		263
2040 Average Daily Wastewater Flow (gpm)		90
2040 Peak Wastewater Flow (gpm)		359
Remaining Capacity After 2040		28%
Adequate Capacity		Yes
General Lift Station Information		
Address		3000 Country Club
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Fillmore LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		16
Electrical Service		3 Phase - 480V - 100 Amp
Standby Emergency Generator		No
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		22,019
Force Main Size (in)		8
Force Main Length (ft)		4,656
Force Main Material		SDR 26 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Hydromatic	Hydromatic
Pump Model	S4QX	S4QX
Motor Size (Hp)	25	25
Rated Pump Capacity	500 gpm @ 91' TDH	500 gpm @ 91' TDH

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Country Club Lift Station
Figure IV-8



Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Crane Road Lift Station		
Firm Pumping Capacity (gpm)		300
2018 Average Daily Wastewater Flow (gpm)		25
2018 Peak Wastewater Flow (gpm)		101
2040 Average Daily Wastewater Flow (gpm)		93
2040 Peak Wastewater Flow (gpm)		370
Remaining Capacity After 2040		-23%
Adequate Capacity		No
General Lift Station Information		
Address		4001 Tanyard
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Fillmore LS
Type		Duplex Submersible
Wet Well		2 - 6.5' Square
Depth (ft)		13
Electrical Service		3 Phase - 480V - 150 Amp
Standby Emergency Generator		130 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		20,648
Force Main Size (in)		6
Force Main Length (ft)		3,436
Force Main Material		SDR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Wilo	KSB
Pump Model	FA15.66	KRT F 100-401/354XG-S
Motor Size (Hp)	50	50
Rated Pump Capacity	300 gpm @ 160' TDH	300 gpm @ 160' TDH

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Crane Road Lift Station
Figure IV-9



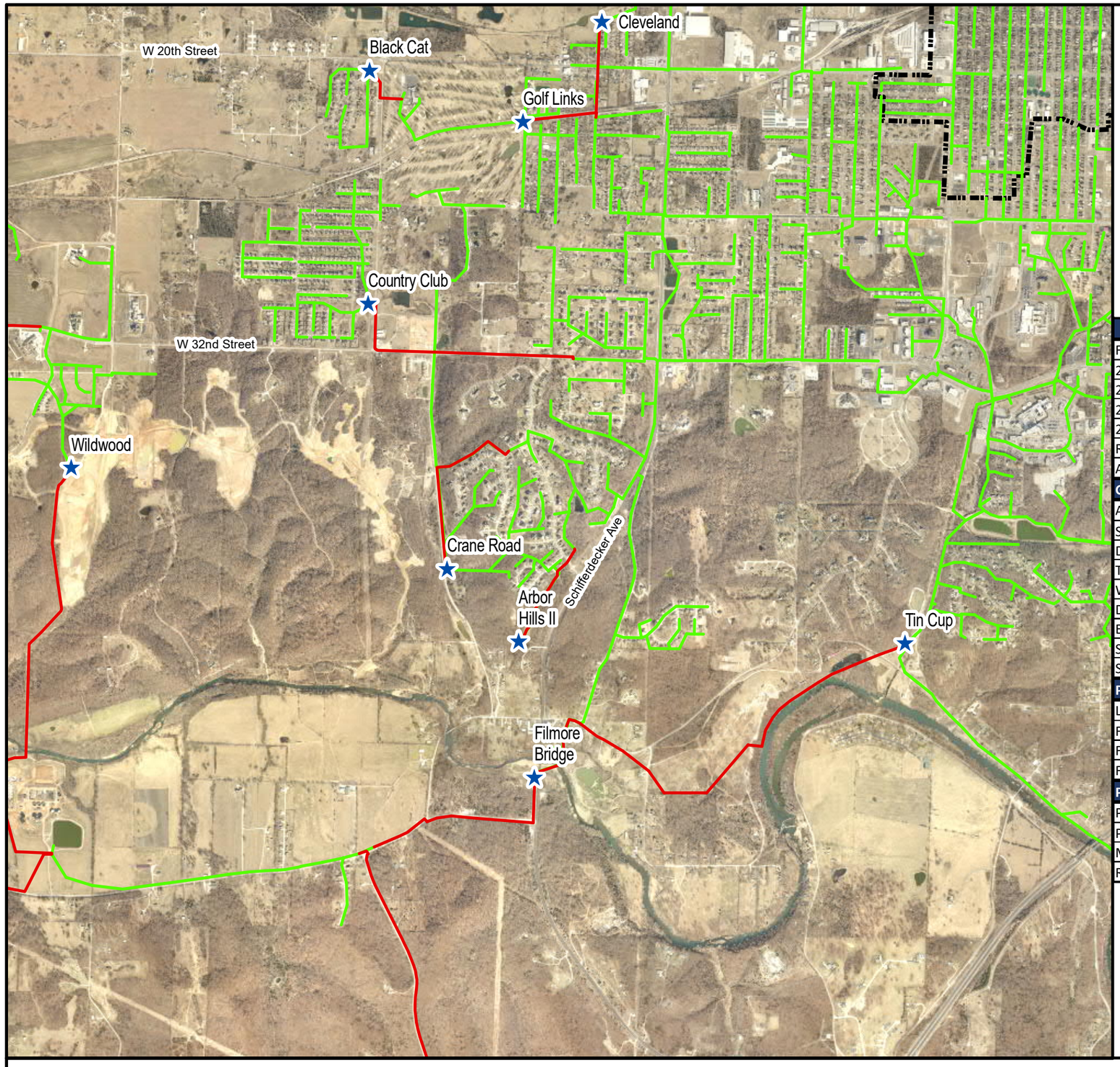
Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

Arbor Hills II Lift Station		
Firm Pumping Capacity (gpm)		80
2018 Average Daily Wastewater Flow (gpm)		1
2018 Peak Wastewater Flow (gpm)		4
2040 Average Daily Wastewater Flow (gpm)		8
2040 Peak Wastewater Flow (gpm)		30
Remaining Capacity After 2040		63%
Adequate Capacity		Yes
General Lift Station Information		
Address		Notting Hill Road
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Fillmore LS
Type		Duplex Submersible
Wet Well		2 - 8' Dia.
Depth (ft)		25.5
Electrical Service		3 Phase - 208V - 200 Amp
Standby Emergency Generator		No
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		1,461
Force Main Size (in)		4
Force Main Length (ft)		2,014
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4RH150M2-03-30	4RH150M2-03-30
Motor Size (Hp)	15	15
Rated Pump Capacity	80 gpm @ 100' TDH	80 gpm @ 100' TDH

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Arbor Hills II Lift Station
Figure IV-10



Legend

- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

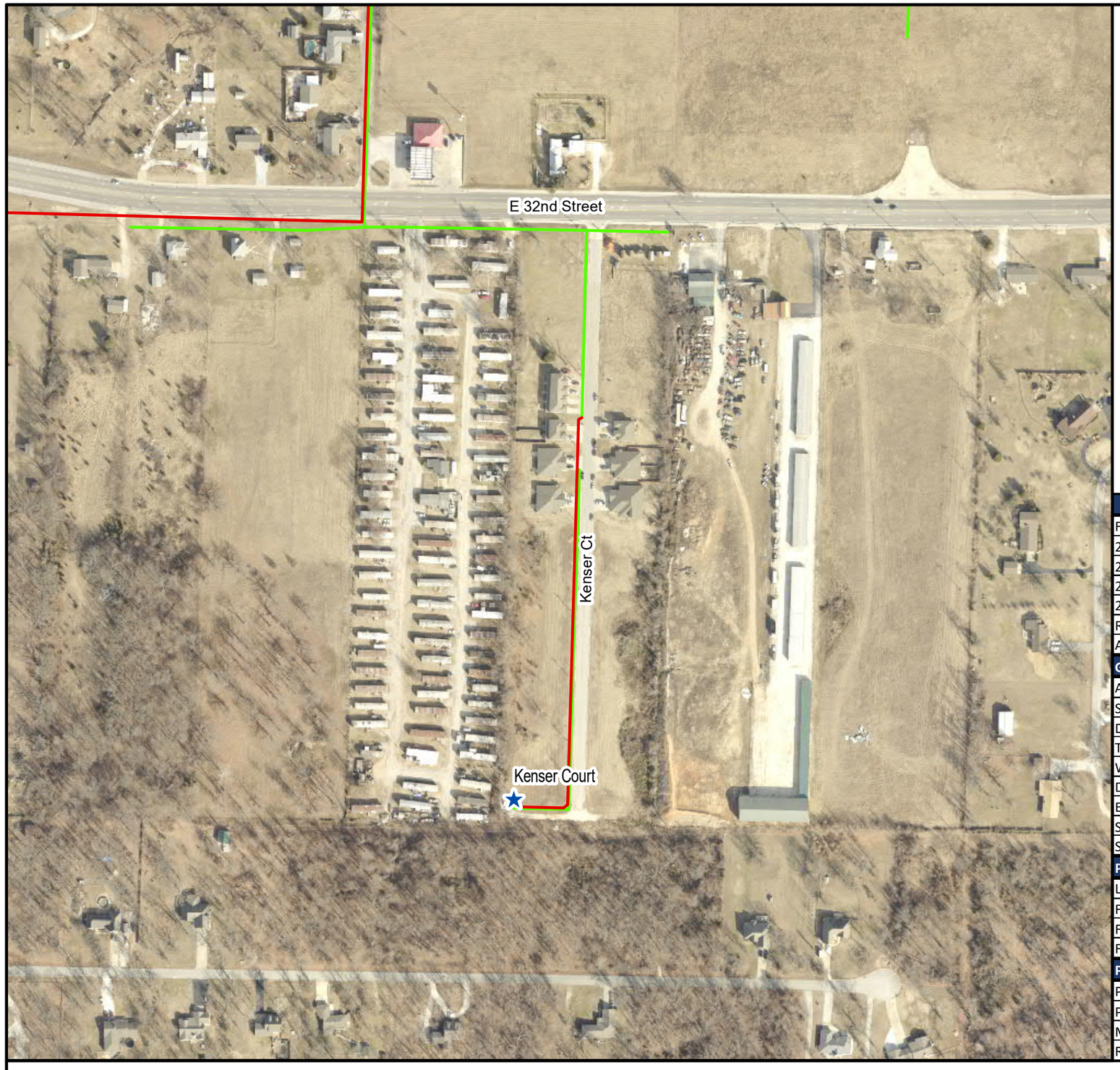
N

Fillmore Lift Station	
Firm Pumping Capacity (gpm)	2400 (3,300 Near Future)
2018 Average Daily Wastewater Flow (gpm)	625
2018 Peak Wastewater Flow (gpm)	2500
2040 Average Daily Wastewater Flow (gpm)	737
2040 Peak Wastewater Flow (gpm)	2950
Remaining Capacity After 2040	-23%
Adequate Capacity	No
General Lift Station Information	
Address	2401 S Coyote Dr.
Sewer Basin	Shoal Creek
Downstream Discharge Destination	Gravity Sewer
Type	Tri-Plex Wet/Dry Well
Wet Well	4' x 24'
Depth (ft)	33
Electrical Service	3 Phase - 480V - 500 Amp
Standby Emergency Generator	250 kW
SCADA Equipped	Yes
Pipeline Information	
Length of Collection System Served (ft)	80,143
Force Main Size (in)	24 (Future Parallel 24)
Force Main Length (ft)	3,935
Force Main Material	Ductile Iron

Pump Information	Pump 1	Pump 2	Pump 3
Pump Make	Yeomans	Yeomans	Yeomans
Pump Model	6315-4A	6315-4A	6315-4A
Motor Size (Hp)	75	75	75
Rated Pump Capacity	1,650 gpm @ 110' TDH	1,650 gpm @ 110' TDH	1,650 gpm @ 110' TDH

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Filmore Bridge Lift Station
Figure IV-11



Legend

- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Kenser Court Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		4
2018 Peak Wastewater Flow (gpm)		17
2040 Average Daily Wastewater Flow (gpm)		8
2040 Peak Wastewater Flow (gpm)		33
Remaining Capacity After 2040		63%
Adequate Capacity		Yes
General Lift Station Information		
Address		3000 Kensor Court
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Flying J LS
Type		Duplex Submersible
Wet Well		7' x 7' Square
Depth (ft)		22
Electrical Service		1 Phase - 240V - 150 Amp
Standby Emergency Generator		40 kW
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		854
Force Main Size (in)		4
Force Main Length (ft)		974
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4R50M4	4R50M4
Motor Size (Hp)	5	5
Rated Pump Capacity	90 gpm @ 60' TDH	90 gpm @ 60' TDH

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Kenser Court Lift Station
Figure IV-12



Legend

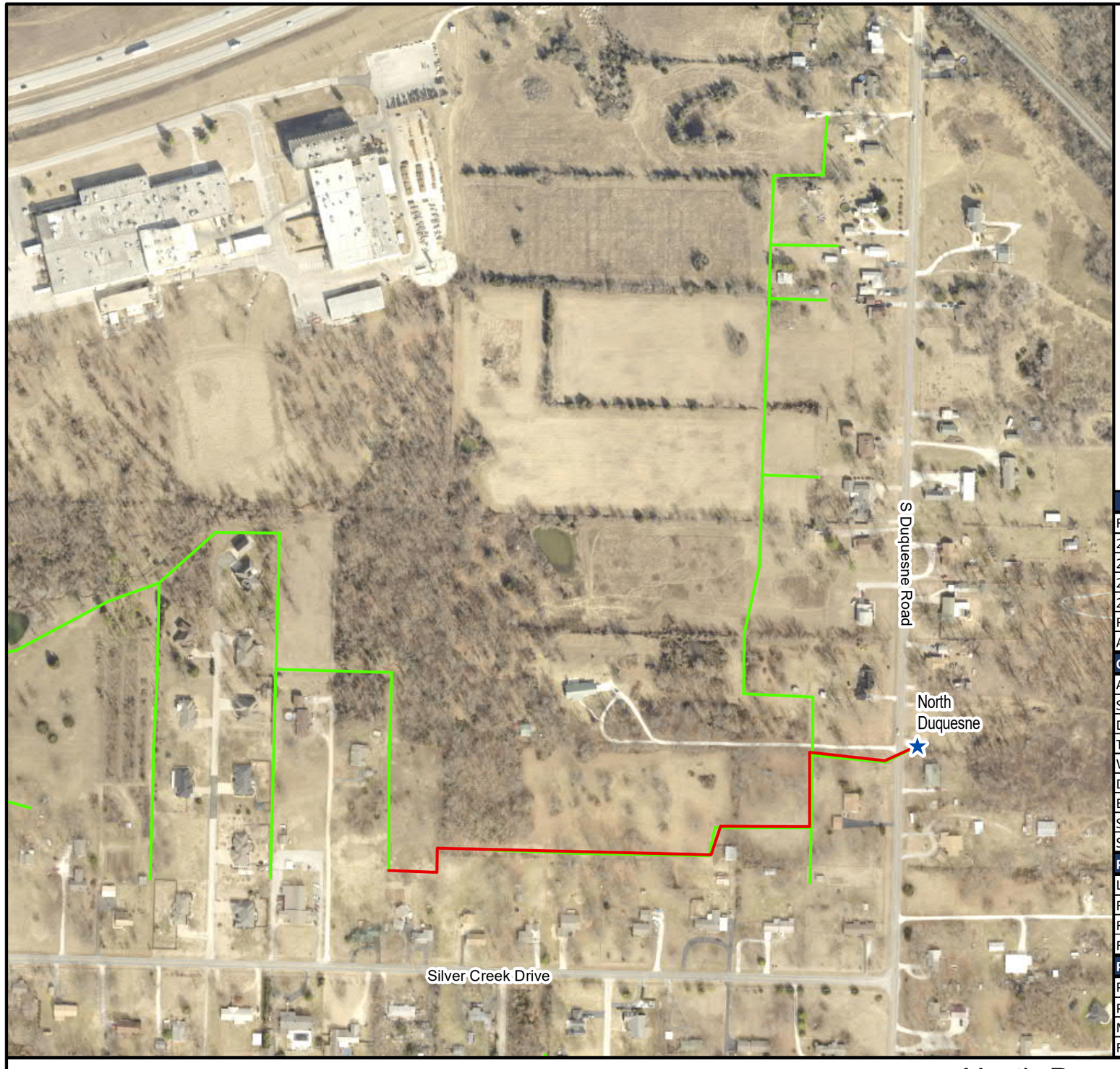
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Flying J Lift Station		
Firm Pumping Capacity (gpm)		265
2018 Average Daily Wastewater Flow (gpm)		40
2018 Peak Wastewater Flow (gpm)		157
2040 Average Daily Wastewater Flow (gpm)		47
2040 Peak Wastewater Flow (gpm)		184
Remaining Capacity After 2040		31%
Adequate Capacity		Yes
General Lift Station Information		
Address		3023 South Serene
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		7' Dia.
Depth (ft)		16
Electrical Service		3 Phase - 480V - 200 Amp
Standby Emergency Generator		30 kW (Future 60 kW)
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		5,832
Force Main Size (in)		6
Force Main Length (ft)		3,054
Force Main Material		SDR 26 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Barnes	Barnes
Pump Model	2519 QR	2519 QR
Motor Size (Hp)	10	10
Rated Pump Capacity	265 gpm @ 65' TDH	265 gpm @ 65' TDH

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Flying J Lift Station
Figure IV-13



Legend

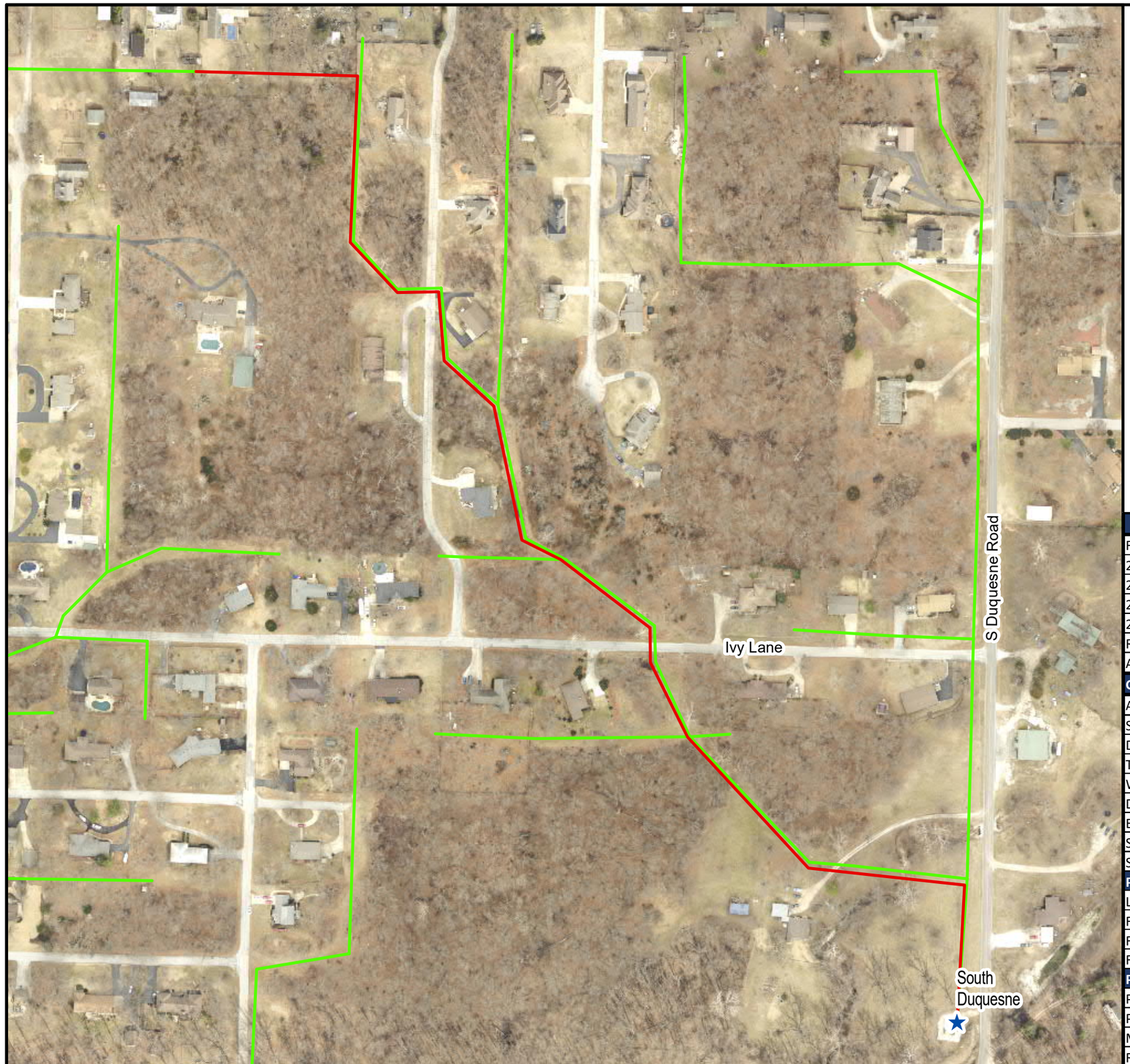
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

North Duquesne Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		4
2018 Peak Wastewater Flow (gpm)		17
2040 Average Daily Wastewater Flow (gpm)		5
2040 Peak Wastewater Flow (gpm)		20
Remaining Capacity After 2040		78%
Adequate Capacity		Yes
General Lift Station Information		
Address		4230 S Duquesne
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		13
Electrical Service		1 Phase - 240V - 100 Amp
Standby Emergency Generator		80 kW Portable
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		4,402
Force Main Size (in)		4
Force Main Length (ft)		1,891
Force Main Material		SDR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4R50M4-23	4R50M4-23
Motor Size (Hp)	5	5
Rated Pump Capacity	90 gpm @ 41' TDH	90 gpm @ 41' TDH

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North Duquesne (Silver Creek B) Lift Station
Figure IV-14



Legend

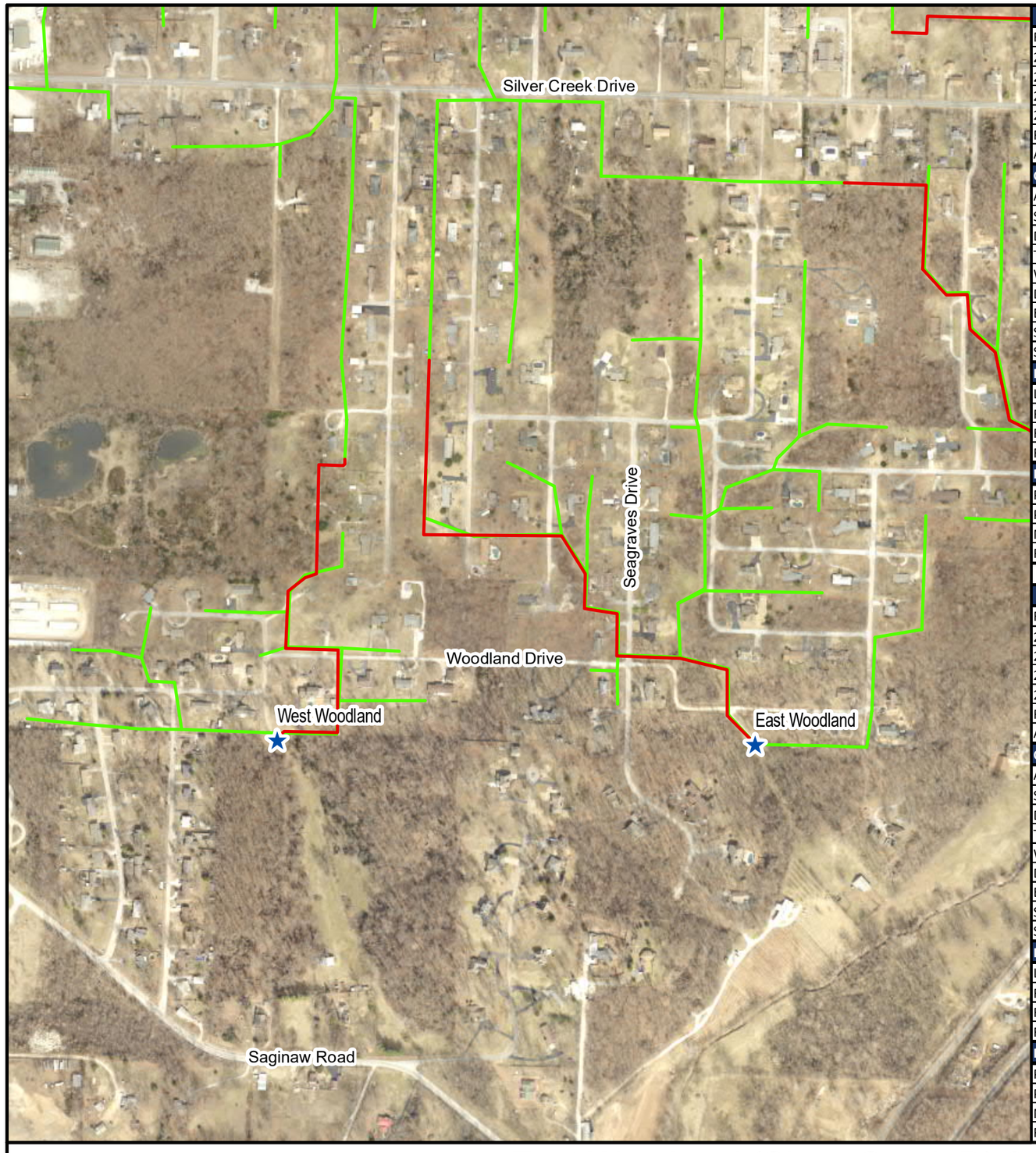
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

South Duquesne Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		7
2018 Peak Wastewater Flow (gpm)		28
2040 Average Daily Wastewater Flow (gpm)		8
2040 Peak Wastewater Flow (gpm)		33
Remaining Capacity After 2040		63%
Adequate Capacity		Yes
General Lift Station Information		
Address		4616 S Duquesne
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		14
Electrical Service		1 Phase - 240V - 400 Amp
Standby Emergency Generator		50 kW
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		7,639
Force Main Size (in)		4
Force Main Length (ft)		2,949
Force Main Material		SDR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4RC200M2-23	4RC200M2-23
Motor Size (Hp)	20	20
Rated Pump Capacity	90 gpm @ 123' TDH	90 gpm @ 123' TDH

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South Duquesne (Silver Creek C) Lift Station
Figure IV-15



East Woodland Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		12
2018 Peak Wastewater Flow (gpm)		49
2040 Average Daily Wastewater Flow (gpm)		15
2040 Peak Wastewater Flow (gpm)		58
Remaining Capacity After 2040		36%
Adequate Capacity		Yes
General Lift Station Information		
Address		3300 East Woodland
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		14
Electrical Service		1 Phase - 240V - 200 Amp
Standby Emergency Generator		40 kW
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		9,818
Force Main Size (in)		4
Force Main Length (ft)		2,693
Force Main Material		SDR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4RH150M2-23	4RH150M2-23
Motor Size (Hp)	15	15
Rated Pump Capacity	90 gpm @ 108' TDH	90 gpm @ 108' TDH

West Woodland Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		6
2018 Peak Wastewater Flow (gpm)		23
2040 Average Daily Wastewater Flow (gpm)		7
2040 Peak Wastewater Flow (gpm)		27
Remaining Capacity After 2039		70%
Adequate Capacity		Yes
General Lift Station Information		
Address		3110 West Woodland
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		15
Electrical Service		1 Phase - 240V - 200 Amp
Standby Emergency Generator		40 kW
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		4,379
Force Main Size (in)		4
Force Main Length (ft)		1,752
Force Main Material		SR 21 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4RH50M2-23	4RH50M2-23
Motor Size (Hp)	15	15
Rated Pump Capacity	90 gpm @ 78' TDH	90 gpm @ 78' TDH

Legend

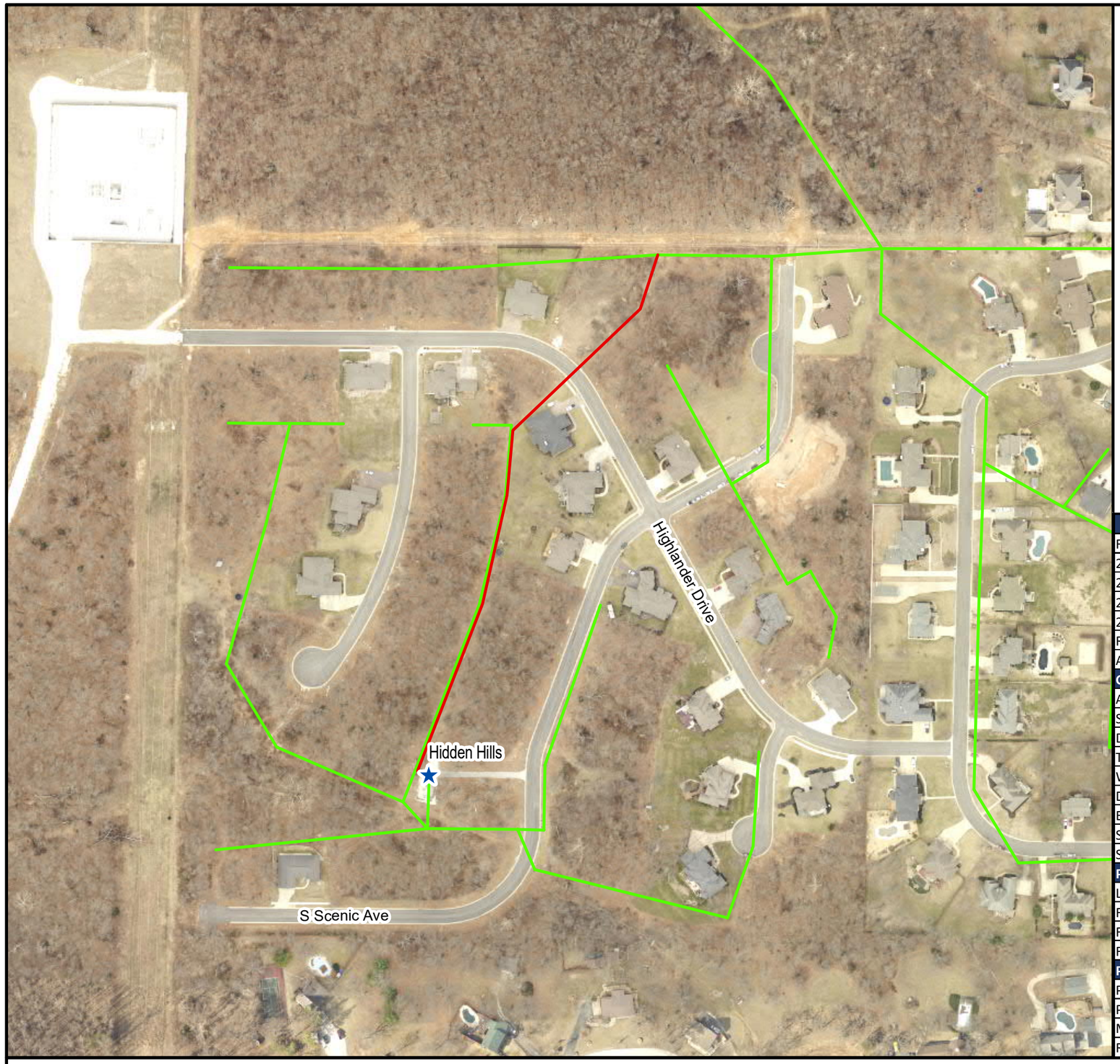
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

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East Woodland (Silver Creek D) & West Woodland (Silver Creek E) Lift Stations

Figure IV-16



Legend

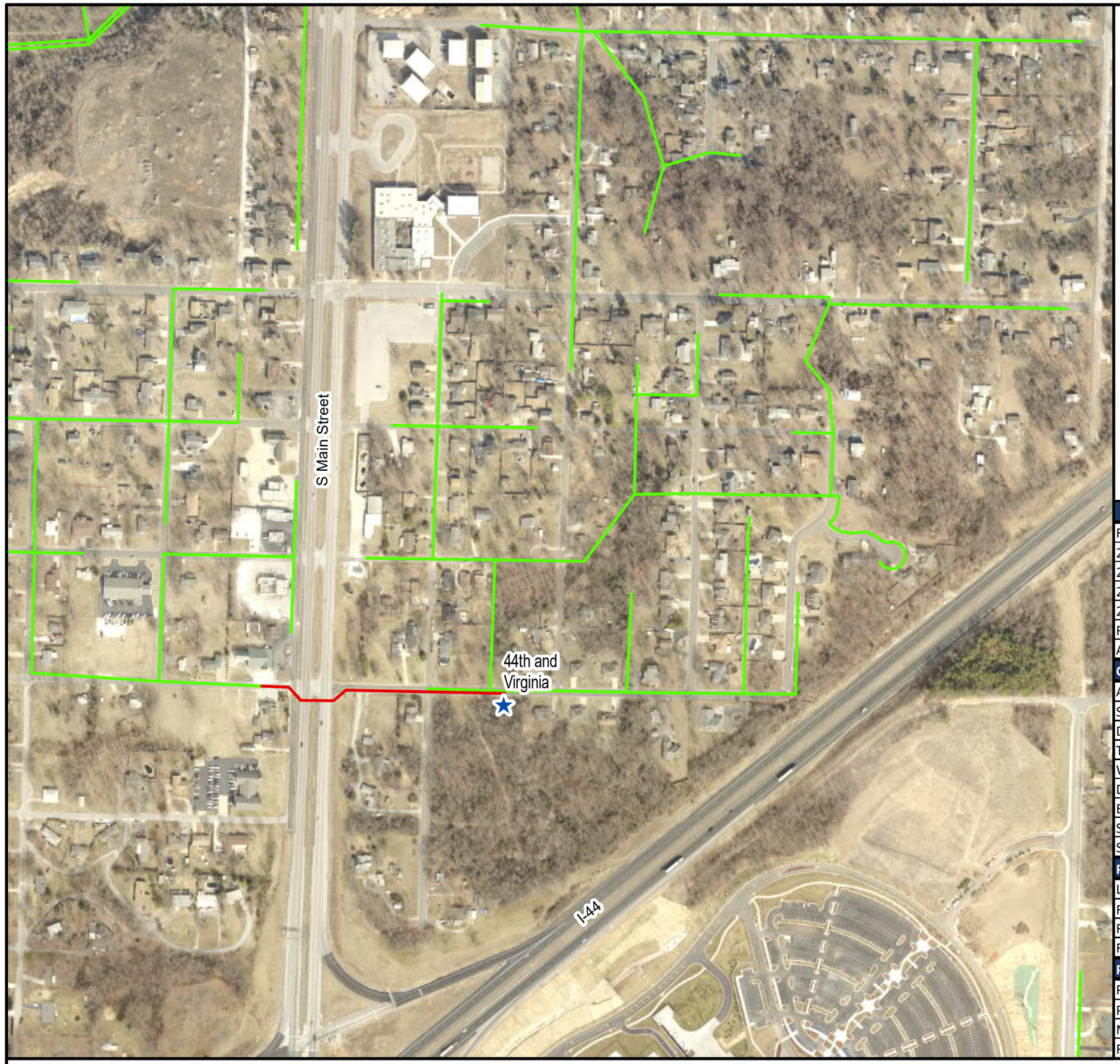
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Hidden Hills Lift Station		
Firm Pumping Capacity (gpm)		200
2018 Average Daily Wastewater Flow (gpm)		3
2018 Peak Wastewater Flow (gpm)		15
2040 Average Daily Wastewater Flow (gpm)		4
2040 Peak Wastewater Flow (gpm)		17
Remaining Capacity After 2040		92%
Adequate Capacity		Yes
General Lift Station Information		
Address		6208 Scenic Avenue
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Submersible
Wet Well		6' Dia.
Depth (ft)		19
Electrical Service		3 Phase - 208V - 125 Amp
Standby Emergency Generator		40 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		3,991
Force Main Size (in)		4
Force Main Length (ft)		1,142
Force Main Material		C900 PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Hydromatic	Hydromatic
Pump Model	S4HRC	S4HRC
Motor Size (Hp)	10	10
Rated Pump Capacity	200 gpm @ 65' TDH	200 gpm @ 65' TDH

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Hidden Hills Lift Station
Figure IV-17



Legend

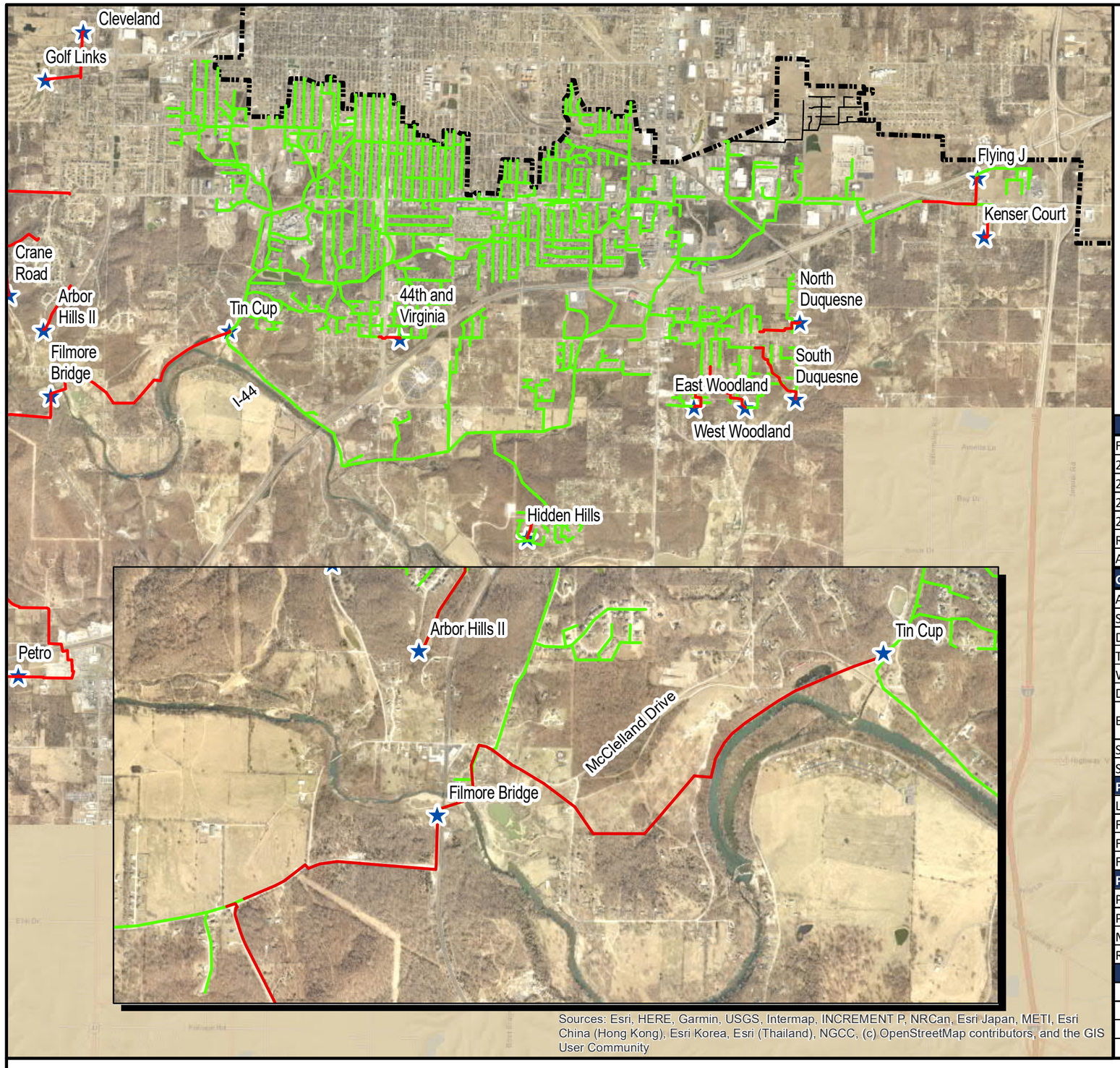
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

44th & Virginia Lift Station		
Firm Pumping Capacity (gpm)		200
2018 Average Daily Wastewater Flow (gpm)		60
2018 Peak Wastewater Flow (gpm)		231
2039 Average Daily Wastewater Flow (gpm)		71
2039 Peak Wastewater Flow (gpm)		269
Remaining Capacity After 2039		-35%
Adequate Capacity		No
General Lift Station Information		
Address		220 E 44th
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Tin Cup LS
Type		Duplex Wet/Dry Well
Wet Well		4' x 9'
Depth (ft)		9
Electrical Service		3 Phase - 230V - 100 Amp
Standby Emergency Generator		50 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		9,435
Force Main Size (in)		6
Force Main Length (ft)		880
Force Main Material		Transite (Future PVC)
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Cornell	Cornell
Pump Model	Unknown	Unknown
Motor Size (Hp)	10	10
Rated Pump Capacity	200 gpm @ 50' TDH	200 gpm @ 50' TDH

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44th & Virginia Lift Station
Figure IV-18



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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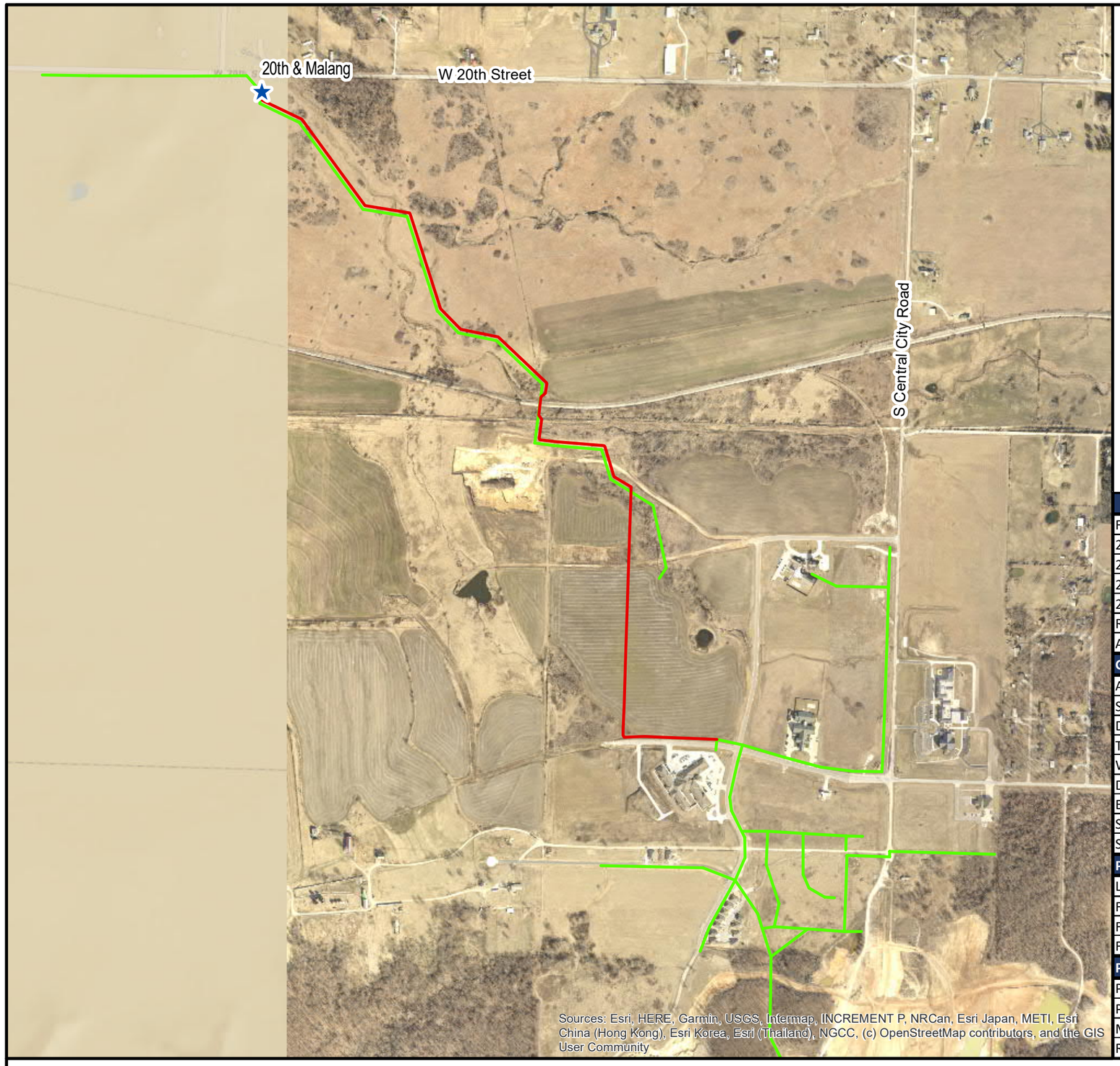
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Tin Cup Lift Station		
Firm Pumping Capacity (gpm)		5,400
2018 Average Daily Wastewater Flow (gpm)		2292
2018 Peak Wastewater Flow (gpm)		9167
2040 Average Daily Wastewater Flow (gpm)		2704
2040 Peak Wastewater Flow (gpm)		10817
Remaining Capacity After 2040		-100%
Adequate Capacity		No
General Lift Station Information		
Address		1801 W Glendale Road
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Gravity Sewer
Type		Quintuplex Wet/Dry Well
Wet Well		23' x 23'
Depth (ft)		34
Electrical Service		3 Phase - 480V - 1000 Amp (Dual System Feed)
Standby Emergency Generator		150 kW (Future 250 kW)
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		254,334
Force Main Size (in)		24/20
Force Main Length (Not Including Shared Filmore		9082/236
Force Main Material		Ductile iron
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Yeomans	Yeomans
Pump Model	6312-3D	6312-3D
Motor Size (Hp)	40	40
Rated Pump Capacity	1,500 gpm @ 70' TDH	1,500 gpm @ 70' TDH
Pump 3	**Pump 4**	**Pump 5**
Yeomans	Yeomans	Yeomans
6312-3D	8518-4A	8518-4A
40	100	100
1,500 gpm @ 70' TDH	3,000 gpm @ 71' TDH	3,000 gpm @ 71' TDH

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Tin Cup Lift Station
Figure IV-19



Legend

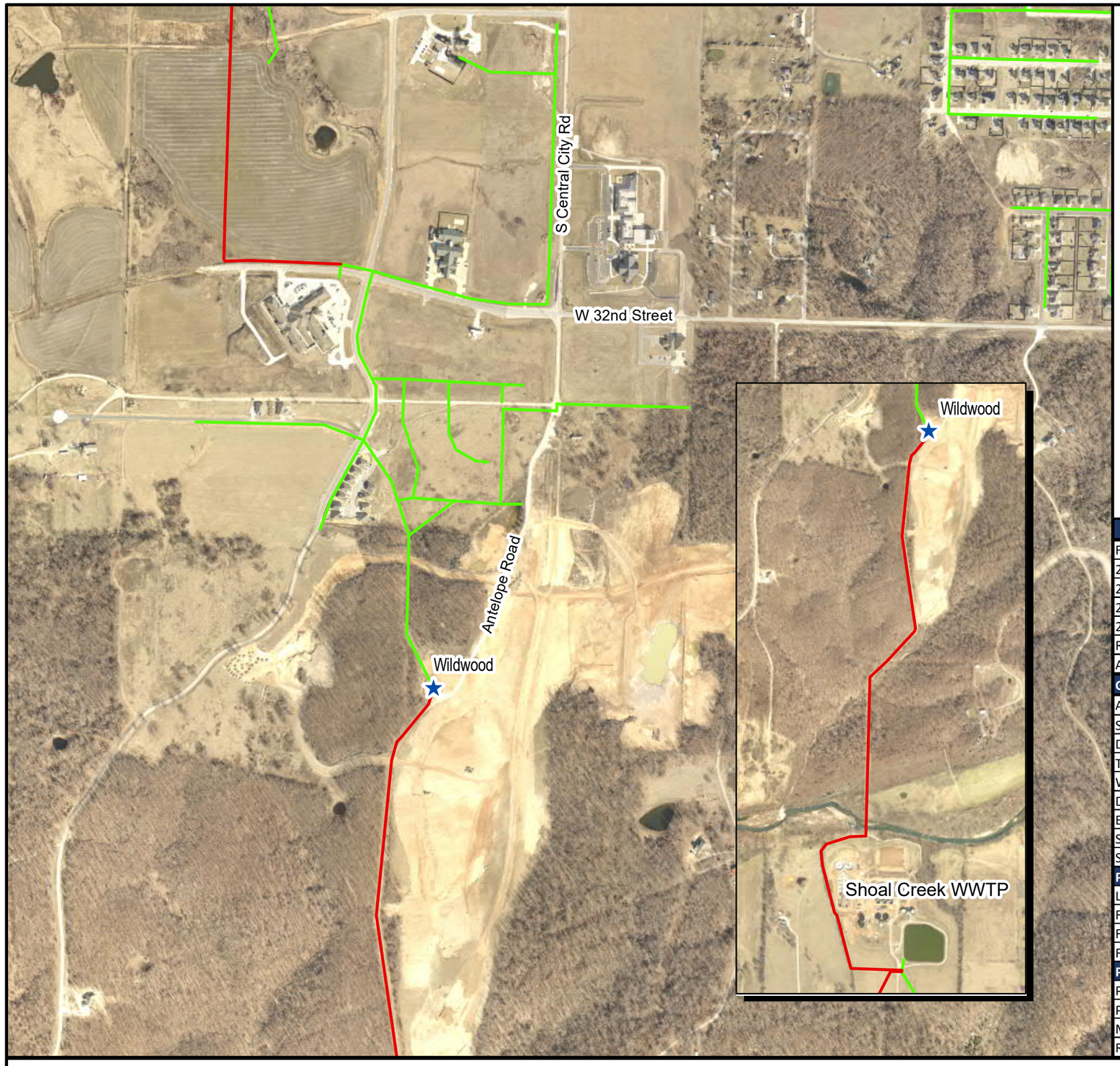
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

20th & Malang Lift Station		
Firm Pumping Capacity (gpm)		200
2018 Average Daily Wastewater Flow (gpm)		40
2018 Peak Wastewater Flow (gpm)		155
2040 Average Daily Wastewater Flow (gpm)		530
2040 Peak Wastewater Flow (gpm)		1642
Remaining Capacity After 2040		-721%
Adequate Capacity		No
General Lift Station Information		
Address		6700 W 20th
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Wildwood LS
Type		Duplex Submersible
Wet Well		8' Dia.
Depth (ft)		29.5
Electrical Service		3 Phase - 480V - 400 Amp
Standby Emergency Generator		100 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		7,213
Force Main Size (in)		6
Force Main Length (ft)		7,297
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	KSB	KSB
Pump Model	KRTF 100-401/374XEG-S IE3	KRTF 100-401/374XEG-S IE3
Motor Size (Hp)	25	25
Rated Pump Capacity	250 gpm @ 120' TDH	250 gpm @ 120' TDH

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20th & Malang Lift Station
Figure IV-20



Legend

- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Wildwood Lift Station		
Firm Pumping Capacity (gpm)		625
2018 Average Daily Wastewater Flow (gpm)		261
2018 Peak Wastewater Flow (gpm)		433
2040 Average Daily Wastewater Flow (gpm)		407
2040 Peak Wastewater Flow (gpm)		904
Remaining Capacity After 2040		-45%
Adequate Capacity		No
General Lift Station Information		
Address		3502 Antelope Road
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Gravity Sewer
Type		Duplex Submersible
Wet Well		2 - 8' Dia.
Depth (ft)		14 & 13
Electrical Service		3 Phase - 480V - 150 Amp
Standby Emergency Generator		60 kW (Future 150 kW)
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		13,243
Force Main Size (in)		8
Force Main Length (ft)		8,572
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	KSB	KSB
Pump Model	KRT80-252/224XEG-S	KRT80-252/224XEG-S
Motor Size (Hp)	30	30
Rated Pump Capacity	625 gpm @ 96' TDH	625 gpm @ 96' TDH

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Wildwood Lift Station
Figure IV-21



Legend

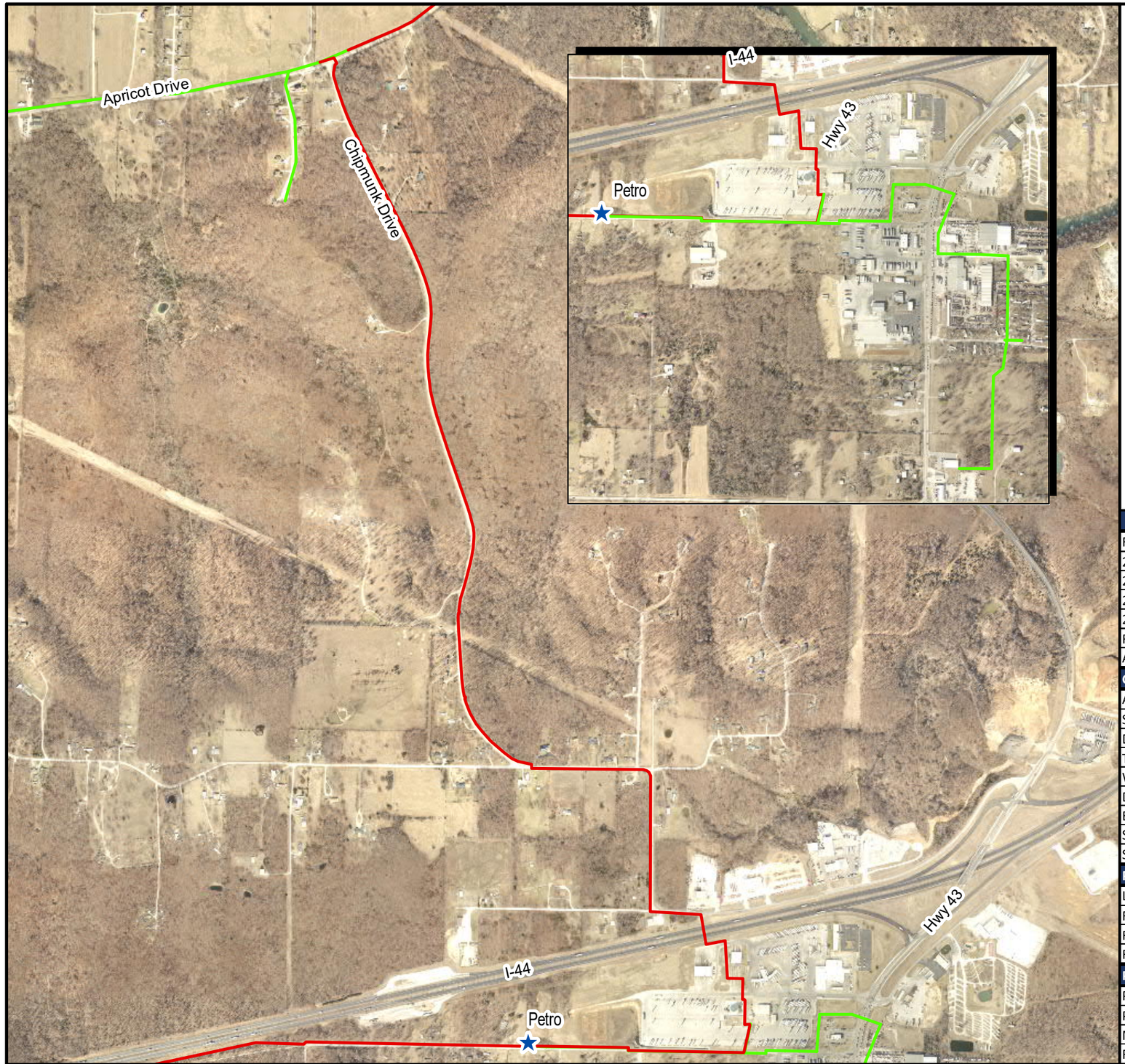
- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Travel Center Lift Station		
Firm Pumping Capacity (gpm)		90
2018 Average Daily Wastewater Flow (gpm)		2
2018 Peak Wastewater Flow (gpm)		20
2040 Average Daily Wastewater Flow (gpm)		2
2040 Peak Wastewater Flow (gpm)		20
Remaining Capacity After 2040		78%
Adequate Capacity		Yes
General Lift Station Information		
Address		200 E Highway (I-44)
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Petro LS
Type		Duplex Submersible
Wet Well		4' Dia.
Depth (ft)		16
Electrical Service		1 Phase - 240V - 200 Amp
Standby Emergency Generator		No
SCADA Equipped		No
Pipeline Information		
Length of Collection System Served (ft)		Travel Center Only
Force Main Size (in)		4
Force Main Length (ft)		6,194
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	WG50-21-35	WG50-21-35
Motor Size (Hp)	5	5
Rated Pump Capacity	90 gpm @ 50' TDH	90 gpm @ 50' TDH

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Travel Center Lift Station
Figure IV-22



Legend

- ★ Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines

N

Petro Lift Station		
Firm Pumping Capacity (gpm)		440
2018 Average Daily Wastewater Flow (gpm)		58
2018 Peak Wastewater Flow (gpm)		223
2040 Average Daily Wastewater Flow (gpm)		68
2040 Peak Wastewater Flow (gpm)		260
Remaining Capacity After 2040		41%
Adequate Capacity		Yes
General Lift Station Information		
Address		4555 Cedar Road
Sewer Basin		Shoal Creek
Downstream Discharge Destination		Gravity Sewer
Type		Duplex Submersible
Wet Well		10' Dia.
Depth (ft)		12.5
Electrical Service		3 Phase - 480V - 200 Amp
Standby Emergency Generator		125 kW
SCADA Equipped		Yes
Pipeline Information		
Length of Collection System Served (ft)		7,808
Force Main Size (in)		8
Force Main Length (ft)		14,203
Force Main Material		PVC
Pump Information	**Pump 1**	**Pump 2**
Pump Make	Myers	Myers
Pump Model	4VC250M4-43	4VC250M4-43
Motor Size (Hp)	25	25
Rated Pump Capacity	440 gpm @ 116' TDH	440 gpm @ 116' TDH

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Petro Lift Station
Figure IV-23

B. Lift Station Recommendations and Associated Costs

1. Turkey Creek Basin

a. Years 0 – 5.

The only lift station recommendation over the next 5 years within the Turkey Creek basin is an upgrade to the pumping capacity of the Dog Pound lift station. As described previously, the currently estimated peak wastewater flow rate is greater than the firm pumping capacity of the lift station. Additionally, the current 300 gpm firm capacity of this lift station does not provide the minimum scour velocity of 2.0 fps through the existing 8" diameter force main.

It's recommended that the firm pumping capacity of the Dog Pound lift station be increased to at least 377 gpm. This firm pumping capacity matches the projected year 2040 peak wastewater flow rate for this lift station basin. It would also increase the velocity within the 8" diameter force main to approximately 2.4 fps. Unfortunately, an increase in pumping capacity will also increase the necessary pump horsepower; which will require replacement of the existing electrical service, controls, and the emergency generator. The following table presents the estimated construction costs and Figure IV-24 shows the recommended Turkey Creek lift station improvements.

TABLE IV-1. LIFT STATION RECOMMENDATIONS
TURKEY CREEK BASIN YEARS 0 – 5

DESCRIPTION	ESTIMATED PROJECT COST
Dog Pound Lift Station Pump Upgrade	**$275,000**

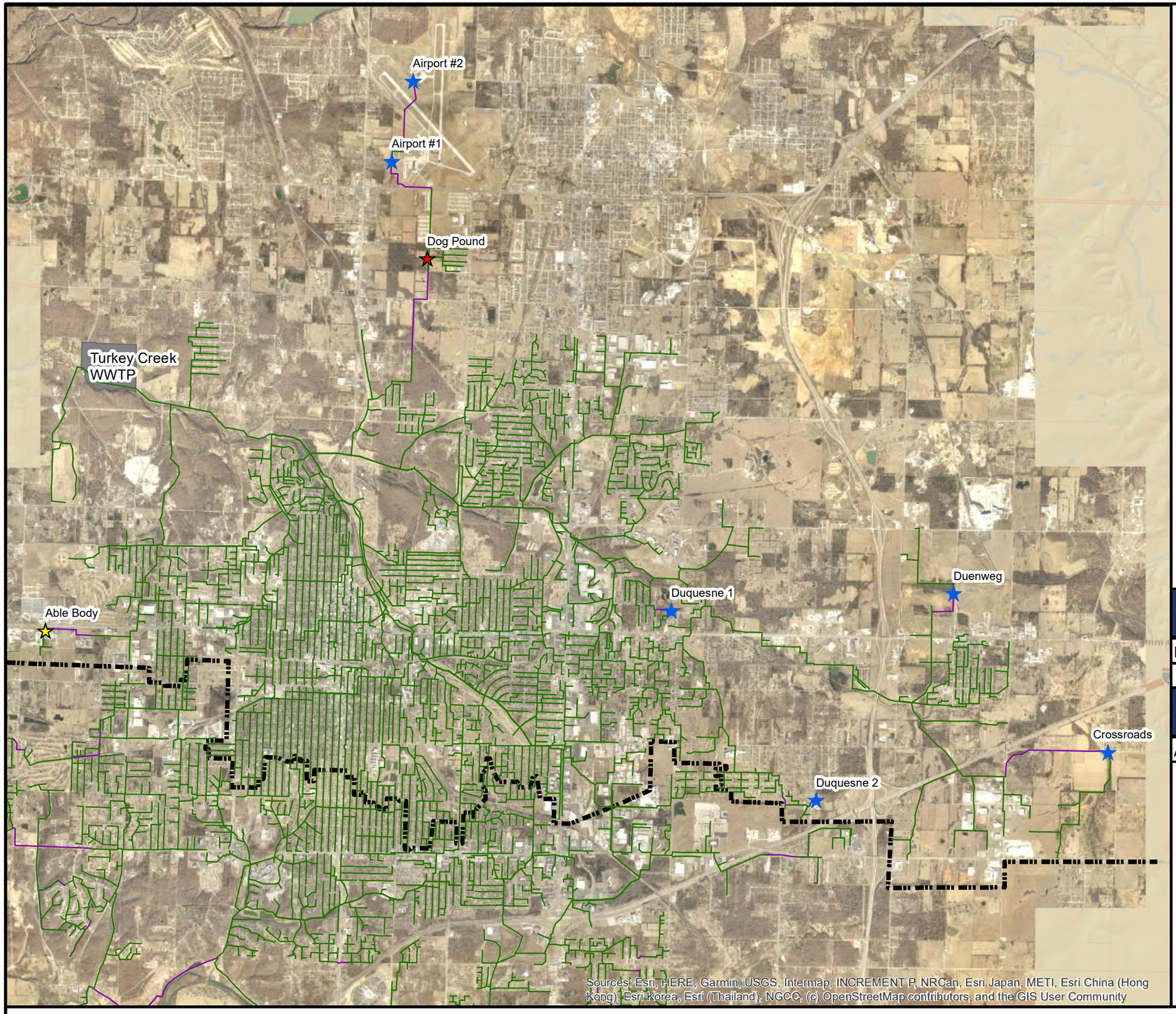
b. Years 6 – 20.

The only other lift station improvement recommended within the Turkey Creek Basin is an upgrade to the Able Body lift station pumping capacity. Although it appears that the current firm pumping capacity of this facility is capable of handling the estimated peak wastewater flow rates, it may not be able to handle the projected 2040 peak flow rate.

It's recommended that the firm pumping capacity of the Able Body lift station be increased to 140 gpm in order to match the projected 2040 peak flow rate. Additionally, this lift station facility doesn't include an emergency generator in the event of a power outage. The table below presents the estimated construction costs and Figure IV-24 shows the recommended lift station improvements.

TABLE IV-2. LIFT STATION RECOMMENDATIONS
TURKEY CREEK BASIN YEARS 6 – 20

DESCRIPTION	ESTIMATED PROJECT COST
Able Body Lift Station Pump Replacement and Emergency Generator	**$140,000**



Legend

Lift Station Improvements

- Recommendations (Yr 0-5)
- Recommendations (Yr 6-20)
- Existing Lift Stations
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Turkey Creek Lift Station Recommendations - Years 0 - 5

Description	Estimated Project Cost
Dog Pound - Pump Upgrade	$275,000

Turkey Creek Lift Station Recommendations - Years 6 - 20

Description	Estimated Project Cost
Able Body - Pump Replacement/Generator	$140,000

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Turkey Creek Basin Lift Station Improvements
Figure IV-24

1. Shoal Creek Basin

a. Years 0 – 5.

One of the initial lift station improvements recommended within the next five years is the replacement of the existing pumps, discharge piping, fittings, and valves at the Country Club lift station. The existing pumps and piping were noted to be in poor condition and in need of replacement. Additionally, this lift station doesn't have an emergency generator and the existing wet well doesn't provide the needed storage capacity in the event of a power outage. Lastly, the existing site security fence is falling down and in need of replacement.

It should be noted that the 500 gpm firm pumping capacity of the Country Club lift station does exceed the capacity of a short section of the receiving gravity sewer line. This short section of existing 8" diameter gravity sewer line was identified within the wastewater collection system section of this report and replacement costs were included in those recommendations.

Another initial lift station recommendation within the Shoal Creek basin is the flood protection of the Filmore Bridge lift station. As shown in previous exhibits, this facility sits very close to Shoal Creek and in 2015 the facility suffered extensive flood damage. Since then, sand bags were added surrounding the dry well portion of the facility to minimize any future potential flood damage. It's recommended that a combination of concrete walls and flood barriers be constructed for more permanent protection from flooding.

The evaluation of the 44th and Virginia lift station also showed the potential for current and future peak wastewater flow rates to exceed the current firm pumping capacity of the facility. Additionally, the existing dry-pit application pumps are prone to blockages due to the configuration of the existing wet well and suction piping. It's recommended that an additional wet well be constructed to house new submersible pumps. Tying the existing and proposed wet wells together also provides the necessary operational storage volume for the larger capacity pumps. Based on the estimated 2040 peak wastewater flow rate, duplex 270 gpm pumps are required.

The North and South Duquesne and East and West Woodland lift stations are not connected to the City's SCADA system. Instead, an autodialer type alarm system is in place that notifies operators, by telephone call, of an alarm condition. Outside of an active alarm condition, the status of these lift stations can only be verified by operators on-site. It's recommended that these lift stations be added to the City's SCADA system to allow operators the ability to remotely monitor these lift stations.

As detailed in the previous 2018 *Wildwood Ranch Lift Station Evaluations* report, a current residential development within the 20th and Malang lift station basin would push the estimated peak wastewater flow rates above this facility's firm pumping capacity. Furthermore, the report presented short-term and long-term recommendations that would allow for the complete development of this lift station basin.

The short-term approach recommended that the pumping capacity of the facility be increased to 400 gpm and a flow equalization basin be constructed that would allow for the continued development within the basin. Unfortunately, this wouldn't be enough to allow for the complete development of all the property within this lift station's drainage basin. A long-term solution was recommended that would install a new larger pressure sewer line from the 20th and Malang lift station all the way to the Shoal Creek WWTF.

This same approach has been included within this report. The short-term recommendations have been included within this section of initial Shoal Creek lift station improvements; while the long-term recommendations are included within the next section of Shoal Creek lift station improvements for years 6 – 20.

The last recommendation within this initial time frame is the installation of an emergency generator at the Travel Center lift station, as well as connecting it to the City's SCADA system. Even though this is a small facility, it isn't conveniently located for operators to verify its status during a power outage. With an emergency generator and remote monitoring capabilities, operators would be able to monitor the status of this lift station during a power outage and wouldn't have to respond and monitor the wastewater level within the wet well.

A map of the recommended improvements is included in Figure IV-25 and the estimated project costs are summarized in the following table.

TABLE IV-3. LIFT STATION RECOMMENDATIONS
SHOAL CREEK BASIN YEARS 0 – 5

DESCRIPTION	ESTIMATED PROJECT COST
Country Club Lift Station Pump and Discharge Pipe Replacement, Emergency Generator, and Site Fencing	$185,000
Filmore Bridge Lift Station Flood Protection	$170,000
44th and Virginia Lift Station Pump and Emergency Generator Upgrade	$310,000
North Duquesne (Silver Creek B) Lift Station SCADA System	$34,500
South Duquesne (Silver Creek C) Lift Station SCADA System	$34,500
East Woodland (Silver Creek D) Lift Station SCADA System	$34,500
West Woodland (Silver Creek E) Lift Station SCADA System	$34,500
20th and Malang Lift Station Upgrade Pumps and Install Overflow Basin	$300,000
Travel Center Lift Station Emergency Generator and SCADA System	$80,000
Estimated Total Cost	**$1,183,000**

b. Years 6 – 20.

One of the least costly lift statin improvements recommended within years 6 through 20 in the Shoal Creek basin includes the replacement of the submersible pumps, discharge piping, fittings, and valves at the 20th and Black Cat lift station. Although the pumps appear to be adequately sized for the current and projected 2040 peak wastewater flow rates, they were noted to be in poor condition. Table IV-4 presents the estimated construction costs for Shoal Creek Years 6 – 20 lift station improvements and Figure IV-25 presents a map the recommended improvements.

Another recommendation within years 6 – 20 concerns the Golf Links lift station. As determined previously, the current and projected 2040 peak wastewater flow rates both appear to be greater than the current firm pumping capacity of this lift station. Additionally, the existing 200 gpm firm pumping capacity of this lift station creates a velocity over 5 fps in the existing 4" force main. Further increasing the flow rate through this existing line uses a great deal of additional pumping horsepower, not to mention the increased risk of pipe failure. To accommodate the recommended increase in firm pumping capacity to 265 gpm, it's also recommended that a larger 6" diameter force main be constructed.

Although the Crane Road lift station appears to be adequately sized considering current wastewater flow rates, as the drainage basin develops, it may become overloaded. To meet the projected 2040 peak wastewater flow rate of 370 gpm, improvements to the pumping capacity must be considered. Additionally, the existing 6" diameter force main is currently at capacity and would require the construction of a new 8" diameter force main. Furthermore, increasing the capacity of the force main would also overload the existing 8" diameter receiving sewer. If the additional pumping capacity and force main are constructed for the Crane Road lift station, the receiving sewer should also be replaced with a 10" diameter pipe.

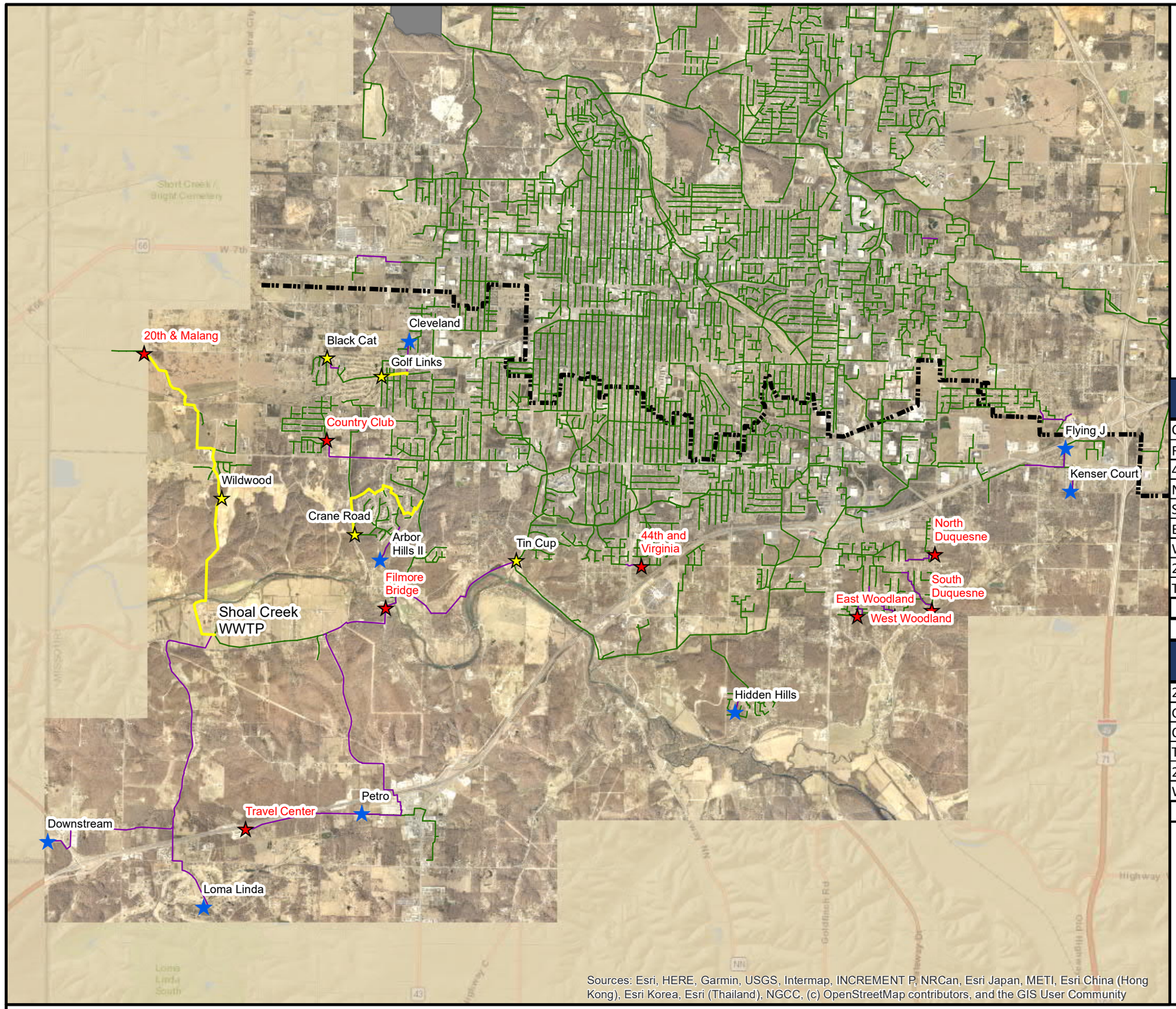
At some point in the future, upgrades to the pumping capacity at the Tin Cup lift station should also be anticipated. Based on the layout of the existing facility, it may be possible to install two additional pumps. Although the existing wet well structures don't have room for the installation of additional suction piping, two self-priming type dry pit application pumps could be installed above the wet wells with drop suction pipes. It's anticipated that two additional 100 Hp pumps each with a capacity of 2,700 gpm could be installed at the Tin Cup Facility. This would bring the firm pumping capacity of this facility to approximately 10,800 gpm (15.6 MGD).

As discussed previously and recommended in the 2018 *Wildwood Ranch Lift Station Evaluations* Report, a long-term solution to increasing the capacity of the 20th and Malang lift station should be completed. The short-term improvements described previously wouldn't be enough for the development of the entire drainage basin. In order to meet the projected peak wastewater flow rate within the 20th and Malang basin, it's recommended that a new force main be constructed from the lift station all the way to the Shoal Creek WWTF. Once the force main is constructed, larger capacity submersible pumps could be installed to meet the projected peak wastewater flow rate of 1,650 gpm (2.4 MGD).

Additionally, the construction of a new force main serving the 20th and Malang lift station will allow the Wildwood lift station to utilize the entire capacity of the existing 8" diameter force main. As development in the basin continues, the pumping capacity of the Wildwood lift station could be increased as necessary to meet the projected peak wastewater flow rate of 704 gpm (note that this estimated flow rate does not include flow from the 20th and Malang lift station).

TABLE IV-4. LIFT STATION RECOMMENDATIONS
SHOAL CREEK BASIN YEARS 6 – 20

DESCRIPTION	ESTIMATED PROJECT COST
20th and Black Cat Lift Station Pump and Discharge Pipe Replacement	$60,000
Golf Links Lift Station Pump and Force Main Upgrade	$275,000
Crane Road Lift Station Pump, Force Main, and Receiving Sewer Upgrade	$1,520,000
Tin Cup Lift Station Pump and Emergency Generator Upgrade	$700,000
20TH and Malang Lift Station Upgrade Pumps and Force Main	$3,170,000
Wildwood Lift Station Pump and Valve Vault Upgrade	$200,000
Estimated Total Cost	**$5,925,000**



Legend

Lift Station Improvements

- Recommendations (Yr 0-5)
- Recommendations (Yr 6-20)
- Recommendations (Yr 6-20)
- Existing Lift Stations
- Existing Pressure Sewer Lines
- Existing Gravity Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

Shoal Creek Lift Station Recommendations - Years 0 - 5	
Description	Estimated Project Cost
Country Club - Pump Replacement/Generator	$185,000
Filmore Bridge - Flood Protection	$170,000
44th and Virginia - Pump Upgrade/Generator	$310,000
North Duquesne - SCADA System	$34,500
South Duquesne - SCADA System	$34,500
East Woodland - SCADA System	$34,500
West Woodland - SCADA System	$34,500
20th & Malang - Pump Upgrade/Overflow Basin	$300,000
Travel Center - Generator/SCADA System	$80,000
Estimated Total Cost	**$1,183,000**

Shoal Creek Lift Station Recommendations - Years 6 - 20	
Description	Estimated Project Cost
20th and Black Cat - Pump Replacement	$60,000
Golf Links - Pump/Force Main Upgrade	$275,000
Crane Road - Pump/Force Main/Reciting Sewer Upgrade	$1,520,000
Tin Cup - Install 2 New Pumps	$700,000
20th and Malang Lift Station	$3,170,000
Wildwood - Pump/Valve Vault Upgrade	$200,000
Estimated Total Cost	**$5,925,000**

N

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Shoal Creek Basin Lift Station Improvements
Figure IV-25

C. Lift Station Elimination and Consolidation Scenarios and Associated Costs

1. Country Club, Crane Road, and Arbor Hills II Lift Station Elimination

As previously referenced in this report, a 2019 Engineering Report completed by Olsson Associates, Inc., outlined a long-term approach for eliminating the Country Club, Crane Road and Arbor Hills II lift station. All three of these lift stations are located within the Tanyard Hollow tributary to Shoal Creek and thus, can gravity flow in a generally southerly direction to the Filmore Bridge lift station interceptor sewer line. A map of the recommended improvements can be seen in Figure IV-26.

The report suggests that these improvements could be accomplished in two phases; however, due to the limitations of the Crane Road lift station and force main, these lift station eliminations should be done as part of a single project. As determined previously in this report, the Crane Road lift station has a firm pumping capacity of 300 gpm and estimated current and peak wastewater flow rates of 101 gpm and 370 gpm, respectively. Furthermore, an increase in the flow rate (greater than 300 gpm) through the existing 6" diameter force main would yield an unrealistic pumping head requirement.

On the other hand, if these lift stations are eliminated, the recommended Country Club and Crane Road lift station improvements outlined in the previous section of this facility plan can be eliminated as well. As shown on the following table, eliminating these lift stations, instead of completing the recommended improvements actually yields a cost savings.

TABLE IV-5. OPINION OF PROBABLE COSTS TO ELIMINATE COUNTRY CLUB, CRANE ROAD, ARBOR HILLS II LIFT STATIONS

DESCRIPTION	ESTIMATED COST
Country Club/Crane Road/Arbor Hills II Lift Station Elimination	$1,200,000
Country Club Lift Station Improvements	$(185,000)
Country Club Lift Station Receiving Sewer	$(175,000)
Crane Road Lift Station Improvements	$(1,520,000)
Total Project Cost	**$(680,000)**

2. West Joplin Lift Station Consolidation

As referenced previously in this Facility Plan, a 2018 Engineering Report evaluating the 20th and Malang and Wildwood lift stations detailed recommended improvements that would allow for the full development of the Wildwood Ranch area. The report also referenced a potential for the expansion of the 20th and Malang lift station basin; however, the scope of the 2018 report didn't include a full evaluation of this option.

The existing 20th and Malang lift station is located within the Spring Branch tributary basin of Short Creek. Spring Branch continues to run northwesterly from the 20th and Malang intersection to the intersection of Old 66 Boulevard and the Kansas state line. If the existing lift station were moved to this approximate location, an additional 1.2 square miles could be opened up for development and connected to the City's wastewater collection system.

Additionally, the 17th and Cleveland, Golf Links, and 20th and Black Cat lift stations are all three located in the Short Creek drainage basin. Short Creek runs northwesterly from the 17th and Cleveland area all the way to the Kansas state line. Construction of gravity interceptor sewer lines and a single larger lift station and force main near the Kansas state line would allow for these lift stations to be eliminated, while also opening up a large drainage area for development.

If both of these lift station facilities were located as shown on Figure IV-27, not only would they be closer to the Turkey Creek WWTF, they could both utilize a common pressure sewer. Of course, under this scenario, flow from these lift stations would be removed from the Shoal Creek WWTF and added to the Turkey Creek WWTF. Additionally, the 20th and Malang, 20th and Black Cat, and Golf Links lift station improvements recommended for the years 6 – 20 could be eliminated as part of this consolidation plan.

TABLE IV-6. OPINION OF PROBABLE COSTS FOR WEST JOPLIN LIFT STATION CONSOLIDATION

DESCRIPTION	ESTIMATED COST
Spring Branch and Short Creek Interceptor Sewers, Pressure Sewers, and Lift Station Facilities	$32,978,800
20th and Malang Lift Station Improvements	$(3,170,000)
20th and Black Cat Lift Station Improvements	$(60,000)
Golf Links Lift Station Improvements	$(275,000)
Total Project Cost	**$29,473,800**

3. Silver Creek Lift Stations Consolidation

The North and South Duquesne and East and West Woodland lift stations were all constructed in what used to be the Village of Silver Creek. All four of these lift stations were constructed at the edge of the corporate limits for the Village, which is now the corporate limits for the City of Joplin. These lift stations are all within the Thurman Creek drainage basin, which generally runs from the Duquesne Road and Ivy Lane intersection southwesterly, through the Village of Saginaw and into Shoal Creek.

A single large lift station constructed near the intersection of Range Line Road and Thurman Creek would allow for the consolidation of these four lift stations. It would also allow for sewer service to be provided to the residents of the Village of Saginaw, as well as, the undeveloped areas on either side of Range Line Road.

Figure IV-28 demonstrates a potential option for consolidating these four lift stations, while also providing additional sewer service to the Thurman Creek drainage basin. The following table also presents an opinion of probable project costs for the various components of this consolidation option.

TABLE IV-7. OPINION OF PROBABLE COSTS TO CONSOLIDATE THE SILVER CREEK LIFT STATIONS

DESCRIPTION	ESTIMATED COST
Total Project Cost	**$5,780,700**

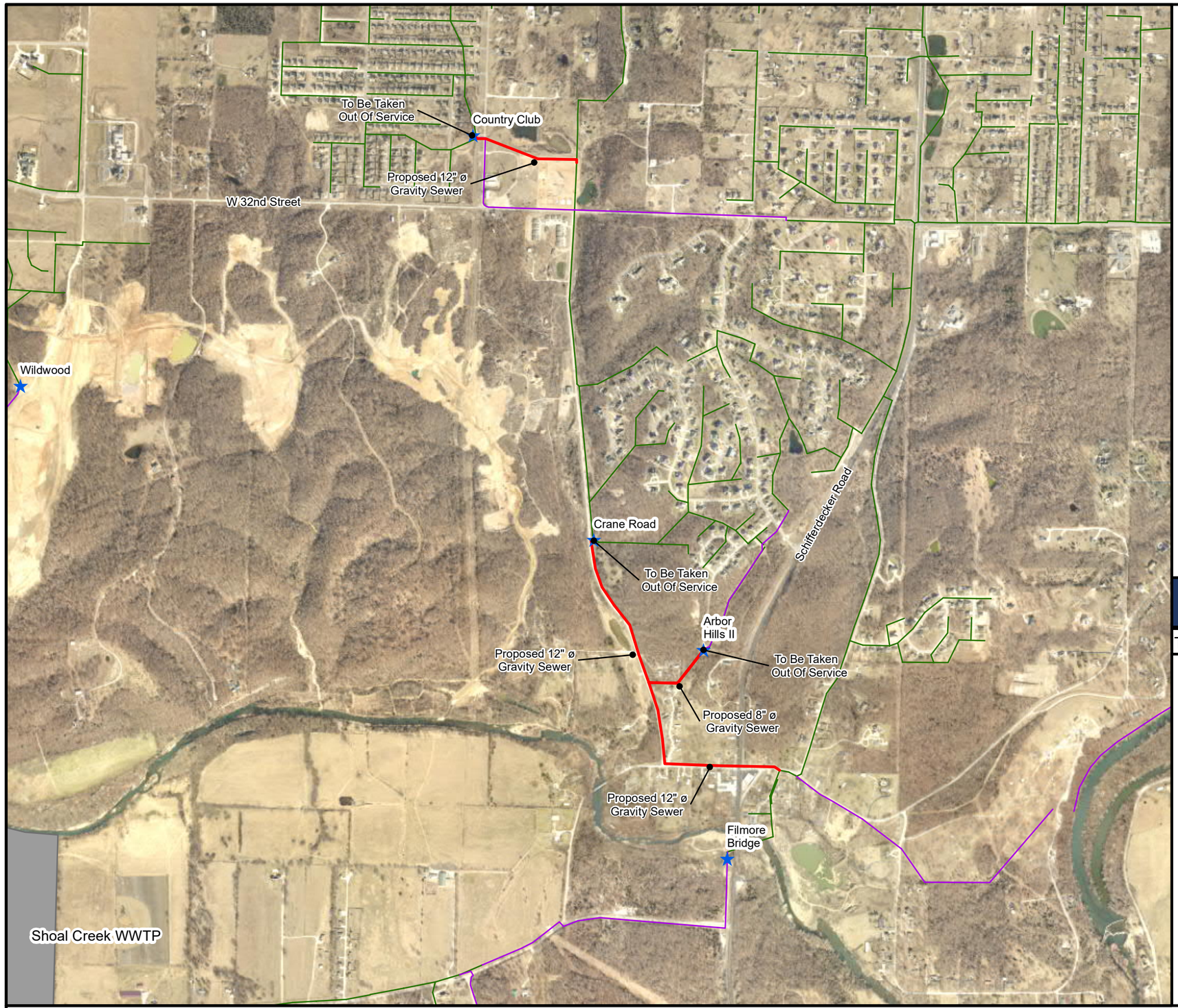
4. Crossroads Lift Station Elimination

The last lift station elimination option evaluated within this report would eliminate the Crossroads lift station located on the east side of Joplin. Currently, this lift station is located within the Turkey Creek drainage basin, but on the south side of I-44. Turkey Creek generally runs westerly through the City of Joplin and to the Turkey Creek WWTF.

Construction of a gravity interceptor sewer line from this lift station north/west across I-44, and through Duenweg, would eventually reach the exiting crossroads interceptor sewer line. Figure IV-29 provides a proposed route for the new interceptor sewer. The following table presents an opinion of probable costs for this lift station consolidation option.

TABLE IV-8. OPINION OF PROBABLE COSTS TO ELIMINATE THE SILVER CREEK LIFT STATIONS

DESCRIPTION	ESTIMATED COST
Total Project Cost	**$4,940,000**



Legend

- Existing Lift Stations
- Proposed Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Existing Gravity Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

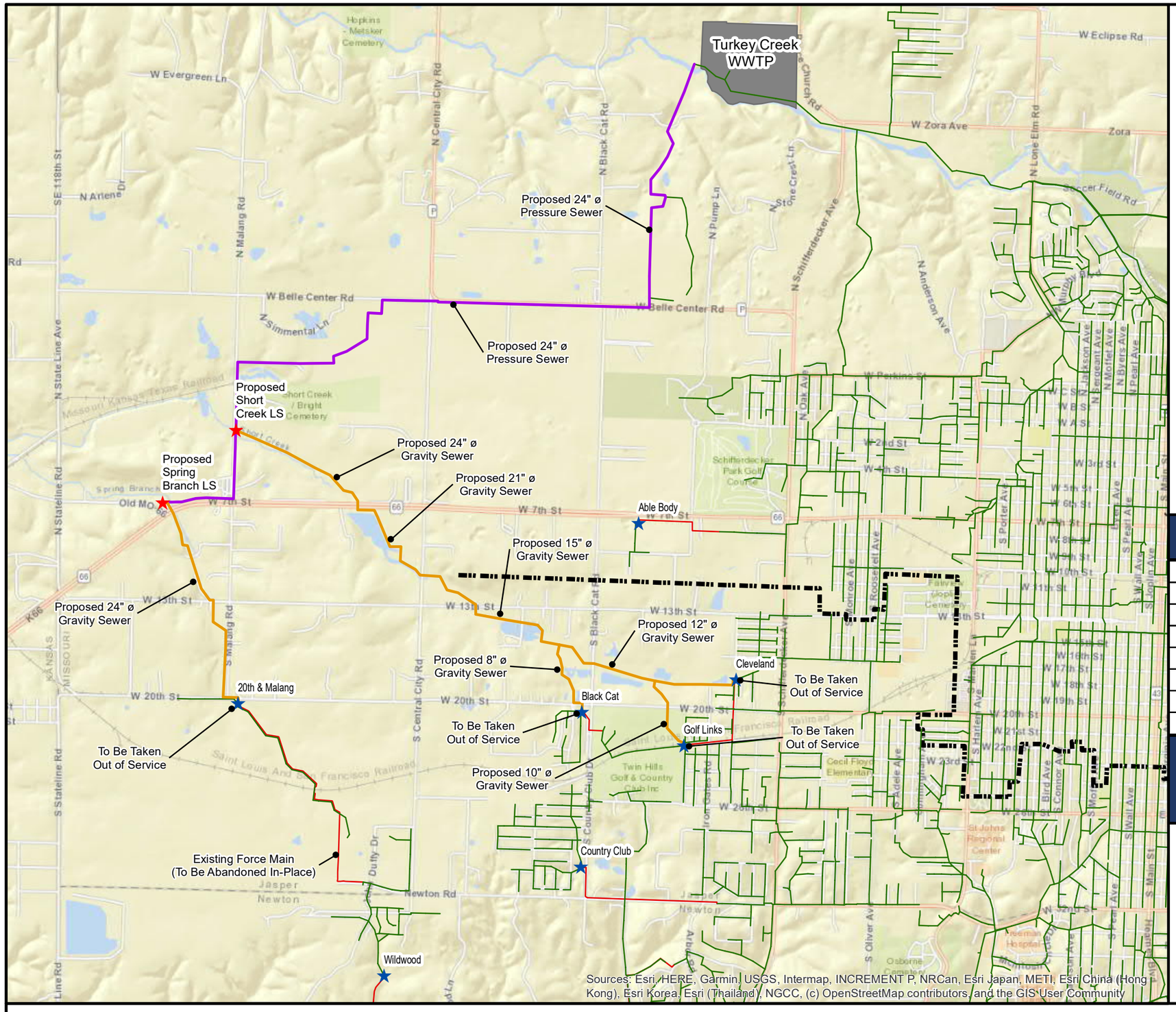
Country Club/Crane Road/Arbor Hills II Lift Station Eliminations

Description	Construction Cost
Total Project Cost	$ 1,200,000

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Country Club / Crane Road / Arbor Hills II Lift Station Eliminations

Figure IV-26



Legend

- Existing Lift Stations
- Proposed Lift Stations
- Proposed Gravity Sewer Lines
- Proposed Pressure Sewer Lines
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

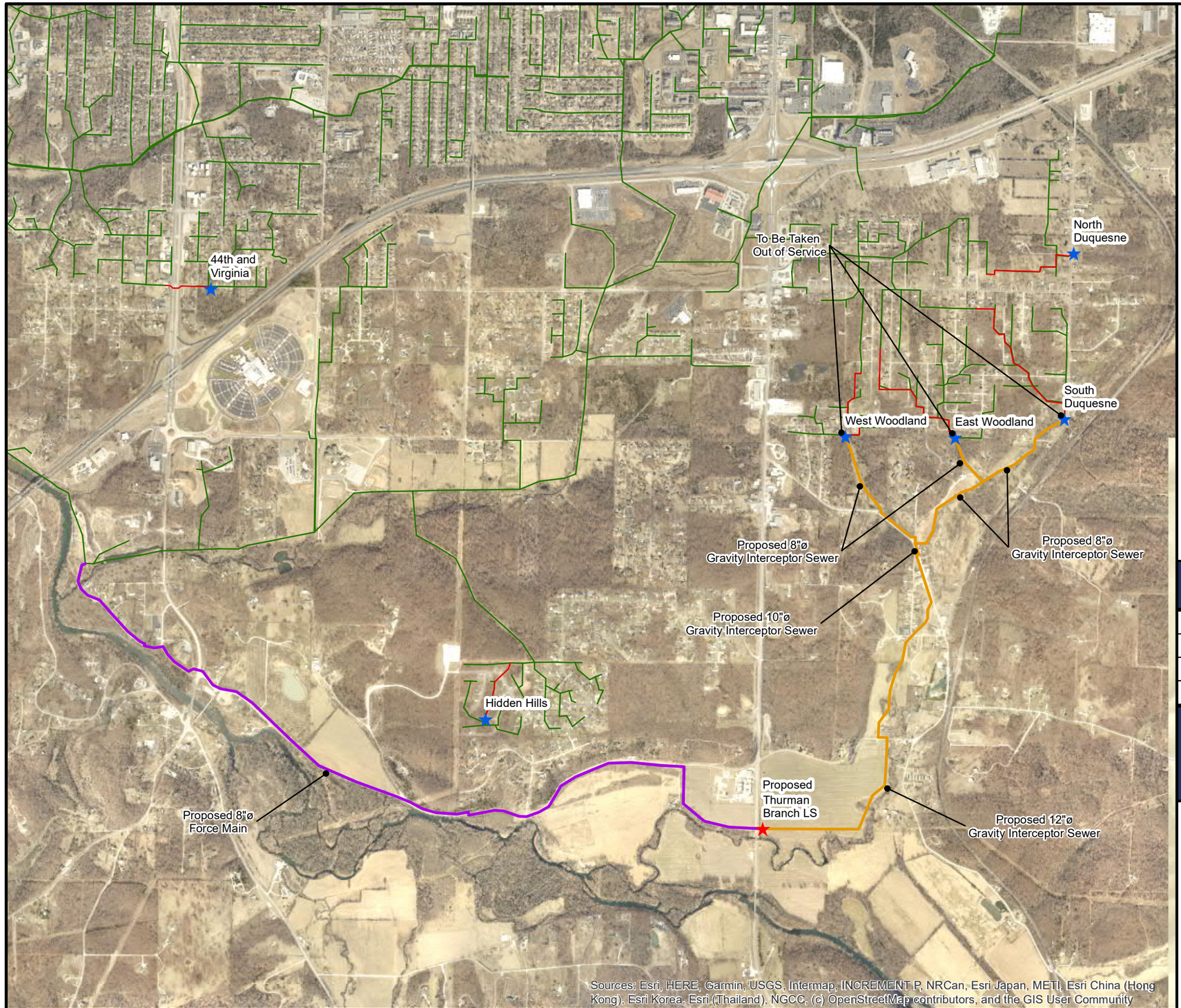
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West Joplin Lift Station Consolidations

Pipe Diameter	Length	Unit Cost	Extended Total
8"	2300	$130	$299,000
10"	2200	$160	$352,000
12"	2400	$190	$456,000
15"	15000	$240	$3,600,000
21"	15000	$335	$5,025,000
24"	37200	$380	$14,136,000
Spring Branch Lift Station			$750,000
Short Creek Lift Station			$750,000
	Construction Total		$25,368,000
	Contingency (10%)		$2,536,800
	Engineering (20%)		$5,074,000
	Total		**$32,978,800**

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West Joplin Lift Station Consolidation
Figure IV-27



Legend

- Existing Lift Stations
- Proposed Lift Stations
- Proposed Gravity Sewer Lines
- Proposed Pressure Sewer Lines
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

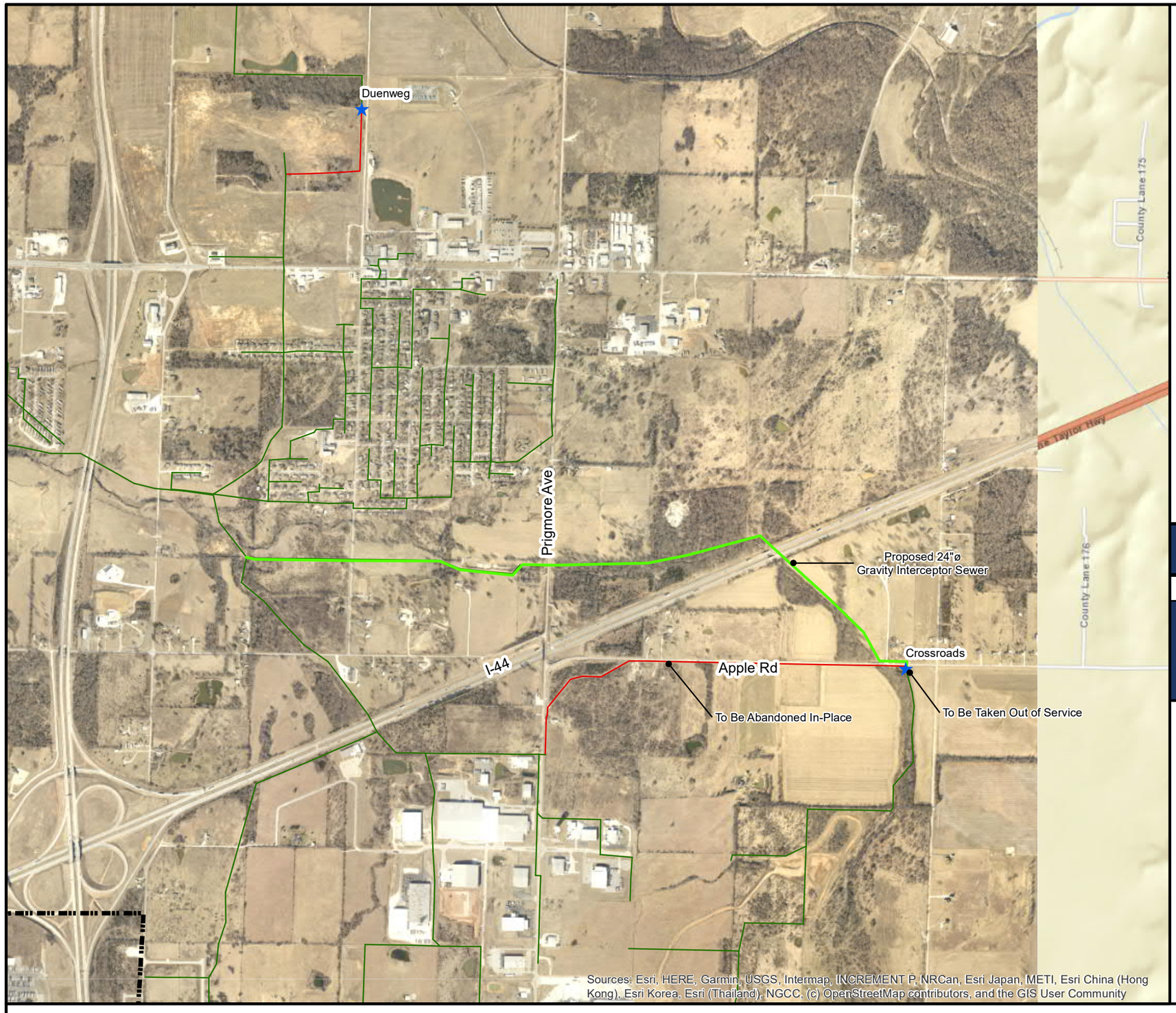
N

Silver Creek Lift Station Consolodation

Pipe Diameter	Length	Unit Cost	Extended Total
8"	22200	$130	$2,886,000
10"	3800	$160	$608,000
12"	3700	$190	$703,000
Thurman Branch Lift Station			$250,000
	Construction Total		$4,447,000
	Contingency (10%)		$444,700
	Engineering (20%)		$889,000
	Total		**$5,780,700**

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Silver Creek Lift Station Consolidation
Figure IV-28



Legend

- Existing Lift Stations
- Proposed Gravity Sewer Line
- Existing Gravity Sewer Lines
- Existing Pressure Sewer Lines
- Turkey Creek / Shoal Creek Basin Boundary Line

N

Crossroads Lift Station Elimination

Pipe Diameter	Length	Unit Cost	Extended Total
24"	10000	$380	$3,800,000
	Construction Total		$3,800,000
	Contingency (10%)		$380,000
	Contingency (25%)		$760,000
	Total		**$4,940,000**

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Crossroads Lift Station Elimination
Figure IV-29

V. WASTEWATER TREATMENT FACILITIES

A. Background and Scope

As mentioned previously, the City of Joplin maintains wastewater collection and treatment facilities in two separate drainage basins. The sewerage system within the Turkey Creek drainage area serves approximately two-thirds of the City of Joplin and includes sewer service to the community of Duenweg and parts of Duquesne, located east of Joplin. The sewerage system within the Shoal Creek drainage area serves approximately one-third of the total area served by the City of Joplin, and includes sewer service to the community of Loma Linda and a portion of Duquesne. See treatment facilities location map, Figure V-1.

1. Turkey Creek Basin

The City of Joplin completed construction in 1985 of a major interceptor sewer and a new wastewater treatment plant northwest of Joplin adjacent to Turkey Creek. The plant underwent a major expansion in 1997 to allow for the demolition of the old Lone Elm wastewater treatment plant and to provide the advanced treatment necessitated by a reclassification of Turkey Creek by the Missouri Clean Water Commission. In 2013 a major upgrade to the plant added significant sludge handling capabilities to the facility and also provided for ultraviolet disinfection of the plant effluent. Renovation of two of the plant's tertiary filters was completed in 2016 to resolve issues with the original units.

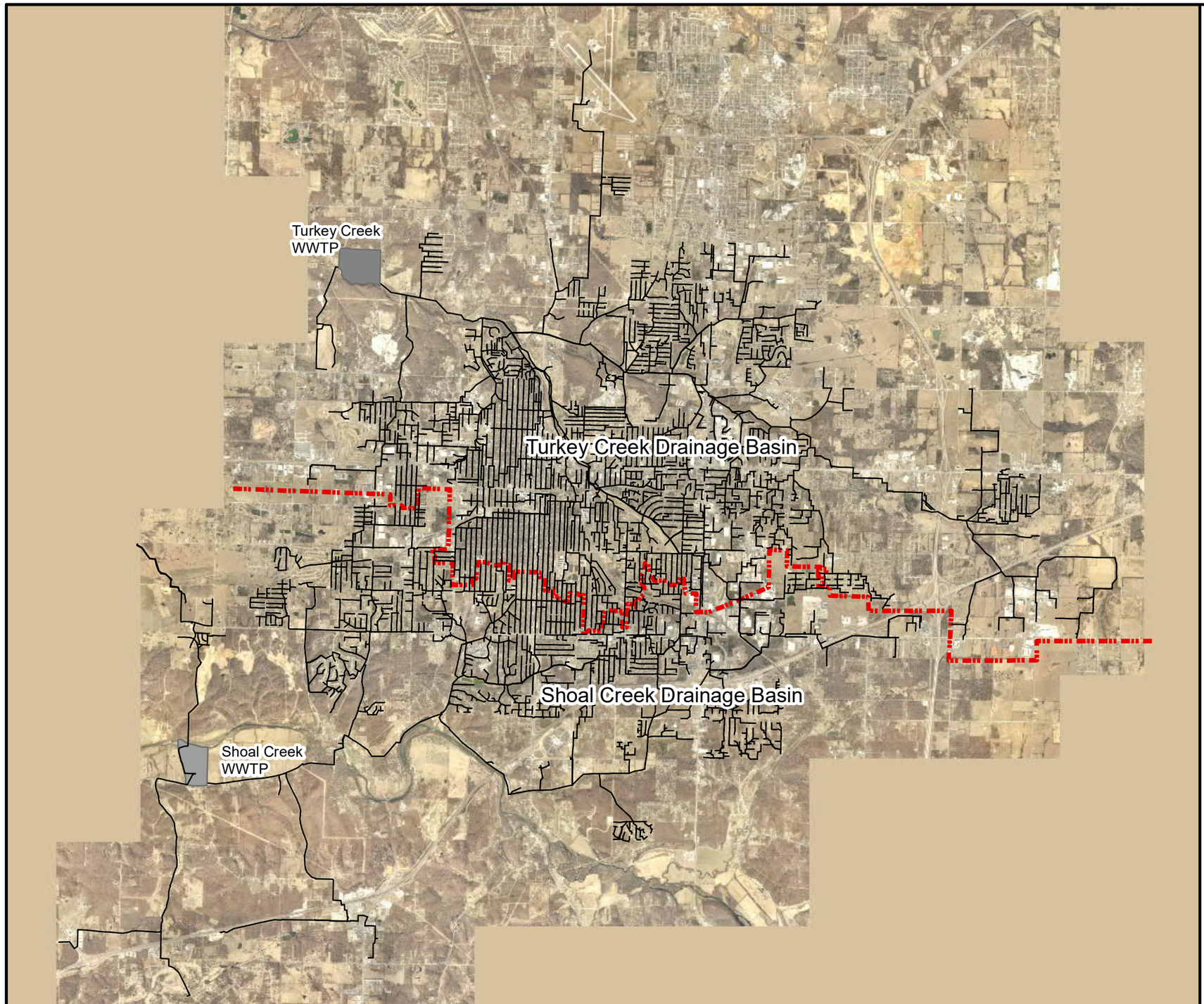
2. Shoal Creek Basin

Construction of a trickling filter type wastewater treatment facility and interceptor sewers for the Shoal Creek drainage basin were completed in 1987. The original plant was significantly upgraded in 2016, and now provides for advanced treatment of the wastewater prior to discharge to Shoal Creek. The Shoal Creek WWTP is located west of Joplin adjacent to Shoal Creek, and provides for treatment of wastewater that is generated in the Shoal Creek drainage basin, including the south part of Joplin, as well as the Town of Loma Linda and commercial development in the Interstate Highway 44 corridor.

B. Effluent Limitations

1. Summary of Receiving Water Quality

Joplin's wastewater treatment facilities discharge into two separate streams, each of which drains a different basin. The Turkey Creek treatment plant treats wastewater generated within the Turkey Creek watershed, and discharges to Turkey Creek at a point approximately three and one-half miles from the Kansas State Line and four miles from the confluence of Turkey Creek and Spring River in Kansas. The Shoal Creek treatment plant serves the Shoal Creek watershed, and discharges to Shoal Creek approximately two miles from the State Line and seven miles from the confluence of Shoal Creek and Spring River in Kansas.



Legend

Turkey Creek / Shoal Creek Basin Boundary Line

N

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Turkey Creek / Shoal Creek Location Map
Figure V-1

a. Turkey Creek

For that reach of Turkey Creek impacted by discharge from the City's Turkey Creek WWTP, the stream is a Class "P" stream, which indicates that the stream maintains a permanent flow, even during drought periods. Missouri Water Quality Standards list six beneficial uses for Turkey Creek, those being livestock and wildlife protection (LWP), protection of aquatic life (AQL), human health protection (HHP), irrigation (IRR), secondary contact recreation (SCR), and whole body contact recreation (WBC-B).

During dry periods, discharge from the Turkey Creek WWTP represents nearly the entire flow of the stream. In developing the current State Operating Permit for the Turkey Creek WWTP, MDNR estimated the seven-day, ten-year low flow of Turkey Creek upstream of the plant discharge to be 0.1 cubic feet per second. Turkey Creek offers practically no assimilative capacity for the treatment plant discharge, hence the effluent limits for the plant discharge require advanced levels of treatment for the wastewater.

The water quality in Turkey Creek is adversely impacted by past lead and zinc mining activities. Flows from mines and surface runoff from mine tailing piles and other areas impacted by mining activities result in abnormally high zinc concentrations within the stream. MDNR's Water Protection Program completed a Total Maximum Daily Loads (TMDLS) study of Turkey Creek in late 2006 wherein 8.5 miles of impaired stream was evaluated to establish a waste load allocation for zinc in Turkey Creek. The TMDL now serves as a basis for dealing with zinc from both point source and non-point source discharges to the stream.

b. Shoal Creek

Shoal Creek is a clean, fast-flowing gravel or rock bottomed Ozark Stream, which supports an appreciable number of game fish and rough fish.

Shoal Creek is a Class "P" stream, which serves as the primary drinking water supply for the City of Joplin. The impoundment from which Joplin's drinking water is drawn is located approximately four miles upstream from the City's Shoal Creek Wastewater Treatment Plant discharge point.

Missouri Water Quality Standards list nine beneficial uses for Shoal Creek, those being drinking water supply (DWS), livestock and wildlife protection (LWP), protection of aquatic life (AQL), human health protection (HHP), irrigation (IRR), industrial water supply (IND), secondary contact recreation (SCR), and whole body contact recreation (WBC-A), cool water fishery (CLF). The estimated seven-day, ten-year low flow of Shoal Creek south of Joplin is 52.24 cfs according to MDNR's Fact Sheet that was used to establish recent operating permit limits for the Shoal Creek WWTP.

2. NPDES Requirements

The City's two Missouri State Operating Permits (MSOPs) establish criteria for the required quality of effluent from the wastewater treatment processes, and procedures for

disposal of the waste solids produced by the treatment process. Copies of the operating permits are set forth in Appendix F. A general discussion of the established limits for discharge to the appropriate stream is provided below.

a. Turkey Creek Discharge

The operating permit for Joplin's Turkey Creek WWTP describes two outfalls to Turkey Creek, with Outfall No. 004 representing the normal plant discharge. Outfall No. 002 is identified as a potential point of discharge from the plant's flow equalization basin, but it does not authorize a discharge at this location.

The recently issued permit (effective January 1, 2020) proposes "final" monthly average limits for carbonaceous biochemical oxygen demand (CBOD) and total suspended solids (TSS) from Outfall No. 004 of 10 mg/l and 15 mg/l respectively, and a warm weather ammonia limit of 1.4 mg/l. The final effluent limitations also require disinfection of the plant effluent. Stringent limits are also established for several metals and organic chemicals. Any discharges through Outfall No. 002 are viewed as bypasses that must be reported as such to regulatory agencies. The issued permit includes a "monitoring only" requirement for nutrients (nitrogen and phosphorus) and a number of metals and organic chemicals that have a low potential for causing a violation of water quality standards.

b. Shoal Creek Discharge

Because of lower wastewater flow rates and greater dilution within the stream, the recently drafted Missouri State Operating Permit for the Shoal Creek WWTP (effective January 1, 2020) reflects less stringent treatment requirements than does the Turkey Creek permit. In the permit the primary Outfall No. 001 at the Shoal Creek WWTP is required to meet 30 mg/l monthly average limits for both BOD and TSS, and a warm weather limit for ammonia has been set at 2.7 mg/l. Zinc and lead are the two metals for which an effluent "final" limit has been established. Seasonal disinfection is required by the permit. Discharges from Outfalls No. 002 and No. 003, two flow equalization basins, are not authorized by the permit, and must be reported to regulatory agencies as bypasses should they occur. The permit includes a "monitoring only" requirement for nutrients (nitrogen and phosphorus).

C. Current Facilities

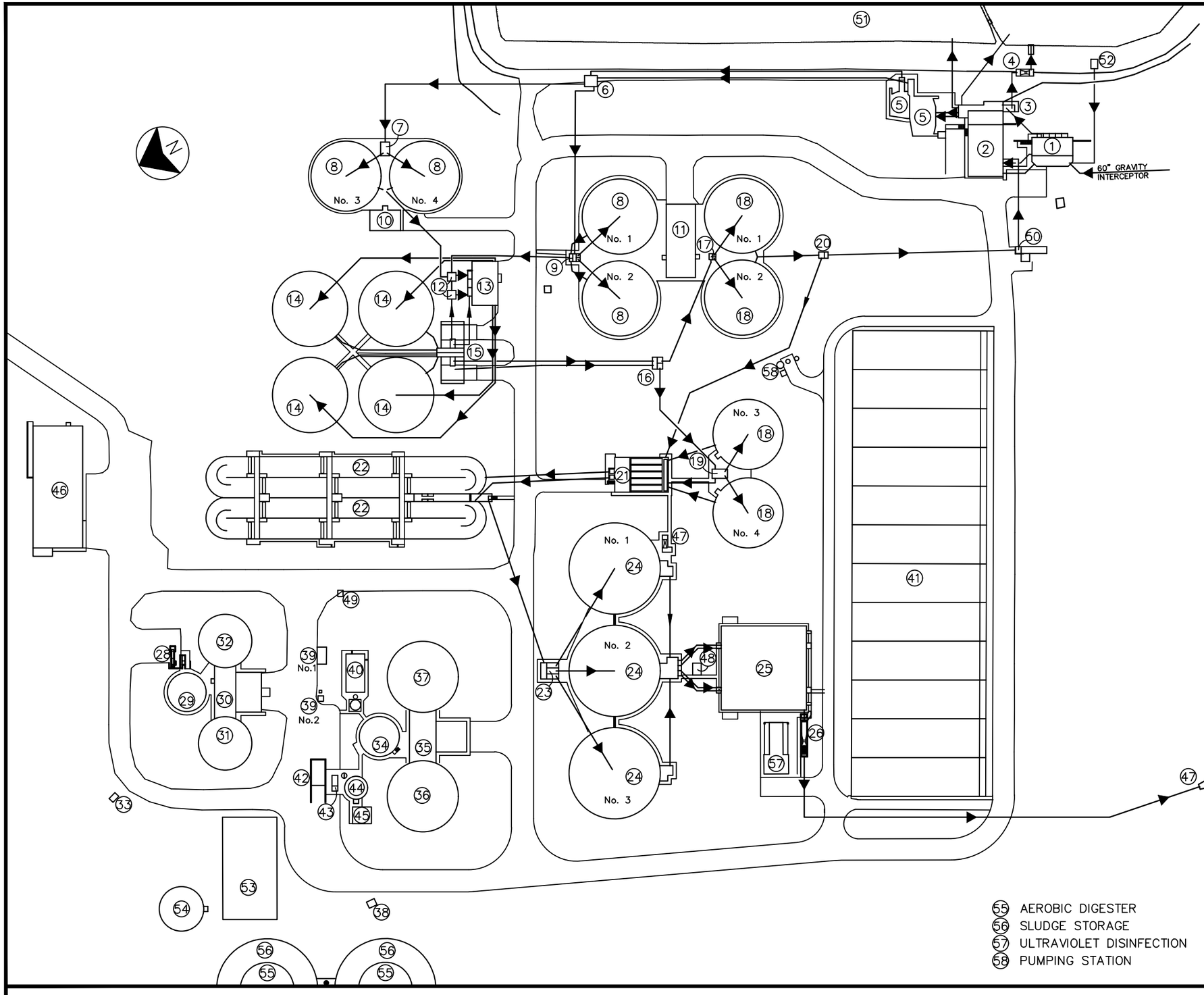
1. Turkey Creek Wastewater Treatment Facilities



a. Treatment

The Turkey Creek WWTP utilizes trickling filter towers and activated sludge processes to provide advanced levels of treatment, as required by the plant's operating permit. The facility was originally designed to provide secondary treatment with completion of the tricking filter type plant in 1985. The facilities were expanded in 1997 with the construction of activated sludge basins and tertiary sand filters. Major improvements to the sludge handling facilities were completed in 2013 with the addition of aerobic sludge digestion and sludge dewatering facilities. Waste sludge is now either aerobically or anaerobically digested prior to disposal as fertilizer on area pastures. Two of the original sand filters were replaced with newer, higher capacity filters in 2016.

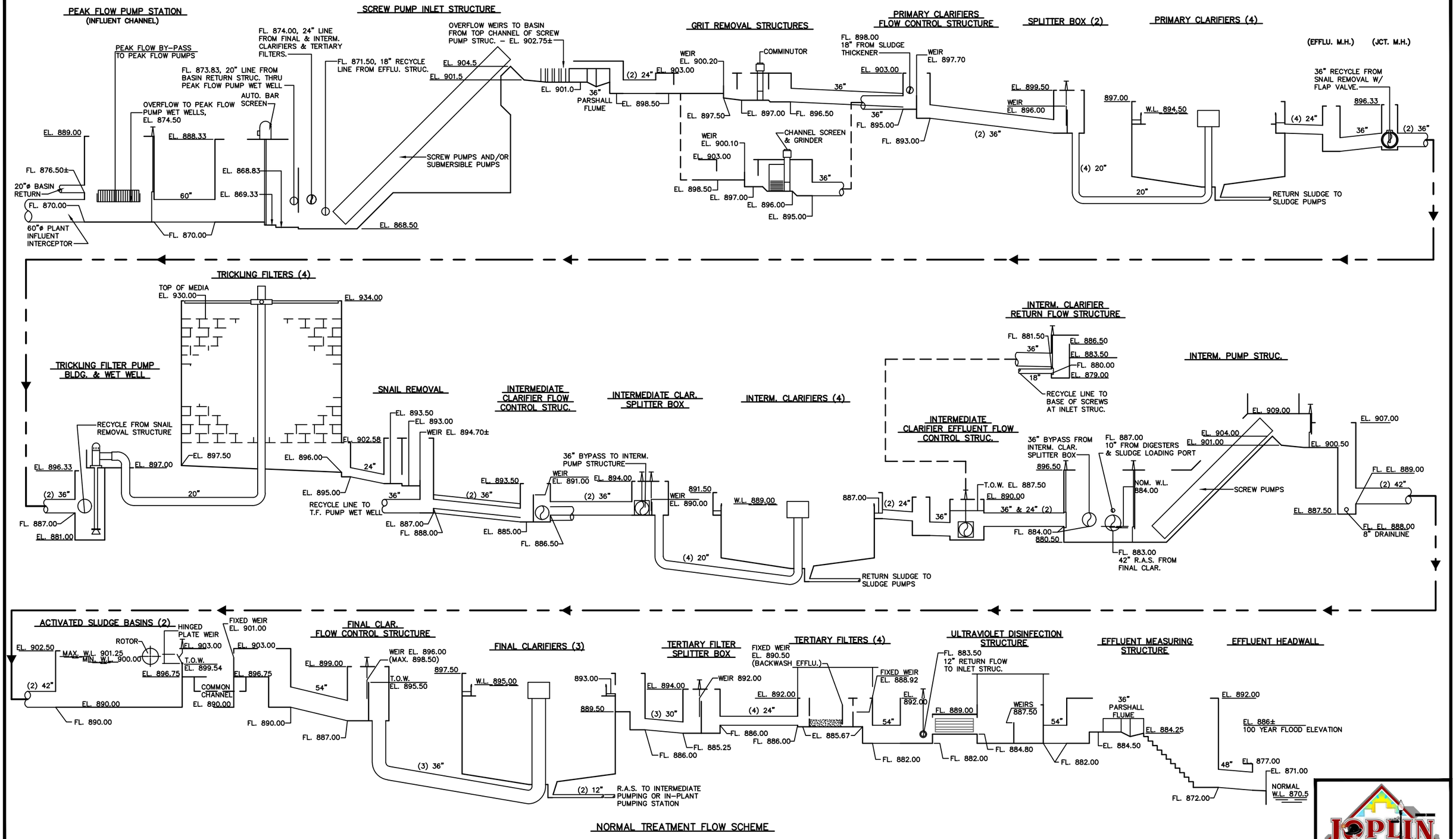
The Turkey Creek WWTP is designed to treat an average flow of 15 million gallons per day (mgd) and a peak flow of 24 mgd. Excess flows of up to an additional 60 mgd can be diverted to a 27-acre flow equalization basin capable of storing approximately 75 million gallons of predominantly stormwater. The biological treatment components are designed to accommodate a raw sewage biochemical oxygen demand (BOD) loading of 21,000 lbs./day, while producing an effluent containing less than 5 mg/l BOD. The flow diagram for the Turkey Creek WWTP is shown in Figure V-2, and the hydraulic profile through the plant is shown in Figure V-3.



1. PEAK FLOW PUMPING STRUCTURE
2. INLET STRUCTURE
3. PEAK FLOW DIVERSION STRUCTURE
4. PEAK FLOW MEASUREMENT STRUCTURE
5. GRIT REMOVAL STRUCTURE
6. PRIMARY CLARIFIERS FLOW CONTROL STRUCTURE
7. PRIMARY CLARIFIER SPLITTER BOX (Clar. 1 & 2)
8. PRIMARY CLARIFIER(S)
9. PRIMARY CLARIFIER SPLITTER BOX (Clar. 3 & 4)
10. SLUDGE PUMP BUILDING
11. MAINTENANCE & PUMP BUILDING
12. PRIMARY CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE(S)
13. TRICKLING FILTER PUMP BUILDING
14. TRICKLING FILTER(S)
15. SNAIL REMOVAL STRUCTURE
16. INTERMEDIATE CLARIFIERS FLOW CONTROL STRUCTURE
17. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 1 & 2)
18. INTERMEDIATE CLARIFIER(S)
19. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 3 & 4)
20. INTERMEDIATE CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE
21. INTERMEDIATE PUMPING STRUCTURE
22. ACTIVATED SLUDGE BASIN(S)
23. FINAL CLARIFIER INFLUENT SPLITTER BOX
24. FINAL CLARIFIER(S)
25. TERTIARY FILTER BUILDING
26. EFFLUENT FLOW MEASUREMENT STRUCTURE
27. EFFLUENT HEADWALL
28. CYCLONE GRIT SEPARATOR & GRIT CLASSIFIER
29. NORTH SLUDGE THICKENER
30. NORTH DIGESTER BUILDING
31. NORTH PRIMARY DIGESTER
32. NORTH SECONDARY DIGESTER
33. NORTH WASTE SLUDGE GAS BURNER
34. SOUTH SLUDGE THICKENER
35. SOUTH DIGESTER BUILDING
36. SOUTH PRIMARY DIGESTER
37. SOUTH SECONDARY DIGESTER
38. SOUTH WASTE SLUDGE GAS BURNER
39. SLUDGE TRUCK LOADING PORTS NO. 1 & 2
40. SLUDGE HOLDING TANK & LIME SILO
41. SLUDGE DRYING BEDS
42. SEPTAGE DUMPING STRUCTURE
43. MECHANICAL SCREEN
44. SEPTAGE RECEIVING TANK
45. SEPTAGE PUMPING STRUCTURE
46. LABORATORY & ADMINISTRATION BUILDING
47. R.A.S. FLOW MEASUREMENT STRUCTURE
48. DRAWDOWN STRUCTURE
49. VALVE BOX 4A
50. INTERMEDIATE CLARIFIER RETURN FLOW STRUCTURE
51. FLOW EQUALIZATION BASIN
52. BASIN RETURN FLOW STRUCTURE
53. SLUDGE HANDLING BUILDING
54. SLUDGE THICKENER
55. AEROBIC DIGESTER
56. SLUDGE STORAGE
57. ULTRAVIOLET DISINFECTION
58. PUMPING STATION

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Turkey Creek WWTP - Plant Layout
Figure V-2



NORMAL TREATMENT FLOW SCHEME

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Turkey Creek WWTP - Hydraulic Profile
Figure V-3

The treatment components are further described as follows:

Raw Sewage Screening

Two mechanically cleaned bar screens are provided at the plant headworks to remove large solids prior to pumping. The screens have been in service since 2013 and are front-cleaning, front-return link driven types that deposit screenings into debris containers. Each screen has 0.5-inch clear bar openings and is capable of a normal operating flow of 15 mgd and a peak design flow of 50 mgd. Either screen can be bypassed, if needed.



Peak Flow Diversion Pumping



A total of six vertical, short coupled propeller pumps are used to deliver peak wet weather flows to the flow equalization basin. The pumps have been in service since 1997. Four of the pumps are rated to deliver 15 mgd each and two of the pumps are rated at 7.5 mgd each, thereby providing a *firm* capacity of 60 mgd with one large pump out of service. Both of the smaller pumps and one of the larger pumps are equipped with variable frequency drives (VFDs) to allow delivery of flows based on water level in the wet well. Discharge piping and flow control structures allow for peak flow diversion through a Parshall flume to the equalization basin. Peak flow pumps can also be used as a backup for the raw sewage pumps.

Raw Sewage Pumps

Two enclosed screw pumps and two submersible sewage pumps are provided to pump screened raw sewage. The two screw pumps were installed in 2019, and the two submersible pumps have been in service since 2013. Each screw pump has a rated capacity of 14.5 mgd, and each submersible sewage pump can deliver 7.3 mgd to the upper level of the inlet structure. The pumps provide a firm capacity of 29 mgd, and a total pumping capacity of 43.5 mgd.



Grit Removal

Three shallow, gravity type grit chambers with grit augers and scrapers are utilized for removal of grit from the wastewater flow. Two of the units were constructed as a part of the original plant construction in 1985, and one unit was installed in 1997. The grit augers have been replaced several times over the years. Each unit is 20-foot diameter and is capable of effective grit removal to flows of approximately 12 mgd.



Comminutors

Three in-channel type comminutors follow the grit chambers. Two units were installed with the original plant construction in 1985 and one unit was installed in 2013. The two original comminutors are designed for peak flows of approximately 6 mgd each, and the newer unit is capable of carrying 21 mgd.



Primary Clarifiers



Four 80-foot diameter primary clarifiers are provided, two of which have 12-foot depths, and two of which have 10-foot depths. Two clarifiers were installed in 1985, and two units were installed in 1997. Each is designed to treat 6 mgd at a surface overflow rate (SOR) of 1200 gpd/sq.ft. Sludge is scraped to a central hopper from which it is pumped to the anaerobic digester sludge thickeners via the cyclone grit separators. With the inclusion of recycle streams from the tertiary filters and intermediate clarifiers, a total peak hourly flow of approximately 26 mgd can be received at the clarifiers, resulting in a maximum SOR of 1300 gpd/sq.ft. under extreme conditions. At average design conditions the SOR will be about 810 gpd/sq.ft.

Trickling Filter Pumping



A combined primary clarifier effluent and tricking filter recycle flow is delivered to the four trickling filter towers by five vertical turbine pumps. Each pump is designed to deliver 6.8 mgd to the towers. The original pumps were replaced with new pumps as a part of plant improvements in 2011. The piping configuration allows for series or parallel operation of the trickling filters, however the units have been exclusively operated in the parallel mode. The motor driven rotary distributor on each tower is capable of applying 6.8 mgd to the media surface. The total maximum flow that can be pumped across the trickling filter towers in a parallel mode is 27 mgd, which requires the operation of four pumps.

Trickling Filter Towers



Four towers are utilized for biological treatment, each of which is approximately 73.5 feet in diameter and 28 feet deep, yielding a total media volume of 475,000 cubic feet. The towers contain modular self-supporting plastic sheet media of a vertical flow design having a specific surface area of approx. 30 sq.ft./cu.ft. of media. The media has been in use since 1985, and has exceeded the typical design life for such material. The hydraulic loading rate to the towers is about 1.1 gpm/sq.ft. of projected tower area. The towers were designed to remove approximately 60 percent of the applied BOD load and 55 percent of the ammonia at an organic loading rate of about 36 lbs. BOD per 1000 cubic feet of media per day.

Snail Removal

Two gravity type snail removal chambers are provided immediately following the trickling filter towers. The chambers provide for gravity settling of snails at flows up to 27 mgd. The shallow, square cells are individually drained and cleaned with the use of a skid-steer front-end loader.



Intermediate Clarifiers



The four 80-foot diameter intermediate clarifiers are suitable for peak hourly flows of 24 mgd when operating at a surface overflow rate of 1200 gpd/sq.ft. Two units were constructed in 1985 as final clarifiers, and were converted to intermediate clarifiers in 1997. The other two units were constructed as intermediate clarifiers in 1997. Two units have 10-foot depths, and two units have 12-foot depths. Sludge is scraped to the center of the clarifiers with a rotating scraper. Sludge is drawn from the original two units with sludge pumps located in the adjacent buildings. This sludge is then pumped to the anaerobic sludge thickeners via cyclone grit separators. Sludge from the newer two units is drawn off with telescopic sludge valves, and is sent by gravity to the waste activated sludge pumping station and/or the plant headworks.

Intermediate Pumping

Intermediate pumping delivers the partially treated effluent flow from the trickling filters and intermediate clarifiers to the activated sludge basins via five (5) screw pumps. The screw pumps were installed in 1997, and each is capable of delivering 12 mgd. The pumps provide a firm capacity of 48 mgd, which is adequate for the current peak plant flow of 24 mgd plus an assumed return activated sludge flow of 24 mgd.



Activated Sludge



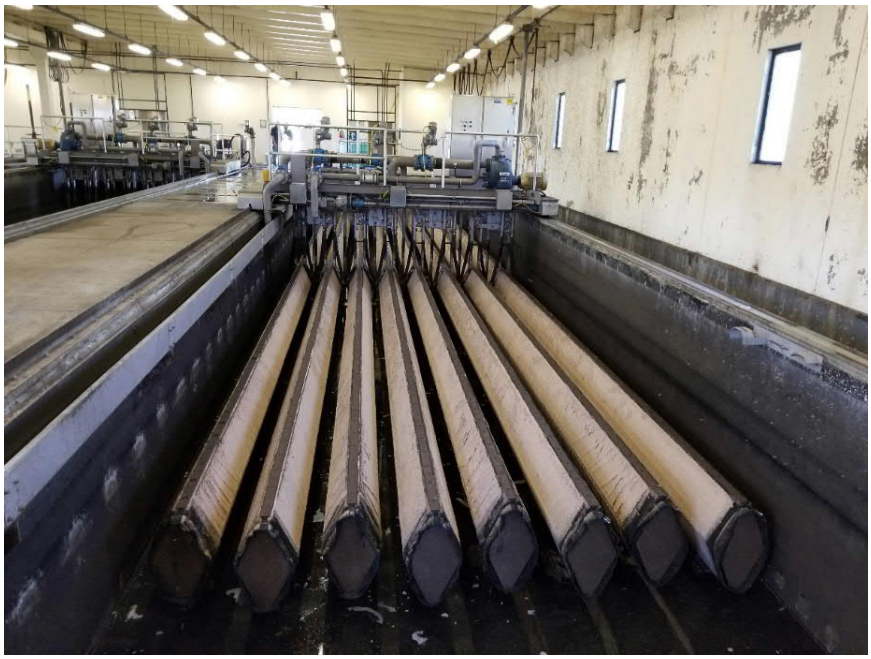
Advanced biological treatment is provided by an oxidation ditch type activated sludge process that was constructed in 1997. Two 1,200,000-gallon basins are provided, each with six mechanical brush type aerators. Each oxidation ditch is also equipped with a pair of submersible mixers that were installed in 2013. These mixers ensure the contents of the tank are properly mixed, regardless of the number of brush rotors in operation. At design conditions, the activated sludge basins provide a hydraulic residence time of 3.8 hours. Assuming a mixed liquor suspended solids concentration of 2500 mg/l, the mean cell residence time calculates to approximately 8.7 days and the food to microorganism ratio is estimated at 0.17 lbs. BOD removed per pound of mixed liquor volatile suspended solids in the basins. A return activated sludge flow rate of approximately 7.5 mgd is normally required for the process. With a total of ten 18-foot-long brush rotor aerators operating at 62 rpm and 10-inches immersion, 720 lbs. oxygen is transferred per hour to the liquid, while 16.2 horsepower is being drawn by each rotor. At 12-inches immersion, 846 lbs. oxygen is transferred per hour and each rotor draws 19 horsepower. In order to allow for immersions to 15-inches and rotor speeds to 70 rpm, 40 horsepower drives are supplied.

Final Clarifiers



Three 105-foot-diameter clarifiers with 15-foot depths are provided to settle solids generated by the activated sludge process. Clarifiers are of the center-feed, peripheral launder design with spiral scraper, flocculating center wells, and sludge removal via telescopic sludge valves. Return activated sludge flows by gravity to the intermediate screw pumps where it is lifted back up to the activated sludge basins. At 16 mgd with all three clarifiers in service, the surface overflow rate equals 600 gpd/sq.ft. At 24.8 mgd the surface overflow rate is 960 gpd/sq.ft. The clarifiers were placed in service in 1997.

Tertiary Filters



Four independent traveling bridge type filters are utilized for effluent polishing. Each unit is located in a 16-foot wide by 75-foot long concrete basin. Two of the filters are of the original sand media design installed in 1997, with each providing 1200 square feet of filter bed surface area. Two of the filters are of the proprietary Aqua-Diamond design that was retrofit into the original basins in 2016. The Aqua-Diamond units each provide 1920 sq.ft. of filtering surface area. At a peak flow of 5 gpm/sq.ft. through the filters the sand filters each have design capacity of 8.6 mgd, and the Aqua-Diamond filters can each carry 13.8 mgd. The total firm capacity of the filters exceeds the 24 mgd peak design capacity of the plant.

Ultraviolet Disinfection



The treated wastewater is disinfected with ultraviolet light prior to discharge to Turkey Creek. The UV equipment was placed in service in 2011. The equipment utilizes a horizontal lamp configuration consisting of two channels with two UV modules in series per channel. A total of 224 low pressure, high output amalgam lamps are utilized to disinfect the 24 mgd design flow to less than 126 e-Coli colonies per 100 ml. The water level in the channels is controlled by a series of fixed weirs downstream of the UV modules to insure proper water level control over the zero-to-24 mgd flow range.

Sludge Thickeners



There are three sludge thickeners, two of which thicken sludge prior to anaerobic digestion, and one that thickens waste activated sludge prior to aerobic digestion. One of the anaerobic sludge thickeners is 40-foot-diameter with a 12-foot depth (1985), and one is 45-foot-diameter with a 13-foot depth (1997). With both of these units in operation, the combined solids loading rate at design conditions is approximately 7 lbs. solids/sq.ft./day. A splitter box divides the flow proportionally to these two thickeners, thereby providing operator control of the sludge loading to each anaerobic digester complex. The waste activated sludge thickener was placed into operation in 2013 and is 50 ft. diameter with a 13-ft. depth. This unit is designed for a solids loading of about 6 lbs. solids/sq.ft./day.



Anaerobic Digesters

Sludge is anaerobically digested in high-rate, complete mix primary digesters. There are two primary digesters; one is 60-foot-diameter with a 29-foot depth (1985) providing a volume of 613,000 gallons, and one is 80-foot-diameter, with 30-foot depth (1997), providing a volume of 1,130,000 gallons. Both units are completely mixed via gas induction assemblies. The digesters have floating covers under which sludge gas is captured. Secondary digesters are provided to allow for sludge thickening and supernatant withdrawal. There are two secondary digesters, each with a gasholder cover. One is 60-foot-diameter with a nominal depth of 28 feet (1985), and one is 80-foot-diameter with a nominal depth of 29 feet (1997). The secondary digesters are unmixed and have floating gasholder covers capable of storing approximately 65,000 cubic feet of sludge gas.

Sludge gas (primarily methane) is captured and used as fuel for the boilers, which in turn are used for heating the primary digesters and several buildings. An engine driven electric generator was originally provided to allow sludge gas to be used to reduce overall power consumption at the plant, but that equipment is no longer in service.

Facilities are provided to deliver digested sludge to trucks for subsequent land application in liquid form, or to belt filter presses for dewatering and disposal as a sludge cake. Alternate delivery of sludge to open drying beds is also provided.

Aerobic Digesters

There are two aerobic digesters for the stabilization of waste activated sludge. The digesters were placed into service in 2013. Each digester is 60-foot diameter, with a 27-foot depth, and containing 584,000 gallons of sludge. The aerobic digesters are equipped with fixed diffusers that receive air from centrifugal blowers. At design conditions the aerobic digesters provide a solids retention time of 26 days at a loading rate of 36 lbs. volatile suspended solids per 1000 cubic feet per day.



Aerobic Digester Blowers

The aerobic digesters were originally (2013) equipped with three 3000 cubic feet per minute capacity high speed turbo blowers. Due to problems with several of the original blowers, the facility now has one of the original blowers plus two new 1500 cfm multistage centrifugal blowers available for aerobic sludge digestion.



Sludge Storage

Each of the two aerobic digesters is centrally located within a larger donut shaped tank that provides about 1.5 million gallons of storage volume (3 million gallons total). The sludge pumping and piping facilities allow for the storage of aerobically digested sludge, anaerobically digested sludge, polymer thickened sludge, or any combination of these.



Sludge Drying Beds

Twelve modified paved sludge drying beds are provided to allow for storage and drying of approximately 650,000 gallons of sludge. Each bed is 45-feet wide by 150-feet long, with underdrains spaced at 9 foot centers. Once dried, sludge is removed from the beds with a front-end loader. Six of the beds are covered with roofs to allow for the storage of dewatered sludge out of the weather.



Lime Feeding System

A bulk lime storage and feeding system is provided to allow metals concentrations in the waste sludge to be reduced on an as-needed basis via addition of lime (calcium hydroxide) to the sludge prior to wasting. The lime is mixed with the sludge in a 77,000-gallon in-ground concrete tank, and the amended sludge is then pumped to the truck loading ports. Two 1000 gpm submersible pumps are used for mixing and delivery to the sludge trucks. The lime feeding system was installed in 1997.



Sludge Dewatering Equipment

Two 2-meter belt filter presses were installed in 2013 to allow for dewatering of liquid sludge to a cake form. The equipment is also capable of thickening waste sludge prior to hauling in liquid form, if so desired. Each belt filter press is capable of dewatering approximately 1100 pounds of dry weight solids per hour.



Septage Facilities

Septage handling facilities are provided to minimize the impact of septage on treatment plant operations. These facilities provide for screening, grease removal, and dilution of septage prior to introduction to the plant process.



b. Operation

The Turkey Creek WWTP treats all of the flows generated in the Turkey Creek Drainage Basin. During periods of normal sewage flow, all wastewater is pumped through the treatment plant and is discharged at Outfall No. 004 (plant outfall). When periods of heavy rainfall cause daily flows to increase beyond the plant's hydraulic capacity, excess flow is diverted to a large flow equalization basin. For rainfall events of short duration, the excess water is temporarily stored in the basin, and is returned to the plant for treatment as system flows subside. If the wet weather flows occur for a long duration, or if the peak flows are quite high, the basin fills to a point where discharge can occur from the basin directly to the receiving stream through Outfall No. 002. Any discharge from the basin is monitored to ensure that the discharge is not having a negative impact on Turkey Creek.

Normally the wastewater received at the Turkey Creek WWTP passes through mechanically cleaned bar screens and is then lifted by enclosed screw pumps or submersible sewage pumps to gravity type grit chambers and comminutors. Screenings are automatically deposited into dumpsters, and grit is deposited into containers that are then manually dumped into a centrally-located dumpster, the contents of which are landfilled.

Screened wastewater enters the primary clarifiers where solids are settled out and floating materials are skimmed off. The settled sludge and floating materials are pumped to two thickeners via recessed impeller sludge pumps. Clarified wastewater flows to a pumping facility that delivers the clarifier effluent plus an amount of recycle flow to the tops of four plastic media trickling filter towers, where biological treatment is accomplished. While the piping and controls allow for operation of the four towers in series (flow across two towers, then across the other two towers) or parallel (flow across all four towers), operation has been almost

exclusively in the parallel mode. The motor operated rotary distributors have variable frequency drives to allow the units to be operated at slow rotational rates, thereby improving the flushing of the media. Rotary distributors are cleaned weekly to insure proper flow distribution across the towers. Normal operation entails operation of two or three trickling filter pumps, delivering from 12 to 18 MGD of clarified sewage and recycle flow to towers continuously. As raw sewage flow increases, the recycle rate decreases accordingly, allowing for continuous pumping with the constant speed turbine pumps. Four pumps are needed to lift the peak plant design flow to the trickling filters.

Biologically treated wastewater leaves the trickling filter towers, passes through a gravity type snail removal chamber, and then flows to the intermediate clarifiers where biological solids are removed from the treated wastewater. The generation of small snails within the towers has been a cyclic problem which is controlled by manually cleaning the snail removal chambers on an as-needed basis. Remaining snails are removed from the sludge flow by cyclone-type separators at the anaerobic digester buildings.

The intermediate clarifiers serve to settle out biological solids generated at the trickling filters. These solids are either pumped to the anaerobic digester sludge thickeners, or are returned to the primary clarifiers. Effluent from the intermediate clarifiers is then lifted along with return activated sludge to two brush-rotor type oxidation ditches. An activated sludge biological treatment process takes place in these basins, and then flows to the final clarifiers where solids are settled out. Effluent from the final clarifiers passes through tertiary filters where additional solids are filtered out. The filtered effluent then passes through the ultraviolet disinfection system on its way to a flow measurement flume. Plant effluent is sampled to ensure compliance with operating permit limits, and then flows down a series of reaeration steps prior to discharge to Turkey Creek.

Waste solids from the primary clarifiers and two of the intermediate clarifiers are thickened in the two gravity sludge thickeners located adjacent to the anaerobic digesters. Thickened sludge is pumped from these thickeners to the primary digesters, where anaerobic decomposition occurs under controlled conditions, resulting in the conversion of solids to methane and carbon dioxide gases. Sludge gas is burned in boilers, which in turn, heat the digester contents, the digester buildings, and the laboratory building. The overflow from the thickeners returns to the primary clarifiers.

Waste activated sludge solids and the solids removed by two of the intermediate clarifiers are intercepted by the waste sludge pump station, and are pumped to the aerobic digester sludge thickener. Thickened sludge from this thickener is pumped to the aerobic digesters for stabilization. The overflow from this thickener returns to the primary clarifiers.

Digested sludge from both the anaerobic and aerobic digesters is normally hauled as liquid sludge in tank trucks with ultimate disposal on agricultural land, primarily pastures. Sludge can also be dewatered to a cake form that can be temporarily stored on the sludge drying beds prior to land-application with a slinger type sludge disposal vehicle.

Sludge disposal follows strict guidelines established by regulatory agencies, and demand for the biosolids by area farmers typically exceeds the quantity of material produced in Joplin's two wastewater treatment plants.

Operation of the Turkey Creek facilities consists primarily of routine maintenance of equipment, monitoring of the various processes, housekeeping chores, and sampling and laboratory testing of wastewaters and effluents to insure conformance with regulatory limits. Screenings, grit, snails, and waste biosolids are hauled as required. The biological treatment processes require attention to the seasonal airflow through the trickling filter towers as well as the control of aeration equipment to insure proper levels of oxygen in the activated sludge basins. Return activated sludge flowrates and wasting of activated sludge are manually controlled to insure proper operation of the activated sludge system.

Over the years wastewater treatment plant operations have been negatively impacted by industrial discharges of wastewaters to the sewer system. These discharges have periodically created problems with the settleability of solids in the clarifiers and sludge thickeners, and have resulted in the plugging of the tertiary filter media.

2. Shoal Creek Wastewater Treatment Facilities

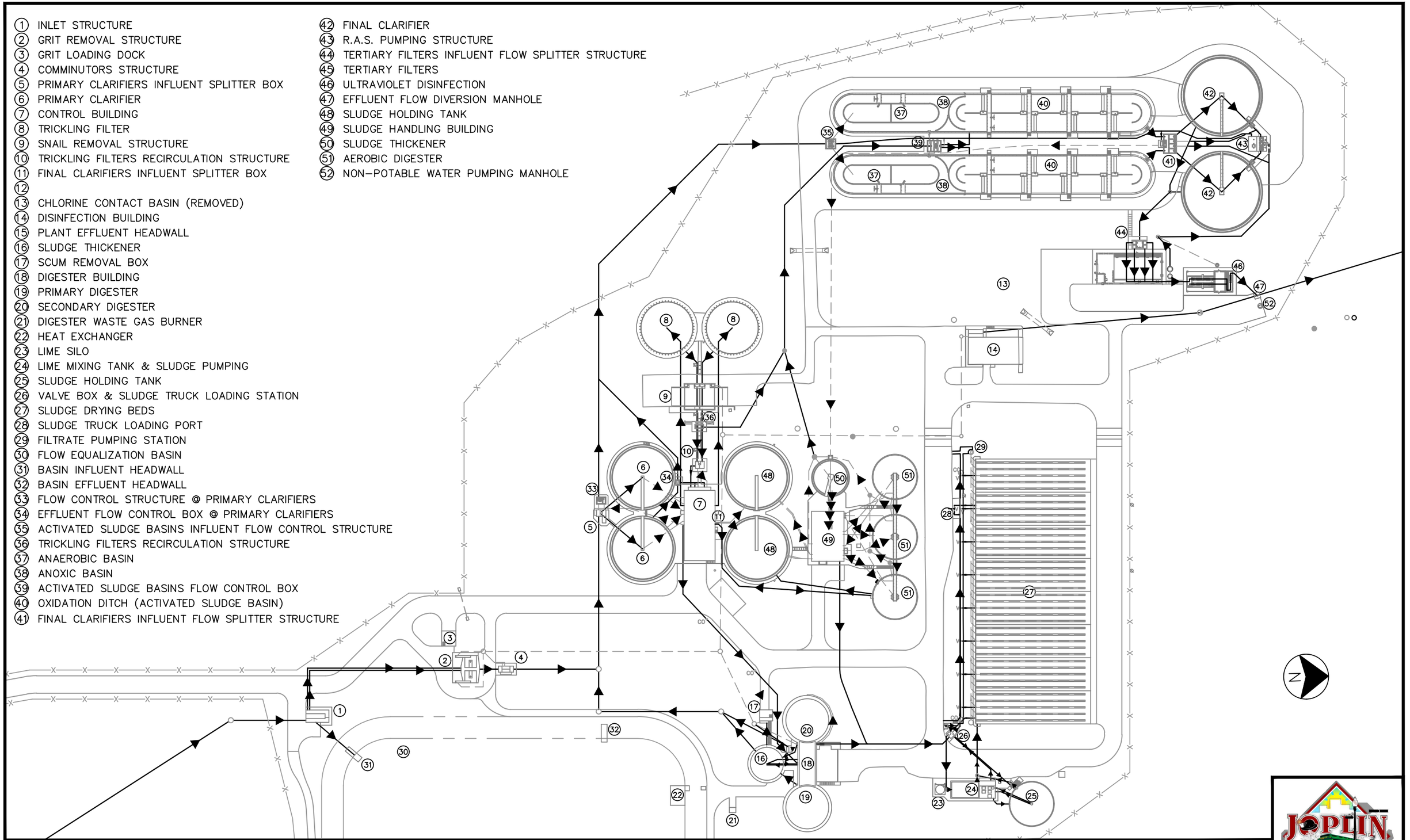


a. Treatment

The original Shoal Creek Wastewater Treatment Plant was completed in 1988 and was of a design very similar to the original Turkey Creek WWTP, utilizing trickling filter towers for biological treatment, and anaerobic digesters for sludge treatment. In 2015 the treatment plant underwent a significant expansion that added activated sludge treatment facilities, aerobic sludge digestion, tertiary filtration, and ultraviolet disinfection to the existing treatment components. The flow diagram for the Shoal Creek WWTP is shown in Figure V-4, and the hydraulic profile through the plant is shown in Figure V-5.

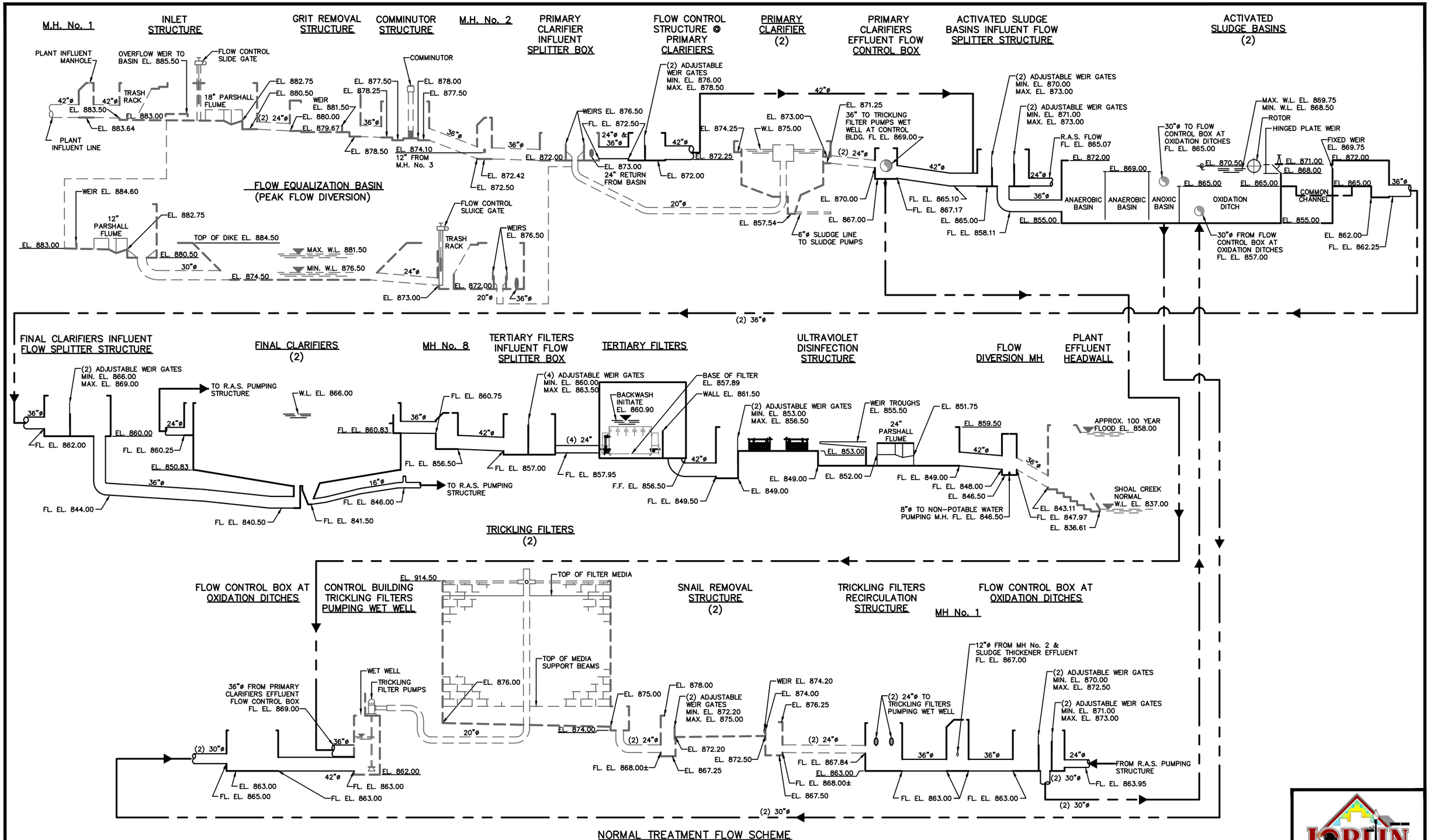
The Shoal Creek WWTP is designed to treat an average flow of 7.2 mgd, and a peak flow of 19 mgd through the plant, with excess flows diverted to a five-acre flow equalization basin located at the treatment plant site and containing a storage volume of approximately 10 million gallons. The biological treatment components were designed to accommodate a raw sewage biochemical oxygen demand (BOD) of 18,390 pounds per day, while producing an effluent containing less than 20 mg/l BOD.

1. INLET STRUCTURE
2. GRIT REMOVAL STRUCTURE
3. GRIT LOADING DOCK
4. COMMINUTORS STRUCTURE
5. PRIMARY CLARIFIERS INFLUENT SPLITTER BOX
6. PRIMARY CLARIFIER
7. CONTROL BUILDING
8. TRICKLING FILTER
9. SNAIL REMOVAL STRUCTURE
10. TRICKLING FILTERS RECIRCULATION STRUCTURE
11. FINAL CLARIFIERS INFLUENT SPLITTER BOX
12.
13. CHLORINE CONTACT BASIN (REMOVED)
14. DISINFECTION BUILDING
15. PLANT EFFLUENT HEADWALL
16. SLUDGE THICKENER
17. SCUM REMOVAL BOX
18. DIGESTER BUILDING
19. PRIMARY DIGESTER
20. SECONDARY DIGESTER
21. DIGESTER WASTE GAS BURNER
22. HEAT EXCHANGER
23. LIME SILO
24. LIME MIXING TANK & SLUDGE PUMPING
25. SLUDGE HOLDING TANK
26. VALVE BOX & SLUDGE TRUCK LOADING STATION
27. SLUDGE DRYING BEDS
28. SLUDGE TRUCK LOADING PORT
29. FILTRATE PUMPING STATION
30. FLOW EQUALIZATION BASIN
31. BASIN INFLUENT HEADWALL
32. BASIN EFFLUENT HEADWALL
33. FLOW CONTROL STRUCTURE @ PRIMARY CLARIFIERS
34. EFFLUENT FLOW CONTROL BOX @ PRIMARY CLARIFIERS
35. ACTIVATED SLUDGE BASINS INFLUENT FLOW CONTROL STRUCTURE
36. TRICKLING FILTERS RECIRCULATION STRUCTURE
37. ANAEROBIC BASIN
38. ANOXIC BASIN
39. ACTIVATED SLUDGE BASINS FLOW CONTROL BOX
40. OXIDATION DITCH (ACTIVATED SLUDGE BASIN)
41. FINAL CLARIFIERS INFLUENT FLOW SPLITTER STRUCTURE
42. FINAL CLARIFIER
43. R.A.S. PUMPING STRUCTURE
44. TERTIARY FILTERS INFLUENT FLOW SPLITTER STRUCTURE
45. TERTIARY FILTERS
46. ULTRAVIOLET DISINFECTION
47. EFFLUENT FLOW DIVERSION MANHOLE
48. SLUDGE HOLDING TANK
49. SLUDGE HANDLING BUILDING
50. SLUDGE THICKENER
51. AEROBIC DIGESTER
52. NON–POTABLE WATER PUMPING MANHOLE



Allgeier, Martin and Associates, Inc.
Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, MO 64804

Shoal Creek WWTP - Plant Layout
Figure V-4



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Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, MO 64804

Shoal Creek WWTP - Hydraulic Profile
Figure V-5

The treatment components at the Shoal Creek WWTP are further described as follows:

Inlet Structure/Screening

The inlet structure contains a mechanically cleaned bar screen to remove large solids ahead of the treatment process. The screen has been in service since 2017 and is a front-cleaning, front-return link driven type that deposits screenings into a debris container. The screen has 0.375-inch clear bar openings and is capable of a normal operating flow of 4 mgd and a peak design flow of 19 mgd. The screen can be bypassed, if needed. In addition to the screen, the inlet structure also contains flowmeters and facilities to divert peak flows to the flow equalization basin.



Grit Removal

Two 16-foot square gravity type grit chambers with scrapers and grit augers are utilized. The grit chambers were originally constructed in 1988. The grit augers were replaced with new shaftless units in 2019. Each chamber is designed for a peak flow of approximately 10 mgd.



Comminutors

Two in-channel type comminutors are utilized to shred solids. The comminutors are each designed for a peak flow of approximately 11.5 mgd. The units were installed in 2015.



Primary Clarifiers

Two 83-foot diameter primary clarifiers with 10-foot depths receive screened and degritted sewage. The clarifiers are suitable for a total peak hourly flow of approximately 16 mgd, including 1 mgd recycle flow from the sludge thickener and digesters, at a surface overflow rate of 1500 gpd/sq.ft. Sludge is scraped to the center of the clarifiers from which it is pumped to the anaerobic digester sludge thickener. A flow control structure located ahead of the primary clarifiers allows for the diversion of a portion on the wastewater flow directly to the activated sludge facilities.



Trickling Filter Pumping

A combined primary clarifier effluent and trickling filter recycle flow is delivered to the two trickling filter towers by five vertical turbine pumps that were installed in 1988. Each pump is capable of delivering 4 mgd to the towers. The piping configuration allows for series or parallel operation of the units, however the trickling filters have historically been operated in the parallel mode. The motor operated rotary distributor on each tower is capable of applying 7.2 mgd to the media surface. The total maximum flow that can be pumped across the trickling filter towers is approximately 14.4 mgd.



Trickling Filter Towers

Two towers are utilized in conjunction with the activated sludge facilities for biological treatment of the wastewater. Each trickling filter tower is approximately 70-foot diameter and 30-feet deep, yielding a total media volume of 230,000 cubic feet. The towers contain modular, self-supporting sheet media having a specific surface area of 30 sq.ft./cu.ft. of media. The media in the south tower was installed in 1995, and the media in the north tower was installed in 2018. The rotary distributors in both towers were replaced with new units in 2006.



Snail Removal

Two gravity type snail removal chambers are provided immediately following the trickling filter towers. The units are sized to accommodate the 14.4 mgd flow through the trickling filters. The shallow, square cells are individually drained and manually cleaned when required.



Activated Sludge



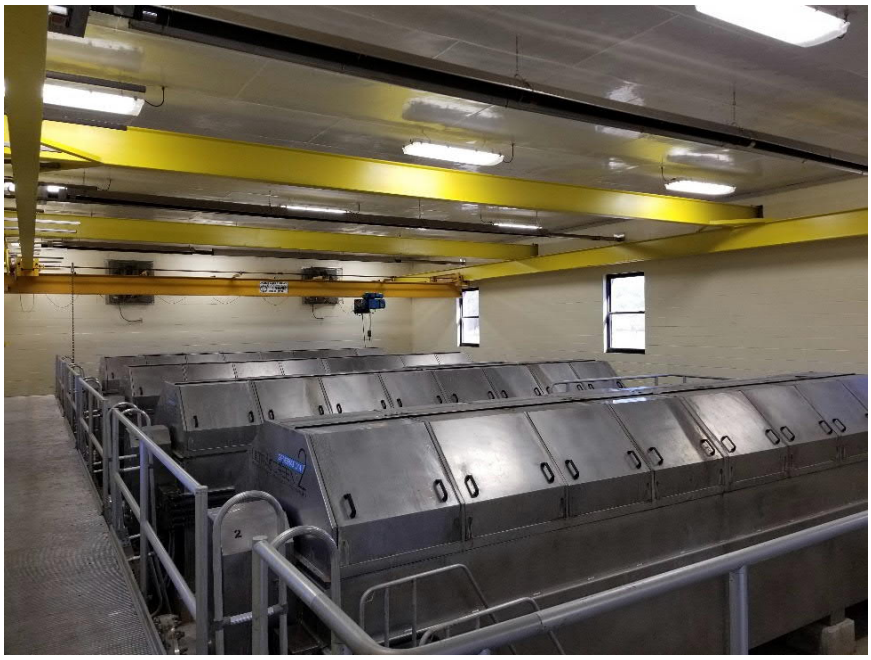
The activated sludge portion of the biological treatment process is designed for a 10-hour hydraulic detention time at 7.2 mgd, and provides two oxidation ditch type aeration basins, each with a volume of 1.5 million gallons (25-foot wide channel by 230-foot straight section by 15-feet deep). The design provides seven 18-foot-long brush rotor aerators per ditch (14 total), with 40 horsepower motors capable of operating the brushes at up to 14 inches immersion at 72 rpm, and delivering 6.2 pounds oxygen per hour per foot of rotor. Assuming one rotor in each ditch is out of service, the remaining twelve rotors can provide 1,340 pounds oxygen per hour, or 32,140 pounds oxygen per day at standard conditions. Each oxidation ditch is also equipped with a pair of submersible mixers to ensure the contents of the tank are properly mixed regardless of the number of brush rotors in operation. The activated sludge portion of the plant was placed into operation in 2015.

Final Clarifiers



Two 110-foot diameter final clarifiers (2015) are provided following the activated sludge basins. The clarifiers are of a center-feed, peripheral launder, flocculating design, with 15-foot depth and spiral scrapers. Sludge is plowed to a center hopper from which sludge is removed via a 16-inch diameter telescopic sludge valve. At the peak flow of 19 mgd, with both units in service, the surface overflow rate equals 1,000 gpd/square foot. At peak flow, assuming a return activated sludge flowrate of 3.6 mgd and a mixed liquor suspended solids (MLSS) concentration of 3,000 mg/l, the solids loading rate to the clarifier equals 30 pounds total suspended solids per square foot per day.

Tertiary Filters



Clarified effluent from the clarifiers flows to four parallel automatic backwash tertiary filters where additional solids are removed from the treated wastewater. The filters were installed in 2015 and are of disc type design with stainless steel mesh media. The filters are designed in conformance with regulatory guidelines, and are designed to operate at loading rates up to 19 mgd with one unit out of service.

Ultraviolet Disinfection



Treated wastewater is disinfected by ultraviolet disinfection facilities that follow the tertiary filters. The disinfection equipment was installed in 2015 and utilizes a horizontal lamp configuration consisting of two channels with two UV modules in series per channel. By utilizing low pressure, high output amalgam lamps, a total of 192 lamps are required to disinfect the 19 mgd design flow to a 30-day geometric mean of less than 126 e-Coli per 100 ml. The water level through the UV channels is controlled by a series of fixed weirs downstream of the UV modules, with adequate weir length to insure proper level control over the 0 to 19 mgd flow range.

Sludge Thickeners



The treatment plant has two gravity sludge thickeners, with one thickening primary clarifier sludge ahead of the anaerobic digesters, and the second one thickening waste activated sludge. The anaerobic sludge thickener was installed in 1988, and is 40-foot diameter and 12-foot deep. The thickener receives the underflow from the primary clarifiers, and is designed for a solids loading rate of 10 lbs.solids/sq.ft./day. The surface overflow rate is maintained over a range of 400 to 800 gpd/sq.ft. Thickener overflow is returned to the primary clarifiers. The waste activated sludge thickener was placed in service in 2015 and is 50-foot diameter with a 13-foot depth. Pumps transfer sludge from this thickener to the aerobic digesters. The design loading to this thickener is 8.2 lbs. solids/sq.ft./day. The typical surface overflow rate of the unit is 330 gpd/sq.ft.

Anaerobic Digesters



Sludge from the primary clarifiers is anaerobically digested in a high-rate, complete-mix primary digester, which is 60-foot-diameter, with a 25-foot sludge depth at the wall. The digester was constructed as a part of the original plant in 1988 and has a floating cover under which sludge gas is captured. A secondary digester of equal dimensions is provided to allow for sludge thickening and supernatant withdrawal. The secondary digester is unmixed, and has a floating gasholder cover capable of storing approximately 25,000 cu. ft. of sludge gas.

Sludge gas (primarily methane) is captured and used as fuel for a boiler, which in turn, is used for heating the primary digester and several buildings. An engine driven electric generator was originally provided to allow sludge gas to be used to reduce overall power consumption at the plant, however this equipment is no longer in service.

Aerobic Digesters



Three aerobic digesters were constructed in 2015 to stabilize the waste activated sludge. These three digesters normally operate in series, with the third tank providing primarily sludge storage. The aerobic digester tanks are 60-foot diameter with average 27-foot depths and conical bottoms, providing approximately 584,000 gallons each. The total solids retention time equals approximately 30 days at an assumed 2.5 percent solids concentration, thereby providing for the generation of Class B biosolids. The gravity sludge thickener, gravity belt thickener, and decant piping allow operators to maintain a higher solids concentration in the tanks if so desired. Aeration of the digesters is with medium bubble air diffusers and four 3000 cfm turbo-type centrifugal blowers. The diffused air system has the ability to deliver 38 cfm/1000 cu. ft. digester volume, with one unit out of service.

Sludge Handling Equipment

The 2015 treatment plant expansion included the installation of a 2-meter gravity belt thickener to allow for the polymer thickening of the aerobically digested sludge. Piping allows for transfer of sludge to and from the aerobic digesters, and allows polymer-thickened sludge to be sent to the lime-mixing and sludge storage facilities.



Sludge Storage

Two of the original treatment plant's final clarifiers were converted in 2015 to sludge holding tanks. Each basin is 83-foot diameter by 12-feet deep and can store up to 490,000 gallons of waste aerobically digested sludge. The third aerobic digester can store 584,000 gallons of aerobically digested sludge. A storage tank is also located adjacent to the lime mixing facilities, and it has a 500,000-gallon capacity. The sludge pumping and piping facilities allow for the storage of aerobically digested sludge, anaerobically digested sludge, polymer thickened sludge, or any combination of these.



Sludge Drying Beds

Eight modified paved sludge drying beds are provided to allow for storage and drying of approximately 650,000 gallons of sludge. Each bed is 45 feet wide by 150 feet long, with underdrains spaced at 9-foot centers. Once dried, sludge is removed from the beds with a small front-end loader.



Lime Feeding System

A bulk lime storage and feeding system was installed in 2006 to allow metals concentrations in the waste sludge to be reduced on an as-needed basis via addition of lime (calcium hydroxide) to the sludge prior to wasting. The lime is mixed with the sludge in a 77,000 gallon in-ground concrete tank, with the amended sludge then pumped to the truck loading ports. Two 1,000 gpm pumps are used for mixing and delivery to the sludge trucks. An additional 60-foot diameter by 25-foot deep tank is provided for storage of approximately 500,000 gallons of waste sludge, and two additional 1,000 gpm pumps are provided to transfer sludge to or from this storage tank.



b. Operation

The Shoal Creek WWTP receives wastewater from the Shoal Creek drainage area via two major lift stations, the Tin Cup and the Filmore Lift Stations, and several smaller lift stations. Peak flows tributary to the Tin Cup Lift Station are dampened by flow equalization basins constructed upstream of the lift station. Peak flow records maintained at the Shoal Creek WWTP therefore reflect the lowering of peak flows associated with the flow equalization basins.

As with the Turkey Creek plant, day to day operation of the Shoal Creek WWTP consists primarily of routine maintenance of equipment, monitoring of the various processes, housekeeping chores, and sampling and laboratory testing of wastewaters and effluents to insure conformance with regulatory limits. Shoal Creek operators make daily visits to the Tin Cup and Filmore lift stations to ensure proper operation of the pumping equipment that delivers the majority of the wastewater to the plant.

During periods of normal sewage flow, all wastewater flows through the treatment plant and is discharged at Outfall No. 001. If periods of heavy rainfall cause daily flows to increase beyond the plant's hydraulic capacity, excess flow is automatically diverted to a large flow equalization basin at the treatment plant site. For rainfall events of short duration, the excess water is temporarily stored in the basin and is returned to the plant for treatment as system flows subside. If the wet weather flows occur for a long duration, or if the peak flows are quite high, the basin can fill to a point where discharge occurs from the basin directly to the receiving stream. Such a discharge would be viewed as a bypass by regulatory agencies.

Normally the wastewater received at the Shoal Creek WWTP passes through a mechanically-cleaned bar screen, gravity type grit chambers, and comminutors on its way to the primary clarifiers. Screenings are automatically deposited into dumpsters, and grit is deposited into containers that are then manually dumped into a centrally-located dumpster, the contents of which are landfilled.

Screened wastewater enters the primary clarifiers where solids are settled out and floating materials are skimmed off. The settled sludge and floating materials are pumped to the anaerobic digester thickener by recessed impeller sludge pumps. Clarified wastewater flows to a pumping facility that delivers the clarifier effluent plus an amount of recycle flow to the tops of two plastic media trickling filter towers where biological treatment is accomplished. The motor operated rotary distributors on the trickling filters have variable frequency drives to allow the units to be operated at slow rotational speeds, thereby improving the flushing of the media. Rotary distributors are cleaned regularly to insure proper flow distribution across the towers. Normal operation entails operation of two trickling filter pumps, delivering 8 mgd of clarified sewage and recycle flow to towers continuously. As raw sewage flow increases, the recycle rate decreases accordingly, allowing for continuous pumping with the constant speed turbine pumps. Four pumps can deliver a flow of about 14.4 mgd to the trickling filters. Flows in excess of this automatically divert directly to the activated sludge portion of the plant.

Biologically treated wastewater leaves the trickling filter towers, passes through a gravity type snail removal chamber, and then flows to two brush-rotor type oxidation ditches. The activated sludge biological treatment process takes place in these basins, and then flows to the final clarifiers where solids are settled out. Effluent from the final clarifiers passes through tertiary filters where additional solids are filtered out. The filtered effluent then passes through the ultraviolet disinfection system on its way to a flow measurement flume. Plant effluent is sampled to ensure compliance with operating permit limits, and then flows down a series of reaeration steps prior to discharge to Shoal Creek.

Waste solids from the primary clarifiers is thickened in the gravity sludge thickener located adjacent to the anaerobic digesters. Thickened sludge is pumped from this thickener to the primary digester, where anaerobic decomposition occurs under controlled conditions, resulting in the conversion of solids to methane and carbon dioxide gases. Sludge gas is burned in boilers, which in turn, heat the digester contents, the digester buildings, and the laboratory building. The overflow from the thickeners returns to the primary clarifiers.

Waste activated sludge solids are intercepted by the waste sludge pump station, and are pumped to the aerobic digester sludge thickener. Thickened sludge from this thickener is pumped to the aerobic digesters for stabilization. The overflow from this thickener returns to the oxidation ditches.

Digested sludge from both the anaerobic and aerobic digesters is normally hauled as liquid sludge in tank trucks with ultimate disposal on agricultural land, primarily pastures. Sludge can also be mechanically thickened to reduce the amount of water that is hauled to the land-application sites. Sludge disposal follows strict guidelines established by regulatory agencies, and demand for the biosolids by area farmers typically exceeds the quantity of material produced in Joplin's two wastewater treatment plants.

Operation of the Shoal Creek facilities consists primarily of routine maintenance of equipment, monitoring of the various processes, housekeeping chores, and sampling and laboratory testing of wastewaters and effluents to insure conformance with regulatory limits. Screenings, grit, snails, and waste biosolids are hauled as required. The biological treatment processes require attention to the seasonal airflow through the trickling filter towers as well as the control of aeration equipment to insure proper levels of oxygen in the activated sludge basins. Return activated sludge flowrates and wasting of activated sludge are manually controlled to insure proper operation of the activated sludge system.

While the preceding reflects the normal operation to date of the Shoal Creek WWTP, it is noteworthy that the plant design also allows for operation in a biological nutrient removal mode that enhances the removal of nitrogen and phosphorus from the wastewater. The operation of the trickling filter and activated sludge facilities can be undertaken in a series mode as described previously, or in a parallel mode where mixed liquor from the aeration basins is recirculated across the trickling filters. The two oxidation ditches contain anaerobic and anoxic zones where improved nitrogen removal and enhanced biological phosphorus removal can be attained. Submersible mixers are provided in all zones to ensure that solids

can be kept in suspension independent of the aeration requirements. Flow control facilities ahead of the biological treatment portions of the plant allow for control of the amount of BOD sent to the aeration basins, as is required for biological nutrient removal.

3. Personnel

a. Current Employees

The City of Joplin currently has thirty-four full-time employees in the wastewater treatment division. The Turkey Creek WWTP serves as the headquarters for the City-wide operations, with offices for the Superintendent, Assistant Superintendent, Chief of Maintenance, Pretreatment/Sludge Management Coordinator, and Laboratory Director. Personnel responsible for equipment maintenance and sludge hauling from both the Turkey Creek and Shoal Creek plants report to the Turkey Creek WWTP. Each individual wastewater treatment plant has a Chief Operator and nine additional shift operators, providing 24-hour operation of each plant, with at least two operators per shift for safety reasons.

The laboratory at the Turkey Creek WWTP serves as the primary laboratory responsible for testing of sludges, industrial wastewaters, and wastewater from both treatment plants. All testing undertaken for regulatory compliance monitoring is done at the Turkey Creek WWTP or is contracted out. The laboratory at the Shoal Creek WWTP is used for basic operational monitoring at that facility. The Laboratory Director at the Turkey Creek WWTP is assisted by two laboratory technicians and one laboratory assistant. The personnel currently employed by the City for wastewater treatment operations are summarized as follows:

TABLE V-1. CURRENT TREATMENT OPERATIONS PERSONNEL

Position	Turkey Creek WWTP Personnel	Shoal Creek WWTP Personnel
Superintendent	1	-
Assistant Superintendent	1	-
Pretreatment Manager	1	-
Pretreatment Assistant	1	-
Equipment Operator	2	-
Lab Director	1	-
Lab Technician	2	-
Lab Assistant	1	-
Chief of Maintenance	1	-
Maintenance Mechanic	2	-
Chief Operator	1	1
Operator	9	9
Laborer	1	-

b. Recommended Additional Personnel

A review of the wastewater treatment plant staffing has been undertaken in an effort to ensure that adequate resources are available to protect the City's very significant investment in wastewater treatment facilities. Adequate staffing is one of the keys to providing the level of treatment required to remain in compliance with regulatory mandates.

In 1973 the Environmental Protection Agency published the widely referenced guide entitled *Estimated Staffing for Municipal Wastewater Treatment Facilities*, which was used successfully by plant managers and state regulatory agencies to estimate staffing needs associated with specific treatment plant processes and activities. Over time this publication became less useful, with the advent of new technologies intended to provide advanced levels of treatment for ever more demanding effluent limits. In order to address the need for a more current determination of staffing needs, the New England Interstate Water Pollution Control Commission prepared a new document in 2008 entitled *The Northeast Guide for Estimating Staffing at Publicly and Privately Owned Wastewater Treatment Plants.* This guide has been widely accepted as an efficient way to estimate numerical staffing requirements for wastewater treatment facilities of various degrees of complexity.

Utilizing the *Northeast Guide* results in a recommendation for 16 personnel at the Shoal Creek WWTP and 27 personnel at the Turkey Creek WWTP. The City currently employs 10 people at the Shoal Creek WWTP and 24 people at the Turkey Creek WWTP. The two plants share laboratory, maintenance and equipment operating personnel. Following a review of the Northeast Guide results and discussions with the treatment plant personnel, it is recommended that the following personnel be added to the staff to improve operations.

1) One Equipment Operator at the Shoal Creek WWTP whose primary purpose is to dispose of waste biosolids. Also dedicate a sludge truck to this plant site.

2) One Laborer to assist with issues created by industrial discharges to the system.

3) One Electrician to serve both treatment facilities.

4) Three additional Maintenance Mechanics to improve maintenance of aging equipment at both plants.

With the addition of 6 personnel, the WWTP staff would increase to 40 people, compared to the 43 staff members estimated with utilization of the *Northeast Guide*.

4. Wastewater Characteristics

a. Source

During 2017, approximately 53-percent of the total amount of water received at the City's two treatment plants was inflow & infiltration (I&I) which entered the system as stormwater and groundwater through leaking sewer pipes and manholes. Approximately 47-percent of the flow was actual wastewater generated by residential, commercial, and industrial sources. During 2018, approximately 59-percent of the total wastewater flow was I&I, and 41-percent was actual wastewater. During 2018, industries accounted for approximately 36-percent, commercial sources contributed 24-percent, and residential sources provided the remaining 40-percent of the actual City-wide sewage flows, excluding I&I.

Water is provided to residents of Joplin by the Missouri-American Water Company, and estimates of water usage and wastewater flows were derived from records provided to the City by the Water Company.

b. System Flows

Water sales data serves as an indicator of the theoretical wastewater flow that would be anticipated if there was no I&I entering the City sewer system. Water sales to users of the Joplin sewer system averaged approximately 7.1 mgd during 2017 and 2018, and it is estimated that nearly all of this water entered the sewerage system.

A breakdown of current theoretical wastewater flows by user class and by drainage basin, as well as I&I contributions, is set forth as follows. The tabulation breaks out the discharge of wastewaters from two large industries, Jasper Products and Gilster-Mary Lee, separately, as facilities exist to allow City personnel to send flows from these two industries to either the Turkey Creek or Shoal Creek systems. The following tabulation assumes that these industrial flows were sent primarily to the Turkey Creek WWTP during 2017 and 2018.

TABLE V-2. CURRENT WASTEWATER FLOWS

Industrial	Number of Users	Wastewater Volume (MGD)
Turkey Creek	21	0.71
Shoal Creek	18	0.88
Jasper & G-ML	3	0.96
Total	**42**	**2.55**
Commercial		
Turkey Creek	1,948	1.01
Shoal Creek	1,367	0.71
Total	**3,315**	**1.72**
Residential		
Turkey Creek	14,158	1.94
Shoal Creek	6,546	0.89
Total	**20,704**	**2.83**
Inflow & Infiltration		
Turkey Creek	-	6.98
Shoal Creek	-	2.22
Total	**-**	**9.20**
Turkey Creek Total	**16,130**	**11.60**
Shoal Creek Total	**7,931**	**4.70**
System Total	**24,061**	**16.30**

Joplin provides sewer service to approximately 20,704 residential service connections, and a sewered population of about 55,380, including Duenweg and Duquesne. The average residential wastewater discharge amounts to approximately 51 gallons per capita per day.

Actual wastewater flow, including the extraneous water that enters the system as I&I, is measured at the wastewater treatment plants. During 2017 and 2018, the average daily flow treated in the Turkey Creek basin (total yearly flow/365 days) was 11.6 mgd. The peak daily flow during those years in the Turkey Creek system was 74.9 mgd, and the minimum daily flow was 4.0 mgd. The peak monthly flow averaged 26.4 mgd.

During 2017 and 2018, the average daily flow treated in the Shoal Creek basin was 4.7 mgd. The peak daily flow was 25.0 mgd, the minimum daily flow was 2.2 mgd, and the peak monthly flow averaged 9.9 mgd.

Daily flow and load data for both of Joplin's drainage basins for years 2017, and 2018 are tabulated in Appendices G, H, I, and J.

c. System Loads

During 2017 and 2018 the Turkey Creek wastewater treatment system received an average of 15,436 pounds biochemical oxygen demand (BOD) per day and 16,597 pounds total suspended solids (TSS) per day. The peak monthly organic load was 27,681 pounds BOD/day, and the peak monthly solids load was 26,605 pounds TSS/day.

During 2017 and 2018 the Shoal Creek wastewater treatment plant received an average of 9,569 pounds BOD and 7,898 pounds TSS/day. Peak monthly loadings were 13,977 pounds BOD/day and 13,363 pounds TSS/day.

The following tabulation reflects current wastewater loads for each drainage basin, delineated by user class.

TABLE V-3. CURRENT WASTEWATER LOADS

Industrial	Number of Users	Average BOD Load (lb/Day)	Average TSS Load (lb/day)
Turkey Creek	24	5,072	5,081
Shoal Creek	18	3,902	1,602
Total	**42**	**8,974**	**6,683**
Commercial			
Turkey Creek	1,948	3,548	3,943
Shoal Creek	1,367	2,515	2,794
Total	**3,315**	**6,063**	**6,737**
Residential			
Turkey Creek	14,158	6,816	7,573
Shoal Creek	6,546	3,152	3,502
Total	**20,704**	**9,968**	**11,075**
Turkey Creek Total	**16,130**	**15,436**	**16,597**
Shoal Creek Total	**7,931**	**9,569**	**7,898**
System Total	**24,061**	**25,005**	**24,495**

The residential loads are estimated based on a total sewered population of approximately 55,380, and an average residential user contribution of 0.18 pounds of BOD and 0.20 pounds of TSS to the sewerage system daily. Commercially generated sewage typically has characteristics similar to domestic wastewater, therefore the commercial loads are estimated from commercial water sales data and domestic BOD and TSS concentrations. The industrial loads are determined by subtracting the residential and commercial loads from the known treatment plant loadings. A comparison was made of the preceding estimated industrial loads, with the results of the industrial sampling and testing program that the City maintains. The estimated numbers are somewhat greater than the numbers derived from the industrial sampling program, however that is not unusual. Some

industries are able to operate in a manner that favors collection by the City of low-strength samples that may underestimate the load they discharge to the City.

d. Treatment Facility Loadings

It is anticipated that the Turkey Creek WWTP and Shoal Creek WWTP will remain in service as integral parts of Joplin's wastewater treatment system at least through the design year of 2040. For this reason, an evaluation of the current loadings of the unit processes within these facilities is warranted.

A process flow diagram that reflects the average loading of the Turkey Creek WWTP during 2017 and 2018 is shown in Figure V-6. The average flow treated at the Turkey Creek WWTP was approximately 77-percent of the plant's average hydraulic design capacity (11.6 mgd treated; versus 15 mgd design capacity). The organic (BOD) loading averaged 74-percent of the plant's design capacity (15,436 lbs. BOD treated daily versus 20,960 lbs. BOD/day design capacity). It is noteworthy that the Turkey Creek WWTP has had several instances in recent years where peak wastewater flows during periods of significant precipitation have resulted in unauthorized discharges from the flow equalization basin. It is clear that additional peak flow capacity through the treatment plant would resolve this bypassing.

The process flow diagram for the Shoal Creek WWTP during 2017 and 2018 is shown in Figure V-7. The plant received average flows equal to about 65 percent of its hydraulic design capacity, and the organic loading was 52-percent of the design capacity of the facility. The average flow was 4.7 mgd, compared to a design hydraulic capacity of 7.2 mgd. The organic loading averaged 9,569 lbs. BOD/day, compared to a design plant loading of 18,390 lbs. BOD/day.

D. Future Conditions

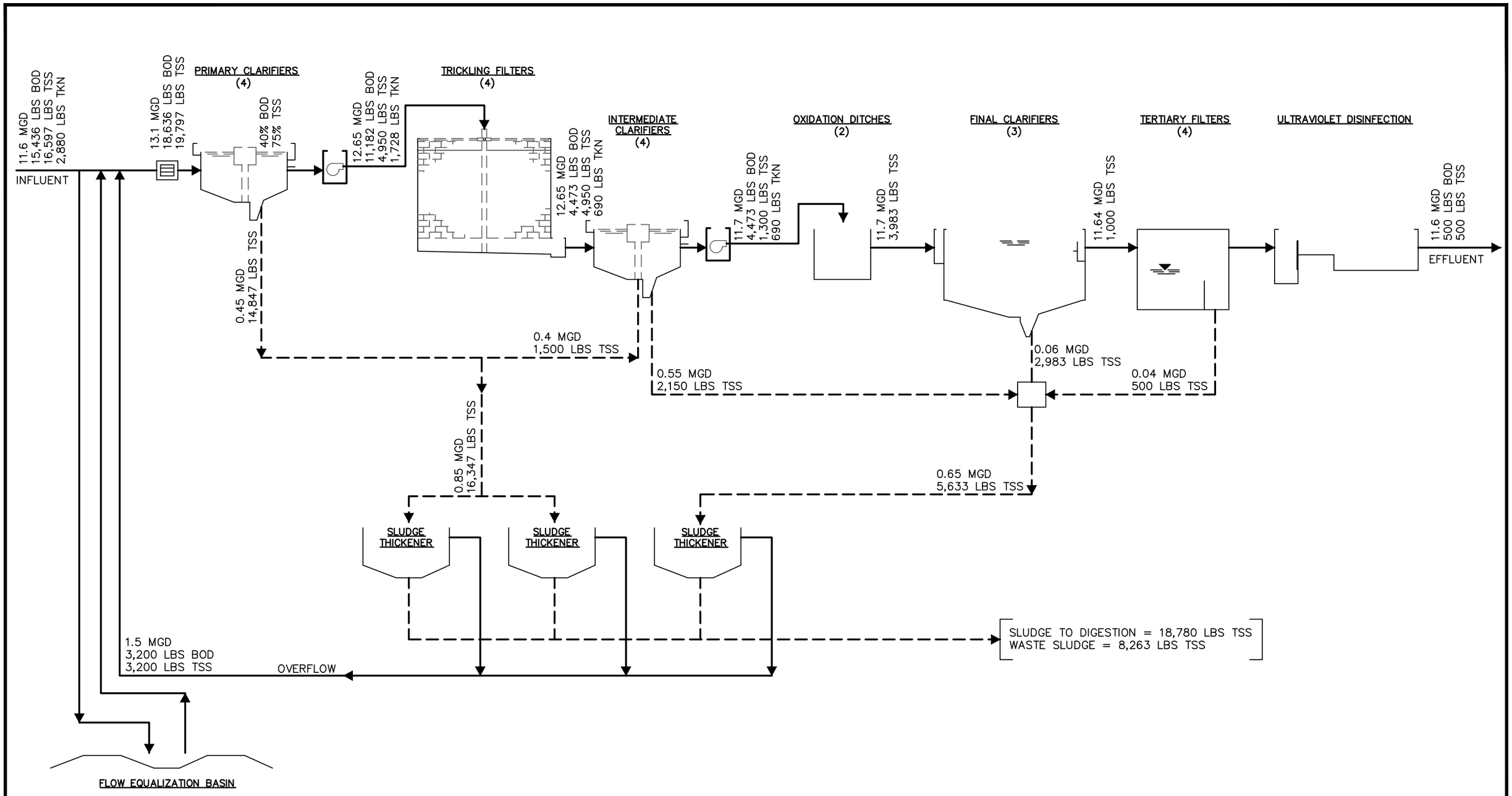
1. General

It is appropriate to study Joplin's wastewater treatment facilities in light of anticipated future conditions instead of merely evaluating today's needs. This section will provide estimates of wastewater treatment needs through the year 2040.

In addition to projecting increases in wastewater flows and loads by user class in each basin, regulatory trends are reviewed in an attempt to anticipate future regulatory limits that may be placed on Joplin's wastewater treatment facilities.

2. Demographic Projections

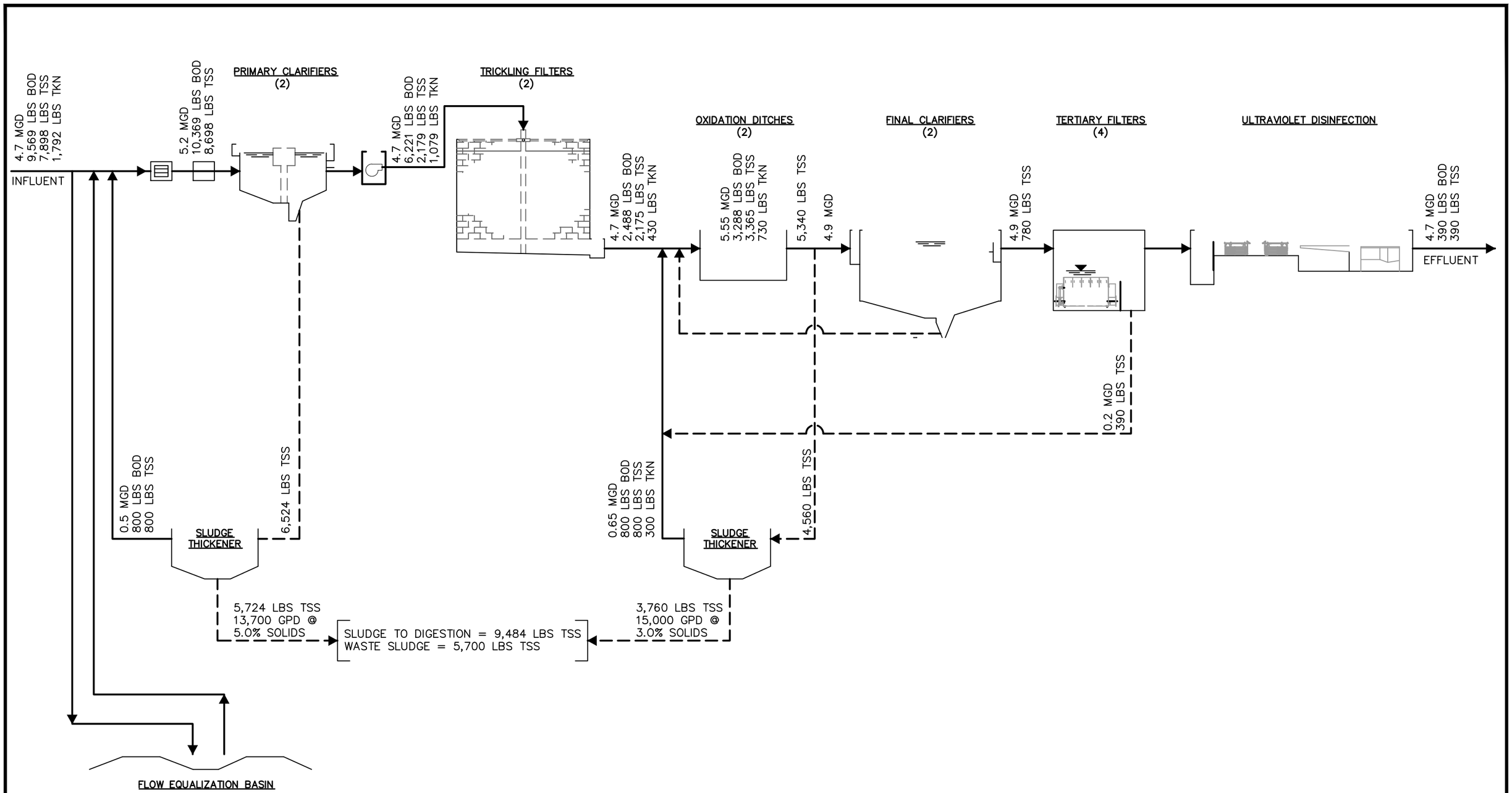
The *City of Joplin Comprehensive Plan 2012* provides useful information relative to past growth of the City, and also allows estimates to be made of future population trends. The Comprehensive Plan recognized the demographic uncertainty that resulted from the 2011 tornado that devastated portions of the City. The recovery of the City has resulted in a current population that exceeds the pre-tornado population. Joplin's website reflects a



Allgeier, Martin and Associates, Inc.
Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, MO 64804

Turkey Creek WWTP Current Flow/Load Diagram - Average Conditions

Figure V-6



Allgeier, Martin and Associates, Inc.
Consulting Engineers and Surveyors
7231 E. 24th Street Joplin, MO 64804

Shoal Creek WWTP Current Flow/Load Diagram - Average Conditions

Figure V-7

population of 50,657 in 2018, which is approximately 12-percent greater than the 2000 population of 45,504. It is reasonable to assume that Joplin and the surrounding areas will see a population growth of about 0.9-percent per year moving forward.

In addition to the population growth, Joplin's sewer service area will likely expand to include a number of presently unsewered residences in outlying villages or other areas outside the City of Joplin. There are eight unsewered incorporated areas in the Shoal Creek basin, with a combined population of about 1,800. It is reasonable to assume that 900 of these people will be on Joplin sewers by the year 2040. Other unincorporated areas are estimated to contain another 900 people who will likely be on City sewers by the year 2040.

In the Turkey Creek drainage basin, an estimated 1000 additional people currently without sewer are expected to be on sewers by the year 2030.

Based upon the preceding population projections, as well as estimates of currently unsewered residences in both the Shoal Creek and Turkey Creek service areas, it is anticipated that Joplin will need to provide sewer service to an additional 13,200 people by the year 2040. This 24 percent increase in residential sewer use is anticipated to be split approximately evenly between the Shoal Creek and Turkey Creek service areas, and is broken down as follows:

TABLE V-4. PROJECTED RESIDENTIAL CUSTOMERS

	Turkey Creek System	Shoal Creek System	Combined System
Currently Sewered	37,870	17,510	55,380
Currently Unsewered	1,000	1,800	2,800
Growth	5,200	5,200	10,400
Total Year 2040	**44,070**	**24,510**	**68,580**

The Shoal Creek basin is currently a high-growth area. While representing approximately one-third of Joplin's currently sewered area, the Shoal Creek service area is expected to result in 50 percent of the increase in residential sewer use through the year 2040.

3. Industrial and Commercial Growth

Joplin continues to experience growth in its commercial and industrial base, resulting in part from an active pursuit of industrial and commercial development by the City and the Joplin Chamber of Commerce. While the industrial and commercial development has brought jobs to the area, the amount of wastewater and the associated organic and solids loadings that these enterprises send to the City's wastewater treatment facilities have changed very little over the last ten years. During this recent ten-year period the installation of pretreatment facilities by existing industries and new industries has resulted in a moderate reduction in the industrial organic load detected by the City's wastewater sampling program. The amount of wastewater sent to the City has also dropped slightly.

Estimating the effect of industrial and commercial growth on wastewater flows and loads is a difficult task for a city such as Joplin. For the purposes of this report it is reasonable

to assume that industrial development will result in a doubling of industrial wastewater flows by the year 2040. It is felt that commercial development will follow a similar pattern, and a doubling of commercial wastewater flows is also projected through the year 2040.

4. Wastewater Flows and Loads

a. Domestic

Based on the preceding sections of this report, year 2040 estimated residential wastewater flows and loads for the two basins that comprise the Joplin sewerage system are tabulated as follows:

TABLE V-5. YEAR 2040 PROJECTED RESIDENTIAL FLOWS AND LOADS

Turkey Creek System	Wastewater Flow (MGD)	BOD Load (lb/day)	TSS Load (lb/day)
Current	1.94	6,816	7,573
Growth	0.62	1,116	1,240
Total Year 2040	**2.56**	**7,932**	**8,813**
Shoal Creek System			
Current	0.89	3,152	3,502
Growth	0.70	1,260	1,400
Total Year 2040	**1.59**	**4,412**	**4,902**
Total System Year 2040	**4.15**	**12,344**	**13,715**

The preceding tabulation reflects an anticipated increase in flows and loads of 100 gallons of sewage flow, 0.18 lbs. BOD, and 0.20 lbs. TSS per added person per day.

b. Industrial and Commercial

The projected growth in industrial and commercial flows and loads through the year 2040 are tabulated as follows:

TABLE V-6. PROJECTED INDUSTRIAL AND COMMERCIAL FLOWS AND LOADS

Turkey Creek - Industrial	Wastewater Flow (MGD)	BOD Load (lb/day)	TSS Load (lb/day)
Current	1.67	5,072	5,081
Growth	1.67	4,000	4,000
Total Year 2040	**3.34**	**9,072**	**9,081**
Turkey Creek - Commercial			
Current	1.01	3,548	3,943
Growth	1.01	2,530	2,530
Total Year 2040	**2.02**	**6,078**	**6,473**
Shoal Creek - Industrial			
Current	0.88	3,902	1,602
Growth	0.88	2,200	2,200
Total Year 2040	**1.76**	**6,102**	**3,802**
Shoal Creek - Commercial			
Current	0.71	2,515	2,794
Growth	0.71	1,780	1,780
Total Year 2040	**1.42**	**4,295**	**4,574**
Total Turkey Creek Year 2040	**5.36**	**15,150**	**15,554**
Total Shoal Creek Year 2040	**3.18**	**10,397**	**8,376**
Total System Year 2040	**8.54**	**25,547**	**23,930**

The preceding tabulation reflects an anticipated sewage strength for future industrial and commercial wastewaters of 300 mg/l BOD and TSS.

c. Inflow & Infiltration

While it is anticipated that the City of Joplin will continue in its efforts to reduce the amount of I&I that enters the system, it would not be prudent to reduce design flows and loads based on projected reductions in I&I through sewer rehabilitation. For the purposes of this study, it is reasonable to assume that I&I will remain at current levels, as tabulated below:

TABLE V-7. PROJECTED SYSTEM INFILTRATION & INFLOW

	Wastewater Flow (MGD)
Turkey Creek	6.98
Shoal Creek	2.22
Total System Year 2040	**9.20**

d. Total Flows and Loads

The total projected average wastewater flows and loads for the City's two drainage basins for the year 2040 are reflected in the following tabulation:

TABLE V-8. PROJECTED FLOWS AND LOADS

Turkey Creek	Wastewater Flow (MGD)	BOD Load (lb/day)	TSS Load (lb/day)
Residential	2.56	7,932	8,813
Industrial	3.34	9,072	9,081
Commercial	2.02	6,078	6,473
Inflow & Infiltration	6.98	0	0
Total Year 2040	**14.90**	**23,082**	**24,367**
Shoal Creek			
Residential	1.59	4,412	4,902
Industrial	1.76	6,102	3,802
Commercial	1.42	4,295	4,574
Inflow & Infiltration	2.22	0	0
Total Year 2040	**6.99**	**14,809**	**13,278**
Total System Year 2040	**21.89**	**37,891**	**37,645**

The preceding tabulation reflects "average" flows and loads anticipated at Joplin's treatment plants during the design year of 2040. In fact, realizing that the facilities must remain in compliance with regulatory limits all the time, not just on the average days, plant components are typically designed to accommodate organic and solids loads that occur during peak months.

Analysis of Joplin's plant records reveals that the average BOD and TSS loads during a peak month are typically about 1.6 times the average yearly loading. The peak monthly flow is approximately 2.2 times the average flow, with this peaking factor driven primarily by rainfall events and the associated I&I. For design purposes, the peaking factors are applied to the average yearly flows and loads, resulting in the following Year 2040 design criteria for the City of Joplin wastewater treatment facilities.

TABLE V-9. PROJECTED TREATMENT FACILITY DESIGN FLOW and LOAD

	Wastewater Flow (MGD)	BOD Load (lb/day)	TSS Load (lb/day)
Turkey Creek	32.80	36,900	39,000
Shoal Creek	15.40	23,700	21,300

The total Kjeldahl nitrogen (TKN) level of the raw wastewater is approximately 34 mg/l at average flow conditions at the Turkey Creek WWTP, and 50 mg/l at the Shoal Creek WWTP. The design TKN loadings are, therefore, 4,200 lbs./day and 2900 lbs./day respectively for the Turkey Creek and Shoal Creek systems.

The Turkey Creek WWTP is designed to handle a peak flow through the mechanical treatment portion of the plant of 24 mgd, with excess flows diverted to a flow equalization basin. The existing 75 million-gallon basin provides capacity to store excess flow, with the intent that this stored flow will be returned to the plant when flows subside. A review of plant flow records reveals that during 2017 and 2018, which were fairly typical years, flows exceeded 24 mgd on a total of 41 days. Discharges from the flow equalization basin occurred on 22 days over this two-year period.

The Shoal Creek WWTP is designed to handle a peak flow of 19 mgd, with excess flows diverted to the flow equalization basins at the WWTP and within the collection system. When the activated sludge facilities at the plant are operated at higher than designed solids concentrations, the final clarifiers hydraulic capacity is reduced due to the high solids loading. The City has found that the plant's hydraulic capacity is nearer 16 mgd when operated at the higher MLSS concentrations. During 2017 and 2018 flows to the treatment plant exceeded 16 mgd on a total of 4 days, resulting in discharges from the basins on 7 days. Had the plant been able to treat the 19 mgd design capacity, there would have likely been no discharges from the basin.

The following tabulation provides a comparison of the design criteria of the City's existing treatment facilities with the anticipated loads and flows that these facilities will be expected to treat by the year 2040:

TABLE V-10. PROJECTED TREATMENT FACILITY DESIGN CRITERIA

Turkey Creek	Current Design Capabilities	Anticipated 2040 Conditions
Average Daily Flow (MGD)	15.0	14.9
Peak Flow Thru WWTP (MGD)	24.0	32.8
Average BOD (lb/day)	20,960	23,082
Peak Month BOD (lb/day)	29,320	36,900
Average TSS (lb/day)	19,860	24,367
Peak Month TSS (lb/day)	27,900	39,000
Average TKN (lb/day)	4,060	4,200
Shoal Creek		
Average Daily Flow (MGD)	7.2	7.0
Peak Flow Thru WWTP (MGD)	19.0	20.0
Average BOD (lb/day)	18,390	14,809
Peak Month BOD (lb/day)	25,740	23,700
Average TSS (lb/day)	14,510	13,278
Peak Month TSS (lb/day)	20,320	21,300
Average TKN (lb/day)	1,800	2,900

As is evident from the preceding tabulation, the Turkey Creek WWTP lacks the treatment capacity that is needed to accommodate the flows and loads expected by the year 2040. Existing facilities are generally adequate for average flows, however additional hydraulic capacity is needed to reduce or eliminate discharges from the flow equalization basin. Added biological treatment facilities will also be needed to treat future organic and solids loads.

The Shoal Creek WWTP has adequate capacity to treat the anticipated year 2040 flows and loads, with a couple of exceptions. First, clarifier capacity is marginal and has resulted in limitations as to the amount of wastewater that can be properly clarified when relatively high MLSS concentrations are maintained in the activated sludge basins. Additional clarifier capacity would resolve this issue. Second, at estimated peak year 2040 conditions, the brush rotor aerators in the oxidation ditches will fall somewhat short of supplying the amount of oxygen required. The installation of additional aeration capacity within the existing oxidation ditches would resolve this future issue.

5. Effluent Limits

The State of Missouri Department of Natural Resources has recently issued new Missouri State Operating Permits for both of Joplin's wastewater treatment plants. These permits are set forth in Appendix F.

While the existing permits reflect MDNR's current evaluation of the impact of wastewater effluent on Turkey Creek and Shoal Creek, it is likely that future discharge limits will become ever more restrictive as the impact on downstream water uses is considered. Both streams flow into Kansas within only a few miles of the treatment plant discharges, and after flowing through the southeast corner of Kansas, enter Grand Lake in Oklahoma. Several states have an interest in the quality of effluent from Joplin's wastewater treatment plants.

It is anticipated that future effluent limits will establish controls on nutrients (nitrogen and phosphorus) in addition to the currently limited constituents. In year 2000, the Environmental Protection Agency published manuals to assist states in "Nutrient Criteria Development" for both "Lakes and Reservoirs", and "Rivers and Streams". A review of these documents in a general context, would reinforce the concept that it is just a matter of time before stringent limits for nitrogen and phosphorus are established for Joplin's two treatment plant discharges. Recommended EPA criteria for total phosphorus and total nitrogen in rivers and streams in southwest Missouri are 0.01 mg/l and 0.31 mg/l, respectively. Phosphorus and nitrogen recommendations for lakes and reservoirs are 0.008 mg/l P and 0.46 mg/l N. In order to maintain such low levels of nutrients in the streams and lakes, it is anticipated that effluent nutrient limits, when established, might ultimately be less than 0.1 mg/l total phosphorus and 1 mg/l total nitrogen. Recently proposed operating permits for other Missouri communities have included the phasing-in of similar nutrient limits over a 40-year period.

In addition to the probability of future effluent limits for nitrogen and phosphorus, it is anticipated that future discharges will face lower limits for BOD, TSS, and ammonia. As plant flows increase, the allowed concentration of these constituents will likely decrease to ensure that the discharge remains within the assimilative capacity of the stream. Future ammonia limits of 0.6 mg/l are anticipated in response to the EPA's determination that this lower limit is needed to protect water quality.

6. Future Environment Without Improvements

The future environmental conditions in the Joplin area under the "no project" alternative are important to the planning process. No changes in topography, geology, climate, or hydrology are anticipated to occur with or without the project. The biggest potential effects will be to water quality and demographics.

a. Water Quality

The primary purpose of this study is to set forth recommended improvements to Joplin's wastewater treatment facilities to allow the treatment facilities to continue to meet current and future regulatory effluent limitations. The recently expanded City facilities generally meet regulatory limits, although periodic excursions of metals limits have occurred. The Turkey Creek WWTP is operating at about 75-percent percent of its design organic (BOD) treatment capacity, and the Shoal Creek WWTP is operating at less than 55-percent of its design organic treatment capacity. Overall the Joplin wastewater treatment system is operating well below its organic design limit, however each treatment plant has had issues with high flows that have resulted in discharges from their flow equalization basins. MDNR establishes effluent limits that will maintain the quality of a receiving stream at a

level suitable for its intended uses. So long as effluent quality meets the levels set forth in the State Operating Permit, it is reasonable to assume that water quality is being adequately protected. Limited improvements to the City's wastewater treatment facilities are needed to adequately handle anticipated increases in system wastewater flows, and to comply with possibly more stringent effluent limits.

Pollution of either Shoal Creek or Turkey Creek by inadequately treated wastewaters will result in a corresponding change in both benthic and fish communities. As water quality decreases, the abundance of game fish will decrease and the number of rough fish will increase. Although few fish are currently present in Turkey Creek due to past mining activities in the area, degradation of Turkey Creek could impact Spring River, which is located about four miles downstream of the discharge point from the Turkey Creek WWTP.

b. Demographic Changes

Future population growth patterns could be affected by the "no project" alternative. It is felt that population growth could be slowed if wastewater system improvements are not made. Under increasingly stringent wastewater discharge regulations, land developers are finding access to city sewers more and more attractive. Without city sewers and adequate treatment facilities, some land development for housing purposes would, in all likelihood, be curtailed. Industries are also coming under more pressure to ensure effective wastewater treatment, and city sewers provide an attractive means of wastewater disposal. Although industries are assessed a fee by the City for industrial wastewater discharges, partial treatment of the wastewater by the industry followed by discharge to the city sewer is generally less expensive for the industry than complete treatment and disposal. Without the maintenance of adequate treatment capacity, industrial growth may be stifled by the lack of sufficient wastewater treatment facilities.

Land-use patterns, although not dictated by sewer service, are influenced by sewer accessibility. Housing generally precedes, then develops along sewer lines. Without additional sewer lines connected to the City system, housing developments would need to utilize septic tanks (if allowed) or develop their own collection and treatment system, and land-use would probably be less structured.

In general, unless wastewater treatment facilities are upgraded regularly to maintain compliance with regulatory requirements, the planning area is expected to be less desirable to both housing developers and industries, and a slower rate of population growth may be expected.

E. Wastewater Treatment Alternatives

1. Flow and Waste Reduction

Flow reduction measures are usually directed at removing excessive I&I from the wastewater collection system. The City of Joplin is committed to reducing the amount of I&I entering its sewer system and to eliminating sewer system overflows. That being said, the results of their efforts are as of yet unknown, and it would be inappropriate to assume

that associated reductions in flow might eliminate the need for other modifications to the wastewater treatment system and/or its operation. It is unlikely that I&I removal efforts will have a significant impact on the day-to-day wastewater treatment needs of the City, but will instead serve to limit the peak flow events and reduce the frequency of sanitary sewer overflows and backups.

2. Optimum Operation of Existing Facilities

Joplin's two wastewater treatment plants and the associated collection systems are well maintained, and generally operated in a manner that maximizes treatment efficiency. Both plants have faced operational challenges in the last several years as a result of the discharge of specific industrial wastewaters to the City sewers. The nature of some of the industrial suspended solids has caused problems with poorly settling solids in the final clarifiers, resulting in a decrease in the hydraulic capacity of its effluent filters. This hydraulic bottleneck in the plant has required an increase in the use of the flow equalization basin, thereby increasing the frequency of direct discharges from the basin to the stream. Contracts have recently been executed to replace the filter media on two existing filters, and to entirely replace the filter equipment in the other two filters.

The need for the following recommended modifications to treatment facilities at both of the City's wastewater treatment plants is driven not by any deficiency in the operation of existing facilities, but instead by issues beyond the operators' control, and by anticipated future growth of the service area.

3. Regional Solutions

Regionalization of wastewater treatment facilities was fully evaluated as a part of the planning process associated with the original Joplin wastewater treatment facilities in the 1980s. The current layout of area wastewater treatment facilities reflects this previous planning. A treatment plant at Carl Junction serves that town and the Village of Airport Drive, while a plant at Webb City also serves Carterville and Oronogo. In general, with the exception of some City of Joplin flows that are pumped to the Turkey Creek system, wastewater flows in the Center Creek basin are treated at facilities within that drainage area.

Joplin's wastewater treatment facilities are regional to the extent that future sewer service in the Turkey Creek basin and Shoal Creek basin near Joplin are provided by the facilities described herein. Joplin serves the towns of Duenweg and Duquesne, located east of Joplin, and also the town of Loma Linda located south of Joplin in the Rock Branch arm of Five Mile Creek.

The previously developed estimates of year 2040 wastewater flows and loads assume that the various incorporated areas and unincorporated developments that surround Joplin will be provided sewer service by Joplin in the future.

4. Land Application

Land application does not represent a viable option for treatment of Joplin's wastewater in either the Turkey Creek or Shoal Creek drainage basins. Very large tracts of land are required to accommodate land application systems, and the large wastewater flows

received by the City's treatment plants translate into a need for several thousand acres of land for conventional high rate irrigation systems capable of eliminating plant discharges. In addition, construction of storage basins large enough to allow land application to cease during cold or wet periods would not be practical.

For facilities of the capacity required, located in the Joplin area with its topographic and geologic constraints, land application in any of its various forms remains impractical as a means of treating Joplin's wastewater. Given the existing mechanical treatment facilities, with their ability to be expanded, a shift to land application is neither practical nor cost-effective.

5. Upgrade of Existing Turkey Creek Facilities

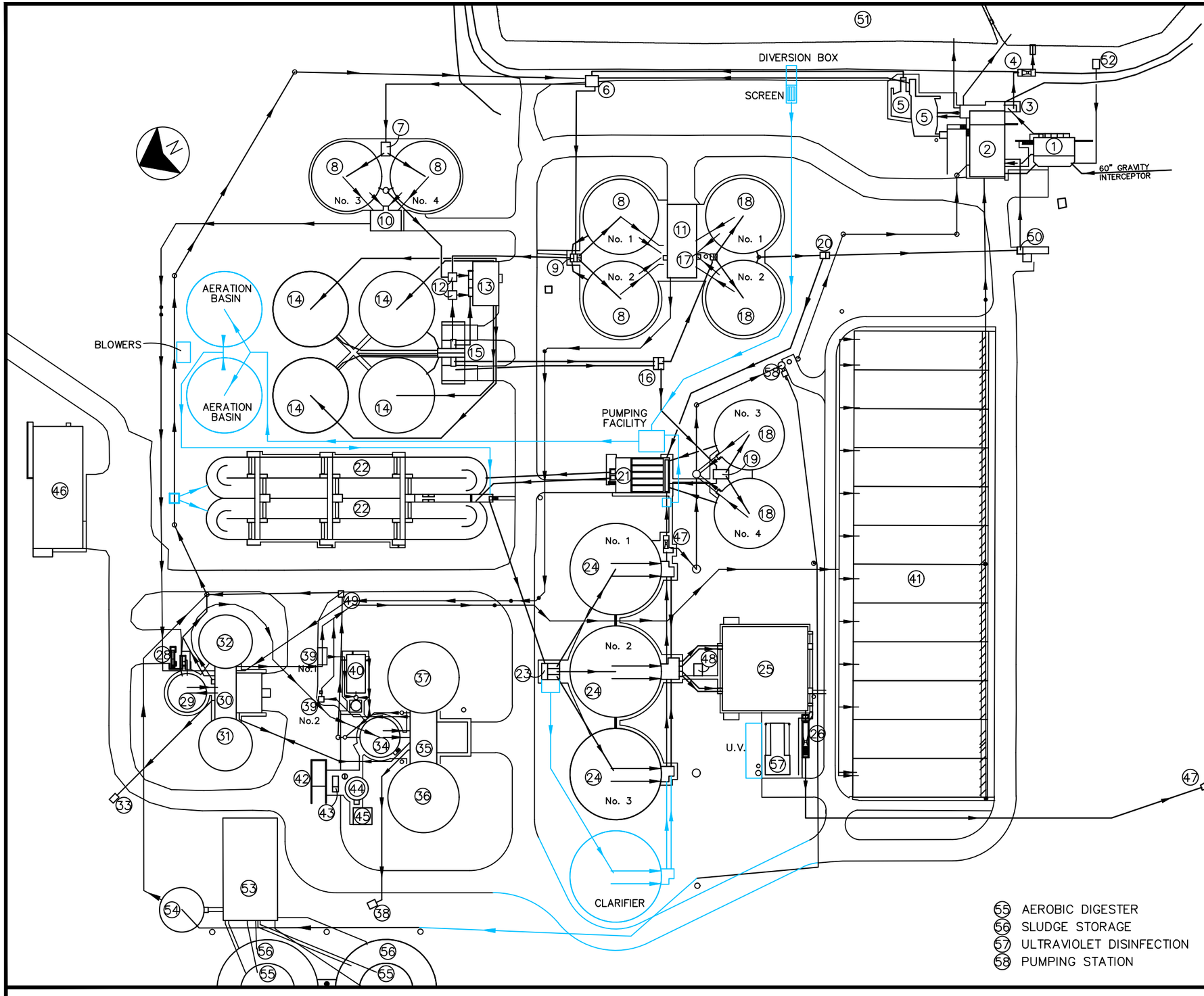
a. General

The Turkey Creek WWTP was constructed in its current location with the intent that the plant would be expanded over time as Joplin's wastewater treatment needs grew. Two major expansions of the facilities have taken place since its original construction in 1985, and the existing site provides the opportunity for additional upgrades going forward. The most cost-effective approach to meeting the City's wastewater treatment needs in the Turkey Creek drainage basin includes improvements to the existing Turkey Creek WWTP.

In evaluating the ability of the Turkey Creek WWTP to adequately treat the flows and loads anticipated over the next twenty years, it is apparent that there is a need for increased peak flow capacity through the facility to reduce or eliminate discharges from the flow equalization basin. Additional biological treatment capacity is also needed to treat future organic and solids loads. A comparison of existing plant design capabilities with future requirements provided previously in Table V-10. By 2040 the average daily flow to the facility is projected to increase from the current 11.6 mgd to just less than the 15 mgd design capacity of the existing facilities.

After evaluating the options available to resolve the issues with peak flow capacity and future biological treatment needs, it was determined that modifications to the existing plant should include additional activated sludge basins and associated clarification and pumping facilities that would allow for the diversion of up to an additional 11 mgd of screened raw sewage through the WWTP during peak flow periods. The inclusion of these facilities, plus improvements to raw sewage screening and effluent disinfection facilities, would increase the peak hydraulic capacity of the WWTP from 24 mgd to 35 mgd. These same facilities would also address future needs for increased biological treatment capacity.

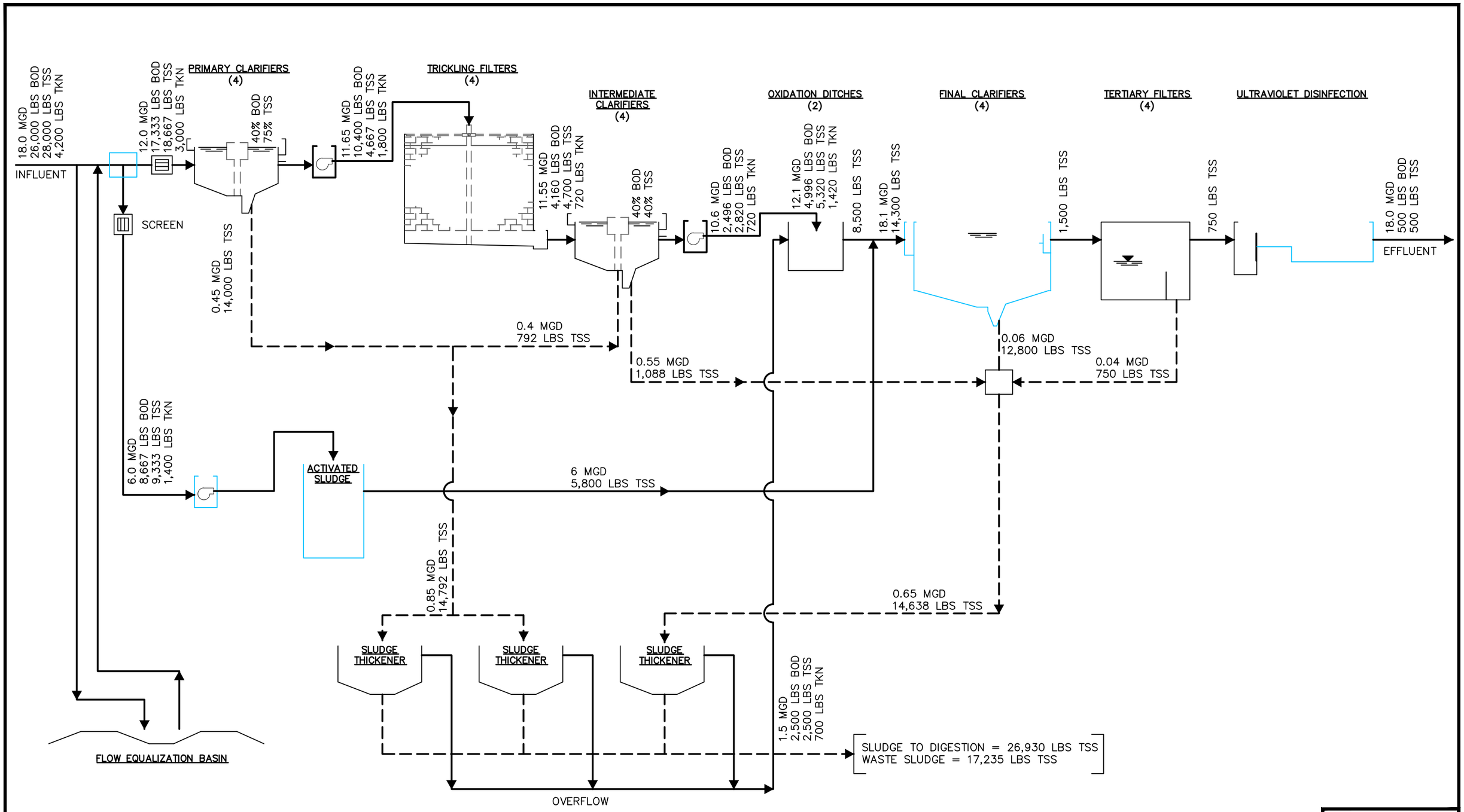
Figure V-8 provides a plant layout that includes the previously discussed improvements. Figures V-9 and V-10 provide flow/load diagrams based on year 2040 design average conditions and design peak monthly conditions respectively. The plant components that are a part of the preceding improvements are discussed in the following sections.



1. PEAK FLOW PUMPING STRUCTURE
2. INLET STRUCTURE
3. PEAK FLOW DIVERSION STRUCTURE
4. PEAK FLOW MEASUREMENT STRUCTURE
5. GRIT REMOVAL STRUCTURE
6. PRIMARY CLARIFIERS FLOW CONTROL STRUCTURE
7. PRIMARY CLARIFIER SPLITTER BOX (Clar. 1 & 2)
8. PRIMARY CLARIFIER(S)
9. PRIMARY CLARIFIER SPLITTER BOX (Clar. 3 & 4)
10. SLUDGE PUMP BUILDING
11. MAINTENANCE & PUMP BUILDING
12. PRIMARY CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE(S)
13. TRICKLING FILTER PUMP BUILDING
14. TRICKLING FILTER(S)
15. SNAIL REMOVAL STRUCTURE
16. INTERMEDIATE CLARIFIERS FLOW CONTROL STRUCTURE
17. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 1 & 2)
18. INTERMEDIATE CLARIFIER(S)
19. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 3 & 4)
20. INTERMEDIATE CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE
21. INTERMEDIATE PUMPING STRUCTURE
22. ACTIVATED SLUDGE BASIN(S)
23. FINAL CLARIFIER INFLUENT SPLITTER BOX
24. FINAL CLARIFIER(S)
25. TERTIARY FILTER BUILDING
26. EFFLUENT FLOW MEASUREMENT STRUCTURE
27. EFFLUENT HEADWALL
28. CYCLONE GRIT SEPARATOR & GRIT CLASSIFIER
29. NORTH SLUDGE THICKENER
30. NORTH DIGESTER BUILDING
31. NORTH PRIMARY DIGESTER
32. NORTH SECONDARY DIGESTER
33. NORTH WASTE SLUDGE GAS BURNER
34. SOUTH SLUDGE THICKENER
35. SOUTH DIGESTER BUILDING
36. SOUTH PRIMARY DIGESTER
37. SOUTH SECONDARY DIGESTER
38. SOUTH WASTE SLUDGE GAS BURNER
39. SLUDGE TRUCK LOADING PORTS NO. 1 & 2
40. SLUDGE HOLDING TANK & LIME SILO
41. SLUDGE DRYING BEDS
42. SEPTAGE DUMPING STRUCTURE
43. MECHANICAL SCREEN
44. SEPTAGE RECEIVING TANK
45. SEPTAGE PUMPING STRUCTURE
46. LABORATORY & ADMINISTRATION BUILDING
47. R.A.S. FLOW MEASUREMENT STRUCTURE
48. DRAWDOWN STRUCTURE
49. VALVE BOX 4A
50. INTERMEDIATE CLARIFIER RETURN FLOW STRUCTURE
51. FLOW EQUALIZATION BASIN
52. BASIN RETURN FLOW STRUCTURE
53. SLUDGE HANDLING BUILDING
54. SLUDGE THICKENER
55. AEROBIC DIGESTER
56. SLUDGE STORAGE
57. ULTRAVIOLET DISINFECTION
58. PUMPING STATION

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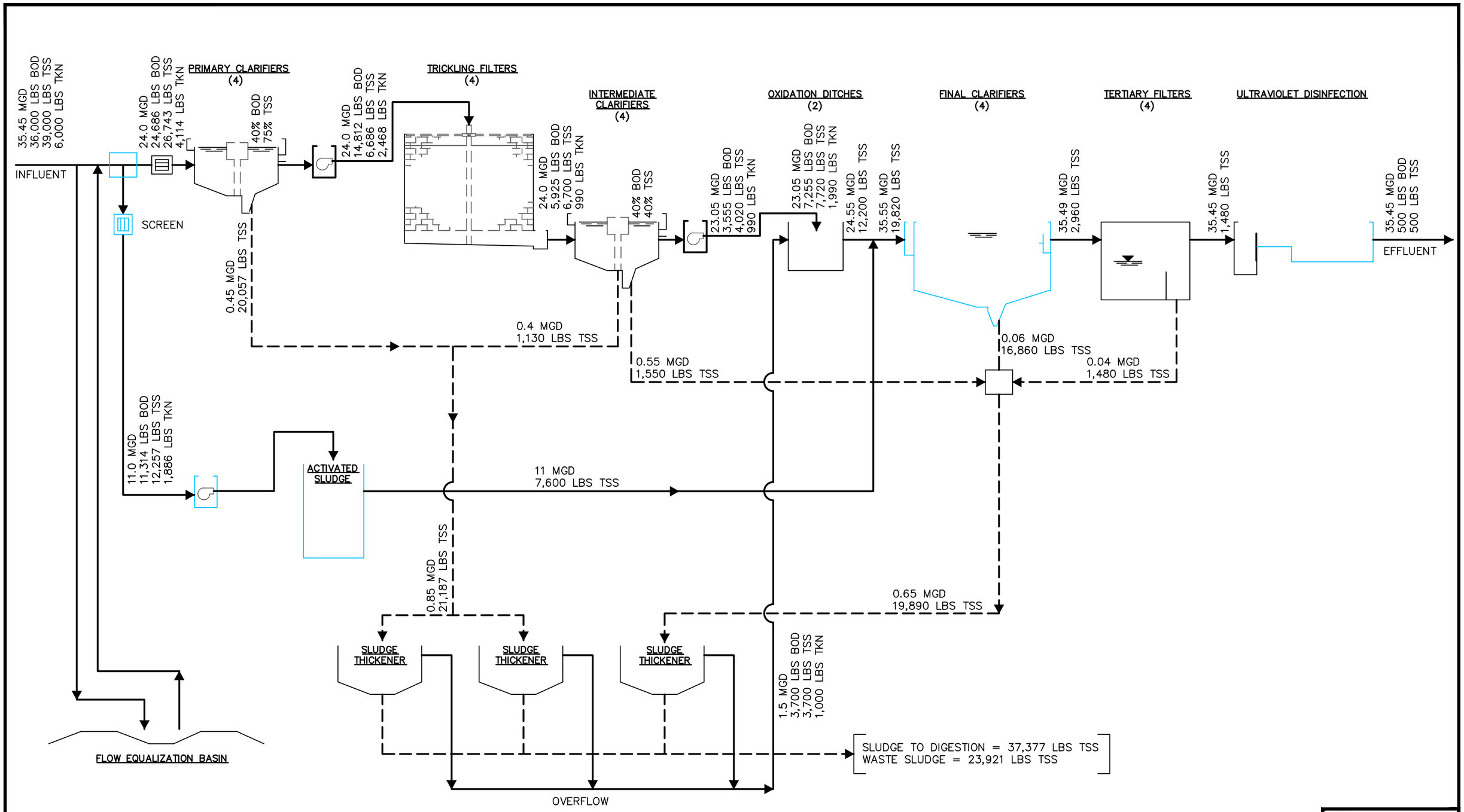
Turkey Creek WWTP - Plant Improvements
Figure V-8



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Turkey Creek WWTP Year 2040 Flow/Load Diagram - Average Conditions

Figure V-9



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Turkey Creek WWTP Year 2040 Flow/Load Diagram - Peak Conditions

Figure V-10

b. Screening

The proposed improvements include the diversion of a portion of the wastewater from a location that precedes the existing primary clarifiers, to new activated sludge basins. As such, a fine screen is needed to remove trash and other solids from the flow prior to delivery to the new aeration basins. A single screen with 11 mgd capacity is proposed.

c. Pumping Facilities

Because of the existing hydraulic grade through the wastewater treatment plant, the flow to the new aeration basins will need to be pumped. The pumps will need to deliver not only the 11 mgd screened wastewater flow, but also an equal amount of return activated sludge flow from the final clarifiers, for a total firm capacity of 22 mgd.

d. Activated Sludge Facilities

At an estimated year 2040 peak design flow of 35 mgd, 24 mgd would flow through the existing oxidation ditches containing about 7,255 lbs. BOD and 1,990 lbs. TKN per day. The existing brush rotor aerators and basins are adequately sized to treat this load.

At peak flow conditions the newly proposed activated sludge facilities are expected to receive an estimated additional 11 mgd of wastewater containing 11,600 lbs. BOD and 1,886 lbs. TKN per day. The actual oxygen requirements (AOR) equate to 22,595 lbs. oxygen per day, and the oxygen requirement at standard conditions is about 60,100 lbs. per day. To supply enough oxygen to meet peak load requirements, while also allowing for intermittent operation of the blowers at average load conditions, four 3,000 scfm, 200 horsepower blowers are needed. At average design conditions of 6 mgd and 8,667 lbs. BOD per day, the hydraulic retention time (HRT) in the aeration basins equals 3.8 days, and the food-to-microorganism ratio (F:M) equals 0.38 lbs. BOD per lb. MLVSS.

e. Clarifiers

The three existing 105-foot diameter final clarifiers provide a total hydraulic capacity of 26 mgd. The addition of a fourth final clarifier will increase the peak hydraulic capacity to 35 mgd, at a surface overflow rate of 1,012 gpd/ sq. ft.

Return activated sludge from the clarifier will be sent to the planned pumping facilities, and will be lifted along with screened wastewater to the new aeration basins.

f. Tertiary Filters

The existing tertiary filters are currently being refurbished and will provide a firm capacity of 41.5 mgd at 5 gpm/sq.ft. when completed. The filters will have ample capacity to treat the 35 mgd peak flows planned for the treatment plant.

g. UV Disinfection Facilities

The existing ultraviolet disinfection facilities provide for disinfection of up to 24 mgd. In order to provide for the disinfection of up to 35 mgd, modifications will be required to increase the hydraulic capacity of the channels that contain the UV lamp modules, and to provide additional lamps for greater UV output. For the purpose of this study, it is reasonable to assume that a new structure would be built adjacent to the existing UV facilities, and the number of lamp modules would be increased by fifty percent.

h. Sludge Treatment and Disposal

A review of the Turkey Creek WWTP's sludge treatment and disposal facilities determined that the existing facilities are adequate for the solids expected to be generated at year 2040 design conditions.

At an estimated peak sludge flow to the anaerobic digesters, of 18,967 lbs. TSS/day, the loading to the two primary digesters would equal 65 lbs. VSS/1000 cu.ft.-day, which is well below the design guide of 80 lbs. VSS/1000 cu.ft.-day. The solids retention time (SRT) under peak conditions would equal about 34 days, which is comfortably above the typical minimum design condition of 15 days.

The aerobic digester loading at peak design conditions is anticipated to be 18,410 lbs. TSS/day, which equates to a volatile-solids loading of 94 lbs. VSS/1000 cu.ft.-day, and a solids retention time of 21 days. Each of these criteria are in conformance with typical design guidelines.

The City has the ability to store approximately 4 million gallons of waste sludge at the Turkey Creek WWTP prior to disposal by land application. Capability also exists to dewater the liquid sludge to significantly reduce the volume of sludge hauled from the treatment plant. The storage volume equates to about 160-days storage at current average conditions, and 77-days storage at anticipated year 2040 average conditions.

i. Trickling Filter Towers

The Turkey Creek WWTP utilizes four trickling filter towers as a part of its biological treatment process. These trickling filters are a key component of the facility, and it is important that they remain in service. The corrugated plastic media modules that comprise these units have been in service since 1985, and are in need of replacement. Similar media that was supplied by a different manufacture at the Shoal Creek WWTP in 1987 collapsed in 2017. The media at the Turkey Creek WWTP has been in service longer than the Shoal Creek WWTP media that failed, and it is reasonable to infer that it is just a matter of time before the Turkey Creek WWTP media fails.

j. Cost Estimates

The estimated capital costs associated with the previously discussed improvements to the Turkey Creek WWTP are presented in Table V-11. Of the

recommended improvements, the replacement of the trickling filter media should receive top priority. The other improvements are needed primarily to resolve current issues with unauthorized discharges from the facility's flow equalization basin. They also provide adequate capacity to treat the increase in wastewater organic and solids loads anticipated through year 2040.

In comparing the current plant loadings with current plant capacity and estimates of year 2040 loadings, it is estimated that the Turkey Creek WWTP will be operating near the plant capacity for peak monthly BOD and TSS loadings by about year 2023. The current average plant capacity for BOD and TSS is anticipated to be reached by about year 2034. The peak flow capacity of the plant has already been reached, as evidenced by the frequency of discharges from the flow equalization basin.

Table V-11. ESTIMATED CAPITAL COSTS – TURKEY CREEK WWTP

Improvements	Capital Cost
Trickling Filter Media Replacement	
Four Trickling Filters	$4,400,000
Contingencies	440,000
Engineering	380,000
Total Tertiary Filter Media	$5,220,000
Activated Sludge Facilities	
Screening Facilities	$520,000
Pumping Facilities	1,330,000
Aeration Basins and Equipment	4,400,000
Clarifier	1,670,000
Other	1,100,000
Contingencies	900,000
Engineering	1,980,000
Total Activated Sludge Facilities	$11,900,000
Disinfection Facilities	
UV Equipment and Structure	$610,000
Contingencies	60,000
Engineering	135,000
Total Disinfection Facilities	$800,000
Total All Projects	**$17,920,000**

The construction of additional treatment facilities at the Turkey Creek WWTP will result in increased operation and maintenance costs. The total increase in O&M

costs during the initial years of operation are estimated at $180,000 annually for the previously described improvements, of which about one-half is the result of increased power costs.

6. Upgrade of Existing Shoal Creek Facilities

a. General

As with the Turkey Creek WWTP, the Shoal Creek WWTP was constructed at its current location with plans to expand the facility as wastewater treatment needs in the Shoal Creek drainage basin grew. A major expansion of the facilities was completed in 2015, and the site provides space for additional upgrades when needed.

The Shoal Creek WWTP has adequate capacity to treat the average flows and loads expected over the next twenty years, however additional hydraulic capacity through the final clarifiers would improve the operation of the oxidation ditches when conditions warrant a high level of activated sludge solids in the ditches. In anticipation of a future need for increased peak flow capacity through the plant, the splitter box ahead of the existing clarifiers provides stub-outs for two additional clarifiers.

In reviewing the various modes of operation available for biological treatment, and the relationship of the trickling filters and activated sludge components of the plant, it is likely that increased levels of aeration will be needed in the oxidation ditches at future peak load conditions. The existing ditches accommodate the addition of supplemental aeration equipment when needed.

The City is currently making improvements to the two major lift stations and the pressure sewer that deliver a majority of the wastewater from the Shoal Creek drainage basin to the treatment plant. It is anticipated that the short-term peak flows received at the plant will increase as a result of the added pumping capacity that will be available when the improvements are completed. Modifications to the plant headworks will be needed at some point to increase the hydraulic capacity, to improve screening operations, and to better control the diversion of peak flows to and from the flow equalization basin.

Figure V-11 provides a plant layout that includes the previously discussed improvements. Figures V-12 and V-13 provide flow/load diagrams based on year 2040 design average conditions and design peak monthly conditions respectively. The plant components that are a part of the preceding improvements are discussed in the following sections.

b. Clarifiers

The two existing 110-foot diameter final clarifiers provide a total hydraulic capacity of 19 mgd so long as the mixed liquor suspended solids level in the oxidation ditches remains below about 3000 mg/l. Above this solids concentration the solids loading becomes a controlling factor as to the amount of flow that can be properly clarified. The addition of a third 110-foot diameter clarifier would allow for proper

settling of up to 5000 mg/l MLSS at a flow rate of 20 mgd. The preceding would keep the solids loading rate within the normal design guideline of 40 lbs. TSS/sq.ft.-day assuming a return activated sludge flow of 7.2 mgd.

c. Activated Sludge Facilities

For the year 2040 peak conditions shown in Figure V-13, an estimated 20 mgd would be treated, while excess flow is diverted to the flow equalization basin. The trickling filters are capable of treating up to 14 mgd, therefore 6 mgd would flow directly to the activated sludge basins without benefit of primary clarification or tricking filter treatment. Under these conditions the oxidation ditches would see a BOD load of about 13,500 lbs./day and a TKN load of about 2,100 lbs./day. The existing brush rotor aerators are capable of providing approximately 80-percent of the oxygen required by these loads. In order to meet the total oxygen requirement at the anticipated year 2040 peak conditions, retrievable fine bubble diffuser assemblies could be installed in the existing oxidation ditches, along with two 1800 scfm, 100 hp blowers per basin. At peak design conditions of 20 mgd and 13,500 lbs. BOD/day, the hydraulic retention time in the oxidation ditches is 3.6 hours, the mean cell residence time is 15 days, and the food-to-microorganism ratio equals 0.24 lbs. BOD/lb. MLVSS. Each of these conditions is consistent with typical design guidance for such facilities.

d. Headworks Modifications

In order to insure adequate hydraulic capacity through the plant headworks, it is proposed that a second mechanically cleaned bar screen be installed. Improved hydraulics would also be attained by removing the existing comminutors, and through modifications to the valves and piping to improve the diversion of flows to the equalization basin. The grit removal chambers contain the original scrapers and drives, and replacement of this old equipment is also warranted.

e. Cost Estimates

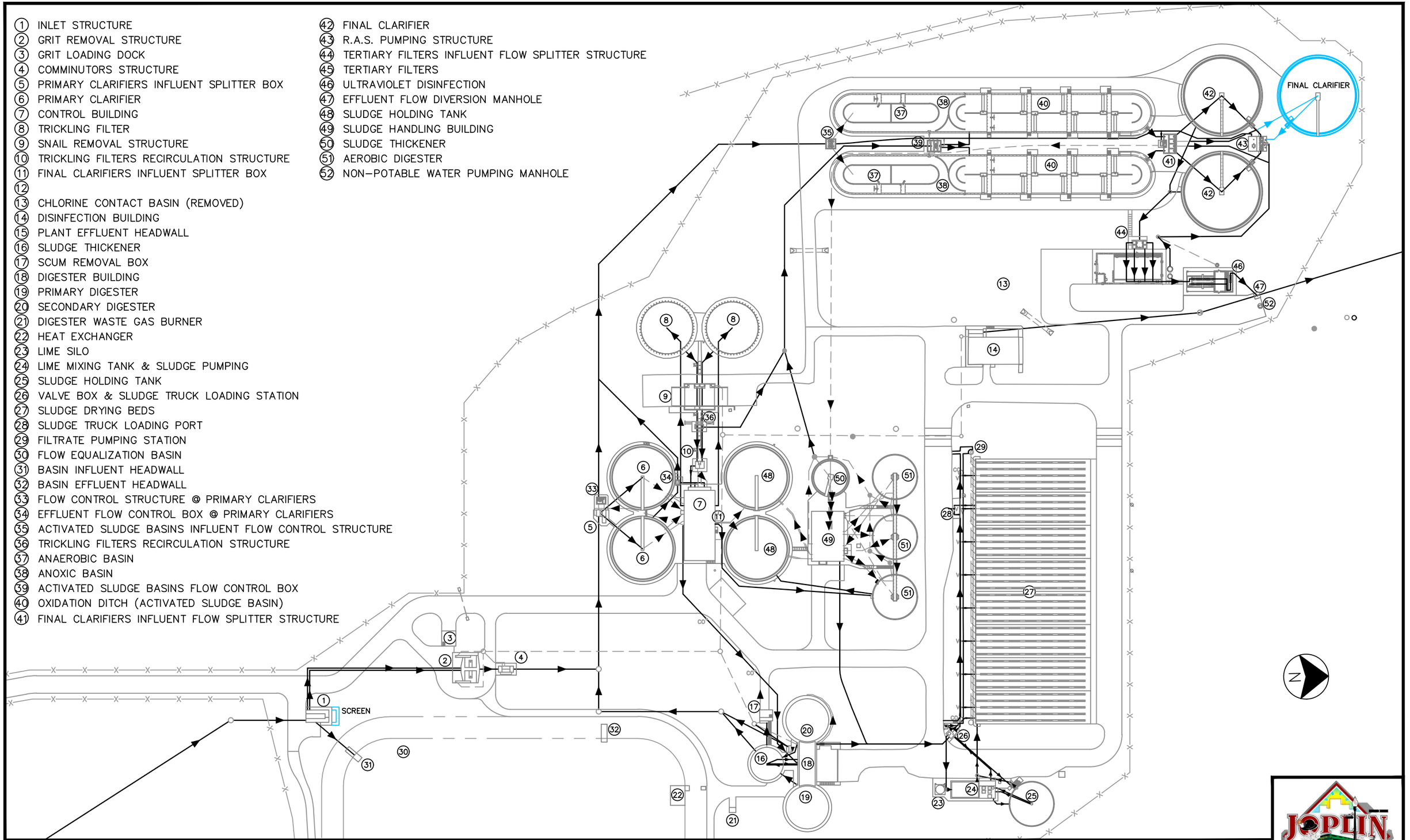
The estimated capital costs for the previously described improvements to the Shoal Creek WWTP are set forth in Table V-12. Of the improvements discussed, the construction of a third final clarifier is needed in the near future. The other improvements will become more important in the future.

Table V-12 ESTIMATED CAPITAL COSTS – SHOAL CREEK WWTP

Improvements	Capital Cost
Clarifier	
Structure and Equipment	$1,670,000
Contingencies	167,000
Engineering	363,000
Total Clarifier	$2,200,000
Activated Sludge Facilities	
Aeration System, Complete	$1,100,000
Contingencies	110,000
Engineering	240,000
Total Aeration Modifications	$1,450,000
Headworks Modifications	
Screening Facilities	$720,000
Other	250,000
Contingencies	97,000
Engineering	193,000
Total Headworks Modifications	$1,260,000
Total All Projects	**$4,910,000**

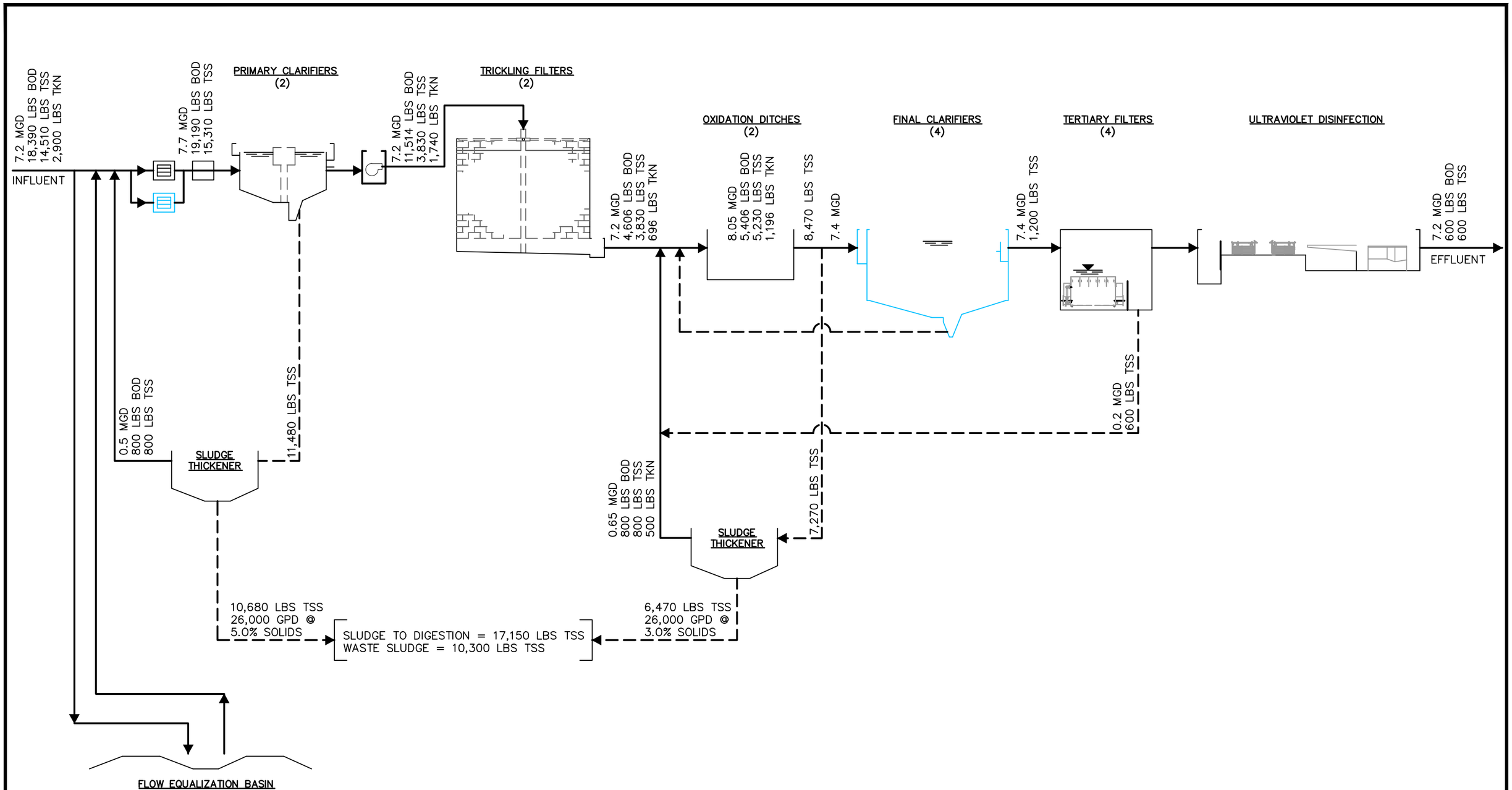
The construction of additional treatment facilities at the Shoal Creek WWTP will result in increased operation and maintenance costs. The O&M costs associated with an additional clarifier and/or the headworks improvements are minimal. The operation of an additional clarifier is expected to cost about $7,000 per year, and the new screening equipment is estimated to add about $15,000 annually to the O&M costs. The installation of supplemental aeration equipment at the oxidation ditches would increase the O&M costs during the initial years of operation by an estimated $110,000 annually, with about one-half of this added cost resulting from increased electrical usage.

1. INLET STRUCTURE
2. GRIT REMOVAL STRUCTURE
3. GRIT LOADING DOCK
4. COMMINUTORS STRUCTURE
5. PRIMARY CLARIFIERS INFLUENT SPLITTER BOX
6. PRIMARY CLARIFIER
7. CONTROL BUILDING
8. TRICKLING FILTER
9. SNAIL REMOVAL STRUCTURE
10. TRICKLING FILTERS RECIRCULATION STRUCTURE
11. FINAL CLARIFIERS INFLUENT SPLITTER BOX
12.
13. CHLORINE CONTACT BASIN (REMOVED)
14. DISINFECTION BUILDING
15. PLANT EFFLUENT HEADWALL
16. SLUDGE THICKENER
17. SCUM REMOVAL BOX
18. DIGESTER BUILDING
19. PRIMARY DIGESTER
20. SECONDARY DIGESTER
21. DIGESTER WASTE GAS BURNER
22. HEAT EXCHANGER
23. LIME SILO
24. LIME MIXING TANK & SLUDGE PUMPING
25. SLUDGE HOLDING TANK
26. VALVE BOX & SLUDGE TRUCK LOADING STATION
27. SLUDGE DRYING BEDS
28. SLUDGE TRUCK LOADING PORT
29. FILTRATE PUMPING STATION
30. FLOW EQUALIZATION BASIN
31. BASIN INFLUENT HEADWALL
32. BASIN EFFLUENT HEADWALL
33. FLOW CONTROL STRUCTURE @ PRIMARY CLARIFIERS
34. EFFLUENT FLOW CONTROL BOX @ PRIMARY CLARIFIERS
35. ACTIVATED SLUDGE BASINS INFLUENT FLOW CONTROL STRUCTURE
36. TRICKLING FILTERS RECIRCULATION STRUCTURE
37. ANAEROBIC BASIN
38. ANOXIC BASIN
39. ACTIVATED SLUDGE BASINS FLOW CONTROL BOX
40. OXIDATION DITCH (ACTIVATED SLUDGE BASIN)
41. FINAL CLARIFIERS INFLUENT FLOW SPLITTER STRUCTURE
42. FINAL CLARIFIER
43. R.A.S. PUMPING STRUCTURE
44. TERTIARY FILTERS INFLUENT FLOW SPLITTER STRUCTURE
45. TERTIARY FILTERS
46. ULTRAVIOLET DISINFECTION
47. EFFLUENT FLOW DIVERSION MANHOLE
48. SLUDGE HOLDING TANK
49. SLUDGE HANDLING BUILDING
50. SLUDGE THICKENER
51. AEROBIC DIGESTER
52. NON–POTABLE WATER PUMPING MANHOLE



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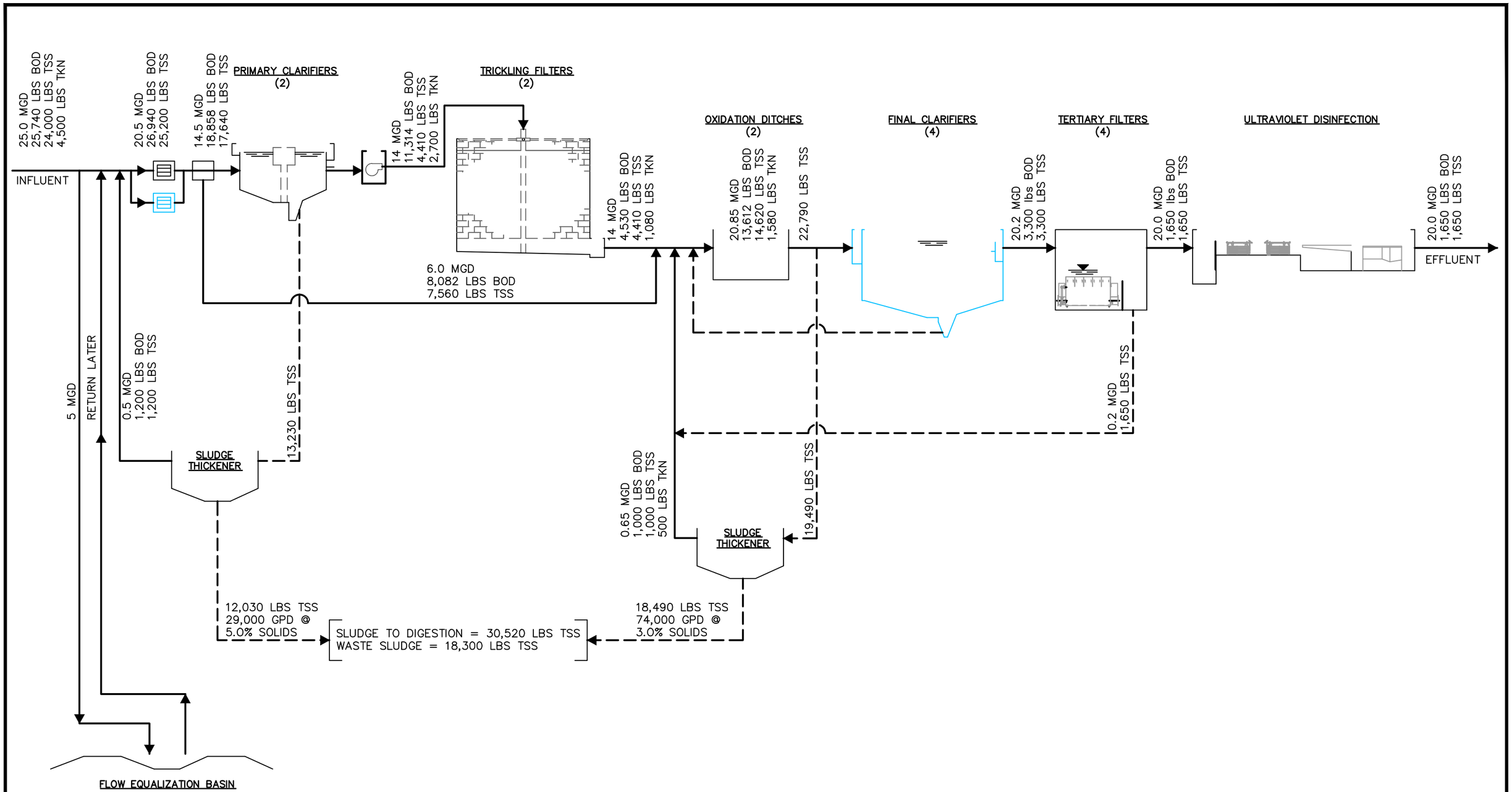
Shoal Creek WWTP Improvements
Figure V-11



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Shoal Creek WWTP Year 2040 Flow/Load Diagram - Average Conditions

Figure V-12



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Shoal Creek WWTP Year 2040 Flow/Load Diagram - Peak Conditions

Figure V-13

7. Lift Station Consolidation Impacts on Treatment

Section V-4 outlines several options for lift station consolidation. In general, lift station consolidation will have little to no impact on the treatment processes. Two of the options change the treatment plant that would receive flow from the proposed lift station. Both change the receiving plant from the Shoal Creek plant to the Turkey Creek plant. This effectively accelerates the need for the proposed improvements outlined in Table V-11 at the Turkey Creek plant, while extending the useful life of the Shoal Creek plant.

APPENDIX A

Inflow and Infiltration Strategic Plan

The City of Joplin

Inflow and Infiltration Strategic Plan
Project No. 99483

Revision 6
12/19/2017

Inflow and Infiltration Strategic Plan

prepared for

The City of Joplin
Inflow and Infiltration Strategic Plan
Joplin, Missouri

Project No. 99483

Revision 6
12/19/2017

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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INDEX AND CERTIFICATION

The City of Joplin
Inflow and Infiltration Strategic Plan
Project No. 99483

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Certification

I hereby certify, as a Professional Engineer in the state of Missouri, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by The City of Joplin or others without specific verification or adaptation by the Engineer.

_____

Clifford Cate, P.E., state, & license

Date: _____

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
Ac	Acres
ADDF	Average daily dry-weather flow
BMcD	Burns & McDonnell Engineering Company, Inc.
CCTV	Closed-Circuit Television
CIP	Capital Improvement Plan
CIPP	Cured-In-Place Pipe
DW HG	Dry-Weather, High Groundwater
DW LG	Dry-Weather, Low Groundwater
Gal	Gallons
GPD	Gallons per Day
I&I	Inflow and infiltration
IDM	Inch-Diameter Mile
In	Inches
MIT	Minimum Inter-event Time
PDDF	Peak daily dry-weather flow
PPB	Parts per billion
SCADA	Supervisory Control and Data Acquisition
SCS	Soil Conservation Service
WWTP	Wastewater Treatment Plant

1.0 EXECUTIVE SUMMARY

The City of Joplin (the City) has made efforts in recent years to reduce inflow and infiltration (I&I) in the wastewater collection system through a sewer rehabilitation program based largely on pipe condition data within some older portions of town. As part of a targeted I&I reduction program, the City conducted flow monitoring in the spring of 2017 to evaluate the current condition of the sewer system and to identify remaining areas of high I&I and metals loadings. Assessment of the City's sanitary sewer system has been documented in this memorandum. This memorandum documents how the flows within the City's sanitary sewer system reacts to rainfall. The objective of the first step in the work plan developed for the City was to identify I&I by means of flow metering and rank basins based on quantity of I&I. Metals sampling of zinc, copper, and lead was also completed at manhole locations where flow meters were installed. Metals concentration data was required for evaluating their impact on the sewer system.

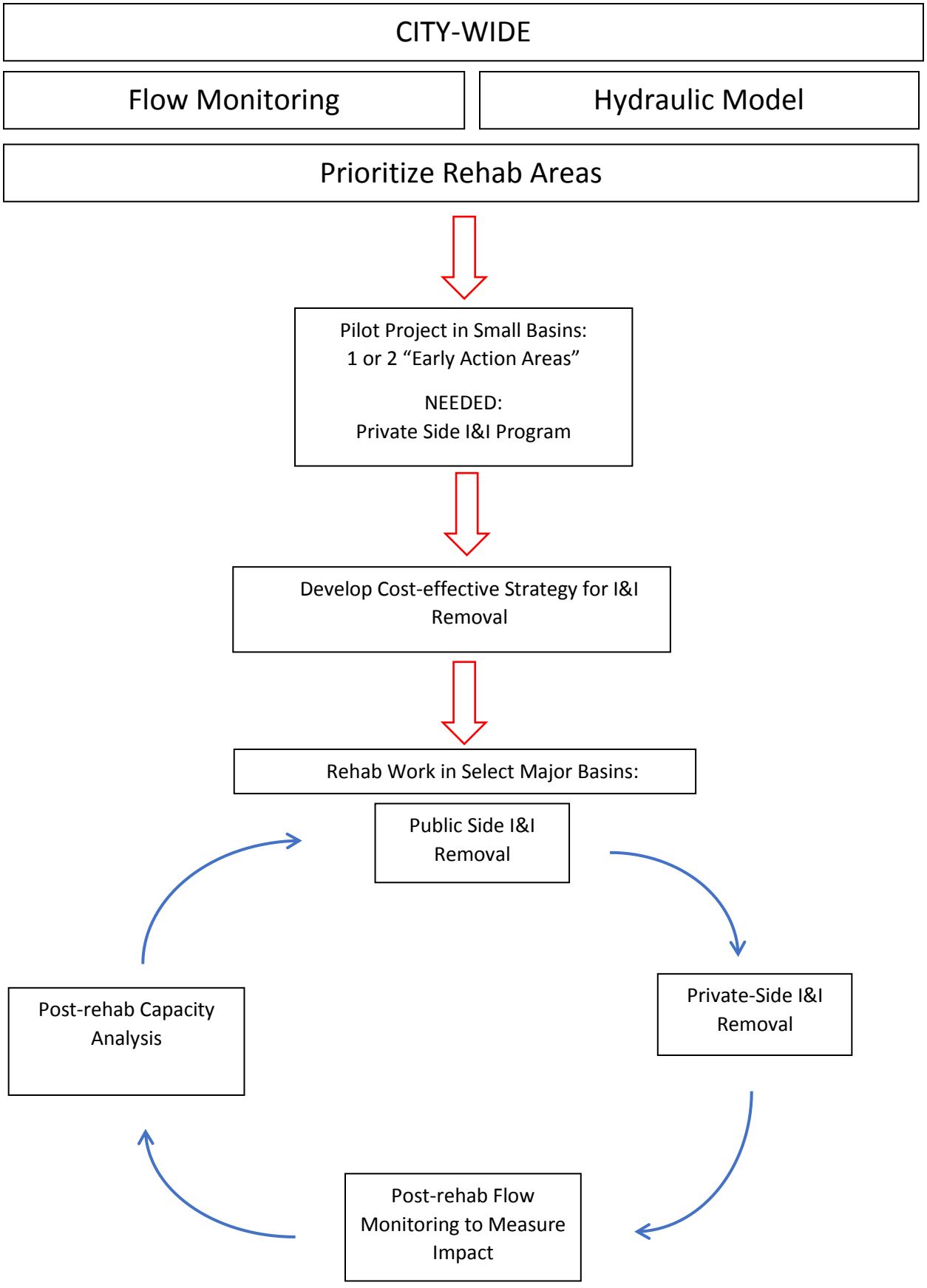
The next steps in the work plan are shown in Figure 1-1. This flow metering data, metals sampling, and I&I analysis will be incorporated into the hydraulic model. The hydraulic model is a tool that can be used to optimize the City's collection system hydraulics.

The hydraulic model will then be used to analyze the system in several ways including:

- Analysis of the metering data will develop a prioritized list of areas for cost-effective I&I removal. The hydraulic model can be used to predict where I&I reduction is more cost effective than other strategies for capital improvements.
- Estimate the incremental and cumulative impacts of I&I reduction efforts to sewer system capacity and level of service.
- Estimate the impacts of rerouting flows from overloaded parts of the system to underutilized parts.
- Evaluate pumping station control logic and SCADA changes and pumping station and/or force main consolidation possibilities.
- Evaluate impacts of future development and population growth on collection system capacity.
- Optimize sewer collection system improvements for size, location, year, and cost.

After the hydraulic model has been developed, reconstruction work can begin in select basins, which will be prioritized by incorporating several factors including, but not limited to, high levels of I&I. As work begins on public infrastructure within any "Early Action Areas", discussions will be initiated regarding efforts to establish a private side I&I program.

FIGURE 1-1


CITY-WIDE
Flow Monitoring
Hydraulic Model
Prioritize Rehab Areas
Pilot Project in Small Basins:
1 or 2 "Early Action Areas"
NEEDED:
Private Side I&I Program
Develop Cost-effective Strategy for I&I Removal
Rehab Work in Select Major Basins:
Public Side I&I Removal
Private-Side I&I Removal
Post-rehab Flow Monitoring to Measure Impact
Post-rehab Capacity Analysis

These three areas (flow monitoring and metals sampling, system hydraulic model and private side I&I program) will all be utilized together to provide the City with additional tools to implement a comprehensive, cost-effective I&I reduction plan for its wastewater collection system.

1.1 Flow and Rainfall Monitoring

Flow and rainfall monitoring was performed to establish a relationship between precipitation (rainfall intensity and rainfall volume) and system flow rates. The system was divided into 51 meter catchments for metering purposes. The flow and rainfall data was collected between March 2017 and June 2017. Figure 3-1 shows the locations of the flow meters.

Flow monitoring was performed to obtain system flow rates during both dry and wet weather conditions. Rainfall monitoring was performed to correlate wet weather flows with rainfall. 35 rainfall events totaling over 25 inches of rain were recorded. Rainfall data is presented in Table 4-3. The flow-rainfall relationship was used to rank the meter catchments by amount of I&I.

1.2 Flow and Rainfall Analysis

The flow analysis deconstructed the flow meter hydrographs into the various components of sanitary sewer system flow (see Figure 4-1.) A typical flow pattern consists of an average daily diurnal pattern where peak flows occur during the morning and late evening.

During rain events, rainwater enters the sanitary sewer collection system through illicit sources. This flow reaction is considered inflow. As the ground becomes saturated, the water begins to seep through additional sources that are further below the surface. This slow seepage is considered infiltration.

1.3 Summary of I&I Assessment

Data from the flow, rainfall and metals testing was analyzed under numerous scenarios and by various methods as described and presented in detail within the report to follow.

Table 1-1 identifies the 5 sewer catchments ranked highest for I&I. within the City sewer system. Figure 1-4 highlights the areas of the system that exceed USEPA's guidelines for infiltration. These rankings can be used to prioritize future investigations and ultimately cost-effective I&I removal projects.

Table 1-1: Top 5 Ranked Total I&I Meter Catchments

Meter Catchment	Basin	Combined I&I Ranking	Combined Inflow Ranking	Combined Infiltration Ranking	Overall Rank
P08-220B	Turkey Creek	1	1	1	1
FMM10-340	Turkey Creek	2	4	2	2
FMK12-170	Turkey Creek	5	5	4	3
FMM09-315	Turkey Creek	6	7	5	4
FMM09-235	Turkey Creek	3	2	16	5
FMM09-255	Turkey Creek	3	2	16	5

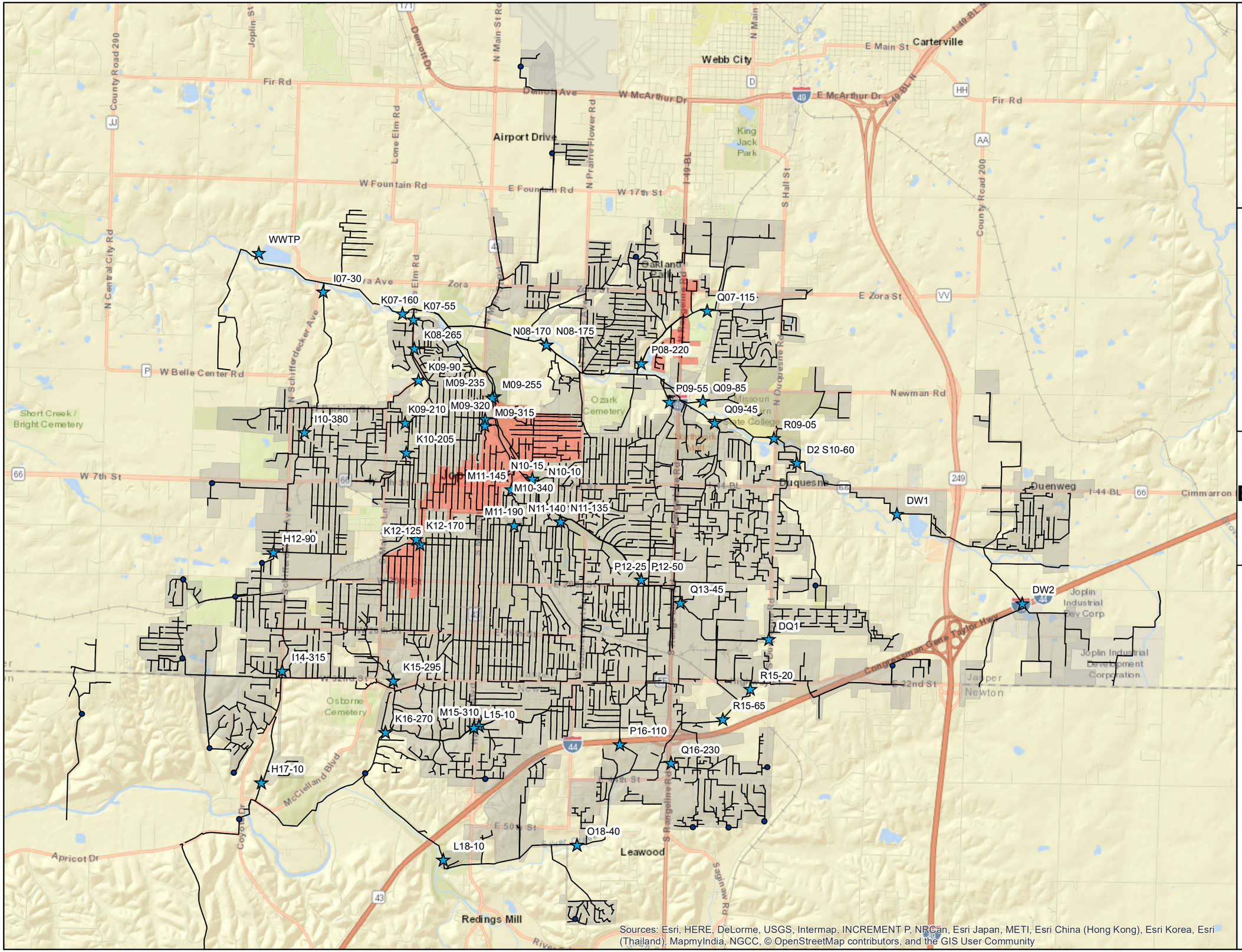
The rankings identified in Table 1-1 were produced by evaluating three I&I volume-to-rainfall indices to eliminate biases in the data to specific meter catchment characteristics, such as large meter catchment area or high linear feet of pipes.

Based on the indices of total I&I volume, inflow volume, and infiltration volume, the individual rankings were cumulated and ranked to produce an overall rank for each meter catchment.

Figure 1-2
City of Joplin
Top 5 Catchments With Excessive I&I

CITY OF JOPLIN MISSOURI

BURNS McDONNELL



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

N
W E
S

Legend

- Flow Meters
- Sanitary Sewer
- Tier 1
- Tier 2 and Above

As part of this system-wide flow monitoring effort, metals sampling in the collection system was done to identify basins with high contamination levels of lead, zinc, and copper. Initially, it was thought that a direct correlation would be found between I&I and metals concentrations, and that the findings would be used to develop and implement an overall I&I reduction program which would also reduce the metals loadings. Table 1-2, below, shows that the findings of this investigation do not support this conceptual strategy. Based on the rankings of zinc loadings and I&I, Table 1-2 indicates that there is no relationship between high I&I areas and high metals (zinc) loading areas. Accordingly, reducing excessive I&I for capacity purposes will make sense, but reducing I&I to reduce metals loadings may result in increased metals loadings to area streams, since groundwater tainted with metals would bypass the wastewater treatment process. Thus, the result of removing infiltration from the sewer system may result in persistent, elevated background metals levels in area waters.

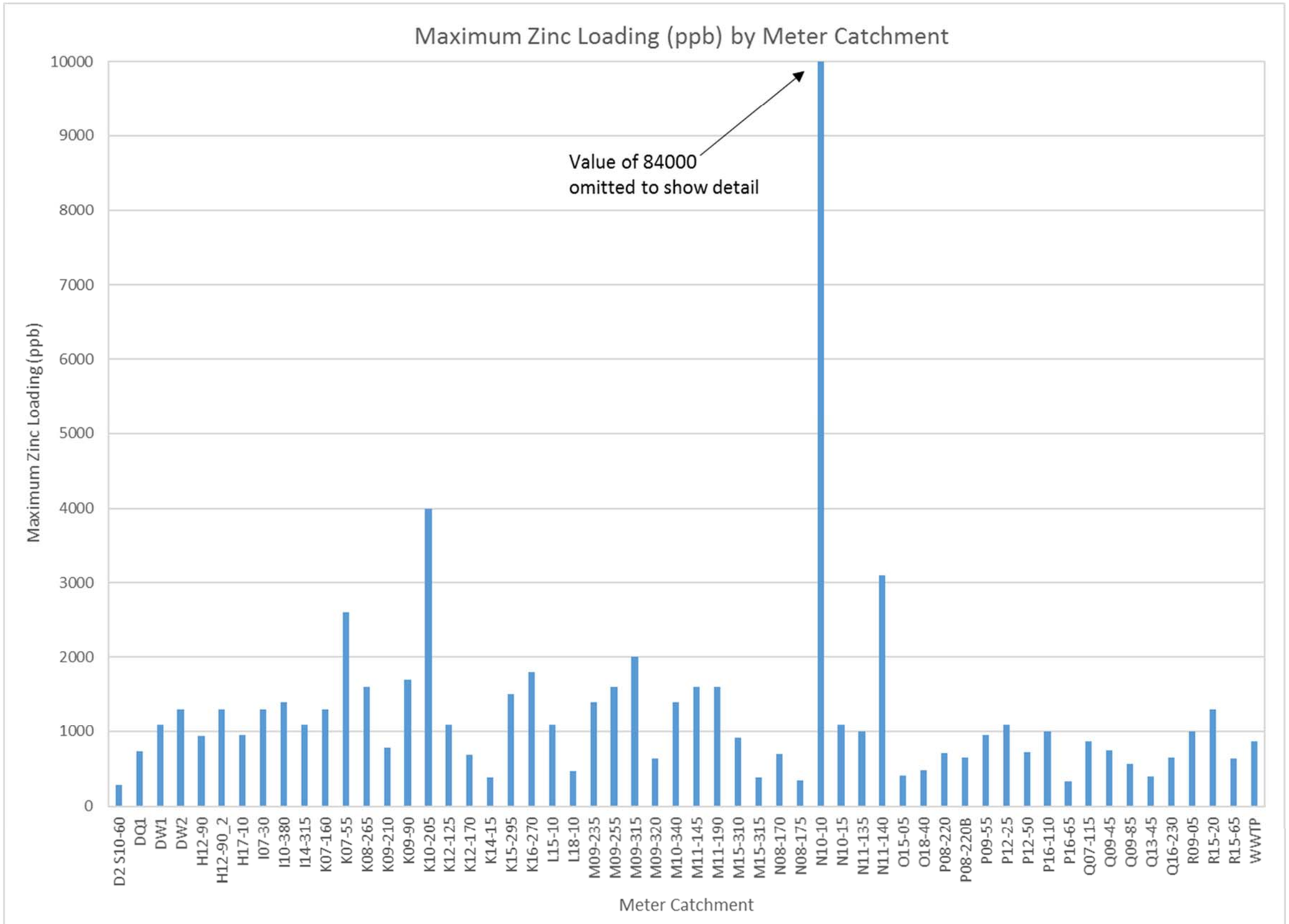
Years ago, local mine tailings or "chat" as it is locally known, were used as bedding and backfill for sewer lines. Metals from those tailings/ 'chat' are now leaching into the sewers and being treated at the treatment plant. In fact, these mine tailings/ 'chat' were prevalently used for all sorts of infrastructure throughout the City in applications such as for storm sewers, house foundations, asphalt, concrete, street construction, gas lines, and other backfill uses. The ubiquitous use of this material around the City is, in part, the reason that the instream concentrations are higher than those in the treatment plant discharge.

Table 1-2 presents the maximum and average zinc loadings in parts per billion (ppb) and ranking of the top five associated meter catchments based on maximum zinc loading. The associated I&I ranking for these meter catchments is also included. Rankings are from highest to lowest priority and are based on cumulative values. Figure 1-3 presents the maximum zinc loadings by meter catchment.

Table 1-2: Top 5 Ranked Zinc Loading Meter Catchments

Meter Catchment	Cumulative Zinc (ppb)		Zinc Rank	I&I Rank
	Maximum	Average		
N10-10	84,000	8,248	1	8
K10-205	4,000	1,737	2	33
N11-140	3,100	1,188	3	21
K07-55	2,600	1,390	4	15
M09-315	2,000	621	5	4

Figure 1-3: Maximum Zinc Loading by Meter Catchment

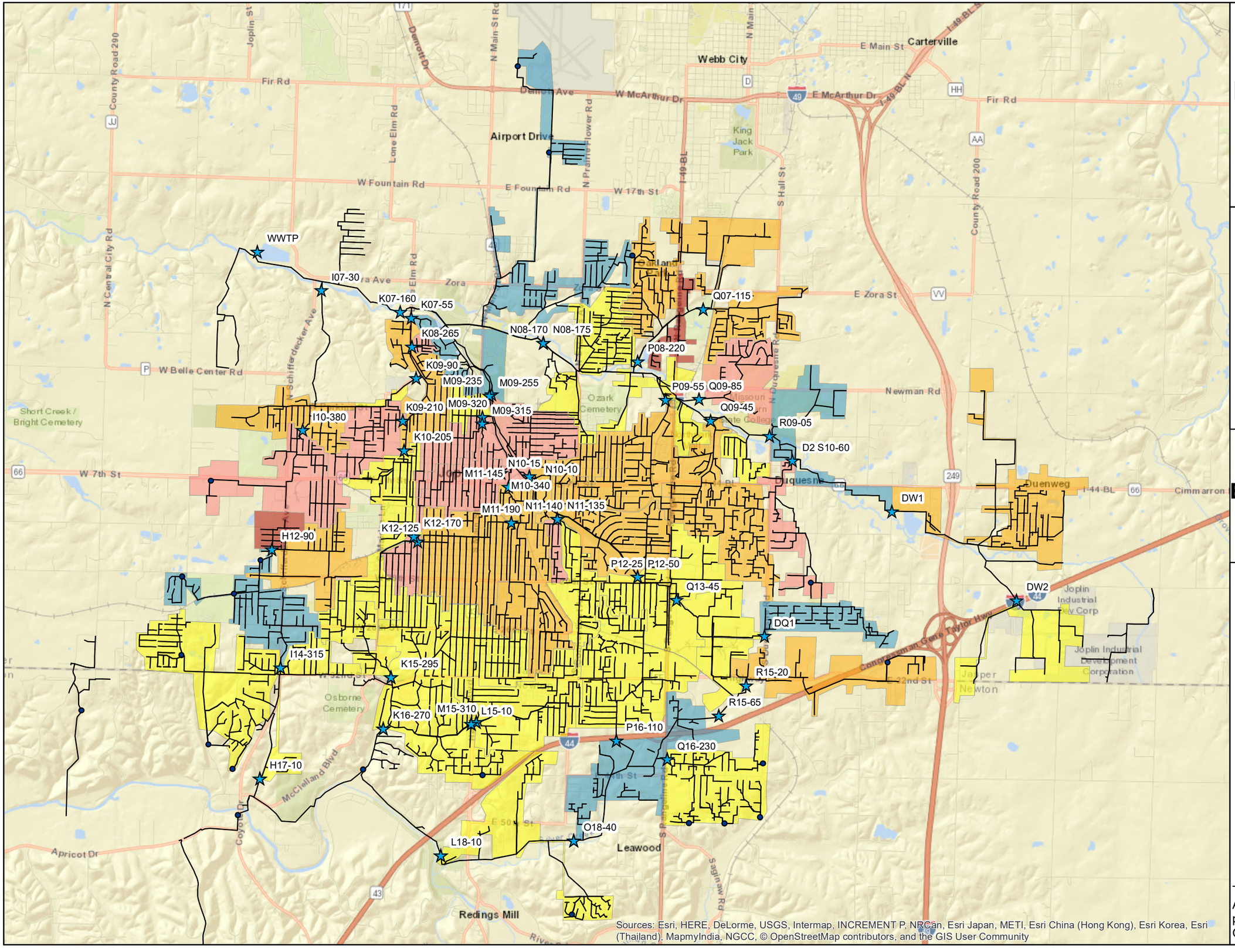


The I&I rankings, not the metals rankings, should serve as a guide for prioritization of future investigation and determination of projects for ultimately cost-effective I&I removal. While the six meter catchments listed in Table 1-1 represent the highest recorded levels of I&I within the system, it should be noted that 47 of the 51 meter catchments were found to have infiltration rates that exceed established USEPA recommended guidelines. Figure 1-4 presents areas of the City's wastewater collection system that exceed the established USEPA infiltration guidelines.

Figure 1-4
City of Joplin Metered Catchments Exceeding EPA Infiltration Rate Guidelines

CITY OF JOPLIN MISSOURI

BURNS McDONNELL



N
W E
S

Legend

- Flow Meters
- Sanitary Sewer
- 0-4
- 4-25
- 25-40
- 40-120
- >120

Thousand Gallons per Inch of Rainfall
All Catchments in Excess of 4,000 Gallons per Inch of Rainfall Exceed EPA Guidelines for Infiltration Rate

1.4 Metals Sampling and Analysis

Metals sampling was conducted concurrent with the flow monitoring, and at the same locations. Samples were taken during routine flow monitor maintenance visits and tested for zinc, lead, and copper. The top ten highest prioritized areas were visually compared to rainfall events recorded during the sampling period. Prioritization was based on incremental metal concentrations.

1.5 Metals Sampling Results

The lag time in rainfall peak and zinc loading peak may be indicative of groundwater influences. This is somewhat corroborated by the elevated loadings which are sustained over several weeks. Hydraulic modeling of flows and pollutants may provide clarification of the operational mechanisms causing the elevated readings.

1.6 Zinc Pollutant and I&I Rankings

The meter catchments were ranked in order of severity of I&I and recorded zinc loadings for the purposes of identifying cost-effective locations for proposed sewer improvements and rehabilitation.

APPENDIX B

Joplin Sewer Model Study

City of Joplin, Missouri

Inflow and Infiltration Strategic Plan Phase 2
Project No. 106594

November 2018

Joplin Sewer Model Study

prepared for

City of Joplin, Missouri
Inflow and Infiltration Strategic Plan Phase 2

Project No. 106594

November 2018

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ADDF	Average Daily Dry-Weather Flow
AMA	Allgeier, Martin, and Associates, Inc.
BMcD	Burns & McDonnell
City	City of Joplin, Missouri
GIS	Geographic Information Systems
gpcd	Gallons per Capita per Day
HGL	Hydraulic Grade Line
I&I	Inflow and Infiltration
MGD	Million Gallons per Day
mg/l	Milligrams per Liter
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service
PDDF	Peak Daily Dry-Weather Flow
ppm	Parts per Million
RPA	Return Period Analysis
SCS	Soil Conservation Service
USGS	United States Geological Survey
WWTP	Waste Water Treatment Plant

0.0 EXECUTIVE SUMMARY

0.1 Introduction

The City of Joplin, Missouri (City) retained Burns & McDonnell (BMcD) to develop an inflow and infiltration (I&I) strategic plan (Phase I) and to develop a sanitary sewer system model (Phase II). Phase I has been completed and is documented in the *Inflow and Infiltration Strategic Plan* dated December 2017. The purpose of this report is to document the efforts of the sanitary sewer system model.

This report provides the City with a comprehensive document pertaining to model development, and to provide an evaluation of the existing system. Specifically, this report summarizes the following components of the modeling project.

- Flow and Rainfall Data Analysis
- Data Gap Analysis
- Model Calibration and Verification
- Existing Conditions
- Evaluation of Three (3) Alternatives

0.2 Flow and Rainfall Data Analysis

Flow monitoring was performed to obtain system flow rates during both dry and wet weather conditions. Rainfall monitoring was performed to correlate the wet weather flows with rainfall. During Phase I, 51 flow meters and six (6) rain gauges were installed to monitor flows throughout the system and the respective rainfall across the system.

For the initial model development and calibration, 20 flow meters and five (5) rain gauges were used. The remaining flow meters may be incorporated into the model under a future contract.

A rainfall analysis of the previously collected data was completed for the 20 flow meters. Rainfall events within the flow monitoring period were reviewed, and independent events were selected for calibration and verification purposes.

0.3 Data Gap Analysis

A data gap analysis was conducted to evaluate the quality and completeness of data provided by the City. The purpose of the analysis was to provide a list of missing data and recommendations to populate the data gaps.

Data gaps were populated using computer inference tools or assumed by the engineer. Overall, the City's data was significantly complete and produced a slight number of data gaps.

0.4 Model Calibration and Verification

The calibrated model developed encompassed sanitary sewers eight (8) inches and larger. The model included approximately 8,100 manholes; approximately 2,128,000 linear feet (LF) of pipe; and 21 pump stations. After the model was constructed, calibration and verification were required to confirm that the hydraulic model reasonably reproduced results of the measured rainfall events.

0.4.1 Dry Weather Calibration

Dry weather flow calibration defines the ADDF for each subcatchment to verify that dry weather flows generated by the hydraulic model replicate, as closely as possible, field measured data.

To be considered calibrated for peak flow rate, the simulated peak had to be within +/-10-percent or within +/-0.2 MGD of the observed peak. To be considered calibrated for volume, the simulated volume had to be within +/-10-percent of the observed volume. Model results were also visually reviewed to confirm the predicted hydrograph followed the shape and magnitude of the meter data.

In some cases, calibration to both peak flow rate and volume were difficult to obtain due to the recorded flow meter data exhibiting peak flow abnormalities. Modeled flows were able to be calibrated at 13 flow meter locations for peak flow and calibrated at all 20 flow meter locations for volume.

Table 0-1: Dry Weather Calibration Summary

Meter	Peak Flow Difference		Volume Difference	
	(MGD)	(%)	(MG)	(%)
I07-30	-0.12	-27.2%	0.00	0.2%
K07-160[1]	-1.40	-16.0%	-1.84	-5.2%
K07-55[1]	-0.28	-25.8%	0.32	7.3%
K10-205	-0.12	-20.5%	0.14	5.4%
M09-235[1]	-0.38	-14.4%	0.01	0.1%
M09-255[1]	-0.22	-24.7%	-0.16	-5.3%
M11-145	-0.13	-18.6%	-0.07	-2.9%
N08-175	-0.15	-14.7%	-0.19	-4.6%
N08-170[1]	-0.50	-16.9%	0.19	1.5%
N10-15	-0.15	-12.4%	0.10	1.9%
N10-10[2]	-0.02	-46.7%	-0.01	-6.0%
P08-220[2]	-0.06	-45.1%	-0.02	-7.5%
P08-220B	-0.17	-14.8%	-0.09	-2.0%

Meter	Peak Flow Difference		Volume Difference	
	(MGD)	(%)	(MG)	(%)
Q13-45[2]	-0.01	-55.6%	0.00	-0.2%
R09-05	-0.17	-24.5%	0.00	0.3%
H17-10[1]	-0.69	-41.3%	-0.02	-0.3%
K16-270	-0.01	-1.0%	0.24	4.1%
L18-10[1]	-0.53	-16.7%	0.04	0.2%
M15-310	-0.05	-29.2%	0.00	0.2%
L15-10	-0.06	-12.4%	0.05	2.3%

Notes:
1. Meter calibrated to volume only due to peak flow abnormalities.
2. Low flow conditions.

0.4.2 Wet Weather Calibration and Verification

Wet weather calibration was performed to correlate the response of the hydraulic model to field measured data during and after rainfall events. Calibration was followed by a verification process in which the accuracy of the model was further verified using independent rainfall events.

Hydraulic model results were compared against flow meter recorded values for peak flow, volume, and overall shape. For a range of events, if the calculated percentage error for peak flow and volume was within calibration tolerances and the overall hydrograph shape was similar, the model was considered calibrated. Wet weather calibration tolerances were the same as the dry weather calibration tolerances, as described in Section 0.4.1.

It should be noted that although some percentage differences appear large, the absolute differences in peak flow or volume are small. This can occur when modest flows cause a meter to fail calibration tolerances but is not a cause for concern in these circumstances.

Table 0-2: Wet Weather Calibration Summary

Meter	Calibration Event	Peak Flow Difference		Volume Difference	
		(MGD)	(%)	(MG)	(%)
I07-30	04/21/17	-0.33	-9.9%	0.07	1.9%
	05/27/17	0.36	18.1%	0.16	9.9%
	06/17/17	-0.20	-24.1%	0.07	33.5%
K07-160	04/21/17	2.70	5.3%	6.97	10.0%
	05/03/17	0.86	1.4%	7.02	10.7%
K07-55	04/21/17	-0.78	-9.5%	0.02	0.2%

Meter	Calibration Event	Peak Flow Difference		Volume Difference	
		(MGD)	(%)	(MG)	(%)
	05/03/17	-0.82	-9.2%	-1.05	-11.3%
K10-205	05/27/17	0.20	6.1%	-0.28	-11.4%
	06/17/17	-0.21	-18.6%	0.03	9.0%
M09-235	05/11/17	0.34	4.0%	-1.15	-9.9%
	05/27/17	-0.36	-3.4%	0.06	0.6%
M09-255	04/21/17	-1.02	-11.3%	0.32	3.2%
	05/03/17	-0.51	-4.9%	-0.91	-9.0%
M11-145	05/11/17	-0.16	-6.0%	-0.45	-11.4%
	05/27/17	0.10	2.4%	-0.44	-11.2%
N08-175[1]	04/21/17	0.66	15.1%	0.44	7.8%
N08-170[1]	04/21/17	1.36	8.1%	2.56	10.2%
	05/03/17	-4.63	-17.5%	-0.19	-0.7%
	05/27/17	2.09	20.4%	-0.85	-5.9%
N10-15[2]	04/21/17	-0.42	-7.3%	1.40	13.6%
	05/03/17	-0.12	-2.1%	0.48	5.2%
	05/27/17	-0.92	-16.1%	0.29	5.5%
N10-10[2]	04/02/17	0.00	5.9%	0.00	11.3%
	06/17/17	-0.08	-55.2%	0.00	41.2%
P08-220	04/21/17	0.07	5.6%	-0.29	-14.9%
	05/03/17	0.25	19.9%	0.18	10.0%
	05/11/17	0.34	48.2%	-0.10	-10.3%
P08-220B	04/21/17	-0.13	-3.2%	0.21	3.2%
Q13-45	04/21/17	0.01	6.7%	0.00	-0.5%
	05/03/17	0.02	8.9%	0.01	7.8%
R09-05	04/29/17	-0.79	-9.4%	0.94	13.7%
	05/03/17	0.32	6.7%	-0.38	-9.5%
	05/27/17	0.58	28.2%	0.16	8.7%
H17-10	04/21/17	-0.71	-13.8%	-0.99	-11.1%
	05/03/17	0.20	3.6%	-0.71	-9.0%
	05/11/17	0.09	2.6%	-1.61	-31.0%
K16-270[3]	04/20/17	0.18	10.0%	0.04	3.9%
L18-10	04/02/17	-0.20	-5.1%	-0.02	-0.3%
	05/27/17	-0.04	-0.6%	-0.25	-2.9%
M15-310	04/21/17	-0.21	-9.7%	0.17	8.6%
	05/03/17	0.16	7.0%	0.16	8.9%
L15-10	04/02/17	0.05	4.6%	-0.08	-5.6%
	05/11/17	0.08	3.8%	-0.13	-4.3%
	05/27/17	-0.92	-27.5%	0.18	5.8%

Meter	Calibration Event	Peak Flow Difference		Volume Difference	
		(MGD)	(%)	(MG)	(%)
Notes: 1. N08-175 and N08-170 are parallel pipes. 2. N10-15 and N10-10 are parallel pipes. 3. There were numerous dropouts in the recorded metering data. Calibrated to one storm event and overall shape.					

Table 0-3 summarizes peak and volume results for each verification rainfall event.

Table 0-3: Wet Weather Verification Summary

Meter	Verification Event	Peak Flow Difference		Volume Difference	
		(MGD)	(%)	(MG)	(%)
I07-30	04/26/17	0.08	5.7%	-0.30	-22.6%
K07-160	04/26/17	-2.89	-10.1%	-1.95	-6.9%
	05/19/17	3.97	6.8%	23.19	28.6%
K07-55	04/04/17	0.01	0.2%	0.21	6.5%
	04/26/17	-0.07	-2.2%	-0.38	-11.0%
	05/11/17	1.35	35.6%	0.05	1.0%
	05/19/17	-0.22	-2.4%	4.37	47.3%
K10-205	04/26/17	0.63	45.3%	-0.01	-0.7%
	06/04/17	0.50	50.9%	0.10	8.4%
M09-235	04/04/17	2.44	32.8%	0.15	2.5%
	06/04/17	0.55	10.0%	0.23	3.6%
M09-255	04/26/17	0.00	0.1%	0.05	1.4%
	05/19/17	-0.76	-7.2%	1.41	11.4%
M11-145	04/04/17	-0.09	-3.6%	-0.19	-9.6%
	06/18/17	0.06	3.9%	0.28	27.6%
N08-175[1]	04/04/17	0.35	20.6%	-0.15	-9.6%
	04/26/17	0.30	16.2%	0.00	-0.2%
N08-170[1]	04/04/17	2.50	33.1%	0.28	4.2%
	04/26/17	-0.90	-8.1%	-0.62	-5.6%
	05/19/17	-3.14	-13.1%	4.87	14.8%
N10-15[2]	04/04/17	0.13	3.5%	-0.28	-9.1%
	06/04/17	0.17	6.1%	-0.05	-1.5%
N10-10[2]	04/04/17	-0.01	-6.3%	0.00	-10.3%
	04/16/17	-0.02	-27.8%	0.00	28.6%
P08-220	04/04/17	0.01	1.3%	-0.23	-42.0%
	04/26/17	0.02	4.0%	-0.13	-19.2%
	05/19/17	0.16	11.9%	0.44	21.3%

Meter	Verification Event	Peak Flow Difference		Volume Difference	
		(MGD)	(%)	(MG)	(%)
P08-220B	05/19/17	-0.48	-9.1%	0.79	9.3%
	06/04/17	0.14	6.9%	-0.28	-9.9%
Q13-45	04/26/17	0.00	4.4%	0.00	2.9%
	05/19/17	-0.03	-14.6%	-0.03	-12.2%
R09-05	05/19/17	-0.81	-16.3%	0.34	7.1%
H17-10	04/29/17	-0.59	-8.1%	1.24	9.7%
	05/19/17	-0.59	-9.5%	0.56	5.4%
K16-270[3]	04/04/17	-4.98	-64.6%[4]	-0.32	-13.1%
	06/04/17	0.07	3.1%	0.47	20.5%
L18-10	03/26/17	0.23	6.1%	0.85	29.6%
	05/11/17	0.08	1.4%	-1.24	-14.2%
M15-310	04/26/17	0.12	13.6%	-0.11	-13.9%
	05/19/17	0.24	10.3%	0.89	37.8%
L15-10	04/04/17	0.34	25.5%	-0.10	-7.5%
	06/04/17	-0.05	-3.9%	-0.23	-12.3%

Notes:
1. N08-175 and N08-170 are parallel pipes.
2. N10-15 and N10-10 are parallel pipes.
3. There were numerous dropouts in the recorded metering data.
4. Peak flow abnormality, but overall shape followed recorded metering data.

The hydraulic model calibration and verification was found to reproduce satisfactory sewer flow and volume results for a variety of rainfall events.

0.5 Water Quality Calibration

Metals sampling was conducted on the fifty-one (51) flow meters during the 2017 rainfall and flow monitoring period. These collection days and times were independent of rainfall.

The samples obtained during the monitoring period were used for calibration. Calibration was conducted for zinc, copper, and lead on the 20 flow meter locations used for the hydraulic model calibration.

0.5.1 Water Quality Dry Weather Calibration

The water quality dry weather calibration was based on average pollutant concentrations during dry weather conditions. Dry weather conditions were assumed to be sampling dates without precipitation during the collection day or the day prior.

Similar to the hydraulic calibration, a percentage error was calculated at each flow meter location by comparing the recorded pollutant concentration against the predicted concentration. The model was considered calibrated at the meter location if the modeled concentration was within +/- 10-percent of the average sample concentration. Modeled concentrations were calibrated at all 20 locations for zinc, copper, and lead.

0.5.2 Water Quality Wet Weather Calibration

Wet weather calibration was completed to correlate the modeled metals concentration to the sampling data obtained during wet weather monitoring times. Wet weather conditions were assumed to be sampling dates with precipitation occurring during the collection day or the day prior.

Although samples were obtained during wet weather conditions, sampling did not occur at an hourly interval or necessarily during the rainfall event. Average concentrations of zinc, lead, and copper were determined for the wet weather days. Sampling dates, with measured concentrations comparable to the averages, were then selected as the calibration event.

To be considered calibrated, the simulated metal concentration had to be within +/-10-percent of the observed concentration. Modeled concentrations were calibrated at all twenty (20) meter locations for zinc, copper and lead.

0.6 Existing Conditions Analysis

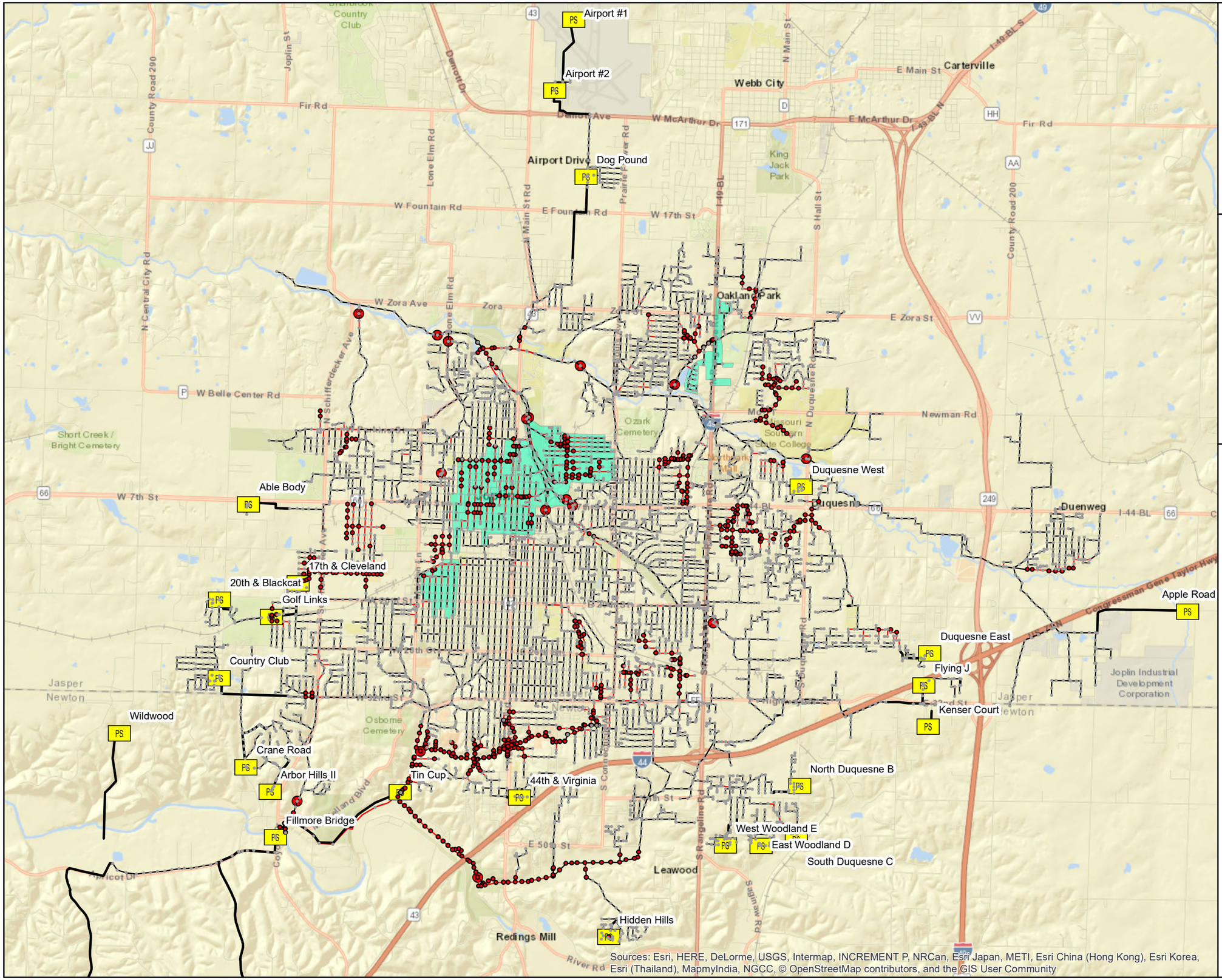
Evaluation of existing conditions included identifying projected sanitary sewer pipes with a reduced level of service during the 1-year, 6-hour design event; and manholes with a reduced level of service during the 5-year, 6-hour design event. The evaluation was performed using the existing conditions model, which included some modifications related to the Filmore lift station force mains.

The model showed flow constrictions at several pump stations including 17th and Cleveland, East Woodland, West Duquesne, Filmore Bridge, and Tin Cup. The pumping capacities for the West Duquesne pump station should be verified prior to any additional recommendations. Modeling results indicated clusters of manholes that do not meet the target level of service. These clusters generally correlate to the top five I&I catchments (as documented in *Inflow and Infiltration Strategic Plan, 2017)*. The remaining manholes and conduits that did not provide a 1-year and 5-year level of service, respectively, are a result of flat or undersized pipes, flow imbalances in the parallel pipes, and high quantities of I&I. Figure 0-1 displays the conduits and manholes that do not meet the level of service during the existing conditions.

Figure 0-1
City of Joplin
Conduit and Manhole
Level of Service

CITY OF JOPLIN MISSOURI

BURNS McDONNELL



N
W E
S

Legend

- LOS Greater than 5-Year
- LOS Less than 5-Year
- PS — Pump Station
- Forcemain

Return Period

- > or equal to 1-year LOS
- < 1-year LOS
- Calibration Flow Meter
- Top 5 I&I Basins

0.7 I&I Reduction Analysis

The *Inflow and Infiltration Strategic Plan* dated December 19, 2017 documented that forty-seven (47) of the fifty-one (51) meter catchments were found to have infiltration rates of concern. As part of the hydraulic modeling efforts, an analysis of the most cost effective I&I reduction and the impacts to the water quality were analyzed.

The cost-effective percent of reduction for the system was determined to be the "knee of the curve" Based on the analysis, it was concluded that a 30-percent I&I reduction on average in the targeted sewersheds was the most cost-effective.

After evaluating the percent of I&I reduction, the water quality impacts were considered at the Turkey Creek Wastewater Treatment Plant to determine if the reduction of I&I had a negative impact on the water quality.

From the recommendation of I&I reduction at 30-percent, it was determined that the effects of the I&I reduction on the surface water quality is less than 10-percent for all three pollutants. Therefore, the recommendation stands to proceed with a 30-percent I&I reduction across the system.

0.8 Evaluated Alternatives

Three alternatives, not including the base alternative, were evaluated to address deficiencies during wet weather events within the system, as identified by the existing conditions analysis. The following measures were considered during the development of the proposed alternatives:

- 30-percent I&I reduction
- Increased pipe diameters
- Increased pipe slopes
- Parallel pipes
- Shifting of flow between existing parallel systems
- Increased pumping capacity
- Storage
- Existing inline storage

0.8.1 Base Alternative – Upsized Pipes

To evaluate the cost-effectiveness of the alternatives, a base alternative was established. This alternative considered upsizing pipes to meet the target level of service. This base alternative analyzed the level of service with no pump station restrictions.

0.8.2 Alternative 1 - 30% I&I Reduction

Alternative 1 evaluated a 30-percent I&I reduction throughout the Shoal Creek and Turkey Creek wastewater treatment plant basins. For this alternative, I&I reduction only was considered, and upsizing of pipes and increased pumping capacities were not a component of the alternative.

Although runoff was decreased by 30-percent, modeling results indicated a number of manholes and conduits still at a reduced level of service.

0.8.3 Alternative 2 - 30% I&I Reduction with Upsized Pipes

Alternative 2 considered a 30-percent I&I reduction systemwide along with several other proposed measures to address deficiencies. This generally included upsizing pipe diameters, shifting flow between existing parallel systems, increasing pumping capacity, and utilizing existing pipes for inline storage. Figure 0-2 displays the conduits that are recommended to upsize or install a parallel sewer to meet the level of service.

Figure 0-2
City of Joplin
Alternative 2
Upsized Pipes and Parallel Pipes

CITY OF JOPLIN MISSOURI

BURNS McDONNELL

N
W E
S

Legend

- Existing Manholes
- PS — Pump Station
- Existing Sewer
- Proposed Alt 2 CIP
- Forcemain
- Calibration Flow Meter

Airport #2
Webb City
Carterville
Airport Drive
Dog Pound
King Jack Park
Oakland Park
Zora
Ozark Cemetery
Missouri Southern State College
Northpark Mall
Duquesne West
Duquesne
Duenweg
Able Body
Joplin
Short Creek / Bright Cemetery
17th & Cleveland
20th & Blackcat
Golf Links
Country Club
Wildwood
Crane Road
Arbor Hills II
Fillmore Bridge
Tin Cup
44th & Virginia
Osborne Cemetery
Jasper
Newton
North Duquesne B
West Woodland E
East Woodland D
South Duquesne C
Leawood
Redings Mill
Hidden Hills
Duquesne East
Flying J
Kenser Court
Apple Road
Joplin Industrial Development Corporation
Fir Rd
W McArthur Dr
E McArthur Dr
E Main St
W Fountain Rd
E Fountain Rd
W 17th St
E Zora St
W Zora Ave
W Belle Center Rd
W Parkins St
Newman Rd
W 7th St
E 7th St
I-44-BL
W 20th St
E 20th St
W 26th St
E 26th St
W 32nd St
E 32nd St
E 44th St
E 50th St
Highway FF
US-71-N
Congressman Gene Taylor
River Rd
Saginaw Rd
Lone Elm Rd
N Main St
S Hall St
County Road 200
County Road 290
N Central City Rd
N Schifferdecker Ave
S St Louis Ave
N Rangeline Rd
S Rangeline Rd
N Duquesne Rd
S Duquesne Rd
S Connecticut Ave
Prairie Flower Rd
I-49-BL
I-44
I-49

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Gravity pipe diameters were upsized based on a systemwide 30-percent I&I reduction to meet the target level of service. Flat slopes on pipes being replaced were increased, or a parallel line was proposed to prevent additional upsizing. Parallel pipes or pipe realignments were also recommended at three (3) locations in the downtown area due to alignment restrictions.

Existing parallel systems and cross connections were analyzed to determine if shifting flows between the two systems would address downstream deficiencies. There were five (5) locations within the system where this was applicable:

- Parallel system in the vicinity of N11-305 and M10-80;
- Parallel system in the vicinity of P07-85 and P08-220;
- Parallel system in the vicinity of L08-285 and L07-95;
- Cross connection between M09-275 and M09-210; and
- Parallel system in vicinity of N15-170 to K16-55.

This alternative also included increased pumping capacity at four (4) lift stations and adjustments to the Filmore Bridge lift station pump operations. The lift stations with increased capacity were 17th & Cleveland, West Duquesne (assumed pumping capacity will need to be verified), East Woodland, and Tin Cup lift stations.

The proposed improvements are initial and are subject to change following cost-effective I&I removal efforts have been completed in the upstream basins.

0.8.4 Alternative 3 – 30% I&I Reduction, Upsized Pipes, and Storage

Alternative 3 was identical to Alternative 2 with additional storage considered. The City provided Burns & McDonnell with six (6) possible locations for storage. Each location was reviewed to determine if storage was advantageous to reduce the quantity of upsized pipes.

With the 30-percent I&I reduction and parallel system modifications, modeling indicated that in general the level of service near four (4) of the storage locations was met. Therefore, storage was evaluated only at the existing basins and Soccer Field Road locations.

For the existing basin storage, flows were pulled off from the system at manhole K16-55, above the dry weather flow level. The approximate area of the east pond (4.3 acres) was used for modeling purposes. Modeling results indicated approximately 300,000 cubic feet (CF) of storage was used for the 5-year return event. Pumping capacity was set to 0.47 MGD with a drawdown time of approximately three (3)

days. This storage would eliminate approximately 1,760 linear feet (LF) of upsized pipe between manhole K16-55 and K16-295; and decrease the total necessary pumping capacity at Tin Cup by approximately 5 million gallons per day (MGD).

Alternative 3 also considered storage at Soccer Field Road. Flows were pulled off from the system at manhole L07-15, above the dry weather flow level. An approximate area of 15.6 acres was used for modeling. Modeling showed approximately 1,829,100 CF of storage for the 5-year event. Pumping capacity to allow for an approximate two and half (2.5) day drawdown was 4.9 MGD. The main advantage of this storage would be eliminating the need for approximately 2,320 LF of upsized pipes between L07-115 down to K07-150.

0.9 Opinion of Probable Cost

Unit costs for construction only were developed for each type of improvement using previous City of Joplin bid tabs and engineering experience. Each bid tab provided by the City was evaluated to determine a cost per inch-diameter per linear foot considering the costs associated with sewer improvements only. The bid tab cost per inch-diameter per linear foot were averaged to develop an overall unit cost for the sewer line improvements. This is an opinion of probable construction cost that includes, but is not limited to, mobilization, demolition, excavation, backfill, restoration and demobilization.

Due to safety and odor concerns with earth basins, both proposed storage locations were proposed to be below grade, covered storage tanks. This is an opinion of probable construction cost that includes, but is not limited to, construction of the structure, release pumping and controls.

A cost per gallon per day of I&I removed was applied for a 30-percent I&I reduction. The total opinion of probable cost for I&I reduction remained constant across alternatives 1, 2 and 3.

It should be noted that a cost was not assigned to pumping capacity increases for each alternative due to a lack of information. A more detailed design would need to be conducted to assign a relative cost for the various pump station upgrades.

Table 0-4 summarizes the opinion of probable construction cost for each alternative evaluated.

Table 0-4: Opinion of Probable Construction Cost for Various Alternatives

Base Alternative[1]	$ 91,638,000
Alternative 1	$ 10,707,000
Alternative 2[1]	$ 41,757,000
Alternative 3[1]	$ 109,972,000
Notes: 1. Does not include costs for increased pumping capacities.	

APPENDIX C

CITY OF JOPLIN, MISSOURI
JOPLIN CREEK-LONE ELM INTERCEPTOR SEWER REPLACEMENT
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	20	LF	0'-6' Deep Trench & Backfill for 48" Dia. Pipe	$ 48.00	$ 960
2	600	LF	6'-8' Deep Trench & Backfill for 48" Dia. Pipe	$ 70.00	$ 42,000
3	1620	LF	8'-10' Deep Trench & Backfill for 48" Dia. Pipe	$ 90.00	$ 145,800
4	100	LF	10'-12' Deep Trench & Backfill for 48" Dia. Pipe	$ 120.00	$ 12,000
5	2340	LF	48" Dia. Gravity Sewer Pipe and Bedding	$ 500.00	$ 1,170,000
6	60	LF	48" Aerial Stream Crossing	$ 2,000.00	$ 120,000
7	2340	LF	Pressure and Deflection Testing of 48" Dia. Pipe	$ 10.00	$ 23,400
8	8	EA	96" Diameter Manhole	$ 10,000.00	$ 80,000
9	16	EA	96" Diameter Manhole Extra Depth	$ 500.00	$ 8,000
10	1	EA	Connection to Ex. Soccer Field Road Junction Box	$ 75,000.00	$ 75,000
11	1	EA	Connection to Ex. Lone Elm Junction Box	$ 50,000.00	$ 50,000
12	8	EA	Testing of 96" Diameter Manholes	$ 1,000.00	$ 8,000
13	100	LF	Pavement Repair & Replacement	$ 250.00	$ 25,000
14	2240	LF	Type A Surface Restoration	$ 5.00	$ 11,200
15	2	EA	Trench Plug	$ 5,000.00	$ 10,000
16	1000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 15,000
17	1	LS	All Other Work For Perfection of Project	$ 200,000.00	$ 200,000
			Construction Subtotal		$ 1,996,360
			Contingencies (10%)		$ 199,636
			Engineering Design		$ 157,000
			Engineering Bidding/Construction		$ 35,000
			Engineering Inspection		$ 108,000
			Project Cost		**$ 2,495,996**

CITY OF JOPLIN, MISSOURI
EAST ROYAL HEIGHTS INTERCEPTOR SEWER REPLACEMENT
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1850	LF	6'-8' Deep Trench & Backfill for 27" Dia. Pipe	$ 38.00	$ 70,300
2	1850	LF	8'-10' Deep Trench & Backfill for 27" Dia. Pipe	$ 40.00	$ 74,000
3	3700	LF	27" Dia. PVC Gravity Sewer Pipe and Bedding	$ 100.00	$ 370,000
4	3700	LF	Pressure and Deflection Testing of 27" Dia. Pipe	$ 3.00	$ 11,100
5	12	EA	60" Diameter Manhole	$ 5,500.00	$ 66,000
6	8	FT	60" Diameter Manhole Extra Depth	$ 250.00	$ 2,000
7	12	EA	Testing of 60" Diameter Manholes	$ 300.00	$ 3,600
8	3700	LF	Type A Surface Restoration	$ 3.00	$ 11,100
9	1000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 15,000
10	1	LS	All Other Work For Perfection of Project	$ 65,000.00	$ 65,000
			Construction Subtotal		$ 688,100
			Contingencies (10%)		$ 68,810
			Engineering Design		$ 50,000
			Engineering Bidding/Construction		$ 25,000
			Engineering Inspection		$ 72,000
			Project Cost		**$ 903,910**

CITY OF JOPLIN, MISSOURI
GLENDALE INTERCEPTOR SEWER REPLACEMENT
PHASE I (LAGOON - JACKSON AVE.)
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	520	LF	6'-8' Deep Trench & Backfill for 18" Dia. Pipe	$ 30.00	$ 15,600
2	520	LF	8'-10' Deep Trench & Backfill for 18" Dia. Pipe	$ 32.00	$ 16,640
3	900	LF	6'-8' Deep Trench & Backfill for 24" Dia. Pipe	$ 35.00	$ 31,500
4	900	LF	8'-10' Deep Trench & Backfill for 24" Dia. Pipe	$ 40.00	$ 36,000
5	450	LF	6'-8' Deep Trench & Backfill for 30" Dia. Pipe	$ 38.00	$ 17,100
6	450	LF	8'-10' Deep Trench & Backfill for 30" Dia. Pipe	$ 40.00	$ 18,000
7	1040	LF	18" Dia. PVC Gravity Sewer Pipe and Bedding	$ 70.00	$ 72,800
8	1800	LF	24" Dia. PVC Gravity Sewer Pipe and Bedding	$ 85.00	$ 153,000
9	900	LF	30" Dia. PVC Gravity Sewer Pipe and Bedding	$ 110.00	$ 99,000
10	60	LF	Pipe Bursting for a 18" Dia. Gravity Sewer Pipe	$ 350.00	$ 21,000
11	1100	LF	Pressure and Deflection Testing of 18" Dia. Pipe	$ 3.00	$ 3,300
12	1800	LF	Pressure and Deflection Testing of 24" Dia. Pipe	$ 3.00	$ 5,400
13	900	LF	Pressure and Deflection Testing of 30" Dia. Pipe	$ 3.00	$ 2,700
14	5	EA	48" Diameter Manhole	$ 4,500.00	$ 22,500
15	10.0	FT	48" Diameter Manhole Extra Depth	$ 250.00	$ 2,500
16	5	EA	Testing of 48" Diameter Manholes	$ 200.00	$ 1,000
17	12	EA	60" Diameter Manhole	$ 5,500.00	$ 66,000
18	24.0	FT	60" Diameter Manhole Extra Depth	$ 250.00	$ 6,000
19	12	EA	Testing of 60" Diameter Manholes	$ 300.00	$ 3,600
20	3740	LF	Type A Surface Restoration	$ 3.00	$ 11,220
21	500	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 7,500
22	1	LS	All Other Work For Perfection of Project	$ 65,000.00	$ 65,000
			Construction Subtotal		$ 677,360
			Contingencies (10%)		$ 67,736
			Engineering Design		$ 50,000
			Engineering Bidding/Construction		$ 25,000
			Engineering Inspection		$ 54,000
			Phase I Project Cost		**$ 874,096**

CITY OF JOPLIN, MISSOURI
GLENDALE INTERCEPTOR SEWER REPLACEMENT
PHASE II (JACKSON AVE. - INDIANA AVE.)
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1200	LF	6'-8' Deep Trench & Backfill for 18" Dia. Pipe	$ 30.00	$ 36,000
2	1200	LF	8'-10' Deep Trench & Backfill for 18" Dia. Pipe	$ 32.00	$ 38,400
3	975	LF	6'-8' Deep Trench & Backfill for 21" Dia. Pipe	$ 32.00	$ 31,200
4	975	LF	8'-10' Deep Trench & Backfill for 21" Dia. Pipe	$ 35.00	$ 34,125
5	2400	LF	18" Dia. PVC Gravity Sewer Pipe and Bedding	$ 70.00	$ 168,000
6	1950	LF	21" Dia. PVC Gravity Sewer Pipe and Bedding	$ 80.00	$ 156,000
7	165	LF	Pipe Bursting for an 18" Dia. Gravity Sewer Pipe	$ 350.00	$ 57,750
8	2565	LF	Pressure and Deflection Testing of 18" Dia. Pipe	$ 3.00	$ 7,695
9	1950	LF	Pressure and Deflection Testing of 21" Dia. Pipe	$ 3.00	$ 5,850
10	18	EA	48" Diameter Manhole	$ 4,500.00	$ 81,000
11	36	FT	48" Diameter Manhole Extra Depth	$ 250.00	$ 9,000
12	18	EA	Testing of 48" Diameter Manholes	$ 200.00	$ 3,600
13	4065	LF	Type A Surface Restoration	$ 3.00	$ 12,195
14	285	LF	Pavement Repair & Replacement	$ 100.00	$ 28,500
15	1000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 15,000
16	1	LS	All Other Work For Perfection of Project	$ 70,000.00	$ 70,000
			Construction Subtotal		$ 754,315
			Contingencies (10%)		$ 75,432
			Engineering Design		$ 55,000
			Engineering Bidding/Construction		$ 25,000
			Engineering Inspection		$ 72,000
			Phase II Project Cost		**$ 981,747**

CITY OF JOPLIN, MISSOURI
GLENDALE INTERCEPTOR SEWER REPLACEMENT
PHASE III (INDIANA AVE. TO CONNECTICUT AVE.)
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	500	LF	6'-8' Deep Trench & Backfill for 8" Dia. Pipe	$ 15.00	$ 7,500
2	500	LF	8'-10' Deep Trench & Backfill for 8" Dia. Pipe	$ 18.00	$ 9,000
3	350	LF	6'-8' Deep Trench & Backfill for 12" Dia. Pipe	$ 20.00	$ 7,000
4	350	LF	8'-10' Deep Trench & Backfill for 12" Dia. Pipe	$ 22.00	$ 7,700
5	1500	LF	6'-8' Deep Trench & Backfill for 21" Dia. Pipe	$ 32.00	$ 48,000
6	1500	LF	8'-10' Deep Trench & Backfill for 21" Dia. Pipe	$ 35.00	$ 52,500
7	1000	LF	8" Dia. PVC Gravity Sewer Pipe and Bedding	$ 40.00	$ 40,000
8	700	LF	12" Dia. PVC Gravity Sewer Pipe and Bedding	$ 50.00	$ 35,000
9	3000	LF	21" Dia. PVC Gravity Sewer Pipe and Bedding	$ 80.00	$ 240,000
10	1000	LF	Pressure and Deflection Testing of 8" Dia. Pipe	$ 3.00	$ 3,000
11	700	LF	Pressure and Deflection Testing of 12" Dia. Pipe	$ 3.00	$ 2,100
12	3000	LF	Pressure and Deflection Testing of 21" Dia. Pipe	$ 3.00	$ 9,000
13	15	EA	48" Diameter Manhole	$ 4,500.00	$ 67,500
14	30	FT	48" Diameter Manhole Extra Depth	$ 250.00	$ 7,500
15	15	EA	Testing of 48" Diameter Manholes	$ 200.00	$ 3,000
16	3380	LF	Type A Surface Restoration	$ 3.00	$ 10,140
17	1320	LF	Pavement Repair & Replacement	$ 100.00	$ 132,000
18	1000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 15,000
19	1	LS	All Other Work For Perfection of Project	$ 70,000.00	$ 70,000

Construction Subtotal		$ 765,940
Contingencies (10%)		$ 76,594
Engineering Design		$ 55,000
Engineering Bidding/Construction		$ 25,000
Engineering Inspection		$ 72,000
	Phase III Project Cost	**$ 994,534**
	Project Cost	**$ 2,850,377**

CITY OF JOPLIN, MISSOURI
I-44 INTERCEPTOR SEWER REPLACEMENT
OPINION OF PROBABLE PROJECT COSTS

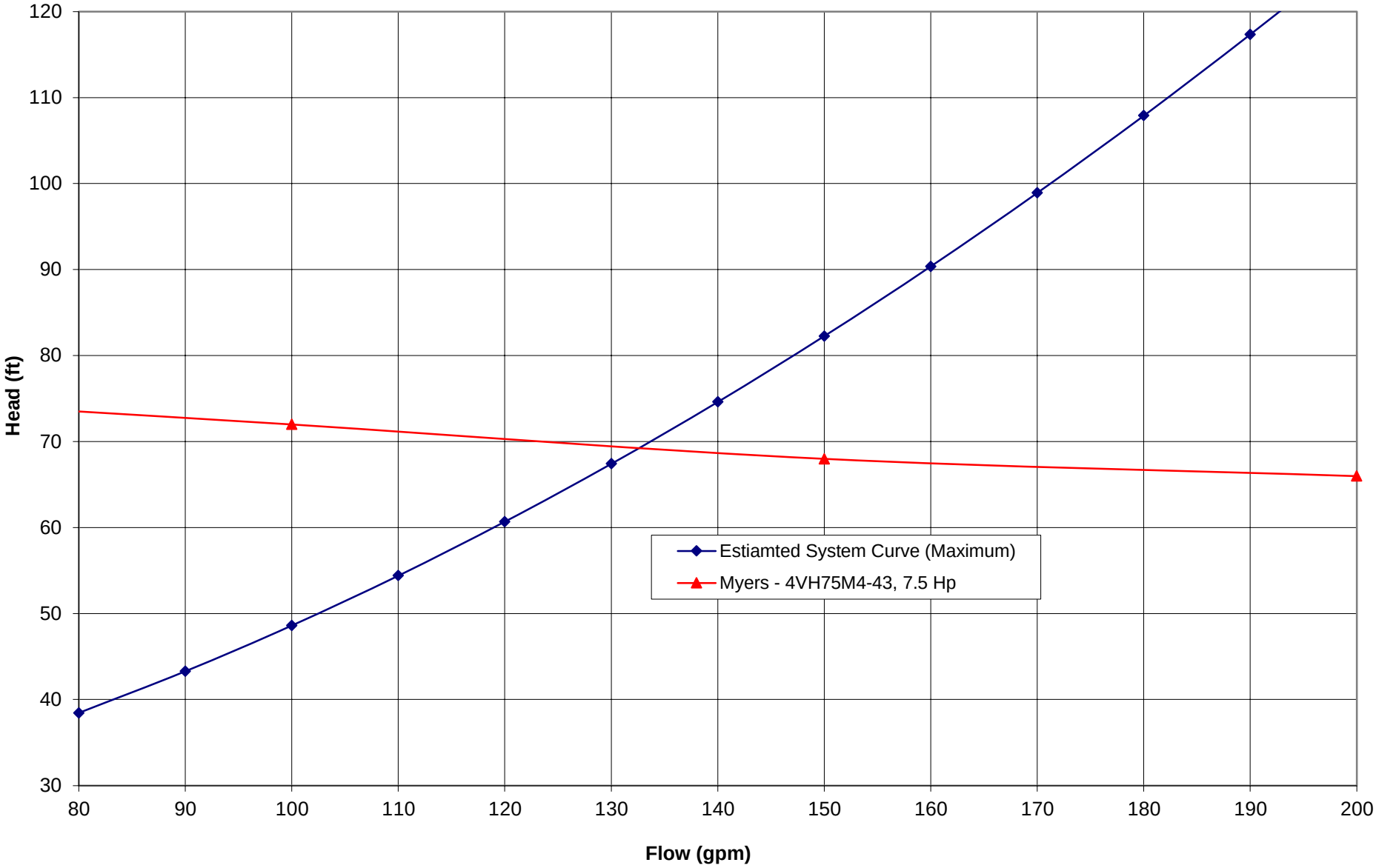
ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	4160	LF	6'-8' Deep Trench & Backfill for 30" Dia. Pipe	$ 38.00	$ 158,080
2	4160	LF	8'-10' Deep Trench & Backfill for 30" Dia. Pipe	$ 40.00	$ 166,400
3	2700	LF	10'-12' Deep Trench & Backfill for 30" Dia. Pipe	$ 45.00	$ 121,500
4	11020	LF	30" Dia. PVC Gravity Sewer Pipe and Bedding	$ 110.00	$ 1,212,200
5	11020	LF	Pressure and Deflection Testing of 30" Dia. Pipe	$ 3.00	$ 33,060
6	31	EA	60" Diameter Manhole	$ 5,500.00	$ 170,500
7	62	FT	60" Diameter Manhole Extra Depth	$ 250.00	$ 15,500
8	80	LF	Hwy. Bore for a 30" DIP Pipe in a 48" Dia. Casing	$ 800.00	$ 64,000
9	31	EA	Testing of 60" Diameter Manholes	$ 300.00	$ 9,300
10	205	LF	Concrete Encasement for 30" Dia. Gravity Sewer	$ 200.00	$ 41,000
11	10920	LF	Type A Surface Restoration	$ 3.00	$ 32,760
12	100	LF	Pavement Repair & Replacement	$ 200.00	$ 20,000
13	2000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 30,000
14	1	LS	All Other Work For Perfection of Project	$ 210,000.00	$ 210,000
			Construction Subtotal		$ 2,284,300
			Contingencies (10%)		$ 228,430
			Engineering Design		$ 177,000
			Engineering Bidding/Construction		$ 40,000
			Engineering Inspection		$ 144,000
			Project Cost		**$ 2,873,730**

CITY OF JOPLIN, MISSOURI
32ND STREET INTERCEPTOR SEWER REPLACEMENT
OPINION OF PROBABLE PROJECT COSTS

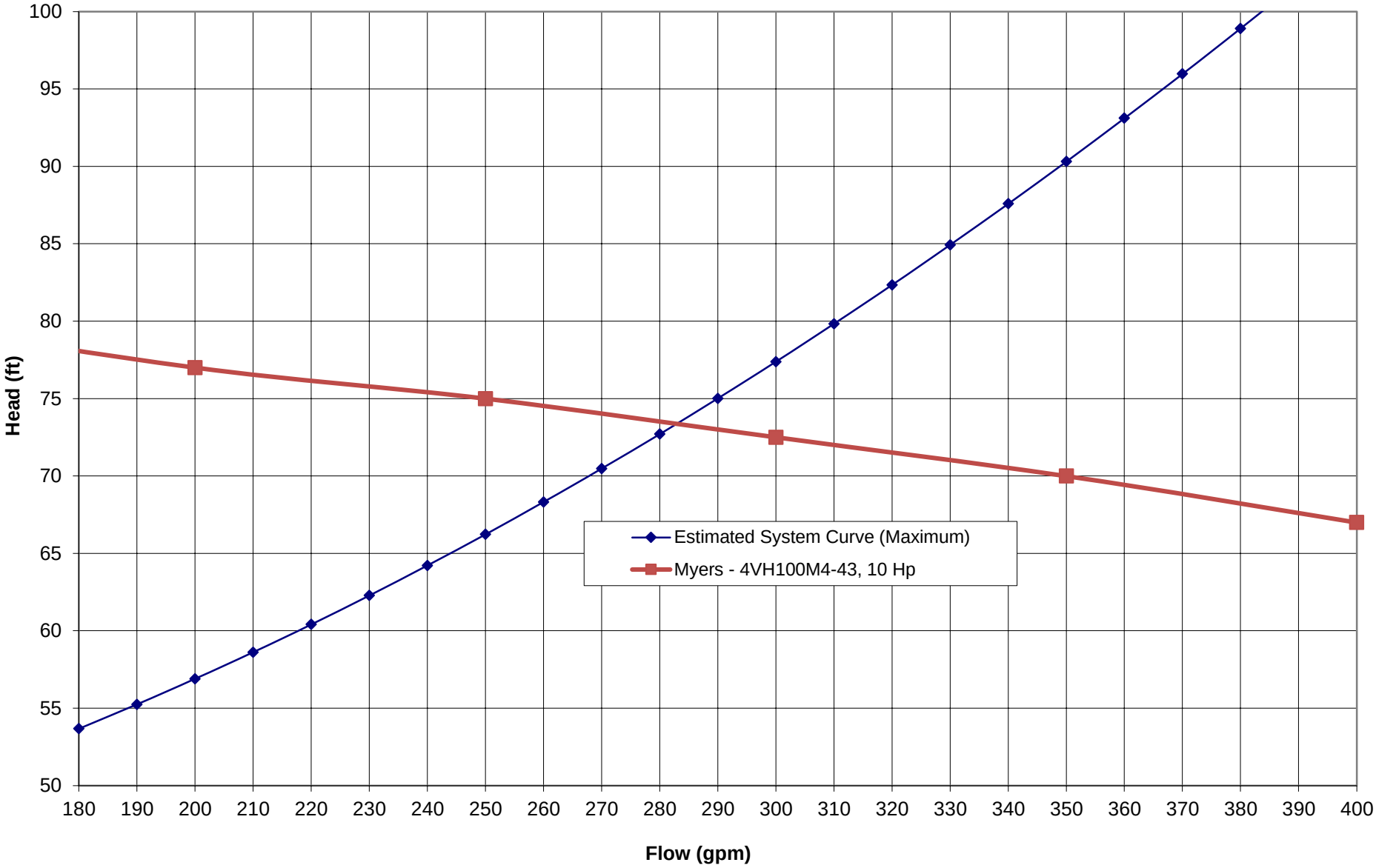
ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	88	LF	8'-10' Deep Trench & Backfill for 21" Dia. Pipe	$ 32.00	$ 2,816
2	87	LF	10'-12' Deep Trench & Backfill for 21" Dia. Pipe	$ 35.00	$ 3,045
3	400	LF	6'-8' Deep Trench & Backfill for 24" Dia. Pipe	$ 35.00	$ 14,000
4	400	LF	8'-10' Deep Trench & Backfill for 24" Dia. Pipe	$ 40.00	$ 16,000
5	175	LF	21" Dia. PVC Gravity Sewer Pipe and Bedding	$ 80.00	$ 14,000
6	800	LF	24" Dia. PVC Gravity Sewer Pipe and Bedding	$ 85.00	$ 68,000
7	175	LF	Hwy. Bore for a 21" DIP Pipe in a 36" Dia. Casing	$ 600.00	$ 105,000
8	100	LF	Hwy. Bore for a 24" DIP Pipe in a 36" Dia. Casing	$ 700.00	$ 70,000
9	350	LF	Pressure and Deflection Testing of 21" Dia. Pipe	$ 3.00	$ 1,050
10	900	LF	Pressure and Deflection Testing of 24" Dia. Pipe	$ 3.00	$ 2,700
11	5	EA	60" Diameter Manhole	$ 5,500.00	$ 27,500
12	8	FT	60" Diameter Manhole Extra Depth	$ 250.00	$ 2,000
13	5	EA	Testing of 60" Diameter Manholes	$ 300.00	$ 1,500
14	975	LF	Type A Surface Restoration	$ 3.00	$ 2,925
15	1	LS	Streambank Stabilization	$ 25,000.00	$ 25,000
16	500	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 7,500
17	1	LS	All Other Work For Perfection of Project	$ 40,000.00	$ 40,000
			Construction Subtotal		$ 403,036
			Contingencies (10%)		$ 40,304
			Engineering Design		$ 30,000
			Engineering Bidding/Construction		$ 15,000
			Engineering Inspection		$ 36,000
			Project Cost		**$ 524,340**

APPENDIX D

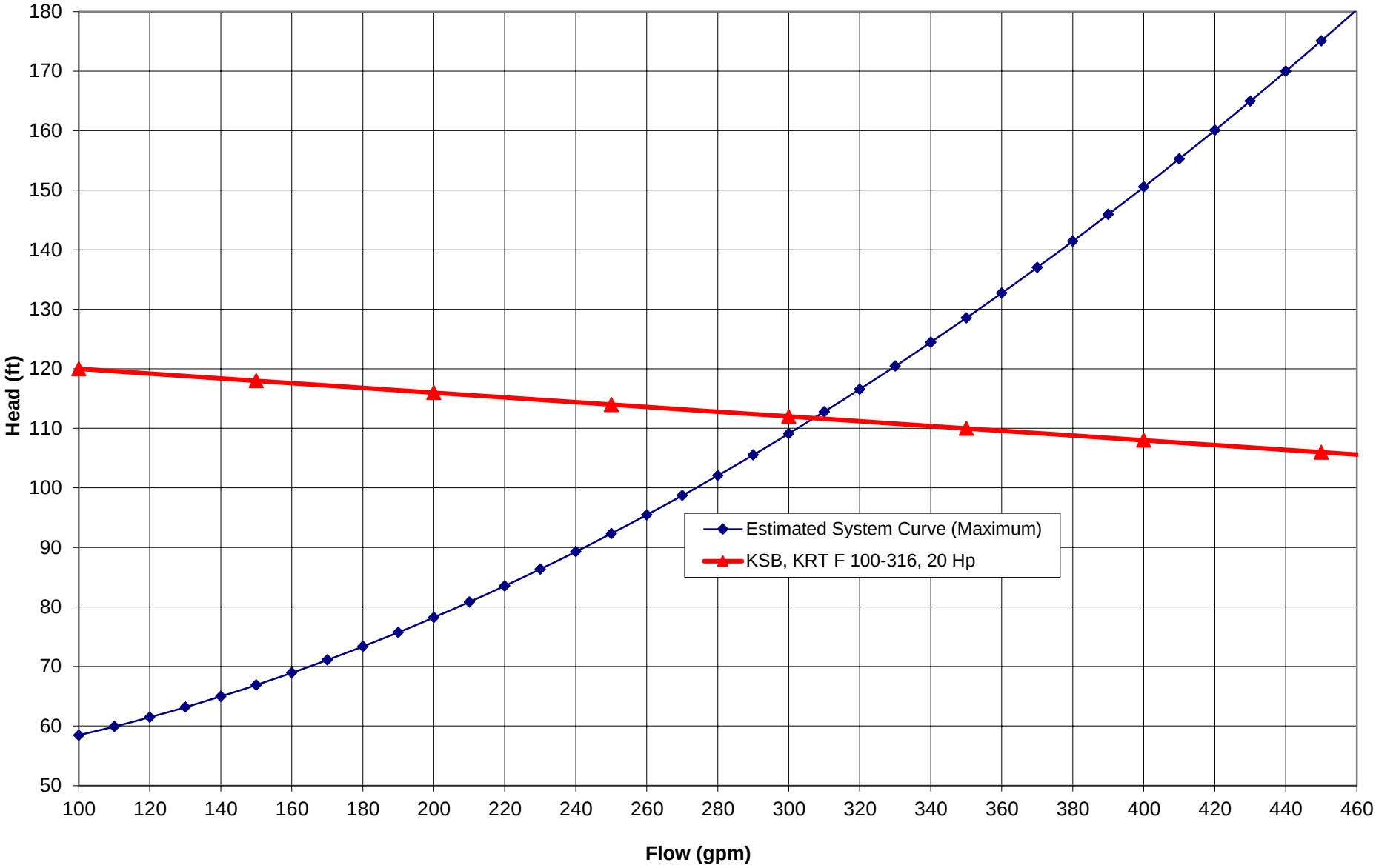
CITY OF JOPLIN
AIRPORT #2 LIFT STATION ESTIMATED SYSTEM CURVE



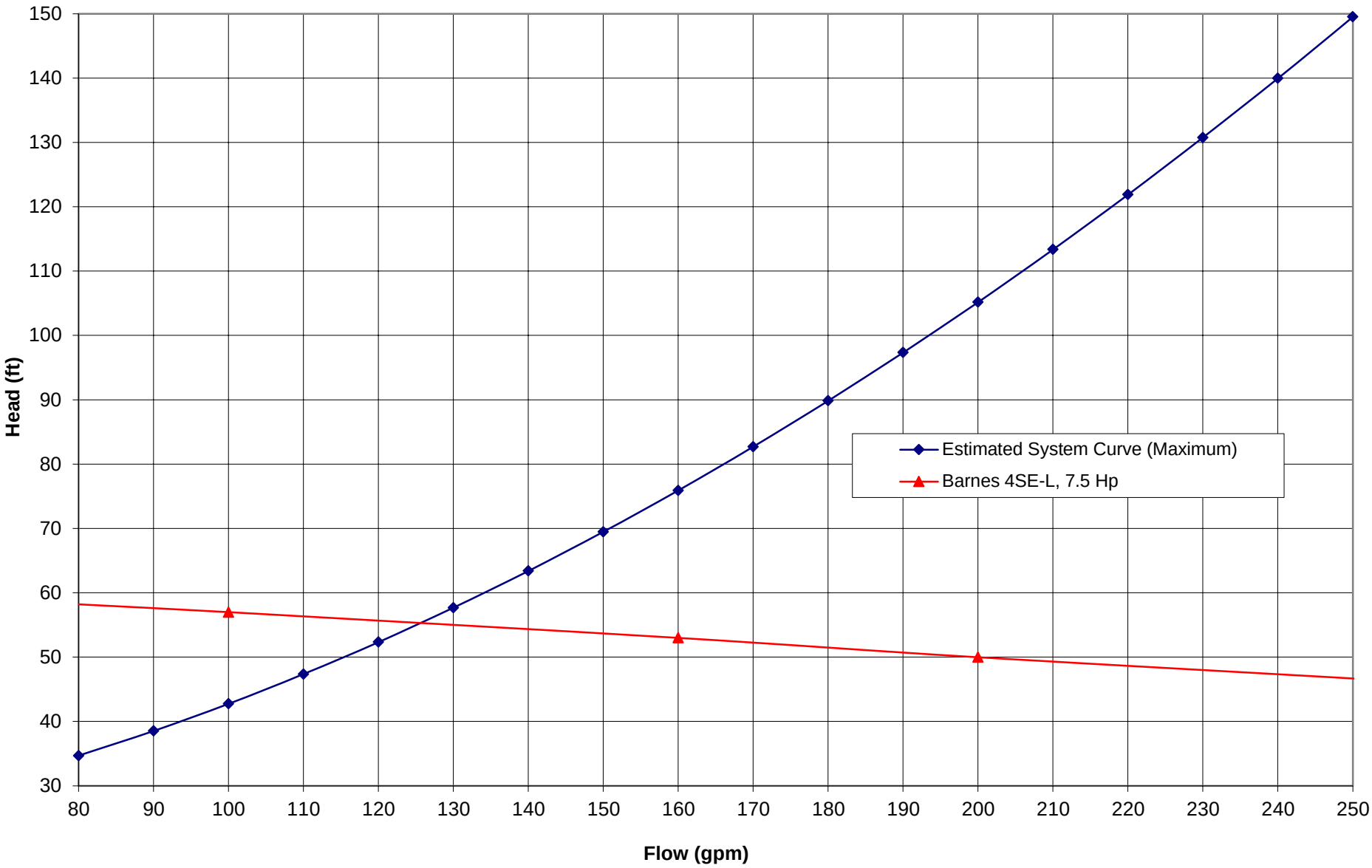
CITY OF JOPLIN
AIRPORT #1 LIFT STATION ESTIMATED SYSTEM CURVE



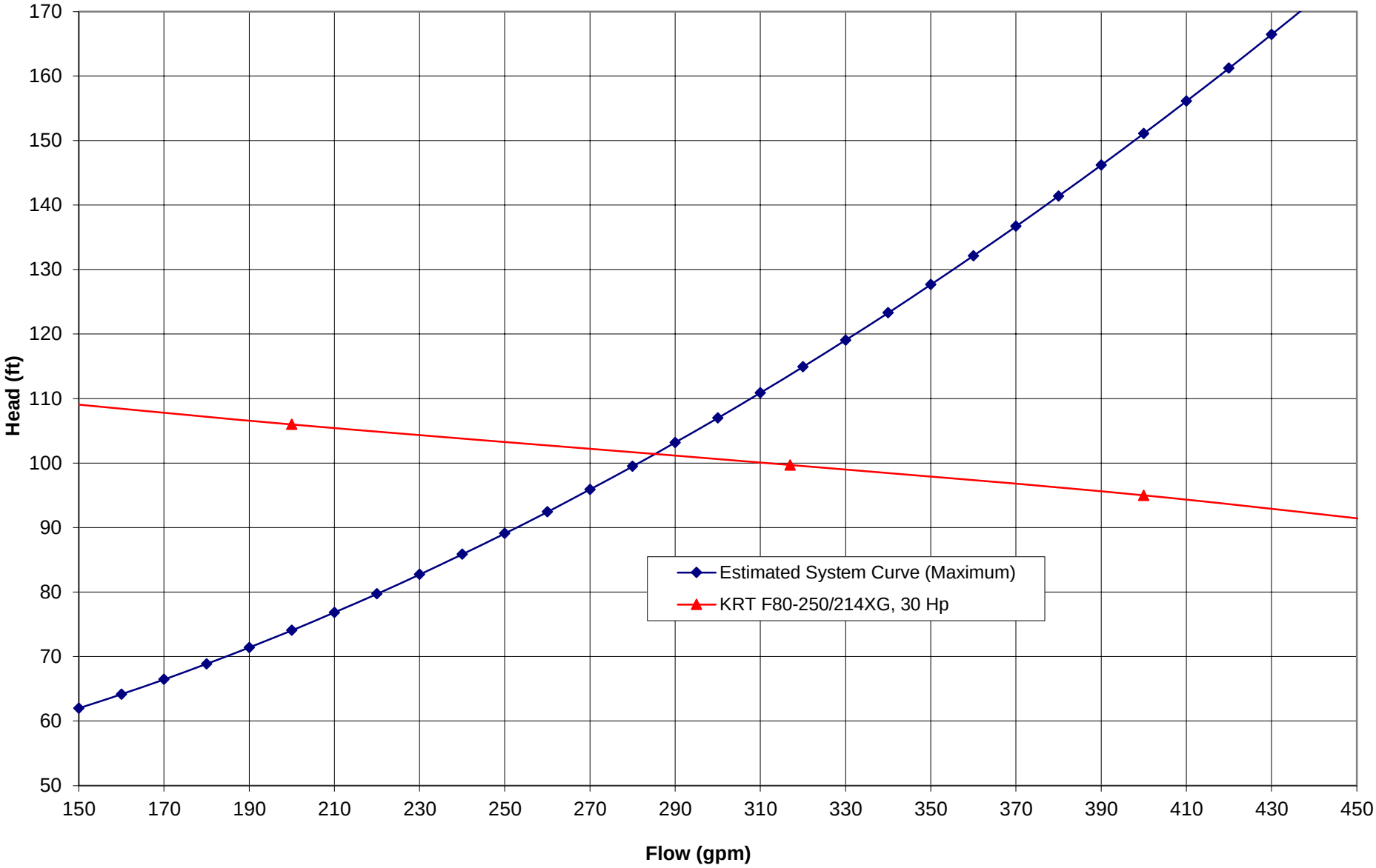
CITY OF JOPLIN
DOG POUND LIFT STATION ESTIMATED SYSTEM CURVE



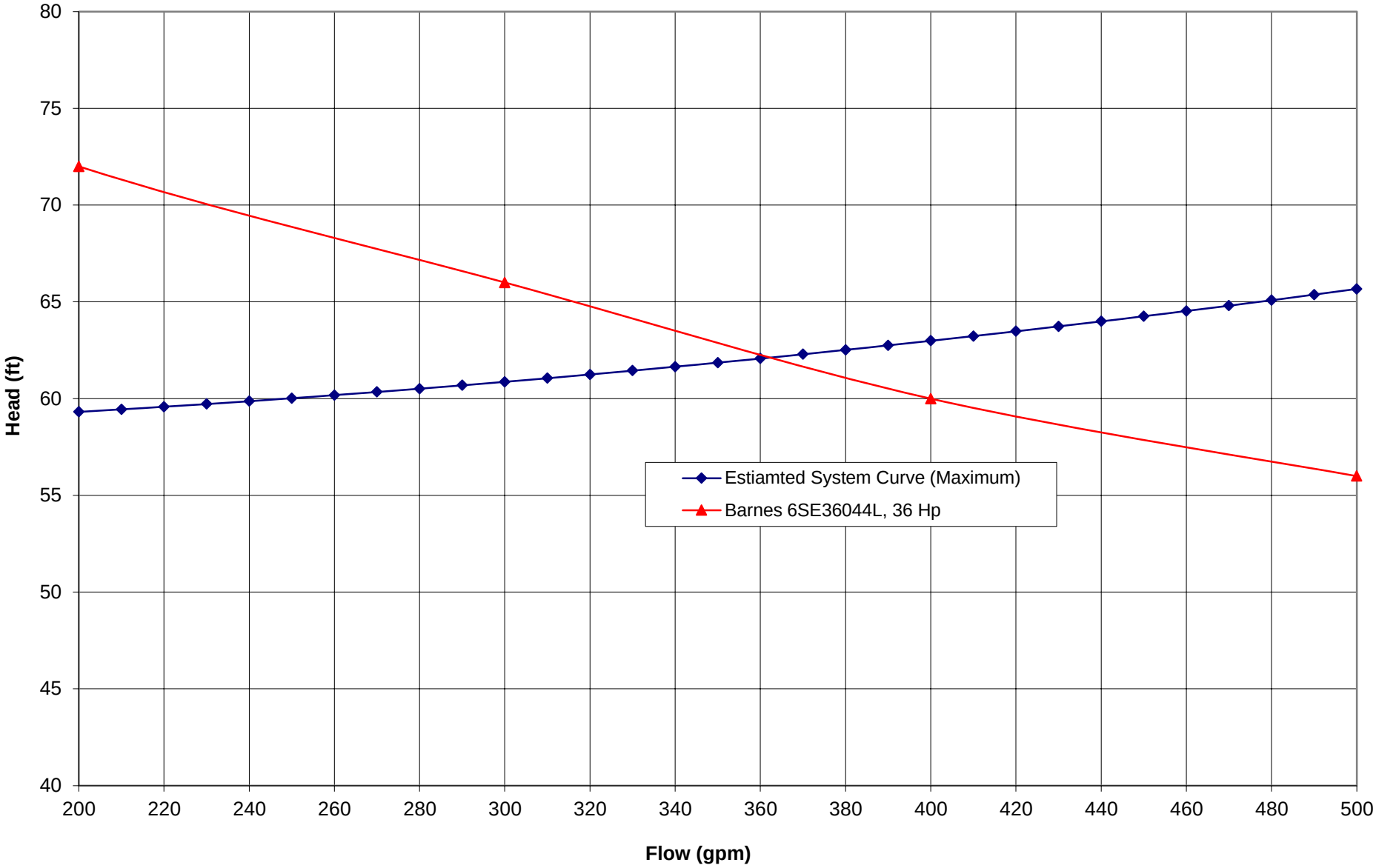
CITY OF JOPLIN
ABLE BODY LIFT STATION ESTIMATED SYSTEM CURVE



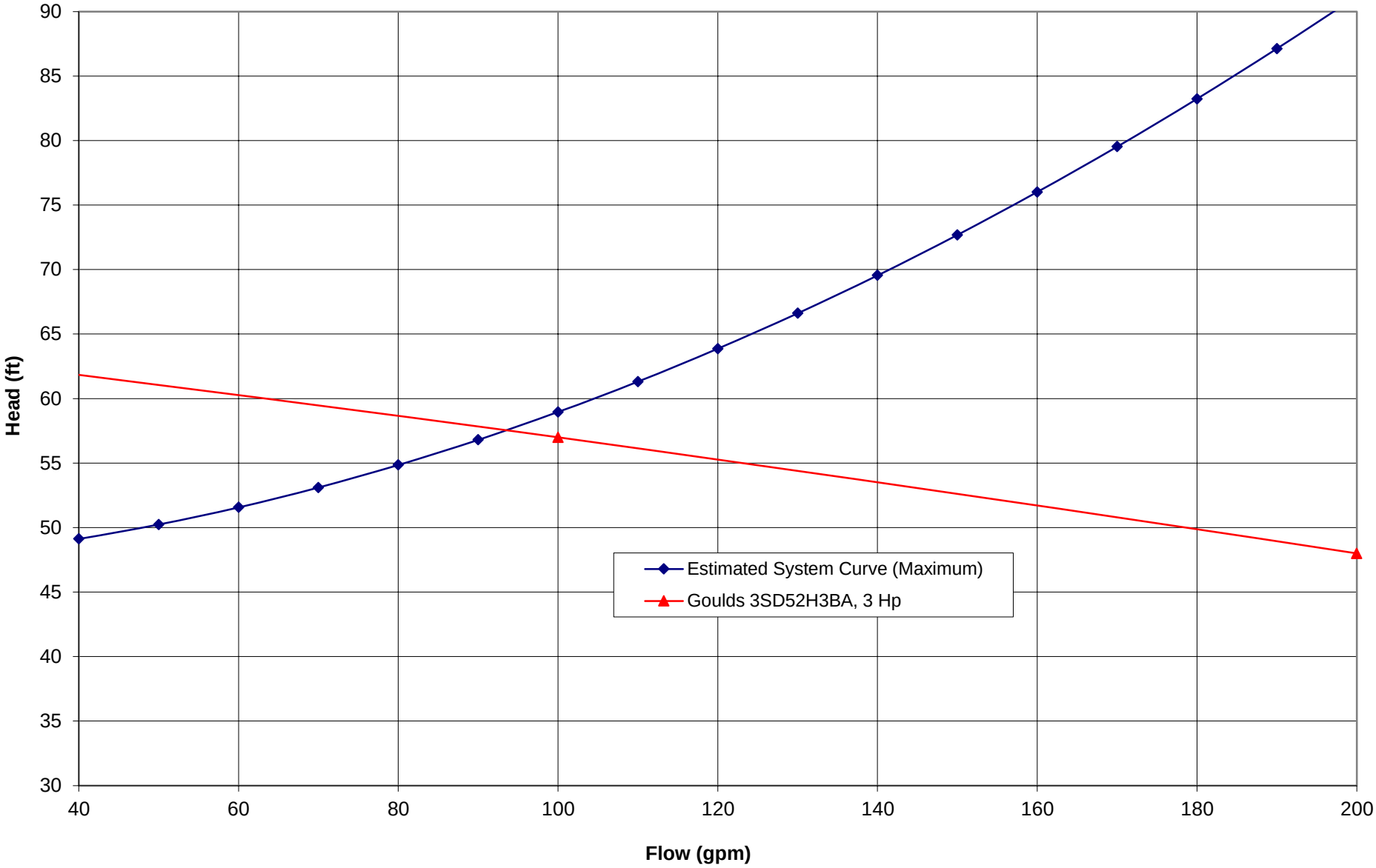
CITY OF JOPLIN
CROSSROADS LIFT STATION ESTIMATED SYSTEM CURVE



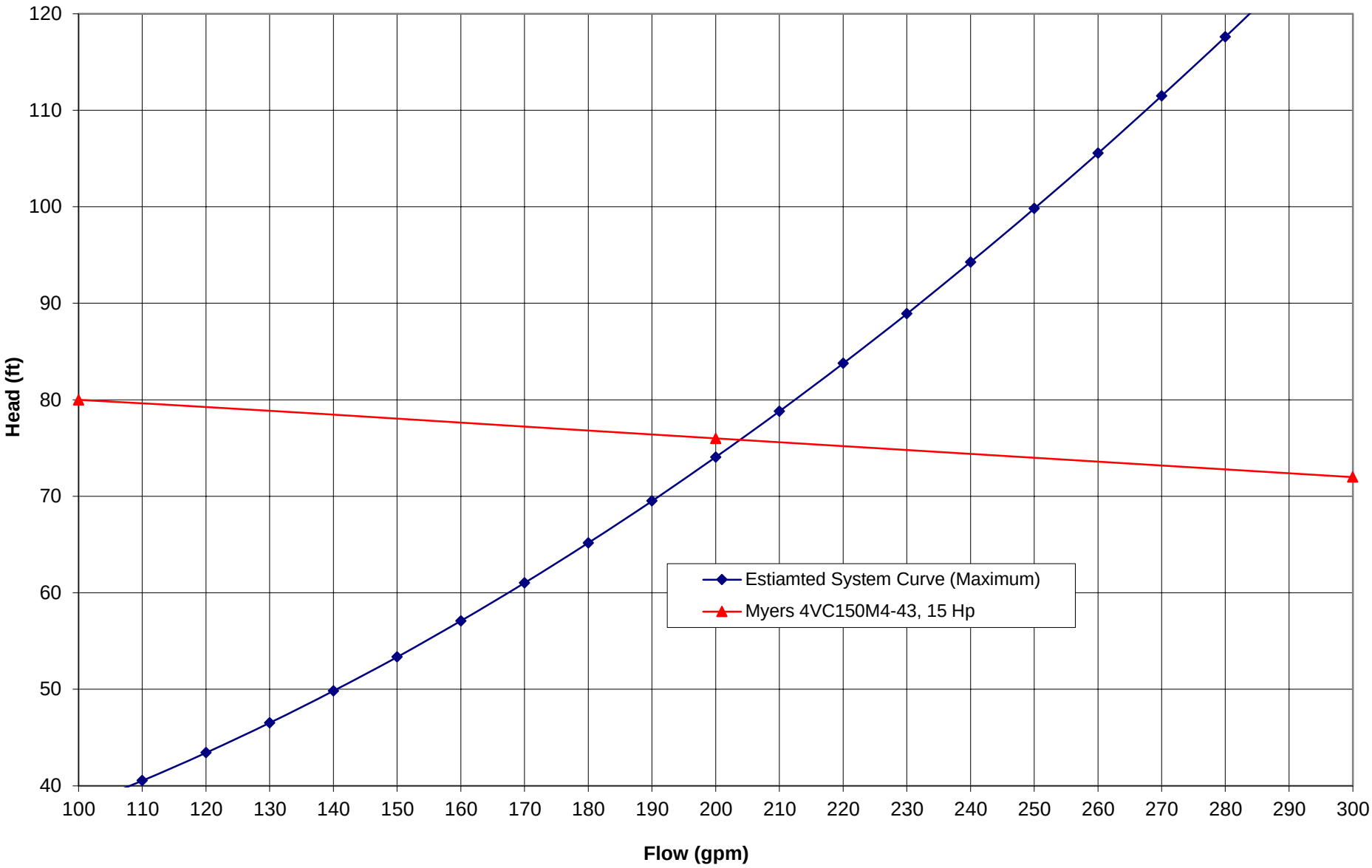
CITY OF JOPLIN
17th & CLEVELAND LIFT STATION ESTIMATED SYSTEM CURVE



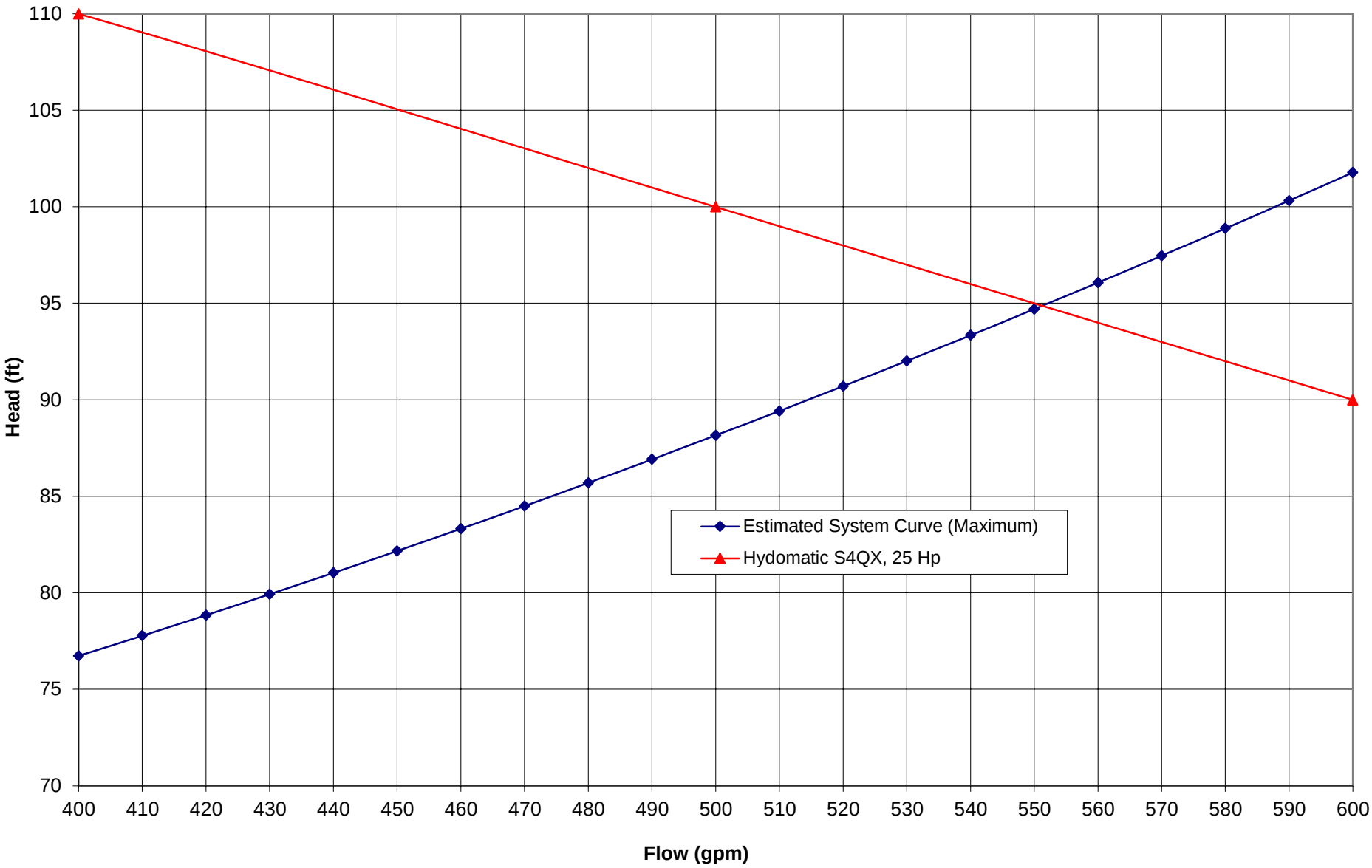
CITY OF JOPLIN
20th & BLACK CAT LIFT STATION ESTIMATED SYSTEM CURVE



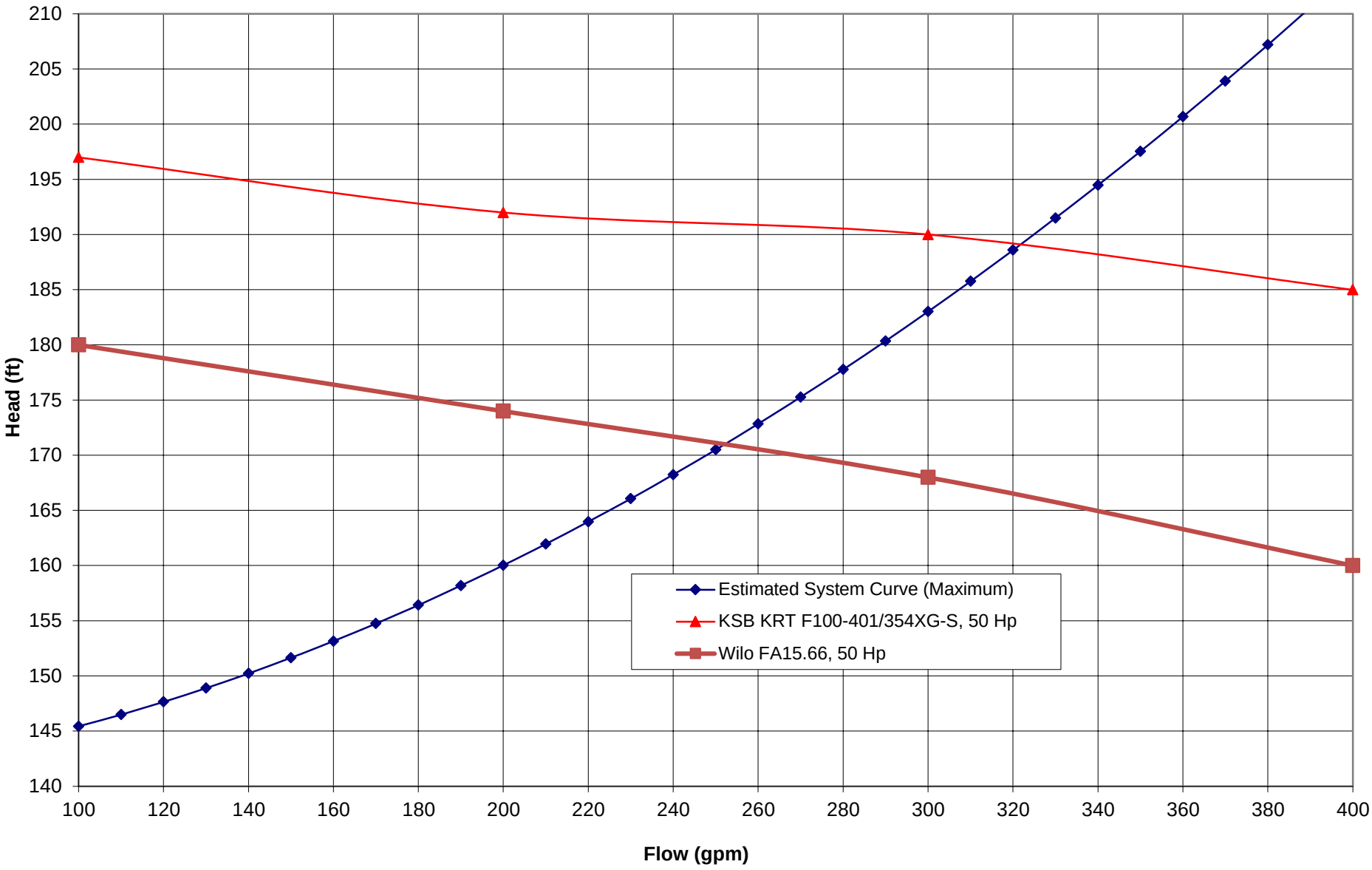
CITY OF JOPLIN
GOLF LINKS LIFT STATION ESTIMATED SYSTEM CURVE



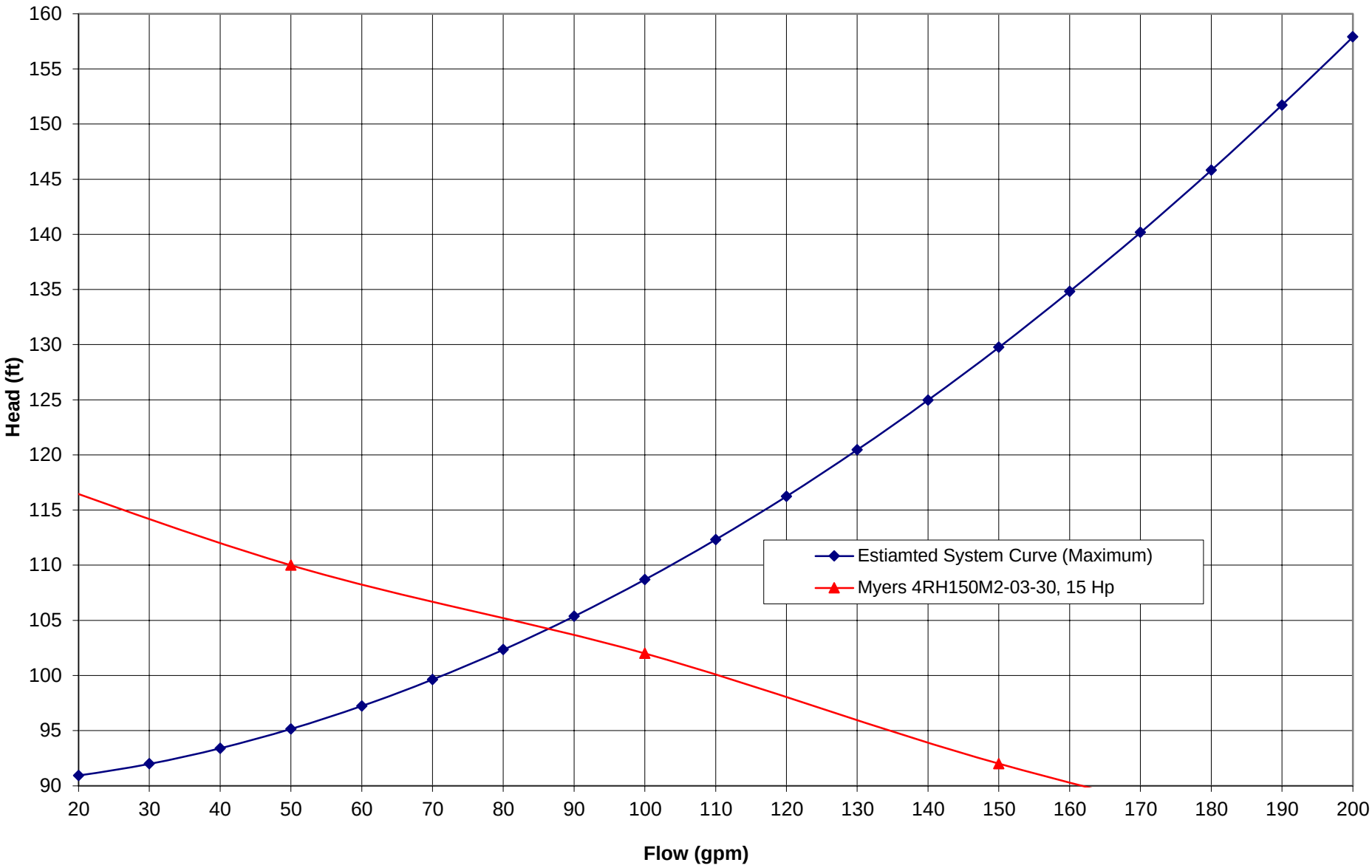
CITY OF JOPLIN
COUNTRY CLUB LIFT STATION ESTIMATED SYSTEM CURVE



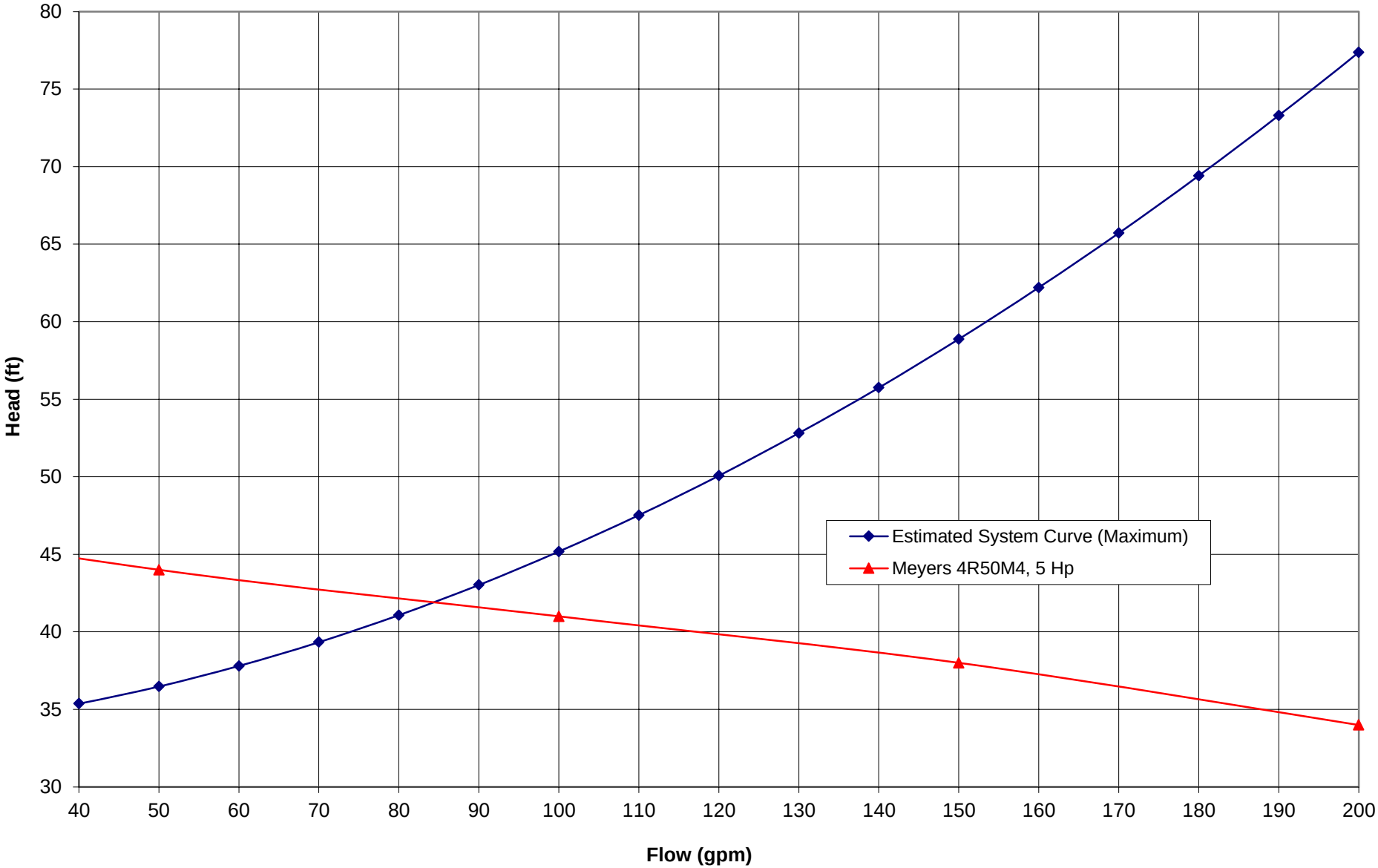
CITY OF JOPLIN
CRANE ROAD LIFT STATION ESTIMATED SYSTEM CURVE



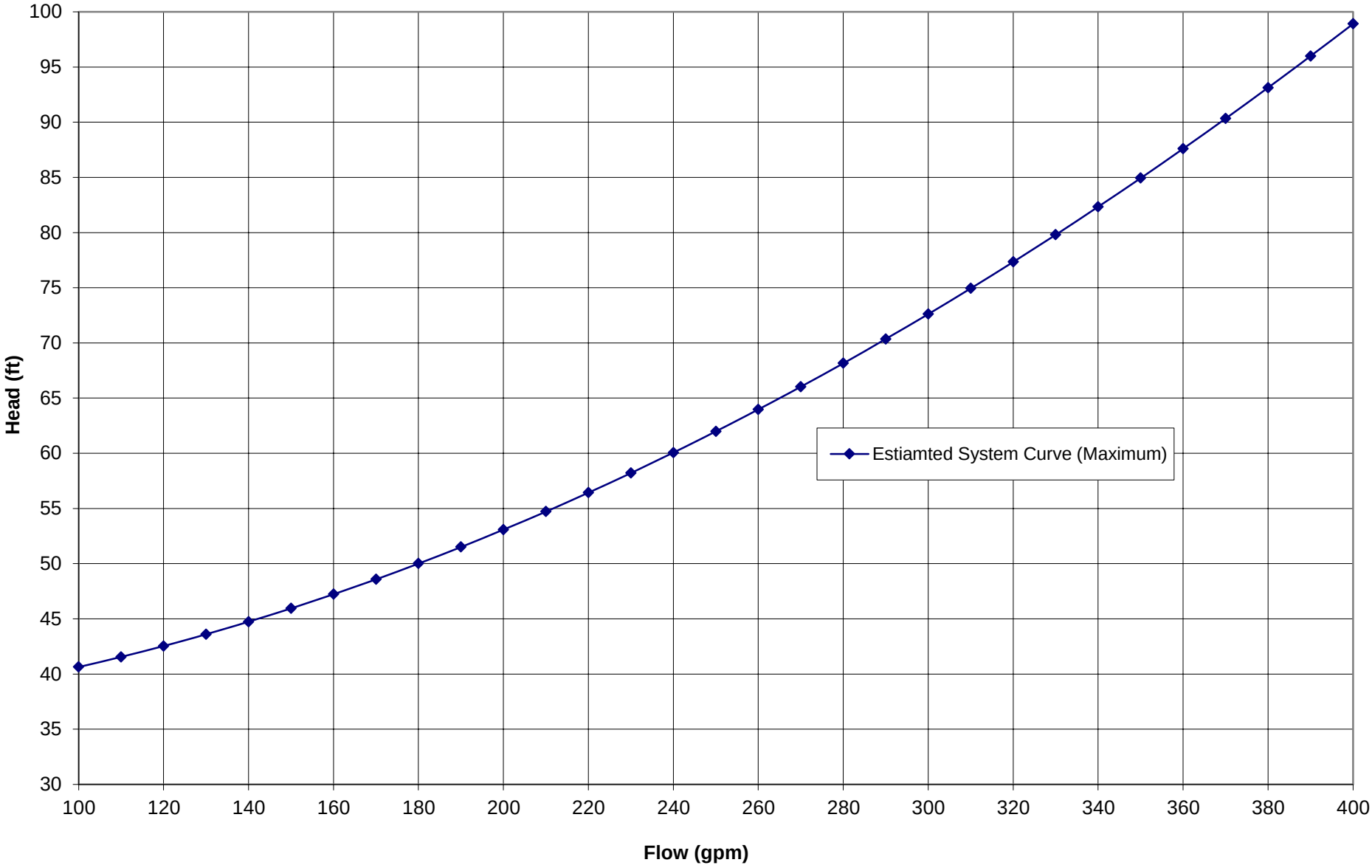
CITY OF JOPLIN
ARBOR HILLS II LIFT STATION ESTIMATED SYSTEM CURVE



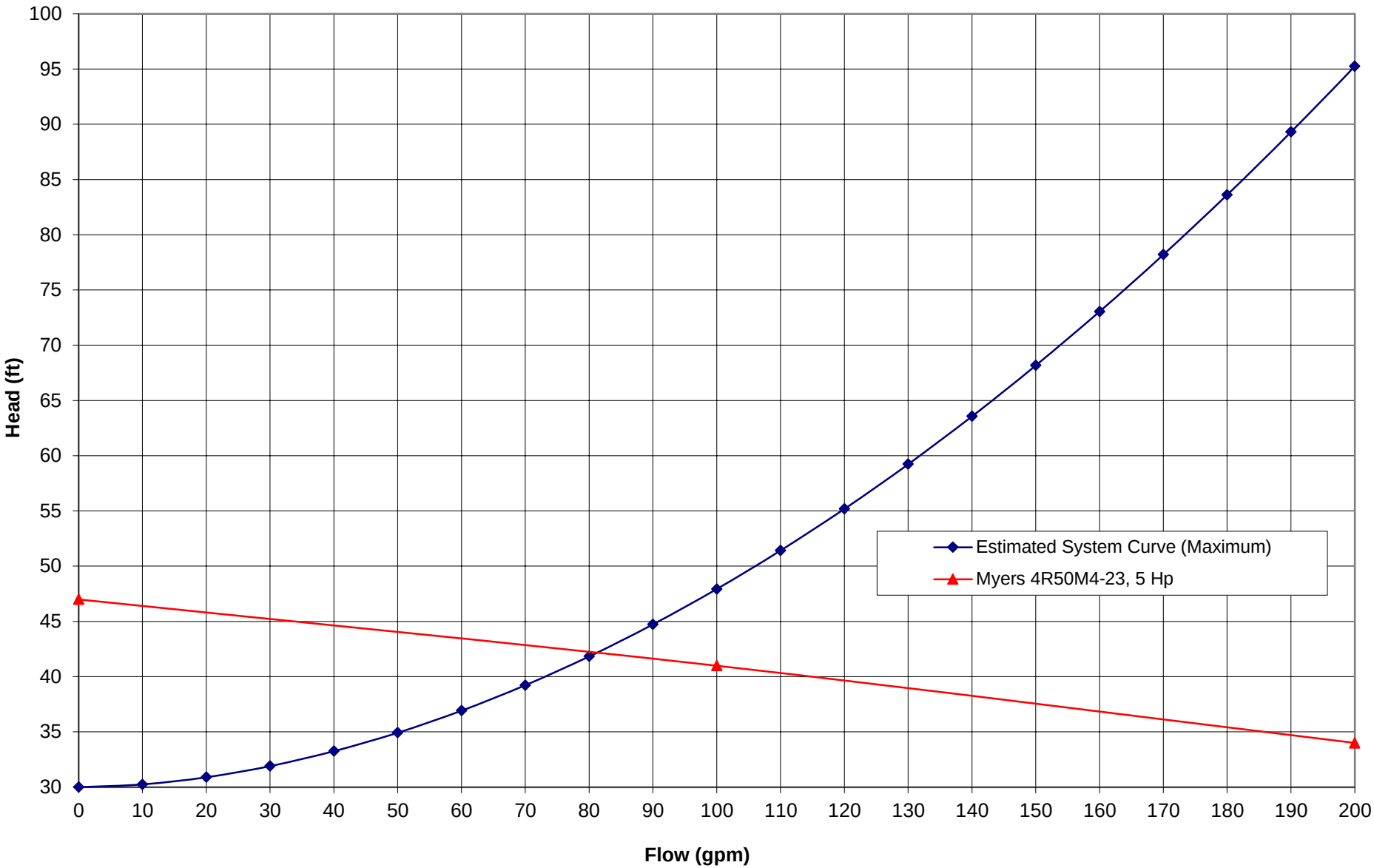
CITY OF JOPLIN
KENSER COURT LIFT STATION ESTIMATED SYSTEM CURVE



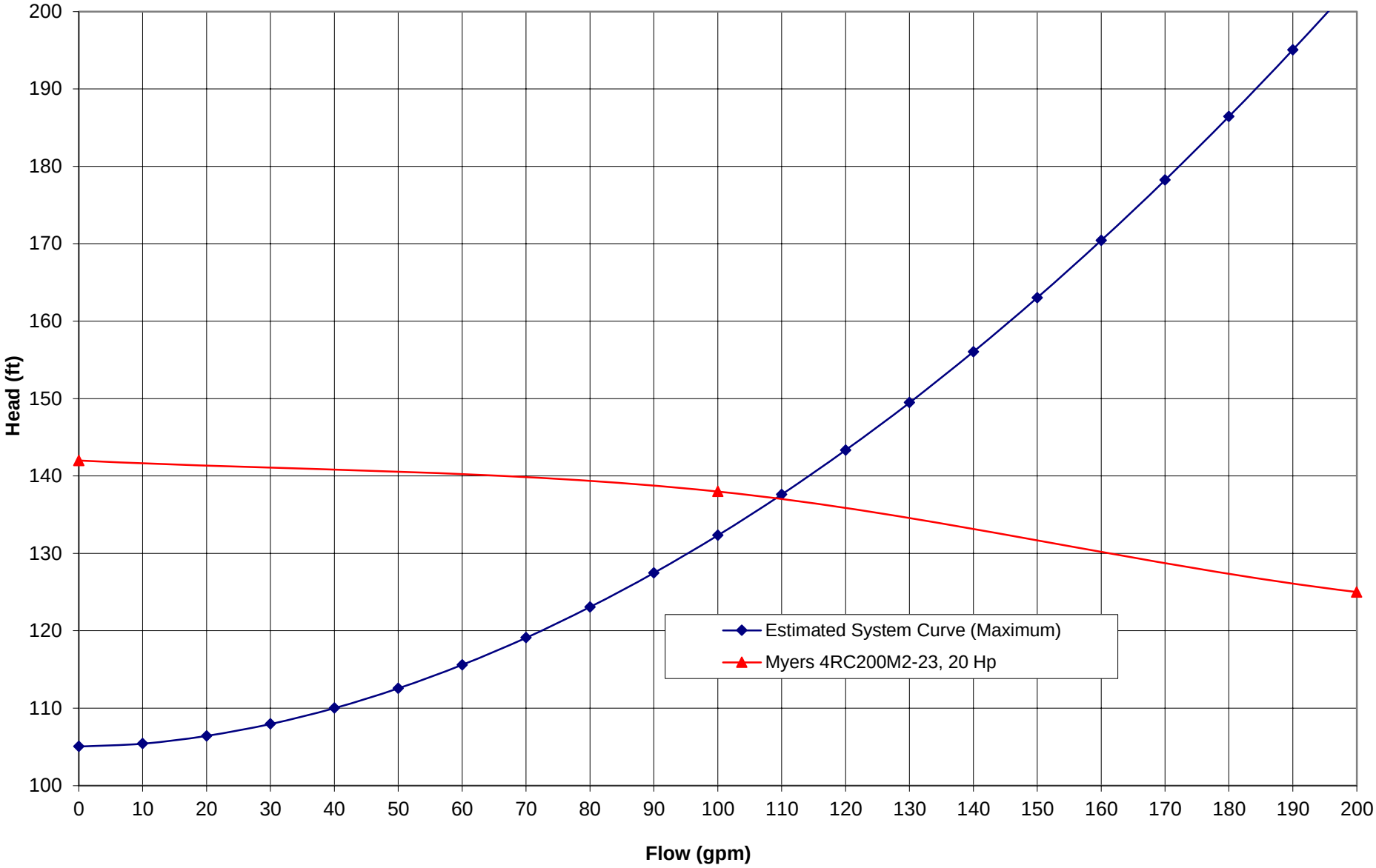
CITY OF JOPLIN
FLYING J LIFT STATION ESTIMATED SYSTEM CURVE



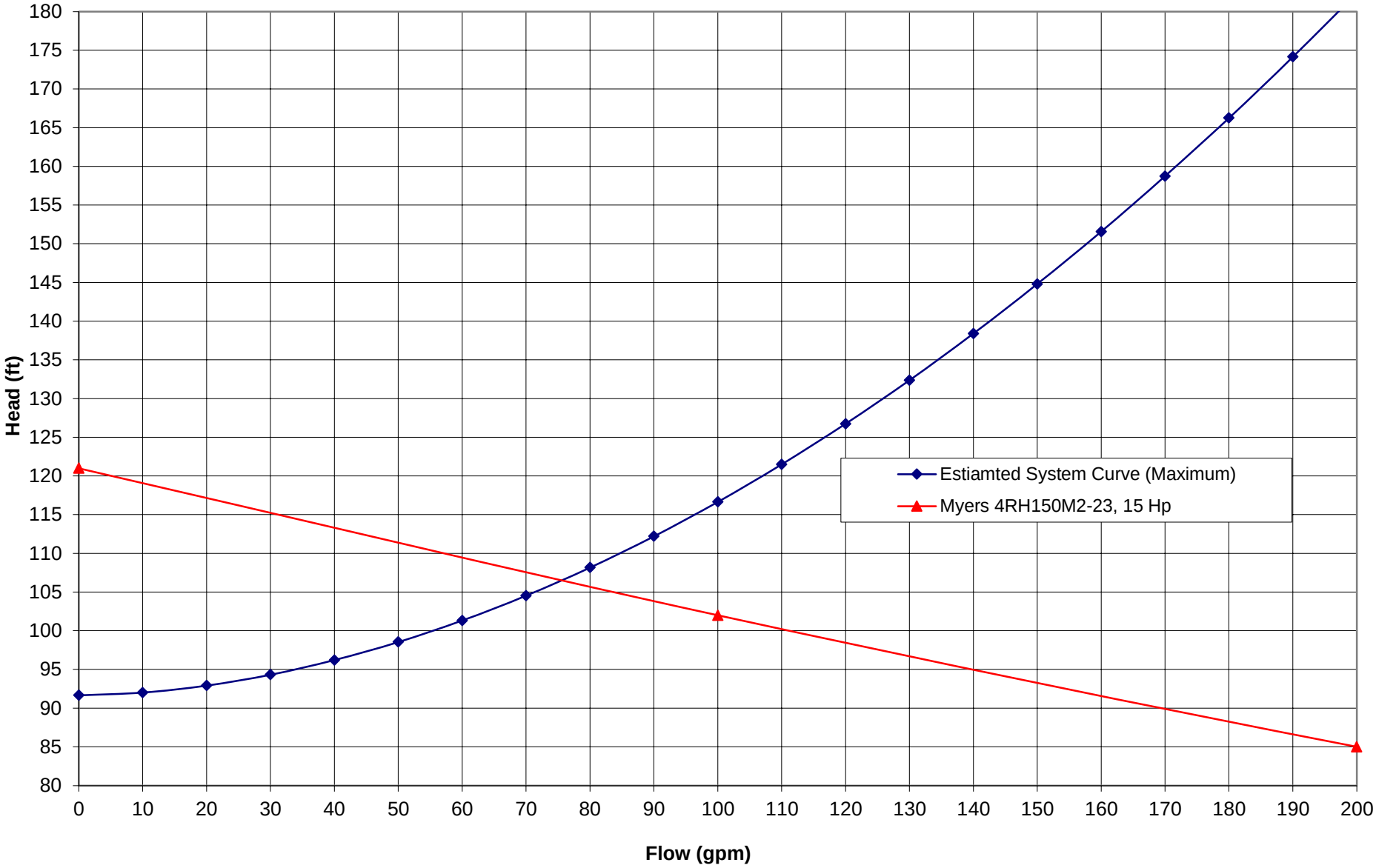
CITY OF JOPLIN
NORTH DUQUESNE LIFT STATION ESTIMATED SYSTEM CURVE



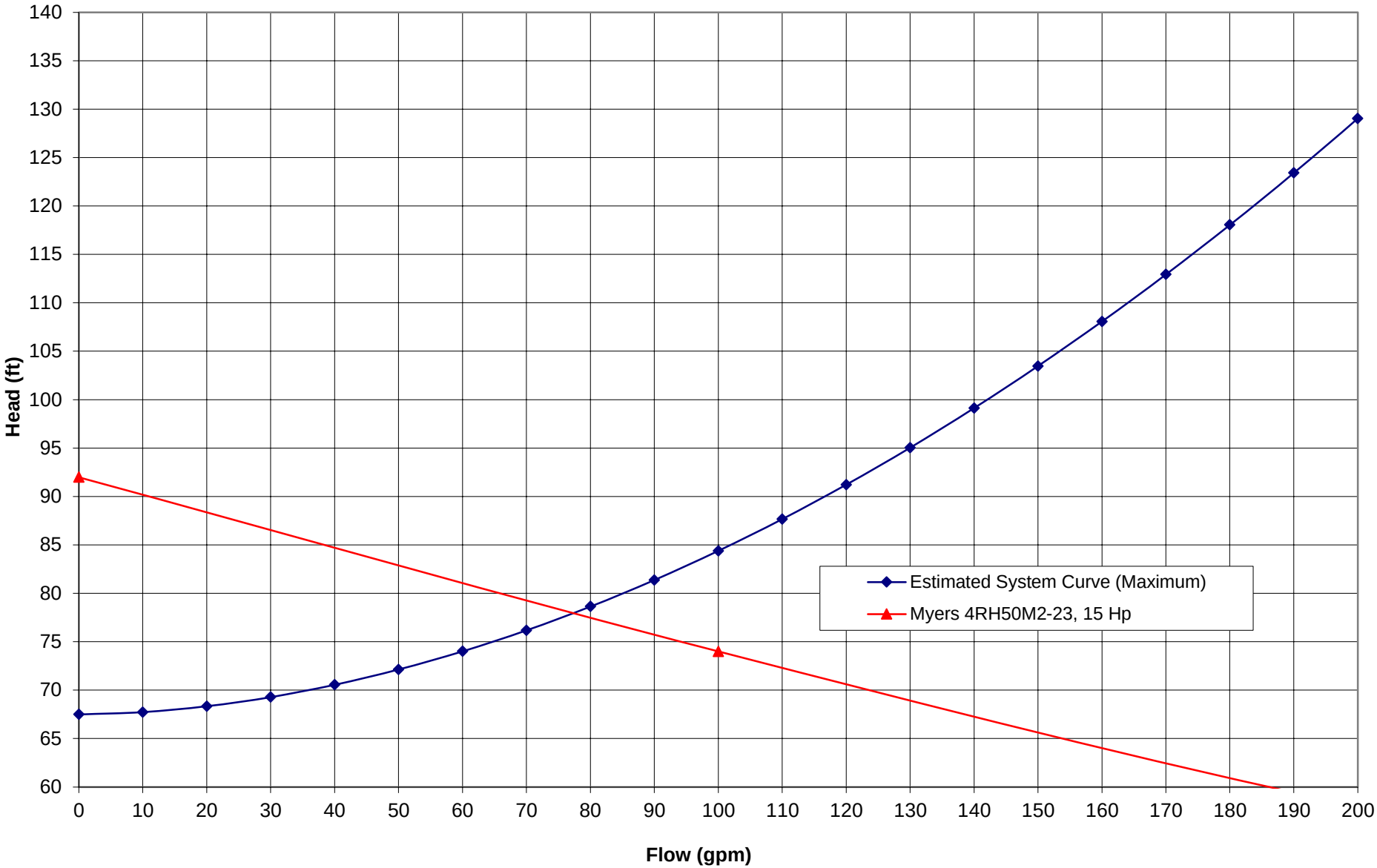
CITY OF JOPLIN
SOUTH DUQUESNE LIFT STATION ESTIMATED SYSTEM CURVE



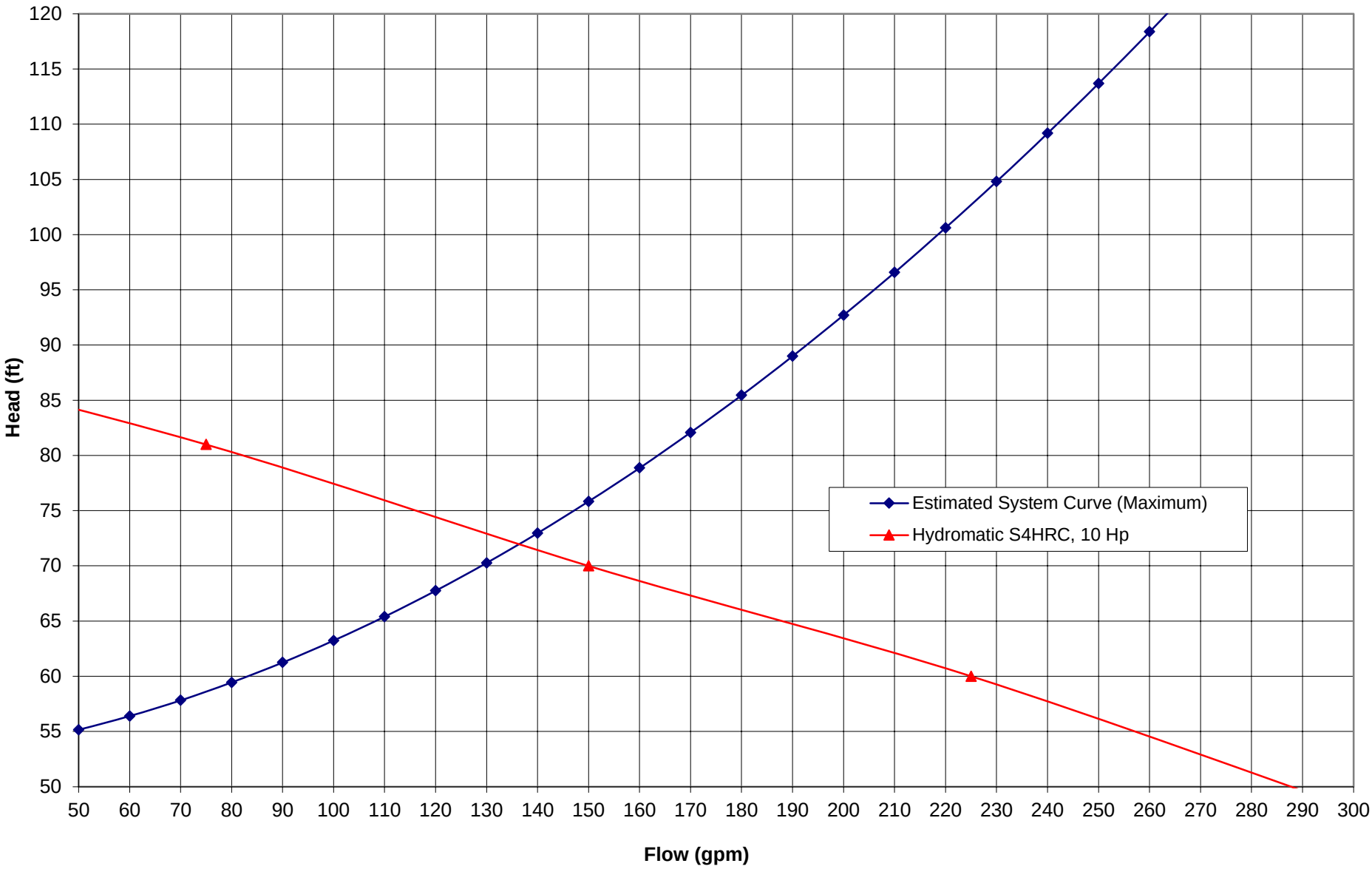
CITY OF JOPLIN
EAST WOODLAND LIFT STATION ESTIMATED SYSTEM CURVE



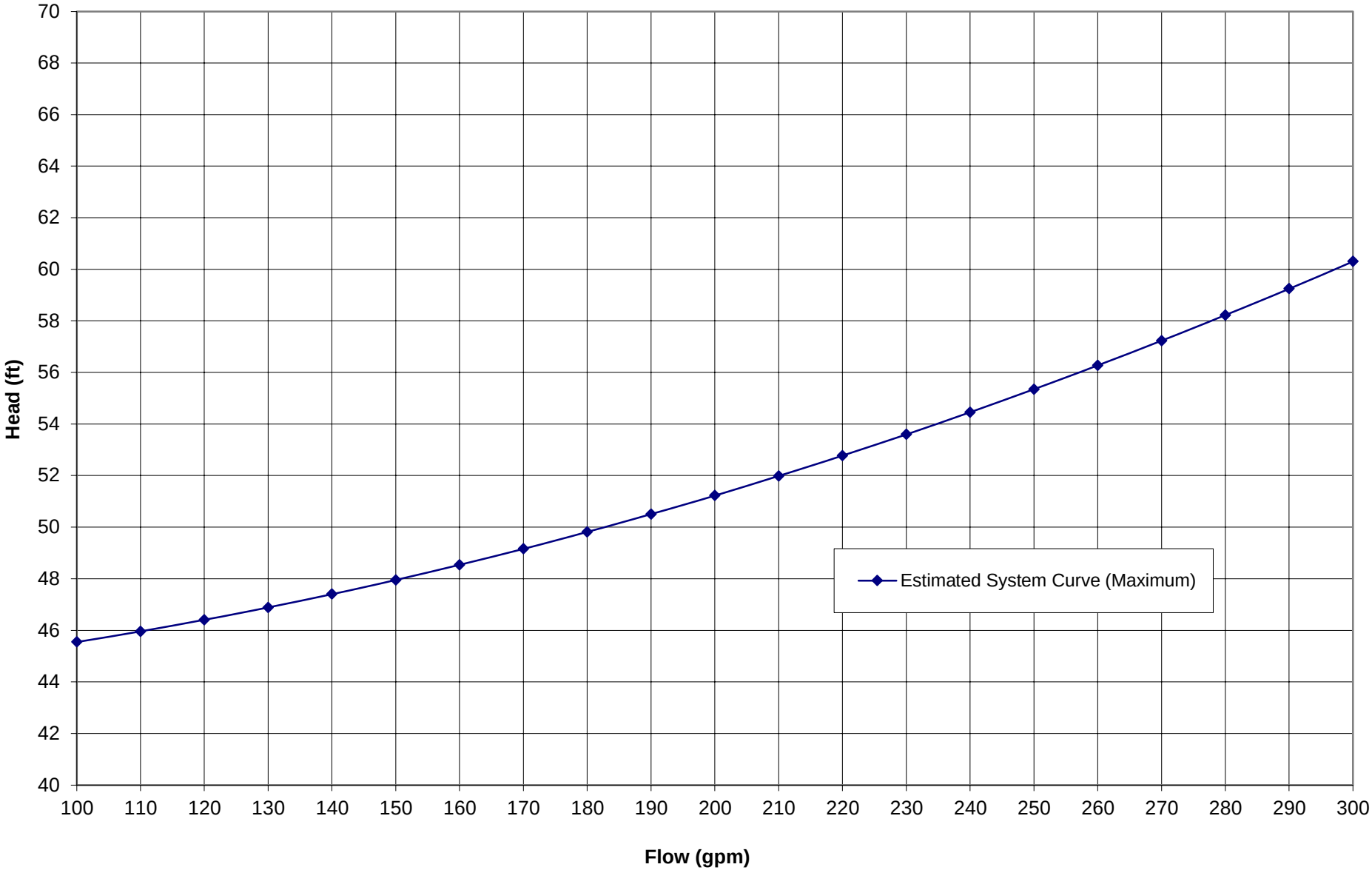
CITY OF JOPLIN
WEST WOODLAND LIFT STATION ESTIMATED SYSTEM CURVE



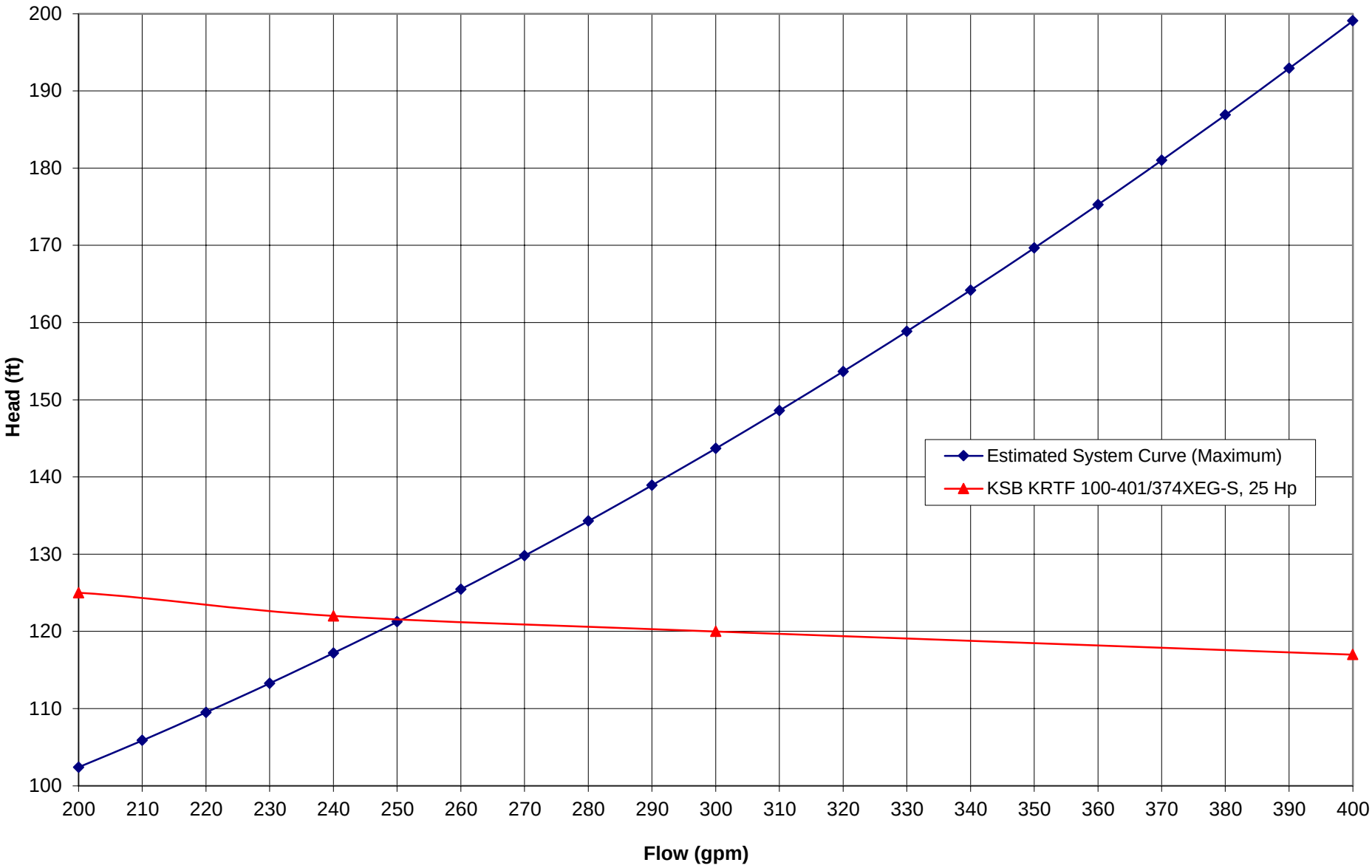
CITY OF JOPLIN
HIDDEN HILLS LIFT STATION ESTIMATED SYSTEM CURVE



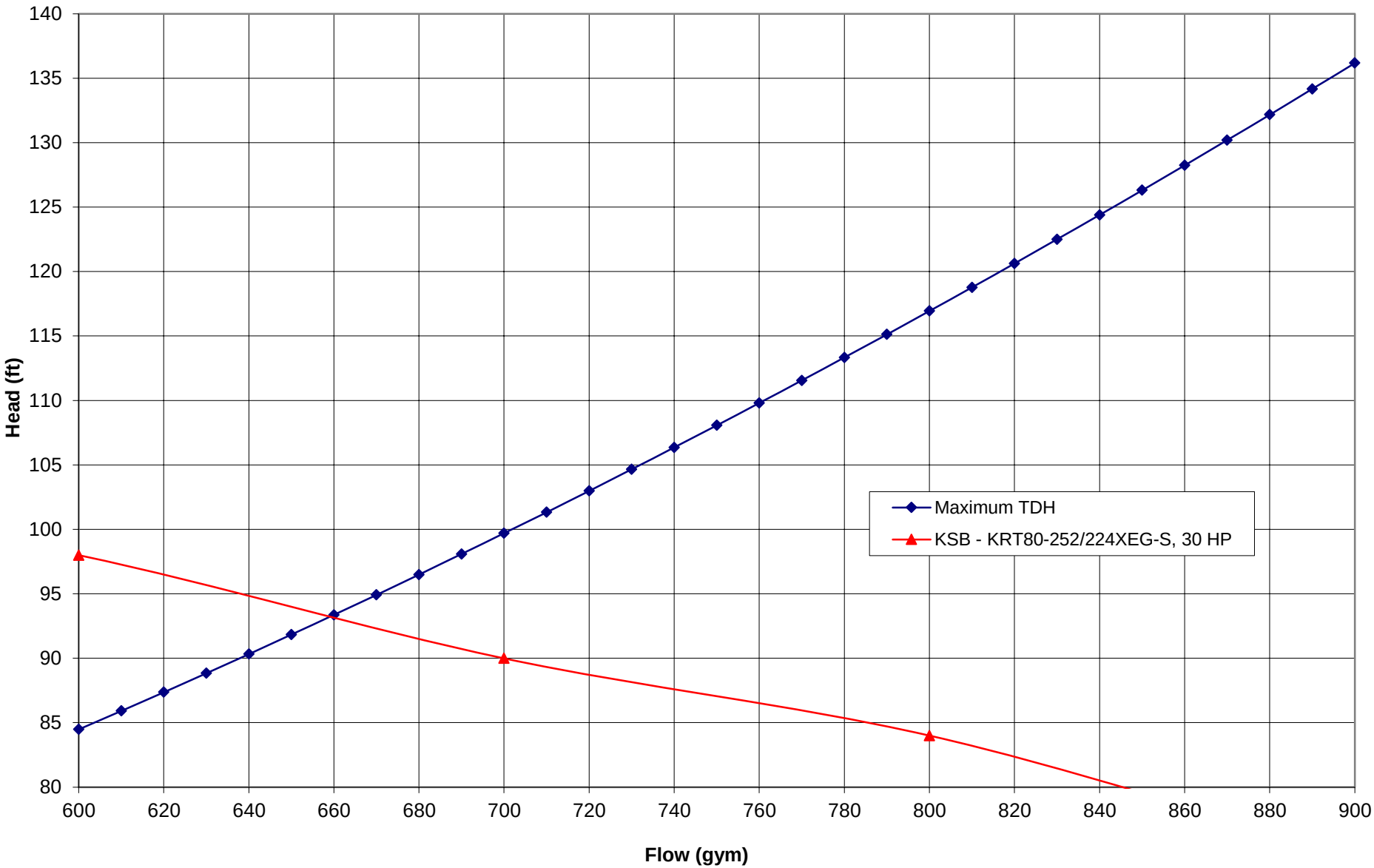
CITY OF JOPLIN
44th & VIRGINIA LIFT STATION ESTIMATED SYSTEM CURVE



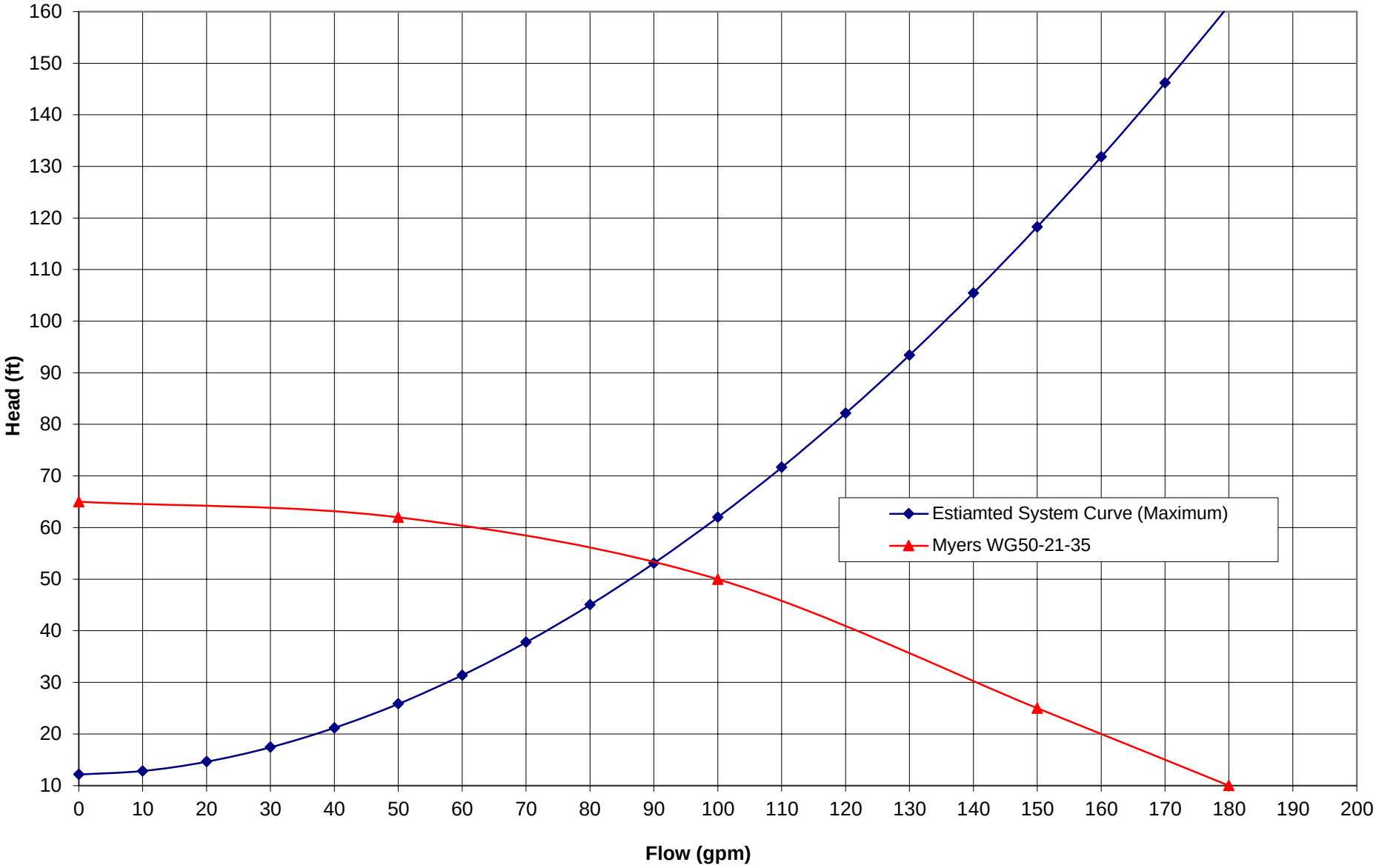
CITY OF JOPLIN
20TH AND MALANG LIFT STATION ESTIMATED SYSTEM CURVE



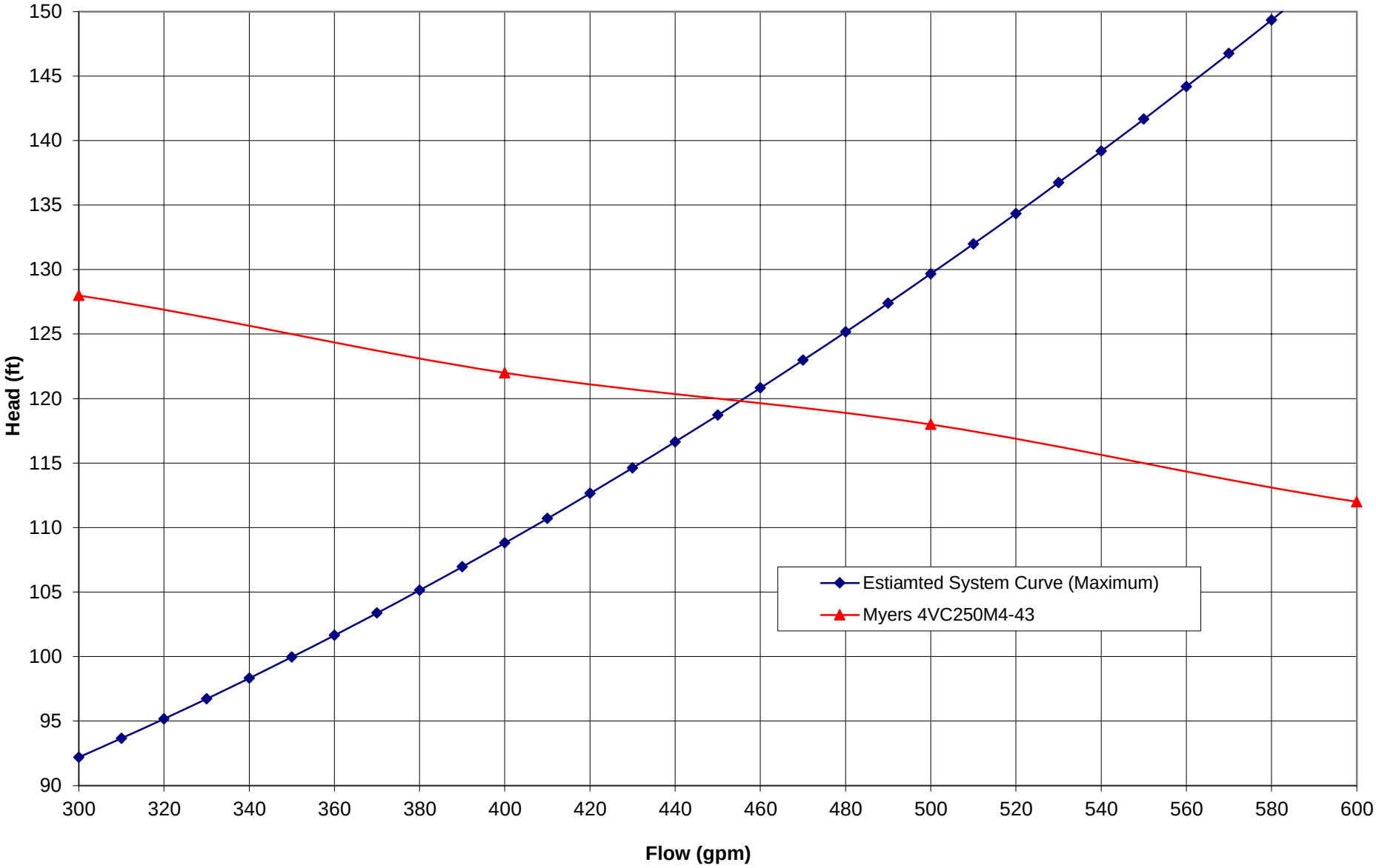
CITY OF JOPLIN
WILDWOOD LIFT STATION ESTIMATED SYSTEM CURVE



CITY OF JOPLIN
TRAVEL CENTER LIFT STATION ESTIMATED SYSTEM CURVE



CITY OF JOPLIN
PETRO LIFT STATION ESTIMATED SYSTEM CURVE



APPENDIX E

CITY OF JOPLIN, MISSOURI
DOG POUND LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Duplex Submersible Pumps and Accessories	$ 45,000	$ 45,000
2	1	LS	Control Panel	$ 20,000	$ 20,000
3	1	LS	Electrical Service Upgrades	$ 15,000	$ 15,000
4	1	LS	Emergency Generator and ATS	$ 75,000	$ 75,000
5	1	LS	8' Diameter Concrete Wet Well	$ 25,000	$ 25,000
6	1	LS	6' Diameter Concrete Valve Vault	$ 4,500	$ 4,500
7	1	LS	Discharge Piping, Valves, Fittings	$ 10,500	$ 10,500
8	1	LS	Connection to Existing 8" Force Main	$ 1,500	$ 1,500
			Construction Subtotal		$ 196,500
			Contingency (10%)		$ 19,650
			Engineering Design		$ 18,000
			Engineering Bidding/Construction		$ 9,000
			Engineering Inspection		$ 18,000
			Project Cost		**$ 261,150**

CITY OF JOPLIN, MISSOURI
COUNTRY CLUB LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Duplex Submersible Pumps and Accessories	$ 35,000	$ 35,000
2	1	LS	Control Panel	$ 19,000	$ 19,000
3	1	LS	Emergency Generator and ATS	$ 60,000	$ 60,000
4	1	LS	Discharge Piping, Valves, Fittings	$ 10,500	$ 10,500
5	225	LF	6' Chain Link Site Security Fencing	$ 30	$ 6,750
			Construction Subtotal		$ 131,250
			Contingency (10%)		$ 13,125
			Engineering Design		$ 12,000
			Engineering Bidding/Construction		$ 8,000
			Engineering Inspection		$ 18,000
			Project Cost		**$ 182,375**

CITY OF JOPLIN, MISSOURI
FILMORE BRIDGE LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Reinforced Concrete Walls	$ 45,000	$ 45,000
2	1	LS	Shelter Type Roof	$ 18,000	$ 18,000
3	1	LS	Extended Culvert	$ 15,000	$ 15,000
4	1	LS	Flood Barrier Stop Logs	$ 15,000	$ 15,000
5	1	LS	Miscellaneous	$ 20,000	$ 20,000
			Construction Subtotal		$ 113,000
			Contingency (10%)		$ 11,300
			Engineering Design		$ 12,000
			Engineering Bidding/Construction		$ 8,000
			Engineering Inspection		$ 18,000
			Project Cost		**$ 162,300**

CITY OF JOPLIN, MISSOURI
44TH AND VIRGINIA LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Duplex Submersible Pumps and Accessories	$ 36,600	$ 36,600
2	1	LS	Control Panel	$ 18,000	$ 18,000
3	1	LS	Electrical Service Upgrades	$ 20,000	$ 20,000
4	1	LS	Emergency Generator and ATS	$ 50,000	$ 50,000
5	1	LS	8' Diameter Concrete Wet Well	$ 25,000	$ 25,000
6	1	LS	6' Diameter Concrete Valve Vault	$ 4,500	$ 4,500
7	1	LS	Discharge Piping, Valves, Fittings	$ 10,500	$ 10,500
8	50	LF	6" Diameter Force Main	$ 95	$ 4,750
9	1	LS	Connection to Existing 6" Force Main	$ 5,000	$ 5,000
10	1	LS	Replacement of Existing Interior Ladder	$ 5,000	$ 5,000
11	1	LS	Renovation of Existing Wet Well	$ 20,000	$ 20,000
12	1	LS	Miscellaneous Sitework	$ 25,000	$ 25,000
			Construction Subtotal		$ 224,350
			Contingency (10%)		$ 22,435
			Engineering Design		$ 23,200
			Engineering Bidding/Construction		$ 11,600
			Engineering Inspection		$ 27,000
			Project Cost		**$ 308,585**

CITY OF JOPLIN, MISSOURI
NORTH DUQUESNE LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	SCADA RTU	$ 20,000	$ 20,000
			Construction Subtotal		$ 20,000
			Contingency (10%)		$ 2,000
			Engineering Design		$ 2,500
			Engineering Bidding/Construction		$ 5,000
			Engineering Inspection		$ 5,000
			Project Cost		**$ 34,500**

CITY OF JOPLIN, MISSOURI
SOUTH DUQUESNE LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	SCADA RTU	$ 20,000	$ 20,000
			Construction Subtotal		$ 20,000
			Contingency (10%)		$ 2,000
			Engineering Design		$ 2,500
			Engineering Bidding/Construction		$ 5,000
			Engineering Inspection		$ 5,000
			Project Cost		**$ 34,500**

CITY OF JOPLIN, MISSOURI
EAST WOODLAND LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	SCADA RTU	$ 20,000	$ 20,000
			Construction Subtotal		$ 20,000
			Contingency (10%)		$ 2,000
			Engineering Design		$ 2,500
			Engineering Bidding/Construction		$ 5,000
			Engineering Inspection		$ 5,000
			Project Cost		**$ 34,500**

CITY OF JOPLIN, MISSOURI
WEST WOODLAND LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	SCADA RTU	$ 20,000	$ 20,000
			Construction Subtotal		$ 20,000
			Contingency (10%)		$ 2,000
			Engineering Design		$ 2,500
			Engineering Bidding/Construction		$ 5,000
			Engineering Inspection		$ 5,000
			Project Cost		**$ 34,500**

CITY OF JOPLIN, MISSOURI
20TH AND MALANG LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Temporary Bypass Piping	$ 2,625	$ 2,625
2	1	LS	4" Bypass Pump (One Month)	$ 31,500	$ 31,500
3	1	LS	Duplex Submersible Pumps and Accessories	$ 89,250	$ 89,250
4	1	LS	Control Panel and Electrical Modifications	$ 31,500	$ 31,500
5	1	LS	10' Diameter Overflow Storage Basin	$ 21,000	$ 21,000
6	2	LS	Miscellaneous Site Work	$ 26,250	$ 52,500
			Construction Subtotal		$ 228,375
			Contingency (10%)		$ 22,838
			Engineering Design		$ 20,000
			Engineering Bidding/Construction		$ 10,000
			Engineering Inspection		$ 18,000
			Project Cost		**$ 299,213**

CITY OF JOPLIN, MISSOURI
TRAVEL CENTER LIFT STATION IMPROVEMENTS
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	1	LS	Emergency Generator and Automatic Transfer Switch	$ 20,000	$ 20,000
2	1	LS	Electrical Modifications	$ 10,000	$ 10,000
3	1	LS	SCADA RTU	$ 20,000	$ 20,000
			Construction Subtotal		$ 50,000
			Contingency (10%)		$ 5,000
			Engineering Design		$ 8,000
			Engineering Bidding/Construction		$ 5,000
			Engineering Inspection		$ 9,000
			Project Cost		**$ 77,000**

CITY OF JOPLIN, MISSOURI
COUNTRY CLUB, CRANE ROAD, ARBOR HILLS II LIFT STATION ELIMINATION
OPINION OF PROBABLE PROJECT COSTS

ITEM NO.	NO. OF UNITS	UNIT	DESCRIPTION	UNIT PRICE	EXTENDED TOTAL
1	450	LF	6'-8' Deep Trench & Backfill for 8" Dia. Pipe	$ 15.00	$ 6,750
2	450	LF	8'-10' Deep Trench & Backfill for 8" Dia. Pipe	$ 18.00	$ 8,100
3	658	LF	6'-8' Deep Trench & Backfill for 10" Dia. Pipe	$ 18.00	$ 11,844
4	657	LF	8'-10' Deep Trench & Backfill for 10" Dia. Pipe	$ 20.00	$ 13,140
5	2150	LF	6'-8" Deep Trench & Backfill for 12" Dia. Pipe	$ 30.00	$ 64,500
6	2150	LF	8'-10" Deep Trench & Backfill for 12" Dia. Pipe	$ 35.00	$ 75,250
7	900	LF	8" Gravity Sewer Pipe and Bedding	$ 40.00	$ 36,000
8	1315	LF	10" Gravity Sewer Pipe and Bedding	$ 45.00	$ 59,175
9	4300	LF	12" Gravity Sewer Pipe and Bedding	$ 50.00	$ 215,000
10	80	LF	Hwy. Bore for a 12" DIP Pipe in a 24" Dia. Casing	$ 400.00	$ 32,000
11	900	LF	Testing of 8" Dia. Gravity Sewer Pipe	$ 3.00	$ 2,700
12	1315	LF	Testing of 10" Dia. Gravity Sewer Pipe	$ 3.00	$ 3,945
13	4380	LF	Testing of 12" Dia. Gravity Sewer Pipe	$ 3.00	$ 13,140
14	29	EA	48" Diameter Manhole	$ 4,500.00	$ 130,500
15	58	EA	48" Diameter Manhole Extra Depth	$ 250.00	$ 14,500
16	1	EA	60" Diameter Manhole	$ 5,500.00	$ 5,500
17	4	EA	60" Diameter Manhole Extra Depth	$ 250.00	$ 1,000
18	1	LS	Demolition of Existing Country Club Lift Station	$ 15,000.00	$ 15,000
19	1	LS	Demolition of Existing Crane Road Lift Station	$ 15,000.00	$ 15,000
20	1	LS	Demolition of Existing Arbor Hills Lift Station	$ 10,000.00	$ 10,000
21	29	EA	Testing of 48" Diameter Manholes	$ 200.00	$ 5,800
22	1	EA	Testing of 60" Diameter Manholes	$ 300.00	$ 300
23	245	LF	Pavement Repair & Replacement	$ 100.00	$ 24,500
24	6270	LF	Type A Surface Restoration	$ 3.00	$ 18,810
25	4	EA	Trench Plug	$ 5,000.00	$ 20,000
26	2000	CY	Disposal of Lead Contaminated Soil	$ 15.00	$ 30,000
27	1	LS	All Other Work For Perfection of Project	$ 75,000.00	$ 75,000
			Construction Subtotal		$ 907,454
			Contingencies (10%)		$ 90,745
			Engineering Design		$ 62,000
			Engineering Bidding/Construction		$ 30,000
			Engineering Inspection		$ 108,000
			Project Cost		**$ 1,198,199**

APPENDIX F

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0023256
Owner:	City of Joplin
Address:	602 S. Main Street, Joplin, MO 64801
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Joplin Shoal Creek Wastewater Treatment Facility
Facility Address:	2860 Apricot Drive, Joplin, MO 64804
Legal Description:	See Page 2
UTM Coordinates:	See Page 2
Receiving Stream:	See Page 2
First Classified Stream and ID:	See Page 2
USGS Basin & Sub-watershed No.:	See Page 2

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

See Page 2

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

January 1, 2020
Effective Date

Edward B. Galbraith, Director, Division of Environmental Quality

March 31, 2023
Expiration Date

Chris Wieberg, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #001 – POTW – SIC #4952
The use or operation of this facility shall be by or under the supervision of a Certified A Operator.
Mechanical bar screen / grit removal / comminutor / primary clarifier (2) / trickling filter (2) / oxidation ditch (2) / Biological Nutrient Removal / final clarifiers (2) / tertiary filtration / UV Disinfection / anaerobic digester (2) / sludge thickening / aerobic digester (3) / sludge is land applied
Design population equivalent is 34,800.
Design flow is 7.2 MGD.
Actual flow is 4.9 MGD.
Design sludge production is 2,605 dry tons/year.

Legal Description:	Sec. 25, T27N, R34W, Newton County
UTM Coordinates:	X = 358538, Y = 4100020
Receiving Stream:	Shoal Creek (P)
First Classified Stream and ID:	Shoal Creek (P) (3222) 303(d) List
USGS Basin & Sub-watershed No.:	(11070207-0806)

Outfalls #002 and #003
Discharges from these outfalls are not authorized, and shall be subject to 40 CFR 122.41(m) and reported according to 40 CFR 122.21(m)(3)(i) & (ii).

Permitted Feature INF – Influent Monitoring

Permitted Feature SM1 – Instream Monitoring
Instream monitoring location – Upstream – At Coyote Drive Bridge over Shoal Creek. See Special Condition #17.

Permitted Feature SM2 – Instream Monitoring
Instream monitoring location – Downstream – Approximately 600 yards from Outfall #001. See Special Condition #17.

OUTFALL #001

TABLE A-1.
INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. In accordance with 10 CSR 20-7.031, the final effluent limitations outlined in **Table A-2** must be achieved as soon as possible but no later than **January 1, 2022**. These interim effluent limitations in **Table A-1** are effective beginning **January 1, 2020** and remain in effect through **December 31, 2021** or as soon as possible. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: M						
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand$_5$	mg/L		45	30	once/week	composite**
Total Suspended Solids	mg/L		45	30	once/week	composite**
E. coli (Note 1, Page 5)	#/100mL		630	126	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	 13.7 13.7		 2.7 2.8	once/week	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Lead, Total Recoverable	µg/L	*		*	once/month	composite**
Zinc, Total Recoverable	µg/L	214.5		124.6	once/month	composite**

EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units***	SU	6.0		9.0	once/week	grab

EFFLUENT PARAMETER(S)	UNITS	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand$_5$ – Percent Removal (Note 2, Page 6)	%	85	once/month	calculated
Total Suspended Solids – Percent Removal (Note 2, Page 6)	%	85	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

Limit Set: Q

EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Oil & Grease	mg/L	*		*	once/quarter†	grab
Cadmium, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Cyanide, Amenable to Chlorination	µg/L	*		*	once/quarter†	composite**

MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE APRIL 28, 2020. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

OUTFALL #001	TABLE A-2. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **January 1, 2022** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: M						
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand$_5$	mg/L		45	30	once/week	composite**
Total Suspended Solids	mg/L		45	30	once/week	composite**
E. coli (Note 1, Page 6)	#/100mL		630	126	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	 13.7 13.7		 2.7 2.8	once/week	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Lead, Total Recoverable	µg/L	25.6		8.2	once/month	composite**
Zinc, Total Recoverable	µg/L	214.5		124.6	once/month	composite**

EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units***	SU	6.0		9.0	once/week	grab

EFFLUENT PARAMETER(S)	UNITS	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand$_5$ – Percent Removal (Note 2, Page 6)	%	85	once/month	calculated
Total Suspended Solids – Percent Removal (Note 2, Page 6)	%	85	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2022. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

EFFLUENT PARAMETER(S)	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Oil & Grease	mg/L	*		*	once/quarter†	grab
Cadmium, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Cyanide, Amenable to Chlorination	µg/L	*		*	once/quarter†	grab

MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE APRIL 28, 2022. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

* Monitoring requirement only.
** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.
*** pH is measured in pH units and is not to be averaged.
† See table below for quarterly sampling requirements.

Quarterly Minimum Sampling Requirements			
Quarter	**Months**	**Quarterly Effluent Parameters**	**Report is Due**
First	January, February, March	Sample at least once during any month of the quarter	April 28th
Second	April, May, June	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	October 28th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28th

Note 1 – Effluent limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 – Influent sampling for BOD_5 and TSS is not required when the facility does not discharge effluent during the reporting period. Samples are to be collected prior to any treatment process. Calculate Percent Removal by using the following formula: [(Average Influent –Average Effluent) / Average Influent] x 100% = Percent Removal. Influent and effluent samples are to be taken during the same month. The Average Influent and Average Effluent values are to be calculated by adding the respective values together and dividing by the number of samples taken during the month. Influent samples are to be collected as a 24-hour composite sample, composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

OUTFALL #001	**TABLE A-3. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations in **Table A-3** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETER(S)	**UNITS**	**FINAL EFFLUENT LIMITATIONS**			**MONITORING REQUIREMENTS**	
		DAILY MAXIMUM	**WEEKLY AVERAGE**	**MONTHLY AVERAGE**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
Limit Set: WA						
Acute Whole Effluent Toxicity (Note 3)	TU_a	*			once/year	composite**
ACUTE WET TEST MONITORING REPORTS SHALL BE SUBMITTED **ANNUALLY**; THE FIRST REPORT IS DUE JANUARY 28, 2021.						
Limit Set: WC						
Chronic Whole Effluent Toxicity (Note 4)	TU_c	*			once/permit cycle	composite**
CHRONIC WET TEST REPORTS SHALL BE SUBMITTED **ONCE PER PERMIT CYCLE**; THE FIRST REPORT IS DUE JANUARY 28, 2023.						

* Monitoring requirement only.
** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 3 – The Acute WET test shall be conducted once per year. See Special Condition #15 for additional requirements.

Note 4 –The Chronic WET test shall be conducted once per permit cycle. An Acute WET test is not required during the year of the Chronic test. See Special Condition #16 for additional requirements.

PERMITTED FEATURE INF	TABLE B-1. INFLUENT MONITORING REQUIREMENTS

The monitoring requirements in **Table B-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The influent wastewater shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: IM						
Biochemical Oxygen Demand$_5$ (Note 2)	mg/L			*	once/month	composite**
Total Suspended Solids (Note 2)	mg/L			*	once/month	composite**
Ammonia as N	mg/L	*		*	once/month	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020.

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 2 – Influent sampling for BOD_5 and TSS is not required when the facility does not discharge effluent during the reporting period. Samples are to be collected prior to any treatment process. Calculate Percent Removal by using the following formula: [(Average Influent –Average Effluent) / Average Influent] x 100% = Percent Removal. Influent and effluent samples are to be taken during the same month. The Average Influent and Average Effluent values are to be calculated by adding the respective values together and dividing by the number of samples taken during the month. Influent samples are to be collected as a 24-hour composite sample, composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

PERMITTED FEATURE SM1	TABLE C-1. INSTREAM MONITORING REQUIREMENTS

The monitoring requirements in **Table C-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The stream shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: UM						
Ammonia as N	mg/L	*		*	once/month	grab
Total Phosphorus	mg/L	*		*	once/month	grab
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	grab
Nitrite + Nitrate	mg/L	*		*	once/month	grab

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020.

* Monitoring requirement only.

PERMITTED FEATURE SM2	TABLE C-2. INSTREAM MONITORING REQUIREMENTS					
The monitoring requirements in **Table C-2** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The stream shall be monitored by the permittee as specified below:						
PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: DM						
Hardness, Total	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020.						

* Monitoring requirement only.

D. SCHEDULE OF COMPLIANCE

The facility shall attain compliance with final effluent limitations as soon as possible but in no case later than **two (2) years** of the effective date of this permit.

1. Within six months of the effective date of this permit, the permittee shall report progress made in attaining compliance with the final effluent limits for Total Recoverable Lead.

2. The permittee shall submit interim progress reports detailing progress made in attaining compliance with the final effluent limits every 12 months from the effective date of this permit.

3. Within **two (2) years** of the effective date of this permit, the permittee shall attain compliance with the final effluent limits for Total Recoverable Lead.

Please submit progress reports to the Missouri Department of Natural Resources via the Electronic Discharge Monitoring Report (eDMR) Submission System.

E. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and August 1, 2019, and hereby incorporated as though fully set forth herein.

F. SPECIAL CONDITIONS

1. Electronic Discharge Monitoring Report (eDMR) Submission System.
   (a) Discharge Monitoring Reporting Requirements. The permittee must electronically submit compliance monitoring data via the eDMR system. In regards to Standard Conditions Part I, Section B, #7, the eDMR system is currently the only Department approved reporting method for this permit.
   (b) Programmatic Reporting Requirements. The following reports (if required by this permit) must be electronically submitted as an attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:
      (1) Collection System Maintenance Annual Reports;
      (2) Schedule of Compliance Progress Reports;
      (3) Sludge/Biosolids Annual Reports;
         i. In addition to the annual Sludge/Biosolids report submitted to the Department, the permittee must submit Sludge/Biosolids Annual Reports electronically using EPA's NPDES Electronic Reporting Tool ("NeT") (https://cdx.epa.gov/).
      (4) Pretreatment Program Reports; and
      (5) Any additional report required by the permit excluding bypass reporting.

   After such a system has been made available by the Department, required data shall be directly input into the system by the next report due date.

F. SPECIAL CONDITIONS (continued)

(c) Other actions. The following shall be submitted electronically after such a system has been made available by the Department:
  (1) Notices of Termination (NOTs);
  (2) No Exposure Certifications (NOEs); and
  (3) Bypass reporting, See Special Condition #9 for 24-hr. bypass reporting requirements.

(d) Electronic Submissions. To access the eDMR system, use the following link in your web browser: https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx.

(e) Waivers from Electronic Reporting. The permittee must submit compliance monitoring data and reports electronically. The Department may grant a waiver to a permittee in compliance with 40 CFR Part 127. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. The Department will either approve or deny this electronic reporting waiver request within 120 calendar days. Only permittees with an approved waiver request may submit monitoring data and reports on paper to the Department for the period that the approved electronic reporting waiver is effective.

2. The full implementation of this operating permit, which includes implementation of any applicable schedules of compliance, shall constitute compliance with all applicable federal and state statutes and regulations in accordance with §644.051.16, RSMo, and the Clean Water Act (CWA) section 402(k); however, this permit may be reopened and modified, or alternatively revoked and reissued:
   (a) To comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the CWA, if the effluent standard or limitation so issued or approved:
     (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
     (2) controls any pollutant not limited in the permit.
   (b) To incorporate an approved pretreatment program or modification thereto pursuant to 40 CFR 403.8(c) or 40 CFR 403.18(e), respectively.

3. All outfalls must be clearly marked in the field. This does not include instream monitoring locations.

4. Report as no-discharge when a discharge does not occur during the report period. For instream samples, report as "no flow" if no stream flow occurs during the report period.

5. Reporting of Non-Detects:
   (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
   (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
   (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
   (d) Where the permit contains a Minimum Level (ML) and the permittee is granted authority in the permit to report zero in lieu of the < ML for a specified parameter (conventional, priority pollutants, metals, etc.), then zero (0) is to be reported for that parameter.
   (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.
   (f) When calculating monthly averages, use one-half of the method detection limit (MDL) instead of a zero. Where all data are below the MDL, the "<MDL" shall be reported as indicated in item (c).

6. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).

7. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. To request a modification of the operational control testing requirements listed in 10 CSR 20-9, the permittee shall submit a permit modification application and fee to the Department requesting a deviation from the operational control monitoring requirements. Upon approval of the request, the Department will modify the permit.

F. SPECIAL CONDITIONS (continued)

8. The permittee shall develop and implement a program for maintenance and repair of its collection system. The permittee may compare collection system performance results and other data with the benchmarks used in the Departments' Capacity, Management, Operation, And Maintenance (CMOM) Model located at http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc. Additional information regarding the Departments' CMOM Model is available at http://dnr.mo.gov/pubs/pub2574.htm.

   The permittee shall also submit a report via the Electronic Discharge Monitoring Report (eDMR) Submission System annually, by January 28th, for the previous calendar year. The report shall contain the following information:
   (a) A summary of the efforts to locate and eliminate specific sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
   (b) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
   (c) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.

9. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3), and with Standard Condition Part I, Section B, subsection 2. Bypasses are to be reported to the Southwest Regional Office during normal business hours or by using the online Sanitary Sewer Overflow/Facility Bypass Application located at: https://dnr.mo.gov/mogem/ or the Environmental Emergency Response spill-line at 573-634-2436 outside of normal business hours. Once an electronic reporting system compliant with 40 CFR Part 127, the National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, is available all bypasses must be reported electronically via the new system. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

   The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.

10. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.

11. An all-weather access road to the treatment facility shall be maintained.

12. The outfall sewer shall be protected and maintained against the effects of floodwater, ice, or other hazards as to reasonably insure its structural stability, freedom from stoppage, and that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.

13. Sludge treatment, storage and disposal practices shall be conducted in accordance with Standard Conditions Part III.

14. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:
   (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour, static, non-renewal toxicity tests with the following species:
      - The fathead minnow, *Pimephales promelas* (Acute Toxicity EPA Test Method 2000.0).
      - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity EPA Test Method 2002.0).
   (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
   (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
   (d) The Allowable Effluent Concentration (AEC) is 88%; the dilution series is: 100%, 95%, 88%, 44%, and 22%.
   (e) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
   (f) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of acute toxic units ($TU_a = 100/LC_{50}$) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration 50 Percent (LC_{50}) is the effluent concentration that would cause death in 50 percent of the test organisms at a specific time.

F. SPECIAL CONDITIONS (continued)

15. Chronic Whole Effluent Toxicity (WET) tests shall be conducted as follows:
    (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the most recent edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013; Table IA, 40 CFR Part 136).* The permittee shall concurrently conduct 7-day, static, renewal toxicity tests with the following species:
        - The fathead minnow, *Pimephales promelas* (Survival and Growth Test Method 1000.0).
        - The daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.0).
    (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
    (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
    (d) The Allowable Effluent Concentration (AEC) is 42%; the dilution series is: 100%, 84%, 42%, 21%, and 10.5%.
    (e) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
    (f) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of chronic toxic units ($TU_c = 100/IC_{25}$) reported according to the *Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* chapter on report preparation and test review. The 25 percent Inhibition Effect Concentration (IC_{25}) is the toxic or effluent concentration that would cause 25 percent reduction in mean young per female or in growth for the test populations.

16. Receiving Water Monitoring Conditions:
    (a) In-stream receiving water samples should be taken at the location(s) specified on Page 2 of this permit. In the event that a safe, accessible location is not present at the location(s) listed, a suitable location can be negotiated with the Department. Samples should be taken at least four feet from the bank or from the middle of the stream (whichever is less) and 6-inches below the surface if possible. The upstream receiving water sample should be collected at a point upstream from any influence of the effluent, where the water is visibly flowing down stream.
    (b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream/lake characteristics (e.g., septic conditions, algae growth, etc.), the stream segment (e.g., riffle, pool or run) from where the sample was collected. These observations shall be submitted with the sample results.
    (c) Samples shall not be collected from areas with especially turbulent flow, still water or from the stream bank, unless these conditions are representative of the stream reach or no other areas are available for sample collection. Sampling should not be made when significant precipitation has occurred recently. The sampling event should be terminated and rescheduled if any of the following conditions occur:
        - If turbidity in the stream increases notably; or
        - If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hours
    (d) Always use the correct sampling technique and handling procedure specified for the parameter of interest. Please refer to the latest edition of Standard Methods for the Examination of Water and Wastewater for further discussion of proper sampling techniques. All analyses must be conducted in accordance with an approved EPA method. Meters shall be calibrated immediately (within 1 hour) prior to the sampling event.
    (e) Please contact the Department if you need additional instructions or assistance.

17. Stormwater Pollution Prevention Plan (SWPPP):
    A SWPPP must be developed and implemented by **July 1, 2020**. Through implementation of the SWPPP, the permittee shalt minimize the release of pollutants in stormwater from the facility to the waters of the state. The SWPPP shall be developed in consultation with the concepts and methods described in the following document: Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.
    (a) The SWPPP must identify any stormwater outfall from the facility and Best Management Practices (BMPs) used to prevent or reduce the discharge of contaminants in stormwater. The stormwater outfalls shall either be marked in the field or clearly marked on a map and maintained with the SWPPP.
    (b) The SWPPP must include a schedule and procedures for a once per month routine site inspection.
        (1) The monthly routine inspection shall be documented in a brief written report, which shall include:
            i. The person(s) conducting the inspection.
            ii. The inspection date and time.
            iii. Weather information for the day of the inspection.
            iv. Precipitation information for the entire period since the last inspection.

F. SPECIAL CONDITIONS (continued)

v. Description of the discharges observed, including visual quality of the discharges (sheen, turbid, etc.).
vi. Condition of BMPs
vii. If BMPs were replaced or repaired.
viii. Observations and evaluations of BMP effectiveness.

(2) Any deficiency observed during the routine inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
(3) The routine inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
(4) The routine inspection reports shall be made available to Department personnel upon request.

(c) The SWPPP must include a schedule and procedures for a once per year comprehensive site inspection.
(1) The annual comprehensive inspection shall be documented in a written report, which shall include:
i. The person(s) conducting the inspection.
ii. The inspection date and time.
iii. Findings from the areas of your facility that were examined;
iv. All observations relating to the implementation of your control measures including:
1. Previously unidentified discharges from the site,
2. Previously unidentified pollutants in existing discharges,
3. Evidence of, or the potential for, pollutants entering the drainage system;
4. Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, and
5. Additional control measures needed to address any conditions requiring corrective action identified during the inspection.
v. Any required revisions to the SWPPP resulting from the inspection;
vi. Any incidence of noncompliance observed or a certification stating that the facility is in compliance with Special Condition D.24.

(2) Any deficiency observed during the comprehensive inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
(3) The comprehensive inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
(4) The comprehensive inspection reports shall be made available to Department personnel upon request.

(d) The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested.
(e) The SWPPP must be reviewed and updated at a minimum once per permit cycle, as site conditions or control measures change.

18. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP.

(a) Permittee shall adhere to the following minimum Best Management Practices (BMPs):
(1) Minimize the exposure of industrial material storage areas, loading and unloading areas, dumpsters and other disposal areas, maintenance activities, and fueling operations to rain, snow, snowmelt, and runoff, by locating industrial materials and activities inside or protecting them with storm resistant coverings, if warranted and practicable.
(2) Provide good housekeeping practices on the site to prevent potential pollution sources from coming into contact with stormwater and provide collection facilities and arrange for proper disposal of waste products, including sludge.
(3) Implement a maintenance program to ensure that the structural control measures and industrial equipment is kept in good operating condition and to prevent or minimize leaks and other releases of pollutants.
(4) Prevent or minimize the spillage or leaks of fluids, oil, grease, fuel, etc. from equipment and vehicle maintenance, equipment and vehicle cleaning, or activities.
(5) Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed.
(6) Provide stormwater runoff controls to divert, infiltrate, reuse, contain, or otherwise minimize pollutants in the stormwater discharge.
(7) Enclose or cover storage piles of salt or piles containing salt, used for deicing or other commercial or industrial purposes.
(8) Provide training to all employees who; work in areas where industrial materials or activities are exposed to stormwater, are responsible for stormwater inspections, are members of the Pollution Prevention Team. Training must cover the specific control measures and monitoring, inspection, planning, reporting and documentation requirements of this permit. Training is recommended annually for any applicable staff and whenever a new employee is hired who meets the description above.
(9) Eliminate and prevent unauthorized non-stormwater discharges at the facility.
(10) Minimize generation of dust and off-site tracking of raw, final, or waste materials by implementing appropriate control measures.

F. SPECIAL CONDITIONS (continued)

19. Expanded Effluent Testing: Permittee must sample and analyze for the pollutants listed in 40 CFR 122.21 Appendix J, Table 2, as well as Aluminum and Iron. Pursuant to 40 CFR 122.21(j)(4) the permittee shall provide this data with the permit renewal application from a minimum of three samples taken within four and one-half years prior to the date of the permit application. Samples must be representative of the seasonal variation in the discharge from each outfall. Approved and sufficiently sensitive testing methods listed in 40 CFR 136.3 must be utilized. A method is "sufficiently sensitive" when; 1) the method quantifies the pollutant below the level of the applicable water quality criterion or; 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015 and or 40 CFR 136. These methods are also required for parameters listed as monitoring only, as the data collected may be used to determine if numeric limitations need to be established.

20. Pretreatment Program: The City of Joplin is required to implement and update the previously approved pretreatment program. The applicable reporting requirements for the program are detailed in Special Condition #21 of the Missouri State Operating Permit MO-0103349 for the Joplin Turkey Creek WWTF.

21. Sewer Extension Authority Supervised Program: The City of Joplin has a department approved Sewer Program. The applicable reporting requirements for the program are detailed in Special Condition #22 of the Missouri State Operating Permit MO-0103349 for the Joplin Turkey Creek WWTF.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0023256
JOPLIN SHOAL CREEK WASTEWATER TREATMENT FACILITY

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollutant Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)(A)2.], a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

A Factsheet is not an enforceable part of an operating permit.

This Factsheet is for a Major facility.

Part I – Facility Information

Facility Type: POTW
Facility Description: Mechanical bar screen / grit removal / comminutor / primary clarifier (2) / trickling filter (2) / oxidation ditch (2) / Biological Nutrient Removal / final clarifiers (2) / tertiary filtration / UV disinfection anaerobic digester (2) / sludge thickening / aerobic digester (3) / sludge is land applied
Design population equivalent is 34,800.
Design flow is 7.2 MGD. Actual flow is 4.9 MGD.
Design sludge production is 2,605 dry tons/year.

Have any changes occurred at this facility or in the receiving water body that affects effluent limit derivation?
✓ No.

Application Date: 08/09/16
Expiration Date: 02/02/17

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#001	11.2	Tertiary	Domestic

Facility Performance History:
This facility was last inspected on March 14, 2016. The inspection showed the following unsatisfactory features: failure to develop and implement a program for maintenance and repair of the collection system.

A review of Discharge Monitoring Reports shows exceedances for the following (month/year): Ammonia (1/17) and pH (8/18).

Comments:
Changes in this permit include the addition of instream, influent, and effluent Total Phosphorous and Total Nitrogen (speciated), downstream Total Hardness, a Chronic WET test once per permit cycle, and a schedule of compliance for Total Recoverable Lead. The following parameters were removed: Total Recoverable Arsenic, Chromium (III), Copper, Mercury, Nickel; Total Dissolved Chromium (VI); and Total Toxic Organics. See Part VI of the Fact Sheet for further information regarding the addition and removal of effluent parameters. Special conditions were updated to include the addition of inflow and infiltration reporting requirements, reporting of Non-detects, bypass reporting requirements, development of a Stormwater Pollution Prevention Plan, and the use of the Electronic Discharge Monitoring Report (eDMR) submission system.

Part II – Operator Certification Requirements

✓ This facility is required to have a certified operator.

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], the permittee shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators at regulated wastewater treatment facilities shall be certified in accordance with [10 CSR 20-9.020(2)] and any other applicable state law or regulation. As per [10 CSR 20-9.020(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

Owned or operated by or for a

- ☒ - Municipalities
- ☐ - County
- ☐ - Public Sewer District
- ☐ - State agency
- ☐ - Public Water Supply Districts
- ☐ - Private Sewer Company regulated by the Public Service Commission

Each of the above entities are only applicable if they have a Population Equivalent greater than two hundred (200).

This facility currently requires a chief operator with an **A** Certification Level. Please see **Appendix - Classification Worksheet**. Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator's Name: Lyndell J. Edwards
Certification Number: 5316
Certification Level: WW-A

The listing of the operator above only signifies that staff drafting this operating permit have reviewed appropriate Department records and determined that the name listed on the operating permit application has the correct and applicable Certification Level.

Part III – Operational Control Testing Requirements

Missouri Clean Water Commission regulation 10 CSR 20-9.010 requires certain publically owned treatment works and privately owned facilities regulated by the Public Service Commission to conduct internal operational control monitoring to further ensure proper operation of the facility and to be a safeguard or early warning for potential plant upsets that could affect effluent quality. This requirement is only applicable if the publically owned treatment works and privately owned facilities regulated by the Public Service Commission has a Population Equivalent greater than two hundred (200).

10 CSR 20-9.010(3) allows the Department to modify the monitoring frequency required in the rule based upon the Department's judgement of monitoring needs for process control at the specified facility.

✓ As per [10 CSR 20-9.010(4))], the facility is required to conduct operational monitoring. These operational monitoring reports are to be submitted to the Department along with the MSOP discharge monitoring reports. The facility is a mechanical plant and is required to conduct operational control monitoring as follows:

Operational Monitoring Parameter	Frequency
Precipitation	Daily (M-F)
Flow – Influent or Effluent	Daily (M-F)
pH – Influent	Daily (M-F)
Temperature (Aeration basin)	Daily (M-F)
TSS – Influent	Weekly
TSS – Mixed Liquor	Weekly
Settleability – Mixed Liquor	Daily (M-F)
Dissolved Oxygen – Mixed Liquor	Daily (M-F)
pH – Anaerobic Digester	Daily (M-F)
Temperature – Anaerobic Digester	Daily (M-F)
Dissolved Oxygen – Aerobic Digester	Daily (M-F)

Part IV – Receiving Stream Information

RECEIVING STREAM(S) TABLE: OUTFALL #001

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Shoal Creek	P	3222	AQL, CLF, DWS, HHP, IND, IRR, LWP, SCR, WBC-A	11070207-0806	Direct Discharge

*As per 10 CSR 20-7.031 Missouri Water Quality Standards, the Department defines the Clean Water Commission's water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and 1st classified receiving stream's beneficial water uses to be maintained are in the receiving stream table in accordance with [10 CSR 20-7.031(1)(C)].

Uses found in the receiving streams table, above:

10 CSR 20-7.031(1)(C)1.:
AQL = Protection of aquatic life (Current narrative use(s) are defined to ensure the protection and propagation of fish shellfish and wildlife, which is further subcategorized as: WWH = Warm Water Habitat; **CDH** = Cold-water habitat; **CLH** = Cool-water habitat; EAH = Ephemeral Aquatic Habitat; MAH = Modified Aquatic Habitat; LAH = Limited Aquatic Habitat. This permit uses AQL effluent limitations in 10 CSR 20-7.031 Table A for all habitat designations unless otherwise specified.)

10 CSR 20-7.031(1)(C)2.: Recreation in and on the water
WBC = Whole Body Contact recreation where the entire body is capable of being submerged;
WBC-A = Whole body contact recreation that supports swimming uses and has public access;
WBC-B = Whole body contact recreation that supports swimming;
SCR = Secondary Contact Recreation (like fishing, wading, and boating).

10 CSR 20-7.031(1)(C)3. to 7.:
HHP = Human Health Protection as it relates to the consumption of fish;
IRR = Irrigation for use on crops utilized for human or livestock consumption;
LWP = Livestock and wildlife protection;
DWS = Drinking Water Supply;
IND = Industrial water supply

10 CSR 20-7.031(1)(C)8-11.: Wetlands (10 CSR 20-7.031 Table A currently does not have corresponding habitat use criteria for these defined uses)
WSA = Storm- and flood-water storage and attenuation; WHP = Habitat for resident and migratory wildlife species;
WRC = Recreational, cultural, educational, scientific, and natural aesthetic values and uses; WHC = Hydrologic cycle maintenance.

10 CSR 20-7.031(6): **GRW** = Groundwater

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)*		
	1Q10	7Q10	30Q10
Shoal Creek (P)	52.24	56.22	65.28

* - Data from USGS Gauge Station 07187000 located on Shoal Creek above Joplin, MO.

MIXING CONSIDERATIONS TABLE:

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(a)]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(b)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
13.06	14.055	16.32	1.306	1.4055	1.632

RECEIVING STREAM MONITORING REQUIREMENTS:

Permitted Feature SM1. Facilities with a design flow greater than or equal to one million gallons per day are required to sample their effluent monthly for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia per 10 CSR 20-7.015(9)(D)8.B. Upstream monitoring for these parameters is necessary to determine background concentrations in order to complete calculations related to nutrient loading to the receiving stream.

Permitted Feature SM2. Downstream sampling for Total Hardness is included as the permit includes metals that the toxicity of the metals are hardness dependent.

Receiving Water Body's Water Quality
Currently, the Department has not conducted a stream survey for this waterbody. When a stream survey is conducted, more information may be available about the receiving stream.

Part V – Rationale and Derivation of Effluent Limitations & Permit Conditions

ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:
As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream, and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

- ✓ The facility does not discharge to a Losing Stream as defined by [10 CSR 20-2.010(40)] & [10 CSR 20-7.031(1)(O)], or is an existing facility.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(o); 40 CFR Part 122.44(l)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

- ✓ Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.
  - ✓ Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance.

    - **Ammonia as N**. Effluent limitations were re-calculated for Ammonia based on new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for Ammonia. The newly established limitations are still protective of water quality.

    - **Metals**. The previous permit for this facility included monitoring requirements for Total Recoverable Arsenic, Total Recoverable Chromium III, Total Dissolved Chromium VI, Total Recoverable Copper, Total Recoverable Mercury, and Total Recoverable Nickel. Using all applicable data from Discharge Monitoring Reports, the permit writer conducted a Reasonable Potential Analysis on all parameters and determined the facility had no reasonable potential to cause or contribute to an excursion of the standard and has removed these parameters. Please see **APPENDIX – RPA RESULTS**. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

    - **Oil and Grease**. The previous permit had final effluent limits of 15 mg/L as a daily maximum and 10 mg/L as a monthly average. No evidence of an excursion of the Water Quality Standard (WQS) has been observed by the department in the past and the facility has not disclosed any other information related to the characteristics of the discharge which has the potential to cause or contribute to an excursion of the WQS. As a result, monitoring requirements have been included in this permit to determine if the discharge has the reasonable potential to cause or contribute to an excursion of the WQS. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

    - **pH**. The previous permit contained final effluent limits of 6.5-9.0 SU. However, the permit writer has determined that final effluent limits of 6.0-9.0 SU are protective of the water quality standard [10 CSR 20-7.031(5)(E)], due to the buffering capacity of the mixing zone.

    - **Total Recoverable Cadmium and Cyanide Amenable to Chlorination**. Monitoring only. Using all applicable data from Discharge Monitoring Reports, the permit writer conducted a Reasonable Potential Analysis on all parameters and determined the facility had no reasonable potential to cause or contribute to an excursion of the standard and has removed these effluent limits. Please see **APPENDIX – RPA RESULTS**. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

    - **Total Residual Chlorine (TRC)**. The previous permit contained final effluent limits of 17 µg/L as a daily maximum and 8 µg/L as a monthly average. This facility no longer utilizes chlorination chemicals and there is no indication that the receiving stream has chlorine impairment. The permit writer has made a determination that the discharge does not have the reasonable potential to cause or contribute to an excursion of water quality and has removed the final effluent limits for TRC from this permit. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

    - **Total Toxic Organics (TTOs)**. Monitoring for TTOs was established for Categorical Industrial Users discharging to POTWs, including but not limited to, Electroplating (40 CFR 413). The previous permit contained a requirement to sample and report TTOs twice per year. A review of the TTO results over the last permit cycle shows compliance in accordance with 40 CFR 413.14(f). Due to consistency in compliance, the monitoring requirement for TTOs was removed. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

- ✓ The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b).

  - **General Criteria**. The previous permit contained a special condition which described a specific set of prohibitions related to general criteria found in 10 CSR 20-7.031(4). In order to comply with 40 CFR 122.44(d)(1), the permit writer has conducted reasonable potential determinations for each general criterion and established numeric effluent limitations where reasonable potential exists. While the removal of the previous permit special condition creates the appearance of backsliding, since this permit establishes numeric limitations where reasonable potential to cause or contribute to an excursion of the general criteria exists the permit maintains sufficient effluent limitations and monitoring requirements in order to protect water quality, this permit is equally protective as compared to the previous permit. Therefore, given this new information, and the fact that the previous permit special condition was not consistent with 40 CFR 122.44(d)(1), an error occurred in the establishment of the general criteria as a special condition of the previous permit. Please see Part VI – Effluent Limits Determination for more information regarding the reasonable potential determinations for each general criterion related to this facility.

ANTIDEGRADATION:
In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)], for domestic wastewater discharge with new, altered, or expanding discharges, the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. In accordance with Missouri's water quality regulations for antidegradation [10 CSR 20-7.031(3)], degradation may be justified by documenting the socio-economic importance of a discharge after determining the necessity of the discharge. Facilities must submit the antidegradation review request to the Department prior to establishing, altering, or expanding discharges. See http://dnr.mo.gov/env/wpp/permits/antideg-implementation.htm

- ✓ No degradation proposed and no further review necessary. Facility did not apply for authorization to increase pollutant loading or to add additional pollutants to their discharge.

For stormwater discharges, the stormwater BMP chosen for the facility, through the antidegradation analysis performed by the facility, must be implemented and maintained at the facility. Failure to implement and maintain the chosen BMP alternative is a permit violation; see SWPPP.

- ✓ The facility must review and maintain stormwater BMPs as appropriate.

AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:
As per [10 CSR 20-6.010(2)(C)], …An applicant may utilize a lower preference continuing authority by submitting, as part of the application, when a higher level authority is available, must submit information to the Department for review and approval, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or any other regional sewage service and treatment plan approved for higher preference authority by the Department.

BIOSOLIDS & SEWAGE SLUDGE:
Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works

- ✓ Permittee is authorized to land apply biosolids in accordance with Standard Conditions III.

COMPLIANCE AND ENFORCEMENT:
Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

- ✓ The facility is not currently under Water Protection Program enforcement action.

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. This final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online. In an effort to aid facilities in the reporting of applicable information electronically, the Department has created several new forms including operational control monitoring forms and an I&I location and reduction form. These forms are optional and found on the Department's website at the following locations:

Operational Monitoring Lagoon: http://dnr.mo.gov/forms/780-2801-f.pdf
Operational Monitoring Mechanical: http://dnr.mo.gov/forms/780-2800-f.pdf
I&I Report: http://dnr.mo.gov/forms/780-2690-f.pdf

Per 40 CFR 127.15 and 127.24, permitted facilities may request a temporary waiver for up to 5 years or a permanent waiver from electronic reporting from the Department. To obtain an electronic reporting waiver, a permittee must first submit an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. Each facility must make a request. If a single entity owns or operates more than one facility, then the entity must submit a separate request for each facility based on its specific circumstances. An approved waiver is non-transferable.

The Department must review and notify the facility within 120 calendar days of receipt if the waiver request has been approved or rejected [40 CFR 124.27(a)]. During the Department review period as well as after a waiver is granted, the facility must continue submitting a hard-copy of any reports required by their permit. The Department will enter data submitted in hard-copy from those facilities allowed to do so and electronically submit the data to the EPA on behalf of the facility.

✓ The permittee/facility is currently using the eDMR data reporting system.

NUMERIC LAKE NUTRIENT CRITERIA

✓ This facility does not discharge into a lake watershed where numeric lake nutrient criteria are applicable.

PRETREATMENT PROGRAM:
The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a Publicly Owned Treatment Works [40 CFR Part 403.3(q)].

Pretreatment programs are required at any POTW (or combination of POTW operated by the same authority) and/or municipality with a total design flow greater than 5.0 MGD and receiving industrial wastes that interfere with or pass through the treatment works or are otherwise subject to the pretreatment standards. Pretreatment programs can also be required at POTWs/municipals with a design flow less than 5.0 MGD if needed to prevent interference with operations or pass through.

Several special conditions pertaining to the permittee's pretreatment program may be included in the permit, and are as follows:

- Implementation and enforcement of the program,
- Annual pretreatment report submittal,
- Submittal of list of industrial users,
- Technical evaluation of need to establish local limitations, and
- Submittal of the results of the evaluation

✓ This permittee has an approved pretreatment program in accordance with the requirements of [40 CFR Part 403] and [10 CSR 20-6.100] and is expected to implement and enforce its approved program. See Special Condition #21 of permit MO-0103349 for Joplin Turkey Creek WWTF for requirements regarding the pretreatment program.

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard.

In accordance with [40 CFR Part 122.44(d)(1)(iii)] if the permit writer determines that any given pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

✓ An RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS.**

REMOVAL EFFICIENCY:
Removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

✓ Secondary Treatment is 85% removal [40 CFR Part 133.102(a)(3) & (b)(3)].

SANITARY SEWER OVERFLOWS (SSO) AND INFLOW AND INFILTRATION (I&I):

Sanitary Sewer Overflows (SSOs) are defined as untreated sewage releases and are considered bypassing under state regulation [10 CSR 20-2.010(12)] and should not be confused with the federal definition of bypass. SSOs result from a variety of causes including blockages, line breaks, and sewer defects that can either allow wastewater to backup within the collection system during dry weather conditions or allow excess stormwater and groundwater to enter and overload the collection system during wet weather conditions. SSOs can also result from lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. SSOs include overflows out of manholes, cleanouts, broken pipes, and other into waters of the state and onto city streets, sidewalks, and other terrestrial locations.

Inflow and Infiltration (I&I) is defined as unwanted intrusion of stormwater or groundwater into a collection system. This can occur from points of direct connection such as sump pumps, roof drain downspouts, foundation drains, and storm drain cross-connections or through cracks, holes, joint failures, faulty line connections, damaged manholes, and other openings in the collection system itself. I&I results from a variety of causes including line breaks, improperly sealed connections, cracks caused by soil erosion/settling, penetration of vegetative roots, and other sewer defects. In addition, excess stormwater and groundwater entering the collection system from line breaks and sewer defects have the potential to negatively impact the treatment facility.

Missouri RSMo §644.026.1.(13) mandates that the Department issue permits for discharges of water contaminants into the waters of this state, and also for the operation of sewer systems. Such permit conditions shall ensure compliance with all requirements as established by sections 644.006 to 644.141. Standard Conditions Part I, referenced in the permit, contains provisions requiring proper operation and maintenance of all facilities and systems of treatment and control. Missouri RSMo §644.026.1.(15) instructs the Department to require proper maintenance and operation of treatment facilities and sewer systems and proper disposal of residual waste from all such facilities. To ensure that public health and the environment are protected, any noncompliance which may endanger public health or the environment must be reported to the Department within 24 hours of the time the permittee becomes aware of the noncompliance. Standard Conditions Part I, referenced in the permit, contains the reporting requirements for the permittee when bypasses and upsets occur. The permit also contains requirements for permittees to develop and implement a program for maintenance and repair of the collection system. The permit requires that the permittee submit an annual report to the Department for the previous calendar year that contains a summary of efforts taken by the permittee to locate and eliminate sources of excess I & I, a summary of general maintenance and repairs to the collection system, and a summary of any planned maintenance and repairs to the collection system for the upcoming calendar year.

- ✓ At this time, the Department recommends the US EPA's Guide for Evaluating Capacity, Management, Operation and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (Document # EPA 305-B-05-002) or the Departments' CMOM Model located at http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at http://dnr.mo.gov/pubs/pub2574.htm. The CMOM identifies some of the criteria used to evaluate a collection system's management, operation, and maintenance and was intended for use by the EPA, state, regulated community, and/or third party entities. The CMOM is applicable to small, medium, and large systems; both public and privately owned; and both regional and satellite collection systems. The CMOM does not substitute for the Clean Water Act, the Missouri Clean Water Law, and both federal and state regulations, as it is not a regulation.

SCHEDULE OF COMPLIANCE (SOC):

Per 644.051.4 RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement, or if prohibited by other statute or regulation. A SOC includes an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the Clean Water Act, and 40 CFR §122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR § 122.47(a)(1), 10 CSR 20-7.031(11), and 10 CSR 20-7.015(9), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, a SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR § 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit that was not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study that may result in site-specific criteria or alternative effluent limits. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance to Permit Writers in developing SOCs, and attain a greater level of consistency, on April 9, 2015 the Department issued an updated policy on development of SOCs. This policy provides guidance to Permit Writers on the standard time frames for schedules for common activities, and guidance on factors that may modify the length of the schedule such as a Cost Analysis for Compliance.

✓ The time given for effluent limitations of this permit listed under Interim Effluent Limitation and Final Effluent Limitations were established in accordance with [10 CSR 20-7.031(11)]. The facility has been given a schedule of compliance to meet final effluent limits for Total Recoverable Lead. The two (2) year schedule of compliance allowed for this facility should provide adequate time to make operational changes required to meet effluent limits.

The following suggested milestones can be used by the permittee as a timeline toward compliance with new permit requirements. Once the permit holder's engineer has completed facility design with actual costs associated with permit compliance, it may be necessary for the permit holder to request additional time within the schedule of compliance. The Department is committed to review all requests for additional time in the schedule of compliance where adequate justification is provided.

Suggested Milestones during the 2 Year Schedule of Compliance

Year	Milestone(s)
1	**Monitor to ensure compliance.**
2	**Monitor to ensure compliance.**

SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM:
In accordance with [10 CSR 20-6.010(6)(A)], the Department may grant approval of a permittee's Sewer Extension Authority Supervised Program. These approved permittees regulate and approve construction of sanitary sewers and pump stations, which are tributary to this wastewater treatment facility. The permittee shall act as the continuing authority for the operation, maintenance, and modernization of the constructed collection system. See http://dnr.mo.gov/env/wpp/permits/sewer-extension.htm.

✓ The permittee's Sewer Extension Authority Supervised Program has been reauthorized. Please see **Appendix – Sewer Extension Authority Supervised Program Reauthorization Letter** for applicable conditions.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure.

Additionally in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of stormwater discharges. The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed the facility will employ the control measures determined to be adequate to achieve the benchmark values discussed above. The facility will conduct monitoring and inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example, if sample results from an outfall show values of TSS above the benchmark value, the BMP being employed is deficient in controlling stormwater pollution. Corrective action should be taken to repair, improve, or replace the failing BMP. This internal evaluation is required at least once per month but should be continued more frequently if BMPs continue to fail. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)]. For further guidance, consult the antidegradation implementation procedure (http://dnr.mo.gov/env/wpp/docs/AIP050212.pdf).

Alternative Analysis (AA) evaluation of the BMPs is a structured evaluation of BMPs that are reasonable and cost effective. The AA evaluation should include practices that are designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of AIP defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The AA evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure* (AIP), Section II.B.

If parameter-specific numeric exceedances continue to occur and the permittee feels there are no practicable or cost-effective BMPs which will sufficiently reduce a pollutant concentration in the discharge to the benchmark values established in the permit, the permittee can submit a request to re-evaluate the benchmark values. This request needs to include 1) a detailed explanation of why the facility is unable to comply with the permit conditions and unable to establish BMPs to achieve the benchmark values; 2) financial data of the company and documentation of cost associated with BMPs for review and 3) the SWPPP, which should contain adequate documentation of BMPs employed, failed BMPs, corrective actions, and all other required information. This will allow the Department to conduct a cost analysis on control measures and actions taken by the facility to determine cost-effectiveness of BMPs. The request shall be submitted in the form of an operating permit modification; the application is found at: http://dnr.mo.gov/forms/index.html.

✓ 10 CSR 20-6.200 and 40 CFR 122.26(b)(14)(ix) includes treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that is located within the confines of the facility, with a design flow of 1.0 MGD or more, or are required to have an approved pretreatment program under 40 CFR part 403, as an industrial activity in which permit coverage is required. In lieu of requiring sampling in the site-specific permit, the facility is required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP).

A facility can apply for conditional exclusion for "no exposure" of industrial activities and materials to stormwater by submitting a permit modification via Form B2 (http://dnr.mo.gov/forms/780-1805-f.pdf) appropriate application filing fees and a completed No Exposure Certification for Exclusion from NPDES Stormwater Permitting under Missouri Clean Water Law (https://dnr.mo.gov/forms/780-2828-f.pdf) to the Department's Water Protection Program, Operating Permits Section. Upon approval of the No Exposure Certification, the permit will be modified and the Special Condition to develop and implement a SWPPP will be removed.

VARIANCE:

As per the Missouri Clean Water Law § 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law §§644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law §§644.006 to 644.141.

✓ This operating permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:

As per [10 CSR 20-2.010(86)], the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant that may be discharged into that stream without endangering its water quality.

✓ Wasteload allocations were calculated where applicable using water quality criteria or water quality model results and the dilution equation below:

$$Ce = \frac{(Qe + Qs)C - (Qs \times Cs)}{(Qe)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
Ce = effluent concentration
Cs = upstream concentration
Qe = effluent flow
Qs = upstream flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

Number of Samples "n":
Additionally, in accordance with the TSD for water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the Long Term Average (LTA) associated with a particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying distribution or treatment performance, which should be, at a minimum, be targeted to comply with the values dictated by the WLA. Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed using an assumed number of samples is "n = 4" at a minimum. For Total Ammonia as Nitrogen, "n = 30" is used.

WLA MODELING:
There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

✓ A WLA study was either not submitted or determined not applicable by Department staff.

WHOLE EFFLUENT TOXICITY (WET) TEST:
A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES). WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures that the provisions in the 10 CSR 20-6.010(8)(A) and the Water Quality Standards 10 CSR 20-7.031(4)(D),(F),(G),(J)2.A & B are being met. Under [10 CSR 20-6.010(8)(B)], the Department may require other terms and conditions that it deems necessary to assure compliance with the Clean Water Act and related regulations of the Missouri Clean Water Commission. In addition the following MCWL apply: §§§644.051.3 requires the Department to set permit conditions that comply with the MCWL and CWA; 644.051.4 specifically references toxicity as an item we must consider in writing permits (along with water quality-based effluent limits, pretreatment, etc…); and 644.051.5 is the basic authority to require testing conditions. WET test will be required by facilities meeting the following criteria:

☒ Facility is a designated Major.
☐ Facility continuously or routinely exceeds its design flow.
☐ Facility that exceeds its design population equivalent (PE) for BOD_5 whether or not its design flow is being exceeded.
☐ Facility (whether primarily domestic or industrial) that alters its production process throughout the year.
☐ Facility handles large quantities of toxic substances, or substances that are toxic in large amounts.
☒ Facility has Water Quality-based Effluent Limitations for toxic substances (other than NH_3)
☐ Facility is a municipality with a Design Flow ≥ 22,500 gpd.
☐ Other – please justify.

✓ The permittee is required to conduct WET test for this facility.

40 CFR 122.41(M) - BYPASSES:
The federal Clean Water Act (CWA), Section 402 prohibits wastewater dischargers from "bypassing" untreated or partially treated sewage (wastewater) beyond the headworks. A bypass is defined as an intentional diversion of waste streams from any portion of a treatment facility, [40 CFR 122.41(m)(1)(i)]. Additionally, Missouri regulation 10 CSR 20-7.015(9)(G) states a bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending, to waters of the state. Only under exceptional and specified limitations do the federal regulations allow for a facility to bypass some or all of the flow from its treatment process. Bypasses are prohibited by the CWA unless a permittee can meet all of the criteria listed in 40 CFR 122.41(m)(4)(i)(A), (B), & (C). Any bypasses from this facility are subject to the reporting required in 40 CFR 122.41(l)(6) and per Missouri's Standard Conditions I, Section B, part 2.b. Additionally, Anticipated Bypasses include bypasses from peak flow basins or similar devices designed for peak wet weather flows.

- ✓ Bypasses occur or have occurred at this facility. The previous permit allowed the facility to discharge from Outfalls #002 and #003 under emergency conditions when the plant was operating at capacity. The permittee entered into a VCA on December 11, 2011 to eliminate discharges from Outfalls #002 and #003. In 2017, the VCA was extended until December 11, 2021. An Abatement Order on Consent (AOC) became effective on June 6, 2019, which supersedes the VCA. Per the AOC, the City agrees to implement The City of Joplin's 2026 Activities Plan of its System Renewal and SSO Prevention Plan. Until all upgrades to the City's wastewater collection system have been completed, the City agrees to operate and maintain the existing collection system and peak flow outfalls so as to comply with the conditions and requirements of this permit.

303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

- ✓ This facility discharges to a 303(d) listed stream. Shoal Creek (P) (3222) is listed on the 2016 Missouri 303(d) List for Zinc. This facility is not considered to be a source of the above listed pollutant(s); however, final effluent limits were included in this permit because effluent monitoring data submitted to the Department by the City shows the discharge has reasonable potential to cause an excursion of state water quality standards for Zinc.

Part VI – Effluent Limits Determination

CATEGORIES OF WATERS OF THE STATE:

As per Missouri's Effluent Regulations [10 CSR 20-7.015], the waters of the state are divided into the below listed seven (7) categories. Each category lists effluent limitations for specific parameters, which are presented in each outfall's Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

- ☐ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ☐ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ☐ Losing Streams [10 CSR 20-7.015(4)]
- ☐ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ☐ Special Streams [10 CSR 20-7.015(6)]
- ☐ Subsurface Waters [10 CSR 20-7.015(7)]
- ☒ All Other Waters [10 CSR 20-7.015(8)]

OUTFALL #001 – MAIN FACILITY OUTFALL

Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

EFFLUENT LIMITATIONS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Flow	MGD	1	*		*	*/*	1/day	monthly	T
BOD_5	mg/L	1		45	30	45/30	1/week	monthly	C
TSS	mg/L	1		45	30	45/30	1/week	monthly	C
*Escherichia coli***	#/100mL	1, 3		630	126	630/126	1/week	monthly	G
Ammonia as N (Apr 1 –Sep 30)	mg/L	2, 3	13.7		2.7	10.8/3.2	1/week	monthly	C
Ammonia as N (Oct 1 – Mar 31)	mg/L	2, 3	13.7		2.8	13.5/4.3	1/week	monthly	C
Total Phosphorus	mg/L	1	*		*	*/*	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	*/*	1/month	monthly	C
Nitrite + Nitrate	mg/L	1	*		*	*/*	1/month	monthly	C
Lead, Total Recoverable	µg/L	2	25.6		8.2	*/*	1/month	monthly	C
Zinc, Total Recoverable	µg/L	2	214.5		124.5	196.2/117.7	1/month	monthly	C
Oil & Grease	mg/L	1, 3	*		*	15/10	1/quarter	quarterly	G
Cadmium, Total Recoverable	µg/L	2	*		*	1.0/0.6	1/quarter	quarterly	C
Cyanide, Amenable to Chlorination	µg/L	2	*		*	20.2/7.6	1/quarter	quarterly	G
Acute Whole Effluent Toxicity	TUa	1, 9	*			*	1/year	annually	C
Chronic Whole Effluent Toxicity	TUc	1, 9	*			*	1/permit cycle	1/permit cycle	C

PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU	1	6.0		9.0	6.5-9.0	1/week	monthly	G

PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
BOD_5 Percent Removal	%	1			85	85	1/month	monthly	M
TSS Percent Removal	%	1			85	85	1/month	monthly	M

* - Monitoring requirement only.
** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.
*** - Parameter not previously established in previous state operating permit.

**** - C = 24-hour composite
G = Grab
T = 24-hr. total
M = Measured/calculated

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

OUTFALL #001 – DERIVATION AND DISCUSSION OF LIMITS:

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification.

- **Biochemical Oxygen Demand (BOD_5)**. Operating permit retains 45 mg/L as a Weekly Average and 30 mg/L as a Monthly Average from the previous permit. Please see the **CATEGORIZATION OF WATERS OF THE STATE** sub-section of the **Effluent Limits Determination.**

- **Total Suspended Solids (TSS)**. Operating permit retains 45 mg/L as a Weekly Average and 30 mg/L as a Monthly Average from the previous permit. Please see the **CATEGORIZATION OF WATERS OF THE STATE** sub-section of the **Effluent Limits Determination.**

- ***Escherichia coli (E. coli)***. Monthly average of 126 per 100 mL as a geometric mean and Weekly Average of 630 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), for discharges within two miles upstream of segments retaining the Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.015(9)(B). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). The Geometric Mean is calculated by multiplying all of the data points and taking the nth root of this product, where n = # of samples collected. For example: Five *E. coli* samples were collected with results of 1, 4, 6, 10, and 5 (#/100mL). Geometric Mean = 5^{th} root of (1)(4)(6)(10)(5) = 5^{th} root of 1,200 = 4.1 #/100mL.

- **Total Ammonia Nitrogen**. Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L.

Season	Temp (˚C)	pH (SU)	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

Summer: April 1 – September 30
Chronic WLA: $C_e = ((10.075 + 16.32)1.5 – (14.055 * 0.01))/10.075$
$C_e = 3.91$ mg/L

Acute WLA: $C_e = ((10.075 + 1.306)12.1 – (1.306 * 0.01))/10.075$
$C_e = 13.67$ mg/L

LTA_c = 3.91 mg/L (0.467) = 1.83 mg/L [CV = 2.00, 99^{th} Percentile, 30 day avg.]
LTA_a = 13.67 mg/L (0.117) = 1.60 mg/L [CV = 2.00, 99^{th} Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.60 mg/L (8.55) = **13.7** mg/L [CV = 2.00, 99^{th} Percentile]
AML = 1.60 mg/L (1.68) = **2.7** mg/L [CV = 2.00, 95^{th} Percentile, n =30]

Winter: October 1 – March 31
Chronic WLA: $C_e = ((10.075 + 16.32)3.1 – (14.055 * 0.01))/10.075$
$C_e = 8.11$ mg/L

Acute WLA: $C_e = ((10.075 + 1.306)12.1 – (1.306 * 0.01))/10.075$
$C_e = 13.67$ mg/L

LTA_c = 8.11 mg/L (0.517) = 4.19 mg/L [CV = 1.70, 99^{th} Percentile, 30 day avg.]
LTA_a = 12.1 mg/L (0.131) = 1.79 mg/L [CV = 1.70, 99^{th} Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.79 mg/L (7.63) = **13.7** mg/L [CV = 1.70, 99^{th} Percentile]
AML = 1.79 mg/L (1.57) = **2.8** mg/L [CV = 1.70, 95^{th} Percentile, n =30]

- **Oil & Grease**. Conventional pollutant. Monitoring only is required.

- **Total Phosphorus and Total Nitrogen (Speciated)**. Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrite + Nitrate are required per 10 CSR 20-7.015(9)(D)8.

- **pH**. 6.0-9.0 SU. pH limitations [10 CSR 20-7.015] are technology-based effluent limitations protective of the consecutive 4-day average Water Quality Standard [10 CSR 20-7.031(5)(E)], due to the assimilative capacity of the mixing zone.

- **Cyanide, Amenable to Chlorination.** A reasonable potential analysis was conducted and found that the discharge does not have reasonable potential to cause or contribute to an excursion of the water quality standard. Quarterly monitoring requirements have been included in order to reassess this determination at the time of next renewal. The permit is still protective of water quality.

- **Biochemical Oxygen Demand (BOD_5) Percent Removal**. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD_5.

- **Total Suspended Solids (TSS) Percent Removal**. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

Metals

Effluent limitations for total recoverable metals were developed using methods and procedures outlined in the "Technical Support Document for Water Quality-based Toxic Controls" (EPA/505/2-90-001) and "The Metals Translator: Guidance For Calculating a Total Recoverable Permit Limit from a Dissolved Criterion" (EPA 823-B-96-007). General warm-water fishery criteria apply. Ecoregion water hardness for Ozark Highlands of 170 mg/L is used in the calculation below. This value represents the 50th percentile (median) for all watersheds in-stream hardness values through the Ecoregion.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and absorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the Department, partitioning evaluations may be considered and site-specific translators developed.

- **Cadmium, Total Recoverable**. Monitoring only requirements have been included in this permit. An RPA was conducted and determined that there is no reasonable potential to violate the water quality standard for Cadmium, please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Lead, Total Recoverable**. Protection of Aquatic Life Acute Criteria = 114 µg/L, Chronic Criteria = 4.5 µg/L. The hardness value of 170 mg/L represents the 50th percentile (median) for Shoal Creek (P).

  Acute AQL WQS: $e^{(1.273 * \ln 170 - 1.460448)} * (1.46203 - \ln 170 * 0.145712) = 114.4$ [at Hardness 170]
  Chronic AQL WQS: $e^{(1.273 * \ln 170 - 4.704797)} * (1.46203 - \ln 170 * 0.145712) = 4.46$ [at Hardness 170]

  Acute TR WQS: 114.4 µg/L ÷ 0.714 = 160.4 µg/L [Total Recoverable Conversion]
  Chronic TR WQS: 4.46 µg/L ÷ 0.714 = 6.25 µg/L [Total Recoverable Conversion]

  Acute WLA: $C_e = ((10.075 + 1.4055)160.4 - (1.4055 * 0.0))/10.075 = 182.8$ µg/L
  Chronic WLA: $C_e = ((10.075 + 14.055)6.25 - (14.055 * 0.0))/10.075 = 14.99$ µg/L

  LTA_a: 182.8 (0.111) = 20.2 [CV = 2.18, 99th Percentile]
  LTA_c: 14.99 (0.189) = 2.8 [CV = 2.18, 99th Percentile]

  Use most protective number of LTA_a or LTA_c.

  MDL: 2.8 (9.04) = **25.6 µg/L** [CV = 2.18, 99th Percentile]
  AML: 2.8 (2.90) = **8.2 µg/L** [CV = 2.18, 95th Percentile, n = 4]

- **Zinc, Total Recoverable**. Protection of Aquatic Life Acute Criteria = 184.08 µg/L, Chronic Criteria = 184.08 µg/L. The hardness value of 170 mg/L represents the 50th percentile (median) for Shoal Creek (P).

  Acute AQL WQS: $e^{(0.8473 * \ln 170 + 0.884)} * 0.98 = 184.1$ [at Hardness 170]
  Chronic AQL WQS: $e^{(0.8473 * \ln 170 + 0.884)} * 0.98 = 184.1$ [at Hardness 170]

  Acute TR WQS: 184.1 ÷ 0.978 = 188.2 [Total Recoverable Conversion]
  Chronic TR WQS: 184.1 ÷ 0.986 = 186.7 [Total Recoverable Conversion]

  Acute WLA: $C_e = ((10.075 + 1.4055)188.2 - (1.4055 * 0.0))/10.075 = 214.5$ µg/L
  Chronic WLA: $C_e = ((10.075 + 14.055)186.7 - (14.055 * 0.0))/10.075 = 447.6$ µg/L

  LTA_a: 214.5 (0.419) = 89.97 [CV = 0.43, 99th Percentile]
  LTA_c: 447.6 (0.625) = 280.0 [CV = 0.43, 99th Percentile]

  Use most protective number of LTA_a or LTA_c.

  MDL: 89.97 (2.38) = **214.5 µg/L** [CV = 0.43, 99th Percentile]
  AML: 89.97 (1.38) = **124.6 µg/L** [CV = 0.43, 95th Percentile, n = 4]

Whole Effluent Toxicity

- **Acute Whole Effluent Toxicity**. Monitoring requirement only. The permit writer has determined that this facility has reasonable potential to cause toxicity in the receiving stream.

  Classified P with other than default Mixing Considerations, the AEC% is determined as follows:

  Acute AEC% = $\{[(10.075 + 1.4055) / 10.075]^{-1}\} \times 100 =$ **88%**

- **Chronic Whole Effluent Toxicity**. Monitoring requirement only. The permit writer has determined that this facility has reasonable potential to cause toxicity in the receiving stream.

  (Classified P with other than default Mixing Considerations, the AEC% is determined as follows:

  Chronic AEC% = $\{[(10.075 + 14.055) / 10.075]^{-1}\} \times 100 =$ **42%**

Parameters Removed.

- **Metals**. The previous permit for this facility included monitoring requirements for Total Recoverable Arsenic, Total Recoverable Chromium III, Total Dissolved Chromium VI, Total Recoverable Copper, Total Recoverable Mercury, and Total Recoverable Nickel. Using all applicable data from Discharge Monitoring Reports, the permit writer conducted a Reasonable Potential Analysis on all parameters and determined the facility had no reasonable potential to cause or contribute to an excursion of the standard and has removed these parameters. Please see **APPENDIX – RPA RESULTS**. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

- **Total Residual Chlorine (TRC).** The previous permit contained final effluent limits of 17 µg/L as a daily maximum and 8 µg/L as a monthly average. This facility no longer utilizes chlorination chemicals and there is no indication that the receiving stream has chlorine impairment. The permit writer has made a determination that the discharge does not have the reasonable potential to cause or contribute to an excursion of water quality and has removed the final effluent limits for TRC from this permit. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

- **Total Toxic Organics (TTOs)**. Monitoring for TTOs was established for Categorical Industrial Users discharging to POTWs, including but not limited to, Electroplating (40 CFR 413). The previous permit contained a requirement to sample and report TTOs twice per year. A review of the TTO results over the last permit cycle shows compliance in accordance with 40 CFR 413.14(f). Due to consistency in compliance, the monitoring requirement for TTOs was removed. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

Sampling Frequency Justification: Sampling and Reporting Frequency for BOD_5, TSS, *E. coli*, pH, and Ammonia were reduced from twice per week to once per week. Total Recoverable Lead and Total Recoverable Zinc were increased from once per quarter to once per month. Weekly sampling is required for *E. coli*, per 10 CSR 20-7.015(9)(D)6.A.

WET Test Sampling Frequency Justification. WET Testing schedules and intervals are established in accordance with the Department's Permit Manual; Section 5.2 *Effluent Limits / WET Testing for Compliance Bio-monitoring*. It is recommended that WET testing be conducted during the period of lowest stream flow.

Acute Whole Effluent Toxicity

- ✓ No less than **ONCE/YEAR:**
  - Facility is designated as a Major facility or has a design flow ≥ 1.0 MGD.
  - Facility incorporates a pretreatment program.
  - Facility has Water Quality-based effluent limitations for toxic substances (other than NH_3).

Chronic Whole Effluent Toxicity

- ✓ No less than **ONCE/PERMIT CYCLE:**
  - POTW facilities with a design flow of greater than 1.0 million gallons per day, but less than 10 million gallons per day, shall conduct and submit to the Department a chronic WET test no less than once per five years.

Sampling Type Justification: As per 10 CSR 20-7.015, samples collected for mechanical plants shall be a 24 hour composite sample. Grab samples, however, must be collected for pH, *E. coli*, Oil & Grease, and Chromium, VI in accordance with recommended analytical methods. Federal regulation 40 CFR 122.21(j) requires cyanide samples collected to fulfill application requirements be grab. For further information on sampling and testing methods please review 10 CSR 20-7.015(9)(D) 2.

PERMITTED FEATURE INF – INFLUENT MONITORING

The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

INFLUENT MONITORING TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
BOD_5	mg/L	1			*	***	1/month	monthly	C
TSS	mg/L	1			*	***	1/month	monthly	C
Ammonia as N	mg/L	1	*		*	***	1/month	monthly	C
Total Phosphorus	mg/L	1	*		*	***	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	***	1/month	monthly	C
Nitrite + Nitrate	mg/L	1	*		*	***	1/month	monthly	C

* - Monitoring requirement only.
**** - C = Composite
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

Influent Parameters

- **BOD_5 and TSS**. An influent sample is required to determine the removal efficiency. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia**. Influent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia required per 10 CSR 20-7.015(9)(D)8.

Sampling Frequency Justification: The sampling and reporting frequencies for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia parameters were established to match the required sampling frequency of these parameters in the effluent, per [10 CSR 20-7.015(9)(D)8.]. The sampling and reporting frequencies for influent BOD_5 and TSS have been established to match the required sampling frequency of these parameters in the effluent.

Sampling Type Justification: Sample types for influent parameters were established to match the required sampling type of these parameters in the effluent. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

PERMITTED FEATURE SM1 – INSTREAM MONITORING (UPSTREAM)
The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

MONITORING REQUIREMENTS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Ammonia as N	mg/L	7	*		*	***	1/month	monthly	G
Total Phosphorus	mg/L	7	*		*	***	1/month	monthly	G
Total Kjeldahl Nitrogen	mg/L	7	*		*	***	1/month	monthly	G
Nitrite + Nitrate	mg/L	7	*		*	***	1/month	monthly	G

* - Monitoring requirement only.
**** - G = Grab
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:
1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

PERMITTED FEATURE SM1 – DERIVATION AND DISCUSSION OF MONITORING REQUIREMENTS:

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia**. Facilities with a design flow greater than or equal to one million gallons per day are required to sample their effluent monthly for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate and Ammonia per 10 CSR 20-7.015(9)(D)8. Upstream monitoring for these parameters is necessary to determine background stream concentrations in order to complete calculations that determine instream nutrient loading.

Sampling Frequency Justification: The sampling and reporting frequency for Total Phosphorus and Total Nitrogen (speciated) parameters has been established to match the required sampling frequency of these parameters in the effluent.

Sampling Type Justification: For the purposes of instream data collection, and as the upstream water quality should be consistent over a 24 hour period, grab samples are sufficient. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

PERMITTED FEATURE SM2 – INSTREAM MONITORING (DOWNSTREAM)
The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

MONITORING REQUIREMENTS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Total Hardness	mg/L	1, 3	*		*	***	1/month	monthly	G

* - Monitoring requirement only.
**** - G = Grab
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:
1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

PERMITTED FEATURE SM2 – DERIVATION AND DISCUSSION OF MONITORING REQUIREMENTS:

- **Total Hardness**. Monitoring only requirement as the metals parameters contained in the permit are hardness based. This data will be used in the next permit renewal.

Sampling Frequency Justification: The sampling and reporting frequency for Total Hardness has been established to match the required sampling frequency of the metals parameters in the effluent.

Sampling Type Justification: For the purposes of instream data collection, and as the upstream water quality should be consistent over a 24 hour period, grab samples are sufficient. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

OUTFALL #001 – GENERAL CRITERIA CONSIDERATIONS:

In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into the permit for those pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality. The rule further states that pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above a narrative criterion within an applicable State water quality standard, the permit shall contain a numeric effluent limitation to protect that narrative criterion. In order to comply with this regulation, the permit writer will complete reasonable potential determinations on whether the discharge will violate any of the general criteria listed in 10 CSR 20-7.031(4). These specific requirements are listed below followed by derivation and discussion (the lettering matches that of the rule itself, under 10 CSR 20-7.031(4)). It should also be noted that Section 644.076.1, RSMo as well as Section D – Administrative Requirements of Standard Conditions Part I of this permit states that it shall be unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri that is in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule or regulation promulgated by the commission.

(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses. The discharge from this facility is made up of treated domestic wastewater. Based upon review of the Report of Compliance Inspection for the inspection conducted on March 14, 2016, no evidence of an excursion of this criterion has been observed by the Department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, this facility utilizes secondary treatment technology and is currently in compliance with the secondary treatment technology based effluent limits established in this permit and there has been no indication to the Department that the stream has had issues maintaining beneficial uses as a result of this discharge. Based on the information reviewed during the drafting of this permit, these final effluent limitations appear to have protected against the excursion of this criterion in the past. Therefore, the discharge does not have the reasonable potential to cause or contribute to an excursion of this criterion.

(B) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.

(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.

(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life. This permit contains final effluent limitations which are protective of both acute and chronic toxicity for various pollutants that are either expected to be discharged by domestic wastewater facilities or that were disclosed by this facility on the application for permit coverage. Based on the information reviewed during the drafting of this permit, it has been determined if the facility meets final effluent limitations established in this permit, there is no reasonable potential for the discharge to cause an excursion of this criterion.

(E) Waters shall provide for the attainment and maintenance of water quality standards downstream including waters of another state. Please see (D) above as justification is the same.

(F) There shall be no significant human health hazard from incidental contact with the water. Please see (D) above as justification is the same.

(G) There shall be no acute toxicity to livestock or wildlife watering. Please see (D) above as justification is the same.

(H) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community. Please see (A) above as justification is the same.

(I) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247. The discharge from this facility is made up of treated domestic wastewater. No evidence of an excursion of this criterion has been observed by the Department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, any solid wastes received or produced at this facility are wholly contained in appropriate storage facilities, are not discharged, and are disposed of offsite. This discharge is subject to Standard Conditions Part III, which contains requirements for the management and disposal of sludge to prevent its discharge. Therefore, this discharge does not have reasonable potential to cause or contribute to an excursion of this criterion.

Part VII – Cost Analysis for Compliance

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

- ✓ The Department is required to determine "findings of affordability" because the permit applies to a combined or separate sanitary sewer system for a publically-owned treatment works.

Cost Analysis for Compliance - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3.

The following table summarizes the results of the cost analysis. See **Appendix – Cost Analysis for Compliance** for detailed information.

Summary Table. Cost Analysis for Compliance Summary for the City of Joplin

New Permit Requirements	
Joplin Shoal Creek	
Outfall #001:	Monthly monitoring (influent and effluent) for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test once per permit cycle; and the development of a Stormwater Pollution Prevention Plan (SWPPP)
SM1 (Upstream):	Monthly monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, Nitrites + Nitrates, and Ammonia as N
SM2 (Downstream):	Monitoring for Total Hardness
Joplin Turkey Creek	
Outfall #004:	Monthly monitoring (influent and effluent) for Total Phosphorous, Total Kjeldahl Nitrogen, and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test per permit cycle; and the development of a Stormwater Pollution Prevention Plan (SWPPP)
SM1 (Upstream):	Monthly monitoring for Total Phosphorous, Total Kjeldahl Nitrogen, Nitrites + Nitrates, and Ammonia as N
SM2 (Downstream):	Monitoring for Total Hardness

Estimated Annual Cost	Annual Median Household Income (MHI)	Estimated Monthly User Rate	User Rate as a Percent of MHI
$13,692	$40,024	$37.48	1.12%

Part VIII – Administrative Requirements

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

WATER QUALITY STANDARD REVISION:
In accordance with section 644.058, RSMo, the Department is required to utilize an evaluation of the environmental and economic impacts of modifications to water quality standards of twenty-five percent or more when making individual site-specific permit decisions.

- ✓ This operating permit contains a permit requirement for Total Recoverable Lead and Zinc which water quality criteria has been modified by twenty-five percent or more since the issuance of the previous permit. The change and approval of Lead and Zinc by the EPA is environmentally necessary to ensure the criteria are reflective of the most current science available while protecting the water quality standards of the receiving stream without placing needless and overly burdensome requirements on regulated entities.

PERMIT SYNCHRONIZATION:
The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than 4 years old, that data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit. With permit synchronization, this permit will expire in the 3rd Quarter of calendar year 2022.

PUBLIC NOTICE:
The Department shall give public notice that a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in and water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing. The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit. For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this operating permit was from October 25, 2019 to November 25, 2019. No comments received.

  Following the public notice period, the Sewer Extension Authority Supervised Program was approved and reauthorized by the Department. The final permit for this facility includes the updated special condition and reauthorization letter dated December 18, 2019.

DATE OF FACT SHEET: AUGUST 27, 2019

COMPLETED BY:

ASHLEY KEELY, ENVIRONMENTAL SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT
(573) 751-7326
ASHLEY.KEELY@DNR.MO.GOV

Appendices

APPENDIX - CLASSIFICATION WORKSHEET:

Item	Points Possible	Points Assigned
Maximum Population Equivalent (P.E.) served , peak day	1 pt./10,000 PE or major fraction thereof. (Max 10 pts.)	3.5
Design Flow (avg. day) or peak month's flow (avg. day) whichever is larger	1 pt. / MGD or major fraction thereof. (Max 10 pts.)	6.5
Effluent Discharge		
Missouri or Mississippi River	0	
All other stream discharges except to losing streams and stream reaches supporting whole body contact recreation	1	
Discharge to lake or reservoir outside of designated whole body contact recreational area	2	
Discharge to losing stream, or stream, lake or reservoir area supporting whole body contact recreation	3	3
Direct reuse or recycle of effluent	6	
Land Application/Irrigation		
Drip Irrigation	3	
Land application/irrigation	5	
Overland flow	4	
Variation in Raw Wastes (highest level only)		
Variations do not exceed those normally or typically expected	0	
Reoccurring deviations or excessive variations of 100 to 200 percent in strength and/or flow	2	2
Reoccurring deviations or excessive variations of more than 200 percent in strength and/or flow	4	
Department-approved pretreatment program	6	6
Preliminary Treatment		
STEP systems (operated by the permittee)	3	
Screening and/or comminution	3	3
Grit removal	3	3
Plant pumping of main flow	3	
Flow equalization	5	
Primary Treatment		
Primary clarifiers	5	5
Chemical addition (except chlorine, enzymes)	4	
Secondary Treatment		
Trickling filter and other fixed film media with or without secondary clarifiers	10	10
Activated sludge (including aeration, oxidation ditches, sequencing batch reactors, membrane bioreactors, and contact stabilization)	15	15
Stabilization ponds without aeration	5	
Aerated lagoon	8	
Advanced Lagoon Treatment – Aerobic cells, anaerobic cells, covers, or fixed film	10	
Biological, physical, or chemical	12	
Carbon regeneration	4	
Total from page **ONE (1)**	----	57

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Solids Handling		
Sludge Holding	5	5
Anaerobic digestion	10	10
Aerobic digestion	6	6
Evaporative sludge drying	2	
Mechanical dewatering	8	
Solids reduction (incineration, wet oxidation)	12	
Land application	6	6
Disinfection		
Chlorination or comparable	5	
On-site generation of disinfectant (except UV light)	5	
Dechlorination	2	
UV light	4	4
Required Laboratory Control Performed by Plant Personnel (highest level only)		
Lab work done outside the plant	0	
Push – button or visual methods for simple test such as pH, settleable solids	3	
Additional procedures such as DO, COD, BOD, titrations, solids, volatile content	5	
More advanced determinations, such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	7	7
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	
Total from page **TWO (2)**	----	38
Total from page **ONE (1)**	---	57
Grand Total	---	95

☒ - A: 71 points and greater
☐ - B: 51 points – 70 points
☐ - C: 26 points – 50 points
☐ - D: 0 points – 25 points

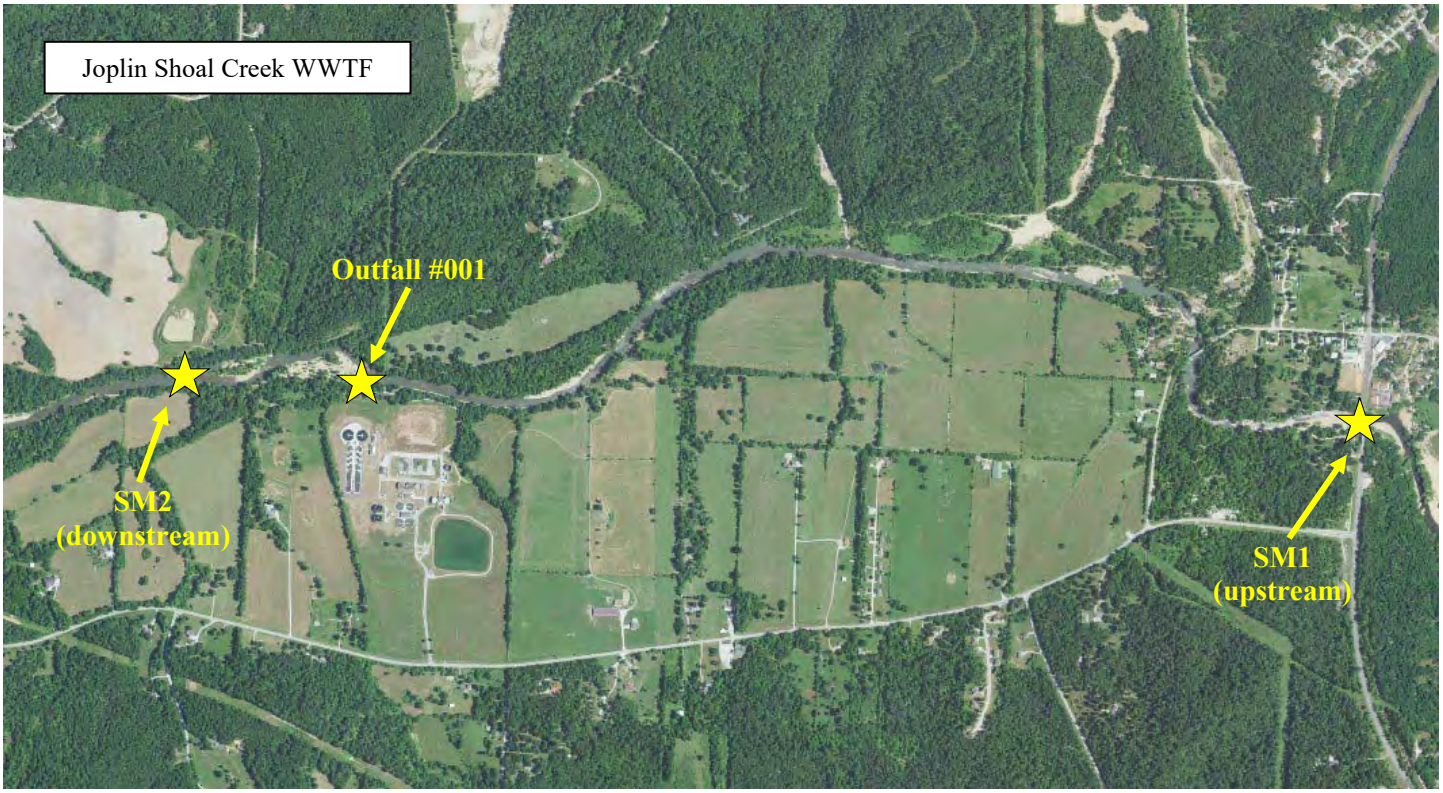
APPENDIX – RPA RESULTS:

Parameter	CMC*	RWC Acute*	CCC*	RWC Chronic*	n**	Range max/min	CV***	MF	RP Yes/No
Total Ammonia as Nitrogen (Summer) (mg/L)	12.1	41.42	1.5	17.86	16	5.75/0.117	2.00	8.14	YES
Total Ammonia as Nitrogen (Winter) (mg/L)	12.1	80.85	3.1	34.87	18	14.6/0.1	1.70	6.26	YES
Arsenic, Total Recoverable (µg/L)	340.0	0.70	150.0	0.34	11	0.55/0.25	0.3	1.46	NO
Cadmium, Total Recoverable (µg/L)	8.7	1.68	1.2	0.80	42	0.86/0.04	1.01	2.22	NO
Chromium III, Total Recoverable (µg/L)	2784.7	1.61	133.1	0.77	11	0.86/0.25	0.53	2.14	NO
Chromium IV, Total Dissolved (µg/L)	15.0	5.48	10.0	2.60	11	5/2.5	0.28	1.25	NO
Copper, Total Recoverable (µg/L)	23.1	15.11	14.7	7.18	11	6.2/1.3	0.57	2.78	NO
Lead, Total Recoverable (µg/L)	160.4	33.9	6.3	16.12	11	3.2/0.019	2.18	12.08	YES
Mercury, Total Recoverable (µg/L)	1.65	0.09	0.8	0.04	11	0.1/0.1	0.0	1.00	NO
Nickel, Total Recoverable (µg/L)	735.5	4.85	81.7	2.30	11	3.4/1.7	0.26	1.62	NO
Zinc, Total Recoverable (µg/L)	184.1	258.0	186.7	122.65	42	190/35	0.43	1.55	YES
Cyanide, Amenable to Chlorination (µg/L)	22.0	1.75	5.0	0.83	11	2/2	0.0	1.00	NO

N/A – Not Applicable
* - Units are (µg/L) unless otherwise noted.
** - If the number of samples is 10 or greater, then the CV value must be used in the WQBEL for the applicable constituent. If the number of samples is < 10, then the default CV value must be used in the WQBEL for the applicable constituent.
*** - Coefficient of Variation (CV) is calculated by dividing the Standard Deviation of the sample set by the Mean of the same sample set.
RWC – Receiving Water Concentration. It is the concentration of a toxicant or the parameter toxicity in the receiving water after mixing (if applicable).
n – Is the number of samples.
MF – Multiplying Factor. 99% Confidence Level and 99% Probability Basis.
RP – Reasonable Potential. It is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Reasonable Potential Analysis is conducted as per (TSD, EPA/505/2-90-001, Section 3.3.2). A more detailed version including calculations of this RPA is available upon request.

APPENDIX – ALTERNATIVE:



APPENDIX – COST ANALYSIS FOR COMPLIANCE:

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

Joplin Shoal Creek and Turkey Creek WWTF, Permit Renewal
City of Joplin
Missouri State Operating Permit #MO-0023256

Section 644.145 RSMo requires the Department of Natural Resources (Department) to make a "finding of affordability" when "issuing permits under" or "enforcing provisions of" state or federal clean water laws "pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works." This cost analysis does not dictate how the permittee will comply with new permit requirements.

New Permit Requirements

Joplin Shoal Creek

Outfall #001: Monthly monitoring (influent and effluent) for Total Phosphorus, Total Kjeldahl Nitrogen (TKN), and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test once per permit cycle; final effluent limitations for Lead, TR; and the development of a Stormwater Pollution Prevention Plan (SWPPP)

SM1 (Upstream): Monthly monitoring for Total Phosphorus, TKN, Nitrites + Nitrates, and Ammonia as N

SM2 (Downstream): Monthly monitoring for Total Hardness

Joplin Turkey Creek

Outfall #004: Monthly monitoring (influent and effluent) for Total Phosphorous, TKN, and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test per permit cycle; and the development of a SWPPP

SM1 (Upstream): Monthly monitoring for Total Phosphorous, TKN, Nitrites + Nitrates, and Ammonia as N

SM2 (Downstream): Monthly monitoring for Total Hardness

Connections
The number of connections was obtained from the Department's fee tracking website.

Connection Type	Joplin Shoal Creek	Joplin Turkey Creek	Total
Residential	4,728	14,185	18,913
Commercial	540	1,621	2,161
Industrial	16	48	64
Total	**5,284**	**15,854**	**21,138**

Data Collection for this Analysis
This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City's financial and socioeconomic situation. The financial questionnaire available to permittees on the Department's website (http://dnr.mo.gov/forms/780-2511-f.pdf) is a required attachment to the permit renewal application. If the financial questionnaire is not submitted with the renewal application, the Department sends a request to complete the form with the welcome correspondence. If certain data was not provided by the permittee to the Department and the data is not obtainable through readily available sources, this analysis will state that the information is "unknown".

Eight Criteria of 644.145 RSMo
The Department must consider the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with new permit requirements.

(1) A community's financial capability and ability to raise or secure necessary funding;

Criterion 1 Table. Current Financial Information for the City of Joplin	
Current Monthly User Rates per 5,000 gallons*	$37.43
Median Household Income (MHI)[1]	$40,024
Current Annual Operating Costs (excludes depreciation)	Unknown

*User Rates were obtained from the 2018 Missouri Public Utility Alliance Water and Wastewater Rate Survey.

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

The following tables outline the estimated costs of the new permit requirements:

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Joplin Shoal Creek			
Total Phosphorus sampling (influent, effluent, and instream)	Monthly	$24	$864
Total Kjeldahl Nitrogen sampling (influent, effluent, and instream)	Monthly	$33	$1,188
Nitrites sampling (influent, effluent, and instream)	Monthly	$20	$720
Nitrates sampling (influent, effluent, and instream)	Monthly	$20	$720
Ammonia as N sampling (influent and instream)	Monthly	$20	$480
Total Hardness sampling	Monthly	$47	$564
Chronic WET test	Once every 5 years	$1,550	$310
SWPPP	Costs estimated for 5 years	$10,000	$2,000
Estimated Annual Cost of New Permit Requirements for Joplin Shoal Creek			$6,846
Joplin Turkey Creek			
Total Phosphorus sampling (influent, effluent, and instream)	Monthly	$24	$864
Total Kjeldahl Nitrogen (influent, effluent, and instream)	Monthly	$33	$1,188
Nitrites (influent, effluent, and instream)	Monthly	$20	$720
Nitrates (influent, effluent, and instream)	Monthly	$20	$720
Ammonia as N (influent and instream)	Monthly	$20	$480
Total Hardness (downstream)	Monthly	$47	$564
Chronic WET test	Once every 5 years	$1,550	$310
SWPPP	Costs estimated for 5 years	$10,000	$2,000
Estimated Annual Cost of New Permit Requirements for Joplin Turkey Creek			$6,846
Total Estimated Annual Cost of New Permit Requirements			**$13,692**

The permit for Joplin Shoal Creek also includes final effluent limitations for Lead, TR. A review of effluent data submitted to the department illustrates the facility is currently in compliance with the new effluent limitations and as a result, as a result, there is not expected to be a cost associated with this new requirement.

Criterion 2B Table. Estimated Costs for New Permit Requirements		
(1)	Estimated Annual Cost	$13,692
(2)	Estimated Monthly User Cost for New Requirements	$0.05
	Estimated Monthly User Cost for New Requirements as a Percent of MHI[2]	0.002%
(3)	Total Monthly User Cost*	$37.48
	Total Monthly User Cost as a Percent of MHI[3]	1.12%

* Current User Rate + Estimated Monthly Costs of New Sampling Requirements

Due to the minimal cost associated with new permit requirements, the Department anticipates an extremely low to no rate increase will be necessary, which could impact individuals or households of this community.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

This analysis is being conducted based on new requirements in the permit, which will not require the addition of new control technologies at the facility. However, the new sampling requirements are being established in order to provide data regarding the health of the receiving stream's aquatic life and to ensure that the existing permit limits are providing adequate protection of aquatic life. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the surrounding communities. Maintaining Missouri's water quality standards fulfills the goal of restoring and maintaining the chemical, physical, and biological integrity of the receiving stream; and, where attainable, it achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

Nutrient Monitoring
Nutrients are mineral compounds that are required for organisms to grow and thrive. Of the six (6) elemental macronutrients, nitrogen and phosphorus are generally not readily available and limit growth of organisms. Excess nitrogen and phosphorus will cause a shift in the ecosystem's food web. Once excess nitrogen and phosphorous are introduced into a waterbody, some species' populations will dramatically increase, while other populations will not be able to sustain life. Competition and productivity are two factors in which nutrients can alter aquatic ecosystems and the designated uses of a waterbody. For example, designated uses, such as drinking water sources and recreational uses, become impaired when algal blooms take over a waterbody. These blooms can cause foul tastes and odors in the drinking water, unsightly appearance, and fish mortality in the waterbody. Some algae also produce toxins that may cause serious adverse health conditions such as liver damage, tumor promotion, paralysis, and kidney damage. The monitoring requirements for nitrogen and phosphorus have been added to the permit to provide data regarding the health of the receiving stream's aquatic life. A healthy ecosystem is beneficial as it provides reduced impacts on human and aquatic health as well as recreational opportunities.

Stormwater Pollution Prevention Plan (SWPPP)
Stormwater runoff is water from rain or snowmelt that does not immediately infiltrate into the ground and flows over or through natural or man-made storage or conveyance systems. When undeveloped areas are converted to land uses with impervious surfaces such as buildings, parking lots, and roads, the natural hydrology of the land is altered and can result in increased surface runoff rates, volumes, and pollutant loads. Stormwater runoff picks up industrial pollutants and typically discharges them directly into nearby waterbodies or indirectly via storm sewer systems. Runoff from areas where industrial activities occur can contain toxic pollutants (e.g., heavy metals and organic chemicals) and other pollutants such as trash, debris, and oil and grease, when facility practices allow exposure of industrial materials to stormwater. This increased flow and pollutant load can impair waterbodies, degrade biological habitats, pollute drinking water sources, and cause flooding and hydrologic changes to the receiving water, such as channel erosion. Industrial facilities typically perform a portion of their activities in outdoor areas exposed to the elements. This may include activities such as material storage and handling, vehicle fueling and maintenance, shipping and receiving, and salt storage, all of which can result in pollutants being exposed to precipitation and capable of being carried off in stormwater runoff. Also, facilities may have performed industrial activities outdoors in the past and materials from those activities still remain exposed to precipitation. In addition, accidental spills and leaks, improper waste disposal, and illicit connections to storm sewers may also lead to exposure of pollutants to stormwater.

A SWPPP is a written document that identifies the industrial activities conducted at the site, including any structural control practices, which the industrial facility operator will implement to prevent pollutants from making their way into stormwater runoff. The SWPPP also must include descriptions of other relevant information, such as the physical features of the facility, and procedures for spill prevention, conducting inspections, and training of employees. The SWPPP is intended to be a "living" document, updated as necessary, such that when industrial activities or stormwater control practices are modified or replaced, the SWPPP is similarly revised to reflect these changes.

Whole Effluent Toxicity (WET) test
The WET Test is a quantifiable method of determining if discharge from a facility may be causing toxicity to aquatic life by itself or in combination with receiving stream water. WET tests are required under 10 CSR 20-6.010(8)(A)4 to be performed by specialists properly trained in conducting the test according to 40 CFR 136. This test will help ensure that the existing permit limits are providing adequate protection for aquatic life.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The community did not provide the Department with updated information, nor could it be found through readily available data.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

(a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
(b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

The following table characterizes the current overall socioeconomic condition of the community as compared to the overall socioeconomic condition of Missouri. The following information was compiled using the latest U.S. Census data.

Criterion 5 Table. Socioeconomic Data [1, 5-9] for the City of Joplin

No.	Administrative Unit	Joplin City	Missouri State
1	Population (2016)	51,231	6,059,651
2	Percent Change in Population (2000-2016)	12.6%	8.3%
3	2016 Median Household Income (in 2017 Dollars)	$40,024	$50,417
4	Percent Change in Median Household Income (2000-2016)	-7.3%	-5.9%
5	Median Age (2016)	36.5	38.3
6	Change in Median Age in Years (2000-2016)	1.8	2.2
7	Unemployment Rate (2016)	7.4%	6.6%
8	Percent of Population Below Poverty Level (2016)	18.5%	15.3%
9	Percent of Household Received Food Stamps (2016)	17.7%	13.0%
10	(Primary) County Where the Community Is Located	Jasper County	

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The community did not report any other investments relating to environmental improvements.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

The new requirements associated with this permit will not impose a financial burden on the community, nor will they require the City of Joplin to seek funding from an outside source.

(8) An assessment of any other relevant local community economic conditions.

The community did not report any other relevant local economic conditions.

Conclusion and Finding

As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the permittee to increase monitoring. The Department has considered the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with the new permit requirements.

This analysis examined whether the new sampling requirements affect the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. After reviewing the above criteria, the Department finds that the new sampling requirements may result in a low burden with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References

1. (A) 2016 MHI in 2016 Dollar: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars). http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B19013&prodType=table.
   (B) 2000 MHI in 1999 Dollar: U.S. Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) 2017 CPI, 2016 CPI and 1999 CPI: For United States, United States Bureau of Labor Statistics (2017) Consumer Price Index - All Urban Consumers, United States City Average. All Items. 1982-84=100. http://data.bls.gov/timeseries/CUUR0000SA0?data_tool=Xgtable. For Missouri State: United States Bureau of Labor Statistics (2017) Consumer Price Index - All Urban Consumers, Midwest Urban Areas, All Items. 1982-84=100. http://data.bls.gov/timeseries/CUUR0200SA0?data_tool=Xgtable.
   (D) 2016 MHI in 2017 Dollar: 2016 MHI in 2016 Dollar x 2017 CPI /2016 CPI; 2000 MHI in 2017 Dollar: 2000 MHI in 1999 Dollar x 2017 CPI /1999 CPI.
   (E) Percent Change in Median Household Income (2000-2016) = (2016 MHI in 2017 Dollar - 2000 MHI in 2017 Dollar) / (2000 MHI in 2017 Dollars).
2. (13,692/21,138)/12 = $0.05 (Estimated Monthly User Cost for New Requirements)
3. (0.05/($40,024/12))100% = 0.002% (New Sampling Only)
4. (37.48/($40,024/12))100% = 1.12% (Total User Cost)
5. (A) Total Population in 2016: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B01003&prodType=table.
   (B) Total Population in 2000: U.S. Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) Percent Change in Population (2000-2016) = (Total Population in 2016 - Total Population in 2000) / (Total Population in 2000).
6. (A) Median Age in 2016: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B01002&prodType=table.
   (B) Median Age in 2000: For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC., Page 2. https://www.census.gov/prod/cen2000/phc-1-1-pt1.pdf. For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC., Pages 64-92. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) Change in Median Age in Years (2000-2016) = (Median Age in 2016 - Median Age in 2000).
7. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, B23025: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B23025&prodType=table.
8. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1701&prodType=table.
9. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B22003: Receipt of Food Stamps/SNAP in the Past 12 Months by Poverty Status in the Past 12 Months for Households - Universe: Households. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B22003&prodType=table.

APPENDIX – SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM REAUTHORIZATION LETTER

Missouri Department of
NATURAL RESOURCES
Michael L. Parson, Governor — Carol S. Comer, Director

DEC 18 2019

Mr. David Hertzberg, P.E.
Public Works Director
602 S. Main Street
Joplin, MO 64801

RE: Sewer Extension Authority Supervised Program Reauthorization – Joplin- Turkey Creek WWTF, MO-0103349, Jasper County and Joplin-Shoal Creek WWTF, Newton County, ACT#450

Dear Mr. Herzberg:

The Missouri Department of Natural Resources' Water Protection Program has reevaluated the city of Columbia's Sewer Extension Authority Supervised Program (Program) and approved the reauthorization per 10 CSR 20-6.010(6). This Program delegate's administrative responsibility of construction sewer extension permits to the city of Joplin and reporting requirements are included in the associated Missouri State Operating Permits (MSOP).

The Program for city of Joplin shall apply to construction permits for sewer extensions that discharge to the following MSOP:

- MO-0103349 [Joplin-Turkey Creek WWTF]
- MO-0023256 [Joplin-Shoal Creek WWTF]

The city of Joplin shall act as the continuing authority for the constructed collection system.

This approval is granted until it is reauthorized during the operating permit renewal. Enclosed are the Program conditions, annual reporting requirements, and renewal reauthorization requirements. The Program annual report must be submitted to the Department by March 31 of each year.

This reauthorization does not supersede any requirements of the operating permit or enforcement actions. Nothing in this reauthorization removes any obligations to comply with county or other local ordinances or restrictions.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250, RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier.

If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is: Administrative Hearing Commission, United States Post Office Bldg., Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102, Phone: 573-751-2422, Fax: 573-751-5018, and Website: www.oa.mo.gov/ahc.

If you have any questions concerning this matter, please contact Ms. Leasue Meyers, of the Water Protection Program by phone at 573-751-7906 or by mail at Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

Thank you for your efforts to help ensure clean water in Missouri.

Sincerely,

WATER PROTECTION PROGRAM

Chris Wieberg
Director

CW:lmt

Enclosure

c: Mr. Dan Johnson, PE, Assistant Director of Public Works
Mr. Chris Parker, PE, City of Joplin
Ms. Ashley Keely, Wastewater Unit

City of Joplin
Page One

Activity No. ACT450

SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM REAUTHORIZATION

I. CONDITIONS:

1. This approval is limited to sewer extensions proposed within the city of Joplin boundaries for which the receiving wastewater treatment facility is owned, operated, and maintained by the city of Joplin

2. Upon completion of accepted construction, the city of Joplin will become the continuing authority for the operation, maintenance, and modernization of the sewer extension.

3. Additional requirements may be necessary to comply with the requirements contained in 10 CSR 20-4, "Grants and Loans" when funding from the Department is requested.

4. Any updates to the city of Joplin's Standard Specifications and Drawings, dated May 2019 will require a subsequent review and approval by the Department.

   A. This approval is limited to only wastewater components. Other items contained in this standard specification and details such as drinking water, roadways, structural, mechanical, electrical, etc. were not reviewed.

5. This approval may be reopened and modified to comply with any new or amended design regulations in 10 CSR 20-6.010 and 10 CSR 20-8.

II. ANNUAL REPORTS:

The city of Joplin must submit an annual report by March 31st of each year to the Engineering Section. The electronic submittals may be emailed to DNR.WPPEngineerSection@dnr.mo.gov. The report shall contain the following for each sewer extension, per 10 CSR 20-6.010(6)(D)1:

1. Name of sewer extension;
2. Type of wastewater (i.e. domestic or industrial);
3. Design flow in gallons per day;
4. Length of sewer and force main;
5. Capacity of each pump station, if applicable;
6. Date sewer extension permit is issued;
7. Dates of leakage and deflection tests passing;

8. Dates of city of Joplin construction inspections;
9. Date sewer extension construction is accepted; and
10. The remaining capacity of the wastewater treatment facility.

III. REAUTHORIZATION REQUEST:

The city of Joplin must submit a request for reauthorization to the Engineering Section at least 180 days prior to expiration date of the Joplin-Turkey Creek WWTF operating permit. The request shall contain the following, per 10 CSR 20-6.010(6)(E):

1. The current standard technical specifications and typical detail drawings signed, sealed, and dated by a Missouri registered professional engineer.

2. A current layout map, or maps, of the collection system or electronic demonstration. The map(s) shall show sewer sizes and lengths, manholes, cleanouts, pump stations, force mains, air release valves, other sewer appurtenances as necessary, and street names.

3. A list and current number of Missouri registered professional engineers and other qualified staff reviewing plans, issuing sewer extension permits, preparing reports, inspecting construction, and enforcing local and state requirements under the Program.

4. A written statement from the city of Joplin ensuring that permanent plans of all permitted and constructed sewer extensions records are maintained.

Leasue Meyers, EI
Engineering Section
leasue.meyers@dnr.mo.gov

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

Part I – General Conditions

Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
   a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
   b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.

2. **Monitoring Requirements**.
   a. Records of monitoring information shall include:
      i. The date, exact place, and time of sampling or measurements;
      ii. The individual(s) who performed the sampling or measurements;
      iii. The date(s) analyses were performed;
      iv. The individual(s) who performed the analyses;
      v. The analytical techniques or methods used; and
      vi. The results of such analyses.
   b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.

3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

4. **Test Procedures**. The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is "sufficiently sensitive" when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.

5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
   a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
   b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

Section B – Reporting Requirements

1. **Planned Changes.**
   a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
      i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
      ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
      iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
      iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.

2. **Non-compliance Reporting.**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

b. The following shall be included as information which must be reported within 24 hours under this paragraph.
   i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
   ii. Any upset which exceeds any effluent limitation in the permit.
   iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.

c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.

3. **Anticipated Noncompliance**. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.

4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.

5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.

6. **Other Information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

7. **Discharge Monitoring Reports.**
   a. Monitoring results shall be reported at the intervals specified in the permit.
   b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
   c. Monitoring results shall be reported to the Department no later than the 28th day of the month following the end of the reporting period.

Section C – Bypass/Upset Requirements

1. **Definitions.**
   a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
   b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
   c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. **Bypass Requirements.**
   a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.
   b. Notice.
      i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
      ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
   c. Prohibition of bypass.
      i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
         1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
         3. The permittee submitted notices as required under paragraph 2. b. of this section.
      ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.

3. **Upset Requirements.**
   a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
   b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      ii. The permitted facility was at the time being properly operated; and
      iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
   c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
   a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
   b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement

imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed $10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

2. **Duty to Reapply.**
   a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
   b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
   c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. **Proper Operation and Maintenance**. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

6. **Permit Actions.**
   a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
      i. Violations of any terms or conditions of this permit or the law;
      ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
      iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
      iv. Any reason set forth in the Law or Regulations.
   b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. **Permit Transfer.**
   a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
   b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
   c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.

8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
    a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
    d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

12. **Closure of Treatment Facilities.**
    a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
    b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.

13. **Signatory Requirement.**
    a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
MAY 1, 2013

PART II - SPECIAL CONDITIONS – PUBLICLY OWNED TREATMENT WORKS
SECTION A – INDUSTRIAL USERS

1. Definitions

Definitions as set forth in the Missouri Clean Water Laws and approved by the Missouri Clean Water Commission shall apply to terms used herein.

Significant Industrial User (SIU). Except as provided in the *General Pretreatment Regulation* 10 CSR 20-6.100, the term Significant Industrial User means:

1. All Industrial Users subject to Categorical Pretreatment Standards; and
2. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the Publicly-Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's or for violating any Pretreatment Standard or requirement.

Clean Water Act (CWA) is the the federal Clean Water Act of 1972, 33 U.S.C. § 1251 et seq. (2002).

2. Identification of Industrial Discharges

Pursuant to 40 CFR 122.44(j)(1), all POTWs shall identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging to the POTW subject to Pretreatment Standards under section 307(b) of the CWA and 40 CFR 403.

3. Application Information

Applications for renewal or modification of this permit must contain the information about industrial discharges to the POTW pursuant to 40 CFR 122.21(j)(6)

4. Notice to the Department

Pursuant to 40 CFR 122.42(b), all POTWs must provide adequate notice of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging these pollutants; and
2. Any substantial change into the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For purposes of this paragraph, adequate notice shall include information on:
   i. the quality and quantity of effluent introduced into the POTW, and
   ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

For POTWs without an approved pretreatment program, the notice of industrial discharges which was not included in the permit application shall be made as soon as practicable. For POTWs with an approved pretreatment program, notice is to be included in the annual pretreatment report required in the special conditions of this permit. Notice may be sent to:

Missouri Department of Natural Resources
Water Protection Program
Attn: Pretreatment Coordinator
P.O. Box 176
Jefferson City, MO 65102

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
August 1, 2019

PART III – BIOSOLIDS AND SLUDGE FROM DOMESTIC TREATMENT FACILITIES

SECTION A – GENERAL REQUIREMENTS

1. PART III Standard Conditions pertain to biosolids and sludge requirements under the Missouri Clean Water Law and regulations for domestic and municipal wastewater and also incorporates federal sludge disposal requirements under 40 CFR Part 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR Part 503 for domestic biosolids and sludge.
2. PART III Standard Conditions apply only to biosolids and sludge generated at domestic wastewater treatment facilities, including public owned treatment works (POTW) and privately owned facilities.
3. Biosolids and Sludge Use and Disposal Practices:
    a. The permittee is authorized to operate the biosolids and sludge generating, treatment, storage, use, and disposal facilities listed in the facility description of this permit.
    b. The permittee shall not exceed the design sludge/biosolids volume listed in the facility description and shall not use biosolids or sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
    c. For facilities operating under general operating permits that incorporate Standard Conditions PART III, the facility is authorized to operate the biosolids and sludge generating, treatment, storage, use and disposal facilities identified in the original operating permit application, subsequent renewal applications or subsequent written approval by the department.
4. Biosolids or Sludge Received from other Facilities:
    a. Permittees may accept domestic wastewater biosolids or sludge from other facilities as long as the permittee's design sludge capacity is not exceeded and the treatment facility performance is not impaired.
    b. The permittee shall obtain a signed statement from the biosolids or sludge generator or hauler that certifies the type and source of the sludge
5. Nothing in this permit precludes the initiation of legal action under local laws, except to the extent local laws are preempted by state law.
6. This permit does not preclude the enforcement of other applicable environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable biosolids or sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act or under Chapter 644 RSMo.
8. In addition to Standard Conditions PART III, the Department may include biosolids and sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Exceptions to Standard Conditions PART III may be authorized on a case-by-case basis by the Department, as follows:
    a. The Department may modify a site-specific permit following permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR § 124.10, and 40 CFR § 501.15(a)(2)(ix)(E).
    b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR Part 503.

SECTION B – DEFINITIONS

1. Best Management Practices are practices to prevent or reduce the pollution of waters of the state and include agronomic loading rates (nitrogen based), soil conservation practices, spill prevention and maintenance procedures and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food, feed or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR Part 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with 40 CFR Part 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Feed crops are crops produced primarily for consumption by animals.
8. Fiber crops are crops such as flax and cotton.
9. Food crops are crops consumed by humans which include, but is not limted to, fruits, vegetables and tobacco.
10. Industrial wastewater means any wastewater, also known as process wastewater, not defined as domestic wastewater. Per 40 CFR Part 122.2, process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. Land application of industrial wastewater, residuals or sludge is not authorized by Standard Conditions PART III.
11. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological contact systems, and other similar facilities. It does not include wastewater treatment lagoons or constructed wetlands for wastewater treatment.
12. Plant Available Nitrogen (PAN) is nitrogen that will be available to plants during the growing seasons after biosolids application.
13. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
14. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs), sewage sludge incinerator ash, or grit/screenings generated during preliminary treatment of domestic sewage.
15. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen or concrete lined basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
16. Septage is the sludge pumped from residential septic tanks, cesspools, portable toilets, Type III marine sanitation devices, or similar treatment works such as sludge holding structures from residential wastewater treatment facilities with design populations of less than 150 people. Septage does not include grease removed from grease traps at a restaurant or material removed from septic tanks and other similar treatment works that have received industrial wastewater. The standard for biosolids from septage is different from other sludges. See Section H for more information.

SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES

1. Biosolids or sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and the requirements of Standard Conditions PART III or in accordance with Section A.3.c., above.
2. The permittee shall operate storage and treatment facilities, as defined by Section 644.016(23), RSMo, so that there is no biosolids or sludge discharged to waters of the state. Agricultural storm water discharges are exempt under the provisions of Section 644.059, RSMo.
3. Mechanical treatment plants shall have separate biosolids or sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove biosolids or sludge from these storage compartments on the required design schedule is a violation of this permit.

SECTION D – BIOSOLIDS OR SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR BY CONTRACT HAULER

1. Permittees that use contract haulers, under the authority of their operating permit, to dispose of biosolids or sludge, are responsible for compliance with all the terms of this permit. Contract haulers that assume the responsibility of the final disposal of biosolids or sludge, including biosolids land application, must obtain a Missouri State Operating Permit unless the hauler transports the biosolids or sludge to another permitted treatment facility.
2. Testing of biosolids or sludge, other than total solids content, is not required if biosolids or sludge are hauled to a permitted wastewater treatment facility, unless it is required by the accepting facility.

SECTION E – INCINERATION OF SLUDGE

1. Please be aware that sludge incineration facilities may be subject to the requirements of 40 CFR Part 503 Subpart E, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or, if the ash is determined to be hazardous, with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, mass of sludge incinerated and mass of ash generated. Permittee shall also provide the name of the ash disposal facility and permit number if applicable.

SECTION F – SURFACE DISPOSAL SITES AND BIOSOLIDS AND SLUDGE LAGOONS

1. Please be aware that surface disposal sites of biosolids or sludge from wastewater treatment facilities may be subject to other laws including the requirements in 40 CFR Part 503 Subpart C, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Biosolids or sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain biosolids or sludge storage lagoons as storage facilities, accumulated biosolids or sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of biosolids or sludge removed will be dependent on biosolids or sludge generation and accumulation in the facility. Enough biosolids or sludge must be removed to maintain adequate storage capacity in the facility.
    a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of biosolids or sludge on the bottom of the lagoon, upon prior approval of the Department; or
    b. Permittee shall close the lagoon in accordance with Section I.

SECTION G – LAND APPLICATION OF BIOSOLIDS

1. The permittee shall not land apply biosolids unless land application is authorized in the facility description, the special conditions of the issued NPDES permit, or in accordance with Section A.3.c., above.
2. This permit only authorizes "Class A" or "Class B" biosolids derived from domestic wastewater to be land applied onto grass land, crop land, timber, or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
3. Class A Biosolids Requirements: Biosolids shall meet Class A requirements for application to public contact sites, residential lawns, home gardens or sold and/or given away in a bag or other container.
4. Class B biosolids that are land applied to agricultural and public contact sites shall comply with the following restrictions:
    a. Food crops that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of biosolids.
    b. Food crops below the surface of the land shall not be harvested for 20 months after application of biosolids when the biosolids remain on the land surface for four months or longer prior to incorporation into the soil.
    c. Food crops below the surface of the land shall not be harvested for 38 months after application of biosolids when the biosolids remain on the land surface for less than four months prior to incorporation into the soil.
    d. Animal grazing shall not be allowed for 30 days after application of biosolids.
    e. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of biosolids.
    f. Turf shall not be harvested for one year after application of biosolids if used for lawns or high public contact sites in close proximity to populated areas such as city parks or golf courses.
    g. After Class B biosolids have been land applied to public contact sites with high potential for public exposure, as defined in 40 CFR § 503.31, such as city parks or golf courses, access must be restricted for 12 months.
    h. After Class B biosolids have been land applied public contact sites with low potential for public exposure as defined in 40 CFR § 503.31, such as a rural land application or reclamation sites, access must be restricted for 30 days.

5. Pollutant limits
    a. Biosolids shall be monitored to determine the quality for regulated pollutants listed in Table 1, below. Limits for any pollutants not listed below may be established in the permit.
    b. The number of samples taken is directly related to the amount of biosolids or sludge produced by the facility (See Section J, below). Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to achieve pollutant concentration below those identified in Table 1, below.
    c. Table 1 gives the ceiling concentration for biosolids. Biosolids which exceed the concentrations in Table 1 may not be land applied.

TABLE 1

Biosolids ceiling concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

d. Table 2 below gives the low metal concentration for biosolids. Because of its higher quality, biosolids with pollutant concentrations below those listed in Table 2 can safely be applied to agricultural land, forest, public contact sites, lawns, home gardens or be given away without further analysis. Biosolids containing metals in concentrations above the low metals concentrations but below the ceiling concentration limits may be land applied but shall not exceed the annual loading rates in Table 3 and the cumulative loading rates in Table 4. The permittee is required to track polluntant loading onto application sites for parameters that have exceeded the low metal concentration limits.

TABLE 2

Biosolids Low Metal Concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2,800

e. Annual pollutant loading rate.

Table 3

Biosolids Annual Loading Rate	
Pollutant	Kg/ha (lbs./ac) per year
Arsenic	2.0 (1.79)
Cadmium	1.9 (1.70)
Copper	75 (66.94)
Lead	15 (13.39)
Mercury	0.85 (0.76)
Nickel	21 (18.74)
Selenium	5.0 (4.46)
Zinc	140 (124.96)

f. Cumulative pollutant loading rates.

Table 4

Biosolids Cumulative Pollutant Loading Rate	
Pollutant	Kg/ha (lbs./ac)
Arsenic	41 (37)
Cadmium	39 (35)
Copper	1500 (1339)
Lead	300 (268)
Mercury	17 (15)
Nickel	420 (375)
Selenium	100 (89)
Zinc	2800 (2499)

6. Best Management Practices. The permittee shall use the following best management practices during land application activities to prevent the discharge of biosolids to waters of the state.
   a. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under § 4 of the Endangered Species Act or its designated critical habitat.
   b. Apply biosolids only at the agronomic rate of nitrogen needed (see 5.c. of this section).
   c. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop

nitrogen removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kgTN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.

i. PAN can be determined as follows:

(Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).

[1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis.

ii. Crop nutrient production/removal to be based on crop specific nitrogen needs and realistic yield goals. **NOTE**: There are a number of reference documents on the Missouri Department of Natural Resources website that are informative to implement best management practices in the proper management of biosolids, including crop specific nitrogen needs, realistic yields on a county by county basis and other supporting references.

iii. Biosolids that are applied at agronomic rates shall not cause the annual pollutant loading rates identified in Table 3 to be exceeded.

d. Buffer zones are as follows:

i. 300 feet of a water supply well, sinkhole, water supply reservoir or water supply intake in a stream;

ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstandingstate resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;

iii. 150 feet of dwellings or public use areas;

iv. 100 feet (35 feet if biosolids application is down-gradient or the buffer zone is entirely vegetated) of lake, pond, wetlands or gaining streams (perennial or intermittent);

v. 50 feet of a property line. Buffer distances from property lines may be waived with written permission from neighboring property owner.

vi. For the application of dry, cake or liquid biosolids that are subsurface injected, buffer zones identified in 5.d.i. through 5.d.iii above, may be reduced to 100 feet. The buffer zone may be reduced to 35 feet if the buffer zone is permanently vegetated. Subsurface injection does not include methods or technology reflective of combination surface/shallow soil incorporation.

e. Slope limitation for application sites are as follows:

i. For slopes less than or equal to 6 percent, no rate limitation;

ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels;

iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.

iv. Dry, cake or liquid biosolids that are subsurface injected, may be applied on slopes not to exceed 20 percent. Subsurface injection does not include the use of methods or technology reflective of combination surface/shallow soil incorporation.

f. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.

g. Biosolids may be land applied to sites with soil that are snow covered, frozen, or saturated with liquid when site restrictions or other controls are provided to prevent pollutants from being discharged to waters of the state during snowmelt or stormwater runoff. During inclement weather or unfavorable soil conditions use the following management practices:

i. A maximum field slope of 6% and a minimum 300 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be utilized for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not include the use of mthods or technology refletive of combination surface/shallow soil incorporation;

ii. A maximum field slope of 2% and 100 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be used for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not included the use of methods or technology refletive of combination surface/shallow soil incorporation;

iii. Other best management practices approved by the Department.

SECTION H – SEPTAGE

1. Haulers that land apply septage must obtain a state permit. An operating permit is not required for septage haulers who transport septage to another permitted treatment facility for disposal.
2. Do not apply more than 30,000 gallons of septage per acre per year or the volume otherwise stipulated in the operating permit.
3. Septic tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to mechanical treatment facilities.
4. Septage must comply with Class B biosolids regarding pathogen and vector attraction reduction requirements before it may be applied to crops, pastures or timberland. To meet required pathogen and vector reduction requirements, mix 50 pounds of hydrated lime for every 1,000 gallons of septage and maintain a septage pH of at least 12 pH standard units for 30 minutes or more prior to application.
5. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.
6. As residential septage contains relatively low levels of metals, the testing of metals in septage is not required.

SECTION I– CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical and lagoons) and sludge or biosolids storage and treatment facilities. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all sludges and/or biosolids. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6.010 and 10 CSR 20 – 6.015.
3. Biosolids or sludge that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
    a. Biosolids and sludge shall meet the monitoring and land application limits for agricultural rates as referenced in Section G, above.
    b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
    c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre. Alternative, site-specific application rates may be included in the closure plan for department consideration.
        i. PAN can be determined as follows:
        (Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).
        [1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis
4. Domestic wastewater treatment lagoons with a design treatment capacity less than or equal to 150 persons, are "similar treatment works" under the definition of septage. Therefore the sludge within the lagoons may be treated as septage during closure activities. See Section B, above. Under the septage category, residuals may be left in place as follows:
    a. Testing for metals or fecal coliform is not required.
    b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
    c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Biosolids or sludge left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, and unless otherwise approved, the lagoon berm shall be demolished, and the site shall be graded and contain ≥70% vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion. Alternative biosolids or sludge and soil mixing ratios may be included in the closure plan for department consideration.
6. Lagoon and earthen structure closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200.
7. When closing a mechanical wastewater plant, all biosolids or sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
    a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain ≥70% vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate

surface water drainage without creating erosion.

b. Hazardous Waste shall not be land applied or disposed during mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations pursuant to 10 CSR 25.

c. After demolition of the mechanical plant, the site must only contain clean fill defined in Section 260.200.1(6) RSMo as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill, reclamation, or other beneficial use. Other solid wastes must be removed.

8. If biosolids or sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or I, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR Part 503, Subpart C.

SECTION J – MONITORING FREQUENCY

1. At a minimum, biosolids or sludge shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

TABLE 5

Biosolids or Sludge produced and disposed (Dry Tons per Year)	Monitoring Frequency (See Notes 1, and 2)		
	Metals, Pathogens and Vectors, Total Phosphorus, Total Potassium	Nitrogen TKN, Nitrogen PAN[1]	Priority Pollutants[2]
319 or less	1/year	1 per month	1/year
320 to 1650	4/year	1 per month	1/year
1651 to 16,500	6/year	1 per month	1/year
16,501+	12/year	1 per month	1/year

[1] Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

[2] Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) are required only for permit holders that must have a pre-treatment program. Monitoring requirements may be modified and incorporated into the operating permit by the Department on a case-by-case basis.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids. This data shall be used to calculate the dry tons of sludge applied per acre.
Note 2: Table 5 is not applicable for incineration and permit holders that landfill their sludge.

2. Permittees that operate wastewater treatment lagoons, peak flow equalization basins, combined sewer overflow basins or biosolids or sludge lagoons that are cleaned out once a year or less, may choose to sample only when the biosolids or sludge is removed or the lagoon is closed. Test one composite sample for each 319 dry tons of biosolids or sludge removed from the lagoon during the reporting year or during lagoon closure. Composite sample must represent various areas at one-foot depth.
3. Additional testing may be required in the special conditions or other sections of the permit.
4. Biosolids and sludge monitoring shall be conducted in accordance with federal regulation 40 CFR § 503.8, Sampling and analysis.

SECTION K – RECORD KEEPING AND REPORTING REQUIREMENTS

1. The permittee shall maintain records on file at the facility for at least five years for the items listed in Standard Conditions PART III and any additional items in the Special Conditions section of this permit. This shall include dates when the biosolids or sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
2. Reporting period
   a. By February 19th of each year, applicable facilities shall submit an annual report for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and biosolids or sludge disposal facilities.
   b. Permittees with wastewater treatment lagoons shall submit the above annual report only when biosolids or sludge are removed from the lagoon during the report period or when the lagoon is closed.
3. Report Form. The annual report shall be prepared on report forms provided by the Department or equivalent forms approved by the Department.
4. Reports shall be submitted as follows:
   Major facilities, which are those serving 10,000 persons or more or with a design flow equal to or greater than 1 million gallons per day or that are required to have an approved pretreatment program, shall report to both the Department and EPA if the facility land applied, disposed of biosolids by surface disposal, or operated a sewage sludge incinerator. All other facilities shall maintain their biosolids or sludge records and keep them available to Department personnel upon request. State reports shall be submitted to the address listed as follows:

   DNR regional or other applicable office listed in the
   permit (see cover letter of permit)
   ATTN: Sludge Coordinator

Reports to EPA must be electronically submitted online via the Central Data Exchange at: https://cdx.epa.gov/ Additional information is available at: https://www.epa.gov/biosolids/compliance-and-annual-reporting-guidance-about-clean-water-act-laws

5. Annual report contents. The annual report shall include the following:
    a. Biosolids and sludge testing performed. If testing was conducted at a greater frequency than what is required by the permit, all test results must be included in the report.
    b. Biosolids or sludge quantity shall be reported as dry tons for the quantity produced and/or disposed.
    c. Gallons and % solids data used to calculate the dry ton amounts.
    d. Description of any unusual operating conditions.
    e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
        i. This must include the name and address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
        ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
    f. Contract Hauler Activities:
    If using a contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate biosolids or sludge use permit.
    g. Land Application Sites:
        i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
        ii. If the "Low Metals" criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
        iii. Report the method used for compliance with pathogen and vector attraction requirements.
        iv. Report soil test results for pH and phosphorus. If no soil was tested during the year, report the last date when tested and the results.

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Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FACILITY NAME	
Joplin, Shoal Creek Wastewater Treatment Facility	
PERMIT NO.	COUNTY
MO0023256	Newton

APPLICATION OVERVIEW

Form B2 has been developed in a modular format and consists of Parts A, B and C and a Supplemental Application Information (Parts D, E, F and G) packet. All applicants must complete Parts A, B and C. Some applicants must also complete parts of the Supplemental Application Information packet. The following items explain which parts of Form B2 you must complete. Submittal of an incomplete application may result in the application being returned.

BASIC APPLICATION INFORMATION

A. Basic Application Information for all Applicants. All applicants must complete Part A.

B. Additional Application Information for all Applicants. All applicants must complete Part B.

C. Certification. All applicants must complete Part C.

SUPPLEMENTAL APPLICATION INFORMATION

D. Expanded Effluent Testing Data. A treatment works that discharges effluent to surface water of the United States and meets one or more of the following criteria must complete *Part D - Expanded Effluent Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

E. Toxicity Testing Data. A treatment works that meets one or more of the following criteria must complete *Part E - Toxicity Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

F. Industrial User Discharges and Resource Conservation and Recovery Act / Comprehensive Environmental Response, Compensation and Liability Act Wastes. A treatment works that accepts process wastewater from any significant industrial users, also known as SIUs, or receives a Resource Conservation and Recovery Act or CERCLA wastes must complete *Part F - Industrial User Discharges and Resource Conservation and Recovery Act /CERCLA Wastes*.

SIUs are defined as:

1. All Categorical Industrial Users, or CIUs, subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations 403.6 and 40 Code of Federal Regulations 403.6 and 40 CFR Chapter 1, Subchapter N.
2. Any other industrial user that meets one or more of the following:
   - i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions).
   - ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant.
   - iii. Is designated as an SIU by the control authority.
   - iv. Is otherwise required by the permitting authority to provide the information.

G. Combined Sewer Systems. A treatment works that has a combined sewer system must complete *Part G - Combined Sewer Systems.*

ALL APPLICANTS MUST COMPLETE PARTS A, B and C

RECEIVED
AUG 09 2016

Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR AN OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED	FEE SUBMITTED
8/9/16	OSB

PART A – BASIC APPLICATION INFORMATION

1. THIS APPLICATION IS FOR:

- ☐ An operating permit for a new or unpermitted facility. Construction Permit # _____
  (Include completed Antidegradation Review or request to conduct an Antidegradation Review, see instructions)
- ☑ An operating permit renewal: Permit #MO- 0023256 Expiration Date February 2, 2016
- ☐ An operating permit modification: Permit #MO-_____ Reason: _____

1.1 Is the appropriate fee included with the application (see instructions for appropriate fee)? ☐ YES ☑ NO

2. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE	
Joplin Shoal Creek Wastewater Treatment Facility		(417) 624-3615	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
2860 Apricot Drive	Joplin	MO	64804

2.1 **LEGAL DESCRIPTION** (Facility Site): ¼, ¼, ¼, Sec. 25 , T 27 , R 34W COUNTY

2.2 UTM Coordinates Easting (X): 358427 Northing (Y): 4099332
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

2.3 Name of receiving stream: Shoal Creek

2.4 Number of Outfalls: 3 wastewater outfalls, 1 ~~stormwater outfalls, 2~~ Peak Flow Ea Basins instream monitoring sites

3. OWNER

NAME	EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE	
City of Joplin	llawson@joplinmo.org	(417) 624-0820	
ADDRESS	CITY	STATE	ZIP CODE
602 S. Main St.	Joplin	MO	64801

- **3.1** Request review of draft permit prior to Public Notice? ☑ YES ☐ NO
- **3.2** Are you a Publically Owned Treatment Works (POTW)? ☑ YES ☐ NO
  If yes, is the Financial Questionnaire attached? ☑ YES ☐ NO
- **3.3** Are you a Privately Owned Treatment Facility? ☐ YES ☑ NO
- **3.4** Are you a Privately Owned Treatment Facility regulated by the Public Service Commission (PSC)? ☐ YES ☑ NO

4. CONTINUING AUTHORITY: Permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.

NAME	EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE	
City of Joplin	llawson@joplinmo.org	(417) 624-0820	
ADDRESS	CITY	STATE	ZIP CODE
602 S. Main St.	Joplin	MO	64801

If the Continuing Authority is different than the Owner, include a copy of the contract agreement between the two parties and a description of the responsibilities of both parties within the agreement.

5. OPERATOR

NAME	TITLE	CERTIFICATE NUMBER (IF APPLICABLE)
Lyndell J. Edwards	Superintendent of Wastewater Div.	5316
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE	
ledwards@joplinmo.org	(417) 624-3615	

6. FACILITY CONTACT

NAME	TITLE		
Lyndell J. Edwards	Superintendent of Wastewater Division		
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
ledwards@joplinmo.org	(417) 624-3615		
ADDRESS	CITY	STATE	ZIP CODE
3457 W. Eddy Lane	Joplin	MO	64801

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT Fac.	MO- MO0023256	001

PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION

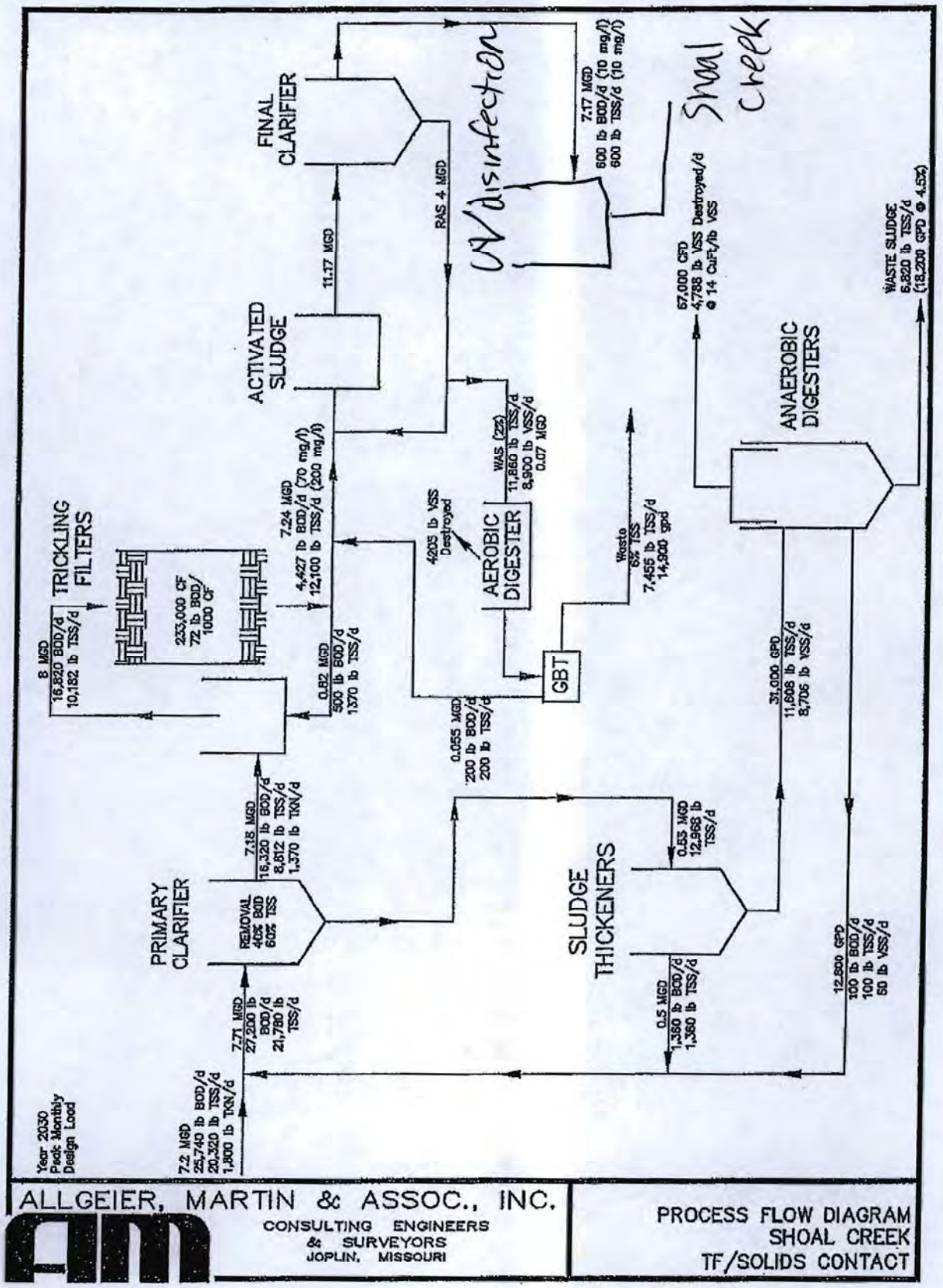
7.1 Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant. Show all of the treatment units, including disinfection (e.g. – Chlorination and Dechlorination), influents, and outfalls. Specify where samples are taken. Indicate any treatment process changes in the routing of wastewater during dry weather and peak wet weather. Include a brief narrative description of the diagram.
Attach sheets as necessary.

See Attachment ~~7.1 A~~ 7.1 A

When there is a very significant amount of rain a portion of the flow can be diverted to the peak flow equalization basin to control the amount going into the treatment system. The controlling factor being the capacity of the UV system which is rated to 15 MGD peak flow.

The City can also divert flow to the Old Plant Site in a significant rain event to relieve the main lift station, Tin Cup, for a period of time. Long events are not conducive to avoiding bypasses from outfall 003 but we have not had very many over the five preceding years and with our efforts to repair the collection system we should see that eliminated.

7.1A



ALLGEIER, MARTIN & ASSOC., INC.
CONSULTING ENGINEERS
& SURVEYORS
JOPLIN, MISSOURI

PROCESS FLOW DIAGRAM
SHOAL CREEK
TF/SOLIDS CONTACT

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT Facility	MO- MO0023256	# 001

PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION (continued)

7.2 Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information.

a. The area surrounding the treatment plant, including all unit processes.
b. The location of the downstream landowner(s). (See Item 10.)
c. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.
d. The actual point of discharge.
e. Wells, springs, other surface water bodies and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.
f. Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.
g. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, or disposed.

7.3 Facility SIC Code: 4952. | Discharge SIC Code: _____.

7.4 Number of people presently connected or population equivalent (P.E.): 13,380 Design P.E. 78,830

7.5 Connections to the facility:

Number of units presently connected:

Homes 6500 Trailers ALL Apartments ALL Other (including industrial) 12

Number of Commercial Establishments: 600

7.6 Design Flow: 6.5 MGD | Actual Flow: 4.6 MGD

7.7 Will discharge be continuous through the year? Yes ☑ No ☐

Discharge will occur during the following months: How many days of the week will discharge occur?

Continuous 24/7

7.8 Is industrial wastewater discharged to the facility? Yes ☑ No ☐

If yes, describe the number and types of industries that discharge to your facility. Attach sheets as necessary

SEE PART F. AND ATTACHMENTS.

Refer to the APPLICATION OVERVIEW to determine whether additional information is needed for Part F.

7.9 Does the facility accept or process leachate from landfills?: Yes ☐ No ☑

7.10 Is wastewater land applied? Yes ☐ No ☑

If yes, is Form I attached? Yes ☐ No ☐

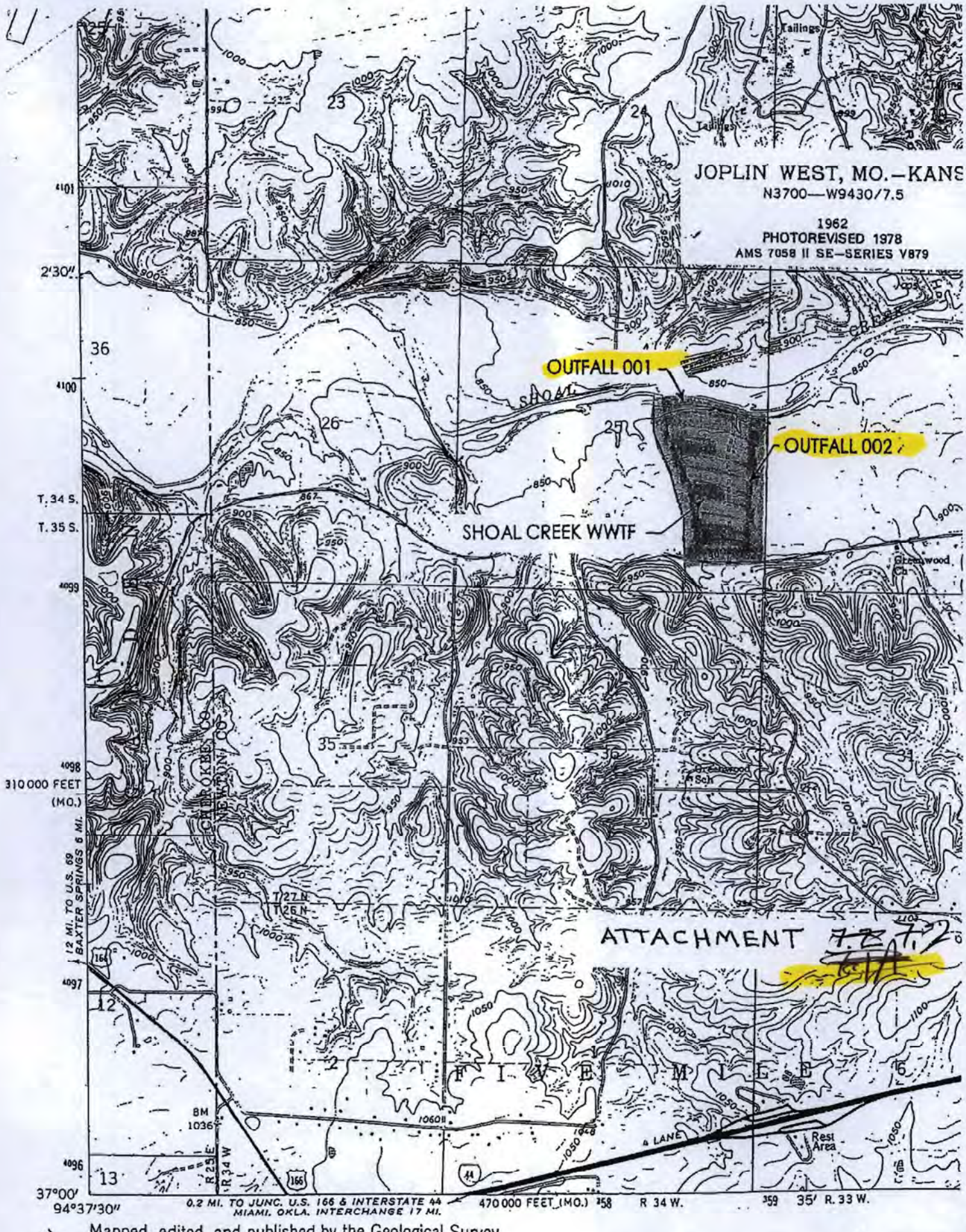
7.11 Does the facility discharge to a losing stream or sinkhole? Yes ☐ No ☑

7.12 Has a wasteload allocation study been completed for this facility? Yes ☑ No ☐

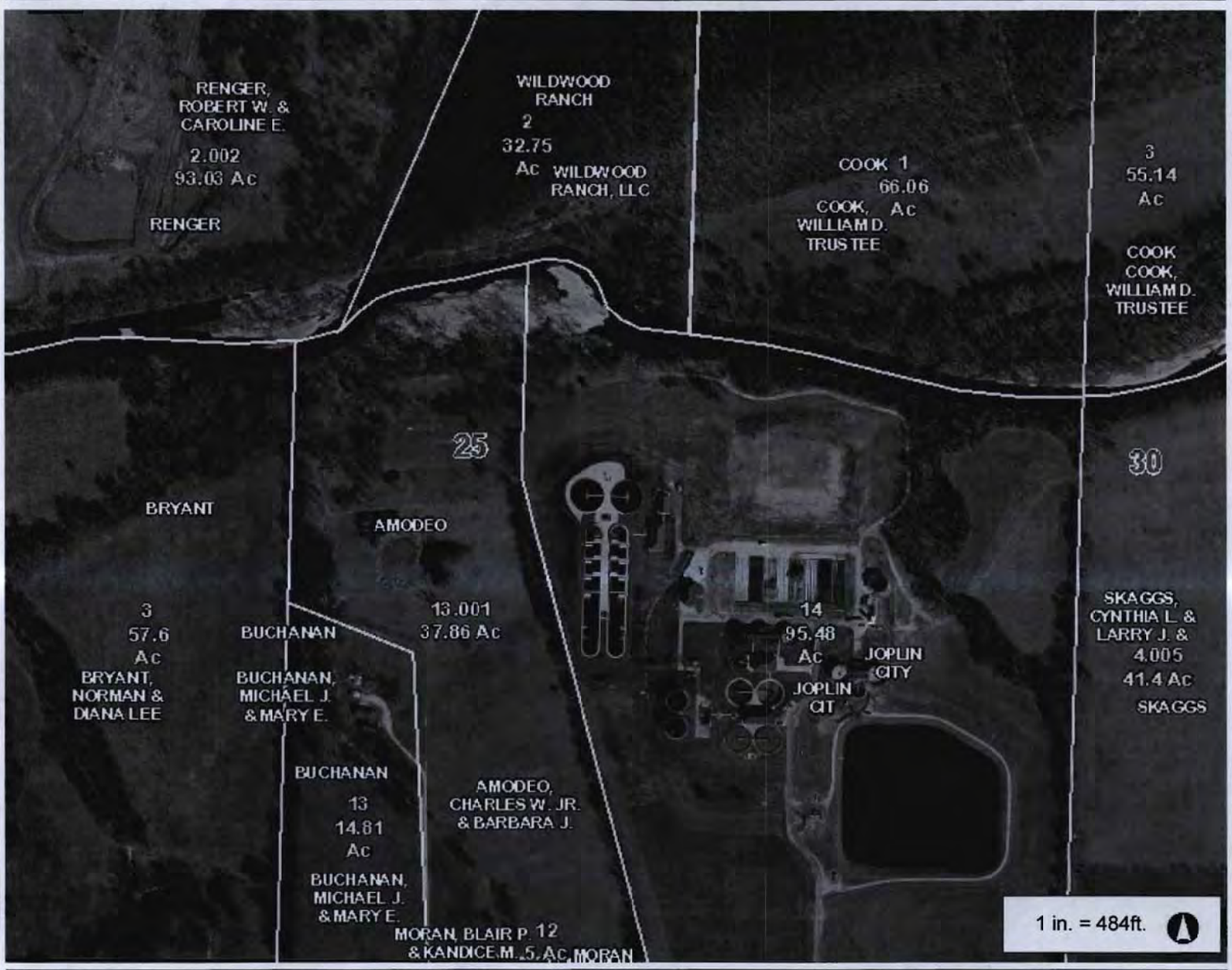
8. LABORATORY CONTROL INFORMATION

LABORATORY WORK CONDUCTED BY PLANT PERSONNEL

Lab work conducted outside of plant.	Yes ☑	No ☐
Push–button or visual methods for simple test such as pH, settleable solids.	Yes ☑	No ☐
Additional procedures such as Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, titrations, solids, volatile content.	Yes ☑	No ☐
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	Yes ☑	No ☐
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph.	Yes ☐	No ☑


JOPLIN WEST, MO.–KANS
N3700—W9430/7.5
1962
PHOTOREVISED 1978
AMS 7058 II SE–SERIES V879
OUTFALL 001
OUTFALL 002
SHOAL CREEK WWTF
ATTACHMENT 7.2
T. 34 S.
T. 35 S.
310 000 FEET (MO.)
12 MI. TO U.S. 69 BAXTER SPRINGS 6 MI.
CHEROKEE CO
NEWTON CO
T 27 N
T 26 N
FIVE MILE
4 LANE
Rest Area
BM 1036
37°00'
94°37'30"
0.2 MI. TO JUNC. U.S. 166 & INTERSTATE 44 MIAMI, OKLA. INTERCHANGE 17 MI.
470 000 FEET (MO.)
R 34 W.
R. 33 W.
Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial
PEORIA 7057 I NW

Newton County, MO





Legend

- Road
  - County Roads / City Streets
  - Interstate Highway
  - US Highway
  - Numbered State Highway
  - Lettered State Highway
- Railroad
- Parcel
- Parcel Number/Acres
- Owner Name
- Owner Last Name
- Corporate Limit Line
- Land Hook
  - DASHED LAND HOOK
  - SOLID LAND HOOK
- Section
- County Boundary

Notes

968.7 0 484.36 968.7 Feet

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT facility	MO- 0023256	001

PART A – BASIC APPLICATION INFORMATION

9. SLUDGE HANDLING, USE AND DISPOSAL

9.1 Is the sludge a hazardous waste as defined by 10 CSR 25? Yes ☐ No ☑

9.2 Sludge production (Including sludge received from others): Design Dry Tons/Year Actual Dry Tons/Year

9.3 Sludge storage provided: Yes Cubic feet; 360K Days of storage; 110 Average percent solids of sludge;

☐ No sludge storage is provided. ☐ Sludge is stored in lagoon.

9.4 Type of storage:

☑ Holding Tank ☐ Building
☐ Basin ☐ Lagoon
☐ Concrete Pad ☑ Other (Describe) _____

9.5 Sludge Treatment:

☑ Anaerobic Digester ☑ Storage Tank ☑ Lime Stabilization ☐ Lagoon
☑ Aerobic Digester ☐ Air or Heat Drying ☐ Composting ☐ Other (Attach Description)

9.6 Sludge use or disposal:

☑ Land Application ☐ Contract Hauler ☐ Hauled to Another Treatment Facility ☐ Solid Waste Landfill
☐ Surface Disposal (Sludge Disposal Lagoon, Sludge Held For More Than Two Years) ☐ Incineration
☐ Other (Attach Explanation Sheet) _____

9.7 Person responsible for hauling sludge to disposal facility:
☐ By Applicant ☐ By Others (complete below)

NAME	EMAIL ADDRESS		
City of Joplin	ledwards@joplinmo.org		
ADDRESS	CITY	STATE	ZIP CODE
3457 w. Eddy			
CONTACT PERSON	TELEPHONE NUMBER WITH AREA CODE	PERMIT NO.	
Lyndell J. Edwards, Superintendent	(417) 624-3615	MO- 0023256	

9.8 Sludge use or disposal facility:
☑ By Applicant ☐ By Others (Complete below)

NAME	EMAIL ADDRESS		
Various farmers, ranchers and landowners			
ADDRESS	CITY	STATE	ZIP CODE
CONTACT PERSON	TELEPHONE NUMBER WITH AREA CODE	PERMIT NO.	
		MO-	

9.9 Does the sludge or biosolids disposal comply with Federal Sludge Regulation 40 CFR 503?
☑Yes ☐ No (Explain)

END OF PART A

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT Facility	MO- 0023256	# 001

PART B – ADDITIONAL APPLICATION INFORMATION

10. COLLECTION SYSTEM

10.1 Length of sanitary sewer collection system in miles
158

10.2 Does significant infiltration occur in the collection system? ☑ Yes ☐ No
If yes, briefly explain any steps underway or planned to minimize inflow and infiltration:

Infiltration-1.46 MGD Inflow 0.84 MGD average for the year.

The peak flow variance annual report for 2015 is attached. See attachment 10.2 A.

11. BYPASSING

Does any bypassing occur anywhere in the collection system or at the treatment facility? Yes ☑ No ☐
If yes, explain:

Yes because of occurrences that have happened over the lifetime of the expiring permit. these episodes are recorded on the MODNR website.

See attachment 11 A.

12. OPERATION AND MAINTENANCE PERFORMED BY CONTRACTOR(S)

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of the contractor?
Yes ☐ No ☑
If Yes, list the name, address, telephone number and status of each contractor and describe the contractor's responsibilities. (Attach additional pages if necessary.)

NAME	
MAILING ADDRESS	
TELEPHONE NUMBER WITH AREA CODE	EMAIL ADDRESS
RESPONSIBILITIES OF CONTRACTOR	

13. SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION

Provide information about any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses for each.

Oxidation ditches, aerobic digesters, tertiary filters, UV disinfection. See attachment 10.2 A. All of this has been completed and is operational.

In the lifetime of this pending Permit a parallel pressure main from the Fillmore Bridge list station will be installed to take advantage of the larger capacity pumps of the lift station renovation that is ongoing.

11 A.

CITY OF JOPLIN REPORT TO MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
ANNUAL I & I REPORT

PART I: FACILITY INFORMATION

CITY: JOPLIN PERMIT #: MO-0023256 COUNTY: Newton	OWNER/BILLING ADDRESS: 602 S. Main Street Joplin, MO 64801	IF ADDRESS CHANGE IS REQUESTED: OWNER ☐ BILLING ☐

PART II: MONITORING INFORMATION

FOR THE YEAR OF: 2015	PHONE #: (417) 624-0820, ext. 584	DATE: 2/26/2016

PART III: REPORTING INFORMATION

1. MANHOLE OBSERVATION:

NUMBER OBSERVED: 149 FROM Jun-15 TO Dec-15

MANHOLES REPLACED: YES [X] NO [ ] HOW MANY? 7

IF SO, TYPE OF MANHOLE REPLACED: Brick MH's & Concrete Flush Tanks

MANHOLES REHABBED: YES [X] NO [ ] HOW MANY? 41

IF SO, TYPE OF MANHOLE REHABBED: Brick and Concrete Block

2. SMOKE TESTING:

LINEAR FEET OF LINES TESTED: ZERO FROM n/a TO n/a

LINES CLEANED: YES [X] NO [ ] FEET? 118,561

IF SO, HOW WAS LINE CLEANED JET YES PIG NO Rodder YES

LENGTH OF TYPE OF CLEANING: JET 118,561 PIG NO Rodder 91000

NUMBER OF LINES REPLACED 5 Number of linear feet: 2000

IF SO, TYPE OF LINE REPLACED: Vitrified Clay & Concrete

IF DIFFERENT THAN ORIGINAL, REPLACE WITH WHAT TYPE? PVC

NUMBER OF LINES REHABBED: 77 NUMBER OF LINEAR FEET: 23,476

IF SO, TYPE OF LINE REHABBED: VCP and Concrete

3. CCTV (CLOSED CIRCUIT) YES IF SO, LINEAR FEET VIEWED: 118,561

FROM: 1/1/2015 TO: 12/31/2015

4. LAMPHOLES OBSERVED: NUMBER 3 REPLACED 0

PART V: CONTACT INFORMATION

OPERATOR NAME (PRINTED)	REPORT PREPARED BY: Chris Parker	DATE: 2/26/2016
OWNER SIGNATURE:	PHONE: 417-624-5703 EXT:538	

SEND FORM TO: MISSOURI DEPARTMENT OF NATURAL RESOURCES
SOUTHWEST REGIONAL OFFICE
2040 WEST WOODLAND
SPRINGFIELD, MO 65807

FACILITY NAME	PERMIT NO.	OUTFALL NO.
JOPLIN SHOAL CREEK WWT FACILITY	MO- 0023256	# 001

PART B – ADDITIONAL APPLICATION INFORMATION

14. EFFLUENT TESTING DATA

Applicants must provide effluent testing data for the following parameters. Provide the indicated effluent data **for each outfall through which effluent is discharged**. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least **three samples** and must be no more than four and one-half years apart.

Outfall Number

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)	7.1	S.U.	7.1	S.U.	5
pH (Maximum)	7.7	S.U.	7.7	S.U.	5
Flow Rate	8.3	MGD	4.56	MGD	60

*For pH report a minimum and a maximum daily value

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
		Conc.	Units	Conc.	Units	Number of Samples		
Conventional and Nonconventional Compounds								
BIOCHEMICAL OXYGEN DEMAND (Report One)	BOD_5	115	mg/L	9.48	mg/L	12	SM20THed 5210B	2.0
	$CBOD_5$	26.2	mg/L	10.8	mg/L	12	SM20THed 5210B	2.0
E. COLI		>2419.6	#/100 mL	13.1	#/100 mL	10	IDEXSM209223B	1.0MPN/100
TOTAL SUSPENDED SOLIDS (TSS)		116	mg/L	4.19	mg/L	18	SM20thed2540D	
AMMONIA (as N)		17.8	mg/L	2.28	mg/L	14	EPA350-1/SM4500	0.1
CHLORINE* (TOTAL RESIDUAL, TRC)		0 µg/l	mg/L	0 µg/l	mg/L	not using Cl2		
DISSOLVED OXYGEN			mg/L		mg/L	not using Cl2	SM20thed45000G	
OIL and GREASE		<5.0	mg/L	<5.0	mg/L	12	EPA 1664 A	5.0
OTHER			mg/L		mg/L			

*Report only if facility chlorinates

END OF PART B

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT Facility	MO- 0023256	001

PART C – CERTIFICATION

15. CERTIFICATION

All applicants must complete the Certification Section. This certification must be signed by an officer of the company or city official. All applicants must complete all applicable sections as explained in the Application Overview. By signing this certification statement, applicants confirm that they have reviewed the entire form and have completed all sections that apply to the facility for which this application is submitted.

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PRINTED NAME	OFFICIAL TITLE (MUST BE AN OFFICER OF THE COMPANY OR CITY OFFICIAL)
Lyndell J. Edwards	Superintendent of Wastewater Division

SIGNATURE L J Edwards Jr

TELEPHONE NUMBER WITH AREA CODE
(417) 624-3615

DATE SIGNED 06/15/2016

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

Send Completed Form to:

Department of Natural Resources
Water Protection Program
ATTN: NPDES Permits and Engineering Section
P.O. Box 176
Jefferson City, MO 65102

END OF PART C
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH PARTS OF FORM B2 YOU MUST COMPLETE.

Do not complete the remainder of this application, unless at least one of the following statements applies to your facility:

1. Your facility design flow is equal to or greater than 1,000,000 gallons per day.
2. Your facility is a pretreatment treatment works.
3. Your facility is a combined sewer system.

Submittal of an incomplete application may result in the application being returned. Permit fees for returned applications shall be forfeited. Permit fees for applications being processed by the department that are withdrawn by the applicant shall be forfeited.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek Wastewater Treatment	MO- 0023256	001

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part D applies to the treatment works.

If the treatment works has a design flow greater than or equal to 1 million gallons per day or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information **for each outfall through which effluent is discharged**. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum, effluent testing data must be based on at least **three pollutant scans** and must be no more than four and one-half years apart.

Outfall Number (Complete Once for Each Outfall Discharging Effluent to Waters of the State.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS AND HARDNESS											
ALUMINUM	0.20	mg/l			0.13	mg/l			3	EPA 200.8	0.010
ANTIMONY	<0.50	µg/l			<0.50	µg/l			3	EPA 200.8	0.50
ARSENIC	<0.50	µg/l			<0.50	µg/l			3	EPA 200.8	0.50
BERYLLIUM	<0.20	µg/l			<0.20	µg/l			3	EPA 200.8	0.20
CADMIUM	0.18	µg/l			0.14	µg/l			3	EPA 200.8	0.080
CHROMIUM III	2.2	µg/l			1.8	µg/l			3	EPA 200.8	0.50
CHROMIUM VI	0.013	mg/l			0.008	mg/l			3	EPA 3500B	0.0050
COPPER	20	µg/l			12.4	µg/l			3	EPA 200.8	1.0
IRON	0.439	mg/l			0.30	mg/l				EPA 200.8	0.050
LEAD	2.4	µg/l			1.35	µg/l				EPA 200.8	0.10
MERCURY	<0.20	µg/l			<0.20	µg/l			3	EPA 245.1	0.20
NICKEL	4.9	µg/l			3.53	µg/l			3	EPA 200.8	0.50
SELENIUM	0.87	µg/l			0.62	µg/l			3	EPA 200.8	0.5
SILVER	<0.50	µg/l			<0.50	µg/l			3	EPA 200.8	0.5
THALLIUM	<0.10	µg/l			<0.10	µg/l			3	EPA 200.8	0.1
ZINC	0.14	mg/l			0.12	mg/l			3	EPA 200.8	0.0050
CYANIDE	<0.004	mg/l			<0.004	mg/l			3	EPA4500CN	0.0040
TOTAL PHENOLIC COMPOUNDS	<0.050	mg/l			<0.050	mg/l			3	EPA 420.1	0.050
HARDNESS (as $CaCO_3$)	180	mg/l			175	mg/l			3	EPA 130.2	5.0
VOLATILE ORGANIC COMPOUNDS											
ACROLEIN	<100	µg/l			<100	µg/l				EPA 624 low	100
ACRYLONITRILE	<120	µg/l			<20	µg/l			3	EPA 624 low	20.0
BENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
BROMOFORM	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
CARBON TETRACHLORIDE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT FAC.	MO- 0023256	# 001

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
CHLOROBENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
CHLORODIBROMO-METHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
CHLOROETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
2-CHLORO-ETHYLVINYL ETHER	<1.0	µg/l			<10.0	µg/l			3	EPA 624 low	10.0
CHLOROFORM	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
DICHLOROBROMO-METHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,1-DICHLORO-ETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,2-DICHLORO-ETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
TRANS-1,2-DICHLOROETHYLENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,1-DICHLORO-ETHYLENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,2-DICHLORO-PROPANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,3-DICHLORO-PROPYLENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
ETHYLBENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
METHYL BROMIDE	<5.0	µg/l			<5.0	µg/l			3	EPA 624 low	5.0
METHYL CHLORIDE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
METHYLENE CHLORIDE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,1,2,2-TETRA-CHLOROETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
TETRACHLORO-ETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
TOLUENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,1,1-TRICHLORO-ETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,1,2-TRICHLORO-ETHANE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
TRICHLORETHYLENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
VINYL CHLORIDE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL	<20.0	µg/l			<20.0	µg/l			3	EPA 625	20.0
2-CHLOROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
2,4-DICHLOROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
2,4-DIMETHYLPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
4,6-DINITRO-O-CRESOL	<10.0	µg/l			<10.0	µg/l			3	EPA 625	10.0
2,4-DINITROPHENOL	<50.0	µg/l			<50.0	µg/l			3	EPA 625	50.0
2-NITROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
4-NITROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT FAC.	MO- 0023256	# 001

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
PENTACHLOROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
PHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
2,4,6-TRICHLOROPHENOL	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BASE-NEUTRAL COMPOUNDS											
ACENAPHTHENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
ACENAPHTHYLENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
ANTHRACENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BENZIDINE	<50.0	µg/l			<50.0	µg/l			3	EPA 625	50.0
BENZO(A)ANTHRACENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BENZO(A)PYRENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
3,4-BENZO-FLUORANTHENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BENZO(GH) PHERYLENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BENZO(K) FLUORANTHENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BIS (2-CHLOROTHOXY) METHANE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BIS (2-CHLOROETHYL) – ETHER	<6.0	µg/l			<6.0	µg/l			3	EPA 625	6.0
BIS (2-CHLOROISO-PROPYL) ETHER	<6.0	µg/l			<6.0	µg/l			3	EPA 625	6.0
BIS (2-ETHYLHEXYL) PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
4-BROMOPHENYL PHENYL ETHER	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
BUTYL BENZYL PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
2-CHLORONAPH-THALENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
4-CHLORPHENYL PHENYL ETHER	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
CHRYSENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
DI-N-BUTYL PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
DI-N-OCTYL PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
DIBENZO (A,H) ANTHRACENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
1,2-DICHLORO-BENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,3-DICHLORO-BENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
1,4-DICHLORO-BENZENE	<1.0	µg/l			<1.0	µg/l			3	EPA 624 low	1.0
3,3-DICHLORO-BENZIDINE	<20.0	µg/l			<20.0	µg/l			3	EPA 625	20.0
DIETHYL PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
DIMETHYL PHTHALATE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT FAC.	MO- 0023256	# 001

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
2,4-DINITRO-TOLUENE	<6.0	µg/l			<6.0	µg/l			3	EPA 625	6.0
2,6-DINITRO-TOLUENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
1,2-DIPHENYL-HYDRAZINE	<8.0	µg/l			<8.0	µg/l			3	EPA 625	8.0
FLUORANTHENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
FLUORENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
HEXACHLOROBENZENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
HEXACHLOROBUTADIENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
HEXACHLOROCYCLO-PENTADIENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
HEXACHLOROETHANE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
INDENO (1,2,3-CD) PYRENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
ISOPHORONE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
NAPHTHALENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
NITROBENZENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
N-NITROSODI-PROPYLAMINE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
N-NITROSODI-METHYLAMINE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
N-NITROSODI-PHENYLAMINE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
PHENANTHRENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
PYRENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0
1,2,4-TRICHLOROBENZENE	<5.0	µg/l			<5.0	µg/l			3	EPA 625	5.0

Use this space (or a separate sheet) to provide information on other pollutants not specifically listed in this form.

END OF PART D

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT FAC.	MO- 0023256	# 001

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWs, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

A. POTWs with a design flow rate greater than or equal to 1 million gallons per day
B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403)
C. POTWs required by the permitting authority to submit data for these parameters

- At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years: _____ chronic 4 acute

Complete the following chart **for the last three whole effluent toxicity tests.** Allow one column per test. Copy this page if more than three tests are being reported.

	Most Recent	2ND Most Recent	3RD Most Recent
A. Test Information			
Test Method Number	EPA 2002.2 AND 2000.0	EPA 2000.0	EPA 2002.2
Final Report Number	EEC 10317	EEC 10077-10078	EEC 9809
Outfall Number	# 001	# 001	#001
Dates Sample Collected	09/22/2015	09/10/2014	08/21/2013
Date Test Started	09/23/2015	09/11/2014	08/22/2013
Duration	48 HOURS	48 HOURS	48 HOURS
B. Toxicity Test Methods Followed			
Manual Title			
Edition Number and Year of Publication	5TH ED. OCT. 2002	5TH ED. OCT. 2002	5TH ED. OCT. 2002
Page Number(s)	275	275	275
C. Sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used			
24-Hour Composite	AUTOMATIC SAMPLER	AUTOMATIC SAMPLER	AUTOMATIC SAMPLER
Grab	1 GAL CUBIE UPSTREAM	1 GAL. CUBIE UPSTREAM	1 GAL. CUBIE UPSTREAM
D. Indicate where the sample was taken in relation to disinfection (Check all that apply for each)			
Before Disinfection	☐	☐	☐
After Disinfection	☐ UV DISINFECTION	☐ CHLORINATION	☐ CHLORINATION
After Dechlorination	☐	☐ DECLORINATION	☐ DECHLORINATION
E. Describe the point in the treatment process at which the sample was collected			
Sample Was Collected:	OUTFALL #001	OUTFALL #001	OUTFALL #001
F. Indicate whether the test was intended to assess chronic toxicity, acute toxicity, or both			
Chronic Toxicity	☐	☐	☐
Acute Toxicity	☐ ACUTE	☐ ACUTE	☐ ACUTE
G. Provide the type of test performed			
Static	☐ STATIC	☐ STATIC	☐ STATIC
Static-renewal	☐	☐	☐
Flow-through	☐	☐	☐
H. Source of dilution water. If laboratory water, specify type; if receiving water, specify source			
Laboratory Water	☐ SYNTHETIC20%DMW	☐ SYNTHETIC20%DMW	☐ SYNTHETIC205DMW
Receiving Water	☐ UPSTREAM SHOAL CR	☐ UPSTREAMSHOALCR	☐ UPSTREAMSHOALCR

Manual Title: Methods for Measuring Acute Toxicity of Effluents and Receiving waters to Freshwater and Marine Organisms

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT	MO- 0023256	#001

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA (continued)

	Most Recent	Second Most Recent	Third Most Recent
I. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh Water	UPSTREAM SAMPLE	UPSTREAM SAMPLE	UPSTREAM SAMPLE
Salt Water			
J. Percentage of effluent used for all concentrations in the test series			
	6.25,12.5	6.25,12.5	6.25,12.5
	25,50	25,50	25,50
	89,100	89,100	89,100
K. Parameters measured during the test (State whether parameter meets test method specifications)			
pH	8.4 MEETS	7.8 MEETS	7.6 MEETS
Salinity	N/A	N/A	N/A
Temperature	25.1 MEETS	21.5 MEETS	25.0 MEETS
Ammonia	N/A	N/A	N/A
Dissolved Oxygen	7.5 MEETS	8.5 MEETS	8.4 MEETS
L. Test Results			
Acute:			
Percent Survival in 100% Effluent	100%	100%	100%
LC_{50}	>100	>100	>100
95% C.I.	>100	>100	>100
Control Percent Survival	100%	100%	100%
Other (Describe)			
Chronic:			
NOEC			
IC_{25}			
Control Percent Survival			
Other (Describe)			
M. Quality Control/ Quality Assurance			
Is reference toxicant data available?	YES	YES	YES
Was reference toxicant test within acceptable bounds?	YES	YES	YES
What date was reference toxicant test run (MM/DD/YYYY)?	09/16/2015	07/30/2014	07/16/2013
Other (Describe)			

Is the treatment works involved in a toxicity reduction evaluation? ☐ Yes ☑ No

If yes, describe:

If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date Submitted (MM/DD/YYYY)

Summary of Results (See Instructions)

END OF PART E

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin Shoal Creek WWT Facility	MO- 0023256	# 001

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWs, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

A. POTWs with a design flow rate greater than or equal to 1 million gallons per day
B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403)
C. POTWs required by the permitting authority to submit data for these parameters

- At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years: _____chronic 4 acute

Complete the following chart **for the last three whole effluent toxicity tests.** Allow one column per test. Copy this page if more than three tests are being reported.

	4th Most Recent	2ND Most Recent	3RD Most Recent
A. Test Information			
Test Method Number	EPA 2002.2		
Final Report Number	EEC 9597		
Outfall Number	# 001		
Dates Sample Collected	07/09/2012		
Date Test Started	07/10/2012		
Duration	48 HOURS		
B. Toxicity Test Methods Followed			
Manual Title			
Edition Number and Year of Publication	5th ed. Oct. 2002		
Page Number(s)	275		
C. Sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used			
24-Hour Composite	automatic sampler		
Grab	1 gal. cubie upstream		
D. Indicate where the sample was taken in relation to disinfection (Check all that apply for each)			
Before Disinfection	☐	☐	☐
After Disinfection	☐ chlorination	☐	☐
After Dechlorination	☐ dechlorination	☐	☐
E. Describe the point in the treatment process at which the sample was collected			
Sample Was Collected:	Outfall # 001		
F. Indicate whether the test was intended to assess chronic toxicity, acute toxicity, or both			
Chronic Toxicity	☐	☐	☐
Acute Toxicity	☐ Acute	☐	☐
G. Provide the type of test performed			
Static	☐ static	☐	☐
Static-renewal	☐	☐	☐
Flow-through	☐	☐	☐
H. Source of dilution water. If laboratory water, specify type; if receiving water, specify source			
Laboratory Water	☐ Synthetic (20%DMW)	☐	☐
Receiving Water	☐ upstream Shoal Creek	☐	☐

Manual Title: Methods for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J Shoal Creek WWT Fac.	MO-0023256	

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA (continued)

	Most Recent	Second Most Recent	Third Most Recent
I. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh Water	Upstream sample SC		
Salt Water			
J. Percentage of effluent used for all concentrations in the test series			
	6.25,12.5		
	25,50		
	90,100		
K. Parameters measured during the test (State whether parameter meets test method specifications)			
pH	7.7		
Salinity	N/A		
Temperature	24.0 C meets		
Ammonia	N/A		
Dissolved Oxygen	8.8 meets		
L. Test Results			
Acute:			
Percent Survival in 100% Effluent	100%		
LC_{50}	>100		
95% C.I.	N/A		
Control Percent Survival	100%		
Other (Describe)			
Chronic:			
NOEC			
IC_{25}	N/A		
Control Percent Survival			
Other (Describe)			
M. Quality Control/ Quality Assurance			
Is reference toxicant data available?	Yes		
Was reference toxicant test within acceptable bounds?	Yes		
What date was reference toxicant test run (MM/DD/YYYY)?	06/29/2012		
Other (Describe)			

Is the treatment works involved in a toxicity reduction evaluation? ☐ Yes ☑ No

If yes, describe:

If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date Submitted (MM/DD/YYYY)

Summary of Results (See Instructions)

END OF PART E

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
J. SHOAL CREEK WWT FAC.	MO- 0023256	# 001

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

Refer to the APPLICATION OVERVIEW to determine whether Part F applies to the treatment works.

18. GENERAL INFORMATION

18.1 Does the treatment works have, or is it subject to, an approved pretreatment program?

☑ Yes ☐ No

18.2 Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works:

Number of non-categorical SIUs 8

Number of CIUs 4

19. INDUSTRIES CONTRIBUTING MORE THAN 5 PERCENT OF THE ACTUAL FLOW TO THE FACILITY OR OTHER SIGNIFICANT INDUSTRIAL USERS INFORMATION

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME See Attachments 19A

MAILING ADDRESS	CITY	STATE	ZIP CODE

19.1 Describe all of the industrial processes that affect or contribute to the SIU's discharge

19.2 Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.

Principal Product(s):

Raw Material(s):

19.3 Flow Rate

a. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd ☐ Continuous ☐ Intermittent

b. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd ☐ Continuous ☐ Intermittent

19.4 Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local Limits ☐ Yes ☐ No

b. Categorical Pretreatment Standards ☐ Yes ☐ No

If subject to categorical pretreatment standards, which category and subcategory?

19.5 Problems at the treatment works attributed to waste discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

☐ Yes ☐ No

If Yes, describe each episode

19A

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
	MO-	

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

Refer to the APPLICATION OVERVIEW to determine whether Part F applies to the treatment works.

18. GENERAL INFORMATION

18.1 Does the treatment works have, or is it subject to, an approved pretreatment program?

☒ Yes ☐ No

18.2 Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works:

Number of non-categorical SIUs 8

Number of CIUs 4

19. INDUSTRIES CONTRIBUTING MORE THAN 5 PERCENT OF THE ACTUAL FLOW TO THE FACILITY OR OTHER SIGNIFICANT INDUSTRIAL USERS INFORMATION

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME See attached

MAILING ADDRESS	CITY	STATE	ZIP CODE
See attached			

19.1 Describe all of the industrial processes that affect or contribute to the SIU's discharge

See attached

19.2 Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.

Principal Product(s): See attached

Raw Material(s): " "

19.3 Flow Rate

a. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

See attached gpd ☐ Continuous ☐ Intermittent

b. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

See attached gpd ☐ Continuous ☐ Intermittent

19.4 Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local Limits ☒ Yes ☐ No

b. Categorical Pretreatment Standards ☒ Yes ☐ No

If subject to categorical pretreatment standards, which category and subcategory?

40CFR 460.1 ← Hospitals, Electroplating – 40 CFR 413.1

19.5 Problems at the treatment works attributed to waste discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

☐ Yes ☐ No

If Yes, describe each episode

INDUSTRIES DISCHARGING TO SHOAL CREEK

INDUSTRY NAME	CURRENT PERMIT START DATE	CURRENT PERMIT EXPIRATION DATE	ADDRESS	CITY	CATEGORICAL?
HAMPSHIRE PET PRODUCTS	August 25, 2015	August 24, 2016	7700 East Alliance Parkway	JOPLIN, MO 64801	NO
AUTOTRONICS	February 21, 2016	February 20, 2017	2700 Davis Boulevard	JOPLIN, MO 64801	YES
JASPER PRODUCTS	July 6, 2016	July 5, 2017	3877 East 27th Street	JOPLIN, MO 64801	NO
PROTEIN SOLUTIONS	July 6, 2016	July 5, 2017	3800 East 32nd Street	JOPLIN, MO 64801	NO
FREEMAN EAST	July 6, 2015	July 5, 2018	932 East 34th Street	JOPLIN, MO 64801	YES
FREEMAN WEST	July 6, 2015	July 5, 2018	1102 West 32nd Street	JOPLIN, MO 64801	YES
FAG	August 17, 2015	August 16, 2018	3900 Rangeline Road	JOPLIN, MO 64801	NO
GENERAL MILLS	September 1, 2015	August 31, 2018	3007 Stephens Avenue	JOPLIN, MO 64801	NO
WESTROCK	September 21, 2015	September 20, 2018	4200 East 32nd Street	JOPLIN, MO 64801	NO
PETRO	November 9, 2015	November 8, 2018	4240 Highway 43	JOPLIN, MO 64801	NO
MERCY	April 10, 2016	April 9, 2019	100 Mercy Way	JOPLIN, MO 64801	YES
GILSTER-MARY LEE	July 6, 2016	July 5, 2019	3727 East 27th Street	JOPLIN, MO 64801	NO

INDUSTRIES DISCHARGING TO SHOAL CREEK

INDUSTRY NAME	INDUSTRIAL PROCESS	PRINCIPAL PRODUCT	RAW MATERIALS
HAMPSHIRE PET PRODUCTS	Manufacture Pet Treats	Dog Biscuits	Flour, Soybean Meal, Meat By-products
AUTOTRONICS	Heat treating, grinding, & machining	Electromagnetic clutches and brakes	Steel, Copper Wire
JASPER PRODUCTS	Mixing, packaging, & processing	Dairy & Soy Milk Products	Rice, almond, soy and dairy milk
PROTEIN SOLUTIONS	Grinding, emulsifying, freezing, cooking	Ground & emulsified chicken parts, dried chicken	Raw chicken
FREEMAN EAST	Hospital	No products produced (Hospital)	No Raw Materials (Hospital)
FREEMAN WEST	Hospital	No products produced (Hospital)	No Raw Materials (Hospital)
FAG	Forging, Turning, Heat Treating, Grinding	Ball and roller bearings	Steel
GENERAL MILLS	Baking, freezing, packaging	Pot Pie Crust, Breadsticks, Pizza, Bread, Dough	Flour, Vegetable Oil, Water, Salt, Sugar
WESTROCK	Sheeting, Printing, Cutting, Folding, Gluing	Folding Paperboard Boxes	Paperboard, Inks, Resinous Coatings, Glue
PETRO	N/A (Truck Stop)	N/A (Truck Stop)	Oil, Diesel fuel, Gasoline, Detergents
MERCY	Hospital	No products produced (Hospital)	No Raw Materials (Hospital)
GILSTER-MARY LEE	Mixing, extrusion, drying, packaging	Ready-To-Eat Cereals	Milled Grain Products, salt, sugar, syrup

INDUSTRY NAME	AVERAGE PROCESS WW FLOW RATE, GPD	AVG. NON-PROCESS WW FLOW RATE, GPD	CONTINUOUS OR INTERMITTANT?
HAMPSHIRE PET PRODUCTS	11,585	2,925	CONTINUOUS ON BOTH
AUTOTRONICS	200	72	CONTINUOUS, PROCESS BATCH
JASPER PRODUCTS	766,000	61,000	CONTINUOUS ON BOTH
PROTEIN SOLUTIONS	18,000	89,000	CONTINUOUS, PROCESS BATCH
FREEMAN EAST	0	28,000	CONTINUOUS
FREEMAN WEST	0	155,000	CONTINUOUS
FAG	900	182,827	CONTINUOUS, PROCESS BATCH
GENERAL MILLS	0	235,434	CONTINUOUS
WESTROCK	0	4,932	CONTINUOUS
PETRO	0	44,050	CONTINUOUS
MERCY	0	368,133	CONTINUOUS
GILSTER-MARY LEE	5,000	40,000	CONTINUOUS ON BOTH

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
JOPLIN SHOAL CREEK WWT FACILITY	MO- 0023256	# 001

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

20. RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE

20.1 Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail or dedicated pipe? ☐ Yes ☑ No

20.2 Method by which RCRA waste is received. (Check all that apply)
☐ Truck ☐ Rail ☐ Dedicated Pipe

20.3 Waste Description

EPA Hazardous Waste Number	Amount (volume or mass)	Units

21. CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER

21.1 Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?
☐ Yes ☑ No
Provide a list of sites and the requested information for each current and future site.

21.2 Waste Origin. Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

21.3 List the hazardous constituents that are received (or are expected to be received). Included data on volume and concentration, if known. (Attach additional sheets if necessary)

21.4 Waste Treatment

a. Is this waste treated (or will it be treated) prior to entering the treatment works?
☐ Yes ☐ No

If Yes, describe the treatment (provide information about the removal efficiency):

b. Is the discharge (or will the discharge be) continuous or intermittent?
☐ Continuous ☐ Intermittent

If intermittent, describe the discharge schedule:

END OF PART F

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO. MO-	OUTFALL NO.

PART G – COMBINED SEWER SYSTEMS

Refer to the APPLICATION OVERVIEW to determine whether Part G applies to the treatment works.

22. GENERAL INFORMATION

22.1 System Map. Provide a map indicating the following: (May be included with basic application information.)

A. All CSO Discharges.
B. Sensitive Use Areas Potentially Affected by CSOs. (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems and Outstanding Natural Resource Waters.)
C. Waters that Support Threatened and Endangered Species Potentially Affected by CSOs.

22.2 System Diagram. Provide a diagram, either in the map provided above or on a separate drawing, of the Combined Sewer Collection System that includes the following information:

A. Locations of Major Sewer Trunk Lines, Both Combined and Separate Sanitary.
B. Locations of Points where Separate Sanitary Sewers Feed into the Combined Sewer System.
C. Locations of In-Line or Off-Line Storage Structures.
D. Locations of Flow-Regulating Devices.
E. Locations of Pump Stations.

22.3 Percent of collection system that is combined sewer

22.4 Population served by combined sewer collection system

22.5 Name of any satellite community with combined sewer collection system

23. CSO OUTFALLS. COMPLETE THE FOLLOWING ONCE FOR EACH CSO DISCHARGE POINT

23.1 Description of Outfall

a. Outfall Number
b. Location

c. Distance from Shore (if applicable) _____ ft
d. Depth Below Surface (if applicable) _____ ft
e. Which of the following were monitored during the last year for this CSO?

☐ Rainfall ☐ CSO Pollutant Concentrations ☐ CSO
☐ CSO Flow Volume ☐ Receiving Water Quality

f. How many storm events were monitored last year?

23.2 CSO Events

a. Give the Number of CSO Events in the Last Year Events ☐ Actual ☐ Approximate
b. Give the Average Duration Per CSO Event
Hours ☐ Actual ☐ Approximate
c. Give the Average Volume Per CSO Event
Million Gallons ☐ Actual ☐ Approximate
d. Give the minimum rainfall that caused a CSO event in the last year _____ inches of rainfall

23.3 Description of Receiving Waters

a. Name of Receiving Water
b. Name of Watershed/River/Stream System
c. U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)
d. Name of State Management/River Basin
e. U.S. Geological Survey 8- Digit Hydrologic Cataloging Unit Code (If Known)

23.4 CSO Operations

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable state water quality standard.)

END OF PART G

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

Numerical excursions

July 2012 Missing data

January 2013 exceeded daily max for NH3/N, 14.2 mg/l

April 2013 Exceeded Monthly average for TR Zinc 0.002 mg/l and E coli >2419.6 MPN/100ml

May 2013 exceeded monthly average TR zinc 0.019 mg/l and E coli >2419.6, 1986.3, 488.4

June 2013- Total recoverable Zinc 0.009 mg/l

July 2013- NH3/N exceeded monthly average 0.68 mg/l and one BOD analysis.

August 2013 E coli 1299.7

January 2014 exceeded daily max NH3/N 4.9 mg/l and monthly average 0.59 mg/l

February 2014 Exceeded daily max TSS and daily max NH3/N0. 1mg/l, 0.5mg/l and monthly avg. 2.62mg/l

April 2014 exceeded daily max. NH3/N 0.75 mg/l, 0.45 mg/l Missing BOD week of 04/13/-04/19/2014

July 2014 NH3/N exceeded monthly average 2.23 mg/l, TSS twice, 5 mg/l and 13 mg/l

August 2014 NH3/N daily max. 5.9 mg/l, monthly average 0.65 mg/l

September 2014 missing BOD analysis and one sample for E. coli

October 2014 two E. coli exceeds 841.4, 686.7 MPN/100ml

November 2014 NH3/N effluent concentration 17.8 mg/l

January 2015 exceeded TSS on the 31st with 116 mg/l, Max7/ AVG 30.1

March 2015 TR Zinc daily max 0.0438, 0.0738 mg/l, new limits on Cadmium were exceeded 0.0006, 0.0002, 0.001, and 0.0008 mg/l

April 2015 daily max TR Zinc 0.0838, 0.0238 mg/l, monthly average 0.0823 mg/l Cadmium daily max 0.0006, 0.0007, monthly avg. 0.0004

May 2015 monthly average Zinc, 0.0123 mg/l, monthly average NH3/N 0.03 mg/l

June 2015 daily max TR Zinc, 0.0238, 0.0638 mg/l, monthly avg.0.0723 mg/l, TR Cadmium daily max 0.0009 mg/l monthly avg. 0.0003 mg/l, NH3/N daily max0.2 mg/l, monthly avg. 1.86 mg/l

July 2015 Daily max NH3/N 0.3, 2.8 mg/l, monthly avg. 0.85

September 2015 Zinc and Cadmium exceeded

October 2105 E.coli 1553.1 on the 12th UV turned off

December 2015 Monthly avg. TR Zinc 0.0223 mg/l

January 2016 Monthly avg. TR zinc by 0.071 mg/l

February 2016 Daily max TR zinc by 0.21 mg/l, and monthly avg. by 0.037

March 2016 monthly avg. TR zinc by 0.0053 mg/l

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0103349
Owner:	City of Joplin
Address:	602 South Main Street, Joplin, MO 64801
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Joplin Turkey Creek Wastewater Treatment Facility
Facility Address:	3457 West Eddy Lane, Joplin, MO 64801
Legal Description:	See Page 2
UTM Coordinates:	See Page 2
Receiving Stream:	See Page 2
First Classified Stream and ID:	See Page 2
USGS Basin & Sub-watershed No.:	See Page 2

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

See Page 2

This permit authorizes only wastewater discharges and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

January 1, 2020
Effective Date

Edward B. Galbraith, Director, Division of Environmental Quality

September 30, 2022
Expiration Date

Chris Wieberg, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #002 – Equalization basin – discharges from this outfall are not authorized, and shall be subject to 40 CFR 122.41(m) and reported according to 40 CFR 122.21(m)(3)(i) & (ii).

Outfall #004 (main outfall) – POTW – SIC #4952
The use or operation of this facility shall be by or under the supervision of a Certified "A" Operator.
Influent screening / peak flow pumping / grit removal / comminution / flow splitter / primary clarification / biotowers / intermediate clarification / oxidation ditch (2) / final clarification / Diamond Fabric Filter / UV disinfection / step aeration prior to Turkey Creek / anaerobic sludge digestion / aerobic digestion / sludge belt press / sludge drying beds / sludge is land applied

Design population equivalent is 100,000.
Design flow is 15 MGD.
Actual flow is 8.4 MGD.
Design sludge production is 2,340 dry tons/year.

Legal Description:	SW ¼, SE ¼, Sec. 29, T28N, R33W, Jasper County
UTM Coordinates:	X= 361664, Y= 4109167
Receiving Stream:	Turkey Creek (P)
First Classified Stream and ID:	Turkey Creek (P) (3216) 303(d) List
USGS Basin & Sub-watershed No.:	(11070207-0901)

Permitted Feature INF – Influent Monitoring
Influent Monitoring Location – Headworks

Permitted Feature SM1 – Upstream Monitoring
Instream monitoring location – Approximately 0.8 miles upstream of Outfall #004 near the Schifferdecker Road bridge. See Special Condition #17.

Permitted Feature SM2 – Downstream Monitoring
Instream monitoring location – Blackcat Road bridge. See Special Condition #17.

OUTFALL #004	TABLE A-1. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations in **Table A-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: M						
Flow	MGD	*		*	once/day	24 hr. total
Carbonaceous Biochemical Oxygen Demand$_5$	mg/L		10	10	once/week	composite**
Total Suspended Solids	mg/L		20	15	once/week	composite**
E. coli (Note 1, Page 5)	#/100mL		1,030	206	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	 4.7 11.5		 1.4 2.7	once/week	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Cadmium, Total Recoverable	µg/L	2.8		1.4	once/month	composite**
Copper, Total Recoverable	µg/L	34.4		13.0	once/month	composite**
Cyanide, Amenable to Chlorination (Note 2, Page 4)	µg/L	8.4 (10 ML)		4.0 (10 ML)	once/month	grab
Zinc, Total Recoverable	µg/L	269.8		152.7	once/month	composite**

EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units***	SU	6.0		9.0	once/week	grab

EFFLUENT PARAMETER(S)	UNITS	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Carbonaceous Biochemical Oxygen Demand$_5$ – Percent Removal (Note 3, Page 5)	%	85	once/month	calculated
Total Suspended Solids – Percent Removal (Note 3, Page 5)	%	85	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

* Monitoring requirement only.
** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.
*** pH is measured in pH units and is not to be averaged.

OUTFALL #004	TABLE A-1 (continued). FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations in **Table A-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: Q						
Oil & Grease	mg/L	15		10	once/quarter†	grab
Arsenic, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Chromium (III), Total Recoverable	µg/L	*		*	once/quarter†	composite**
Chromium (VI), Dissolved	µg/L	*		*	once/quarter†	grab
Lead, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Mercury, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Nickel, Total Recoverable	µg/L	*		*	once/quarter†	composite**
Pentachlorophenol (Note 4)	µg/L	*		*	once/quarter†	grab
Phenol	µg/L	*		*	once/quarter†	grab

MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE APRIL 28, 2020.

* Monitoring requirement only.
** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.
† See table on Page 5 for quarterly sampling requirements.

Note 1 – Effluent limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 – This effluent limit is below the accepted minimum quantification level (ML). The Department has determined the current acceptable ML of Cyanide Amenable to Chlorination to be 10 µg/L when using SM 4500-CN^-G. Cyanides Amenable to Chlorination after Distillation in *Standard Methods for the Examination of Water and Wastewater*, 22nd Edition. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 10 µg/L will be considered violations of the permit and values less than the minimum quantification level of 10 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of Cyanide in excess of the effluent limits stated in the permit.

Note 3 – Influent sampling for BOD_5 and TSS is not required when the facility does not discharge effluent during the reporting period. Samples are to be collected prior to any treatment process. Calculate Percent Removal by using the following formula: [(Average Influent –Average Effluent) / Average Influent] x 100% = Percent Removal. Influent and effluent samples are to be taken during the same month. The Average Influent and Average Effluent values are to be calculated by adding the respective values together and dividing by the number of samples taken during the month. Influent samples are to be collected as a 24-hour composite sample, composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 4 – Effluent limitations for Pentachlorophenol (PCP) are dependent upon the pH of the effluent. The pH must be sampled within the same hour as the PCP sample is collected.

Quarterly Minimum Sampling Requirements			
Quarter	**Months**	**Quarterly Effluent Parameters**	**Report is Due**
First	January, February, March	Sample at least once during any month of the quarter	April 28th
Second	April, May, June	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	October 28th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28th

OUTFALL #004	**TABLE A-2. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: WA						
Acute Whole Effluent Toxicity (Note 5)	TU_a	*			once/year	composite**
ACUTE WET TEST MONITORING REPORTS SHALL BE SUBMITTED **ANNUALLY**; THE FIRST REPORT IS DUE JANUARY 28, 2021.						
Limit Set: WC						
Chronic Whole Effluent Toxicity (Note 6)	TU_c	*			once/permit cycle	composite**
CHRONIC WET TEST REPORTS SHALL BE SUBMITTED **ONCE PER PERMIT CYCLE**; THE FIRST REPORT IS DUE JANUARY 28, 2022.						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Note 5 – The Acute WET test shall be conducted once per year. See Special Condition #15 for additional requirements.

Note 6 – The Chronic WET test shall be conducted once per permit cycle. An Acute WET test is not required during the year of the Chronic test. See Special Condition #16 for additional requirements.

PERMITTED FEATURE **INF**	**TABLE B-1. INFLUENT MONITORING REQUIREMENTS**

The monitoring requirements in **Table B-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The influent wastewater shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: IM						
Biochemical Oxygen Demand$_5$ (Note 3)	mg/L			*	once/month	composite**
Total Suspended Solids (Note 3)	mg/L			*	once/month	composite**
Ammonia as N	mg/L	*		*	once/month	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020.

* Monitoring requirement only.
** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.
† See table below for quarterly sampling requirements.

Note 3 – Influent sampling for BOD_5 and TSS is not required when the facility does not discharge effluent during the reporting period. Samples are to be collected prior to any treatment process. Calculate Percent Removal by using the following formula: [(Average Influent –Average Effluent) / Average Influent] x 100% = Percent Removal. Influent and effluent samples are to be taken during the same month. The Average Influent and Average Effluent values are to be calculated by adding the respective values together and dividing by the number of samples taken during the month. Influent samples are to be collected as a 24-hour composite sample, composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

Quarterly Minimum Sampling Requirements			
Quarter	**Months**	**Quarterly Influent Parameters**	**Report is Due**
First	January, February, March	Sample at least once during any month of the quarter	April 28th
Second	April, May, June	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	October 28th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28th

PERMITTED FEATURE SM1	TABLE C-1. INSTREAM MONITORING REQUIREMENTS

The monitoring requirements in **Table C-1** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The stream shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: UM						
Ammonia as N	mg/L	*		*	once/month	grab
Total Phosphorus	mg/L	*		*	once/month	grab
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	grab
Nitrite + Nitrate	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE _____.						
Limit Set: UQ						
Arsenic, Dissolved	µg/L	*		*	once/quarter†	grab
Cadmium, Dissolved	µg/L	*		*	once/quarter†	grab
Chromium (III), Dissolved	µg/L	*		*	once/quarter†	grab
Chromium (VI), Dissolved	µg/L	*		*	once/quarter†	grab
Copper, Dissolved	µg/L	*		*	once/quarter†	grab
Lead, Dissolved	µg/L	*		*	once/quarter†	grab
Mercury, Dissolved	µg/L	*		*	once/quarter†	grab
Nickel, Dissolved	µg/L	*		*	once/quarter†	grab
Zinc, Dissolved	µg/L	*		*	once/quarter†	grab
Pentachlorophenol (Note 4)	µg/L	*		*	once/quarter†	grab
MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE APRIL 28, 2020.						

* Monitoring requirement only.

Note 4 – The pH must be sampled within the same hour as the PCP sample is collected.

PERMITTED FEATURE SM2	TABLE C-2. INSTREAM MONITORING REQUIREMENTS

The monitoring requirements in **Table C-2** shall become effective on **January 1, 2020** and remain in effect until expiration of the permit. The stream shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: DM						
Hardness, Total	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE FEBRUARY 28, 2020.						

* Monitoring requirement only.

D. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and August 1, 2019 and hereby incorporated as though fully set forth herein.

E. SPECIAL CONDITIONS

1. Electronic Discharge Monitoring Report (eDMR) Submission System.
   (a) Discharge Monitoring Reporting Requirements. The permittee must electronically submit compliance monitoring data via the eDMR system. In regards to Standard Conditions Part I, Section B, #7, the eDMR system is currently the only Department approved reporting method for this permit.
   (b) Programmatic Reporting Requirements. The following reports (if required by this permit) must be electronically submitted as an attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:
      (1) Collection System Maintenance Annual Reports;
      (2) Sludge/Biosolids Annual Reports;
         i. In addition to the annual Sludge/Biosolids report submitted to the Department, the permittee must submit Sludge/Biosolids Annual Reports electronically using EPA's NPDES Electronic Reporting Tool ("NeT") (https://cdx.epa.gov/).
      (3) Pretreatment Program Reports; and
      (4) Any additional report required by the permit excluding bypass reporting.
      After such a system has been made available by the Department, required data shall be directly input into the system by the next report due date.
   (c) Other actions. The following shall be submitted electronically after such a system has been made available by the Department:
      (1) Notices of Termination (NOTs);
      (2) No Exposure Certifications (NOEs); and
      (3) Bypass reporting, See Special Condition #9 for 24-hr. bypass reporting requirements.
   (d) Electronic Submissions. To access the eDMR system, use the following link in your web browser: https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx.
   (e) Waivers from Electronic Reporting. The permittee must submit compliance monitoring data and reports electronically. The Department may grant a waiver to a permittee in compliance with 40 CFR Part 127. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. The Department will either approve or deny this electronic reporting waiver request within 120 calendar days. Only permittees with an approved waiver request may submit monitoring data and reports on paper to the Department for the period that the approved electronic reporting waiver is effective.

E. SPECIAL CONDITIONS (continued)

2. The full implementation of this operating permit, which includes implementation of any applicable schedules of compliance, shall constitute compliance with all applicable federal and state statutes and regulations in accordance with §644.051.16, RSMo, and the Clean Water Act (CWA) section 402(k); however, this permit may be reopened and modified, or alternatively revoked and reissued:
   (a) To comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the CWA, if the effluent standard or limitation so issued or approved:
      (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
      (2) controls any pollutant not limited in the permit.
   (b) To incorporate an approved pretreatment program or modification thereto pursuant to 40 CFR 403.8(c) or 40 CFR 403.18(e), respectively.

3. All outfalls must be clearly marked in the field. This does not include instream monitoring locations.

4. Report as no-discharge when a discharge does not occur during the report period. For instream samples, report as "no flow" if no stream flow occurs during the report period.

5. Reporting of Non-Detects:
   (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
   (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
   (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
   (d) Where the permit contains a Minimum Level (ML) and the permittee is granted authority in the permit to report zero in lieu of the < ML for a specified parameter (conventional, priority pollutants, metals, etc.), then zero (0) is to be reported for that parameter.
   (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.
   (f) When calculating monthly averages, use one-half of the method detection limit (MDL) instead of a zero. Where all data are below the MDL, the "<MDL" shall be reported as indicated in item (c).

6. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).

7. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. To request a modification of the operational control testing requirements listed in 10 CSR 20-9, the permittee shall submit a permit modification application and fee to the Department requesting a deviation from the operational control monitoring requirements. Upon approval of the request, the Department will modify the permit.

8. The permittee shall develop and implement a program for maintenance and repair of its collection system. The permittee may compare collection system performance results and other data with the benchmarks used in the Departments' Capacity, Management, Operation, And Maintenance (CMOM) Model located at http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc. Additional information regarding the Departments' CMOM Model is available at http://dnr.mo.gov/pubs/pub2574.htm.

   The permittee shall also submit a report via the Electronic Discharge Monitoring Report (eDMR) Submission System annually, by January 28th, for the previous calendar year. The report shall contain the following information:
   (a) A summary of the efforts to locate and eliminate specific sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
   (b) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
   (c) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.

E. SPECIAL CONDITIONS (continued)

9. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3), and with Standard Condition Part I, Section B, subsection 2. Bypasses are to be reported to the Southwest Regional Office during normal business hours or by using the online Sanitary Sewer Overflow/Facility Bypass Application located at: https://dnr.mo.gov/mogem/ or the Environmental Emergency Response spill-line at 573-634-2606 outside of normal business hours. Once an electronic reporting system compliant with 40 CFR Part 127, the National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, is available all bypasses must be reported electronically via the new system. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

10. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.

11. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.

12. An all-weather access road to the treatment facility shall be maintained.

13. The outfall sewer shall be protected and maintained against the effects of floodwater, ice, or other hazards as to reasonably insure its structural stability, freedom from stoppage, and that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.

14. Sludge treatment, storage and disposal practices shall be conducted in accordance with Standard Conditions Part III.

15. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:
    (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour, static, non-renewal toxicity tests with the following species:
        - The fathead minnow, *Pimephales promelas* (Acute Toxicity EPA Test Method 2000.0).
        - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity EPA Test Method 2002.0).
    (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
    (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
    (d) The Allowable Effluent Concentration (AEC) for this facility is 100% with the dilution series being: 100%, 50%, 25%, 12.5%, and 6.25%.
    (e) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
    (f) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of acute toxic units ($TU_a = 100/LC_{50}$) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration 50 Percent (LC_{50}) is the effluent concentration that would cause death in 50 percent of the test organisms at a specific time.

16. Chronic Whole Effluent Toxicity (WET) tests shall be conducted as follows:
    (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the chronic toxicity of NPDES effluents are found in the most recent edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013; Table IA, 40 CFR Part 136).* The permittee shall concurrently conduct 7-day, static, renewal toxicity tests with the following species:
        - The fathead minnow, *Pimephales promelas* (Survival and Growth Test Method 1000.0).
        - The daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.0).
    (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
    (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
    (d) The Allowable Effluent Concentration (AEC) is 100%, the dilution series is: 100%, 50%, 25%, 12.5%, and 6.25%.

E. SPECIAL CONDITIONS (continued)

(e) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.

(f) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of chronic toxic units ($TU_c = 100/IC_{25}$) reported according to the *Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* chapter on report preparation and test review. The 25 percent Inhibition Effect Concentration (IC_{25}) is the toxic or effluent concentration that would cause 25 percent reduction in mean young per female or in growth for the test populations.

17. Receiving Water Monitoring Conditions

(a) In-stream receiving water samples should be taken at the location(s) specified on Page 2 of this permit. In the event that a safe, accessible location is not present at the location(s) listed, a suitable location can be negotiated with the Department. Samples should be taken at least four feet from the bank or from the middle of the stream (whichever is less) and 6-inches below the surface if possible. The upstream receiving water sample should be collected at a point upstream from any influence of the effluent, where the water is visibly flowing down stream.

(b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream/lake characteristics (e.g., septic conditions, algae growth, etc.), the stream segment (e.g., riffle, pool or run) from where the sample was collected. These observations shall be submitted with the sample results.

(c) Samples shall not be collected from areas with especially turbulent flow, still water or from the stream bank, unless these conditions are representative of the stream reach or no other areas are available for sample collection. Sampling should not be made when significant precipitation has occurred recently. The sampling event should be terminated and rescheduled if any of the following conditions occur:

- If turbidity in the stream increases notably; or
- If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hours

(d) Always use the correct sampling technique and handling procedure specified for the parameter of interest. Please refer to the latest edition of Standard Methods for the Examination of Water and Wastewater for further discussion of proper sampling techniques. All analyses must be conducted in accordance with an approved EPA method. Meters shall be calibrated immediately (within 1 hour) prior to the sampling event.

(e) Please contact the Department if you need additional instructions or assistance.

18. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be developed and implemented by **July 1, 2020**. Through implementation of the SWPPP, the permittee shalt minimize the release of pollutants in stormwater from the facility to the waters of the state. The SWPPP shall be developed in consultation with the concepts and methods described in the following document: Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.

(a) The SWPPP must identify any stormwater outfall from the facility and Best Management Practices (BMPs) used to prevent or reduce the discharge of contaminants in stormwater. The stormwater outfalls shall either be marked in the field or clearly marked on a map and maintained with the SWPPP.

(b) The SWPPP must include a schedule and procedures for a once per month routine site inspection.

1. The monthly routine inspection shall be documented in a brief written report, which shall include:
   i. The person(s) conducting the inspection.
   ii. The inspection date and time.
   iii. Weather information for the day of the inspection.
   iv. Precipitation information for the entire period since the last inspection.
   v. Description of the discharges observed, including visual quality of the discharges (sheen, turbid, etc.).
   vi. Condition of BMPs
   vii. If BMPs were replaced or repaired.
   viii. Observations and evaluations of BMP effectiveness.
2. Any deficiency observed during the routine inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.
3. The routine inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.
4. The routine inspection reports shall be made available to Department personnel upon request.

(c) The SWPPP must include a schedule and procedures for a once per year comprehensive site inspection.

(1) The annual comprehensive inspection shall be documented in a written report, which shall include:
   i. The person(s) conducting the inspection.
   ii. The inspection date and time.
   iii. Findings from the areas of your facility that were examined;

E. SPECIAL CONDITIONS (continued)

iv. All observations relating to the implementation of your control measures including:
1. Previously unidentified discharges from the site,
2. Previously unidentified pollutants in existing discharges,
3. Evidence of, or the potential for, pollutants entering the drainage system;
4. Evidence of pollutants discharging to receiving waters at all facility outfall(s), and the condition of and around the outfall, and
5. Additional control measures needed to address any conditions requiring corrective action identified during the inspection.

v. Any required revisions to the SWPPP resulting from the inspection;

vi. Any incidence of noncompliance observed or a certification stating that the facility is in compliance with Special Condition #25.

(2) Any deficiency observed during the comprehensive inspection must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report.

(3) The comprehensive inspection reports must be kept onsite with the SWPPP and maintained for a period of five (5) years.

(4) The comprehensive inspection reports shall be made available to Department personnel upon request.

(d) The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested.

(e) The SWPPP must be reviewed and updated at a minimum once per permit cycle, as site conditions or control measures change.

19. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP.

a. Permittee shall adhere to the following minimum Best Management Practices (BMPs):

(1) Minimize the exposure of industrial material storage areas, loading and unloading areas, dumpsters and other disposal areas, maintenance activities, and fueling operations to rain, snow, snowmelt, and runoff, by locating industrial materials and activities inside or protecting them with storm resistant coverings, if warranted and practicable.

(2) Provide good housekeeping practices on the site to prevent potential pollution sources from coming into contact with stormwater and provide collection facilities and arrange for proper disposal of waste products, including sludge.

(3) Implement a maintenance program to ensure that the structural control measures and industrial equipment is kept in good operating condition and to prevent or minimize leaks and other releases of pollutants.

(4) Prevent or minimize the spillage or leaks of fluids, oil, grease, fuel, etc. from equipment and vehicle maintenance, equipment and vehicle cleaning, or activities.

(5) Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed.

(6) Provide stormwater runoff controls to divert, infiltrate, reuse, contain, or otherwise minimize pollutants in the stormwater discharge.

(7) Enclose or cover storage piles of salt or piles containing salt, used for deicing or other commercial or industrial purposes.

(8) Provide training to all employees who; work in areas where industrial materials or activities are exposed to stormwater, are responsible for stormwater inspections, are members of the Pollution Prevention Team. Training must cover the specific control measures and monitoring, inspection, planning, reporting and documentation requirements of this permit. Training is recommended annually for any applicable staff and whenever a new employee is hired who meets the description above.

(9) Eliminate and prevent unauthorized non-stormwater discharges at the facility.

(10) Minimize generation of dust and off-site tracking of raw, final, or waste materials by implementing appropriate control measures.

20. Expanded Effluent Testing: Permittee must sample and analyze for the pollutants listed in 40 CFR 122.21 Appendix J, Table 2, as well as Aluminum and Iron. Pursuant to 40 CFR 122.21(j)(4) the permittee shall provide this data with the permit renewal application from a minimum of three samples taken within four and one-half years prior to the date of the permit application. Samples must be representative of the seasonal variation in the discharge from each outfall. Approved and sufficiently sensitive testing methods listed in 40 CFR 136.3 must be utilized. A method is "sufficiently sensitive" when; 1) the method quantifies the pollutant below the level of the applicable water quality criterion or; 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015 and or 40 CFR 136. These methods are also required for parameters listed as monitoring only, as the data collected may be used to determine if numeric limitations need to be established.

E. SPECIAL CONDITIONS (continued)

21. Pretreatment: The permittee shall implement and enforce its approved pretreatment program in accordance with the requirements of 10 CSR 20-6.100. The approved pretreatment program is hereby incorporated by reference.

    (a) The permittee shall submit to the Department via the Electronic Discharge Monitoring Report (eDMR) Submission System on or before March 31st of each year a report briefly describing its pretreatment activities during the previous calendar year. At a minimum, the report shall include the following:
        (1) An updated list of the Permittee's Industrial Users, including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The Permittee shall provide a brief explanation of each deletion. This list shall identify which Industrial Users are subject to categorical pretreatment Standards and specify which Standards are applicable to each Industrial User. The list shall indicate which Industrial Users are subject to local standards that are more stringent than the categorical Pretreatment Standards. The Permittee shall also list the Industrial Users that are subject only to local Requirements;
        (2) A summary of the status of Industrial User compliance over the reporting period;
        (3) A summary of compliance and enforcement activities (including inspections) conducted by the Permittee during the reporting period; and
        (4) Any other relevant information requested by the Department.
    (b) Pursuant to 40 CFR 122.44(j)(2)(ii), the permittee shall submit to the Department a written technical evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) by **July 1, 2020**.

22. The permittee shall update their pretreatment program to incorporate the requirements of 10 CSR 20-6.100, effective October 30, 2012, which adopted the 2005 "Streamlining" revisions to the federal pretreatment rule, 40 CFR 403. This update to city code will include at the minimum the "required streamlining" 40 CFR 403 rule updates. The permittee shall submit the draft revision to the pretreatment program along with the draft revisions to the city code to the Department by **January 1, 2022**, for review and approval. After draft review, the formal submission of the program modification will follow the requirements of 40 CFR 403.18. The permittee shall immediately finalize implement the updates to the pretreatment program and adopt the revised city code no later than **6 months** after Department approval of the changes. The permittee shall submit notification of city code adoption to the Department no later than **7 months** after Department approval.

23. Sewer Extension Authority Supervised Program. The Department approved the Sewer Extension Authority Supervised Program for the City of Joplin to regulate and approve construction of sanitary sewers and pump stations, which are tributary to this wastewater treatment facility on December 18, 2019. The City of Joplin shall act as the continuing authority for the operation, maintenance, and modernization of the constructed collection system. This approval may be modified or revoked by the Department if the wastewater collection, transportation, or treatment facilities reach their design capacity, if the treatment facility falls into chronic noncompliance with the permit, or if the permittee fails to follow the terms and conditions of the submitted and approved program.

    This permit may be reopened and modified or alternatively revoked and reissued to incorporate new or modified conditions to the Sewer Extension Authority Supervised Program, if information indicates changes are necessary to assure compliance with Missouri's Clean Water Law and associated regulations. When any of the above mentioned conditions occur, the permittee will be notified prior to any modifications of this permit condition. Plans and specifications for all projects which include a proposed sanitary sewer overflow must be submitted to the Department to provide record information for location and size of the sanitary sewer overflow.

    An annual report on the Sewer Extension Authority Supervised Program must be submitted by January 28 of each year to the Missouri Department of Natural Resources' Water Protection Program's Engineering Section. Please see **Appendix – Sewer Extension Authority Supervised Program Reauthorization Letter** for applicable conditions.

    The Department's Water Protection Program's Engineering Section will reevaluate the City's Sewer Extension Authority Supervised Program for reauthorization when they file an application for permit renewal to determine if it is current, complete, and meets the requirements of 10 CSR 20-8 Minimum Design Standards. Once the Sewer Extension Authority Supervised Program is reauthorized or denied, this condition will be updated accordingly.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0103349
JOPLIN TURKEY CREEK WASTEWATER TREATMENT FACILITY

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollutant Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)(A)2.], a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

A Factsheet is not an enforceable part of an operating permit.

This Factsheet is for a Major facility.

Part I – Facility Information

Facility Type: POTW

Facility Description: Influent screening / peak flow pumping / grit removal / comminution / flow splitter / primary clarification / biotowers / intermediate clarification / oxidation ditch (2) / final clarification / Diamond Fabric Filter / UV disinfection / step aeration prior to Turkey Creek / anaerobic sludge digestion / aerobic digestion / sludge belt press / sludge drying beds / sludge is land applied
Design population equivalent is 100,000.
Design flow is 15 MGD.
Actual flow is 8.4 MGD.
Design sludge production is 2,340 dry tons/year.

Have any changes occurred at this facility or in the receiving water body that affects effluent limit derivation?
✓ No.

Application Date: 04/11/12
Expiration Date: 01/25/12

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#004	23.25	Tertiary	Domestic

Facility Performance History:
Since the previous permit was issued on January 26, 2007, the facility has shown the following exceedances:

- Ammonia (1)
- Cadmium (25)
- Copper (1)
- Cyanide (6)
- Phenol (2)
- Zinc (43)

The most recent compliance inspection of the facility was performed by the Southwest Regional Office April 28 – 30, 2015. At the time of the inspection the facility was found to be in non-compliance based upon observations made at the time of the inspection. In September 2016 the city completed upgrade work on their tertiary filters to increase their treatment capacity. The City entered into a voluntary compliance agreement (VCA) with the department in an effort to eliminate the #002 bypass outfall. Upon issuance of this permit, any discharges from Outfall #002 will be considered a bypass.

Comments:
Changes in this permit include the addition of instream, influent, and effluent Total Phosphorus and Total Nitrogen (speciated) monitoring; a Chronic WET test once per permit cycle; downstream monitoring for Total Hardness; and the development of a SWPPP. Total Toxic Organics, downstream monitoring for metals, and all parameters for Outfall #002 were removed. Additionally, monitoring for Total Recoverable Arsenic, Chromium (III), Lead, Mercury, Nickel, Total Dissolved Chromium (VI), Pentachlorophenol, and Phenol were reduced from monthly to quarterly. See Part VII of the Fact Sheet for further information regarding the addition and removal of effluent parameters. The following special conditions were added or updated: inflow and infiltration reporting requirements, reporting of Non-detects, bypass reporting requirements, pretreatment requirements, instream monitoring requirements, SWPPP reporting requirements, and eDMR reporting requirements.

Part II – Operator Certification Requirements

✓ This facility is required to have a certified operator.

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], the permittee shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators at regulated wastewater treatment facilities shall be certified in accordance with [10 CSR 20-9.020(2)] and any other applicable state law or regulation. As per [10 CSR 20-9.020(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

Owned or operated by or for a

☒ - Municipalities	☐ - State agency
☐ - County	☐ - Public Water Supply Districts
☐ - Public Sewer District	☐ - Private Sewer Company regulated by the Public Service Commission

Each of the above entities are only applicable if they have a Population Equivalent greater than two hundred (200).

This facility currently requires a chief operator with a **A** Certification Level. Please see **Appendix - Classification Worksheet**. Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator's Name: Lyndell Edwards
Certification Number: 5316
Certification Level: WW-A

The listing of the operator above only signifies that staff drafting this operating permit have reviewed appropriate Department records and determined that the name listed on the operating permit application has the correct and applicable Certification Level.

Part III – Operational Control Testing Requirements

Missouri Clean Water Commission regulation 10 CSR 20-9.010 requires certain publically owned treatment works and privately owned facilities regulated by the Public Service Commission to conduct internal operational control monitoring to further ensure proper operation of the facility and to be a safeguard or early warning for potential plant upsets that could affect effluent quality. This requirement is only applicable if the publically owned treatment works and privately owned facilities regulated by the Public Service Commission has a Population Equivalent greater than two hundred (200).

10 CSR 20-9.010(3) allows the Department to modify the monitoring frequency required in the rule based upon the Department's judgement of monitoring needs for process control at the specified facility.

✓ As per [10 CSR 20-9.010(4))], the facility is required to conduct operational monitoring. These operational monitoring reports are to be submitted to the Department along with the MSOP discharge monitoring reports. The facility is a mechanical plant and is required to conduct operational control monitoring as follows:

Operational Monitoring Parameter	Frequency
Precipitation	Daily (M-F)
Flow – Influent or Effluent	Daily (M-F)
pH – Influent	Daily (M-F)
Temperature (Aeration basin)	Daily (M-F)
TSS – Influent	Weekly
TSS – Mixed Liquor	Weekly
Settleability – Mixed Liquor	Daily (M-F)
Dissolved Oxygen – Mixed Liquor	Daily (M-F)
pH – Anaerobic Digester	Daily (M-F)
Temperature –Anaerobic Digester	Daily (M-F)
Dissolved Oxygen – Aerobic Digester	Daily (M-F)

Part IV – Receiving Stream Information

RECEIVING STREAM(S) TABLE: OUTFALL #004

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Turkey Creek 303(d)	P	3216	AQL, HHP, IRR, LWP, SCR, WBC-B	11070207-0901	Direct Discharge

*As per 10 CSR 20-7.031 Missouri Water Quality Standards, the Department defines the Clean Water Commission's water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and 1st classified receiving stream's beneficial water uses to be maintained are in the receiving stream table in accordance with [10 CSR 20-7.031(1)(C)].

Uses found in the receiving streams table, above:

10 CSR 20-7.031(1)(C)1.:
AQL = Protection of aquatic life (Current narrative use(s) are defined to ensure the protection and propagation of fish shellfish and wildlife, which is further subcategorized as: WWH = Warm Water Habitat; **CDH** = Cold-water habitat; **CLH** = Cool-water habitat; EAH = Ephemeral Aquatic Habitat; MAH = Modified Aquatic Habitat; LAH = Limited Aquatic Habitat. This permit uses AQL effluent limitations in 10 CSR 20-7.031 Table A for all habitat designations unless otherwise specified.)

10 CSR 20-7.031(1)(C)2.: Recreation in and on the water
WBC = Whole Body Contact recreation where the entire body is capable of being submerged;
WBC-A = Whole body contact recreation that supports swimming uses and has public access;
WBC-B = Whole body contact recreation that supports swimming;
SCR = Secondary Contact Recreation (like fishing, wading, and boating).

10 CSR 20-7.031(1)(C)3. to 7.:
HHP = Human Health Protection as it relates to the consumption of fish;
IRR = Irrigation for use on crops utilized for human or livestock consumption;
LWP = Livestock and wildlife protection;
DWS = Drinking Water Supply;
IND = Industrial water supply

10 CSR 20-7.031(1)(C)8-11.: Wetlands (10 CSR 20-7.031 Table A currently does not have corresponding habitat use criteria for these defined uses)
WSA = Storm- and flood-water storage and attenuation; WHP = Habitat for resident and migratory wildlife species; WRC = Recreational, cultural, educational, scientific, and natural aesthetic values and uses; WHC = Hydrologic cycle maintenance.

10 CSR 20-7.031(6): **GRW** = Groundwater

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Turkey Creek (P)	0.1	0.1	1.0

MIXING CONSIDERATIONS TABLE:

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(a)]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(b)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
0.025	0.025	0.25	0.0025	0.0025	N/A

RECEIVING STREAM MONITORING REQUIREMENTS:

Permitted Feature SM1. (Upstream)
Facilities with a design flow greater than or equal to one million gallons per day are required to sample their effluent monthly for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia per 10 CSR 20-7.015(9)(D)8.B. Upstream monitoring for these parameters is necessary to determine background concentrations in order to complete calculations related to nutrient loading to the receiving stream.

Upstream monitoring for Dissolved Arsenic, Cadmium, Chromium (III), Chromium (VI), Copper, Lead, Mercury, Nickel, Zinc, and Pentachlorophenol is necessary to determine background concentrations in order to complete calculations to determine reasonable potential to exceed water quality standards in the receiving stream.

Permitted Feature SM2. (Downstream)
Downstream sampling for Total Hardness is included as the permit includes metals that the toxicity of the metals are hardness dependent.

Receiving Water Body's Water Quality
Currently, the Department has not conducted a stream survey for this waterbody. When a stream survey is conducted, more information may be available about the receiving stream.

Part V – Rationale and Derivation of Effluent Limitations & Permit Conditions

ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:
As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream, and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

✓ The facility does not discharge to a Losing Stream as defined by [10 CSR 20-2.010(40)] & [10 CSR 20-7.031(1)(O)], or is an existing facility.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(o); 40 CFR Part 122.44(l)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

✓ Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.

✓ Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance.

- **Ammonia as N**. Effluent limitations were re-calculated for Ammonia based on new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for Ammonia. The newly established limitations are still protective of water quality.

- **Arsenic, Chromium (III), Chromium (VI), Lead, Mercury, Nickel, Phenol, and Pentachlorophenol**. Monitoring only. Using all applicable data from Discharge Monitoring Reports, the permit writer conducted a Reasonable Potential Analysis on all parameters and determined the facility had no reasonable potential to cause or contribute to an excursion of the standard and has removed these effluent limits. The monitoring frequencies were also reduced to once per quarter. Please see **APPENDIX – RPA RESULTS**. The reasonable potential analysis for these parameters showed no potential to exceed water quality standards. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

- **Cadmium, Total Recoverable**. Effluent limitations were re-calculated for Total Recoverable Cadmium based on new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for Cadmium. The newly established limitations are still protective of water quality.

- **Outfall #002**. The limitations and monitoring requirements associated with Outfall #002 were removed from the permit. This outfall is now considered a bypass and is no longer authorized to discharge. The City and Department agreed to a Voluntary Compliance Agreement (VCA) to allow the facility time to eliminate the discharge.

- **Total Toxic Organics (TTOs)**. Monitoring for TTOs was established for Categorical Industrial Users discharging to POTWs, including but not limited to, Electroplating (40 CFR 413). The previous permit contained a requirement to sample and report TTOs twice per year. A review of the TTO results over the last permit cycle shows compliance in accordance with 40 CFR 413.14(f). Due to consistency in compliance, the monitoring requirement for TTOs was removed. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

- **WET Test**. WET testing requirements were changed from % survival to monitoring only for toxic units. This change reflects modifications to Missouri's Effluent Regulation found at 10 CSR 20-7.015. 40 CFR 122.44(d)(1)(ii) requiring the department to establish effluent limitations to control all parameters which have the reasonable potential to cause or contribute to an excursion above any state water quality standard, including state narrative criteria. The previous permit imposed a pass/fail limitation without collecting sufficient numerical data to conduct an analytical reasonable potential analysis. The permit writer has made a reasonable potential determination which concluded the facility does not have reasonable potential at this time but monitoring is required. Implementation of the toxic unit monitoring requirement will allow the department to effect numeric criteria in accordance with water quality standards established under §303 of the CWA.

- **Zinc, Total Recoverable**. Effluent limitations were re-calculated for Total Recoverable Zinc based on new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for Zinc. The newly established limitations are still protective of water quality.

✓ The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b).

- **General Criteria**. The previous permit contained a special condition which described a specific set of prohibitions related to general criteria found in 10 CSR 20-7.031(4). In order to comply with 40 CFR 122.44(d)(1), the permit writer has conducted reasonable potential determinations for each general criterion and established numeric effluent limitations where reasonable potential exists. While the removal of the previous permit special condition creates the appearance of backsliding, since this permit establishes numeric limitations where reasonable potential to cause or contribute to an excursion of the general criteria exists the permit maintains sufficient effluent limitations and monitoring requirements in order to protect water quality, this permit is equally protective as compared to the previous permit. Therefore, given this new information, and the fact that the previous permit special condition was not consistent with 40 CFR 122.44(d)(1), an error occurred in the establishment of the general criteria as a special condition of the previous permit. Please see Part VI – Effluent Limits Determination for more information regarding the reasonable potential determinations for each general criterion related to this facility.

ANTIDEGRADATION:

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)], for domestic wastewater discharge with new, altered, or expanding discharges, the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. In accordance with Missouri's water quality regulations for antidegradation [10 CSR 20-7.031(3)], degradation may be justified by documenting the socio-economic importance of a discharge after determining the necessity of the discharge. Facilities must submit the antidegradation review request to the Department prior to establishing, altering, or expanding discharges. See http://dnr.mo.gov/env/wpp/permits/antideg-implementation.htm

✓ No degradation proposed and no further review necessary. Facility did not apply for authorization to increase pollutant loading or to add additional pollutants to their discharge.

For stormwater discharges, the stormwater BMP chosen for the facility, through the antidegradation analysis performed by the facility, must be implemented and maintained at the facility. Failure to implement and maintain the chosen BMP alternative is a permit violation; see SWPPP.

✓ The facility must review and maintain stormwater BMPs as appropriate.

AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:
As per [10 CSR 20-6.010(2)(C)], …An applicant may utilize a lower preference continuing authority by submitting, as part of the application, when a higher level authority is available, must submit information to the Department for review and approval, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or any other regional sewage service and treatment plan approved for higher preference authority by the Department.

BIOSOLIDS & SEWAGE SLUDGE:
Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works

✓ Permittee is authorized to land apply biosolids in accordance with Standard Conditions III.

COMPLIANCE AND ENFORCEMENT:
Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

✓ The facility is currently under enforcement action. The enforcement action is due to failure to meet permit limits.

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. This final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online. In an effort to aid facilities in the reporting of applicable information electronically, the Department has created several new forms including operational control monitoring forms and an I&I location and reduction form. These forms are optional and found on the Department's website at the following locations:

Operational Monitoring Lagoon: http://dnr.mo.gov/forms/780-2801-f.pdf
Operational Monitoring Mechanical: http://dnr.mo.gov/forms/780-2800-f.pdf
I&I Report: http://dnr.mo.gov/forms/780-2690-f.pdf

Per 40 CFR 127.15 and 127.24, permitted facilities may request a temporary waiver for up to 5 years or a permanent waiver from electronic reporting from the Department. To obtain an electronic reporting waiver, a permittee must first submit an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. Each facility must make a request. If a single entity owns or operates more than one facility, then the entity must submit a separate request for each facility based on its specific circumstances. An approved waiver is non-transferable.

The Department must review and notify the facility within 120 calendar days of receipt if the waiver request has been approved or rejected [40 CFR 124.27(a)]. During the Department review period as well as after a waiver is granted, the facility must continue submitting a hard-copy of any reports required by their permit. The Department will enter data submitted in hard-copy from those facilities allowed to do so and electronically submit the data to the EPA on behalf of the facility.

✓ The permittee/facility is currently using the eDMR data reporting system.

NUMERIC LAKE NUTRIENT CRITERIA

✓ This facility does not discharge into a lake watershed where numeric lake nutrient criteria are applicable.

PRETREATMENT PROGRAM:
The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a Publicly Owned Treatment Works [40 CFR Part 403.3(q)].

Pretreatment programs are required at any POTW (or combination of POTW operated by the same authority) and/or municipality with a total design flow greater than 5.0 MGD and receiving industrial wastes that interfere with or pass through the treatment works or are otherwise subject to the pretreatment standards. Pretreatment programs can also be required at POTWs/municipals with a design flow less than 5.0 MGD if needed to prevent interference with operations or pass through.

Several special conditions pertaining to the permittee's pretreatment program may be included in the permit, and are as follows:

- Implementation and enforcement of the program,
- Annual pretreatment report submittal,
- Submittal of list of industrial users,
- Technical evaluation of need to establish local limitations, and
- Submittal of the results of the evaluation

✓ This permittee has an approved pretreatment program in accordance with the requirements of [40 CFR Part 403] and [10 CSR 20-

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard.

In accordance with [40 CFR Part 122.44(d)(1)(iii)] if the permit writer determines that any given pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

✓ An RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS.**

REMOVAL EFFICIENCY:
Removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

✓ Secondary Treatment is 85% removal [40 CFR Part 133.102(a)(3) & (b)(3)].

SANITARY SEWER OVERFLOWS (SSO) AND INFLOW AND INFILTRATION (I&I):
Sanitary Sewer Overflows (SSOs) are defined as untreated sewage releases and are considered bypassing under state regulation [10 CSR 20-2.010(12)] and should not be confused with the federal definition of bypass. SSOs result from a variety of causes including blockages, line breaks, and sewer defects that can either allow wastewater to backup within the collection system during dry weather conditions or allow excess stormwater and groundwater to enter and overload the collection system during wet weather conditions. SSOs can also result from lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. SSOs include overflows out of manholes, cleanouts, broken pipes, and other into waters of the state and onto city streets, sidewalks, and other terrestrial locations.

Inflow and Infiltration (I&I) is defined as unwanted intrusion of stormwater or groundwater into a collection system. This can occur from points of direct connection such as sump pumps, roof drain downspouts, foundation drains, and storm drain cross-connections or through cracks, holes, joint failures, faulty line connections, damaged manholes, and other openings in the collection system itself. I&I results from a variety of causes including line breaks, improperly sealed connections, cracks caused by soil erosion/settling, penetration of vegetative roots, and other sewer defects. In addition, excess stormwater and groundwater entering the collection system from line breaks and sewer defects have the potential to negatively impact the treatment facility.

Missouri RSMo §644.026.1.(13) mandates that the Department issue permits for discharges of water contaminants into the waters of this state, and also for the operation of sewer systems. Such permit conditions shall ensure compliance with all requirements as established by sections 644.006 to 644.141. Standard Conditions Part I, referenced in the permit, contains provisions requiring proper operation and maintenance of all facilities and systems of treatment and control. Missouri RSMo §644.026.1.(15) instructs the Department to require proper maintenance and operation of treatment facilities and sewer systems and proper disposal of residual waste from all such facilities. To ensure that public health and the environment are protected, any noncompliance which may endanger public health or the environment must be reported to the Department within 24 hours of the time the permittee becomes aware of the noncompliance. Standard Conditions Part I, referenced in the permit, contains the reporting requirements for the permittee when bypasses and upsets occur. The permit also contains requirements for permittees to develop and implement a program for maintenance and repair of the collection system. The permit requires that the permittee submit an annual report to the Department for the previous calendar year that contains a summary of efforts taken by the permittee to locate and eliminate sources of excess I & I, a summary of general maintenance and repairs to the collection system, and a summary of any planned maintenance and repairs to the collection system for the upcoming calendar year.

✓ At this time, the Department recommends the US EPA's Guide for Evaluating Capacity, Management, Operation and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (Document # EPA 305-B-05-002) or the Departments' CMOM Model located at http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at http://dnr.mo.gov/pubs/pub2574.htm. The CMOM identifies some of the criteria used to evaluate a collection system's management, operation, and maintenance and was intended for use by the EPA, state, regulated community, and/or third party entities. The CMOM is applicable to small, medium, and large systems; both public and privately owned; and both regional and satellite collection systems. The CMOM does not substitute for the Clean Water Act, the Missouri Clean Water Law, and both federal and state regulations, as it is not a regulation.

The permittee entered into a VCA on December 11, 2011 to eliminate discharges from Outfall #002. In 2017, the VCA was extended until December 11, 2021. An Abatement Order on Consent (AOC) became effective on June 6, 2019, which supersedes the VCA. Per the AOC, the City agrees to implement The City of Joplin's 2026 Activities Plan of its System Renewal and SSO Prevention Plan. Until all upgrades to the City's wastewater collection system have been completed, the City agrees to operate and maintain the existing collection system and peak flow outfalls so as to comply with the conditions and requirements of this permit.

SCHEDULE OF COMPLIANCE (SOC):

Per 644.051.4 RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement, or if prohibited by other statute or regulation. A SOC includes an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the Clean Water Act, and 40 CFR §122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR § 122.47(a)(1), 10 CSR 20-7.031(11), and 10 CSR 20-7.015(9), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, a SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR § 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit that was not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study that may result in site-specific criteria or alternative effluent limits. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance to Permit Writers in developing SOCs, and attain a greater level of consistency, on April 9, 2015 the Department issued an updated policy on development of SOCs. This policy provides guidance to Permit Writers on the standard time frames for schedules for common activities, and guidance on factors that may modify the length of the schedule such as a Cost Analysis for Compliance.

✓ This permit does not contain an SOC.

SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM:
In accordance with [10 CSR 20-6.010(6)(A)], the Department may grant approval of a permittee's Sewer Extension Authority Supervised Program. These approved permittees regulate and approve construction of sanitary sewers and pump stations, which are tributary to this wastewater treatment facility. The permittee shall act as the continuing authority for the operation, maintenance, and modernization of the constructed collection system. See http://dnr.mo.gov/env/wpp/permits/sewer-extension.htm.

✓ The permittee's Sewer Extension Authority Supervised Program has been reauthorized. Please see **Appendix – Sewer Extension Authority Supervised Program Reauthorization Letter** for applicable conditions.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure.

Additionally in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of stormwater discharges. The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed the facility will employ the control measures determined to be adequate to achieve the benchmark values discussed above. The facility will conduct monitoring and inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example, if sample results from an outfall show values of TSS above the benchmark value, the BMP being employed is deficient in controlling stormwater pollution. Corrective action should be taken to repair, improve, or replace the failing BMP. This internal evaluation is required at least once per month but should be continued more frequently if BMPs continue to fail. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)]. For further guidance, consult the antidegradation implementation procedure (http://dnr.mo.gov/env/wpp/docs/AIP050212.pdf).

Alternative Analysis (AA) evaluation of the BMPs is a structured evaluation of BMPs that are reasonable and cost effective. The AA evaluation should include practices that are designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of AIP defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The AA evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure* (AIP), Section II.B.

If parameter-specific numeric exceedances continue to occur and the permittee feels there are no practicable or cost-effective BMPs which will sufficiently reduce a pollutant concentration in the discharge to the benchmark values established in the permit, the permittee can submit a request to re-evaluate the benchmark values. This request needs to include 1) a detailed explanation of why the facility is unable to comply with the permit conditions and unable to establish BMPs to achieve the benchmark values; 2) financial data of the company and documentation of cost associated with BMPs for review and 3) the SWPPP, which should contain adequate documentation of BMPs employed, failed BMPs, corrective actions, and all other required information. This will allow the Department to conduct a cost analysis on control measures and actions taken by the facility to determine cost-effectiveness of BMPs. The request shall be submitted in the form of an operating permit modification; the application is found at: http://dnr.mo.gov/forms/index.html.

✓ 10 CSR 20-6.200 and 40 CFR 122.26(b)(14)(ix) includes treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that is located within the confines of the facility, with a design flow of 1.0 MGD or more, or are required to have an approved pretreatment program under 40 CFR part 403, as an industrial activity in which permit coverage is required. In lieu of requiring sampling in the site-specific permit, the facility is required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP).

A facility can apply for conditional exclusion for "no exposure" of industrial activities and materials to stormwater by submitting a permit modification via Form B2 (http://dnr.mo.gov/forms/780-1805-f.pdf) appropriate application filing fees and a completed No Exposure Certification for Exclusion from NPDES Stormwater Permitting under Missouri Clean Water Law (https://dnr.mo.gov/forms/780-2828-f.pdf) to the Department's Water Protection Program, Operating Permits Section. Upon approval of the No Exposure Certification, the permit will be modified and the Special Condition to develop and implement a SWPPP will be removed.

VARIANCE:

As per the Missouri Clean Water Law § 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law §§644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law §§644.006 to 644.141.

✓ This operating permit is not drafted under premises of a petition for variance; however, the Department of Natural Resources presented a proposed Water Quality Standards Variance for Zinc for the City of Joplin – Turkey Creek WWTF to the Missouri Clean Water Commission (MCWC) on July 22, 2019. The Department intends to seek the MCWCs approval of the variance during the January 9, 2020 Missouri Clean Water Commission meeting. Upon approval, the variance will be incorporated into the Department's upcoming water quality standards rule package for adoption into the Code of State Regulations and subsequent approval by the US Environmental Protection Agency.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:

As per [10 CSR 20-2.010(86)], the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant that may be discharged into that stream without endangering its water quality.

✓ Wasteload allocations were calculated where applicable using water quality criteria or water quality model results and the dilution equation below:

$$Ce = \frac{(Qe + Qs)C - (Qs \times Cs)}{(Qe)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration Ce = effluent concentration
Cs = upstream concentration Qe = effluent flow
Qs = upstream flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

Number of Samples "n":
Additionally, in accordance with the TSD for water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the Long Term Average (LTA) associated with a particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying distribution or treatment performance, which should be, at a minimum, be targeted to comply with the values dictated by the WLA. Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed using an assumed number of samples is "n = 4" at a minimum. For Total Ammonia as Nitrogen, "n = 30" is used.

WLA MODELING:
There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

✓ A WLA study was either not submitted or determined not applicable by Department staff.

WHOLE EFFLUENT TOXICITY (WET) TEST:
A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES). WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures that the provisions in the 10 CSR 20-6.010(8)(A) and the Water Quality Standards 10 CSR 20-7.031(4)(D),(F),(G),(J)2.A & B are being met. Under [10 CSR 20-6.010(8)(B)], the Department may require other terms and conditions that it deems necessary to assure compliance with the Clean Water Act and related regulations of the Missouri Clean Water Commission. In addition the following MCWL apply: §§§644.051.3 requires the Department to set permit conditions that comply with the MCWL and CWA; 644.051.4 specifically references toxicity as an item we must consider in writing permits (along with water quality-based effluent limits, pretreatment, etc…); and 644.051.5 is the basic authority to require testing conditions. WET test will be required by facilities meeting the following criteria:

- ☒ Facility is a designated Major.
- ☐ Facility continuously or routinely exceeds its design flow.
- ☐ Facility that exceeds its design population equivalent (PE) for BOD_5 whether or not its design flow is being exceeded.
- ☐ Facility (whether primarily domestic or industrial) that alters its production process throughout the year.
- ☐ Facility handles large quantities of toxic substances, or substances that are toxic in large amounts.
- ☒ Facility has Water Quality-based Effluent Limitations for toxic substances (other than NH_3)
- ☐ Facility is a municipality with a Design Flow ≥ 22,500 gpd.
- ☐ Other – please justify.

✓ The permittee is required to conduct WET test for this facility.

40 CFR 122.41(M) - BYPASSES:
The federal Clean Water Act (CWA), Section 402 prohibits wastewater dischargers from "bypassing" untreated or partially treated sewage (wastewater) beyond the headworks. A bypass is defined as an intentional diversion of waste streams from any portion of a treatment facility, [40 CFR 122.41(m)(1)(i)]. Additionally, Missouri regulation 10 CSR 20-7.015(9)(G) states a bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending, to waters of the state. Only under exceptional and specified limitations do the federal regulations allow for a facility to bypass some or all of the flow from its treatment process. Bypasses are prohibited by the CWA unless a permittee can meet all of the criteria listed in 40 CFR 122.41(m)(4)(i)(A), (B), & (C). Any bypasses from this facility are subject to the reporting required in 40 CFR 122.41(l)(6) and per Missouri's Standard Conditions I, Section B, part 2.b. Additionally, Anticipated Bypasses include bypasses from peak flow basins or similar devices designed for peak wet weather flows.

✓ Bypasses occur or have occurred at this facility. The previous permit allowed the facility to discharge from Outfall #002 under emergency conditions when the plant and equalization basin were operating at capacity. The permittee entered into a VCA on December 11, 2011 to eliminate discharges from Outfall #002. In 2017, the VCA was extended until December 11, 2021. An Abatement Order on Consent (AOC) became effective on June 6, 2019, which supersedes the VCA. Per the AOC, the City agrees to implement The City of Joplin's 2026 Activities Plan of its System Renewal and SSO Prevention Plan. Until all upgrades to the City's wastewater collection system have been completed, the City agrees to operate and maintain the existing collection system and peak flow outfalls so as to comply with the conditions and requirements of this permit.

303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

- ✓ This facility discharges to a stream with an EPA TMDL for Zinc, approved on October 25, 2006. The TMDL established wasteload allocations which resulted in a calculated daily maximum permit limitation of 216 µg/L for Outfall #004. A monthly average limitation of 152.7 µg/L has been established for this permit cycle. The monthly average limit expressed in this permit meets the assumptions and requirements of the TMDL as it pertains to the discharge from Turkey Creek WWTF.

Part VI – Effluent Limits Determination

CATEGORIES OF WATERS OF THE STATE:
As per Missouri's Effluent Regulations [10 CSR 20-7.015], the waters of the state are divided into the below listed seven (7) categories. Each category lists effluent limitations for specific parameters, which are presented in each outfall's Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

- ☐ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ☐ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ☐ Losing Streams [10 CSR 20-7.015(4)]
- ☐ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ☐ Special Streams [10 CSR 20-7.015(6)]
- ☐ Subsurface Waters [10 CSR 20-7.015(7)]
- ☒ All Other Waters [10 CSR 20-7.015(8)]

OUTFALL #004 – MAIN FACILITY OUTFALL
Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

EFFLUENT LIMITATIONS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Flow	MGD	1	*		*	*/*	1/day	monthly	T
$CBOD_5$	mg/L	1		10	10	10/10	1/week	monthly	C
TSS	mg/L	1		20	15	20/15	1/week	monthly	C
Escherichia coli **	#/100 mL	1, 3		1,030	206	Fecal 1,000/400	1/week	monthly	G
Ammonia as N (Apr 1 –Sep 30)	mg/L	2, 3	4.7		1.4	Mar – May 6.8/3.4; June – Aug 3.1/1.6	1/week	monthly	C
Ammonia as N (Oct 1 – Mar 31)	mg/L	2, 3	11.5		2.7	Sep – Nov 6.8/3.4; Dec – Feb 7.5/3.7	1/week	monthly	C
Total Phosphorus	mg/L	1	*		*	***	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	***	1/month	monthly	C
Nitrite + Nitrates	mg/L	1	*		*	***	1/month	monthly	C
Cadmium, Total Recoverable	µg/L	2, 3	2.8		1.4	0.8/0.4	1/month	monthly	C
Copper, Total Recoverable	µg/L	2, 3	34.4		13.0	21/11	1/month	monthly	C
Cyanide, Amenable to Chlorination	µg/L	2, 3	8.4		4.0	7/4	1/month	monthly	G
Zinc, Total Recoverable	µg/L	2, 3	269.8		152.7	220/110	1/month	monthly	C
Acute Whole Effluent Toxicity	TUa	1, 9	*			Pass/Fail	1/year	annually	C
Chronic Whole Effluent Toxicity	TUc	1, 9	*			***	1/permit cycle	1/permit cycle	C
Oil & Grease	mg/L	1, 3	15		10	15/10	1/quarter	quarterly	G
Arsenic, Total Recoverable	µg/L	2, 3	*		*	*/*	1/quarter	quarterly	C
Chromium III, Total Recoverable	µg/L	2, 3	*		*	*/*	1/quarter	quarterly	C
Chromium VI, Dissolved	µg/L	2, 3	*		*	16/8	1/quarter	quarterly	G
Lead, Total Recoverable	µg/L	2, 3	*		*	13/6	1/quarter	quarterly	C
Mercury, Total Recoverable	µg/L	2, 3	*		*	0.9/0.3	1/quarter	quarterly	C
Nickel, Total Recoverable	µg/L	2, 3	*		*	171/58	1/quarter	quarterly	C
Pentachlorophenol	µg/L	2, 3	*		*	Daily Max 5/8/12 Monthly Avg. 1/2/4	1/quarter	quarterly	G
Phenol	µg/L	2, 3	*		*	184/70	1/quarter	quarterly	G
PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU	1	6.0		9.0	6.0-9.0	1/week	monthly	G
PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
$CBOD_5$ Percent Removal	%	1			85	85	1/month	monthly	M
TSS Percent Removal	%	1			85	85	1/month	monthly	M

* - Monitoring requirement only.
** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.
*** - Parameter not previously established in previous state operating permit.

**** - C = 24-hour composite
G = Grab
T = 24-hr. total
M = Measured/calculated

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

OUTFALL #004 – DERIVATION AND DISCUSSION OF LIMITS:

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification.

- **Biochemical Oxygen Demand (BOD_5)**. Operating permit retains 10 mg/L as a Weekly Average and 10 mg/L as a Monthly Average from the previous permit. Please see the **CATEGORIZATION OF WATERS OF THE STATE** sub-section of the **Effluent Limits Determination.**

- **Total Suspended Solids (TSS)**. Operating permit retains 20 mg/L as a Weekly Average and 15 mg/L as a Monthly Average from the previous permit. Please see the **CATEGORIZATION OF WATERS OF THE STATE** sub-section of the **Effluent Limits Determination.**

- ***Escherichia coli (E. coli)***. Monthly average of 126 per 100 mL as a geometric mean and Weekly Average of 630 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), for discharges within two miles upstream of segments or lakes Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.015(9)(B). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). The Geometric Mean is calculated by multiplying all of the data points and then taking the nth root of this product, where n = # of samples collected. For example: Five *E. coli* samples were collected with results of 1, 4, 6, 10, and 5 (#/100mL). Geometric Mean = 5^{th} root of (1)(4)(6)(10)(5) = 5^{th} root of 1,200 = 4.1 #/100mL.

- **Total Ammonia Nitrogen**. Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L.

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

Summer: April 1 – September 30
Chronic WLA: $C_e = ((23.25 + 0.25)1.5 – (0.25 * 0.01))/23.25 = 1.52$ mg/L

Acute WLA: $C_e = ((23.25 + 0.0025)12.1 – (0.0025 * 0.01))/23.25 = 12.1$ mg/L

LTA_c = 1.52 mg/L (0.691) = 1.05 mg/L [CV = 0.91, 99th Percentile, 30 day avg.]
LTA_a = 12.1 mg/L (0.223) = 2.70 mg/L [CV = 0.91, 99th Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.05 mg/L (4.49) = **4.7** mg/L [CV = 0.91, 99th Percentile]
AML = 1.05 mg/L (1.29) = **1.4** mg/L [CV = 0.91, 95th Percentile, n =30]

Winter: October 1 – March 31
Chronic WLA: $C_e = ((23.25 + 0.25)3.1 – (0.25 * 0.01))/23.25$
$C_e = 3.13$ mg/L

Acute WLA: $C_e = ((23.25 + 0.0025)12.1 – (0.0025 * 0.01))/23.25$
$C_e = 12.1$ mg/L

LTA_c = 3.13 mg/L (0.595) = 1.87 mg/L [CV = 1.30, 99th Percentile, 30 day avg.]
LTA_a = 12.1 mg/L (0.162) = 1.96 mg/L [CV = 1.30, 99th Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.87 mg/L (6.18) = **11.5** mg/L [CV = 1.30, 99th Percentile]
AML = 1.87 mg/L (1.43) = **2.7** mg/L [CV = 1.30, 95th Percentile, n =30]

- **Oil & Grease**. Conventional pollutant, Protection of aquatic life CCC = 10 mg/L [10 CSR 20-7.031, Table A1, Other Inorganic Substances]. The Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) (TSD), Section 5.4.2 , recognizes the use of the chronic criteria to be set to the average monthly limit. Therefore WLA=10 mg/L monthly average. The daily maximum was calculated by multiplying the monthly average by 1.5 per the TSD. Therefore, 1.5*10 mg/L = 15 mg/L Daily Maximum.

- **Total Phosphorus and Total Nitrogen (Speciated)**. Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrite + Nitrate are required per 10 CSR 20-7.015(9)(D)8.

- **pH**. 6.0-9.0 SU. pH limitations [10 CSR 20-7.015] are technology-based effluent limitations protective of the consecutive 4-day average Water Quality Standard [10 CSR 20-7.031(5)(E)], due to the assimilative capacity of the mixing zone.

- **Cyanide, Amenable to Chlorination.** Protection of Aquatic Life CMC = 22 µg/L, CCC = 5.0 µg/L [10 CSR 20-7.031, Table A1, Other Inorganic Substances], Background CN = 0 µg/L. The Department has determined the current acceptable ML of Cyanide Amenable to Chlorination to be 10 µg/L when using SM 4500-CN-G.

  Chronic WLA: $C_e = ((23.25 + 0.025)5.0 – (0.025 * 0.0))/23.25 = 5.0$ µg/L
  Acute WLA: $C_e = ((23.25 + 0.0025)22 – (0.0025 * 0.0))/23.25 = 22$ µg/L

  $LTA_c = 5.0\ (0.497) = 2.49$ µg/L [CV = 0.66, 99th Percentile]
  $LTA_a = 22\ (0.294) = 6.48$ µg/L [CV = 0.66, 99th Percentile]

  Use most protective number of LTA_c or LTA_a.

  MDL = 2.49 (3.40) = **8.4** µg/L [CV = 0.66, 99th Percentile]
  AML = 2.49 (1.62) = **4.0** µg/L [CV = 0.66, 95th Percentile, n = 4]

- **Biochemical Oxygen Demand (BOD_5) Percent Removal**. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD_5.

- **Total Suspended Solids (TSS) Percent Removal**. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

Metals
Downstream water hardness of 260 mg/L is used in the calculation below. This value represents the 50th percentile (median) for all sample data submitted to the Department by the facility in compliance with the in-stream monitoring requirements of the operating permit.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and absorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the Department, partitioning evaluations may be considered and site-specific translators developed.

- **Arsenic, Total Recoverable**. Quarterly monitoring requirements have been included in this permit. An RPA was conducted WQS and determined that there is no reasonable potential to violate the water quality standard for Arsenic, please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Cadmium, Total Recoverable***. Protection of Aquatic Life Chronic Criteria = 1.39 µg/L, Acute Criteria = 11.3 µg/L. Upstream concentration (C_s) = 2.72 µg/L. The hardness value of **260 mg/L** represents the 50th percentile (median) for Turkey Creek (P).

  Acute AQL WQS: $e^{(1.0166 * \ln 260 - 3.062490)} * (1.136672 - \ln 260 * 0.041838) = 12.1$ [at Hardness 260]
  Chronic AQL WQS: $e^{(0.7977 * \ln 260 - 3.909)} * (1.101672 - \ln 260 * 0.041938) = 1.47$ [at Hardness 260]

  Acute WQS: 12.1 ÷ 0.904 = 13.3 µg/L [Total Recoverable Conversion]
  Chronic WQS: 1.47 ÷ 0.869 = 1.69 µg/L [Total Recoverable Conversion]

  Acute WLA: $C_e = ((23.25 + 0.0025)13.3 – (0.0025 * 2.72))/23.25 = 13.3$ µg/L
  Chronic WLA: $C_e = ((23.25 + 0.025)1.69 – (0.025 * 2.72))/23.25 = 1.69$ µg/L

  LTA_a: 13.3 (0.301) = 4.01 µg/L [CV = 0.65, 99th Percentile]
  LTA_c: 1.69 (0.504) = 0.85 µg/L [CV = 0.65, 99th Percentile]

Use most protective number of LTA_a or LTA_c.

MDL: 0.85 (3.32) = **2.8** µg/L [CV = 0.65, 99th Percentile]
AML: 0.85 (1.60) = **1.4** µg/L [CV = 0.65, 95th Percentile, n = 4]

* - The permit limits for cadmium are more stringent than ambient stream levels upstream of the Turkey Creek WWTF's point of discharge. The WWTF consistently discharges cadmium levels below instream levels. While the permittee is pursuing a variance for zinc due to similarly elevated upstream levels, the Department and permittee anticipate that the plant will be able to meet the final effluent limits for cadmium. If the facility is unable to meet the limits established in this permit, the permittee may decide to seek a variance for cadmium based upon the upstream levels, the source of which is legacy mining impacts.

- **Chromium (III), Total Recoverable**. Monitoring only requirements have been included in this permit. An RPA was conducted and determined that there is no reasonable potential to violate the water quality standard for Chromium (III), please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Chromium (VI), Dissolved**. Monitoring only requirements have been included in this permit. An RPA was conducted and determined that there is no reasonable potential to violate the water quality standard for Chromium (VI), please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Copper, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 19.13 µg/L, Acute Criteria = 31.01 µg/L. Upstream concentration (C_s) = 1.55 µg/L. The hardness value of **260 mg/L** represents the 50th percentile (median) for Turkey Creek (P).

Acute AQL WQS: $e^{(0.9422 * \ln 260 - 1.700300)} * 0.960 = 33.1$ [at Hardness 260]
Chronic AQL WQS: $e^{(0.78545 * \ln 260 - 1.702)} * 0.960 = 20.3$ [at Hardness 260]

Acute WQS: 33.1 µg/L ÷ 0.960 = 34.4 µg/L [Total Recoverable Conversion]
Chronic WQS: 20.3 µg/L ÷ 0.960 = 21.1 µg/L [Total Recoverable Conversion]

Acute WLA: $C_e = ((23.25 + 0.0025)34.4 – (0.0025 * 1.55))/23.25 = 34.4$ µg/L
Chronic WLA: $C_e = ((23.25 + 0.025)21.1 – (0.025 * 1.55))/23.25 = 21.1$ µg/L

LTA_a = 34.4 (0.183) = 6.22 µg/L [CV = 1.15, 99th Percentile]
LTA_c = 21.1 (0.333) = 7.04 µg/L [CV = 1.15, 99th Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 6.22 (5.54) = **34.4 µg/L** [CV = 1.15, 99th Percentile]
AML = 6.22 (2.09) = **13.0 µg/L** [CV = 1.15, 95th Percentile, n = 4]

- **Lead, Total Recoverable**. Monitoring only requirements have been included in this permit. An RPA was conducted and determined that there is no reasonable potential to violate the water quality standard for Lead, please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Mercury, Total Recoverable**. Monitoring only requirements have been included in this permit. An RPA was conducted and concluded that there is no reasonable potential to violate the water quality standard for Mercury, please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Nickel, Total Recoverable**. Monitoring only requirements have been included in this permit. An RPA was conducted and concluded that there is no reasonable potential to violate the water quality standard for Nickel, please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Phenol**. Monitoring only requirements have been included in this permit. An RPA was conducted and concluded that there is no reasonable potential to violate the water quality standard for Phenol please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Pentachlorophenol**. Monitoring only requirements have been included in this permit. An RPA was conducted and concluded that the discharge has no reasonable potential to violate the water quality standard for Pentachlorophenol at a pH of 6.5, 7.0, and 7.5. Please see **Appendix – RPA Results.** This determination will be reassessed at the time of renewal.

- **Zinc, Total Recoverable**. Protection of Aquatic Life Chronic Criteria = 263.8 µg/L, Acute Criteria = 263.8 µg/L. Upstream concentration (C_s) = 555.78 µg/L. The hardness value of **260 mg/L** represents the 50th percentile (median) for Turkey Creek (P).

  Acute AQL WQS: $e^{(0.8473 * \ln 260 + 0.884)} * 0.98 = 263.8$ [at Hardness 260]
  Chronic AQL WQS: $e^{(0.8473 * \ln 260 + 0.884)} * 0.98 = 263.8$ [at Hardness 260]

  Acute TR WQS: $263.8 \div 0.978 = 269.8$ [Total Recoverable Conversion]
  Chronic TR WQS: $263.8 \div 0.986 = 267.6$ [Total Recoverable Conversion]

  Acute WLA: $C_e = ((23.25 + 0.0025)269.8 – (0.0025 * 555.78))/23.25 = 269.8$ µg/L
  Chronic WLA: $C_e = ((23.25 + 0.025)267.6 – (0.025 * 555.78))/23.25 = 267.3$ µg/L

  LTA_a: 269.8 (0.402) = 108.4 [CV = 0.45, 99th Percentile]
  LTA_c: 267.3 (0.609) = 162.9 [CV = 0.45, 99th Percentile]

  Use most protective number of LTA_a or LTA_c.

  MDL: 108.4 (2.49) = **269.7 µg/L** [CV = 0.45, 95th Percentile, n = 4]
  AML: 108.4 (1.41) = **152.7 µg/L** [CV = 0.45, 95th Percentile, n = 4]

Whole Effluent Toxicity

- **Acute Whole Effluent Toxicity**. Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards.

  Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

- **Chronic Whole Effluent Toxicity**. Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards.

  Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

Parameters Removed.

- **Outfall #002 – Equalization basin**. Due to the fact that #002 is now considered a bypass, all associated limits and monitoring requirements have been removed.

- **Total Toxic Organics (TTOs)**. Monitoring for TTOs was established for Categorical Industrial Users discharging to POTWs, including but not limited to, Electroplating (40 CFR 413). The previous permit contained a requirement to sample and report TTOs twice per year. A review of the TTO results over the last permit cycle shows compliance in accordance with 40 CFR 413.14(f). Due to consistency in compliance, the monitoring requirement for TTOs was removed. The permit is still protective of water quality and this determination will be reassessed at the time of renewal.

Sampling Frequency Justification: Sampling and Reporting Frequency for Outfall #004 were established in accordance with 10 CSR 20-7.015(8) and (9). Weekly sampling is required for *E. coli*, per 10 CSR 20-7.015(9)(D)6.A.

WET Test Sampling Frequency Justification. WET Testing schedules and intervals are established in accordance with the Department's Permit Manual; Section 5.2 *Effluent Limits / WET Testing for Compliance Bio-monitoring.* It is recommended that WET testing be conducted during the period of lowest stream flow.

Acute Whole Effluent Toxicity

- ✓ No less than **ONCE/YEAR:**
  - Facility is designated as a Major facility or has a design flow ≥ 1.0 MGD.
  - Facility incorporates a pretreatment program.
  - Facility has Water Quality-based effluent limitations for toxic substances (other than NH_3).

Chronic Whole Effluent Toxicity

- ✓ No less than **ONCE/PERMIT CYCLE:**
  - POTW facilities with a design flow of greater than 1.0 million gallons per day, but less than 10 million gallons per day, shall conduct and submit to the Department a chronic WET test no less than once per five years.

Sampling Type Justification: As per 10 CSR 20-7.015, samples collected for mechanical plants shall be a 24 hour composite sample. Grab samples, however, must be collected for pH, *E. coli*, Oil & Grease, and Chromium (VI) in accordance with recommended analytical methods. Grab samples shall also be collected for cyanide. Federal regulation 40 CFR 122.21(j) requires cyanide samples collected to fulfill application requirements be grab. For further information on sampling and testing methods please review 10 CSR 20-7.015(9)(D) 2.

PERMITTED FEATURE INF – INFLUENT MONITORING
The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

INFLUENT MONITORING TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
BOD_5	mg/L	1			*	***	1/month	monthly	C
TSS	mg/L	1			*	***	1/month	monthly	C
Ammonia as N	mg/L	1	*		*	***	1/month	monthly	C
Total Phosphorus	mg/L	1	*		*	***	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	***	1/month	monthly	C
Nitrite + Nitrate	mg/L	1	*		*	***	1/month	monthly	C

* - Monitoring requirement only. **** - C = Composite
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:
1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

Influent Parameters

- **BOD_5 and TSS**. An influent sample is required to determine the removal efficiency. In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day (BOD_5) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia**. Influent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia required per 10 CSR 20-7.015(9)(D)8.

Sampling Frequency Justification: The sampling and reporting frequencies for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia parameters were established to match the required sampling frequency of these parameters in the effluent, per [10 CSR 20-7.015(9)(D)8.]. The sampling and reporting frequencies for influent BOD_5 and TSS have been established to match the required sampling frequency of these parameters in the effluent.

Sampling Type Justification: Sample types for influent parameters were established to match the required sampling type of these parameters in the effluent. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

PERMITTED FEATURE SM1 – INSTREAM MONITORING (UPSTREAM)
The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

MONITORING REQUIREMENTS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Ammonia as N	mg/L	7	*		*	***	1/quarter	quarterly	G
Total Phosphorus	mg/L	7	*		*	***	1/quarter	quarterly	G
Total Kjeldahl Nitrogen	mg/L	7	*		*	***	1/quarter	quarterly	G
Nitrite + Nitrate	mg/L	7	*		*	***	1/quarter	quarterly	G
Arsenic, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Cadmium, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Chromium (III), Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Chromium (VI), Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Copper, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Lead, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Mercury, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Nickel, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Zinc, Dissolved	µg/L	7	*		*	*/*	1/quarter	quarterly	G
Pentachlorophenol	µg/L	7	*		*	*/*	1/quarter	quarterly	G

* - Monitoring requirement only.
**** - G = Grab
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

PERMITTED FEATURE SM1 – DERIVATION AND DISCUSSION OF MONITORING REQUIREMENTS:

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia**. Facilities with a design flow greater than or equal to one million gallons per day are required to sample their effluent monthly for Total Phosphorus and Total Kjeldahl Nitrogen, Nitrite + Nitrate and Ammonia per 10 CSR 20-7.015(9)(D)8. Upstream monitoring for these parameters is necessary to determine background stream concentrations in order to complete calculations that determine instream nutrient loading.

- **Arsenic, Cadmium, Chromium III, Chromium VI, Copper, Lead, Mercury, Nickel, Zinc, and Pentachlorophenol**. These parameters have been carried forward from the previous permit. The results of the instream monitoring will be used to determine background stream concentrations and develop effluent limitations for the facilities main outfall (#004).

Sampling Frequency Justification: The sampling and reporting frequency for Total Phosphorus and Total Nitrogen (speciated) parameters has been established to match the required sampling frequency of these parameters in the effluent.

Sampling Type Justification: For the purposes of instream data collection, and as the upstream water quality should be consistent over a 24 hour period, grab samples are sufficient. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

PERMITTED FEATURE SM2 – INSTREAM MONITORING (DOWNSTREAM)
The monitoring requirements established in the below Monitoring Requirements Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including the monitoring requirements listed in this table.

MONITORING REQUIREMENTS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Total Hardness	mg/L	1, 3	*		*	***	1/month	monthly	G

* - Monitoring requirement only.
*** - Parameter not previously established in previous state operating permit.
**** - G = Grab

Basis for Limitations Codes:
1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review
5. Antidegradation Policy
6. Water Quality Model
7. Best Professional Judgment
8. TMDL or Permit in lieu of TMDL
9. WET Test Policy
10. Multiple Discharger Variance
11. Nutrient Criteria Implementation Plan

PERMITTED FEATURE SM2 – DERIVATION AND DISCUSSION OF MONITORING REQUIREMENTS:

- **Total Hardness**. Monitoring only requirement as the metals parameters contained in the permit are hardness based. This data will be used in the next permit renewal.

Sampling Frequency Justification: The sampling and reporting frequency for Total Hardness has been established to match the required sampling frequency of the metals parameters in the effluent.

Sampling Type Justification: For the purposes of instream data collection, and as the upstream water quality should be consistent over a 24 hour period, grab samples are sufficient. Samples should be analyzed as soon as possible after collection and/or properly preserved according to method requirements.

OUTFALL #004 – GENERAL CRITERIA CONSIDERATIONS:
In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into the permit for those pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality. The rule further states that pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above a narrative criterion within an applicable State water quality standard, the permit shall contain a numeric effluent limitation to protect that narrative criterion. In order to comply with this regulation, the permit writer will complete reasonable potential determinations on whether the discharge will violate any of the general criteria listed in 10 CSR 20-7.031(4). These specific requirements are listed below followed by derivation and discussion (the lettering matches that of the rule itself, under 10 CSR 20-7.031(4)). It should also be noted that Section 644.076.1, RSMo as well as Section D – Administrative Requirements of Standard Conditions Part I of this permit states that it shall be unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri that is in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule or regulation promulgated by the commission.

(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses. The discharge from this facility is made up of treated domestic wastewater. No evidence of an excursion of this criterion has been observed by the department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, this facility utilizes secondary treatment technology and is currently in compliance with effluent limits that are more stringent than secondary treatment technology based effluent limitations established in 40 CFR 133 and there has been no indication to the department that the stream has had issues maintaining beneficial uses as a result of this discharge. Based on the information reviewed during the drafting of this permit, these final effluent limitations appear to have protected against the excursion of this criterion in the past. Therefore, the discharge does not have the reasonable potential to cause or contribute to an excursion of this criterion.
(B) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.
(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.
(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life. This permit contains final effluent limitations which are protective of both acute and chronic toxicity for various pollutants that are either expected to be discharged by domestic wastewater facilities or that were disclosed by this facility on the application for permit coverage. Based on the information reviewed during the drafting of this permit, it has been determined if the facility meets

final effluent limitations established in this permit, there is no reasonable potential for the discharge to cause an excursion of this criterion.

(E) Waters shall provide for the attainment and maintenance of water quality standards downstream including waters of another state. Please see (D) above as justification is the same.

(F) There shall be no significant human health hazard from incidental contact with the water. Please see (D) above as justification is the same.

(G) There shall be no acute toxicity to livestock or wildlife watering. Please see (D) above as justification is the same.

(H) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community. Please see (A) above as justification is the same.

(I) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247. The discharge from this facility is made up of treated domestic wastewater. No evidence of an excursion of this criterion has been observed by the Department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, any solid wastes received or produced at this facility are wholly contained in appropriate storage facilities, are not discharged, and are disposed of offsite. This discharge is subject to Standard Conditions Part III, which contains requirements for the management and disposal of sludge to prevent its discharge. Therefore, this discharge does not have reasonable potential to cause or contribute to an excursion of this criterion.

Part VII – Cost Analysis for Compliance

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

✓ The Department is required to determine "findings of affordability" because the permit applies to a combined or separate sanitary sewer system for a publically-owned treatment works.

Cost Analysis for Compliance - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3.

Summary Table. Cost Analysis for Compliance Summary for the City of Joplin

New Permit Requirements	
Joplin Shoal Creek	
Outfall #001:	Monthly monitoring (influent and effluent) for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrites + Nitrates; monthly influent monitoring for Ammonia; a Chronic WET test once per permit cycle; and the development of a Stormwater Pollution Prevention Plan (SWPPP)
SM1 (Upstream):	Monthly monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, Nitrites + Nitrates, and Ammonia as N
SM2 (Downstream):	Monitoring for Total Hardness
Joplin Turkey Creek	
Outfall #004:	Monthly monitoring (influent and effluent) for Total Phosphorous, Total Kjeldahl Nitrogen, and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test per permit cycle; and the development of a Stormwater Pollution Prevention Plan (SWPPP)
SM1 (Upstream):	Monthly monitoring for Total Phosphorous, Total Kjeldahl Nitrogen, Nitrites + Nitrates, and Ammonia as N
SM2 (Downstream):	Monitoring for Total Hardness

Estimated Annual Cost	Annual Median Household Income (MHI)	Estimated Monthly User Rate	User Rate as a Percent of MHI
$13,692	$40,024	$37.48	1.12%

Part VIII – Administrative Requirements

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

WATER QUALITY STANDARD REVISION:
In accordance with section 644.058, RSMo, the Department is required to utilize an evaluation of the environmental and economic impacts of modifications to water quality standards of twenty-five percent or more when making individual site-specific permit decisions.

- ✓ This operating permit contains a permit requirement for Cadmium, for which water quality criteria has been modified by twenty-five percent or more since the issuance of the previous permit.

PERMIT SYNCHRONIZATION:
The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than 4 years old, that data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit. With permit synchronization, this permit will expire in the 3rd Quarter of calendar year 2022.

PUBLIC NOTICE:

The Department shall give public notice that a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in and water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing. The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit. For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this operating permit was from October 25, 2019 to November 25, 2019. Responses to the Public Notice of this operating permit did not warrant the modification of effluent limits and/or the terms and conditions of this permit. A comment was submitted by the City of Joplin regarding the sampling location for upstream monitoring. The previously established upstream monitoring location was at the Schifferdecker bridge at Turkey Creek; however, due to recent construction on the bridge which affected the sampling location, the permittee requested an alternate location. The updated upstream monitoring location is approximately 0.8 miles upstream of Outfall #004.

  Following the public notice period, the Sewer Extension Authority Supervised Program was approved and reauthorized by the Department. The final permit for this facility includes the updated special condition and reauthorization letter dated December 18, 2019. Additionally, monitoring for Pentachlorophenol (PCP) was required to be reported at pH of 6.5, 7.0, and 7.5. Because this is a monitoring only requirement, the reporting of PCP at a specific pH was removed; however, pH must be sampled within an hour of sampling for PCP.

DATE OF FACT SHEET: AUGUST 27, 2019; **REVISED**: DECEMBER 18, 2019

COMPLETED BY:
ASHLEY KEELY, ENVIRONMENTAL SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION
DOMESTIC WASTEWATER UNIT
(573) 751-7326
ASHLEY.KEELY@DNR.MO.GOV

Appendices

APPENDIX - CLASSIFICATION WORKSHEET:

Item	Points Possible	Points Assigned
Maximum Population Equivalent (P.E.) served , peak day	1 pt./10,000 PE or major fraction thereof. (Max 10 pts.)	10
Design Flow (avg. day) or peak month's flow (avg. day) whichever is larger	1 pt. / MGD or major fraction thereof. (Max 10 pts.)	15
Effluent Discharge		
Missouri or Mississippi River	0	
All other stream discharges except to losing streams and stream reaches supporting whole body contact recreation	1	
Discharge to lake or reservoir outside of designated whole body contact recreational area	2	
Discharge to losing stream, or stream, lake or reservoir area supporting whole body contact recreation	3	3
Direct reuse or recycle of effluent	6	
Land Application/Irrigation		
Drip Irrigation	3	
Land application/irrigation	5	
Overland flow	4	
Variation in Raw Wastes (highest level only)		
Variations do not exceed those normally or typically expected	0	
Reoccurring deviations or excessive variations of 100 to 200 percent in strength and/or flow	2	2
Reoccurring deviations or excessive variations of more than 200 percent in strength and/or flow	4	
Department-approved pretreatment program	6	6
Preliminary Treatment		
STEP systems (operated by the permittee)	3	
Screening and/or comminution	3	3
Grit removal	3	3
Plant pumping of main flow	3	
Flow equalization	5	
Primary Treatment		
Primary clarifiers	5	5
Chemical addition (except chlorine, enzymes)	4	
Secondary Treatment		
Trickling filter and other fixed film media with or without secondary clarifiers	10	10
Activated sludge (including aeration, oxidation ditches, sequencing batch reactors, membrane bioreactors, and contact stabilization)	15	15
Stabilization ponds without aeration	5	
Aerated lagoon	8	
Advanced Lagoon Treatment – Aerobic cells, anaerobic cells, covers, or fixed film	10	
Biological, physical, or chemical	12	
Carbon regeneration	4	
Total from page **ONE (1)**	----	72

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Solids Handling		
Sludge Holding	5	
Anaerobic digestion	10	10
Aerobic digestion	6	6
Evaporative sludge drying	2	
Mechanical dewatering	8	8
Solids reduction (incineration, wet oxidation)	12	
Land application	6	6
Disinfection		
Chlorination or comparable	5	
On-site generation of disinfectant (except UV light)	5	
Dechlorination	2	
UV light	4	4
Required Laboratory Control Performed by Plant Personnel (highest level only)		
Lab work done outside the plant	0	
Push – button or visual methods for simple test such as pH, settleable solids	3	
Additional procedures such as DO, COD, BOD, titrations, solids, volatile content	5	
More advanced determinations, such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	7	7
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	
Total from page **TWO (2)**	----	41
Total from page **ONE (1)**	---	72
Grand Total	---	113

☒ - A: 71 points and greater
☐ - B: 51 points – 70 points
☐ - C: 26 points – 50 points
☐ - D: 0 points – 25 points

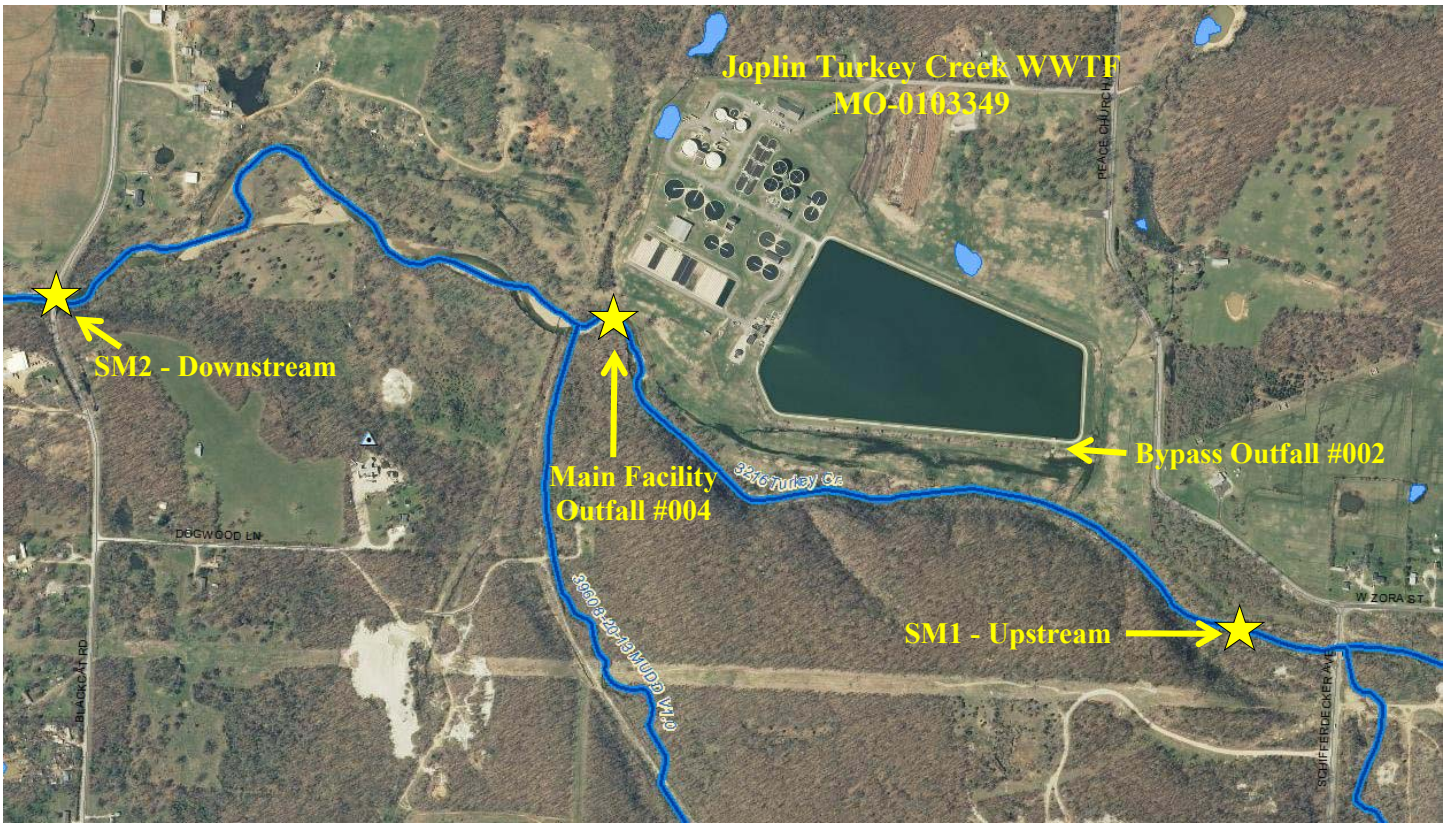
APPENDIX – RPA RESULTS:

Parameter	CMC*	RWC Acute*	CCC*	RWC Chronic*	n**	Range max/min	CV***	MF	RP Yes/No
Ammonia as Nitrogen (Summer)	12.1	4.85	1.5	4.80	69	2.87/0.03	0.91	1.69	YES
Ammonia as Nitrogen (Winter)	12.1	11.20	3.1	11.08	71	6.05/0.125	1.30	1.85	YES
Arsenic, Total Recoverable	340.0	150.0	20	7.98	91	5.1/0.025	0.95	1.57	NO
Cadmium, Total Recoverable	13.34	3.32	1.69	3.32	102	2.30/0.08	0.65	1.44	YES
Chromium III, Total Recoverable	3943.7	8.86	188.5	8.85	94	6.1/0.05	1.28	1.45	NO
Chromium VI, Dissolved	15.0	7.66	10.0	7.65	90	8/0.5	0.35	0.98	NO
Copper, Total Recoverable	34.4	65.8	21.1	65.7	102	38/0.5	1.15	1.73	YES
Lead, Total Recoverable	275.4	9.31	10.7	9.30	101	6/0.3	0.8	1.55	NO
Mercury, Total Recoverable	2.82	0.10	0.5	0.10	71	0.1/0.095	0.0	0.98	NO
Nickel, Total Recoverable	1053.6	64.7	117.1	63.7	102	38/0.31	1.0	1.68	NO
Zinc, Total Recoverable	269.8	719.5	267.6	719.3	102	550/12	0.45	1.31	YES
Cyanide, Amenable to Chlorination	22	12.06	5	12.04	84	12/0.065	0.66	1.0	YES
Phenol	5293.0	191.15	2560.0	190.97	74	240/25	0.87	0.80	NO
Pentachlorophenol 6.5 pH	NA	NA	4.1	0.96	90	0.66/0.0054	1.21	1.46	NO
Pentachlorophenol 7.0 pH	NA	NA	6.7	0.96	90	0.66/0.0054	1.21	1.46	NO
Pentachlorophenol 7.5 pH	NA	NA	11.1	0.96	90	0.66/0.0054	1.21	1.46	NO

N/A – Not Applicable
* - Units are (µg/L) unless otherwise noted.
** - If the number of samples is 10 or greater, then the CV value must be used in the WQBEL for the applicable constituent. If the number of samples is < 10, then the default CV value must be used in the WQBEL for the applicable constituent.
*** - Coefficient of Variation (CV) is calculated by dividing the Standard Deviation of the sample set by the Mean of the same sample set.
RWC – Receiving Water Concentration. It is the concentration of a toxicant or the parameter toxicity in the receiving water after mixing (if applicable).
n – Is the number of samples.
MF – Multiplying Factor. 99% Confidence Level and 99% Probability Basis.
RP – Reasonable Potential. It is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Reasonable Potential Analysis is conducted as per (TSD, EPA/505/2-90-001, Section 3.3.2). A more detailed version including calculations of this RPA is available upon request.

APPENDIX – ALTERNATIVE:



APPENDIX – COST ANALYSIS FOR COMPLIANCE:

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

Joplin Shoal Creek and Turkey Creek WWTF, Permit Renewal
City of Joplin
Missouri State Operating Permit #MO-0023256

Section 644.145 RSMo requires the Department of Natural Resources (Department) to make a "finding of affordability" when "issuing permits under" or "enforcing provisions of" state or federal clean water laws "pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works." This cost analysis does not dictate how the permittee will comply with new permit requirements.

New Permit Requirements

Joplin Shoal Creek

Outfall #001: Monthly monitoring (influent and effluent) for Total Phosphorus, Total Kjeldahl Nitrogen (TKN), and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test once per permit cycle; final limitations for Lead, TR and the development of a Stormwater Pollution Prevention Plan (SWPPP)

SM1 (Upstream): Monthly monitoring for Total Phosphorus, TKN, Nitrites + Nitrates, and Ammonia as N

SM2 (Downstream): Monthly monitoring for Total Hardness

Joplin Turkey Creek

Outfall #004: Monthly monitoring (influent and effluent) for Total Phosphorous, TKN, and Nitrites + Nitrates; monthly influent monitoring for Ammonia as N; a Chronic WET test per permit cycle; and the development of a SWPPP

SM1 (Upstream): Monthly monitoring for Total Phosphorous, TKN, Nitrites + Nitrates, and Ammonia as N

SM2 (Downstream): Monthly monitoring for Total Hardness

Connections

The number of connections was obtained from the Department's fee tracking website.

Connection Type	Joplin Shoal Creek	Joplin Turkey Creek	Total
Residential	4,728	14,185	18,913
Commercial	540	1,621	2,161
Industrial	16	48	64
Total	**5,284**	**15,854**	**21,138**

Data Collection for this Analysis

This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City's financial and socioeconomic situation. The financial questionnaire available to permittees on the Department's website (http://dnr.mo.gov/forms/780-2511-f.pdf) is a required attachment to the permit renewal application. If the financial questionnaire is not submitted with the renewal application, the Department sends a request to complete the form with the welcome correspondence. If certain data was not provided by the permittee to the Department and the data is not obtainable through readily available sources, this analysis will state that the information is "unknown".

Eight Criteria of 644.145 RSMo

The Department must consider the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with new permit requirements.

(1) A community's financial capability and ability to raise or secure necessary funding;

Criterion 1 Table. Current Financial Information for the City of Joplin	
Current Monthly User Rates per 5,000 gallons*	$37.43
Median Household Income (MHI)[1]	$40,024
Current Annual Operating Costs (excludes depreciation)	Unknown

*User Rates were obtained from the 2018 Missouri Public Utility Alliance Water and Wastewater Rate Survey.

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

The following tables outline the estimated costs of the new permit requirements:

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Joplin Shoal Creek			
Total Phosphorus sampling (influent, effluent, and instream)	Monthly	$24	$864
Total Kjeldahl Nitrogen sampling (influent, effluent, and instream)	Monthly	$33	$1,188
Nitrites sampling (influent, effluent, and instream)	Monthly	$20	$720
Nitrates sampling (influent, effluent, and instream)	Monthly	$20	$720
Ammonia as N sampling (influent and instream)	Monthly	$20	$480
Total Hardness sampling	Monthly	$47	$564
Chronic WET test	Once every 5 years	$1,550	$310
SWPPP	Costs estimated for 5 years	$10,000	$2,000
Estimated Annual Cost of New Permit Requirements for Joplin Shoal Creek			$6,846
Joplin Turkey Creek			
Total Phosphorus sampling (influent, effluent, and instream)	Monthly	$24	$864
Total Kjeldahl Nitrogen (influent, effluent, and instream)	Monthly	$33	$1,188
Nitrites (influent, effluent, and instream)	Monthly	$20	$720
Nitrates (influent, effluent, and instream)	Monthly	$20	$720
Ammonia as N (influent and instream)	Monthly	$20	$480
Total Hardness (downstream)	Monthly	$47	$564
Chronic WET test	Once every 5 years	$1,550	$310
SWPPP	Costs estimated for 5 years	$10,000	$2,000
Estimated Annual Cost of New Permit Requirements for Joplin Turkey Creek			$6,846
Total Estimated Annual Cost of New Permit Requirements			**$13,692**

The permit for Joplin Shoal Creek also includes final effluent limitations for Lead, TR. A review of effluent data submitted to the department illustrates the facility is currently in compliance with the new effluent limitations and as a result, as a result, there is not expected to be a cost associated with this new requirement.

Criterion 2B Table. Estimated Costs for New Permit Requirements		
(1)	Estimated Annual Cost	$13,692
(2)	Estimated Monthly User Cost for New Requirements	$0.05
	Estimated Monthly User Cost for New Requirements as a Percent of MHI[2]	0.002%
(3)	Total Monthly User Cost*	$37.48
	Total Monthly User Cost as a Percent of MHI[3]	1.12%

* Current User Rate + Estimated Monthly Costs of New Sampling Requirements

Due to the minimal cost associated with new permit requirements, the Department anticipates an extremely low to no rate increase will be necessary, which could impact individuals or households of this community.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

This analysis is being conducted based on new requirements in the permit, which will not require the addition of new control technologies at the facility. However, the new sampling requirements are being established in order to provide data regarding the health of the receiving stream's aquatic life and to ensure that the existing permit limits are providing adequate protection of aquatic life. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the surrounding communities. Maintaining Missouri's water quality standards fulfills the goal of restoring and maintaining the chemical, physical, and biological integrity of the receiving stream; and, where attainable, it achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

Nutrient Monitoring
Nutrients are mineral compounds that are required for organisms to grow and thrive. Of the six (6) elemental macronutrients, nitrogen and phosphorus are generally not readily available and limit growth of organisms. Excess nitrogen and phosphorus will cause a shift in the ecosystem's food web. Once excess nitrogen and phosphorous are introduced into a waterbody, some species' populations will dramatically increase, while other populations will not be able to sustain life. Competition and productivity are two factors in which nutrients can alter aquatic ecosystems and the designated uses of a waterbody. For example, designated uses, such as drinking water sources and recreational uses, become impaired when algal blooms take over a waterbody. These blooms can cause foul tastes and odors in the drinking water, unsightly appearance, and fish mortality in the waterbody. Some algae also produce toxins that may cause serious adverse health conditions such as liver damage, tumor promotion, paralysis, and kidney damage. The monitoring requirements for nitrogen and phosphorus have been added to the permit to provide data regarding the health of the receiving stream's aquatic life. A healthy ecosystem is beneficial as it provides reduced impacts on human and aquatic health as well as recreational opportunities.

Stormwater Pollution Prevention Plan (SWPPP)
Stormwater runoff is water from rain or snowmelt that does not immediately infiltrate into the ground and flows over or through natural or man-made storage or conveyance systems. When undeveloped areas are converted to land uses with impervious surfaces such as buildings, parking lots, and roads, the natural hydrology of the land is altered and can result in increased surface runoff rates, volumes, and pollutant loads. Stormwater runoff picks up industrial pollutants and typically discharges them directly into nearby waterbodies or indirectly via storm sewer systems. Runoff from areas where industrial activities occur can contain toxic pollutants (e.g., heavy metals and organic chemicals) and other pollutants such as trash, debris, and oil and grease, when facility practices allow exposure of industrial materials to stormwater. This increased flow and pollutant load can impair waterbodies, degrade biological habitats, pollute drinking water sources, and cause flooding and hydrologic changes to the receiving water, such as channel erosion. Industrial facilities typically perform a portion of their activities in outdoor areas exposed to the elements. This may include activities such as material storage and handling, vehicle fueling and maintenance, shipping and receiving, and salt storage, all of which can result in pollutants being exposed to precipitation and capable of being carried off in stormwater runoff. Also, facilities may have performed industrial activities outdoors in the past and materials from those activities still remain exposed to precipitation. In addition, accidental spills and leaks, improper waste disposal, and illicit connections to storm sewers may also lead to exposure of pollutants to stormwater.

A SWPPP is a written document that identifies the industrial activities conducted at the site, including any structural control practices, which the industrial facility operator will implement to prevent pollutants from making their way into stormwater runoff. The SWPPP also must include descriptions of other relevant information, such as the physical features of the facility, and procedures for spill prevention, conducting inspections, and training of employees. The SWPPP is intended to be a "living" document, updated as necessary, such that when industrial activities or stormwater control practices are modified or replaced, the SWPPP is similarly revised to reflect these changes.

Whole Effluent Toxicity (WET) test
The WET Test is a quantifiable method of determining if discharge from a facility may be causing toxicity to aquatic life by itself or in combination with receiving stream water. WET tests are required under 10 CSR 20-6.010(8)(A)4 to be performed by specialists properly trained in conducting the test according to 40 CFR 136. This test will help ensure that the existing permit limits are providing adequate protection for aquatic life.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The community did not provide the Department with updated information, nor could it be found through readily available data.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

(a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
(b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

The following table characterizes the current overall socioeconomic condition of the community as compared to the overall socioeconomic condition of Missouri. The following information was compiled using the latest U.S. Census data.

Criterion 5 Table. Socioeconomic Data [1, 5-9] for the City of Joplin

No.	Administrative Unit	Joplin City	Missouri State
1	Population (2016)	51,231	6,059,651
2	Percent Change in Population (2000-2016)	12.6%	8.3%
3	2016 Median Household Income (in 2017 Dollars)	$40,024	$50,417
4	Percent Change in Median Household Income (2000-2016)	-7.3%	-5.9%
5	Median Age (2016)	36.5	38.3
6	Change in Median Age in Years (2000-2016)	1.8	2.2
7	Unemployment Rate (2016)	7.4%	6.6%
8	Percent of Population Below Poverty Level (2016)	18.5%	15.3%
9	Percent of Household Received Food Stamps (2016)	17.7%	13.0%
10	(Primary) County Where the Community Is Located	Jasper County	

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The community did not report any other investments relating to environmental improvements.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

The new requirements associated with this permit will not impose a financial burden on the community, nor will they require the City of Joplin to seek funding from an outside source.

(8) An assessment of any other relevant local community economic conditions.

The community did not report any other relevant local economic conditions.

Conclusion and Finding

As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the permittee to increase monitoring. The Department has considered the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with the new permit requirements.

This analysis examined whether the new sampling requirements affect the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. After reviewing the above criteria, the Department finds that the new sampling requirements may result in a low burden with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References

1. (A) 2016 MHI in 2016 Dollar: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars). http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B19013&prodType=table.
   (B) 2000 MHI in 1999 Dollar: U.S. Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) 2017 CPI, 2016 CPI and 1999 CPI: For United States, United States Bureau of Labor Statistics (2017) Consumer Price Index - All Urban Consumers, United States City Average. All Items. 1982-84=100. http://data.bls.gov/timeseries/CUUR0000SA0?data_tool=Xgtable. For Missouri State: United States Bureau of Labor Statistics (2017) Consumer Price Index - All Urban Consumers, Midwest Urban Areas, All Items. 1982-84=100. http://data.bls.gov/timeseries/CUUR0200SA0?data_tool=Xgtable.
   (D) 2016 MHI in 2017 Dollar: 2016 MHI in 2016 Dollar x 2017 CPI /2016 CPI; 2000 MHI in 2017 Dollar: 2000 MHI in 1999 Dollar x 2017 CPI /1999 CPI.
   (E) Percent Change in Median Household Income (2000-2016) = (2016 MHI in 2017 Dollar - 2000 MHI in 2017 Dollar) / (2000 MHI in 2017 Dollars).
2. (13,692/21,138)/12 = $0.05 (Estimated Monthly User Cost for New Requirements)
3. (0.05/($40,024/12))100% = 0.002% (New Sampling Only)
4. (37.48/($40,024/12))100% = 1.12% (Total User Cost)
5. (A) Total Population in 2016: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B01003&prodType=table.
   (B) Total Population in 2000: U.S. Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) Percent Change in Population (2000-2016) = (Total Population in 2016 - Total Population in 2000) / (Total Population in 2000).
6. (A) Median Age in 2016: United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B01002&prodType=table.
   (B) Median Age in 2000: For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC., Page 2. https://www.census.gov/prod/cen2000/phc-1-1-pt1.pdf. For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC., Pages 64-92. http://www.census.gov/prod/cen2000/phc-2-27-pt1.pdf.
   (C) Change in Median Age in Years (2000-2016) = (Median Age in 2016 - Median Age in 2000).
7. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, B23025: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B23025&prodType=table.
8. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_S1701&prodType=table.
9. United States Census Bureau. 2012-2016 American Community Survey 5-Year Estimates, Table B22003: Receipt of Food Stamps/SNAP in the Past 12 Months by Poverty Status in the Past 12 Months for Households - Universe: Households. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_16_5YR_B22003&prodType=table.

APPENDIX – SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM REAUTHORIZATION LETTER

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

DEC 18 2019

Mr. David Hertzberg, P.E.
Public Works Director
602 S. Main Street
Joplin, MO 64801

RE: Sewer Extension Authority Supervised Program Reauthorization – Joplin- Turkey Creek WWTF, MO-0103349, Jasper County and Joplin-Shoal Creek WWTF, Newton County, ACT#450

Dear Mr. Herzberg:

The Missouri Department of Natural Resources' Water Protection Program has reevaluated the city of Columbia's Sewer Extension Authority Supervised Program (Program) and approved the reauthorization per 10 CSR 20-6.010(6). This Program delegate's administrative responsibility of construction sewer extension permits to the city of Joplin and reporting requirements are included in the associated Missouri State Operating Permits (MSOP).

The Program for city of Joplin shall apply to construction permits for sewer extensions that discharge to the following MSOP:

- MO-0103349 [Joplin-Turkey Creek WWTF]
- MO-0023256 [Joplin-Shoal Creek WWTF]

The city of Joplin shall act as the continuing authority for the constructed collection system.

This approval is granted until it is reauthorized during the operating permit renewal. Enclosed are the Program conditions, annual reporting requirements, and renewal reauthorization requirements. The Program annual report must be submitted to the Department by March 31 of each year.

This reauthorization does not supersede any requirements of the operating permit or enforcement actions. Nothing in this reauthorization removes any obligations to comply with county or other local ordinances or restrictions.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250, RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier.

Recycled paper

If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is: Administrative Hearing Commission, United States Post Office Bldg., Third Floor, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102, Phone: 573-751-2422, Fax: 573-751-5018, and Website: www.oa.mo.gov/ahc.

If you have any questions concerning this matter, please contact Ms. Leasue Meyers, of the Water Protection Program by phone at 573-751-7906 or by mail at Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

Thank you for your efforts to help ensure clean water in Missouri.

Sincerely,

WATER PROTECTION PROGRAM

Chris Wieberg
Director

CW:lmt

Enclosure

c: Mr. Dan Johnson, PE, Assistant Director of Public Works
Mr. Chris Parker, PE, City of Joplin
Ms. Ashley Keely, Wastewater Unit

City of Joplin
Page One

Activity No. ACT450

SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM REAUTHORIZATION

I. CONDITIONS:

1. This approval is limited to sewer extensions proposed within the city of Joplin boundaries for which the receiving wastewater treatment facility is owned, operated, and maintained by the city of Joplin

2. Upon completion of accepted construction, the city of Joplin will become the continuing authority for the operation, maintenance, and modernization of the sewer extension.

3. Additional requirements may be necessary to comply with the requirements contained in 10 CSR 20-4, "Grants and Loans" when funding from the Department is requested.

4. Any updates to the city of Joplin's Standard Specifications and Drawings, dated May 2019 will require a subsequent review and approval by the Department.

   A. This approval is limited to only wastewater components. Other items contained in this standard specification and details such as drinking water, roadways, structural, mechanical, electrical, etc. were not reviewed.

5. This approval may be reopened and modified to comply with any new or amended design regulations in 10 CSR 20-6.010 and 10 CSR 20-8.

II. ANNUAL REPORTS:

The city of Joplin must submit an annual report by March 31st of each year to the Engineering Section. The electronic submittals may be emailed to DNR.WPPEngineerSection@dnr.mo.gov. The report shall contain the following for each sewer extension, per 10 CSR 20-6.010(6)(D)1:

1. Name of sewer extension;
2. Type of wastewater (i.e. domestic or industrial);
3. Design flow in gallons per day;
4. Length of sewer and force main;
5. Capacity of each pump station, if applicable;
6. Date sewer extension permit is issued;
7. Dates of leakage and deflection tests passing;

8. Dates of city of Joplin construction inspections;
9. Date sewer extension construction is accepted; and
10. The remaining capacity of the wastewater treatment facility.

III. REAUTHORIZATION REQUEST:

The city of Joplin must submit a request for reauthorization to the Engineering Section at least 180 days prior to expiration date of the Joplin-Turkey Creek WWTF operating permit. The request shall contain the following, per 10 CSR 20-6.010(6)(E):

1. The current standard technical specifications and typical detail drawings signed, sealed, and dated by a Missouri registered professional engineer.

2. A current layout map, or maps, of the collection system or electronic demonstration. The map(s) shall show sewer sizes and lengths, manholes, cleanouts, pump stations, force mains, air release valves, other sewer appurtenances as necessary, and street names.

3. A list and current number of Missouri registered professional engineers and other qualified staff reviewing plans, issuing sewer extension permits, preparing reports, inspecting construction, and enforcing local and state requirements under the Program.

4. A written statement from the city of Joplin ensuring that permanent plans of all permitted and constructed sewer extensions records are maintained.

Leasue Meyers, EI
Engineering Section
leasue.meyers@dnr.mo.gov

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

Part I – General Conditions

Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
   a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
   b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.

2. **Monitoring Requirements**.
   a. Records of monitoring information shall include:
      i. The date, exact place, and time of sampling or measurements;
      ii. The individual(s) who performed the sampling or measurements;
      iii. The date(s) analyses were performed;
      iv. The individual(s) who performed the analyses;
      v. The analytical techniques or methods used; and
      vi. The results of such analyses.
   b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.

3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

4. **Test Procedures**. The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is "sufficiently sensitive" when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.

5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
   a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
   b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

Section B – Reporting Requirements

1. **Planned Changes.**
   a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
      i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
      ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
      iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
      iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.

2. **Non-compliance Reporting.**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

b. The following shall be included as information which must be reported within 24 hours under this paragraph.
   i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
   ii. Any upset which exceeds any effluent limitation in the permit.
   iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.

c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.

3. **Anticipated Noncompliance**. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.

4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.

5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.

6. **Other Information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

7. **Discharge Monitoring Reports.**
   a. Monitoring results shall be reported at the intervals specified in the permit.
   b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
   c. Monitoring results shall be reported to the Department no later than the 28th day of the month following the end of the reporting period.

Section C – Bypass/Upset Requirements

1. **Definitions.**
   a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
   b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
   c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. **Bypass Requirements.**
   a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.
   b. Notice.
      i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
      ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
   c. Prohibition of bypass.
      i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
         1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
         3. The permittee submitted notices as required under paragraph 2. b. of this section.
      ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.

3. **Upset Requirements.**
   a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
   b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      ii. The permitted facility was at the time being properly operated; and
      iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
   c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
   a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
   b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement

imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed $10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

2. **Duty to Reapply.**
   a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
   b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
   c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. **Proper Operation and Maintenance**. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

6. **Permit Actions.**
   a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
      i. Violations of any terms or conditions of this permit or the law;
      ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
      iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
      iv. Any reason set forth in the Law or Regulations.
   b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. **Permit Transfer.**
   a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
   b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
   c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.

8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
    a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
    d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

12. **Closure of Treatment Facilities.**
    a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
    b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.

13. **Signatory Requirement.**
    a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
MAY 1, 2013

PART II - SPECIAL CONDITIONS – PUBLICLY OWNED TREATMENT WORKS
SECTION A – INDUSTRIAL USERS

1. Definitions

Definitions as set forth in the Missouri Clean Water Laws and approved by the Missouri Clean Water Commission shall apply to terms used herein.

Significant Industrial User (SIU). Except as provided in the *General Pretreatment Regulation* 10 CSR 20-6.100, the term Significant Industrial User means:

1. All Industrial Users subject to Categorical Pretreatment Standards; and
2. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the Publicly-Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's or for violating any Pretreatment Standard or requirement.

Clean Water Act (CWA) is the the federal Clean Water Act of 1972, 33 U.S.C. § 1251 et seq. (2002).

2. Identification of Industrial Discharges

Pursuant to 40 CFR 122.44(j)(1), all POTWs shall identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging to the POTW subject to Pretreatment Standards under section 307(b) of the CWA and 40 CFR 403.

3. Application Information

Applications for renewal or modification of this permit must contain the information about industrial discharges to the POTW pursuant to 40 CFR 122.21(j)(6)

4. Notice to the Department

Pursuant to 40 CFR 122.42(b), all POTWs must provide adequate notice of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging these pollutants; and
2. Any substantial change into the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For purposes of this paragraph, adequate notice shall include information on:
   i. the quality and quantity of effluent introduced into the POTW, and
   ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

For POTWs without an approved pretreatment program, the notice of industrial discharges which was not included in the permit application shall be made as soon as practicable. For POTWs with an approved pretreatment program, notice is to be included in the annual pretreatment report required in the special conditions of this permit. Notice may be sent to:

Missouri Department of Natural Resources
Water Protection Program
Attn: Pretreatment Coordinator
P.O. Box 176
Jefferson City, MO 65102

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
August 1, 2019

PART III – BIOSOLIDS AND SLUDGE FROM DOMESTIC TREATMENT FACILITIES

SECTION A – GENERAL REQUIREMENTS

1. PART III Standard Conditions pertain to biosolids and sludge requirements under the Missouri Clean Water Law and regulations for domestic and municipal wastewater and also incorporates federal sludge disposal requirements under 40 CFR Part 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR Part 503 for domestic biosolids and sludge.
2. PART III Standard Conditions apply only to biosolids and sludge generated at domestic wastewater treatment facilities, including public owned treatment works (POTW) and privately owned facilities.
3. Biosolids and Sludge Use and Disposal Practices:
    a. The permittee is authorized to operate the biosolids and sludge generating, treatment, storage, use, and disposal facilities listed in the facility description of this permit.
    b. The permittee shall not exceed the design sludge/biosolids volume listed in the facility description and shall not use biosolids or sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
    c. For facilities operating under general operating permits that incorporate Standard Conditions PART III, the facility is authorized to operate the biosolids and sludge generating, treatment, storage, use and disposal facilities identified in the original operating permit application, subsequent renewal applications or subsequent written approval by the department.
4. Biosolids or Sludge Received from other Facilities:
    a. Permittees may accept domestic wastewater biosolids or sludge from other facilities as long as the permittee's design sludge capacity is not exceeded and the treatment facility performance is not impaired.
    b. The permittee shall obtain a signed statement from the biosolids or sludge generator or hauler that certifies the type and source of the sludge
5. Nothing in this permit precludes the initiation of legal action under local laws, except to the extent local laws are preempted by state law.
6. This permit does not preclude the enforcement of other applicable environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable biosolids or sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act or under Chapter 644 RSMo.
8. In addition to Standard Conditions PART III, the Department may include biosolids and sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Exceptions to Standard Conditions PART III may be authorized on a case-by-case basis by the Department, as follows:
    a. The Department may modify a site-specific permit following permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR § 124.10, and 40 CFR § 501.15(a)(2)(ix)(E).
    b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR Part 503.

SECTION B – DEFINITIONS

1. Best Management Practices are practices to prevent or reduce the pollution of waters of the state and include agronomic loading rates (nitrogen based), soil conservation practices, spill prevention and maintenance procedures and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food, feed or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR Part 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with 40 CFR Part 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Feed crops are crops produced primarily for consumption by animals.
8. Fiber crops are crops such as flax and cotton.
9. Food crops are crops consumed by humans which include, but is not limted to, fruits, vegetables and tobacco.
10. Industrial wastewater means any wastewater, also known as process wastewater, not defined as domestic wastewater. Per 40 CFR Part 122.2, process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. Land application of industrial wastewater, residuals or sludge is not authorized by Standard Conditions PART III.
11. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological contact systems, and other similar facilities. It does not include wastewater treatment lagoons or constructed wetlands for wastewater treatment.
12. Plant Available Nitrogen (PAN) is nitrogen that will be available to plants during the growing seasons after biosolids application.
13. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
14. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs), sewage sludge incinerator ash, or grit/screenings generated during preliminary treatment of domestic sewage.
15. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen or concrete lined basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
16. Septage is the sludge pumped from residential septic tanks, cesspools, portable toilets, Type III marine sanitation devices, or similar treatment works such as sludge holding structures from residential wastewater treatment facilities with design populations of less than 150 people. Septage does not include grease removed from grease traps at a restaurant or material removed from septic tanks and other similar treatment works that have received industrial wastewater. The standard for biosolids from septage is different from other sludges. See Section H for more information.

SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES

1. Biosolids or sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and the requirements of Standard Conditions PART III or in accordance with Section A.3.c., above.
2. The permittee shall operate storage and treatment facilities, as defined by Section 644.016(23), RSMo, so that there is no biosolids or sludge discharged to waters of the state. Agricultural storm water discharges are exempt under the provisions of Section 644.059, RSMo.
3. Mechanical treatment plants shall have separate biosolids or sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove biosolids or sludge from these storage compartments on the required design schedule is a violation of this permit.

SECTION D – BIOSOLIDS OR SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR BY CONTRACT HAULER

1. Permittees that use contract haulers, under the authority of their operating permit, to dispose of biosolids or sludge, are responsible for compliance with all the terms of this permit. Contract haulers that assume the responsibility of the final disposal of biosolids or sludge, including biosolids land application, must obtain a Missouri State Operating Permit unless the hauler transports the biosolids or sludge to another permitted treatment facility.
2. Testing of biosolids or sludge, other than total solids content, is not required if biosolids or sludge are hauled to a permitted wastewater treatment facility, unless it is required by the accepting facility.

SECTION E – INCINERATION OF SLUDGE

1. Please be aware that sludge incineration facilities may be subject to the requirements of 40 CFR Part 503 Subpart E, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or, if the ash is determined to be hazardous, with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, mass of sludge incinerated and mass of ash generated. Permittee shall also provide the name of the ash disposal facility and permit number if applicable.

SECTION F – SURFACE DISPOSAL SITES AND BIOSOLIDS AND SLUDGE LAGOONS

1. Please be aware that surface disposal sites of biosolids or sludge from wastewater treatment facilities may be subject to other laws including the requirements in 40 CFR Part 503 Subpart C, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Biosolids or sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain biosolids or sludge storage lagoons as storage facilities, accumulated biosolids or sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of biosolids or sludge removed will be dependent on biosolids or sludge generation and accumulation in the facility. Enough biosolids or sludge must be removed to maintain adequate storage capacity in the facility.
    a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of biosolids or sludge on the bottom of the lagoon, upon prior approval of the Department; or
    b. Permittee shall close the lagoon in accordance with Section I.

SECTION G – LAND APPLICATION OF BIOSOLIDS

1. The permittee shall not land apply biosolids unless land application is authorized in the facility description, the special conditions of the issued NPDES permit, or in accordance with Section A.3.c., above.
2. This permit only authorizes "Class A" or "Class B" biosolids derived from domestic wastewater to be land applied onto grass land, crop land, timber, or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
3. Class A Biosolids Requirements: Biosolids shall meet Class A requirements for application to public contact sites, residential lawns, home gardens or sold and/or given away in a bag or other container.
4. Class B biosolids that are land applied to agricultural and public contact sites shall comply with the following restrictions:
    a. Food crops that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of biosolids.
    b. Food crops below the surface of the land shall not be harvested for 20 months after application of biosolids when the biosolids remain on the land surface for four months or longer prior to incorporation into the soil.
    c. Food crops below the surface of the land shall not be harvested for 38 months after application of biosolids when the biosolids remain on the land surface for less than four months prior to incorporation into the soil.
    d. Animal grazing shall not be allowed for 30 days after application of biosolids.
    e. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of biosolids.
    f. Turf shall not be harvested for one year after application of biosolids if used for lawns or high public contact sites in close proximity to populated areas such as city parks or golf courses.
    g. After Class B biosolids have been land applied to public contact sites with high potential for public exposure, as defined in 40 CFR § 503.31, such as city parks or golf courses, access must be restricted for 12 months.
    h. After Class B biosolids have been land applied public contact sites with low potential for public exposure as defined in 40 CFR § 503.31, such as a rural land application or reclamation sites, access must be restricted for 30 days.

5. Pollutant limits
    a. Biosolids shall be monitored to determine the quality for regulated pollutants listed in Table 1, below. Limits for any pollutants not listed below may be established in the permit.
    b. The number of samples taken is directly related to the amount of biosolids or sludge produced by the facility (See Section J, below). Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to achieve pollutant concentration below those identified in Table 1, below.
    c. Table 1 gives the ceiling concentration for biosolids. Biosolids which exceed the concentrations in Table 1 may not be land applied.

TABLE 1

Biosolids ceiling concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

d. Table 2 below gives the low metal concentration for biosolids. Because of its higher quality, biosolids with pollutant concentrations below those listed in Table 2 can safely be applied to agricultural land, forest, public contact sites, lawns, home gardens or be given away without further analysis. Biosolids containing metals in concentrations above the low metals concentrations but below the ceiling concentration limits may be land applied but shall not exceed the annual loading rates in Table 3 and the cumulative loading rates in Table 4. The permittee is required to track polluntant loading onto application sites for parameters that have exceeded the low metal concentration limits.

TABLE 2

Biosolids Low Metal Concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2,800

e. Annual pollutant loading rate.

Table 3

Biosolids Annual Loading Rate	
Pollutant	Kg/ha (lbs./ac) per year
Arsenic	2.0 (1.79)
Cadmium	1.9 (1.70)
Copper	75 (66.94)
Lead	15 (13.39)
Mercury	0.85 (0.76)
Nickel	21 (18.74)
Selenium	5.0 (4.46)
Zinc	140 (124.96)

f. Cumulative pollutant loading rates.

Table 4

Biosolids Cumulative Pollutant Loading Rate	
Pollutant	Kg/ha (lbs./ac)
Arsenic	41 (37)
Cadmium	39 (35)
Copper	1500 (1339)
Lead	300 (268)
Mercury	17 (15)
Nickel	420 (375)
Selenium	100 (89)
Zinc	2800 (2499)

6. Best Management Practices. The permittee shall use the following best management practices during land application activities to prevent the discharge of biosolids to waters of the state.
   a. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under § 4 of the Endangered Species Act or its designated critical habitat.
   b. Apply biosolids only at the agronomic rate of nitrogen needed (see 5.c. of this section).
   c. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop

nitrogen removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kgTN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.

i. PAN can be determined as follows:

(Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).

[1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis.

ii. Crop nutrient production/removal to be based on crop specific nitrogen needs and realistic yield goals. **NOTE**: There are a number of reference documents on the Missouri Department of Natural Resources website that are informative to implement best management practices in the proper management of biosolids, including crop specific nitrogen needs, realistic yields on a county by county basis and other supporting references.

iii. Biosolids that are applied at agronomic rates shall not cause the annual pollutant loading rates identified in Table 3 to be exceeded.

d. Buffer zones are as follows:

i. 300 feet of a water supply well, sinkhole, water supply reservoir or water supply intake in a stream;

ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstandingstate resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;

iii. 150 feet of dwellings or public use areas;

iv. 100 feet (35 feet if biosolids application is down-gradient or the buffer zone is entirely vegetated) of lake, pond, wetlands or gaining streams (perennial or intermittent);

v. 50 feet of a property line. Buffer distances from property lines may be waived with written permission from neighboring property owner.

vi. For the application of dry, cake or liquid biosolids that are subsurface injected, buffer zones identified in 5.d.i. through 5.d.iii above, may be reduced to 100 feet. The buffer zone may be reduced to 35 feet if the buffer zone is permanently vegetated. Subsurface injection does not include methods or technology reflective of combination surface/shallow soil incorporation.

e. Slope limitation for application sites are as follows:

i. For slopes less than or equal to 6 percent, no rate limitation;

ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels;

iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.

iv. Dry, cake or liquid biosolids that are subsurface injected, may be applied on slopes not to exceed 20 percent. Subsurface injection does not include the use of methods or technology reflective of combination surface/shallow soil incorporation.

f. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.

g. Biosolids may be land applied to sites with soil that are snow covered, frozen, or saturated with liquid when site restrictions or other controls are provided to prevent pollutants from being discharged to waters of the state during snowmelt or stormwater runoff. During inclement weather or unfavorable soil conditions use the following management practices:

i. A maximum field slope of 6% and a minimum 300 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be utilized for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not include the use of mthods or technology refletive of combination surface/shallow soil incorporation;

ii. A maximum field slope of 2% and 100 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be used for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not included the use of methods or technology refletive of combination surface/shallow soil incorporation;

iii. Other best management practices approved by the Department.

SECTION H – SEPTAGE

1. Haulers that land apply septage must obtain a state permit. An operating permit is not required for septage haulers who transport septage to another permitted treatment facility for disposal.
2. Do not apply more than 30,000 gallons of septage per acre per year or the volume otherwise stipulated in the operating permit.
3. Septic tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to mechanical treatment facilities.
4. Septage must comply with Class B biosolids regarding pathogen and vector attraction reduction requirements before it may be applied to crops, pastures or timberland. To meet required pathogen and vector reduction requirements, mix 50 pounds of hydrated lime for every 1,000 gallons of septage and maintain a septage pH of at least 12 pH standard units for 30 minutes or more prior to application.
5. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.
6. As residential septage contains relatively low levels of metals, the testing of metals in septage is not required.

SECTION I– CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical and lagoons) and sludge or biosolids storage and treatment facilities. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all sludges and/or biosolids. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6.010 and 10 CSR 20 – 6.015.
3. Biosolids or sludge that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
    a. Biosolids and sludge shall meet the monitoring and land application limits for agricultural rates as referenced in Section G, above.
    b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
    c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre. Alternative, site-specific application rates may be included in the closure plan for department consideration.
        i. PAN can be determined as follows:
        (Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).
        [1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis
4. Domestic wastewater treatment lagoons with a design treatment capacity less than or equal to 150 persons, are "similar treatment works" under the definition of septage. Therefore the sludge within the lagoons may be treated as septage during closure activities. See Section B, above. Under the septage category, residuals may be left in place as follows:
    a. Testing for metals or fecal coliform is not required.
    b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
    c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Biosolids or sludge left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, and unless otherwise approved, the lagoon berm shall be demolished, and the site shall be graded and contain ≥70% vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion. Alternative biosolids or sludge and soil mixing ratios may be included in the closure plan for department consideration.
6. Lagoon and earthen structure closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200.
7. When closing a mechanical wastewater plant, all biosolids or sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
    a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain ≥70% vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate

surface water drainage without creating erosion.

b. Hazardous Waste shall not be land applied or disposed during mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations pursuant to 10 CSR 25.

c. After demolition of the mechanical plant, the site must only contain clean fill defined in Section 260.200.1(6) RSMo as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill, reclamation, or other beneficial use. Other solid wastes must be removed.

8. If biosolids or sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or I, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR Part 503, Subpart C.

SECTION J – MONITORING FREQUENCY

1. At a minimum, biosolids or sludge shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

TABLE 5

Biosolids or Sludge produced and disposed (Dry Tons per Year)	Monitoring Frequency (See Notes 1, and 2)		
	Metals, Pathogens and Vectors, Total Phosphorus, Total Potassium	Nitrogen TKN, Nitrogen PAN[1]	Priority Pollutants[2]
319 or less	1/year	1 per month	1/year
320 to 1650	4/year	1 per month	1/year
1651 to 16,500	6/year	1 per month	1/year
16,501+	12/year	1 per month	1/year

[1] Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

[2] Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) are required only for permit holders that must have a pre-treatment program. Monitoring requirements may be modified and incorporated into the operating permit by the Department on a case-by-case basis.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids. This data shall be used to calculate the dry tons of sludge applied per acre.
Note 2: Table 5 is not applicable for incineration and permit holders that landfill their sludge.

2. Permittees that operate wastewater treatment lagoons, peak flow equalization basins, combined sewer overflow basins or biosolids or sludge lagoons that are cleaned out once a year or less, may choose to sample only when the biosolids or sludge is removed or the lagoon is closed. Test one composite sample for each 319 dry tons of biosolids or sludge removed from the lagoon during the reporting year or during lagoon closure. Composite sample must represent various areas at one-foot depth.
3. Additional testing may be required in the special conditions or other sections of the permit.
4. Biosolids and sludge monitoring shall be conducted in accordance with federal regulation 40 CFR § 503.8, Sampling and analysis.

SECTION K – RECORD KEEPING AND REPORTING REQUIREMENTS

1. The permittee shall maintain records on file at the facility for at least five years for the items listed in Standard Conditions PART III and any additional items in the Special Conditions section of this permit. This shall include dates when the biosolids or sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
2. Reporting period
   a. By February 19th of each year, applicable facilities shall submit an annual report for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and biosolids or sludge disposal facilities.
   b. Permittees with wastewater treatment lagoons shall submit the above annual report only when biosolids or sludge are removed from the lagoon during the report period or when the lagoon is closed.
3. Report Form. The annual report shall be prepared on report forms provided by the Department or equivalent forms approved by the Department.
4. Reports shall be submitted as follows:
   Major facilities, which are those serving 10,000 persons or more or with a design flow equal to or greater than 1 million gallons per day or that are required to have an approved pretreatment program, shall report to both the Department and EPA if the facility land applied, disposed of biosolids by surface disposal, or operated a sewage sludge incinerator. All other facilities shall maintain their biosolids or sludge records and keep them available to Department personnel upon request. State reports shall be submitted to the address listed as follows:

   DNR regional or other applicable office listed in the
   permit (see cover letter of permit)
   ATTN: Sludge Coordinator

Reports to EPA must be electronically submitted online via the Central Data Exchange at: https://cdx.epa.gov/ Additional information is available at: https://www.epa.gov/biosolids/compliance-and-annual-reporting-guidance-about-clean-water-act-laws

5. Annual report contents. The annual report shall include the following:
    a. Biosolids and sludge testing performed. If testing was conducted at a greater frequency than what is required by the permit, all test results must be included in the report.
    b. Biosolids or sludge quantity shall be reported as dry tons for the quantity produced and/or disposed.
    c. Gallons and % solids data used to calculate the dry ton amounts.
    d. Description of any unusual operating conditions.
    e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
        i. This must include the name and address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
        ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
    f. Contract Hauler Activities:
    If using a contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate biosolids or sludge use permit.
    g. Land Application Sites:
        i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
        ii. If the "Low Metals" criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
        iii. Report the method used for compliance with pathogen and vector attraction requirements.
        iv. Report soil test results for pH and phosphorus. If no soil was tested during the year, report the last date when tested and the results.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR CONSTRUCTION OR OPERATING PERMIT FOR FACILITIES WHICH RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FOR AGENCY USE ONLY	
CHECK NUMBER: NO FEE required	
DATE RECEIVED: 4/11/12	FEE SUBMITTED: Ø

PART A – BASIC APPLICATION INFORMATION

1. This application is for:

- ☐ An operating permit and antidegradation review public notice.
- ☐ A construction permit following an appropriate operating permit and antidegradation review public notice.
- ☐ A construction permit, a concurrent operating permit and antidegradation review public notice.
- ☐ A construction permit (submitted before Aug. 30, 2008 or antidegradation review is not required).
- ☐ An operating permit for a new or unpermitted facility. Construction Permit # _____
- ☑ An operating permit renewal: Permit #MO- 0103349 Expiration Date January 25, 2012
- ☐ An operating permit modification: Permit #MO-_____ Reason: _____

1.1 Is this a Federal/State Funded Project? ☐ Yes ☑ No Funding Agency/Project #: _____

1.2 Is the appropriate fee included with the application (See instructions for appropriate fee)? ☐ Yes ☑ No

2. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE	
Joplin-Turkey Creek Wastewater Treatment Facility			
ADDRESS (PHYSICAL)	CITY	STATE	ZIP
3457 West Eddy Lane	Joplin	MO	64801

2.1 **LEGAL DESCRIPTION** (Plant Site): ¼, NW ¼, SE ¼, Sec. 3624, T 410N, R 33W County Jasper

2.2 UTM Coordinates Easting (X): 3619 Northing (Y): 4109
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

3. OWNER

NAME	TITLE	TELEPHONE NUMBER WITH AREA CODE	
City of Joplin		(417) 624-3615	
ADDRESS	CITY	STATE	ZIP
602 South Main Street	Joplin	Missouri	64801

3.1 Request review of draft permit prior to Public Notice? ☑ Yes ☐ No

4. CONTINUING AUTHORITY: Permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.

NAME		CITY	
City of Joplin		Joplin	
ADDRESS	CERTIFICATE NUMBER (IF APPLICABLE)	STATE	ZIP
602 South Main Street	A-5316	Missouri	64801

5. OPERATOR

NAME	TITLE	TELEPHONE NUMBER WITH AREA CODE
Lyndell J. Edwards A-5316	Superintendent of Plants, WWT	(417) 624-3615

6. FACILITY CONTACT

NAME	TITLE
Lyndell J. Edwards A-5316	Superintendent

MO 780-1805 (09-08)

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR CONSTRUCTION OR OPERATING PERMIT FOR FACILITIES WHICH RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FACILITY NAME	
Joplin-Turkey Creek Wastewater Treatment Facility	
PERMIT NO.	COUNTY
MO-0103349	Jasper

APPLICATION OVERVIEW

Form B2 has been developed in a modular format and consists of Parts A, B and C and a Supplemental Application Information (Parts D, E, F and G) packet. All applicants must complete Parts A, B and C. Some applicants must also complete parts of the Supplemental Application Information packet. The following items explain which parts of Form B2 you must complete. Submittal of an incomplete application may result in the application being returned.

BASIC APPLICATION INFORMATION

A. Basic Application Information for all Applicants. All applicants must complete Part A.

B. Additional Application Information for all Applicants. All applicants must complete Part B.

C. Certification. All applicants must complete Part C.

SUPPLEMENTAL APPLICATION INFORMATION

D. Expanded Effluent Testing Data. A treatment works that discharges effluent to surface water of the United States and meets one or more of the following criteria must complete *Part D - Expanded Effluent Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

E. Toxicity Testing Data. A treatment works that meets one or more of the following criteria must complete *Part E - Toxicity Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

F. Industrial User Discharges and Resource Conservation and Recovery Act / Comprehensive Environmental Response, Compensation and Liability Act Wastes. A treatment works that accepts process wastewater from any significant industrial users, also known as SIUs, or receives a Resource Conservation and Recovery Act or CERCLA wastes must complete *Part F - Industrial User Discharges and Resource Conservation and Recovery Act /CERCLA Wastes*.

SIUs are defined as:

1. All Categorical Industrial Users, or CIUs, subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations 403.6 and 40 Code of Federal Regulations 403.6 and 40 CFR Chapter 1, Subchapter N.
2. Any other industrial user that meets one or more of the following:
   i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions).
   ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant.
   iii. Is designated as an SIU by the control authority.

G. Combined Sewer Systems. A treatment works that has a combined sewer system must complete *Part G - Combined Sewer Systems*.

ALL APPLICANTS MUST COMPLETE PARTS A, B and C

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatme	MO- 0103349	004

PART A – BASIC APPLICATION INFORMATION

7. ADDITIONAL FACILITY INFORMATION

7.1 BRIEF DESCRIPTION OF FACILITIES

Bar Screen, Peak Flow Pumping, Grit Removal, Comminutors, Primary Sedimentation, Trickling Filters, Intermediate Sedimentation, Ammonia Removal (Oxidation Ditches), Final Sedimentation, Tertiary Sand Filtration, UV disinfection

7.2 TOPOGRAPHIC MAP. ATTACH TO THIS APPLICATION A TOPOGRAPHIC MAP OF THE AREA EXTENDING AT LEAST ONE MILE BEYOND FACILITY PROPERTY BOUNDARIES. THIS MAP MUST SHOW THE OUTLINE OF THE FACILITY AND THE FOLLOWING INFORMATION. (YOU MAY SUBMIT MORE THAN ONE MAP IF ONE MAP DOES NOT SHOW THE ENTIRE AREA.)

See Attachments 7.10 7.85 7.85b

a. The area surrounding the treatment plant, including all unit processes.
b. The location of the downstream landowner(s). (See Item 10.)
c. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.
d. The actual point of discharge.
e. Wells, springs, other surface water bodies and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.
f. Any areas where the sewage sludge produced by the treatment works is stored, treated or disposed.
g. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act, or RCRA, by truck, rail or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored or disposed.

7.3 PROCESS FLOW DIAGRAM OR SCHEMATIC. PROVIDE A DIAGRAM SHOWING THE PROCESSES OF THE TREATMENT PLANT. ALSO, PROVIDE A WATER BALANCE SHOWING ALL TREATMENT UNITS, INCLUDING DISINFECTION (E.G. CHLORINATION AND DECHLORINATION). THE WATER BALANCE MUST SHOW DAILY AVERAGE FLOW RATES AT INFLUENT AND DISCHARGE POINTS AND APPROXIMATE DAILY FLOW RATES BETWEEN TREATMENT UNITS. INCLUDE A BRIEF NARRATIVE DESCRIPTION OF THE DIAGRAM. See Attachment 7.3

7.4 FACILITY SIC CODE	DISCHARGE SIC CODE:	FACILITY NAICS CODE:	DISCHARGE NAICS CODE:
4952	4952	2213	2213

7.5 NUMBER OF SEPARATE DISCHARGE POINTS
2 One Plant Discharge, One Peak Flow Equalization Basin Discharge

7.6 NUMBER OF PEOPLE PRESENTLY CONNECTED OR POPULATION EQUIVALENT	DESIGN POPULATION EQUIVILENT
64,267	100,000

NUMBER OF UNITS PRESENTLY CONNECTED
HOMES All APARTMENTS All TRAILERS All OTHER ____

TOTAL DESIGN FLOW (ALL OUTFALLS)	ACTUAL FLOW
15 MGD Peak Flow 24MGD	9.7

7.7 DOES ANY BYPASSING OCCUR ANYWHERE IN THE COLLECTION SYSTEM OR AT THE TREATMENT FACILITY?
Yes ☐ No ☐ (If Yes, attach an explanation.)

7.8 LENGTH OF THE SANITARY SEWER COLLECTION SYSTEM IN MILES
253 miles

7.9 IS INDUSTRIAL WASTE DISCHARGED TO THE FACILITY IDENTIFIED IN ITEM 2? Yes ☑ No ☐

7.10 WILL THE DISCHARGE BE CONTINUOUS THROUGH THE YEAR? Yes ☑ No ☐

A. DISCHARGE WILL OCCUR DURING THE FOLLOWING MONTHS	B. HOW MANY DAYS OF THE WEEK WILL THE DISCHARGE OCCUR?
All Twelve	All Seven

7.11 IS WASTEWATER LAND APPLIED? (If Yes, Attach Form I)	7.12 DOES THIS FACILITY DISCHARGE TO A LOSING STREAM OR SINKHOLE?
Yes ☐ No ☑	Yes ☐ No ☑

7.13 HAS A WASTE LOAD ALLOCATION STUDY BEEN COMPLETED FOR THIS FACILITY?
Yes ☐ No ☑

7.14 LIST ALL PERMIT VIOLATIONS, INCLUDING EFFLUENT LIMIT EXCEEDANCES IN THE LAST FIVE YEARS.
ATTACH A SEPARATE SHEET IF NECESSARY. IF NONE, WRITE NONE.

8. LABORATORY CONTROL INFORMATION

8.1 LABORATORY WORK CONDUCTED BY PLANT PERSONNEL

Lab work conducted outside of plant.	Yes ☑	No ☐
Push–button or visual methods for simple test such as pH, settleable solids.	Yes ☑	No ☐
Additional procedures such as Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, titrations, solids, volatile content.	Yes ☑	No ☐
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	Yes ☑	No ☐
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph.	Yes ☐	No ☑

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatme	MO- 0103349	004

PART A – BASIC APPLICATION INFORMATION

9. SLUDGE HANDLING, USE AND DISPOSAL

9.1 IS THE SLUDGE A HAZARDOUS WASTE AS DEFINED BY 10 CSR 25?
Yes ☐ No ☑

9.2 SLUDGE PRODUCTION, INCLUDING SLUDGE RECEIVED ROM OTHERS
Design Dry Tons/Year 2430 Actual Dry Tons/Year 927.7

9.3 CAPACITY OF SLUDGE HOLDING STRUCTURES

9.4 SLUDGE STORAGE PROVIDED
Cubic Feet 465,348 Days of Storage 30 Average Percent Solids of Sludge 5% ☐ No Sludge Storage is Provided

9.5 TYPE OF STORAGE
☐ Holding Tank ☐ Basin ☐ Building ☐ Concrete Pad ☑ Other (Describe) Secondary Anaerobic Digestors

9.6 SLUDGE TREATMENT
☑ Anaerobic Digester ☐ Storage Tank ☑ Lime Stabilization ☐ Lagoon
☐ Aerobic Digester ☐ Air or Heat Drying ☐ Composting ☐ Other (Attach Description)

9.7 SLUDGE USE OR DISPOSAL
☑ Land Application ☐ Contract Hauler ☐ Hauled to Another Treatment Facility ☐ Solid Waste Landfill
☐ Surface Disposal (Sludge Disposal Lagoon, Sludge Held For More Than Two Years) ☐ Incineration
☐ Other (Attach Explanation Sheet) _____

9.8 PERSON RESPONSIBLE FOR HAULING SLUDGE TO DISPOSAL FACILITY

NAME			
N/A			
ADDRESS	CITY	STATE	ZIP
CONTACT PERSON	TELEPHONE NUMBER WITH AREA CODE	PERMIT NO	
		MO-	

9.9 SLUDGE USE OR DISPOSAL FACILITY
■ By Applicant ☐ By Others (Complete Below)

NAME			
City Owned Property and Private Farmland			
ADDRESS	CITY	STATE	ZIP
VARIOUS IN 20 MILE RADIUS OF	TURKEY CREEK WWT		
CONTACT PERSON	TELEPHONE NUMBER WITH AREA CODE	PERMIT NO	
		MO-	

9.10 DO THE SLUDGE OR BIOSOLIDS DISPOSAL COMPLY WITH FEDERAL SLUDGE REGULATIONS UNDER 40 CFR 503?
■ Yes ☐ No (Attach Explanation)

10. DOWNSTREAM LANDOWNER(S). (ATTACH ADDITIONAL SHEETS AS NECESSARY.)

NAME			
Beverly Cochran			
ADDRESS	CITY	STATE	ZIP
4211W. Unity Lane	Joplin	MO	64801

11. DRINKING WATER SUPPLY INFORMATION

11.1 SOURCE OF YOUR DRINKING WATER SUPPLY

A. PUBLIC SUPPLY (MUNICIPAL OR WATER DISTRICT WATER) (IF PUBLIC, PLEASE GIVE NAME OF PUBLIC SUPPLY)
Missouri American Water Company

B. PRIVATE WELL

C. SURFACE WATER (LAKE, POND OR STREAM)

11.2 DOES YOUR DRINKING WATER SOURCE SERVE AT LEAST 25 PEOPLE AT LEAST 60 DAYS PER YEAR (NOT NECESSARILY CONSECUTIVE DAYS)? Yes ☑ No ☐

11.3 DOES YOUR SPPLY SERVE HOUSING THAT IS OCCUPIED YEAR ROUND BY THE SAME PEOPLE? THIS DOES NOT INCLUDE HOUSING THAT IS OCCUPIED SEASONALLY? Yes ☑ No ☐

END OF PART A

MO 780-1805 (09-08)

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatment	MO- 0103349	004

PART B – ADDITIONAL APPLICATION INFORMATION

20. INFLOW AND INFILTRATION

ESTIMATE THE AVERAGE NUMBER OF GALLONS PER DAY THAT FLOW INTO THE TREATMENT WORKS FROM INFLOW AND INFILTRATION.

Gallons Per Day 2.3 MGD (Average per Year)

BRIEFLY EXPLAIN ANY STEPS UNDERWAY OR PLANNED TO MINIMIZE INFLOW AND INFILTRATION.

As of 04/ 28/11In Situ relining, 21,916 ft, repair or replacement of manholes,80, replace 1511 ft.

20.1 OPERATION AND MAINTENANCE PERFORMED BY CONTRACTOR(S)

ARE ANY OPERATIONAL OR MAINTENANCE ASPECTS (RELATED TO WASTEWATER TREATMENT AND EFFLUENT QUALITY) OF THE TREATMENT WORKS THE RESPONSIBILITY OF A CONTRACTOR?

Yes ☐ No ☑ If Yes, list the name, address, telephone number and status of each contractor and describe the contractor's responsibilities. (Attach additional pages if necessary.)

NAME
N/A

MAILING ADDRESS

TELEPHONE NUMBER WITH AREA CODE

RESPONSIBILITIES OF CONTRACTOR

20.2 SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION. PROVIDE INFORMATION ABOUT ANY UNCOMPLETED IMPLEMENTATION SCHEDULE OR UNCOMPLETED PLANS FOR IMPROVEMENTS THAT WILL AFFECT THE WASTEWATER TREATMENT, EFFLUENT QUALITY OR DESIGN CAPACITY OF THE TREATMENT WORKS. IF THE TREATMENT WORKS HAS SEVERAL DIFFERENT IMPLEMENTATION SCHEDULES OR IS PLANNING SEVERAL IMPROVEMENTS, SUBMIT SEPARATE RESPONSES FOR EACH. (IF NONE, GO TO QUESTION B-20.3.)

A. List the outfall number that is covered by this implementation schedule	B. Indicate whether the planned improvements or implementation schedule are required by local, state or federal agencies.
Outfall No. 004	Yes ☐ No ☑

20.3 WASTEWATER DISCHARGES:

COMPLETE QUESTIONS 20.4 THROUGH 20.7 ONCE FOR EACH OUTFALL (INCLUDING BYPASS POINTS) THROUGH WHICH EFFLUENT IS DISCHARGED. DO NOT INCLUDE INFORMATION ON COMBINED SEWER OVERFLOWS IN THIS SECTION.

20.4 DESCRIPTION OF OUTFALL

OUTFALL NUMBER **004**

A. LOCATION

¼ ___ ¼ ___ ¼ SE Section 29 Township 28N Range 33 ☐ E ☑ W

UTM Coordinates Easting (X): 3624 Northing (Y): 4109

For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

B. Distance from Shore (If Applicable)	C. Depth Below Surface (If Applicable)	D. Average Daily Flow Rate
_____ ft.	_____ ft.	9.3 mgd

E. Does this outfall have either an intermittent or periodic discharge?

☐ Yes ☑ No If Yes, Provide the following information:

Number of Days Per Year Discharge Occurs:	Average Duration of Each Discharge:	Average Flow Per Discharge:	Months in Which Discharge Occurs:
365	24 HRS	9.3 mgd	12

Is Outfall Equipped with a Diffuser? ☐ Yes ■ No

20.5 DESCRIPTION OF RECEIVING WATER

B. Name of Receiving Water

Turkey Creek (P)

B. Name of Watershed (If Known)	U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)
	11070207-160020
B. Name of State Management/River Basin (If Known)	U.S. Geological Survey 8-Digit Hydrologic Cataloging Unit Code (If Known)
Spring River	11070207
B. Critical Flow of Receiving Stream (If Applicable) Acute _____ cfs Chronic _____ cfs	B. Total Hardness of Receiving Stream at Critical Low Flow (If Applicable) mg/L of $CaCO_3$ 200

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FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatme	MO- 0103349	004

PART B – ADDITIONAL APPLICATION INFORMATION (CONTINUED)

20.6 DESCRIPTION OF TREATMENT

A. WHAT LEVELS OF TREATMENT ARE PROVIDED? Check All That Apply

☑ Primary ☑ Secondary ■ Advanced ☐ Other (Describe)

B. INDICATE THE FOLLOWING REMOVAL RATES (AS APPLICABLE)

Design BOD_5 Removal Or Design $CBOD_5$ Removal 90 % Design SS Removal 90 %

Design P Removal ___% Design N Removal ___% Other _____ ___%

C. What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe:

Ultra Violet Radiation

If disinfection is by chlorination, is dechlorination used for this outfall? ☐ Yes ■ No

Does the treatment plant have post aeration? ☑ Yes ☐ No

20.7 EFFLUENT TESTING DATA. ALL APPLICANTS THAT DISCHARGE TO WATERS OF THE U.S. MUST PROVIDE EFFLUENT TESTING DATA FOR THE FOLLOWING PARAMETERS. PROVIDE THE INDICATED EFFLUENT DATA **FOR EACH OUTFALL THROUGH WHICH EFFLUENT IS DISCHARGED**. DO NOT INCLUDE INFORMATION OF COMBINED SEWER OVERFLOWS IN THIS SECTION. ALL INFORMATION REPORTED MUST BE BASED ON DATA COLLECTED THROUGH ANALYSIS CONDUCTED USING 40 CFR PART 136 METHODS. IN ADDITION, THIS DATA MUST COMPLY WITH QA/QC REQUIREMENTS OF 40 CFR PART 136 AND OTHER APPROPRIATE QA/QC REQUIREMENTS FOR STANDARD METHODS FOR ANALYTES NOT ADDRESSED BY 40 CFR PART 136.

OUTFALL NUMBER

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	VALUE	UNITS	VALUE	UNITS	NO. OF SAMPLES
pH (Minimum)	6.5	S.U.		S.U.	12/ day
pH (Maximum)	7.8	S.U.		S.U.	12/day
FLOW RATE	24	MGD	9.3	MGD	Continuous
TEMPERATURE (Winter)	5.56	°C	13	°C	12/day
TEMPERATURE (Summer)	27.78	°C	24.2	°C	12/Day

*For pH report a minimum and a maximum daily value.

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
		CONC.	UNITS	CONC.	UNITS	NO. OF SAMPLES		
Conventional and Nonconventional Compounds								
BIOCHEMICAL OXYGEN DEMAND (Report One)	BOD_5	6.8	mg/L	<2.0	mg/L	Once / week	5210B	2.0
	$CBOD_5$	4.07	mg/L	<2.0	mg/L	Once / week	5210B	2.0
FECAL COLIFORM		15,000	#/100 mL	<2 now	#/100 mL	Once/ week	9221	1.0
TOTAL SUSPENDED SOLIDS (TSS)		12.6	mg/L	1.4	mg/L	Once / Day	160.2	2.0
AMMONIA (AS N)		4.15	mg/L	<0.25	mg/L	Once / week	350	0.25
CHLORINE (TOTAL RESIDUAL, TRC)		N/A	mg/L	N/A	mg/L		330	
DISSOLVED OXYGEN		N/A	mg/L	N/A	mg/L			
TOTAL KJELDAHL NITROGEN (TKN)		13.4	mg/L	5	mg/L	1/Mo.	351	0.64
NITRATE PLUS NITRITE NITROGEN		18.7	mg/L	11.29	mg/L	1/Mo.	300.0, 353	<0.1
OIL AND GREASE		39.5	mg/L	<5.0	mg/L	1/Mo.	413	5.0
PHOSPHORUS (TOTAL)		3.89	mg/L	2.29	mg/L	1/Mo.	365	40
TOTAL DISSOLVE SOLIDS (TDS)		N/A	mg/L	N/A	mg/L			
OTHER			mg/L		mg/L			

END OF PART B

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PART C - CERTIFICATION

30. CERTIFICATION

All applicants must complete the Certification Section. This certification must be signed by an officer of the company or city official. All applicants must complete all applicable sections as explained in the Application Overview. By signing this certification statement, applicants confirm that they have reviewed the entire form and have completed all sections that apply to the facility for which this application is submitted.

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PRINTED NAME AND OFFICIAL TITLE (MUST BE AN OFFICER OF THE COMPANY OR CITY OFFICIAL)

Lyndell J. Edwards Superintendent of Wastewater Treatment

SIGNATURE

TELEPHONE NUMBER WITH AREA CODE

(417) 624-3615

DATE SIGNED

04/07/2012

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

For Design Flows Less than 1 Million Gallons Per Day, Send Completed Form to:	For Design Flows of 1 Million Gallons Per Day or Greater, Send Completed Form to:
Appropriate Regional Office Map of regional offices with addresses and phone numbers is available on the Web at www.dnr.mo.gov/regions/ro-map.pdf.	Department of Natural Resources Water Protection Program ATTN: NPDES Permits and Engineering Section P.O. Box 176 Jefferson City, MO 65102

END OF PART C.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

Do not complete the remainder of this application, unless:

1. Your facility design flow is equal to or greater than 1,000,000 gallons per day.
2. Your facility is a pretreatment treatment works.
3. Your facility is a combined sewer system.

Submittal of an incomplete application may result in the application being returned. Permit fees for returned applications shall be forfeited. Permit fees for applications being processed by the department that are withdrawn by the applicant shall be forfeited.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.

FACILITY NAME	PERMIT NO.	OUTFALL NO.
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PART D – EXPANDED EFFLUENT TESTING DATA

40. EXPANDED EFFLUENT TESTING DATA

Refer to the supplemental application information to determine whether Part D applies to the treatment works.

40.1 EFFLUENT TESTING: IF THE TREATMENT WORKS HAS A DESIGN FLOW GREATER THAN OR EQUAL TO 1 MILLION GALLONS PER DAY OR IT HAS (OR IS REQUIRED TO HAVE) A PRETREATMENT PROGRAM, OR IS OTHERWISE REQUIRED BY THE PERMITTING AUTHORITY TO PROVIDE THE DATA, THEN PROVIDE EFFLUENT TESTING DATA FOR THE FOLLOWING POLLUTANTS. PROVIDE THE INDICATED EFFLUENT TESTING INFORMATION **FOR EACH OUTFALL THROUGH WHICH EFFLUENT IS DISCHARGED**. DO NOT INCLUDE INFORMATION ON COMBINED SEWER OVERFLOWS IN THIS SECTION. ALL INFORMATION REPORTED MUST BE BASED ON DATA COLLECTED THROUGH ANALYSIS CONDUCTED USING 40 CFR PART 136 METHODS. IN ADDITION, THIS DATA MUST COMPLY WITH QA/QC REQUIREMENTS OF 40 CFR PART 136 AND OTHER APPROPRIATE QA/QC REQUIREMENTS FOR STANDARD METHODS FOR ANALYTES NOT ADDRESSED BY 40 CFR PART 136. INDICATE IN THE BLANK ROWS PROVIDED BELOW ANY DATA YOU MAY HAVE ON POLLUTANTS NOT SPECIFICALLY LISTED IN THIS FORM. EFFLUENT TESTING MUST NOT BE MORE THAN FOUR AND ONE-HALF YEARS OLD.

OUTFALL NUMBER (Complete Once for Each Outfall Discharging Effluent to Waters of the State.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS AND HARDNESS											
ANTIMONY		UG/L				UG/L				EPA 200.8	
ARSENIC	0.57	UG/L			<0.50	UG/L			4/mo.	EPA 200.8	0.50
BERYLLIUM		UG/L				UG/L				EPA 200.8	
CADMIUM	0.43	UG/L			0.38	UG/L			4/mo.	EPA 200.8	0.016
CHROMIUM	0.0005	MG/L			<0.005	MG/L			4/mo.	EPA 200.8	0.50
COPPER	0.005	MG/L			0.0028	MG/L			4/mo.	EPA 200.8	0.50
LEAD	0.001	MG/L			0.0035	MG/L			4/mo.	EPA 200.8	0.2
MERCURY	<0.2	UG/L			<0.2	UG/L			4/mo.	EPA 245.1	0.2
NICKEL	0.005	MG/L			0.004	MG/L			4/mo.	EPA 200.8	0.50
SELENIUM	0.6	UG/L			0.3	UG/L			1/yr.	EPA 200.8	0.50
SILVER	<0.5	UG/L			<0.5	UG/L			1/yr	EPA 200.8	0.50
THALLIUM		UG/L				UG/L				EPA 200.8	
ZINC	0.224	MG/L			0.1	MG/L			4/mo.	EPA 200.8	10.0
CYANIDE	<2.5	UG/L			<2.5	UG/L			1/mo.	335.2,335.1	2.5
TOTAL PHENOLIC COMPOUNDS	<50	UG/L			<50	UG/L			1/mo..	EPA 625	50
HARDNESS (as $CaCO_3$)	230	MG/L			200	MG/L			1/mo.	HACH 8226	0-25,000
USE THIS SPACE (OR A SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER METALS REQUESTED BY THE PERMIT WRITER.											
CHROMIUM VI	<0.005	MG/L			<0.005	MG/L			1/MO.	EPA 200.8	

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PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)

40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
VOLATILE ORGANIC COMPOUNDS											
ACROLEIN	<100	UG/L			<100	UG/L			(2/yr.)3=6	624 Mod.	100 UG/L
ACRYLONITRILE	<100	UG/L			<100	UG/L			(2/yr.)3=6	624 Mod.	100
BENZENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
BROMOFORM	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
CARBON TETRACHLORIDE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
CHLOROBENZENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
CHLORODIBROMO-METHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
CHLOROETHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
2-CHLORO-ETHYLVINYL ETHER	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
CHLOROFORM	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
DICHLOROBROMO-METHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,1-DICHLORO-ETHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,2-DICHLORO-ETHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
TRANS-1,2-DICHLOROETHYLENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,1-DICHLORO-ETHYLENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,2-DICHLORO-PROPANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,3-DICHLORO-PROPYLENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
ETHYLBENZENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
METHYL BROMIDE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
METHYL CHLORIDE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
METHYLENE CHLORIDE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
1,1,2,2-TETRA-CHLOROETHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
TETRACHLORO-ETHANE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
TOLUENE	<5.0	UG/L			<5.0	UG/L			(2/yr.)3=6	624 Mod.	5.0
3,4-BENZO-FLUORANTHENE	<10	UG/L			<10	UG/L			(2/yr.)3=6	624 Mod.	10
BENZO(GH) PHERYLENE	<10	UG/L			<10	UG/L			(2/yr.)3=6	624 Mod.	10
BENZO(K) FLUORANTHENE	<10	UG/L			<10	UG/L			(2/yr.)3=6	624 Mod.	10

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PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)

40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
BIS (2-CHLOROTHOXY) METHANE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
BIS (2-CHLOROETHYL) – ETHER	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
BIS (2-ETHYLHEXYL) PHTHALATE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
4-BROMOPHENYL PHENYL ETHER	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
BUTYL BENZYL PHTHALATE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2-CHLORONAPH-THALENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
4-CHLORPHENYL PHENYL ETHER	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
CHRYSENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
DI-N-BUTYL PHTHALATE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
DEBENZO (A,H) ANTHRACENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
1,2-DICHLORO-BENZENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
1,3-DICHLORO-BENZENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
1,4-DICHLORO-BENZENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
3,3-DICHLORO-BENZIDINE	<20	UG/L			<20	UG/L			2/yr.(3)=6	625 Mod.	20 UG/L
DIETHYL PHTHALATE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
DIMETHYL PHTHALATE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2,4-DINITRO-TOLUENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2,6-DINITRO-TOLUENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
1,2-DIPHENYL-HYDRAZINE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
1,1,1-TRICHLORO-ETHANE	<5	UG/L			<5	UG/L			2/yr.(3)=6	625 Mod.	5 UG/L
1,1,2-TRICHLORO-ETHANE	<5	UG/L			<5	UG/L			2/yr.(3)=6	625 Mod.	5 UG/L
TRICHLORETHYLENE	<5	UG/L			<5	UG/L			2/yr.(3)=6	625 Mod.	5 UG/L
VINYL CHLORIDE	<5	UG/L			<5	UG/L			2/yr.(3)=6	625 Mod.	5 UG/L
USE THIS SPACE (OR A SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER VOLATILE ORGANIC COMPOUNDS REQUESTED BY THE PERMIT WRITER											

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PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)

40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL	<20	UG/L			<20	UG/L			2/yr.(3)=6	625 Mod.	20 UG/L
2-CHLOROPHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2,4-DICHLOROPHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2,4-DIMETHYLPHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
4,6-DINITRO-O-CRESOL	<50	UG/L			<50	UG/L			2/yr.(3)=6	625 Mod.	50 UG/L
2,4-DINITROPHENOL	<50	UG/L			<50	UG/L			2/yr.(3)=6	625 Mod.	50 UG/L
2-NITROPHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
4-NITROPHENOL	<50	UG/L			<50	UG/L			2/yr.(3)=6	625 Mod.	50 UG/L
PENTACHLOROPHENOL	<50	UG/L			<50	UG/L			2/yr.(3)=6	625 Mod.	50 UG/L
PHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
2,4,6-TRICHLOROPHENOL	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
USE THIS SPACE (OR A SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER ACID-EXTRACTABLE COMPOUNDS REQUESTED BY THE PERMIT WRITER.											

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PART D – EXPANDED EFFLUENT TESTING DATA (CONTINUED)

40.1 EXPANDED EFFLUENT TESTING DATA (CONTINUED)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	NO. OF SAMPLES		
BASE-NEUTRAL COMPOUNDS											
ACENAPHTHENE	<10	UG/L			<10	UG/L			2/yr.(3)=6	625 Mod.	10 UG/L
ACENAPHTHYLENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
ANTHRACENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
BENZIDINE	<50	UG/L			<50	UG/L			2/yr.	625 Mod.	50 UG/L
BENZO(A)ANTHRACENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
BENZO(A)PYRENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
FLUORANTHENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
FLUORENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
HEXACHLOROBENZENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
HEXACHLOROCYCLO-PENTADIENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
HEXACHLOROETHANE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
INDENO (1,2,3-CD) PYRENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
ISOPHORONE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
NAPHTHALENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
NITROBENZENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
N-NITROSODI-PROPYLAMINE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
N-NITROSODI-METHYLAMINE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
N-NITROSODI-PHENYLAMINE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
PHENANTHRENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
PYRENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
1,2,4-TRICHLOROBENZENE	<10	UG/L			<10	UG/L			2/yr.	625 Mod.	10 UG/L
USE THIS SPACE (OR SEPARATE SHEET) TO PROVIDE INFORMATION ON OTHER BASE-NEUTRAL COMPOUNDS REQUESTED BY THE PERMIT WRITER.											
SEE ATTACHMENT 40.1											

END OF PART D

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MO 780-1805 (09-08)

ATTACHMENT TO 40.1

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	CONC	UNITS	MASS	UNITS	CONC	UNITS	MASS	UNITS	# OF SAMPLES		
ALPHA-BHC	<1.0	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
BETA-BHC	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
DELTA-BHC	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
GAMMA-BHC (LINDANE)	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
HEPTACHLOR	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
ALDRIN	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
HEPTACHLOR EPOXIDE	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
ENDOSULFAN I	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
DIELDRIN	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
4,4 '-DDE	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
ENDRIN	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
ENDOSULFAN II	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
4,4 '- DDD	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
ENDOSULFAN SULFATE	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
4,4' - DDT	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
ENDRIN ALDEHYDE	<0.10	UG/L			<0.10	UG/L			2/YR(3)=6	EPA 608	0.10
GAMMA-CHLORDANE	<0.05	UG/L			<0.05	UG/L			2/YR(3)=6	EPA 608	0.05
TOXAPHENE	<5.0	UG/L			<5.0	UG/L			2/YR(3)=6	EPA 608	5.00
PCB-1016	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00
PCB-1221	<2.0	UG/L			<2.0	UG/L			2/YR(3)=6	EPA 608	2.00
PCB-1232	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00
PCB-1242	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00
PCB-1248	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00
PCB-1254	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00
PCB-1260	<1.0	UG/L			<1.0	UG/L			2/YR(3)=6	EPA 608	1.00

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek WWT Facility	MO- 0103349	004

PART E – TOXICITY TESTING DATA

50. TOXICITY TESTING DATA

Refer to the Supplemental Application Information to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWS, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

A. POTWs with a design flow rate greater than or equal to 1 million gallons per day.

B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403).

C. POTWs required by the permitting authority to submit data for these parameters

- At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

50.1 REQUIRED TESTS. INDICATE THE NUMBER OF WHOLE EFFLUENT TOXICITY TESTS CONDUCTED IN THE PAST FOUR AND ONE-HALF YEARS.

CHRONIC	ACUTE 9 See Attachments 50.1

INDIVIDUAL TEST DATA. Complete the following chart **for the last three whole effluent toxicity tests.** Allow one column per test (where each species constitutes a test). Copy this page if more than three tests are being reported.

	MOST RECENT	2ND MOST RECENT	3RD MOST RECENT
A. TEST INFORMATION			
TEST NUMBER	JT061411B4	See attachments 50.1	
TEST SPECIES AND TEST METHOD NUMBER	Ceriodaphnia Dubia,2002.2		
AGE AT INITIATION OF TEST	< 24 hrs		
OUTFALL NUMBER	Eff. #004		
DATES SAMPLE COLLECTED	6/14/11		
DATE TEST STARTED	6/15/11		
DURATION	48 hrs		
B. GIVE TOXICITY TEST METHODS FOLLOWED			
MANUAL TITLE	Standard Methods 2002.2		
EDITION NUMBER AND YEAR OF PUBLICATION	5th, 2002		
PAGE NUMBER(S)			
C. GIVE THE SAMPLE COLLECTION METHOD(S) USED. FOR MULTIPLE GRAB SAMPLES, INDICATE THE NUMBER OF GRAB SAMPLES USED.			
24-HOUR COMPOSITE	Composite sampler		
GRAB			
D. INDICATE WHERE THE SAMPLE WAS TAKEN IN RELATION TO DISINFECTION. (CHECK ALL THAT APPLY FOR EACH)			
BEFORE DISINFECTION	☐	☐	☐
AFTER DISINFECTION	☑	☐	☐
AFTER DECHLORINATION	☐	☐	☐
E. DESCRIBE THE POINT IN THE TREATMENT PROCESS AT WHICH THE SAMPLE WAS COLLECTED			
SAMPLE WAS COLLECTED			
F. FOR EACH TEST, INCLUDE WHETHER THE TEST WAS INTENDED TO ASSESS CHRONIC TOXICITY, ACUTE TOXICITY OR BOTH.			
CHRONIC TOXICITY	☐	☐	☐
ACUTE TOXICITY	☐	☐	☐
G. PROVIDE THE TYPE OF TEST PERFORMED			
STATIC	☐	☐	☐
STATIC STATIC-RENEWAL	☐	☐	☐
FLOW-THROUGH	☐	☐	☐
H. SOURCE OF DILUTION WATER. IF LABORATORY WATER, SPECIFY TYPE; IF RECEIVING WATER, SPECIFY SOURCE			
LABORATORY WATER			
RECEIVING WATER			

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FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatment	MO- 0103349	004 See attachments 50.1

PART E – TOXICITY TESTING DATA (CONTINUED)

50.1 WHOLE EFFLUENT TOXICITY TESTS DATA (CONTINUED)

	MOST RECENT	2ND MOST RECENT	3RD MOST RECENT
I. TYPE OF DILUTION WATER, IF SALT WATER, SPECIFY "NATURAL" OR TYPE OF ARTIFICIAL SEA SALTS OR BRINE USED.			
FRESH WATER			
SALT WATER			
J. GIVE THE PERCENTAGE EFFLUENT USED FOR ALL CONCENTRATIONS IN THE TEST SERIES.			
K. PARAMETERS MEASURED DURING THE TEST. (STATE WHETHER PARAMETER MEETS TEST METHOD SPECIFICATIONS)			
pH			
SALINITY			
TEMPERATURE			
AMMONIA			
DISSOLVED OXYGEN			
L. TEST RESULTS			
ACUTE:			
PERCENT IN SURVIVAL IN 100% EFFLUENT			
LC_{50}			
95% C.I.			
CONTROL PERCENT SURVIVAL			
OTHER (DESCRIBE)			
CHRONIC:			
NOEC			
IC_{25}			
CONTROL PERCENT SURVIVAL			
OTHER (DESCRIBE)			
M. QUALITY CONTROL ASSURANCE			
IS REFERENCE TOXICANT DATA AVAILABLE?			
WAS REFERENCE TOXICANT TEST WITHIN ACCEPTABLE BOUNDS?			
WHAT DATE WAS REFERENCED TOXICANT TEST RUN (MM/DD/YYYY)?			
OTHER (DESCRIBE)			

50.2 TOXICITY REDUCTION EVALUATION

Is the treatment works involved in a toxicity reduction evaluation? ☐ Yes ☐ No

If yes, describe:

50.3 SUMMARY OF SUBMITTED BIOMONITORING TEST INFORMATION

If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date Submitted (MM/DD/YYYY)

Summary of Results (See Instructions)

END OF PART E

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MO 780-1805 (09-08)

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Joplin-Turkey Creek Wastewater Treatment	MO- 0103349	

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

60. INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

Refer to the Supplemental Application Information to determine whether Part F applies to the treatment works.

All treatment works receiving discharges from significant industrial users or which receive RCRA, CERCLA, or other remedial wastes must complete this form.

See Attachment 6.5

GENERAL INFORMATION

60.1 PRETREATMENT PROGRAM

Does the treatment works have, or is it subject to, an approved pretreatment program?

☑ Yes ☐ No

60.2 NUMBER OF NON-CATEGORICAL SIGNIFICANT INDUSTRIAL USERS, or SIUs AND CATEGORICAL INDUSTRIAL USERS, or CIUs. PROVIDE THE NUMBER OF EACH OF THE FOLLOWING TYPES OF INDUSTRIAL USERS THAT DISCHARGE TO THE TREATMENT WORKS.

A. Number of Non-Categorical SIUs	B. Number of CIUs
11	8

60.3 SIGNIFICANT INDUSTIRAL USER INFORMATION

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME: Able Body Corporation

MAILING ADDRESS	CITY	STATE	ZIP
1000 Schifferdecker Ave.	Joplin	MO	64801

60.4 INDUSTRIAL PROCESSES

DESCRIBE ALL OF THE INDUSTRIAL PROCESSES THAT AFFECT OR CONTRIBUTE TO THE SIU's DISCHARGE.

Painting and cleanup of process areas

60.5 PRINCIPAL PRODUCT(S) AND RAW MATERIAL (S)

Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.

PRINCIPAL PRODUCT(S): Motor Vehicle Equipment bodies

RAW MATERIAL(S): Metals, Fiberglass

60.6 FLOW RATE

A. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd ☐ Continuous ☐ Intermittent

B. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

C.

gpd ☐ Continuous ☐ Intermittent

60.7 PRETREATMENT STANDARDS

Indicate whether the SIU is subject to the following

A.	Local Limits	☑ Yes	☐ No
B.	Categorical Pretreatment Standards	☐ Yes	☐ No

If subject to categorical pretreatment standards, which category and subcategory?

60.8 PROBLEMS AT THE TREATMENT WORKS ATTRIBUTED TO WASTE DISCHARGED BY THE SIU

Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

☐ Yes ☑ No If Yes, describe each episode

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.		
FACILITY NAME Joplin-Turkey Creek Wastewater Treatment	PERMIT NO. MO- 0103349	OUTFALL NO.

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES (CONTINUED)

60.9 RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE

RCRA WASTE. Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail or dedicated pipe?
☐ Yes ☑ No

WASTE TRANSPORT. Method by which RCRA waste is received. (Check all that apply)
☐ Truck ☐ Rail ☐ Dedicated Pipe

WASTE DESCRIPTION. Give EPA hazardous waste number and amount (volume or mass, specify units).

EPA HAZARDOUS WASTE NUMBER	AMOUNT	UNITS

60.10 CERCLA, OR SUPERFUND, WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER AND OTHER REMEDIAL ACTIVITY WASTEWATER

REMEDIATION WASTE. Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?
☐ Yes ☑ No Provide a list of sites and the requested information for each current and future site.

60.11 WASTE ORIGIN

Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

60.12 POLLUTANTS

List the hazardous constituents that are received (or are expected to be received). Included data on volume and concentration, if known. (Attach additional sheets if necessary)

60.13 WASTE TREATMENT

A. Is this waste treated (or will it be treated) prior to entering the treatment works?
☐ Yes ☑ No

If Yes, describe the treatment (provide information about the removal efficiency):

B. Is the discharge (or will the discharge be) continuous or intermittent?
☐ Continuous ☐ Intermittent

If intermittent, describe the discharge schedule:

END OF PART F

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

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MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL.		
FACILITY NAME Joplin-Turkey Creek Wastewater Treatment	PERMIT NO. MO- 0103349	OUTFALL NO.

PART G – COMBINED SEWER SYSTEMS

70. COMBINED SEWER SYSTEMS (COMPLETE THIS PART IF THE TREATMENT WORKS HAS A COMBINED SEWER SYSTEM.)

Refer to the Supplemental Application Information to determine whether Part G applies to the treatment works.

70.1 SYSTEM MAP

Provide a map indicating the following: (May be included with basic application information.)

A. All CSO Discharges.

B. Sensitive Use Areas Potentially Affected by CSOs. (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems and Outstanding Natural Resource Waters.)

C. Waters that Support Threatened and Endangered Species Potentially Affected by CSOs.

70.2 SYSTEM DIAGRAM

Provide a diagram, either in the map provided above or on a separate drawing, of the Combined Sewer Collection System that includes the following information:

A. Locations of Major Sewer Trunk Lines, Both Combined and Separate Sanitary.

B. Locations of Points where Separate Sanitary Sewers Feed into the Combined Sewer System.

C. Locations of In-Line or Off-Line Storage Structures.

D. Locations of Flow-Regulating Devices.

E. Locations of Pump Stations.

70.3 PERCENT OF COLLECTION SYSTEM THAT IS COMBINED SEWER

70.4 POPULATION SERVED BY COMBINED SEWER COLLECTION SYSTEM

70.5 NAME OF ANY SATELLITE COMMUNITY WITH COMBINED SEWER COLLECTION SYSTEM

70.6 CSO OUTFALLS. COMPLETE THE FOLLOWING ONCE FOR EACH CSO DISCHARGE POINT

70.7 DESCRIPTION OF OUTFALL

A. Outfall Number

B. Location

C. Distance from Shore (if applicable)	D. Depth Below Surface (if applicable)
_____ ft	_____ ft

E. Which of the following were monitored during the last year for this CSO?

☐ Rainfall ☐ CSO Pollutant Concentrations ☐ CSO ☐ CSO Flow Volume ☐ Receiving Water Quality

F. How many storm events were monitored last year?

70.8 CSO EVENTS

A. Give the Number of CSO Events in the Last Year	B. Give the Average Duration Per CSO Event
_____ Events ☐ Actual ☐ Approximate	_____ Hours ☐ Actual ☐ Approximate
C. Give the Average Volume Per CSO Event	D. GIVE THE MINIMUM RAINFALL THAT CAUSED A CSO EVENT IN THE LAST YEAR _____ INCHES OF RAINFALL
_____ Million Gallons ☐Actual ☐ Approximate	

70.9 DESCRIPTION OF RECEIVING WATERS

A. Name of Receiving Water

B. Name of Watershed/River/Stream System	U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)
Name of State Management/River Basin	U.S. Geological Survey 8- Digit Hydrologic Cataloging Unit Code (If Known)

70.10 CSO OPERATIONS

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable state water quality standard.)

END OF PART G.

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

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ATTACHMENT 6.50
SIGNIFICANT INDUSTRIAL USERS
TURKEY CREEK WWTP
Updated Feb 2009

Able Body Corporation
1000 Schifferdecker Ave.
Flow = 10,000 GPD
SIC: 3713 – Motor Vehicles / Equipment – Truck & Bus Bodies

Autotronics, Inc.
2700 Davis Boulevard
Flow = 250 GPD
40 CFR - Part 433 - Metal Finishing
SIC: 3629 – Electrical Industrial Apparatus, Not Elsewhere Classified
Categorical – Part 433 – Metal Finishing (nominal)

Cliffstar Corporation
3502 Enterprise Avenue
Flow = 98,000 GPD
SIC: 2033 – Canned Fruits, Vegetables, Preserves, Jams and Wines

Eagle Picher Couples
C& Porter Street
Flow = 27,000
40 CFR – Part 461 – Battery Manufacture
SIC: 3691 – Storage Batteries

Eagle Picher Chemicals (Lead Prod) (Closed)
C& Porter Street
Flow = 700
40 CFR – Part 415 – Inorganic Chemicals
SIC: 2819 – Industrial Inorganic Chemicals

Eagle Picher Rangeline
3220 Industrial Road
Flow = 3,500
40 CFR – Part 461 – Battery Manufacture
SIC: 3691 – Storage Batteries

Mid-American
Precision Products Plant #1
1927 W. 4th
Flow = 2,000 GPD
40 CFR – Part 433 – Metal Finishing
SIC: 3499 – Fabricated Metal Products, Not Elsewhere Classified

ATTACHMENT 6.50
SIGNIFICANT INDUSTRIAL USERS
TURKEY CREEK WWTP
Updated Feb 2009

CertainTeed, Inc.
3401 Enterprise Avenue
Flow = 3,000 GPD
SIC: 3089 – Plastics Products, Not Elsewhere Classified

CLEAN The Uniform Co.
1609 East Falcon Road, W.C.
Flow = 35,000 GPD
SIC: 7218 – Industrial Laundries

International Paper Company (Closed)
2609 Rangeline
Flow = Batch approx. 30,000 GPMonth
40 CFR – Part 429 - Timber Processing, Wood Preserving & Steam
SIC: 2491 – Miscellaneous Wood Products, Wood Preserving
Treated Site Runoff and Groundwater Monitoring Discharge

LaBarge, Inc.
1505 Maiden Lane
Flow = 11,000 GPD
40 CFR – Part 413 – Electroplating, Chemical Etching & Milling
SIC: 3679 – Electronic Components – Not Elsewhere Classified

MidWestern Machinery (Closed)
902 East 4th
Flow = 0 GPD
40 CFR – Part 433 – Metal Finishing
SIC: 3532 – Mining Machinery & Equipment, except oil & gas fields

Modine Manufacturing
3300 West 7th Street
Flow = 28,000 GPD
SIC: 3714 – Motor Vehicle Parts & Accessories
3585 – Air Conditioning & Warm Air Heating Equipment

Safeway Bakery (Glencourt)
1401 Junge Boulevard
Flow = 26,000 GPD
SIC: 2052 – Bakery Products – Cookies & Crackers

ATTACHMENT 6.50
SIGNIFICANT INDUSTRIAL USERS
TURKEY CREEK WWTP
Updated Feb 2009

Star-Brite Plating (Closed)
510 Tyler
Flow = 0 GPD
40 CFR – Part 413 - Electroplating
SIC: 3471 – Electroplating, Plating, Anodizing, Coloring

Tamko Roofing Products – High Street
601 North High Street
Flow = 133,000 GPD
SIC: 2952 – Asphalt, Felts, & Coatings

Tamko Roofing Products – Newman Road
Rangeline & Newman Roads
Flow = 108,000 GPD
SIC: 2621 – Paper Mills
2952 – Asphalt, Felts, & Coatings

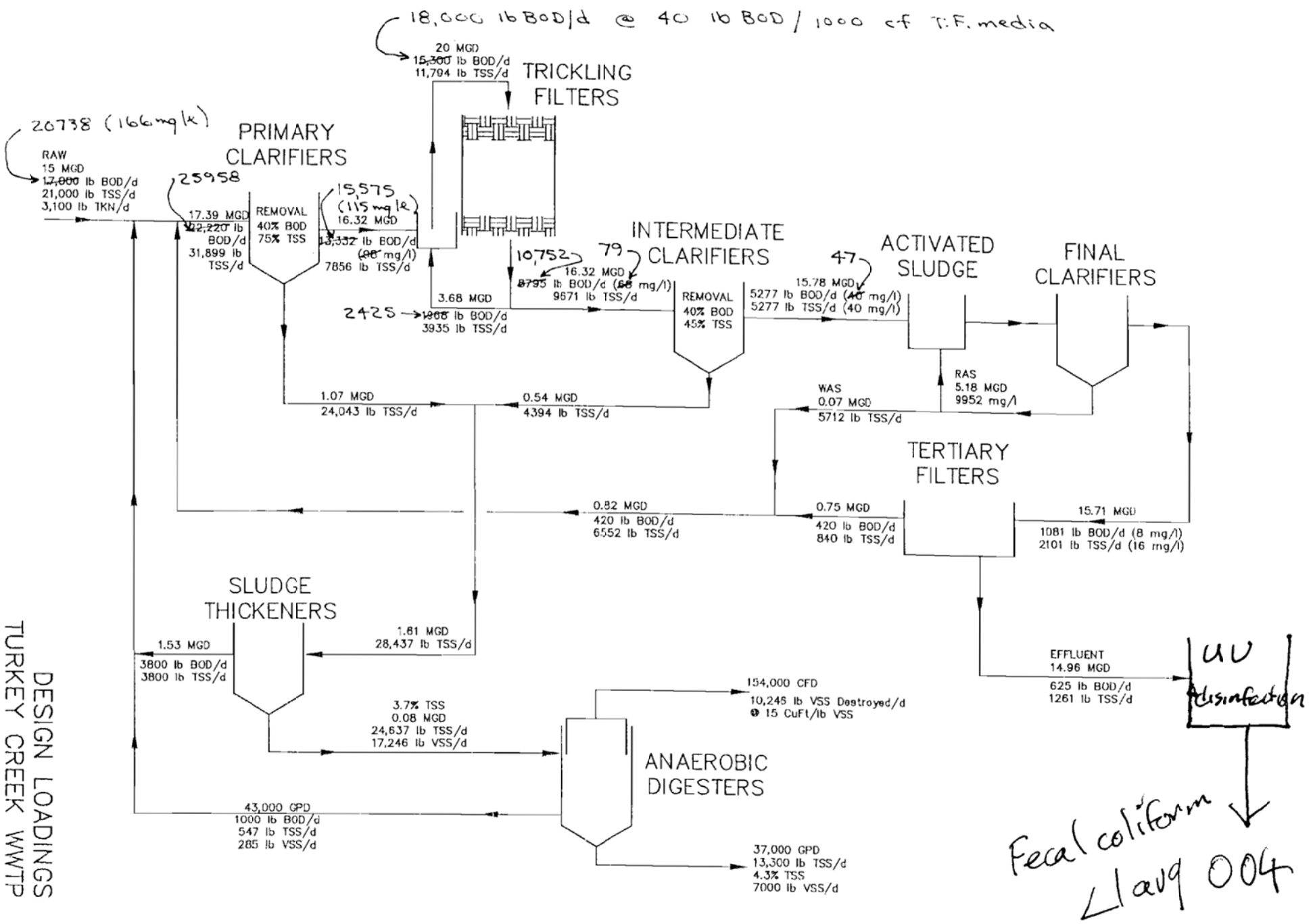
Hampshire Pet Products
7700 East Alliance Pkwy.
Flow = 5,000 GPD
SIC: 0723 – Dog Biscuit Mfg.

*Jasper Products, L.L.C.
3877 East 27th
Flow = 586,354 GPD
SIC: 2026 – Dairy Products-Fluid Milk

*Gilster-MaryLee
3727 East 27th Street
Flow = 36,669 GPD
SIC: 2043 – Cereal, Breakfast Foods

*May go to either plant. Currently going to Shoal Creek WWTP

attachment 7.3

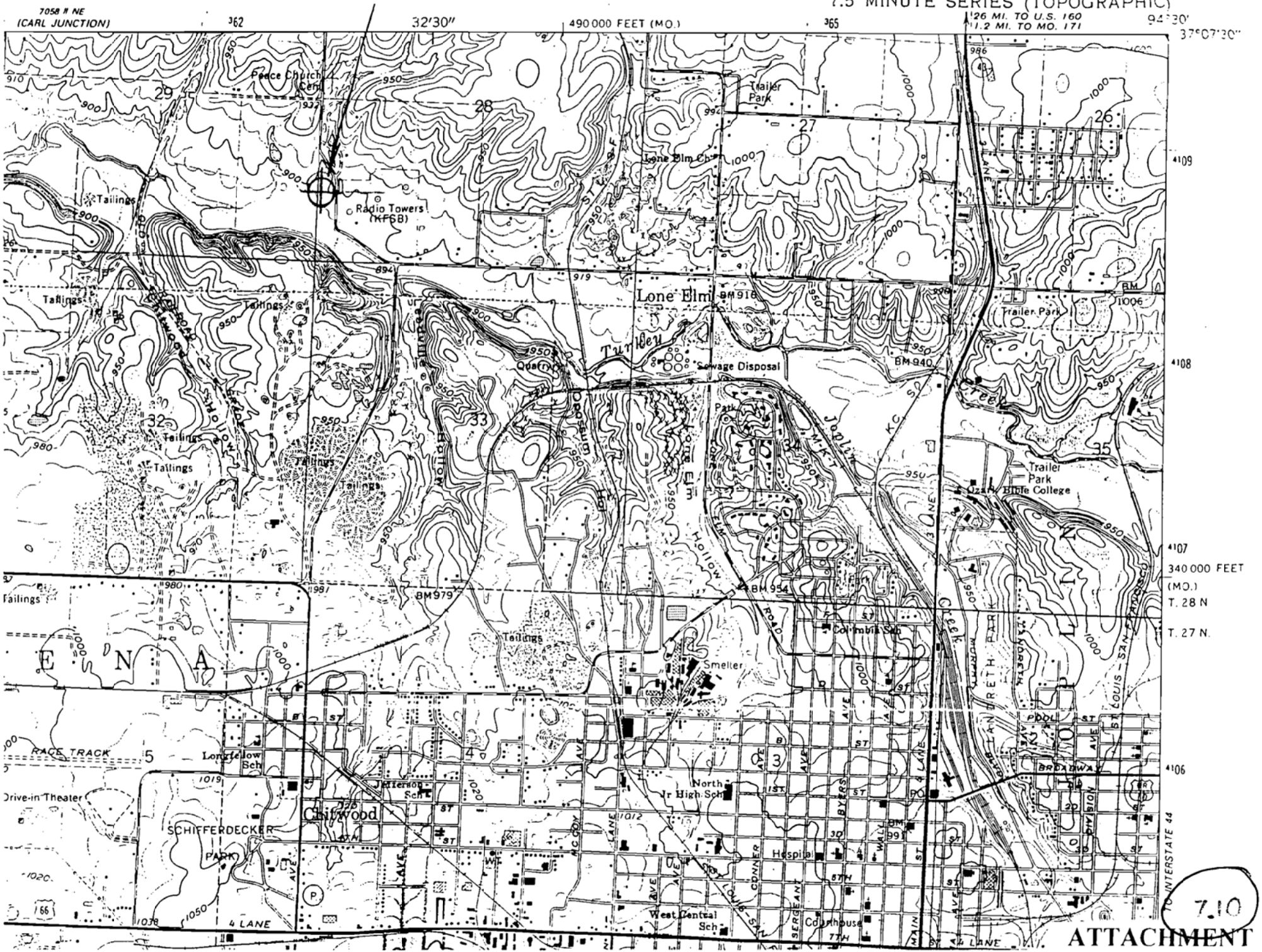


DESIGN LOADINGS
TURKEY CREEK WWTP

OF NATURAL RESOURCES ANA
HOWE, STATE GEOLOGIST

TURKEY CREEK WWTF

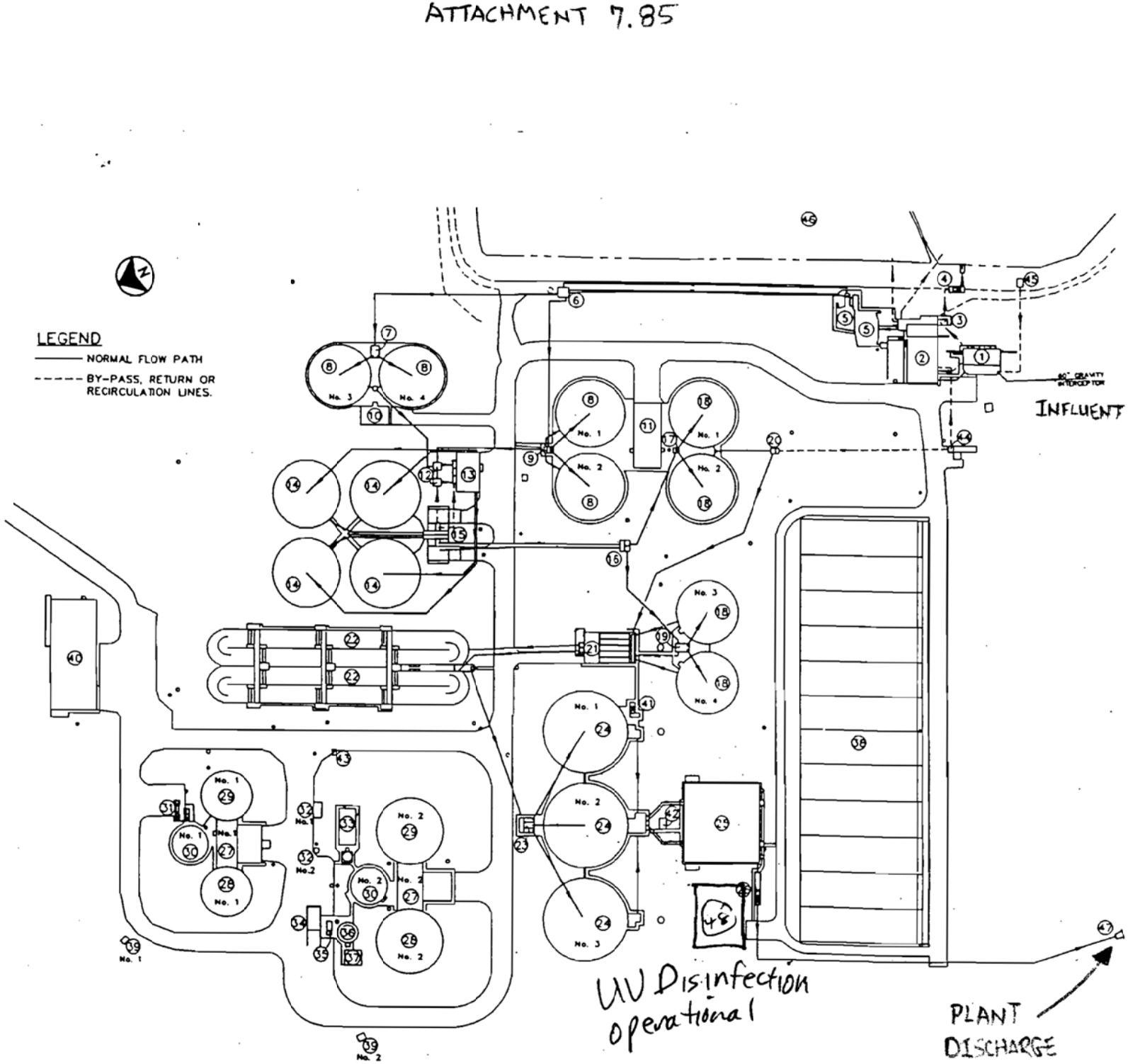
MISSOURI–KANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



7.10

ATTACHMENT

ATTACHMENT 7.85

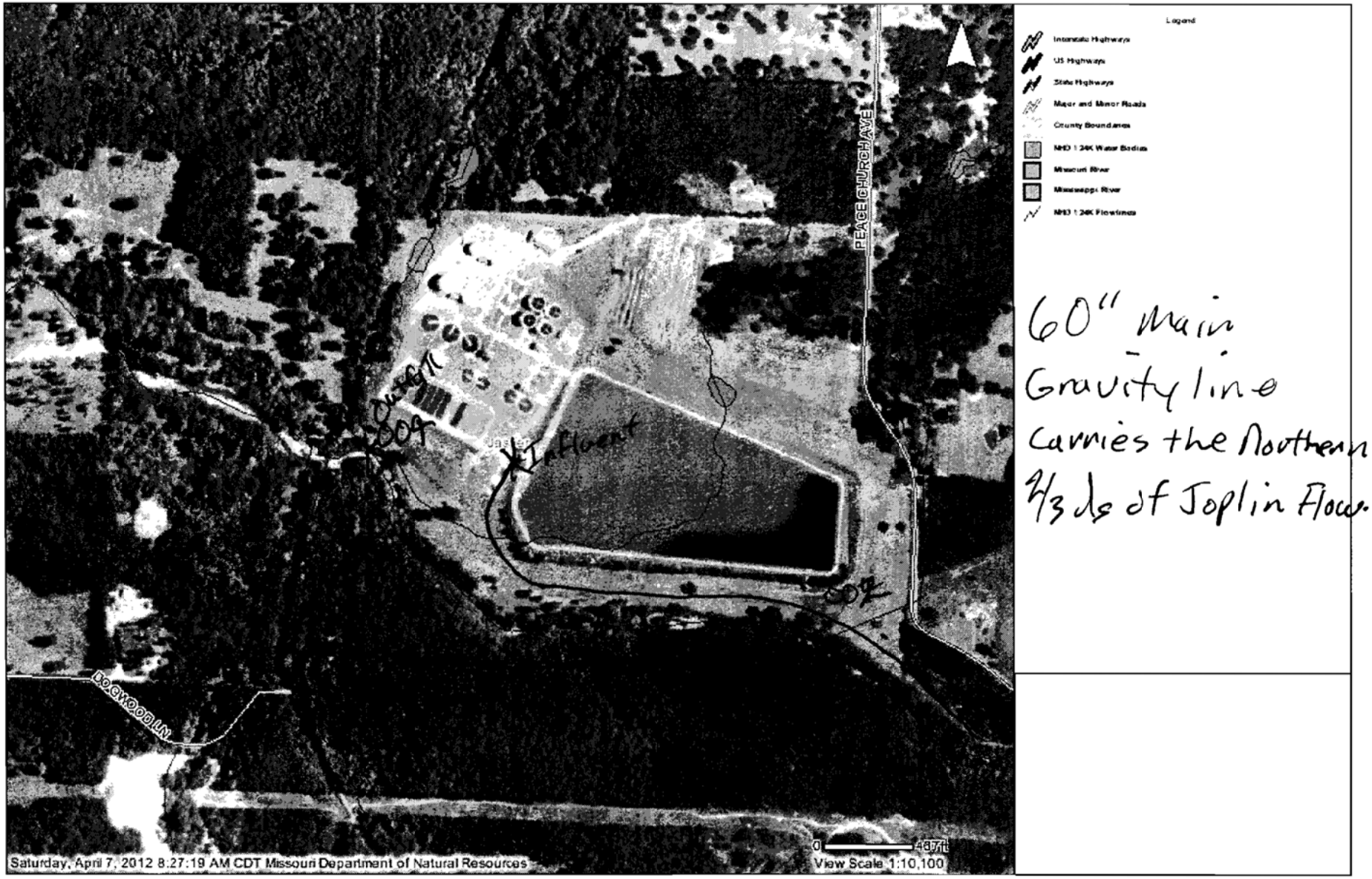


1. PEAK FLOW PUMPING STRUCTURE
2. INLET STRUCTURE
3. PEAK FLOW DIVERSION STRUCTURE
4. PEAK FLOW MEASUREMENT STRUCTURE
5. GRIT REMOVAL STRUCTURE
6. PRIMARY CLARIFIERS FLOW CONTROL STRU
7. PRIMARY CLARIFIER SPLITTER BOX (Clar.
8. PRIMARY CLARIFIER
9. PRIMARY CLARIFIER SPLITTER BOX (Clar.
10. SLUDGE PUMP BUILDING
11. MAINTENANCE & PUMP BUILDING
12. PRIMARY CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE(S)
13. TRICKLING FILTER PUMP BUILDING
14. TRICKLING FILTER
15. SNAIL REMOVAL STRUCTURE
16. INTERMEDIATE CLARIFIERS FLOW CONTROL STRUCTURE
17. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 1 & 2)
18. INTERMEDIATE CLARIFIER
19. INTERMEDIATE CLARIFIER SPLITTER BOX (Clar. 3 & 4)
20. INTERMEDIATE CLARIFIER EFFLUENT FLOW CONTROL STRUCTURE
21. INTERMEDIATE PUMPING STRUCTURE
22. ACTIVATED SLUDGE BASIN
23. FINAL CLARIFIER INFLUENT SPLITTER BOX
24. FINAL CLARIFIER
25. TERTIARY FILTER BUILDING
26. EFFLUENT FLOW MEASUREMENT STRUCTURE
27. DIGESTER BUILDING
28. PRIMARY DIGESTER
29. SECONDARY DIGESTER
30. SLUDGE THICKENER
31. CYCLONE DEGRITTER
32. SLUDGE TRUCK LOADING PORT
33. SLUDGE HOLDING TANK & LIME SILO
34. SEPTAGE DUMPING STRUCTURE
35. MECHANCIAL SCREEN
36. SEPTAGE RECEIVING TANK
37. SEPTAGE PUMPING STRUCTURE
38. SLUDGE DRYING BEDS
39. WASTE GAS BURNER
40. LABORATORY & ADMINISTRATION BUILDING
41. RETURN ACTIVATED SLUDGE FLOW MEASUREMENT STRUCTURE
42. DRAWDOWN STRUCTURE
43. VALVE BOX 4A
44. INTERMEDIATE CLARIFIER RETURN FLOW STR
45. BASIN RETURN FLOW STRUCTURE
46. FLOW EQUALIZATION BASIN
47. EFFLUENT HEADWALL
48 UV Disinfection

FIGURE
PLANT LAY
WASTEWATER

Attachment 7.85 b

Joplin Turkey Creek Treatment Plant



Missouri Department of Natural Resources

Disclaimer: Although this map has been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

Attachment 7.14

Permit Numl	Issue Date	Expiration Dat	Facility Name	Sta	PF No	Limit Set Des	Violation Code	NODI Code	MPED
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		02/28/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		12/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		06/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		12/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		06/30/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Conc. absent - monitor		07/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		03/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		05/31/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		06/30/2008
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		05/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		A	Limit value exceeded		04/30/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		06/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		03/31/2008
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	002		B	Limit value exceeded		12/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		08/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		05/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		03/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		02/28/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		04/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		02/28/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		06/30/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		02/28/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		09/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		08/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		07/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		06/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		02/28/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		10/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		08/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		B	Limit value exceeded		05/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004		A	Limit value exceeded		03/31/2011

No month goes by that we don't exceed on Zinc, cadmium or both.

Param Desc	*Mon Loc*	*Conc Unit*	*Conc 1*	*Stat Base Code*	*DMR Conc 1*
BOD, 5-day, 20 deg. C	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Nitrogen, ammonia total	End of Pipe	mg/L			
Total Suspended Solids	End of Pipe	mg/L			
Total Suspended Solids	End of Pipe	mg/L			
Total Suspended Solids	End of Pipe	mg/L			
Total Suspended Solids	End of Pipe	mg/L			
Total Suspended Solids	End of Pipe	mg/L			
Zinc (Zn), total recovera	End of Pipe	mg/L			
Zinc (Zn), total recovera	End of Pipe	mg/L			
Zinc (Zn), total recovera	End of Pipe	mg/L			
Zinc (Zn), total recovera	End of Pipe	mg/L			
Zinc (Zn), total recovera	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cadmium, total recover	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Cyanide, free (amenable	End of Pipe	mg/L			
Mercury (Hg), total reco	End of Pipe	mg/L			
Nitrogen, ammonia total	End of Pipe	mg/L			
Oil and grease (soxhlet	End of Pipe	mg/L			

MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	02/29/2008
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	06/30/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	Conc. absent - monitor	06/30/2008
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	06/30/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	Concentration absent -	03/31/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	03/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	DMR Non-Receipt	06/30/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	D	Concentration absent -	03/31/2009
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	08/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	07/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	06/30/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	05/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	04/30/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	03/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	02/28/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	01/31/2011
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	12/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	06/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	05/31/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	04/30/2010
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	004	A	Limit value exceeded	03/31/2010
MO0103349	01/26/2007	01/25/2012		02	A	E9	01/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	02	A	E9	01/31/2007
MO0103349	01/26/2007	01/25/2012		04	C	D2	01/31/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	04	C	D2	01/31/2007
MO0103349	01/26/2007	01/25/2012		04	C	D2	12/31/2006
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	04	C	D2	12/31/2006
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	SM1	A	Conc. absent - monitor	06/30/2007
MO0103349	01/26/2007	01/25/2012	JOPLIN TURKEY CREE	SM1	A	Conc. absent - monitor	06/30/2007

Phenol	End of Pipe	mg/L		
Total Toxic Organics (T	End of Pipe	mg/L		
Total Toxic Organics (T	End of Pipe	mg/L		
Total Toxic Organics (T	End of Pipe	mg/L		
Wet Test, 48-Hour Ceric	End of Pipe	pass/fail		
Wet Test, 48-Hour Ceric	End of Pipe	pass/fail		
Wet Test, 48-Hour Ceric	End of Pipe	pass/fail		
Wet Test, 48-Hour Pime	End of Pipe	pass/fail		
Wet Test, 48-Hour Pime	End of Pipe	pass/fail		
Wet Test, 48-Hour Pime	End of Pipe	pass/fail		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
Zinc (Zn), total recovera	End of Pipe	mg/L		
BOD5	1	19	0	0
BOD5	1	19	0	0
NH3 T	1	19	0	0
NH3 T	1	19	0	0
NH3 T	1	19	0	0
NH3 T	1	19	0	0
Pentachlorophenol	Downstream Mo	mg/L		
Pentachlorophenol	Upstream Monit	mg/L		

Conc Min Limit (WQIS,	*Conc Min DMR (WQIS)*	*Conc 2*	*Stat Base Code*	*DMR Conc 2*	*Conc Avg Limit (WQIS*
		30	Monthly Avg.	36.5	
		0.0004	Monthly Avg.	0.0017	
		0.0004	Monthly Avg.	0.005	
		0.0004	Monthly Avg.	0.002	
		0.004	Monthly Avg.	0.005	
		0.004	Monthly Avg.	0.056	
		0.005	Monthly Avg.	0.00752	
		0.005	Monthly Avg.	0.0099	
		MONITORING	Monthly Avg.		
		30	Monthly Avg.	22	
		30	Monthly Avg.	30.67	
		30	Monthly Avg.	28	
		30	Monthly Avg.	29.58	
		30	Monthly Avg.	42.75	
		0.11	Monthly Avg.	0.319	
		0.11	Monthly Avg.	0.159	
		0.11	Monthly Avg.	0.384	
		0.44	Monthly Avg.	0.56	
		0.44	Monthly Avg.	0.48	
		0.0004	Monthly Avg.	0.00077	
		0.0004	Monthly Avg.	0.00046	
		0.0004	Monthly Avg.	0.00054	
		0.0004	Monthly Avg.	0.0007	
		0.0004	Monthly Avg.	0.00041	
		0.0004	Monthly Avg.	0.00046	
		0.004	Monthly Avg.	2.5	
		0.004	Monthly Avg.	0.012	
		0.004	Monthly Avg.	0.0154	
		0.004	Monthly Avg.	0.007	
		0.004	Monthly Avg.	0.004	
		0.004	Monthly Avg.	0.0022	
		0.005	Monthly Avg.	0.0077	
		0.005	Monthly Avg.	0.0099	
		0.0003	Monthly Avg.	0.00036	
		2.5	Monthly Avg.	1.21	
		10	Monthly Avg.	39	

0.100	Monthly Avg.	0.108	
0	Monthly Avg.		
0	Monthly Avg.		
0	Monthly Avg.		
0	Monthly Avg.		
0	Monthly Avg.		
0	Monthly Avg.		
0.11	Monthly Avg.	0.1215	
0.11	Monthly Avg.	0.134	
0.11	Monthly Avg.	0.166	
0.11	Monthly Avg.	0.206	
0.11	Monthly Avg.	0.166	
0.11	Monthly Avg.	0.17	
0.11	Monthly Avg.	0.149	
0.11	Monthly Avg.	0.128	
0.11	Monthly Avg.	0.121	
0.11	Monthly Avg.	0.134	
0.11	Monthly Avg.	0.115	
0.11	Monthly Avg.	0.163	
0.11	Monthly Avg.	0.125	
	0	0	30
	0	0	30
	0	0	3
	0	0	3
	0	0	3
	0	0	3
MONITORING	Monthly Avg.		
MONITORING	Monthly Avg.		

Conc Avg DMR (WQIS,	Conc 3	Stat Base Code	DMR Conc 3	Conc Max Limit (WQIS	Conc Max DMR (WQIS,
	45	Weekly Avg.	41		
	0.0008	Daily Max.	0.0017		
	0.0008	Daily Max.	0.005		
	0.0008	Daily Max.	0.002		
	0.007	Daily Max.	0.005		
	0.007	Daily Max.	0.056		
	0.008	Daily Max.	0.00752		
	0.008	Daily Max.	0.0099		
	MONITORING	Daily Max.			
	45	Weekly Avg.	49		
	45	Weekly Avg.	36		
	45	Weekly Avg.	64.5		
	45	Weekly Avg.	46.5		
	45	Weekly Avg.	51.6		
	0.22	Daily Max.	0.319		
	0.22	Daily Max.	0.159		
	0.22	Daily Max.	0.384		
	0.66	Daily Max.	0.56		
	0.66	Daily Max.	0.48		
	0.0008	Daily Max.	0.0012		
	0.0008	Daily Max.	0.00046		
	0.0008	Daily Max.	0.00071		
	0.0008	Daily Max.	0.00093		
	0.0008	Daily Max.	0.00071		
	0.0008	Daily Max.	0.00054		
	0.007	Daily Max.	2.5		
	0.007	Daily Max.	0.012		
	0.007	Daily Max.	0.0154		
	0.007	Daily Max.	0.011		
	0.007	Daily Max.	0.0146		
	0.007	Daily Max.	0.0112		
	0.008	Daily Max.	0.0077		
	0.008	Daily Max.	0.0099		
	0.0009	Daily Max.	0.001		
	2.5	Daily Max.	5.16		
	15	Daily Max.	39		

	0.150	Daily Max.	0.108		
	MONITORING	Daily Max.			
	MONITORING	Daily Max.			
	MONITORING	Daily Max.			
	0.22	Daily Max.	0.143		
	0.22	Daily Max.	0.151		
	0.22	Daily Max.	0.268		
	0.22	Daily Max.	0.259		
	0.22	Daily Max.	0.218		
	0.22	Daily Max.	0.181		
	0.22	Daily Max.	0.196		
	0.22	Daily Max.	0.142		
	0.22	Daily Max.	0.138		
	0.22	Daily Max.	0.139		
	0.22	Daily Max.	0.126		
	0.22	Daily Max.	0.188		
	0.22	Daily Max.	0.152		
40		0	0	45	40
40		0	0	45	40
		0	0	3	
		0	0	3	
		0	0	3	
		0	0	3	
	MONITORING	Daily Max.			
	MONITORING	Daily Max.			

Mass Unit	Mass 1	Stat Base Code	DMR Mass 1	Mass Avg Limit (WQIS	Mass Avg DMR (WQIS,

APPENDIX G

Appendix G
Turkey Creek Wastewater Treatment Plant
Wastewater Flows/Loads for 2017 & 2018

January 2017			Influent (57 Degrees F)				Effluent (54 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.8			161	6445		10.70	
2	0.02	5.1			153	6520		6.28	
3		5.3			174	7677		9.94	1.160
4		5.4	201	9035	144	6473	5.45	10.80	
5	0.02	5.3	249	10902	197	8626	6.60	10.80	
6		5.4	208	9367	140	6305	6.76	12.80	
7		5.3						11.90	
8		5.4			174	7764		10.80	
9		5.8			169	8189		10.20	
10		5.4			159	7201		10.40	1.600
11		5.7	192	9079	138	6526	4.78	9.20	
12		5.6	227	10507	115	5323	3.88	7.38	
13	0.64	7.8	270	17496	143	9267	3.16	5.88	
14	0.79	8.3			115	7989		10.00	
15	0.74	18.7			151	23575		9.50	
16	0.26	20.1			37	6125		7.76	
17		14.3			39	4598		4.10	0.591
18	T	13.6	54	6084	37	4207	2.27	3.70	
19		10.1	101	8482	71	5996	2.13	3.10	
20	T	10.3	108	9232	77	6582	2.23	2.60	
21	0.31	11.0			107	9780		2.93	
22	0.87	16.7			140	19476		3.04	
23		18.0			109	16390		4.80	
24		14.0			59	6909		2.70	0.569
25		11.9	93	9206	71	7058	2.33	2.80	
26		10.5	74	6475	60	5264	2.54	3.20	
27		10.3	122	10480	97	8298	2.50	3.50	
28		10.9			131	11865		3.14	
29		10.6			133	11724		3.38	
30		10.7			128	11369		3.85	
31		9.7			166	13429		3.45	0.817
Total	**3.65**	**9.7**	**Average**	**9696**		**8898**		**6.60**	

February 2017			Influent (58 Degrees F)				Effluent (57 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		8.2	161	10943	138	9380	3.62	4.90	
2		7.5	123	7735	142	8929	3.02	3.70	
3		8.2	150	10258	143	9779	4	4.30	
4		7.7			151	9684		5.70	
5		7.5			146	9132		6.17	
6	T	7.6			168	10649		5.60	
7		7.3			170	10279		4.45	
8		7.0	236	13679	240	13911		4.69	1.19
9		6.8	268	15154	211	11931	4.56	5.80	
10		6.7	238	13200	175	9706	4.68	4.60	
11		6.6			164	9027		5.97	
12		6.2			160	8300		4.65	
13	0.11	6.5			142	7686		4.75	
14	0.02	7.2			175	10567		4.25	1.21
15		6.6			136	7452		4.50	
16		6.3	166	8777	154	8143	2.55	2.90	
17		6.3	116	6105	138	7262	2.50	2.00	
18		6.1						2.58	
19		5.9			79	3887		0.95	
20	0.13	7.1			165	9743		1.73	
21		6.6						1.70	0.927
22		6.5	204	11059	142	7698	<2.00	2.00	
23		6.3	188	9862	144	7554	<2.00	1.79	
24		6.2	227	11738	177	9152	<2.00	1.71	
25		6.3			192	10088		1.38	
26	0.08	5.4			164	7345		0.92	
27		6.7			172	9611		1.70	
28		5.3			101	4490		2.34	1.36
Total	**0.34**	**6.7**	**Average**	**10774**		**8899**		**3.49**	

March 2017			Influent (59 Degrees F)				Effluent (44 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.01	6.0	150	7456	144	7158	2.16	2.10	
2		6.2	207	10652	164	8439	2.45	1.80	
3		6.1					2.66	2.50	
4		5.9			103	5077		3.03	
5		5.8						3.22	
6	0.4	6.1			112	5661		2.65	
7		7.8			362	23398		4.75	5.45
8		6.3	71	3732	73	3875	3.75	3.00	
9	0.67	5.9	206	10188	189	9347	3.99	3.10	
10		6.4	282	14934	235	12445	3.84	3.00	
11		6.1			223	11289		3.03	
12	0.15	5.9			188	9188		4.20	
13		6.7			189	10514		4.05	
14	T	6.2			247	12689		4.65	4.25
15		6.4	256	13622	223	11866	5.46	5.10	
16		5.9	360	17594	233	11387	6.22	5.10	
17		5.8	309	14844	210	10088	5.58	4.00	
18		5.7			178	8462		4.22	
19		5.6			85	3953		2.98	
20		5.5			156	7104		3.00	
21		5.8			284	13667		3.30	1.34
22		4.9	300	12210	340	13838	3.14	3.20	
23		6.1	222	11313	212	10803	3.48	3.60	
24	0.29	6.5	250	13573	199	10804	4.37	3.90	0.569
25	0.11	7.8			193	12475		5.54	
26	0.15	10.5			206	17988		4.39	
27	0.42	9.9			203	16812		4.20	
28	0.01	9.9			176	14532		4.50	1.06
29	0.28	9.8	133	10915	148	12146	3.46	2.90	
30	0.19	10.5	119	10371	182	15862	3.32	3.00	
31		9.4	161	12662	178	13999	3.32	3.00	
Total	**2.68**	**6.9**	**Average**	**11719**		**11202**		**3.58**	

April 2017			Influent (62 Degrees F)				Effluent (63 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		8.6			135	9683		2.82	
2	0.49	11.6			172	16640		2.70	
3	0.11	12.7			149	15831		2.60	
4	0.81	13.2			175	19280		2.50	1.7
5	0.04	18.5	94	14541	169	26033	2.76	3.20	
6		14.0	83	9726	138	16113	2.16	2.00	
7		11.4	71	6768	99	9418	2.09	1.50	
8		10.4			101	8735		1.96	
9		10.2			101	8567		1.50	
10		9.3			127	9872		1.90	
11		8.8			137	10100		1.85	2.12
12		8.4	138	9633	184	12844	3.32	2.90	
13		8.0	177	11765	226	15022	2.90	2.60	
14	0.02	8.1	162	10890	195	13108	3.10	2.70	
15		7.4			158	9738		2.77	
16	1.03	10.1			174	14657		2.50	
17	0.04	10.8			171	15360		2.55	
18		9.1			149	11296		2.55	0.924
19		8.5	136	9607	142	10031	2.38	2.60	
20	0.32	9.7	152	12271	180	14532	2.50	2.15	
21	2.05	19.4	165	26710	197	31890	2.60	2.30	
22	0.1	22.4			88	16418		3.47	
23		20.8			71	12392		2.24	
24		16.9			67	9455		2.30	
25	0.56	16.4			81	11037		1.86	0.864
26	0.58	20.7	105	18109	122	21041	2.48	3.20	
27	0.01	21.5	87	15629	89	16005	6.80	2.60	
28	0.24	21.3	<66.7	11820	83	14677	<2.00	1.60	
29	4.52	21.3			113	20055		3.02	
30	0.32	21.3			11	14477		3.33	
Total	**11.24**	**13.7**	**Average**	**13122**		**14477**		**2.46**	

May 2017			Influent (64 Degrees F)				Effluent (65 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.01	21.9			43			2.45	
2	0.07	22.5			45	8429		4.10	0.555
3	1.77	22.0	71	13033	105	19274	<2.00	2.20	
4	T	22.4	<33.3	6194	25	4664	<2.00	2.60	
5		22.0	60	11082	47	8587	<2.00	2.70	
6		20.5			59	10021		3.41	
7		18.5			9	1338		2.84	
8		19.7			48	7849		2.25	
9		20.9			83	14418		3.74	1
10	0.65	18.0	90	13563	100	15020	2.72	6.00	
11	0.96	17.8	159	23591	238	35312	2.75	5.43	
12	0.11	21.9	114	20841	226	41316	2.04	3.20	
13		16.7			65	8957		3.33	
14		17.8			193	28635		3.48	
15		23.3						5.19	
16		21.6			104	18709		7.82	0.621
17	0.02	21.9	141	25800	146	26715	3.88	9.71	
18	0.41	15.4			150	19228		12.70	
19	1.97	20.4	146	24864	208	35423	3.70	9.00	
20	0.62	22.3			100	18582		5.42	
21		21.7			22	3915		3.75	
22		21.7			49	8884		3.45	
23	T	21.1			77	13456		2.60	0.681
24		21.8			163	29608		2.40	
25		20.4	91	15503	106	17999	<2.00	2.60	
26		20.2	111	18654	158	26552	<2.00	1.80	
27	0.73	18.1			143	21574		2.08	
28		20.9			199	34687		1.40	
29		19.0			12	1900		0.43	
30	0.03	20.9			7	1299		1.95	0.932
31	0.65	18.8	89	13916	102	15984	<2.00	2.50	
Total	**8.00**	**20.4**	**Average**	**17004**		**17184**		**3.95**	

June 2017			Influent (70 Degrees F)				Effluent (72 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.04	19.7	131	21501	151	24784	2.36	2.00	
2		19.4	102	16529	138	22362	<2.00	2.00	
3	T	14.8			108	13367		3.67	
4	0.97	14.7			148	18132		4.61	
5		19.3			200	32259		3.00	
6		23.0			102	19600		2.86	0.536
7		2.5	98	2039	147	3053	2.46	5.70	
8		10.4					2.25	3.20	
9		9.7	137	11117	175	14201	3.76	7.25	
10		9.2			151	11586		1.93	
11		8.8			164	12091		1.57	
12		9.0			160	11970		1.04	
13		8.0			211	14078		7.22	1
14		8.0			228	15193		0.93	
15	0.11	7.7			253			1.07	
16	0.09	8.5	195	13742	243	17125	3.36	1.00	
17	0.9	9.9			188	15554		1.38	
18	0.36	11.1			185	17080		1.40	
19		9.5			152	11980		2.07	
20		8.0			186	12410		5.72	0.069
21		7.8	136	8881	195	12734	2.15	1.20	
22		7.3	138	8425	238	14530	<2.00	0.92	
23	0.54	10.5	155	13573	268	23469	<2.00	0.64	
24		8.8			233	17139		1.07	
25		8.0			156	10356		2.12	
26	0.49	8.2			201	13780		2.70	
27	0.12	9.9			253	20847		1.95	1.15
28		8.6	139	9923	170	12136	<2.00	2.20	
29		8.2			216	14790		1.85	
30	0.56	11.3	161	15173	265	24974	2.10	2.30	
Total	**4.18**	**10.7**	**Average**	**12090**		**16128**		**2.55**	

July 2017			Influent (74 Degrees F)				Effluent (77 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		9.0			188	14111		1.95	
2		8.2			136	9346		1.63	
3		8.0			179	11943		1.65	
4	1.46	12.7			162	17091		1.38	
5	0.04	15.0	107	13368	297	37105	3.20	2.90	1.37
6		11.8	<80.0	7843	104	10209	<2.00	2.10	
7		10.4	126	10897	158	13665		2.10	
8		9.2			153	11701		1.33	
9		8.7			155	11259		0.82	
10		8.5			139	9888		1.45	
11		8.3			160	11076		1.80	1.01
12		7.9	145	9590	194	12830	<2.00	0.70	
13		7.9	179	11794	203	13375			
14	0.56	9.8					1.63	1.30	
15		6.3			196	10233		2.06	
16		7.3			155	9411		0.56	
17		7.4			173	10720		2.00	
18		7.0			330	19210		4.65	1.21
19		7.1	200	11910	242	14411	2.64	6.30	
20		7.2			170	10180		5.70	
21			200		219		2.65	3.60	
22					245			3.64	
23	0.01	6.6			211	11649		3.29	
24		6.7			251	14088		3.40	
25		6.7			320	17748		13.80	1.32
26	T	6.5	214	11512	186	10005	3.12	4.80	
27	0.8	7.6	230	14559	215	13610	1.90	1.30	
28	0.24	8.9	175	13048	226	16850	1.62	1.60	
29		7.1			133	7920		1.11	
30		6.8			133	7509		0.71	
31	T	6.8			157	8904		1.60	
Total	**3.11**	**8.3**	**Average**	**11613**		**13073**		**2.71**	

August 2017			Influent (74 Degrees F)				Effluent (76 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.08	7.1			193	11460		1.55	1.34
2		6.8	150	8532	173	9840	2.23	1.80	
3	0.06	6.7			195	10912		1.40	
4	0.11	6.6	182	10064	180	9953	2.30	1.30	
5	0.26	6.8			226	12742		1.38	
6	1.02	13.4			230	25627		1.67	
7		8.8			93	6773		1.40	
8		8.1			140	9423		2.00	1.01
9		7.4	164	10108	157	9676	2.18	1.10	
10	0.06	6.9	208	11970	190	10934	2.42	0.80	
11	0.66	15.3	171	21749	214	27218	2.04	0.79	
12	T	10.2			75	6327		2.25	
13	T	9.4			84	6557		2.50	
14		8.6			106	7559		0.93	
15	0.32	8.2			142	9747		1.85	2.25
16	1.46	11.0	160	14652	177	16208	1.95	1.90	
17	T	17.3	168	24267	220	31779	2.44	2.90	
18		11.0	72	6639	81	7474	1.96	2.80	
19	0.02	9.5						0.87	
20		8.7			90	6538		2.90	
21		8.0			97	6485		1.75	
22	1.41	13.7			174	19808		1.50	1.19
23		11.6	94	9148	186	18025	1.84	2.20	
24		9.5	115	9150	147	11696	<2.03	2.30	
25		8.8	126	9226	141	10325	1.56	1.80	
26		8.4			130	9053		2.80	
27		8.2							
28		8.1			195	13092		2.20	
29		7.8			214	13921			1.29
30		7.7			218	14018		3.95	
31		7.9	246	16126	275	18027		3.40	
Total	**5.46**	**9.3**	**Average**	**12636**		**12800**		**1.93**	

September 2017			Influent (73 Degrees F)				Effluent (74 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		7.1	204	12046	219	12931	2.66	5.00	
2		6.4			242	12998		5.98	
3		6.8			154	8785		5.40	
4		6.8			173	9811		6.02	
5		6.9			171	9869		4.10	
6		7.0	212	12412	184	10773	1.86	1.80	0.94
7		7.0			192	11257		1.20	
8		6.5					1.70	1.20	
9		6.3			230	12065		<0.11	
10		6.2			260	13444		3.30	
11		6.6						1.10	
12		6.8			208	11727			0.793
13		6.4					1.64	0.50	
14		6.5	262	14094	257	13825	2.63	1.80	
15		6.1	203	10395	205	10498	2.88	2.00	
16	0.05	6.3			195	10197		1.33	
17	1.03	10.2			174	14845		1.40	
18	T	9.3			102	7894		2.80	
19		6.8			153	8664		1.90	0.561
20		7.0	217	12614	196	11393	1.74	1.90	
21		6.7	247	13884	195	10961	1.63	1.60	
22		6.5	248	13485	205	11147	1.68	1.40	
23		6.4			184	9775		1.15	
24		6.3			236	12479		1.36	
25		6.1			208	10564		2.05	
26		5.9			270	13241		1.90	2
27	0.41	8.8	200	14712	270	19861	1.90	1.30	
28		7.8	183	11935	234	15261	1.99	2.60	
29		6.9	180	10358	178	10243	1.72	1.70	
30		6.6			196	10854		1.25	
Total	**1.49**	**6.9**	**Average**	**12594**		**11680**		**2.32**	

October 2017			Influent (69 Degrees F)				Effluent (68 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		6.5			204	11025		1.68	
2		6.5			248	13465		1.85	
3	0.32	6.7			306	17073		2.70	0.899
4	0.14	7.6			233	14730		2.10	
5	T	7.4	266	16439	274	16933	2.64	2.90	
6	T	6.5	223	12163	235	12818	2.04	2.50	
7	0.2	7.0			209	12219		2.50	
8		6.7			166	9234		2.70	
9	0.81	7.7			219	14119		2.20	
10	0.17	10.3			320	27382		2.10	0.542
11		7.8	185	12065	187	12196	1.42	3.10	
12		7.3	252	15279	247	14976	1.30	2.00	
13		6.6	229	12510	256	13985	<1.23	2.10	
14	0.32	6.4			286	15170		1.73	
15	0.84	13.3			270	30016		1.73	
16		8.7			179	12928		2.60	
17		8.1			262	17634		2.25	0.625
18		7.6	380	23959	273	17213	2.69	1.60	
19		7.2	324	19537	493	29727	2.45	2.60	
20	T	7.2	339	20271	370	22125	3.01	2.70	
21	0.66	6.9			350	20083		4.00	
22	0.85	19.7						5.52	
23		12.3			248	25482		3.93	
24		10.1			81	6769		1.60	0.145
25		9.2	145	11113	151	11573	3.27	3.00	
26		8.4	187	13038	206	14363	2.90	2.40	
27		7.9	262	17240	168	11055	2.54	2.00	
28	0.01	8.5			220	15596		1.30	
29		7.5			185	11525		1.24	
30		7.4			176	10877		4.10	
31	T	7.5			188	11775		1.80	0.578
Total	**4.32**	**8.3**	**Average**	**15783**		**15802**		**2.47**	

November 2017			Influent (66 Degrees F)				Effluent (63 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	T	7.5	190	11869	237	14805	1.81	2.40	
2		7.6	269	17028	285	18041	2.4	3.30	
3		7.3	338	20522	293	17790			
4	T	6.6			191	10561		2.26	
5		6.8			201	11433		1.94	
6		6.8						2.25	
7	T	7.0			191	11071		2.07	0.623
8		6.8	228	12911	224	12685	2.16	2.70	
9		6.6	219	12000	225	12329	<1.58	1.40	
10		6.7	179	9942	217	12053	2.06	2.90	
11	T	6.7			221	12294		12.60	
12	0.01	6.4			184	9821		7.38	
13		6.5			215	11583		3.55	
14	0.05	7.0			266	15551		3.25	0.683
15	0.1	7.5	240	14952	268	16696	6.91	4.20	
16		7.1	236	13876	235	13817	4.98	3.50	
17		6.9	210	12015	248	14189	4.58	3.20	
18	0.1	6.7			199	11186		1.31	
19		6.6			304	16784		1.39	
20		6.7			315	17549		1.90	
21		7.0			328	19094		2.00	1.19
22		6.1	384	19664	327	16745	2.48	2.50	
23		6.1			431	22070		3.26	
24		6.3			250	13031		0.90	
25		6.4			326	17346		3.29	
26		6.4			249	13332		1.50	
27		6.5			294	16011		1.60	
28		6.8			384	21649		0.80	0.884
29	0.26	8.6	348	25018	390	28037	2.92	2.20	
30		7.6	326	20663	386	24466	2.82	2.90	
Total	**0.52**	**6.8**	**Average**	**15872**		**15587**		**2.91**	

December 2017			Influent (61 Degrees F)				Effluent (58 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		7.2	230	13734	206	12301	1.73	1.90	
2		7.0			255	14866		1.91	
3		6.9			196	11312		5.28	
4	0.16	7.1			230	13658		2.35	
5		7.4			259	16006		2.70	2.48
6		6.8	224	12703	209	11853	2.22	2.80	
7		6.5	245	13363	218	11891	2.65	2.90	
8		7.0	376	22076	226	13269	2.78	3.90	
9		6.7			296	16416		4.95	
10		6.7						6.22	
11		6.6						4.95	
12		6.7			249	13872		4.00	1.37
13		6.5	259	14062	209	11347	2.62	3.60	
14		6.5	451	24562	229	12471	3.20	6.50	
15		6.4	415	22289	235	12622	2.80	5.40	
16	T	6.3			222	11683		5.90	
17	0.39	8.0			221	14690		8.57	
18		7.1			165	9702		7.40	
19	0.01	6.6			248	13610		5.60	0.812
20	0.08	7.5			248	15471		5.90	
21		6.8	248	14044	207	11722	3.58	5.80	
22	0.67	7.6	239	15209	206	13109	3.85	5.00	
23	0.06	14.2			194	22910		7.96	
24	T	9.6			74	5900		8.35	
25		7.3			132	8003		14.20	
26		7.9			126	8260		5.88	0
27		7.8			203	13222		16.60	
28		7.9	253	16627	158	10384	3.06	5.80	
29		7.4	231	14160	200	12260	2.73	12.00	
30	T	7.3			232	14183		15.50	
31		7.0			166	9746		11.00	
Total	**1.37**	**7.4**	**Average**	**16621**		**12646**		**6.48**	

January 2018			Influent (56 Degrees F)				Effluent (52 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		7.1			204	12029		9.00	
2		7.3						4.50	
3		7.8	266	17215	253	16374	1.79	7.60	2.410
4		7.6	266	16749	214	13475	2.27	7.50	
5		7.5	234	14676	240	15052	2.18	6.17	
6		7.4			193	11959		4.38	
7	0.42	9.0			180	13541		5.38	
8		9.6			269	21447		6.90	
9		8.1			160	10862		5.56	0.623
10		7.9	213	14069	178	11757	1.74	3.17	
11	0.02	7.7	248	15947	269	17297	2.11	3.80	
12		7.6	251	15972	206	13109	2.13	2.40	
13		8.5			272	19259		4.00	
14	0.01	6.7			169	9373		3.49	
15		7.5			253	15783		3.96	
16		7.7			212	13597		4.35	1.66
17		8.0					2.26	4.80	
18		8.2					2.48	4.82	1.13
19		8.7	283	20558	259	18814	2.30	5.62	
20		8.6			227	16206		4.73	
21	0.01	8.6			138	9875		5.06	
22	T	9.6			183	14682		4.50	
23		9.3			165	12853		5.31	3.23
24		8.0	241	15979	225	14918	3.74	6.11	
25		8.3			296	20366		4.40	0.347
26	T	8.0	309	20488	274	18167	2.09	2.60	
27	T	7.7			260	16740		3.06	
28		7.7			352	22546		4.04	
29		7.7			249	15970		2.80	
30		7.2			266	16017		3.45	1.25
31		7.1			291	17110		3.80	
Total	**0.46**	**8.0**	**Average**	**16850**		**15328**		**4.75**	

February 2018			Influent (55 Degrees F)				Effluent (53 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		7.5	268	16652	294	18267	1.88	3.50	0.517
2		7.4	266	16461	247	15285	3.03	5.80	
3		7.4			227	14028		3.64	
4	0.01	7.2			249	15014		5.49	
5		7.4			277	17003		3.40	
6	T	7.7			360	23209		6.80	0.528
7		7.4	330	20339	425	26194	2.20	6.25	
8		7.8	364	23618	398	25824	3.08	6.00	
9		7.5	287	17856	319	19847	1.97	4.70	
10	T	7.3			261	15825		3.02	
11	T	7.3			409	24969		2.89	
12		7.3			486	29589		6.25	
13		7.6			253	15931		5.86	1.07
14		7.3			306	18706		5.80	
15	T	7.6	276	17448	293	18523	3.20	4.75	
16	T	6.9	298	17198	379	21873	2.80	3.25	
17	0.33	8.7			708	51253		3.29	
18		7.9			301	19706		3.98	
19	0.93	13.9			246	28518		3.82	
20	1.19	21.7			133	24070		6.90	0.411
21	T	21.3	<80	14194	74	13074	3.41	4.80	
22	0.15	21.1	<66.7	11720	41	7215	3.50	4.40	
23	1.33	18.5	<66.7	10298	52	8102	2.04	3.12	
24	0.79	21.8			45	8091		3.30	
25		20.5			34	5736		3.60	
26		20.6			35	5939		2.85	
27	0.2	25.6			43	9163		2.80	0.255
28	0.1	19.2	63	9998	51	8078	<1.72	2.70	
Total	**5.03**	**12.1**	**Average**	**15980**		**18180**		**4.39**	

March 2018			Influent (57 Degrees F)				Effluent (56 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	T	18.1	51	7699	46	6944	1.74	2.30	0.447
2		13.0	80	8726	108	11736	1.68	2.90	
3		15.5			116	14966		1.00	
4	0.21	19.4			74	11867		2.29	
5		18.1			112	16879		5.08	
6		20.3			125	21194		4.30	0.512
7		19.3	132	21236	174	27993	3.28	5.90	
8		19.3	176	28315	193	31050	3.78	6.50	
9		19.6	166	27093	155	25298	3.24	5.62	
10		15.0			11	1376		2.86	
11		8.6			143	10257		3.29	
12		10.3			322	27660		4.66	
13		9.5			296	23427		2.20	0.451
14		9.6	197	15690	229	18239	1.91	2.29	
15		9.6	214	17098	297	23729	1.76	2.38	
16	T	9.4	170	13285	252	19693	1.44	1.50	
17		9.2			164	12583		0.95	
18	0.11	8.7			48	3483		0.82	
19	0.18	9.5			268	21167		2.05	
20	0.02	9.5			286	22755		2.25	1.32
21		8.9	182	13494	172	12753	2.32	2.70	
22		10.2	167	14248	164	13992	2.86	3.90	
23		11.3	147	13792	110	10321	3.18	3.12	
24		10.7			30	2642		1.84	
25	0.07	9.4			28	2158		1.89	
26	0.33	8.9			185	13747		2.35	
27	1.34	18.9			143	22541		5.15	0.601
28	0.04	17.2	69	9855	55	7910	4.82	5.00	
29	T	18.3	<66.7	10165	30	4579	2.26	1.70	
30		16.0	<66.7	8909	29	3813	1.96	1.80	
31	T	14.4			59	7052		1.17	
Total	**2.30**	**13.4**	**Average**	**14972**		**14639**		**2.96**	

April 2018			Influent (59 Degrees F)				Effluent (59 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.24	10.6			89	7833		1.50	
2	0.02	10.6			127	11227		4.40	
3	0.03	10.5			105	9195		3.80	0.216
4		9.0	126	9458	156	11709	2.14	2.80	
5		8.8	112	8229	176	12932	2.00	2.12	
6	0.07	10.6	132	11669	181	16001	2.08	1.90	
7	0.01	11.9			139	13795		1.46	
8	T	12.2			67	6787		1.69	
9		11.4			158	15022		6.18	
10		11.4			216	20536		3.80	0.389
11		12.2	142	14448	198	20146	3.80	6.60	
12		8.8	190	13944	326	23926	3.06	4.80	
13	0.05	6.9	138	7941	191	10991	2.58	4.20	
14		6.4			122	6512		2.16	
15	T	6.3			156	8197		1.63	
16		6.2			171	8842		1.55	
17		6.1			206	10480		0.65	0.174
18		6.0	185	9257	223	11159	2.55	4.20	
19		6.0	193	9658	213	10659	1.98	2.00	
20		5.6	168	7846	183	8547	1.72	1.10	
21	0.32	5.8			205	9916		0.70	
22	0.34	10.1			163	13730		0.24	
23	T	7.2			171	10268		2.40	
24		6.5			154	8348		2.05	0.186
25	1.03	9.8	152	12449	181	14824	1.52	1.70	
26	T	12.5	95	9872	142	14804	<1.48	1.40	
27		8.2	76	5197	90	6155	1.76	2.40	
28		7.5			105	6568		0.40	
29		5.8			120	5805		0.81	
30		6.8			161	9131		2.90	
Total	**2.11**	**8.6**	**Average**	**9998**		**11468**		**2.45**	

May 2018			Influent (66 Degrees F)				Effluent (68 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		9.3			137	10649		1.90	
2	0.06	8.6	173	12423	170	12207	1.68	1.50	0.633
3	0.46	12.7	208	21944	207	21839	1.82	1.30	
4		11.9	131	13045	159	15833	2.36	2.60	
5		10.2			28	2344		0.24	
6	0.06	9.6			76	6045		0.20	
7		9.6			171	13620		1.30	
8		9.4			160	12490		0.70	0.635
9		8.6	142	10126	213	15188	<1.45	1.30	
10	0.08	9.1	187	14114	228	17209	1.64	1.50	
11		8.4	175	12260	221	15482	1.72	1.60	
12		8.2			140	9563		0.80	
13		7.5			210	13136		0.65	
14	0.2	7.9			207	13621		4.85	
15	0.71	13.3			279	30947		2.00	3.24
16	T	9.7	90	7265	120	9708	2.96	3.20	
17	0.17	9.0	141	10583	171	12835	1.80	1.70	
18		8.6	134	9611	168	12050	1.47	1.40	
19	T	7.2			153	9187		1.20	
20	1.22	16.8			193	27042		1.06	
21		18.2			151	22920		3.20	
22		14.3			74	8766			0.404
23	0.31	13.4			115	12852		2.10	
24	0.21	13.1	76	8336	117	12783	<1.62	1.50	
25	T	11.5	91	8747	140	13427	<1.58	1.90	
26		10.7			42	3703		1.03	
27		9.1			77	5806		0.56	
28		9.3			152	11789		2.22	
29	T	9.0			170	12760		2.80	0.493
30	0.02	8.8	168	12330	198	14532	2.10	3.40	
31	0.03	9.0	161	12085	230	17264	<1.30	1.30	
Total	**3.53**	**10.4**	**Average**	**11759**		**13471**		**1.70**	

June 2018			Influent (71 Degrees F)				Effluent (75 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		5.6	147	6865	204	9528	1.96	3.30	
2	T	5.3			73	3205		0.58	
3		5.0			102	4253		0.75	
4		5.2			231	10018		4.05	
5		5.4			306	13781		4.25	0.923
6		6.8	201	11399	254	14405	1.37	2.60	
7		4.8	213	8527	236	9448	1.80	2.50	
8		4.6	185	7097	242	9284	2.16	2.30	
9		4.5			85	3205		0.37	
10		4.4			138	5064		0.23	
11		4.6			272	10435		2.90	
12	1.23	8.6			371	26610		1.70	0.776
13		6.0	110	5504	220	11009	1.96	2.00	
14		5.3	194	8575	153	6763	1.60	1.60	
15		5.0	216	9007	229	9549	1.83	2.00	
16		4.3			36	1291		0.67	
17		4.2			70	2452		1.20	
18		4.4			242	8880		2.25	
19		4.0			219	7306		2.15	2.52
20	1.27	6.5	219	11854	220	11908	2.58	2.00	
21		7.1	154	9119	204	12080	2.89	2.20	
22		5.4	128	5765	134	6035	1.76	1.40	
23		4.9			128	5231		1.02	
24	0.2	7.2			178	10689		0.71	
25	T	5.9			178	8759		2.35	
26	0.29	5.0			163	6797		1.40	1
27		5.8	149	7145	175	8392	1.84	1.60	
28		4.9	230	9399	214	8745	1.90	1.10	
29		4.6			216	8287		1.00	
30		4.5			206	7731		0.38	
Total	**2.99**	**5.3**	**Average**	**8355**		**8705**		**1.75**	

July 2018			Influent (74 Degrees F)				Effluent (78 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.52	10.5			255	22330		1.04	
2		8.6			235	16855		2.10	
3		8.0			204	13611		1.95	1.400
4		7.1			146	8645		1.25	
5		7.3	142	8645	177	10776	1.56	1.00	
6		7.5	199	12447	232	14512	<1.33	1.60	
7		7.5			252	15763		1.08	
8		6.9			207	11912			
9		7.2			237	14231		3.40	
10	0.02	7.0			215	12552		1.75	1.890
11		6.8	192	10889	230	13044	3.14	1.10	
12	0.23	6.8	198	11229	199	11286	3.36	0.80	
13		7.0	372	21717	392	22885	3.34	0.80	
14	T	6.5			248	13444		0.80	
15	0.21	2.6			151	3274		0.77	
16	T	0.4			216	721			
17	0.04	0.7			258	1506			
18		4.5	236	8857	297	11146			
19	T	9.3	205	15900	226	17529			12.7
20	0.04	8.1	235	15875	280	18915		6.00	8.44
21	T	8.5			175	12406	5.38	3.50	
22		8.9			228	16924		2.61	
23		6.8			272	15426			
24		7.6			282	17874		5.90	1.52
25		7.1	199	11784	253	14981	2.15	3.20	
26	0.01	7.1			238	14093		2.40	
27		7.3	285	17351	378	23013	2.12	2.50	
28	0.05	8.3			98	6784		2.14	
29	0.43	10.7			413	36855		4.30	
30	0.51	9.0			281	21092		6.45	
31		9.2			296	22711		4.05	1.6
Total	**2.06**	**7.1**	**Average**	**13470**		**14745**		**2.50**	

August 2018			Influent (75 Degrees F)				Effluent (77 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		7.7	149	9568	183	11752			
2		7.7	237	15220	210	13486	2.36	2.50	1.58
3		7.4	253	15614	212	13084	2.14	2.00	
4		7.1			197	11665		1.16	
5		6.8			170	9641		1.16	
6		7.1			253	14981		3.40	
7	0.36	9.1			246	18670		2.95	2.87
8		16.7	174	24234	205	28552	5.24	5.20	
9	0.13	8.3	202	13983	198	13706	3.30	2.90	
10		8.2	239	16345	238	16276	2.50	1.40	
11	T	7.1			91	5406		0.47	
12	0.09	8.3			173	11975		0.90	
13	0.35	9.7			202	16341		3.10	
14	0.47	11.8			161	15844		2.60	1.01
15	0.57	11.0	114	10458	167	15321	2.60	2.90	
16	T	12.9	71	7671	90	9683	1.94	3.40	
17	0.56	14.4	212	25460	196	23539	1.76	2.00	
18		12.4			18	1861		1.43	
19	2.26	16.2			128	17294		1.19	
20	0.01				201			2.65	
21		15.7			87	11392		2.60	0.433
22	T	14.9	67	8363	112	13918	2.17	3.40	
23	0.6	19.7	154	25302	204	33517	1.88	1.67	1
24	T	17.9	120	17914	178	26573	2.20	4.40	
25	T	16.2			126	17024		5.33	
26		15.1			369	46470		5.05	
27		14.1			335	39394			
28		13.9			229	26547		6.64	0.852
29	T	13.1			234	25565		6.08	
30	1.22	17.2			318	45616	3.70	6.50	
31		14.8	164	20243	207	25550	3.40	6.00	
Total	**6.62**	**12.1**	**Average**	**16183**		**19355**		**3.14**	

September 2018			Influent (73 Degrees F)				Effluent (74 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		12.9			25	2636		1.65	
2		10.8			112	10088		0.30	
3		10.3			100	8590		0.30	
4		10.3			164	14088		1.35	
5	0.07	11.4	178	16924	172	16353	2.24	0.80	0.196
6	1.2	18.2	164	24893	776	117787	2.67	1.60	
7	0.46	19.2	<66.7	10665	121	19375	1.72	0.90	
8	0.33	21.9			91	16621		<0.12	
9		18.9			40	6305		0.11	
10		17.3			89	12841		1.35	
11		18.0			108	16213		1.00	0.106
12		16.8	166	23259	238	33347	<1.42	1.70	
13		14.8	143	17651	170	20983	3.53	3.80	
14		14.6	186	22648	233	28371	1.59	3.10	
15		13.7			196	22395		1.60	
16		13.2			140	15412		1.87	
17		13.5			203	22856		3.55	
18		12.7			237	25103		3.25	1.54
19		11.0	179	16421	236	21651	2.64	3.60	
20		8.9	216	16033	272	20189	2.80	3.10	
21	0.15	10.5	146	12785	250	21893	2.43	2.10	
22	T	9.0			285	21392		1.51	
23		8.7			211	15310		0.90	
24		9.0			202	15162		2.10	
25		8.7			287	20824		0.75	0.441
26		9.3	194	15047	263	20399	1.81	1.10	
27		9.3	177	13728	292	22648	1.54	0.80	
28		9.2	220	16880	286	21944	1.52	0.90	
29		9.0			125	9383		0.28	
30		9.2			168	12890		0.22	
Total	**2.21**	**12.7**	**Average**	**17244**		**21102**		**1.57**	

October 2018			Influent (71 Degrees F)				Effluent (70 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		9.3			247	19158		1.25	
2		9.1			249	18898		0.85	1.43
3		9.2	209	16036	237	18185	3.14	2.00	
4	0.27	10.5	191	16726	249	21805	2.82	1.20	
5		9.0	147	11034	203	15237	3.04	1.80	
6	0.68	11.6			120	11609		1.25	
7	0.14	16.0			292	38964		2.42	
8		13.5			194	21842		39.50	
9	0.36	13.5			144	16213		2.00	0.277
10	0.02	12.8	134	14305	214	22845	3.46	1.00	
11		12.6	97	10225	141	14817	2.24	0.30	
12	0.18	10.9	158	14363	201	18272	1.70	0.30	
13	0.13	10.8			188	16934		<0.14	
14	0.07	11.4			204	19396		0.10	
15	0.01	11.4			241	22913		1.00	
16		10.2			284	24159		0.55	0.806
17		10.0	211	17597	311	25937	1.50	0.50	
18	T	10.0	260	21684	296	24686	1.96	0.10	
19	0.3	11.7	211	20589	335	32689	1.86	0.70	
20		10.4			376	32613		0.60	
21		9.9			196	16183			
22		9.7			255	20629		0.80	
23		9.1			201	15255		0.30	0.274
24		9.2	224	17187	248	19029	2.18	1.10	
25	0.27	10.5	295	25833	427	37392	1.46	0.80	
26		10.5	311	27234	580	50791	1.88	1.10	
27		9.8						0.22	
28		9.3						<0.13	
29		9.6			241	19295		1.55	
30	T	9.6			236	18895		1.10	2.01
31	0.14	9.7	226	18283	242	19577	4.00	1.50	
Total	**2.57**	**10.7**	**Average**	**17777**		**22559**		**2.35**	

November 2018			Influent (65 Degrees F)				Effluent (63 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.33	13.0	224	24286	213	23093	3.8	1.00	1.65
2	0.01	11.6	166	16060	186	17994		2.90	
3	0.27	10.8			92	8287		0.56	
4	0.04	14.4			134	16093		0.33	
5	0.15	13.3			146	16195		2.15	
6		12.3			154	15798		1.15	0.258
7		11.0	133	12201	201	18440	1.87	0.90	
8	0.12	11.7	130	12685	188	18345	2.02	0.90	
9		11.7	150	14637	215	20979	<1.62	0.80	
10		10.2			104	8847		0.36	
11		10.4			202	17521		0.56	
12	0.14	12.0			219	21918		0.75	
13		11.7			168	16393		1.00	0.615
14		10.3	<80.0	6864	161	13830	1.86	1.00	
15		11.5	128	12276	205	19662	4.12	1.00	
16		11.0	150	13761	234	21467	2.46	0.80	
17		10.6			54	4774		<0.13	
18	0.07	10.0			246	20516		0.66	
19		10.4			304	26368		1.15	
20		9.5			264	20917		0.70	6.74
21		10.2	172	14632	337	28668	2.72	0.70	
22		9.1			268	20340		1.24	
23	0.15	10.2			244	20757		1.01	
24		9.4			264	20697		0.22	
25	0.01	9.8			257	21005		0.33	
26		9.5			308	24403		1.30	
27		9.6			258	20657		0.95	4.45
28		9.4	157	12308	234	18345	5.35	0.90	
29		9.2	188	14425	305	23402	3.84	0.60	
30	0.73	9.5	171	13548	259	20521	5.25	0.90	
Total	**2.02**	**10.8**	**Average**	**13974**		**18874**		**0.92**	

December 2018			Influent (62 Degrees F)				Effluent (59 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.34	14.1			191	22460		1.10	
2	T	14.1			138	16228		0.77	
3		13.2			137	15082		2.20	
4		11.5			190	18223		0.85	0.464
5		11.4	127	12075	200	19015	<1.45	1.20	
6		11.7	142	13856	257	25078	3.55	1.30	
7		10.6	197	17416	392	34654	3.26	1.20	
8		10.3			222	19070		<0.12	
9		10.4			532	46144		<0.13	
10		9.9			258	21302		1.55	
11		10.4			236	20470		0.46	1.52
12	T	9.4	220	17247	188	14738	2.14	0.70	
13	0.33	11.3	245	23089	292	27519	3.52	1.13	
14	T	11.0	249	22843	222	20366	<6.00	3.40	
15		10.8			157	14141		7.50	
16		9.6			233	18655		6.93	
17		10.3			302	25942		3.50	
18		9.7			274	22166		4.00	8.07
19	T	10.1	165	13899	194	16341	<11.30	5.20	
20	0.01	10.1			218	18363		5.60	
21		10.0	215	17931	280	23352	<7.47	6.00	
22		9.5			194	15371		6.19	
23		9.7			218	17636		7.14	
24		8.7			180	13060		5.40	9.12
25		7.7			180	11559		5.73	
26	0.38	8.5	189	13398	184	13044	5.02	2.60	
27	0.4	14.5			300	36279		6.02	11.1
28		11.0	128	11743	84	7706	5.57	3.75	
29		10.7			88	7853		1.90	
30	T	11.1			78	7221		1.80	
31	1.23	12.5			256	26688		6.00	
Total	**2.69**	**10.8**	**Average**	**16350**		**19862**		**3.49**	

APPENDIX H

Appendix H
Turkey Creek Basin
Wastewater Flows/Loads for 2017 & 2018

January 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.80			4.80			161	6445				
2	0.02	5.11			5.11			153	6520				
3		5.29			5.29			174	7677				
4		5.39			5.39	201	9035	144	6473				
5	0.02	5.25			5.25	249	10902	197	8626				
6		5.40			5.40	208	9367	140	6305				
7		5.32			5.32								
8		5.35			5.35			174	7764				
9		5.81			5.81			169	8189				
10		5.43			5.43			159	7201	32.0	1449	1.8	82
11		5.67			5.67	192	9079	138	6526				
12		5.55			5.55	227	10507	115	5323				
13	0.64	7.77			7.77	270	17496	143	9267				
14	0.79	8.33			8.33			115	7989				
15	0.74	18.72	3.6		22.32			151	28108				
16	0.26	20.12	6.5		26.62			37	8103				
17		14.32	2.3		16.62			39	5337				
18		13.56			13.56	54	6084	37	4207				
19		10.07			10.07	101	8482	71	5996				
20		10.25			10.25	108	9232	77	6582				
21	0.31	10.96			10.96			107	9780				
22	0.87	16.68	2.9		19.58			140	22862				
23		18.03			18.03			109	16390				
24		14.04			14.04			59	6909				
25		11.92			11.92	93	9206	71	7058				
26		10.52			10.52	74	6475	60	5264				
27		10.30			10.30	122	10480	97	8298				
28		10.86			10.86			131	11865				
29		10.57			10.57			133	11724				
30		10.65			10.65			128	11369				
31		9.70			9.70			166	13429				
Total	**3.65**	**9.7**	**Average**		**10.2**		**9696**		**9253**				

February 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		8.2			8.2	161	10943	138	9380				
2		7.5			7.5	123	7735	142	8929				
3		8.2			8.2	150	10258	143	9779				
4		7.7			7.7			151	9684				
5		7.5			7.5			146	9132				
6	T	7.6			7.6			168	10649				
7		7.3			7.3			170	10279				
8		7.0			7.0	236	13679	240	13911	36.1	2092	2.5	145
9		6.8			6.8	268	15154	211	11931				
10		6.7			6.7	238	13200	175	9706				
11		6.6			6.6			164	9027				
12		6.2			6.2			160	8300				
13	0.11	6.5			6.5			142	7686				
14	0.02	7.2			7.2			175	10567				
15		6.6			6.6			136	7452				
16		6.3			6.3	166	8777	154	8143				
17		6.3			6.3	116	6105	138	7262				
18		6.1			6.1								
19		5.9			5.9			79	3887				
20	0.13	7.1			7.1			165	9743				
21		6.6			6.6								
22		6.5			6.5	204	11059	142	7698				
23		6.3			6.3	188	9862	144	7554				
24		6.2			6.2	227	11738	177	9152				
25		6.3			6.3			192	10088				
26	0.08	5.4			5.4			164	7345				
27		6.7			6.7			172	9611				
28		5.3			5.3			101	4490				
Total	**0.34**	**6.7**	**Average**		**6.7**		**10774**		**8899**				

March 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.01	6.0			6.0	150	7456	144	7158				
2		6.2			6.2	207	10652	164	8439				
3		6.1			6.1								
4		5.9			5.9			103	5077				
5		5.8			5.8								
6	0.40	6.1			6.1			112	5661				
7		7.8			7.8			362	23398	70.6	4563	3.2	207
8		6.3			6.3	71	3732	73	3875				
9	0.67	5.9			5.9	206	10188	189	9347				
10		6.4			6.4	282	14934	235	12445				
11		6.1			6.1			223	11289				
12	0.15	5.9			5.9			188	9188				
13		6.7			6.7			189	10514				
14	T	6.2			6.2			247	12689				
15		6.4			6.4	256	13622	223	11866				
16		5.9			5.9	360	17594	233	11387				
17		5.8			5.8	309	14844	210	10088				
18		5.7			5.7			178	8462				
19		5.6			5.6			85	3953				
20		5.5			5.5			156	7104				
21		5.8			5.8			284	13667				
22		4.9			4.9	300	12210	340	13838				
23		6.1			6.1	222	11313	212	10803				
24	0.29	6.5			6.5	250	13573	199	10804				
25	0.11	7.8			7.8			193	12475				
26	0.15	10.5			10.5			206	17988				
27	0.42	9.9			9.9			203	16812				
28	0.01	9.9			9.9			176	14532				
29	0.28	9.8			9.8	133	10915	148	12146				
30	0.19	10.5			10.5	119	10371	182	15862				
31		9.4			9.4	161	12662	178	13999				
Total	**2.68**	**6.9**	**Average**		**6.9**		**11719**		**11202**				

April 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		8.6			8.6			135	9683				
2	0.49	11.6			11.6			172	16640				
3	0.11	12.7			12.7			149	15831				
4	0.81	13.2	0.8		14.0			175	20448	45.3	5293.006	0.7	81.79038
5	0.04	18.5	1.0		19.5	94	15329	169	27442				
6		14.0			14.0	83	9726	138	16113				
7		11.4			11.4	71	6768	99	9418				
8		10.4			10.4			101	8735				
9		10.2			10.2			101	8567				
10		9.3			9.3			127	9872				
11		8.8			8.8			137	10100				
12		8.4			8.4	138	9633	184	12844				
13		8.0			8.0	177	11765	226	15022				
14	0.02	8.1			8.1	162	10890	195	13108				
15		7.4			7.4			158	9738				
16	1.03	10.1			10.1			174	14657				
17	0.04	10.8			10.8			171	15360				
18		9.1			9.1			149	11296				
19		8.5			8.5	136	9607	142	10031				
20	0.32	9.7			9.7	152	12271	180	14532				
21	2.05	19.4	18.4		37.8	165	52030	197	62121				
22	0.10	22.4	17.1		39.5			88	28968				
23		20.8	3.4		24.2			71	14402				
24		16.9	1.3		18.2			67	10153				
25	0.56	16.4			16.4			81	11037				
26	0.58	20.7	2.7		23.4	105	20474	122	23789				
27	0.01	21.5	1.8		23.3	87	16938	89	17346				
28	0.24	21.3	0.6		21.9	<66.7	12153	83	15091				
29	4.52	21.3	32.1	28.9	53.4			113	50306				
30	0.32	21.3	44.7	48.8	66.0			11	5888				
Total	**11.24**	**13.7**	**Average**		**17.8**		**15632**		**16951**		**5,293.01**		**81.79**

May 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.01	21.9	16.4	21.9	38.3			43	13558				
2	0.07	22.5	4.8	5.8	27.2			45	10223	8.5	1931.0436	0.4	90.87264
3	1.77	22.0	36.8	30.8	58.8	71	34830	105	51509				
4	T	22.4	17.7	21.1	40.0	<33.3	11081	25	8344				
5		22.0	3.8	6.0	25.8	60	12996	47	10070				
6		20.5	1.5	1.6	22.0			59	10753				
7		18.5	0.1	0.2	18.6			9	1346				
8		19.7			19.7			48	7849				
9		20.9	0.3		21.2			83	14625				
10	0.65	18.0			18.0	90	13563	100	15020				
11	0.96	17.8	6.0		23.8	159	31547	238	47221				
12	0.11	21.9	3.1		25.0	114	23788	226	47159				
13		16.7			16.7			65	8957				
14		17.8			17.8			193	28635				
15		23.3			23.3								
16		21.6			21.6			104	18709				
17	0.02	21.9			21.9	141	25800	146	26715				
18	0.41	15.4			15.4			150	19228				
19	1.97	20.4	7.3		27.7	146	33753	208	48086				
20	0.62	22.3	33.2	2.0	55.5			100	46245				
21		21.7	10.1	8.3	31.8			22	5730				
22		21.7	1.3	2.8	22.9			49	9413				
23	T	21.1		0.3	21.1			77	13456				
24		21.8			21.8			163	29608				
25		20.4			20.4	91	15503	106	17999				
26		20.2			20.2	111	18654	158	26552				
27	0.73	18.1	0.3		18.3			143	21873				
28		20.9	3.5		24.4			199	40413				
29		19.0			19.0			12	1900				
30	0.03	20.9			20.9			7	1299				
31	0.65	18.8			18.8	89	13916	102	15984				
Total	**8.00**	**20.4**	**Average**		**25.1**		**21403**		**20616**		**1,931.04**		**90.87**

June 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.04	19.7			19.7	131	21501	151	24784				
2		19.4			19.4	102	16529	138	22362				
3	T	14.8			14.8			108	13367				
4	0.97	14.7			14.7			148	18132				
5		19.3			19.3			200	32259				
6		23.0			23.0			102	19600	18.6	3574.057	1.1	211.36896
7		2.5			2.5	98	2039	147	3053				
8		10.4			10.4								
9		9.7			9.7	137	11117	175	14201				
10		9.2			9.2			151	11586				
11		8.8			8.8			164	12091				
12		9.0			9.0			160	11970				
13		8.0			8.0			211	14078				
14		8.0			8.0			228	15193				
15	0.11	7.7			7.7			253	16142				
16	0.09	8.5			8.5	195	13742	243	17125				
17	0.90	9.9			9.9			188	15554				
18	0.36	11.1			11.1			185	17080				
19		9.5			9.5			152	11980				
20		8.0			8.0			186	12410				
21		7.8			7.8	136	8881	195	12734				
22		7.3			7.3	138	8425	238	14530				
23	0.54	10.5			10.5	155	13573	268	23469				
24		8.8			8.8			233	17139				
25		8.0			8.0			156	10356				
26	0.49	8.2			8.2			201	13780				
27	0.12	9.9			9.9			253	20847				
28		8.6			8.6	139	9923	170	12136				
29		8.2			8.2			216	14790				
30	0.56	11.3	0.2		11.5	161	15374	265	25306				
Total	**4.18**	**10.7**	**Average**		**10.7**		**12111**		**16140**		**3,574.06**		**211.37**

July 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		9.0			9.0			188	14111				
2		8.2			8.2			136	9346				
3		8.0			8.0			179	11943				
4	1.46	12.7	1.9		14.6			162	19658				
5	0.04	15.0			15.0	107	13368	297	37105	25.5	3185.7966	2.7	337.31964
6		11.8			11.8	<80.0	7843	104	10209				
7		10.4			10.4	126	10897	158	13665				
8		9.2			9.2			153	11701				
9		8.7			8.7			155	11259				
10		8.5			8.5			139	9888				
11		8.3			8.3			160	11076				
12		7.9			7.9	145	9590	194	12830				
13		7.9			7.9	179	11794	203	13375				
14	0.56	9.8			9.8								
15		6.3			6.3			196	10233				
16		7.3			7.3			155	9411				
17		7.4			7.4			173	10720				
18		7.0			7.0			330	19210				
19		7.1			7.1	200	11910	242	14411				
20		7.2			7.2			170	10180				
21						200		219					
22								245					
23	0.01	6.6			6.6			211	11649				
24		6.7			6.7			251	14088				
25		6.7			6.7			320	17748				
26	T	6.5			6.5	214	11512	186	10005				
27	0.80	7.6			7.6	230	14559	215	13610				
28	0.24	8.9			8.9	175	13048	226	16850				
29		7.1			7.1			133	7920				
30		6.8			6.8			133	7509				
31	T	6.8			6.8			157	8904				
Total	**3.11**	**8.3**	**Average**		**8.4**		**11613**		**13165**		**3,185.80**		**337.32**

August 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.08	7.1			7.1			193	11460				
2		6.8			6.8	150	8532	173	9840				
3	0.06	6.7			6.7			195	10912				
4	0.11	6.6			6.6	182	10064	180	9953				
5	0.26	6.8			6.8			226	12742				
6	1.02	13.4	2.6		16.0			230	30614				
7		8.8			8.8			93	6773				
8		8.1			8.1			140	9423	33.6	2261.4077	2.4	161.52912
9		7.4			7.4	164	10108	157	9676				
10	0.06	6.9			6.9	208	11970	190	10934				
11	0.66	15.3	1.1		16.4	171	23317	214	29181				
12	T	10.2			10.2			75	6327				
13	T	9.4			9.4			84	6557				
14		8.6			8.6			106	7559				
15	0.32	8.2			8.2			142	9747				
16	1.46	11.0	0.1		11.0	160	14732	177	16297				
17	T	17.3	1.7		19.0	168	26649	220	34898				
18		11.0			11.0	72	6639	81	7474				
19	0.02	9.5			9.5								
20		8.7			8.7			90	6538				
21		8.0			8.0			97	6485				
22	1.41	13.7			13.7			174	19808				
23		11.6			11.6	94	9148	186	18025				
24		9.5			9.5	115	9150	147	11696				
25		8.8			8.8	126	9226	141	10325				
26		8.4			8.4			130	9053				
27		8.2			8.2								
28		8.1			8.1			195	13092				
29		7.8			7.8			214	13921				
30		7.7			7.7			218	14018				
31		7.9			7.9	246	16126	275	18027				
Total	**5.46**	**9.3**	**Average**		**9.4**		**12972**		**13150**				

September 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		7.1			7.1	204	12046	219	12931				
2		6.4			6.4			242	12998				
3		6.8			6.8			154	8785				
4		6.8			6.8			173	9811				
5		6.9			6.9			171	9869				
6		7.0			7.0	212	12412	184	10773	37.0	2166.2316	3.5	204.9138
7		7.0			7.0			192	11257				
8		6.5			6.5								
9		6.3			6.3			230	12065				
10		6.2			6.2			260	13444				
11		6.6			6.6								
12		6.8			6.8			208	11727				
13		6.4			6.4								
14		6.5			6.5	262	14094	257	13825				
15		6.1			6.1	203	10395	205	10498				
16	0.05	6.3			6.3			195	10197				
17	1.03	10.2			10.2			174	14845				
18	T	9.3			9.3			102	7894				
19		6.8			6.8			153	8664				
20		7.0			7.0	217	12614	196	11393				
21		6.7			6.7	247	13884	195	10961				
22		6.5			6.5	248	13485	205	11147				
23		6.4			6.4			184	9775				
24		6.3			6.3			236	12479				
25		6.1			6.1			208	10564				
26		5.9			5.9			270	13241				
27	0.41	8.8			8.8	200	14712	270	19861				
28		7.8			7.8	183	11935	234	15261				
29		6.9			6.9	180	10358	178	10243				
30		6.6			6.6			196	10854				
Total	**1.49**	**6.9**	**Average**		**6.9**		**12594**		**11680**				

October 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		6.5			6.5			204	11025				
2		6.5			6.5			248	13465				
3	0.32	6.7			6.7			306	17073	35.2	1963.9699	3.4	189.70164
4	0.14	7.6			7.6			233	14730				
5	T	7.4			7.4	266	16439	274	16933				
6	T	6.5			6.5	223	12163	235	12818				
7	0.20	7.0			7.0			209	12219				
8		6.7			6.7			166	9234				
9	0.81	7.7			7.7			219	14119				
10	0.17	10.3			10.3			320	27382				
11		7.8			7.8	185	12065	187	12196				
12		7.3			7.3	252	15279	247	14976				
13		6.6			6.6	229	12510	256	13985				
14	0.32	6.4			6.4			286	15170				
15	0.84	13.3			13.3			270	30016				
16		8.7			8.7			179	12928				
17		8.1			8.1			262	17634				
18		7.6			7.6	380	23959	273	17213				
19		7.2			7.2	324	19537	493	29727				
20	T	7.2			7.2	339	20271	370	22125				
21	0.66	6.9			6.9			350	20083				
22	0.85	19.7	1.3		21.0								
23		12.3			12.3			248	25482				
24		10.1			10.1			81	6769				
25		9.2			9.2	145	11113	151	11573				
26		8.4			8.4	187	13038	206	14363				
27		7.9			7.9	262	17240	168	11055				
28	0.01	8.5			8.5			220	15596				
29		7.5			7.5			185	11525				
30		7.4			7.4			176	10877				
31	T	7.5			7.5			188					
Total	**4.32**	**8.3**	**Average**		**8.4**		**15783**		**15941**				

November 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	T	7.5			7.5	190	11869	237	14805				
2		7.6			7.6	269	17028	285	18041				
3		7.3			7.3	338	20522	293	17790				
4	T	6.6			6.6			191	10561				
5		6.8			6.8			201	11433				
6		6.8			6.8								
7	T	7.0			7.0			191	11071	34.6	2006	2.5	145
8		6.8			6.8	228	12911	224	12685				
9		6.6			6.6	219	12000	225	12329				
10		6.7			6.7	179	9942	217	12053				
11	T	6.7			6.7			221	12294				
12	0.01	6.4			6.4			184	9821				
13		6.5			6.5			215	11583				
14	0.05	7.0			7.0			266	15551				
15	0.10	7.5			7.5	240	14952	268	16696				
16		7.1			7.1	236	13876	235	13817				
17		6.9			6.9	210	12015	248	14189				
18	0.10	6.7			6.7			199	11186				
19		6.6			6.6			304	16784				
20		6.7			6.7			315	17549				
21		7.0			7.0			328	19094				
22		6.1			6.1	384	19664	327	16745				
23		6.1			6.1			431	22070				
24		6.3			6.3			250	13031				
25		6.4			6.4			326	17346				
26		6.4			6.4			249	13332				
27		6.5			6.5			294	16011				
28		6.8			6.8			384	21649				
29	0.26	8.6			8.6	348	25018	390	28037				
30		7.6			7.6	326	20663	386	24466				
Total	**0.52**	**6.8**	**Average**		**6.8**		**15872**		**15587**				

December 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		7.2			7.2	230	13734	206	12301				
2		7.0			7.0			255	14866				
3		6.9			6.9			196	11312				
4	0.16	7.1			7.1			230	13658				
5		7.4			7.4			259	16006	57.9	3578.1853	3.7	228.65778
6		6.8			6.8	224	12703	209	11853				
7		6.5			6.5	245	13363	218	11891				
8		7.0			7.0	376	22076	226	13269				
9		6.7			6.7			296	16416				
10		6.7			6.7								
11		6.6			6.6								
12		6.7			6.7			249	13872				
13		6.5			6.5	259	14062	209	11347				
14		6.5			6.5	451	24562	229	12471				
15		6.4			6.4	415	22289	235	12622				
16	T	6.3			6.3			222	11683				
17	0.39	8.0			8.0			221	14690				
18		7.1			7.1			165	9702				
19	0.01	6.6			6.6			248	13610				
20	0.08	7.5			7.5			248	15471				
21		6.8			6.8	248	14044	207	11722				
22	0.67	7.6			7.6	239	15209	206	13109				
23	0.06	14.2			14.2			194	22910				
24	T	9.6			9.6			74	5900				
25		7.3			7.3			132	8003				
26		7.9			7.9			126	8260				
27		7.8			7.8			203	13222				
28		7.9			7.9	253	16627	158	10384				
29		7.4			7.4	231	14160	200	12260				
30	T	7.3			7.3			232	14183				
31		7.0			7.0			166	9746				
Total	**1.37**	**7.4**	**Average**		**7.4**		**16621**		**12646**				

January 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		7.1			7.1			204	12029				
2		7.3			7.3								
3		7.8			7.8	266	17215	253	16374	28.5	1844.4744	4.1	265.34544
4		7.6			7.6	266	16749	214	13475				
5		7.5			7.5	234	14676	240	15052				
6		7.4			7.4			193	11959				
7	0.42	9.0			9.0			180	13541				
8		9.6			9.6			269	21447				
9		8.1			8.1			160	10862				
10		7.9			7.9	213	14069	178	11757				
11	0.02	7.7			7.7	248	15947	269	17297				
12		7.6			7.6	251	15972	206	13109				
13		8.5			8.5			272	19259				
14	0.01	6.7			6.7			169	9373				
15		7.5			7.5			253	15783				
16		7.7			7.7			212	13597				
17		8.0			8.0								
18		8.2			8.2								
19		8.7			8.7	283	20558	259	18814				
20		8.6			8.6			227	16206				
21	0.01	8.6			8.6			138	9875				
22	T	9.6			9.6			183	14682				
23		9.3			9.3			165	12853				
24		8.0			8.0	241	15979	225	14918				
25		8.3			8.3			296	20366				
26	T	8.0			8.0	309	20488	274	18167				
27	T	7.7			7.7			260	16740				
28		7.7			7.7			352	22546				
29		7.7			7.7			249	15970				
30		7.2			7.2			266	16017				
31		7.1			7.1			291	17110				
Total	**0.46**	**8.0**	**Average**		**8.0**		**16850**		**15328**				

February 2018		Wastewater Flows				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		7.5			7.5	268	16652	294	18267				
2		7.4			7.4	266	16461	247	15285				
3		7.4			7.4			227	14028				
4	0.01	7.2			7.2			249	15014				
5		7.4			7.4			277	17003				
6	T	7.7			7.7			360	23209	40.8	2630.3026	4.8	309.44736
7		7.4			7.4	330	20339	425	26194				
8		7.8			7.8	364	23618	398	25824				
9		7.5			7.5	287	17856	319	19847				
10	T	7.3			7.3			261	15825				
11	T	7.3			7.3			409	24969				
12		7.3			7.3			486	29589				
13		7.6			7.6			253	15931				
14		7.3			7.3			306	18706				
15	T	7.6			7.6	276	17448	293	18523				
16	T	6.9			6.9	298	17198	379	21873				
17	0.33	8.7			8.7			708	51253				
18		7.9			7.9			301	19706				
19	0.93	13.9	1.6		15.5			246	31800				
20	1.19	21.7	17.4		39.1			133	43371				
21	T	21.3	7.1		28.4	<80	18925	74	17433				
22	0.15	21.1	0.3		21.4	<66.7	11887	41	7318				
23	1.33	18.5	5.1		23.6	<66.7	13131	52	10331				
24	0.79	21.8	30.9	6.8	52.7			45	19559				
25		20.5	12.3	19.6	32.8			34	9172				
26		20.6	2.8	5.7	23.4			35	6744				
27	0.20	25.6	0.2	1.1	25.8			43	9234				
28	0.10	19.2	0.2	0.6	19.4	63	10102	51	8162				
Total	**5.03**	**12.1**	**Average**		**14.9**		**16692**		**19792**				

March 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	T	15.4	18.1		33.5	51	14249	46	12852				
2		13.7	13.0		26.7	80	17901	108	24076				
3		12.6	15.5		28.1			116	27156				
4	0.21	16.7	19.4		36.1			74	22104				
5		16.3	18.1		34.4			112	32104				
6		17.1	20.3		37.4			125	39021	19.3	6024.8077	1.8	561.89916
7		17.7	19.3		37.0	132	40722	174	53678				
8		16.9	19.3		36.2	176	53121	193	58252				
9		17.4	19.6		37.0	166	51183	155	47791				
10		13.3	15.0		28.3			11	2596				
11		7.2	8.6		15.8			143	18843				
12		7.4	10.3		17.7			322	47533				
13		7.5	9.5		17.0			296	41942				
14		7.5	9.6		17.1	197	28013	229	32563				
15		6.9	9.6		16.5	214	29413	297	40821				
16	T	6.5	9.4		15.9	170	22500	252	33354				
17		6.4	9.2		15.6			164	21337				
18	0.11	6.1	8.7		14.8			48	5925				
19	0.18	6.6	9.5		16.1			268	35918				
20	0.02	7.5	9.5		17.0			286	40644				
21		66.0	8.9		74.9	182	113674	172	107428				
22		7.7	10.2		17.9	167	24973	164	24524				
23		8.1	11.3		19.4	147	23723	110	17752				
24		7.6	10.7		18.3			30	4512				
25	0.07	6.6	9.4		16.0			28	3672				
26	0.33	6.6	8.9		15.5			185	23930				
27	1.34	16.1	18.9	9.4	35.0			143	41742				
28	0.04	15.7	17.2	7.3	32.9	69	18876	55	15150				
29	T	16.0	18.3	1.2	34.3	<66.7	19041	30	8577				
30		13.0	16.0		29.0	<66.7	16130	29	6903				
31	T	11.9	14.4		26.3			59	12868				
Total	**2.30**	**13.0**	**Average**		**26.4**		**33823**		**29212**				

April 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.24	13.1			13.1			89	9709				
2	0.02	13.2			13.2			127	14002				
3	0.03	15.6			15.6			105	13661	20.1	2615.0904	1.2	156.1248
4		11.8			11.8	126	12431	156	15391				
5		11.9			11.9	112	11088	176	17423				
6	0.07	13.5			13.5	132	14840	181	20349				
7	0.01	14.1			14.1			139	16369				
8	T	13.8			13.8			67	7682				
9		13.4			13.4			158	17605				
10		13.9			13.9			216	24950				
11		14.4			14.4	142	17065	198	23796				
12		11.3			11.3	190	17858	326	30641				
13	0.05	10.1			10.1	138	11624	191	16089				
14		9.3			9.3			122	9412				
15	T	8.9			8.9			156	11618				
16		9.0			9.0			171	12778				
17		8.9			8.9			206	15256				
18		8.7			8.7	185	13392	223	16143				
19		8.0			8.0	193	12813	213	14140				
20		8.4			8.4	168	11811	183	12866				
21	0.32	8.5			8.5			205	14601				
22	0.34	12.4			12.4			163	16884				
23	T	10.5			10.5			171	14946				
24		8.8			8.8			154	11315				
25	1.03	11.3	0.9		12.2	152	15428	181	18371				
26	T	14.2			14.2	95	11247	142	16864				
27		11.7			11.7	76	7435	90	8805				
28		10.3			10.3			105	8985				
29		8.6	1.1		9.7			120	9708				
30		9.2			9.2			161	12326				
Total	**2.11**	**11.2**	**Average**		**11.3**		**13086**		**15090**				

May 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		9.3			9.3			137	10649				
2	0.06	8.6			8.6	173	12423	170	12207	31.0	2226.0294	2.8	201.06072
3	0.46	12.7	0.4		13.1	208	22638	207	22529				
4		11.9			11.9	131	13045	159	15833				
5		10.2			10.2			28	2344				
6	0.06	9.6			9.6			76	6045				
7		9.6			9.6			171	13620				
8		9.4			9.4			160	12490				
9		8.6			8.6	142	10126	213	15188				
10	0.08	9.1			9.1	187	14114	228	17209				
11		8.4			8.4	175	12260	221	15482				
12		8.2			8.2			140	9563				
13		7.5			7.5			210	13136				
14	0.20	7.9			7.9			207	13621				
15	0.71	13.3			13.3			279	30947				
16	T	9.7			9.7	90	7265	120	9708				
17	0.17	9.0			9.0	141	10583	171	12835				
18		8.6			8.6	134	9611	168	12050				
19	T	7.2			7.2			153	9187				
20	1.22	16.8	2.8		19.6			193	31549				
21		18.2	1.4		19.6			151	24683				
22		14.3			14.3			74	8766				
23	0.31	13.4			13.4			115	12852				
24	0.21	13.1			13.1	76	8336	117	12783				
25	T	11.5			11.5	91	8747	140	13427				
26		10.7			10.7			42	3703				
27		9.1			9.1			77	5806				
28		9.3			9.3			152	11789				
29	T	9.0			9.0			170	12760				
30	0.02	8.8			8.8	168	12330	198	14532				
31	0.03	9.0			9.0	161	12085	230	17264				
Total	**3.53**	**10.4**	**Average**		**10.5**		**11812**		**13695**				

June 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		5.6	8.3		13.9	147	17041	204	23649				
2	T	5.3	7.9		13.2			73	7981				
3		5.0	7.4		12.4			102	10548				
4		5.2	7.9		13.1			231	25238				
5		5.4	7.9		13.3			306	33942	40.4	4481.2488	2.5	277.305
6		6.8	8.0		14.8	201	24810	254	31352				
7		4.8	9.9		14.7	213	26113	236	28933				
8		4.6			4.6	185	7097	242	9284				
9		4.5	6.9		11.4			85	8119				
10		4.4	7.0		11.4			138	13120				
11		4.6	6.8		11.4			272	25861				
12	1.23	8.6	12.8		21.4			371	66215				
13		6.0	8.8		14.8	110	13578	220	27155				
14		5.3	7.9		13.2	194	21357	153	16843				
15		5.0	7.5		12.5	216	22518	229	23873				
16		4.3	7.2		11.5			36	3453				
17		4.2	6.9		11.1			70	6480				
18		4.4	7.2		11.6			242	23412				
19		4.0	7.0		11.0			219	20091				
20	1.27	6.5	9.7	1.5	16.2	219	29570	220	29705				
21		7.1	11.1		18.2	154	23375	204	30965				
22		5.4	8.2		13.6	128	14518	134	15199				
23		4.9	7.8		12.7			128	13558				
24	0.20	7.2	9.9		17.1			178	25385				
25	T	5.9	9.2		15.1			178	22416				
26	0.29	5.0	9.0		14.0			163	19032				
27		5.8	8.6		14.4	149	17832	175	20944				
28		4.9	8.1		13.0	230	24937	214	23202				
29		4.6	7.7		12.3			216	22158				
30		4.5	7.3		11.8			206	20273				
Total	**2.99**	**5.3**	**Average**		**13.3**		**20229**		**21613**				

July 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.52	10.5			10.5			255	22330				
2		8.6			8.6			235	16855				
3		8.0			8.0			204	13611				
4		7.1			7.1			146	8645				
5		7.3			7.3	142	8645	177	10776				
6		7.5			7.5	199	12447	232	14512				
7		7.5			7.5			252	15763				
8		6.9			6.9			207	11912				
9		7.2			7.2			237	14231				
10	0.02	7.0			7.0			215	12552	42.8	2498.664	3.1	180.978
11		6.8			6.8	192	10889	230	13044				
12	0.23	6.8			6.8	198	11229	199	11286				
13		7.0			7.0	372	21717	392	22885				
14	T	6.5			6.5			248	13444				
15	0.21	2.6	6.5		9.1			151	11460				
16	T	0.4	5.3		5.7			216	10268				
17	0.04	0.7	4.4		5.1			258	10974				
18		4.5	1.6		6.1	236	12006	297	15110				
19	T	9.3			9.3	205	15900	226	17529				
20	0.04	8.1			8.1	235	15875	280	18915				
21	T	8.5			8.5			175	12406				
22		8.9			8.9			228	16924				
23		6.8			6.8			272	15426				
24		7.6			7.6			282	17874				
25		7.1			7.1	199	11784	253	14981				
26	0.01	7.1			7.1			238	14093				
27		7.3			7.3	285	17351	378	23013				
28	0.05	8.3			8.3			98	6784				
29	0.43	10.7			10.7			413	36855				
30	0.51	9.0			9.0			281	21092				
31		9.2			9.2			296	22711				
Total	**2.06**	**7.1**	**Average**		**7.7**		**13784**		**15750**				

August 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		7.7			7.7	149	9568	183	11752				
2		7.7			7.7	237	15220	210	13486				
3		7.4			7.4	253	15614	212	13084				
4		7.1			7.1			197	11665				
5		6.8			6.8			170	9641				
6		7.1			7.1			253	14981				
7	0.36	9.1			9.1			246	18670	51.2	3886	3.7	281
8		16.7			16.7	174	24234	205	28552				
9	0.13	8.3			8.3	202	13983	198	13706				
10		8.2			8.2	239	16345	238	16276				
11	T	7.1			7.1			91	5406				
12	0.09	8.3			8.3			173	11975				
13	0.35	9.7			9.7			202	16341				
14	0.47	11.8			11.8			161	15844				
15	0.57	11.0	5.0		16.0	114	15212	167	22284				
16	T	12.9			12.9	71	7671	90	9683				
17	0.56	14.4	7.9		22.3	212	39428	196	36452				
18		12.4			12.4			18	1861				
19	2.26	16.2	15.3		31.5			128	33627				
20	0.01		8.5		8.5			201	14249				
21		15.7	1.9		17.6			87	12756				
22	T	14.9			14.9	67	8363	112	13918				
23	0.60	19.7			19.7	154	25302	204	33517				
24	T	17.9			17.9	120	17914	178	26573				
25	T	16.2			16.2			126	17024				
26		15.1			15.1			369	46470				
27		14.1			14.1			335	39394				
28		13.9			13.9			229	26547				
29	T	13.1			13.1			234	25565				
30	1.22	17.2	1.5		18.7			318	49595				
31		14.8	3.1		17.9	164	24483	207	30902				
Total	**6.62**	**12.1**	**Average**		**13.1**		**17949**		**20703**				

September 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		12.9			12.9			25	2636				
2		10.8			10.8			112	10088				
3		10.3			10.3			100	8590				
4		10.3			10.3			164	14088				
5	0.07	11.4			11.4	178	16924	172	16353	18.5	1758.906	2.6	247.1976
6	1.20	18.2	1.0		19.2	164	26261	776	124259				
7	0.46	19.2	22.1		41.3	<66.7	22940	121	41677				
8	0.33	21.9	7.6		29.5			91	22389				
9		18.9	2.6		21.5			40	7172				
10		17.3	2.5		19.8			89	14697				
11		18.0			18.0			108	16213				
12		16.8			16.8	166	23259	238	33347				
13		14.8			14.8	143	17651	170	20983				
14		14.6			14.6	186	22648	233	28371				
15		13.7			13.7			196	22395				
16		13.2			13.2			140	15412				
17		13.5			13.5			203	22856				
18		12.7			12.7			237	25103				
19		11.0			11.0	179	16421	236	21651				
20		8.9			8.9	216	16033	272	20189				
21	0.15	10.5			10.5	146	12785	250	21893				
22	T	9.0			9.0			285	21392				
23		8.7			8.7			211	15310				
24		9.0			9.0			202	15162				
25		8.7			8.7			287	20824				
26		9.3			9.3	194	15047	263	20399				
27		9.3			9.3	177	13728	292	22648				
28		9.2			9.2	220	16880	286	21944				
29		9.0			9.0			125	9383				
30		9.2			9.2			168	12890				
Total	**2.21**	**12.7**	**Average**		**13.9**		**18381**		**22344**				

October 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		9.3			9.3			247	19158				
2		9.1			9.1			249	18898	38.4	2914.3296	3.9	295.9866
3		9.2			9.2	209	16036	237	18185				
4	0.27	10.5			10.5	191	16726	249	21805				
5		9.0			9.0	147	11034	203	15237				
6	0.68	11.6			11.6			120	11609				
7	0.14	16.0	0.8		16.8			292	40840				
8		13.5			13.5			194	21842				
9	0.36	13.5			13.5			144	16213				
10	0.02	12.8			12.8	134	14305	214	22845				
11		12.6			12.6	97	10225	141	14817				
12	0.18	10.9			10.9	158	14363	201	18272				
13	0.13	10.8			10.8			188	16934				
14	0.07	11.4			11.4			204	19396				
15	0.01	11.4			11.4			241	22913				
16		10.2			10.2			284	24159				
17		10.0			10.0	211	17597	311	25937				
18	T	10.0			10.0	260	21684	296	24686				
19	0.30	11.7			11.7	211	20589	335	32689				
20		10.4			10.4			376	32613				
21		9.9			9.9			196	16183				
22		9.7			9.7			255	20629				
23		9.1			9.1			201	15255				
24		9.2			9.2	224	17187	248	19029				
25	0.27	10.5			10.5	295	25833	427	37392				
26		10.5			10.5	311	27234	580	50791				
27		9.8			9.8								
28		9.3			9.3								
29		9.6			9.6			241	19295				
30	T	9.6			9.6			236	18895				
31	0.14	9.7			9.7	226	18283	242	19577				
Total	**2.57**	**10.7**	**Average**		**10.7**		**17777**		**22624**				

November 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.33	13.0			13.0	224	24286	213	23093				
2	0.01	11.6			11.6	166	16060	186	17994				
3	0.27	10.8			10.8			92	8287				
4	0.04	14.4			14.4			134	16093				
5	0.15	13.3			13.3			146	16195				
6		12.3			12.3			154	15798	25.6	2626.0992	2.1	215.4222
7		11.0			11.0	133	12201	201	18440				
8	0.12	11.7			11.7	130	12685	188	18345				
9		11.7			11.7	150	14637	215	20979				
10		10.2			10.2			104	8847				
11		10.4			10.4			202	17521				
12	0.14	12.0			12.0			219	21918				
13		11.7			11.7			168	16393				
14		10.3			10.3	<80.0	6864	161	13830				
15		11.5			11.5	128	12276	205	19662				
16		11.0			11.0	150	13761	234	21467				
17		10.6			10.6			54	4774				
18	0.07	10.0			10.0			246	20516				
19		10.4			10.4			304	26368				
20		9.5			9.5			264	20917				
21		10.2			10.2	172	14632	337	28668				
22		9.1			9.1			268	20340				
23	0.15	10.2			10.2			244	20757				
24		9.4			9.4			264	20697				
25	0.01	9.8			9.8			257	21005				
26		9.5			9.5			308	24403				
27		9.6			9.6			258	20657				
28		9.4			9.4	157	12308	234	18345				
29		9.2			9.2	188	14425	305	23402				
30	0.73	9.5			9.5	171	13548	259	20521				
Total	**2.02**	**10.8**	**Average**		**10.8**		**13974**		**18874**				

December 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		11.5			11.5			190	18223				
2		11.4			11.4	127	12075	200	19015				
3		11.7			11.7	142	13856	257	25078				
4		10.6			10.6	197	17416	392	34654	17.4	1538.2296	2.1	185.6484
5		10.3			10.3			222	19070				
6		10.4			10.4			532	46144				
7		9.9			9.9			258	21302				
8		10.4			10.4			236	20470				
9	T	9.4			9.4	220	17247	188	14738				
10	0.33	11.3			11.3	245	23089	292	27519				
11	T	11.0			11.0	249	22843	222	20366				
12		10.8			10.8			157	14141				
13		9.6			9.6			233	18655				
14		10.3			10.3			302	25942				
15		9.7			9.7			274	22166				
16	T	10.1			10.1	165	13899	194	16341				
17	0.01	10.1			10.1			218	18363				
18		10.0			10.0	215	17931	280	23352				
19		9.5			9.5			194	15371				
20		9.7			9.7			218	17636				
21		8.7			8.7			180	13060				
22		7.7			7.7			180	11559				
23	0.38	8.5			8.5	189	13398	184	13044				
24	0.40	14.5	3.8		18.3			300	45787				
25		11.0	1.6		12.6	128	13451	84	8827				
26		10.7	1.4		12.1			88	8880				
27	T	11.1			11.1			78	7221				
28	1.23	12.5	18.8		31.3			256	66827				
29		6.8			6.8			202	11456				
30		9.2	6.1		15.3			86	10956				
31	1.23	10.5	3.0		13.5			60	6768				
Total	**3.58**	**10.3**	**Average**		**11.4**		**16520**		**20740**				

APPENDIX I

Appendix I
Shoal Creek Wastewater Treatment Plant
Wastewater Flows/Loads for 2017 & 2018

January 2017			Influent (61 Degrees F)				Effluent (59 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		2.3			510	9783		8.23	
2		2.9			354	8562		1.86	
3		3.4			264	7486		2.54	0.480
4		3.8	206	6529	149	4722	<2.0	2.40	
5		2.7	222	4999	108	2432	<2.0	2.50	0.140
6		3.0	175	4379	45	1126	<2.0	2.38	
7		2.9			299	7232		4.79	
8		2.8			242	5651		7.39	
9		3.7			368	11356		4.00	
10		3.1			302	7808		5.60	11.200
11		3.1	409	10574	394	10186	2.5	2.10	
12		2.6					5.1	8.38	14.600
13	0.60	3.5	360	10508	160	4670	4.0	2.25	
14	0.80	3.6			866	26001		3.67	
15	0.70	7.1			92	5448		3.00	
16	0.30	6.7						5.75	
17		5.5			130	5963		4.81	0.120
18		5.6	161	7519	150	7006	<2.0	0.73	
19		5.5	<66.7	3060	42	1927	<2.0	0.40	0.140
20		5.4	89	4008	35	1576	<2.0	0.50	
21	0.30	4.7			261	10231		1.02	
22	0.90	6.7			396	22128		5.70	
23		6.4			299	15959		3.30	
24		6.3			155	8144		1.15	0.120
25		5.5	109	5000	183	8394	3.3	3.62	
26		5.6	102	4764	58	2699	<2.0	0.50	0.100
27		5.6	137	6398	65	3012	<2.0	0.50	
28		5.1			230	9783		4.88	
29		5.2			240	10408		3.78	
30		4.9			540	22068		4.38	
31		5.5			219	10046		1.50	0.150
Total	**3.60**	**4.5**	**Average**	**6158**		**8683**		**3.34**	

February 2017			Influent (65 Degrees F)				Effluent (63 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		5.8	178	8610	201	9723	2.2	1.60	
2		4.4	96	3523	39	1431	2.9	2.30	0.14
3		3.8	187	5926	91	2878	3.2	2.70	
4		3.9			355	11547		2.53	
5		3.6			314	9428		2.29	
6		3.5			480	14011		4.34	
7		3.5			317	9253		0.70	
8		3.5	262	7648	354	10333		1.30	0.217
9		3.2	142	3790	62	1660	<2.0	0.57	0.140
10		3.3	206	5670	115	3165	<2.0	0.25	
11		3.2			333	8887		5.29	
12		3.0			450	11259		2.67	
13	0.11	2.9			281	6796		0.52	
14		3.0			304	7606		2.15	
15		3.1			347	8971		1.40	0.128
16		3.1	222	5740	143	3697	2.2	3.00	0.150
17		2.8	246	5745	70	1623	<2.0	0.93	
18		2.9			437	10569		3.48	
19		3.0			456	11409		1.90	
20	0.06	3.0			380	9508		1.69	
21	0.08	3.4			386	10945		2.20	0.143
22		3.3	306	8422	340	9357	<2.0	1.13	
23		3.0	213	5329	48	1201	<2.0	0.46	0.103
24		3.1	253	6541	105	2715	2.5	0.71	
25		3.3			330	9082		1.10	
26	0.10	2.8			392	9154		1.10	
27		3.0			412	10308		2.83	
28		3.1			420	10859		1.15	1.100
Total	**0.35**	**3.3**	**Average**	**6086**		**7763**		**1.87**	

March 2017			Influent (68 Degrees F)				Effluent (66 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.01	3.0	372	9307	359	8982	<2.0	1.20	
2		2.8	202	4717	53	1226	2.0	0.36	0.124
3		3.3	340	9357	123	3385	<2.0	1.00	
4		3.0			710	17764		2.22	
5		3.1			569	14711		1.28	
6	0.40	3.0			525	13136		2.72	
7		3.6			366	10989		1.65	0.573
8		3.3	473	13018	440	12110	2.4	2.70	
9	0.67	3.1	251	6489	58	1487	<2.0	0.50	0.132
10		3.0	348	8707	104	2602	<2.0	0.70	
11	0.01	3.0			380	9508		3.41	
12	0.15	3.2			536	14305			
13	0.01	2.9			189	4571			
14		3.1			486	12565		1.46	0.156
15		3.2	547	14553	465	12371	2.6	1.50	
16		3.0	254	6355	72	1801	2.9	0.92	0.167
17		3.1	236	6102	62	1603	2.7	0.77	
18		3.3			472	12990		1.31	
19		3.1			95	2446		2.06	
20		2.7			610	13736		2.37	
21		2.7			420	9458		3.60	0.200
22		3.1	274	7084	325	8403	<2.0	1.50	
23		3.1	168	4343	59	1512	<2.0	0.77	0.266
24	0.29	3.4	252	7146	125	3545	<2.0	0.64	
25	0.11	3.4			689	19537		0.66	
26	0.15	3.2			530	14145		2.62	
27	0.42	4.9			110	4495		1.00	
28	0.01	3.8			295	9349		1.06	0.996
29	0.28	4.1	240	8207	161	5505	2.4	2.30	
30	0.19	3.9	186	6050	64	2065	<2.0	0.57	0.123
31		3.8	354	11219	106	3359	<2.0	1.00	
Total	**2.70**	**3.3**	**Average**	**8177**		**8183**		**1.51**	

April 2017			Influent (67 Degrees F)				Effluent (68 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.0			335	11176		2.20	
2	0.49	4.4			360	13211		1.08	
3	0.11	4.7			368	14425		1.46	
4	0.81	5.4			349	15718		0.77	0.128
5	0.04	7.6	232	14705	304	19269	<2.0	1.00	
6		5.9	85	4168	38	1850	2.3	2.50	0.124
7		6.0	142	7106	47	2332	<2.0	1.00	
8		6.2			316	16340		0.79	
9		6.2			344	17788		2.09	
10		5.8			338	16350		4.09	
11		4.2			316	11069		2.55	4.750
12		3.7	316	9751	361	11140	3.3	3.50	
13		3.7	120	3703	39	1203	<2.0	1.10	0.149
14	0.02	3.6	207	6215	118	3543	<2.0	0.50	
15		3.5			588	17164		0.54	
16	1.03	4.7			482	18893		0.78	
17	0.04	5.4			452	20356		1.29	
18		4.3			296	10615		0.96	0.162
19		3.7	236	7282	342	10553	<2.0	1.00	
20	0.32	4.3	158	5666	45	1596	<2.0	0.43	0.101
21	2.05	10.2	188	15993	68	5785	<2.0	0.57	
22	0.10	9.6			244	19536		2.69	
23		8.3			139	9622		0.84	
24		7.1			161	9533		0.55	
25	0.56	7.5			200	12510		1.05	0.902
26	0.58	4.7	113	4429	44	1740	<2.0	0.58	
27	0.01	9.6	90	7174	43	3467	2.1	0.86	1.420
28	0.24	8.2	173	11831	134	9164	<2.0	0.50	
29	4.52	12.8			138	14732		0.70	
30	0.32	13.7			200	22852		5.86	
Total	**11.24**	**6.3**	**Average**	**8169**		**11451**		**1.46**	

May 2017			Influent (68 Degrees F)				Effluent (69 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.01	11.3			89	8388		2.82	
2	0.07	8.9			148	10985		0.90	0.104
3	1.77	12.2	64	6512	106	10785	<2.0	0.90	
4		10.2	62	5283	41	3445	<2.0	0.71	0.164
5		10.4	<40	3461	21	1778	<2.0	0.36	
6		9.7			127	10274		0.59	
7		8.3			176	12183		3.76	
8		9.2			224	17187		2.72	
9		9.1			35	2618		1.15	1.690
10	0.65	8.2	201	13746	192	13130	2.7	3.10	
11	0.96	9.7	77	6253	37	2993	<2.0	1.43	<1.000
12	0.11	9.0	120	9007	76	5705	<2.0	0.70	
13		9.5			139	11013		0.57	
14		9.3			41	3149		1.51	
15		8.1			181	12227		4.35	
16		6.2			258	13341		4.10	0.450
17	0.02	5.9	112	5511	44	2145	<2.0	1.70	
18	0.41	4.7			271	10623		2.50	0.158
19	1.97	9.4	201	15758	105	8232	2.0	2.89	
20	0.62	14.2			191	22620		10.60	
21		11.4			112	10649		11.20	
22		10.1			80	6745		1.49	
23		9.9			29	2353		1.35	0.132
24		8.8			162	11890		4.49	
25		8.7	<80	5797	111	8054	<2.0	0.80	0.280
26		6.8	<66.7	3777	49	2779	<2.0	1.10	
27	0.73	6.9			215	12372		5.31	
28		9.8			334	27298		4.94	
29		7.7			43	2761		1.69	
30	0.03	8.6			33	2367		1.30	
31	0.65	7.7	114	7321	66	4238	<2.0	2.86	5.750
Total	**8.00**	**9.0**	**Average**	**7493**		**8849**		**2.71**	

June 2017			Influent (74 Degrees F)				Effluent (76 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.04	6.0	147	7356	59	2932	<2.0	2.30	0.304
2		5.3	127	5614	47	2055	<2.0	2.30	
3		5.3			59	2608		3.20	
4	0.97	5.8			50	2399		3.10	
5		6.1			84	4273		3.84	
6		5.7			194	9222		5.93	0.123
7		4.9	248	10135	269	10993	<2.0	3.62	
8		4.9	219	8950	234	9563	2.1	6.50	0.128
9		4.4	253	9284	230	8440	<2.0	3.86	
10		4.3			352	12623		3.10	
11		4.5			55	2064		5.11	
12		4.1			108	3693		3.15	
13		4.1			287	9814			
14		4.4			56	2037		4.20	0.165
15	0.11	3.8			326	10332		5.47	0.136
16	0.09	4.0	395	13177	369	12310	6.4	7.43	
17	0.90	5.6			194	9061		1.73	
18	0.36	6.0			74	3693		1.20	
19		4.9			114	4659		1.10	
20		4.5			444	16663		5.43	0.671
21		4.1	193	6599	58	1983	2.0	1.00	
22		3.9	410	13336	401	13043	2.3	3.50	0.277
23	0.54	4.5	420	15763	490	18390	2.5	3.90	
24		3.9			63	2033		0.54	
25		3.6						1.02	
26	0.49	4.0			428	14278		4.02	
27	0.12	4.3			84	3012		0.56	0.124
28		3.8	255	8081	314	9951	2.5	4.12	
29		4.2			526	18425		1.16	<0.100
30	0.56	5.6	331	15459	362	16907	<2.0	1.80	
Total	**4.18**	**4.7**	**Average**	**10341**		**8188**		**3.25**	

July 2017			Influent (78 Degrees F)				Effluent (81 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.1			210	7181		8.80	
2		4.0			352	11743		6.40	
3		4.1			226	7728		12.80	
4	1.46	5.0			71	2940		8.00	
5	0.04	5.8	332	16060	400	19349	7.1	9.76	0.132
6		5.4	203	9142	220	9908	6.8	12.80	0.156
7		4.7	277	10858	238	9329	6.9	10.90	
8		4.6			33	1247		9.66	
9		4.2			126	4414		12.30	
10		4.1			106	3625		10.50	
11		3.8			267	8462		17.00	0.102
12		3.6	320	9608	244	7326	6.9	8.00	
13		3.8	301	9539	231	7321	6.8	8.08	0.138
14	0.56	3.7	466	14380	358	11047	6.7	8.58	
15		3.7			160	4937		8.20	
16		3.8			44	1379		15.80	
17		3.5			306	8932		13.30	
18		3.5			99	2890		23.20	0.160
19		3.9	251	8164	114	3708	6.6	15.70	
20		3.5			434	12668		4.17	0.125
21		3.4	527	14944	398	11286	6.8	4.90	
22		2.9			26	622		23.00	
23	0.01	3.3			201	5532		6.00	
24		3.3			67	1855		8.30	
25		3.6			141	4233		6.40	0.158
26		3.6	274	8227	70	2087	7.0	16.40	
27	0.80	3.9	456	14832	359	11677	6.7	8.84	0.147
28	0.24	4.3	415	14883	338	12121	6.9	10.50	
29		3.8			59	1857		20.70	
30		3.4			44	1248		17.30	
31		3.7			46	1419		15.00	
Total	**3.11**	**3.9**	**Average**	**11876**		**6454**		**11.65**	

August 2017			Influent (73 Degrees F)				Effluent (76 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.08	3.8			435	13786		1.90	0.26
2		3.6	364	10929	71	2120	<2.0	0.50	
3	0.06	3.4			236	6692		0.90	0.160
4	0.11	3.4	348	9868	266	7543	2.0	2.50	
5	0.26	3.7			188	5801		0.43	
6	1.02	5.6			315	14712		0.35	
7		4.3			42	1506		0.97	
8		3.9			218	7091		1.20	0.150
9		3.6	178	5344	59	1756	<2.0	0.70	
10	0.06	3.7	362	11171	286	8825	1.8	2.10	0.120
11	0.66	7.1	286	16935	133	7875	1.9	2.20	
12		5.6			122	5698		0.46	
13		5.3			145	6409		1.82	
14		4.8			56	2234		0.32	
15	0.32	4.1			282	9643		1.05	
16	1.46	5.1	330	14036	302	12845	1.8	3.60	
17		7.7	342	21963	328	21064	2.0	4.40	<0.100
18		5.5	174	7981	163	7477	2.0	3.30	
19	0.02	5.2			176	7633		1.01	0.120
20		4.5			268	10058		0.44	
21		3.9			442	14376		0.80	
22	1.41	7.2			248	14892		1.00	
23		5.4	189	8512	196	8827	<2.0	0.50	
24		4.7	222	8702	184	7212	<2.0	1.20	0.308
25		5.0	356	14845	284	11843	1.4	0.30	
26		5.1			202	8592		2.59	0.180
27		4.7			226	8859		1.21	
28		4.1			306	10463		2.84	
29		3.9			298	9693		0.50	0.140
30		3.9			356	11579		1.60	
31		3.4	337	9556	300	8507	1.6	1.00	0.120
Total	**5.46**	**4.7**	**Average**	**11653**		**8891**		**1.41**	

September 2017			Influent (78 Degrees F)				Effluent (78 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.4	441	12505	348	9868	1.6	1.40	
2		3.6			204	6125		0.68	
3		3.9			200	6505		1.18	
4		3.4			216	6125		1.45	
5		6.9			368	21177		4.05	
6		6.2	424	21924	304	15719	1.8	2.10	0.154
7		3.0			290	7256			0.195
8		3.3	473	13018	368	10128	5.8	4.90	
9		3.5			252	7356		0.73	
10		3.3			291	8009		1.76	
11		3.3			368	10128		6.30	
12		3.8			316	10015		2.70	
13		3.2	407	10862	346	9234	2.1	1.70	0.149
14		3.2	358	9554	236	6298	2.9	2.70	0.125
15		3.5	516	15062	305	8903	2.8	2.40	
16	0.05	4.1			290	9916		2.22	
17	1.03	5.5			358	16421		2.83	
18		4.5			280	10508		6.63	
19		3.9			298	9693		3.75	0.141
20		3.5	291	8494	235	6860	2.1	1.60	
21		3.7	218	6727	80	2469	2.0	2.40	0.103
22		4.1	337	11523	322	11010	2.2	4.00	
23		3.4			283	8025		6.70	
24		3.6			256	7686		9.24	
25		3.0			386	9658		12.70	
26		3.4			428	12136		5.45	0.633
27	0.41	4.6	425	16305	237	9092	3.0	3.30	
28		4.3	380	13628	242	8679	2.9	3.10	0.172
29		3.9	662	21532	404	13141	1.5	1.50	
30		3.8			182	5768		1.59	
Total	**1.49**	**3.9**	**Average**	**13428**		**9464**		**3.48**	

October 2017			Influent (75 Degrees F)				Effluent (73 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.8			216	6845		1.82	
2		3.6			353	10598		3.26	
3	0.32	3.5			342	9983		2.00	0.193
4	0.14	4.0			71	2362		0.10	
5		3.8	483	15307	163	5166	2.5	0.90	0.161
6		3.6	251	7536	70	2102	3.1	0.80	
7	0.20	3.8			258	8177		1.28	
8		2.6			361	7828		0.93	
9	0.81	3.7			336	10368		1.90	
10	0.17	5.0			306	12760		1.55	0.159
11		3.8	274	8684	201	6370	1.9	1.80	
12		4.0	221	7373	79	2625	1.4	0.70	0.136
13		3.3	188	5174	80	2202	<1.2	0.50	
14	0.32	3.6			366	10989		1.98	
15	0.84	6.4			454	24233		2.25	
16		4.6			242	9365		3.87	
17		4.0			207	6906		2.25	0.149
18		3.9	234	7611	319	10376	2.7	2.90	
19		3.7	309	9535	352	10862	1.3	0.70	0.157
20		3.4	322	9131	296	8393	1.6	1.30	
21	0.66	3.4			296	8393		0.99	
22	0.85	8.2			313	21405		1.76	
23		6.0			168	8407		4.30	
24		5.0			220	9174		1.15	0.114
25		4.6	377	14463	295	11317	1.9	1.20	
26		4.2	426	14922	264	9247	1.5	0.80	0.128
27		4.7	284	11132	232	9094	1.8	0.50	
28		4.3			208	7459		0.73	
29		4.1			250	8549		1.63	
30		3.2			1040	27756		2.59	
31		4.3			388	13914		5.70	0.432
Total	**4.31**	**4.2**	**Average**	**10079**		**9781**		**1.75**	

November 2017			Influent (70 Degrees F)				Effluent (67 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.6	265	7956	360	10809	5.9	10.00	
2		3.6	204	6125	96	2882	3.8	0.43	0.16
3		4.1	405	13849	396	13541	3.4	1.60	
4		4.1			137	4685		0.77	
5		3.7			278	8579		0.80	
6		3.4			572	16220		0.86	
7		3.1			512	13237		1.80	3.710
8		3.6	464	13931	480	14412	2.1	1.80	
9		3.2	406	10835	508	13558	<1.6	1.00	0.140
10		3.4	221	6267	83	2345	1.5	1.00	
11		3.8			306	9698		2.03	
12	0.01	3.5			318	9282		0.73	
13		3.6			464	13931		2.45	
14	0.05	3.4			804	22798		0.74	<0.100
15	0.10	3.8	826	26178	782	24783	2.2	1.50	
16		3.8	654	20727	574	18191	1.7	1.50	<0.100
17		3.6	475	14261	470	14111	2.4	1.70	
18	0.10	3.7			312	9628		0.96	
19		3.4			458	12987		1.36	
20		3.7			357	11016		1.57	
21		3.5			568	16580		1.35	0.220
22		4.0	328	10942	335	11176	2.5	1.50	0.210
23		3.6			430	12910		1.90	
24		3.2			620	16547		1.20	
25		3.5			332	9691		0.89	
26		3.7			408	12590		1.22	
27		3.4			410	11626		1.32	
28		3.5			402	11734		0.30	0.440
29	0.26	4.0	401	13377	328	10942	2.8	1.00	
30		3.5	527	15383	464	13544	1.7	1.00	0.270
Total	**0.52**	**3.6**	**Average**	**13319**		**12468**		**1.54**	

December 2017			Influent (66 Degrees F)				Effluent (62 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.5	448	13077	480	14011	<1.4	0.90	
2		3.6			300	9007		0.75	
3		3.5			402	11734		0.57	
4	0.05	3.2			454	12116		1.02	
5		3.1			443	11453		0.50	0.142
6		3.4	444	12590	472	13384	<1.4	0.90	
7		3.6	465	13961	484	14532	2.3	0.67	0.101
8		3.4	333	9443	204	5785	1.3	0.12	
9		3.0			220	5504		1.82	
10		3.3			354	9743		2.47	
11		3.3			517	14229		2.89	
12		3.5			344	10041		1.00	
13		3.1	432	11169	434	11221	2.1	0.50	0.128
14		3.2	542	14465	502	13397	1.3	0.75	0.101
15		3.3	324	8917	320	8807	1.3	0.62	
16		3.5			314	9166		3.73	
17	0.45	4.0			410	13678			
18		3.2			505	13477			
19		3.2			336	8967		1.30	<0.100
20	0.01	3.5			482	14070		2.60	
21		3.2	368	9821	315	8407	1.5	0.50	0.109
22	0.76	3.4	454	12874	632	17921	1.8	0.90	
23	0.25	6.4			398	21244		0.70	
24		4.3			230	8248		3.22	
25		3.1			396	10238		8.59	
26		4.5			203	7619		1.10	<0.100
27		3.8			310	9825		1.10	
28		3.5	287	8378	236	6889	2.0	0.70	0.129
29		5.6	241	11256	197	9201	2.5	0.60	
30		4.4			380	13944		0.97	
31		4.0			474	15813		0.80	
Total	**1.52**	**3.7**	**Average**	**11450**		**11409**		**1.46**	

January 2018			Influent (62 Degrees F)				Effluent (57 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.4			273	7741		0.39	
2		3.5			412	12026		0.95	
3		3.7	228	7036	163	5030	2.0	1.00	3.250
4		3.9	358	11644	430	13986	2.2	0.80	2.120
5		3.7	380	11726	326	10060	1.9	0.90	
6		3.7			404	12467		1.63	
7	0.42	3.9			312	10148		0.82	
8		4.5			562	21092		2.09	
9		4.2			486	17024		3.00	0.197
10		3.8	303	9603	205	6497			
11	0.02	3.6	290	8707	404	12130	3.2	0.90	0.128
12		3.7	455	14040	438	13516	2.8	1.50	
13		3.9						0.71	
14	0.01	3.6						0.57	
15		3.7						0.89	
16		3.6						0.46	<0.100
17		3.8					1.6	0.25	2.830
18		4.0					1.5	0.21	0.108
19		3.8	464	14705	496	15719	2.1	1.00	
20		4.4			167	6128		0.71	
21	0.01	3.9			496	16133		0.60	
22		4.2			425	14887		0.57	
23		4.1			396	13541		0.70	<0.100
24		4.5	572	21467	702	26346	2.1	1.80	0.914
25		3.7			414	12775		1.00	<0.100
26		3.8	448	14198	492	15592	1.6	0.70	
27		3.8			430	13628		1.57	
28		3.6			552	16573		1.52	
29		3.4			714	20246		1.97	
30		3.3			434	11945		0.55	3.820
31		3.3			722	19871		1.90	
Total	**0.46**	**3.8**	**Average**	**12570**		**13804**		**1.06**	

February 2018			Influent (61 Degrees F)				Effluent (57 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		3.1	416	10755	532	13754	1.5	0.70	0.126
2		3.5	491	14332	470	13719	2.3	1.30	
3		3.4			386	10945		1.49	
4	0.01	3.5			1175	34298		2.15	
5		3.5			6155	179664		2.00	
6		3.1			2044	52846		1.30	0.117
7		3.6	499	14982	796	23899	2.4	3.20	
8		3.7	678	20922	802	24748	2.6	2.30	0.477
9		3.5	463	13515	472	13778	2.7	2.60	
10		3.6			328	9848		1.67	
11		3.2			56	1481		1.04	
12		3.5			724	21134		3.46	
13		3.2			881	23512		4.08	4.540
14		3.0			222	5554		1.90	
15		3.4	478	13554	366	10378	2.3	1.00	0.133
16		3.8	647	20505	760	24086	2.7	3.00	
17	0.33	4.4			288	10568		0.62	
18		3.8			430	13628		1.28	
19	0.93	6.7			356	19893		1.26	
20	1.19	13.3			582	64557		1.90	
21		13.5	<100	11248	95	10696	2.0	6.90	<0.100
22	0.15	9.3					1.7	4.90	
23	1.33	10.2					2.0	0.60	<0.100
24	0.79	14.9			231	28705		2.29	
25		11.5			41	3884		1.75	
26		10.8			27	2432		1.07	
27	0.20	9.5			30	2393		1.80	6.460
28	0.01	8.5	84	5983	70	4962	1.9	1.70	5.450
Total	**4.94**	**6.1**	**Average**	**13977**		**24052**		**2.12**	

March 2018			Influent (60 Degrees F)				Effluent (61 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		8.6	<80.0	5731	110	7890	2.1	0.90	6.39
2		9.0	129	9683	121	9082	2.3	2.80	
3		6.6			22	1189		1.16	
4	0.22	5.5			115	5275		0.69	
5		5.8			129	6240		<0.14	
6		6.4			102	5444		1.15	0.101
7		6.1	113	5749	86	4355	2.0	1.40	<0.100
8		4.4	222	8147	181	6642	1.9	1.70	
9		4.6	171	6560	226	8670	2.7	2.50	
10		4.7			50	1960		1.22	
11		4.2			37	1307		0.83	
12		4.0			242	8073		0.85	
13		4.3			98	3507		<0.10	0.108
14		4.0	262	8740	174	5805	1.4	0.60	
15		3.8	214	6782	212	6719	1.8	0.60	<0.100
16	0.11	3.8	237	7511	225	7131	1.8	0.60	
17		3.1			75	1939		0.38	
18	0.01	3.9			179	5822		1.17	
19	0.11	3.7			304	9381		1.37	
20	0.10	3.8			83	2643		0.15	0.111
21		3.8	184	5831	108	3423	1.5	0.30	
22		3.8	342	10839	405	12835	1.6	0.20	0.101
23		3.6	274	8227	318	9548	<1.5	0.30	
24		3.5			111	3240		0.12	
25	0.13	3.7			117	3610		0.46	
26	0.25	4.0			83	2782		0.74	
27	2.29	9.4			108	8467		0.30	0.147
28	0.01	8.9	97	7170	71	5292	1.7	0.90	
29	0.33	8.4	105	7356	110	7706	<1.6	0.70	<0.100
30		6.4	184	9821	237	12650	<1.6	0.90	
31	0.04	6.0			38	1902		0.62	
Total	**3.60**	**5.2**	**Average**	**7725**		**5824**		**0.88**	

April 2018			Influent (64 Degrees F)				Effluent (63 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.24	5.6			38	1775		0.79	
2	0.02	5.6			68	3185		0.34	
3	0.03	6.1			90	4579		1.00	<0.100
4		5.2	218	9454	173	7503	<1.4	0.50	
5		4.7	267	10466	268	10505	1.6	0.60	<0.100
6	0.07	4.3	252	9037	216	7746	1.6	0.30	
7	0.01	4.8			78	3102		0.38	
8		4.7			42	1646		<0.11	
9		4.7			59	2297		0.49	
10		4.3			334	11978		0.50	0.117
11		4.1	275	9403	130	4445	1.4	0.80	
12		4.4	253	9284	242	8880	1.4	0.40	0.108
13	0.05	4.2	382	13381	306	10719	1.9	0.60	
14		3.9			296	9628		1.20	
15		3.9			54	1740		0.35	
16		4.2			79	2781		0.66	
17		3.9			188	6115		0.60	<0.100
18		3.9	166	5399	123	4001	1.5	0.50	
19		4.1	315	10771	368	12583	1.5	1.10	<0.100
20		4.1	341	11660	308	10532	1.6	1.00	
21	0.32	3.9			141	4586		1.00	
22	0.34	6.1			140	7122		0.85	
23		4.8			38	1505		1.03	
24		4.0			210	7006		1.70	<0.100
25	1.03	5.6	160	7473	94	4390	1.4	1.10	
26		6.2	244	12617	254	13134	1.6	1.20	<0.100
27		4.9	196	8010	185	7560	1.8	1.40	
28		4.8			37	1461		0.41	
29		4.5			42	1557		<0.11	
30		4.4			64	2330		0.35	
Total	**2.11**	**4.7**	**Average**	**9746**		**5880**		**0.76**	

May 2018			Influent (71 Degrees F)				Effluent (73 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.2			62	2172		0.35	0.127
2	0.06	4.1	212	7249	97	3317	1.1	0.20	
3	0.45	5.9	270	13286	277	13630	1.5	1.00	0.214
4		5.1	281	11952	275	11697	1.8	2.00	
5		4.3			58	2062		0.70	
6	0.06	3.5			157	4583		0.61	
7		4.0			97	3226		0.88	
8		4.2			118	4133		0.30	
9		4.0	257	8574	166	5538	<1.5	0.70	0.164
10	0.08	3.8	265	8398	284	9001	1.5	1.30	
11		3.7	254	7838	238	7344	1.4	0.40	0.142
12		4.1			60	2052		0.45	
13		3.6			78	2342		0.57	
14	0.20	3.6			79	2372		0.24	
15	0.71	6.3			198	10403		0.40	0.229
16		4.6	179	6867	160	6138	2.5	0.30	
17	0.17	4.2	317	11104	327	11454	2.7	1.10	0.184
18		4.0	336	11209	284	9474	2.3	0.30	
19		4.1			93	3166		1.03	
20	1.22	7.3			91	5559		0.91	
21		7.7			107	6871		2.33	
22		7.0			83	4816		0.55	0.116
23	0.31	7.0			60	3474		0.50	
24	0.21	6.3	156	8197	190	9983	<1.6	2.00	
25		5.9	209	10284	202	9940	<1.6	1.60	
26		5.0			250	10425		4.57	
27		3.8			282	8937		3.37	
28		3.3			242	6660		2.80	
29		4.4			99	3633		1.00	0.145
30	0.02	4.3	197	7065	112	4017	<1.5	0.80	
31	0.03	4.0	324	10809	301	10041	1.8	2.30	0.207
Total	**3.52**	**4.8**	**Average**	**9449**		**6402**		**1.15**	

June 2018			Influent (76 Degrees F)				Effluent (79 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.2	286	10018	308	10789	1.5	2.10	
2		4.1			286	9779		1.31	
3		5.4			60	2702		1.11	
4		3.4			96	2722		1.12	
5		3.4			154	4367		4.25	0.227
6		3.7	202	6233	219	6758	1.4	1.90	
7		3.7	328	10121	312	9628	2.1	4.20	0.213
8		3.7	338	10430	300	9257	1.7	4.40	
9		3.8			136	4310			
10		3.6			85	2552		1.22	
11		3.5			155	4524		1.00	
12	1.23	6.0			142	7106		0.80	0.181
13		6.2	143	7394	111	5740	1.3	1.20	
14		4.6	250	9591	270	10358	1.3	1.30	0.105
15		4.2	300	10508	223	7811	1.2	1.20	
16		3.8			138	4373		0.35	
17		3.6			233	6996		3.12	
18		3.7			63	1929		0.77	
19		3.5			93	2715		1.90	0.160
20	1.27	4.8	218	8727	95	3803	2.3	0.30	
21		5.0	193	8048	212	8840	2.0	0.70	0.126
22		4.1	330	11284	192	6565	1.8	1.00	
23		4.1			71	2428		0.53	
24	0.20	4.9			60	2452		0.44	
25		4.6			52	1995		0.41	
26	0.29	4.4			70	2569		0.55	0.108
27		5.7	218	10363	52	2448	3.1	0.30	
28		4.1	230	7865	229	7830	2.7	1.80	0.106
29		4.0			234	7806			
30		3.3			74	2037		1.00	
Total	**2.99**	**4.2**	**Average**	**9215**		**5440**		**1.44**	

July 2018			Influent (79 Degrees F)				Effluent (81 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.8			83	3303		0.50	
2		4.3			65	2331		0.50	0.113
3	0.68	3.8			116	3676		0.70	
4		3.5			257	7502		1.75	
5		3.5	192	5604	196	5721	1.6	1.70	0.166
6		3.9	183	5952	216	7026	1.7	1.30	
7		3.6			266	7986		1.03	
8		3.1			228	5895		1.15	
9		3.6			44	1321		0.40	
10		3.4			58	1645		2.60	0.116
11		3.8	165	5229	89	2821	2.6	0.80	
12		3.7	225	6943	254	7838	2.6	0.40	0.181
13	0.10	3.7	298	9196	314	9689	2.3	1.50	
14		3.6			83	2486		0.11	
15	0.07	3.4			66	1857		0.53	
16		4.1			62	2103		0.83	
17	0.02	3.9			71	2293		0.20	0.159
18		3.9	443	14409	430	13986	2.8	1.10	
19	0.10	4.2	493	17269	474	16603	2.6	1.30	0.122
20		3.8	392	12423	335	10617	1.8	0.80	
21		4.1			309	10566		0.80	
22		3.6			87	2612		0.74	
23		3.6			71	2132		0.74	
24		3.8			107	3391		0.55	0.164
25		3.5	388	11326	160	4670	<1.3	0.50	
26	0.01	3.7			312	9628		0.40	0.164
27		3.6	347	10418	296	8887	1.2	0.60	
28		3.7			61	1882		0.62	
29	0.04	4.8			69	2762		0.92	
30	0.02	4.2			94	3293		1.31	
31		4.0			102	3403		0.40	0.151
Total	**1.04**	**3.8**	**Average**	**9877**		**5481**		**0.86**	

August 2018			Influent (78 Degrees F)				Effluent (77 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		4.0	243	8106	68	2268	1.2	0.70	0.127
2		4.0	418	13944	294	9808	2.0	3.00	0.184
3		3.9	373	12132	275	8945	2.4	4.40	
4		3.6			48	1441		0.85	
5		3.8			72	2282		1.03	
6		3.6			115	3453		0.82	
7	0.36	4.3			75	2690		0.50	0.160
8		4.4	127	4660	48	1743	3.5	0.50	
9	0.13	3.8	315	9983	265	8398	3.4	0.60	0.164
10		3.5	334	9749	255	7443	2.3	1.00	
11		4.0			91	3049		0.32	
12	0.09	3.7			54	1651		0.51	
13	0.35	3.9			52	1675		0.60	
14	0.47	4.1			53	1795		0.25	0.804
15	0.57	6.7	176	9835	82	4582	<1.7	0.70	
16		5.7	182	8652	191	9080	1.3	0.90	0.141
17	0.56	8.1	249	16821	236	15943	<1.6	1.40	
18		5.9			36	1771		1.18	
19	2.26	9.1			45	3385		0.81	
20	0.01	9.0			54	4053		1.22	
21		8.3			36	2464		0.50	0.117
22		7.4	103	6357	32	2000	<1.8	0.20	
23	0.60	7.6	137	8684	132	8367	<1.6	0.70	0.123
24		7.6	166	10522	158	10015	<1.7	1.00	
25		6.4			32	1708		0.50	
26		5.1			33	1404		2.35	
27		4.9			61	2493		1.63	
28		4.9			65	2636		0.75	
29		4.9			47	1900		0.95	0.172
30	1.22	6.3	257	13503	276	14502	2.1	10.40	
31		6.9	189	10876	196	11279	2.3	6.71	1.460
Total	**6.62**	**5.5**	**Average**	**10273**		**4975**		**1.52**	

September 2018			Influent (76 Degrees F)				Effluent (77 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		5.8			50	2419		3.50	
2		4.7			214	8388		0.74	
3		4.4			179	6569		1.20	
4		4.6			54	2052		0.70	0.112
5	0.07	6.1	156	7936	67	3409	2.1	0.70	
6	1.20	8.7	196	14221	203	14729	2.1	0.70	<0.100
7	0.46	10.1					<1.7	1.00	
8	0.33	10.6			37	3236		0.91	
9		8.5			13	943		4.33	
10		7.4			25	1561			
11		6.4			26	1409			0.125
12		5.8	112	5418	37	1809			
13		5.6	177	8267	146	6819	3.7	2.20	0.142
14		5.0	199	8298	187	7798	1.8	0.50	
15		4.7			75	2920		0.30	
16		4.7			66	2567		0.84	
17		5.4			42	1892			
18		6.2			35	1810		6.35	0.105
19		5.3	132	5835	48	2122			
20		4.5	337	12648	345	12948	4.6	2.30	<0.100
21	0.15	5.5	234	10734	229	10504	1.7	0.60	
22		4.6			69	2632		1.00	
23		4.2			49	1727		0.94	
24		4.0			62	2068		0.92	
25	0.02	4.0			118	3936		0.75	0.375
26		3.9	201	6538	95	3090	<1.3	1.00	
27		2.9	497	12020	322	7788	<1.2	0.50	0.138
28		2.8	323	7543	208	4857	1.0	0.50	
29		3.0			81	2037		1.22	
30		3.2			62	1641		0.62	
Total	**2.23**	**5.4**	**Average**	**9042**		**4334**		**1.37**	

October 2018			Influent (71 Degrees F)				Effluent (70 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1		2.9			83	1995		0.61	
2		2.8			100	2335		0.60	0.147
3		2.9	202	4886	51	1233	0.9	0.50	
4	0.27	3.2	196	5231	65	1735	<1.1	0.40	0.211
5		3.4	170	4821	64	1815	1.1	1.10	
6	0.68	3.8			58	1838		1.63	
7	0.14	6.2			47	2410		1.33	
8		5.4			30	1351		2.28	
9	0.36	4.7			31	1196		1.90	0.107
10	0.02	5.0	131	5463	39	1605	6.1	3.00	
11		4.1	108	3693	65	2223	1.8	1.70	0.128
12	0.18	3.5	139	4057	51	1474			
13	0.13	3.8			75	2361		1.70	
14	0.07	3.7			69	2129		1.89	
15	0.01	3.8			30	951		2.16	
16		4.4			53	1934		1.90	0.134
17		3.4	165	4679	55	1548	0.9	1.20	
18		3.1	215	5559	114	2947	1.4	1.40	0.180
19	0.30	3.7	178	5493	75	2327	1.1	1.10	
20		3.5			63	1839		1.30	
21		3.2			56	1495		1.63	
22		2.8			101	2359		2.04	
23		3.2			68	1815		0.65	0.130
24		3.3	206	5670	75	2064	<1.3	0.50	
25	0.27	3.9	295	9595	178	5790	<1.2	0.60	0.187
26		3.1	233	6024	110	2844	1.2	1.40	
27		3.4			60	1701		0.42	
28		2.9			57	1379		0.47	
29		3.0			61	1514		1.00	
30		3.1			54	1396		0.15	0.139
31		2.5	209	4358	61	1272	<0.9	0.10	<0.100
Total	**2.43**	**3.6**	**Average**	**5348**		**1964**		**1.22**	

November 2018			Influent (64 Degrees F)				Effluent (60 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.33	3.8	218	6909	125	3962	<0.8	0.30	0.112
2	0.01	3.4	196	5558	122	3459	<1.1	0.20	
3	0.27	2.9			45	1098		0.10	
4	0.04	4.5			44	1651		0.31	
5	0.15	4.1			120	4103		0.51	
6		3.8			178	5641		0.65	<0.100
7		2.2	212	3890	64	1174		0.50	
8	0.12	3.4	221	6267	140	3970	1.6	0.30	0.228
9		3.0	240	6005	178	4454	2.0	0.70	
10		3.2			76	2028	<1.6	0.45	
11		3.2			87	2322		0.39	
12	0.14	3.4			136	3856		0.43	
13		3.7			77	2376		0.20	0.415
14		5.8	131	6337	40	1935	<1.4	0.20	
15		3.8	213	6750	188	5958	<1.5	<0.10	0.115
16			348		198		<1.5	0.60	
17		3.1			40	1034		0.21	
18	0.07	3.1			34	879		0.96	
19		3.3			64	1761		0.40	
20		2.7			64	1441		0.25	0.174
21		3.1	169	4369	53	1370	0.7	<0.10	0.131
22		2.9			99	2394		0.60	
23	0.15	2.9			134	3241		<0.10	
24		3.0			54	1351		0.30	
25	0.01	3.0			45	1126		<0.11	
26		3.1			45	1163		0.52	
27		3.0			72	1801		<0.10	0.128
28		2.8	313	7309	81	1892	<1.6	0.30	
29		2.7	269	6057	188	4233	<1.6	0.30	0.146
30	0.73	2.9	364	8804	302	7304	<1.7	2.60	
Total	**2.02**	**3.2**	**Average**	**6205**		**2723**		**0.49**	

December 2018			Influent (61 Degrees F)				Effluent (56 Degrees F)		
Date	Rainfall (in)	Flow Treated (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	BOD(5) (mg/l)	TSS (mg/l)	NH3-N (mg/l)
1	0.34	6.8			27	1509		0.22	
2		5.0			54	2252		0.53	
3		4.4			41	1490		<0.11	
4		3.9			57	1838		0.42	0.364
5		3.3	154	4238	40	1101	<1.5	<0.10	
6		3.3	246	6770	186	5119	<1.5	0.20	0.136
7		3.0	328	8207	278	6956	<1.2	0.40	
8		3.2			130	3469		<0.11	
9		3.8			52	1648		<0.08	
10		3.1			71	1836		<0.12	
11		2.9			114	2757		0.36	2.150
12		3.4	216	6125	70	1985	<1.6	0.40	
13	0.33	3.4	417	11685	282	7902	1.3	0.55	<0.100
14		4.0	456	15212	354	11809	1.2	0.53	
15		3.3			68	1871		0.33	
16		3.1			43	1112		0.22	
17		3.0			52	1301		0.21	
18		3.3			61	1679		0.63	<0.100
19		3.1	258	6670	71	1836	<1.6	0.50	
20	0.01	2.3			356	6829		1.10	<0.100
21		3.2	490	13077	526	14038	<1.2	0.90	
22		2.9			76	1838		0.11	
23		3.1			140	3620		0.14	
24		2.7			88	1982		0.31	
25		2.2			78	1431		0.40	
26	0.38	2.6	142	3079	47	1026	<1.6	0.53	0.159
27	0.40	6.1			424	21571		0.75	
28		4.0	185	6172	132	4404	1.3	0.80	<0.100
29		4.0			46	1535		0.50	
30		3.0			46	1151		0.30	
31	1.23	9.0			74	5554		0.70	
Total	**2.69**	**3.7**	**Average**	**8124**		**4014**		**0.46**	

APPENDIX J

Appendix J
Shoal Creek Basin
Wastewater Flows/Loads for 2017 & 2018

January 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		2.3			2.3			510	9783				
2		2.9			2.9			354	8562				
3		3.4			3.4			264	7486				
4		3.8			3.8	206	6529	149	4722				
5		2.7			2.7	222	4999	108	2432				
6		3.0			3.0	175	4379	45	1126				
7		2.9			2.9			299	7232				
8		2.8			2.8			242	5651				
9		3.7			3.7			368	11356				
10		3.1			3.1			302	7808	68.7	1776	10.8	279
11		3.1			3.1	409	10574	394	10186				
12		2.6			2.6								
13	0.60	3.5			3.5	360	10508	160	4670				
14	0.80	3.6			3.6			866	26001				
15	0.70	7.1			7.1			92	5448				
16	0.30	6.7			6.7								
17		5.5			5.5			130	5963				
18		5.6			5.6	161	7519	150	7006				
19		5.5			5.5	<66.7	3055	42	1927				
20		5.4			5.4	89	4008	35	1576				
21	0.30	4.7			4.7			261	10231				
22	0.90	6.7			6.7			396	22128				
23		6.4			6.4			299	15959				
24		6.3			6.3			155	8144				
25		5.5			5.5	109	5000	183	8394				
26		5.6			5.6	102	4764	58	2699				
27		5.6			5.6	137	6398	65	3012				
28		5.1			5.1			230	9783				
29		5.2			5.2			240	10408				
30		4.9			4.9			540	22068				
31		5.5			5.5			219	10046				
Total	**3.60**	**4.5**	**Average**		**4.5**		**6158**		**8683**				

February 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		5.8			5.8	178	8610	201	9723				
2		4.4			4.4	96	3534	39	1431				
3		3.8			3.8	187	5926	91	2878				
4		3.9			3.9			355	11547				
5		3.6			3.6			314	9428				
6		3.5			3.5			480	14011				
7		3.5			3.5			317	9253				
8		3.5			3.5	262	7648	354	10333	45.0	1314	7.4	216
9		3.2			3.2	142	3790	62	1660				
10		3.3			3.3	206	5670	115	3165				
11		3.2			3.2			333	8887				
12		3.0			3.0			450	11259				
13	0.11	2.9			2.9			281	6796				
14		3.0			3.0			304	7606				
15		3.1			3.1			347	8971				
16		3.1			3.1	222	5740	143	3697				
17		2.8			2.8	246	5745	70	1623				
18		2.9			2.9			437	10569				
19		3.0			3.0			456	11409				
20	0.06	3.0			3.0			380	9508				
21	0.08	3.4			3.4			386	10945				
22		3.3			3.3	306	8422	340	9357				
23		3.0			3.0	213	5329	48	1201				
24		3.1			3.1	253	6541	105	2715				
25		3.3			3.3			330	9082				
26	0.10	2.8			2.8			392	9154				
27		3.0			3.0			412	10308				
28		3.1			3.1			420	10859				
Total	**0.35**	**3.3**	**Average**		**3.3**		**6087**		**7763**				

March 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.01	3.0			3.0	372	9307	359	8982				
2		2.8			2.8	202	4717	53	1226				
3		3.3			3.3	340	9357	123	3385				
4		3.0			3.0			710	17764				
5		3.1			3.1			569	14711				
6	0.40	3.0			3.0			525	13136				
7		3.6			3.6			366	10989	77.2	2318	11.5	345
8		3.3			3.3	473	13018	440	12110				
9	0.67	3.1			3.1	251	6489	58	1487				
10		3.0			3.0	348	8707	104	2602				
11	0.01	3.0			3.0			380	9508				
12	0.15	3.2			3.2			536	14305				
13	0.01	2.9			2.9			189	4571				
14		3.1			3.1			486	12565				
15		3.2			3.2	547	14553	465	12371				
16		3.0			3.0	254	6355	72	1801				
17		3.1			3.1	236	6102	62	1603				
18		3.3			3.3			472	12990				
19		3.1			3.1			95	2446				
20		2.7			2.7			610	13736				
21		2.7			2.7			420	9458				
22		3.1			3.1	274	7084	325	8403				
23		3.1			3.1	168	4343	59	1512				
24	0.29	3.4			3.4	252	7146	125	3545				
25	0.11	3.4			3.4			689	19537				
26	0.15	3.2			3.2			530	14145				
27	0.42	4.9			4.9			110	4495				
28	0.01	3.8			3.8			295	9349				
29	0.28	4.1			4.1	240	8207	161	5505				
30	0.19	3.9			3.9	186	6050	64	2065				
31		3.8			3.8	354	11219	106	3359				
Total	**2.70**	**3.3**	**Average**		**3.3**		**8177**		**8183**				

April 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.0			4.0			335	11176				
2	0.49	4.4			4.4			360	13211				
3	0.11	4.7			4.7			368	14425				
4	0.81	5.4			5.4			349	15718	53.2	2396	1.5	68
5	0.04	7.6			7.6	232	14705	304	19269				
6		5.9			5.9	85	4168	38	1850				
7		6.0			6.0	142	7106	47	2332				
8		6.2			6.2			316	16340				
9		6.2			6.2			344	17788				
10		5.8			5.8			338	16350				
11		4.2			4.2			316	11069				
12		3.7			3.7	316	9751	361	11140				
13		3.7			3.7	120	3703	39	1203				
14	0.02	3.6			3.6	207	6215	118	3543				
15		3.5			3.5			588	17164				
16	1.03	4.7			4.7			482	18893				
17	0.04	5.4			5.4			452	20356				
18		4.3			4.3			296	10615				
19		3.7			3.7	236	7282	342	10553				
20	0.32	4.3			4.3	158	5666	45	1596				
21	2.05	10.2			10.2	188	15993	68	5785				
22	0.10	9.6			9.6			244	19536				
23		8.3			8.3			139	9622				
24		7.1			7.1			161	9533				
25	0.56	7.5			7.5			200	12510				
26	0.58	4.7			4.7	113	4429	44	1740				
27	0.01	9.6			9.6	90		43	3467				
28	0.24	8.2			8.2	173	11831	134	9164				
29	4.52	12.8		6.9	19.7			138	22616				
30	0.32	13.7		11.3	25.0			200	41700				
Total	**11.24**	**6.3**	**Average**		**6.9**		**8259**		**12342**				

May 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.01	11.3		6.5	17.8			89	13183				
2	0.07	8.9		3.0	11.9			148	14651	21.9	2168	1.8	178
3	1.77	12.2		11.3	23.5	64	12543	106	20775				
4		10.2		4.6	14.8	62	7660	41	4996				
5		10.4		0.6	11.0	<40	3650	21	1876				
6		9.7			9.7			127	10274				
7		8.3			8.3			176	12183				
8		9.2			9.2			224	17187				
9		9.1			9.1			35	2618				
10	0.65	8.2			8.2	201	13746	192	13130				
11	0.96	9.7			9.7	77	6253	37	2993				
12	0.11	9.0			9.0	120	9007	76	5705				
13		9.5			9.5			139	11013				
14		9.3			9.3			41	3149				
15		8.1			8.1			181	12227				
16		6.2			6.2			258	13341				
17	0.02	5.9			5.9	112	5511	44	2145				
18	0.41	4.7			4.7			271	10623				
19	1.97	9.4			9.4	201	15758	105	8232				
20	0.62	14.2			14.2			191	22620				
21		11.4			11.4			112	10649				
22		10.1			10.1			80	6745				
23		9.9			9.9			29	2353				
24		8.8			8.8			162	11890				
25		8.7			8.7	<80	5797	111	8054				
26		6.8			6.8	<66.7	3777	49	2779				
27	0.73	6.9			6.9			215	12372				
28		9.8			9.8			334	27298				
29		7.7			7.7			43	2761				
30	0.03	8.6			8.6			33	2367				
31	0.65	7.7			7.7	114	7321	66	4238				
Total	**8.00**	**9.0**	**Average**		**9.9**		**8275**		**9498**				

June 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.04	6.0			6.0	147	7356	59	2932				
2		5.3			5.3	127	5614	47	2055				
3		5.3			5.3			59	2608				
4	0.97	5.8			5.8			50	2399				
5		6.1			6.1			84	4273				
6		5.7			5.7			194	9222	26.7	1269	3.9	185
7		4.9			4.9	248	10135	269	10993				
8		4.9			4.9	219	8950	234	9563				
9		4.4			4.4	253	9284	230	8440				
10		4.3			4.3			352	12623				
11		4.5			4.5			55	2064				
12		4.1			4.1			108	3693				
13		4.1			4.1			287	9814				
14		4.4			4.4			56	2037				
15	0.11	3.8			3.8			326	10332				
16	0.09	4.0			4.0	395	13177	369	12310				
17	0.90	5.6			5.6			194	9061				
18	0.36	6.0			6.0			74	3693				
19		4.9			4.9			114	4659				
20		4.5			4.5			444	16663				
21		4.1			4.1	193	6599	58	1983				
22		3.9			3.9	410	13336	401	13043				
23	0.54	4.5			4.5	420	15763	490	18390				
24		3.9			3.9			63	2033				
25		3.6			3.6								
26	0.49	4.0			4.0			428	14278				
27	0.12	4.3			4.3			84	3012				
28		3.8			3.8	255	8081	314	9951				
29		4.2			4.2			526	18425				
30	0.56	5.6			5.6	331	15459	362	16907				
Total	**4.18**	**4.7**	**Average**		**4.7**		**10341**		**8188**				

July 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.1			4.1			210	7181				
2		4.0			4.0			352	11743				
3		4.1			4.1			226	7728				
4	1.46	5.0			5.0			71	2940				
5	0.04	5.8			5.8	332	16060	400	19349	26.0	1258	5.6	271
6		5.4			5.4	203	9142	220	9908				
7		4.7			4.7	277	10858	238	9329				
8		4.6			4.6			33	1247				
9		4.2			4.2			126	4414				
10		4.1			4.1			106	3625				
11		3.8			3.8			267	8462				
12		3.6			3.6	320	9608	244	7326				
13		3.8			3.8	301	9539	231	7321				
14	0.56	3.7			3.7	466	14380	358	11047				
15		3.7			3.7			160	4937				
16		3.8			3.8			44	1379				
17		3.5			3.5			306	8932				
18		3.5			3.5			99	2890				
19		3.9			3.9	251	8164	114	3708				
20		3.5			3.5			434	12668				
21		3.4			3.4	527	14944	398	11286				
22		2.9			2.9			26	622				
23	0.01	3.3			3.3			201	5532				
24		3.3			3.3			67	1855				
25		3.6			3.6			141	4233				
26		3.6			3.6	274	8227	70	2087				
27	0.80	3.9			3.9	456	14832	359	11677				
28	0.24	4.3			4.3	415	14883	338	12121				
29		3.8			3.8			59	1857				
30		3.4			3.4			44	1248				
31		3.7						46					
Total	**3.11**	**3.9**	**Average**		**3.9**		**11876**		**6622**				

August 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.08	3.8			3.8			435	13786				
2		3.6			3.6	364	10929	71	2120				
3	0.06	3.4			3.4			236	6692				
4	0.11	3.4			3.4	348	9868	266	7543				
5	0.26	3.7			3.7			188	5801				
6	1.02	5.6			5.6			315	14712				
7		4.3			4.3			42	1506				
8		3.9			3.9			218	7091	43.0	1399	7.3	237
9		3.6			3.6	178	5344	59	1756				
10	0.06	3.7			3.7	362	11171	286	8825				
11	0.66	7.1			7.1	286	16935	133	7875				
12		5.6			5.6			122	5698				
13		5.3			5.3			145	6409				
14		4.8			4.8			56	2234				
15	0.32	4.1			4.1			282	9643				
16	1.46	5.1			5.1	330	14036	302	12845				
17		7.7			7.7	342	21963	328	21064				
18		5.5			5.5	174	7981	163	7477				
19	0.02	5.2			5.2			176	7633				
20		4.5			4.5			268	10058				
21		3.9			3.9			442	14376				
22	1.41	7.2			7.2			248	14892				
23		5.4			5.4	189	8512	196	8827				
24		4.7			4.7	222	8702	184	7212				
25		5.0			5.0	356	14845	284	11843				
26		5.1			5.1			202	8592				
27		4.7			4.7			226	8859				
28		4.1			4.1			306	10463				
29		3.9			3.9			298	9693				
30		3.9			3.9			356	11579				
31		3.4			3.4	337	9556	300	8507				
Total	**5.46**	**4.7**	**Average**		**4.7**		**11653**		**8891**				

September 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.4			3.4	441	12505	348	9868				
2		3.6			3.6			204	6125				
3		3.9			3.9			200	6505				
4		3.4			3.4			216	6125				
5		6.9			6.9			368	21177				
6		6.2			6.2	424	21924	304	15719	54.2	2803	8.3	429
7		3.0			3.0			290	7256				
8		3.3			3.3	473	13018	368	10128				
9		3.5			3.5			252	7356				
10		3.3			3.3			291	8009				
11		3.3			3.3			368	10128				
12		3.8			3.8			316	10015				
13		3.2			3.2	407	10862	346	9234				
14		3.2			3.2	358	9554	236	6298				
15		3.5			3.5	516	15062	305	8903				
16	0.05	4.1			4.1			290	9916				
17	1.03	5.5			5.5			358	16421				
18		4.5			4.5			280	10508				
19		3.9			3.9			298	9693				
20		3.5			3.5	291	8494	235	6860				
21		3.7			3.7	218	6727	80	2469				
22		4.1			4.1	337	11523	322	11010				
23		3.4			3.4			283	8025				
24		3.6			3.6			256	7686				
25		3.0			3.0			386	9658				
26		3.4			3.4			428	12136				
27	0.41	4.6			4.6	425	16305	237	9092				
28		4.3			4.3	380	13628	242	8679				
29		3.9			3.9	662	21532	404	13141				
30		3.8			3.8			182	5768				
Total	**1.49**	**3.9**	**Average**		**3.9**		**13428**		**9464**				

October 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.8			3.8			216	6845				
2		3.6			3.6			353	10598				
3	0.32	3.5			3.5			342	9983	65.7	1918	10.7	312
4	0.14	4.0			4.0			71	2362				
5		3.8			3.8	483	15307	163	5166				
6		3.6			3.6	251	7536	70	2102				
7	0.20	3.8			3.8			258	8177				
8		2.6			2.6			361	7828				
9	0.81	3.7			3.7			336	10368				
10	0.17	5.0			5.0			306	12760				
11		3.8			3.8	274	8684	201	6370				
12		4.0			4.0	221	7373	79	2625				
13		3.3			3.3	188	5174	80	2202				
14	0.32	3.6			3.6			366	10989				
15	0.84	6.4			6.4			454	24233				
16		4.6			4.6			242	9365				
17		4.0			4.0			207	6906				
18		3.9			3.9	234	7611	319	10376				
19		3.7			3.7	309	9535	352	10862				
20		3.4			3.4	322	9131	296	8393				
21	0.66	3.4			3.4			296	8393				
22	0.85	8.2			8.2			313	21405				
23		6.0			6.0			168	8407				
24		5.0			5.0			220	9174				
25		4.6			4.6	377	14463	295	11317				
26		4.2			4.2	426	14922	264	9247				
27		4.7			4.7	284	11132	232	9094				
28		4.3			4.3			208	7459				
29		4.1			4.1			250	8549				
30		3.2			3.2			1040	27756				
31		4.3			4.3			388	13914				
Total	**4.31**	**4.2**	**Average**		**4.2**		**10079**		**9781**				

November 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.6			3.6	265	7956	360	10809				
2		3.6			3.6	204	6125	96	2882				
3		4.1			4.1	405	13849	396	13541				
4		4.1			4.1			137	4685				
5		3.7			3.7			278	8579				
6		3.4			3.4			572	16220				
7		3.1			3.1			512	13237	75.3	1947	13.0	336
8		3.6			3.6	464	13931	480	14412				
9		3.2			3.2	406	10835	508	13558				
10		3.4			3.4	221	6267	83	2345				
11		3.8			3.8			306	9698				
12	0.01	3.5			3.5			318	9282				
13		3.6			3.6			464	13931				
14	0.05	3.4			3.4			804	22798				
15	0.10	3.8			3.8	826	26178	782	24783				
16		3.8			3.8	654	20727	574	18191				
17		3.6			3.6	475	14261	470	14111				
18	0.10	3.7			3.7			312	9628				
19		3.4			3.4			458	12987				
20		3.7			3.7			357	11016				
21		3.5			3.5			568	16580				
22		4.0			4.0	328	10942	335	11176				
23		3.6			3.6			430	12910				
24		3.2			3.2			620	16547				
25		3.5			3.5			332	9691				
26		3.7			3.7			408	12590				
27		3.4			3.4			410	11626				
28		3.5			3.5			402	11734				
29	0.26	4.0			4.0	401	13377	328	10942				
30		3.5			3.5	527	15383	464	13544				
Total	**0.52**	**3.6**	**Average**		**3.6**		**13319**		**12468**				

December 2017		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.5			3.5	448	13077	480	14011				
2		3.6			3.6			300	9007				
3		3.5			3.5			402	11734				
4	0.05	3.2			3.2			454	12116				
5		3.1			3.1			443	11453	73.9	1911	10.1	261
6		3.4			3.4	444	12590	472	13384				
7		3.6			3.6	465	13961	484	14532				
8		3.4			3.4	333	9443	204	5785				
9		3.0			3.0			220	5504				
10		3.3			3.3			354	9743				
11		3.3			3.3			517	14229				
12		3.5			3.5			344	10041				
13		3.1			3.1	432	11169	434	11221				
14		3.2			3.2	542	14465	502	13397				
15		3.3			3.3	324	8917	320	8807				
16		3.5			3.5			314	9166				
17	0.45	4.0			4.0			410	13678				
18		3.2			3.2			505	13477				
19		3.2			3.2			336	8967				
20	0.01	3.5			3.5			482	14070				
21		3.2			3.2	368	9821	315	8407				
22	0.76	3.4			3.4	454	12874	632	17921				
23	0.25	6.4			6.4			398	21244				
24		4.3			4.3			230	8248				
25		3.1			3.1			396	10238				
26		4.5			4.5			203	7619				
27		3.8			3.8			310	9825				
28		3.5			3.5	287	8378	236	6889				
29		5.6			5.6	241	11256	197	9201				
30		4.4			4.4			380	13944				
31		4.0			4.0			474	15813				
Total	**1.52**	**3.7**	**Average**		**3.7**		**11450**		**11409**				

January 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.4			3.4			273	7741				
2		3.5			3.5			412	12026				
3		3.7			3.7	228	7036	163	5030	51.8	1598	10.4	321
4		3.9			3.9	358	11644	430	13986				
5		3.7			3.7	380	11726	326	10060				
6		3.7			3.7			404	12467				
7	0.42	3.9			3.9			312	10148				
8		4.5			4.5			562	21092				
9		4.2			4.2			486	17024				
10		3.8			3.8	303	9603	205	6497				
11	0.02	3.6			3.6	290	8707	404	12130				
12		3.7			3.7	455	14040	438	13516				
13		3.9			3.9								
14	0.01	3.6			3.6								
15		3.7			3.7								
16		3.6			3.6								
17		3.8			3.8								
18		4.0			4.0								
19		3.8			3.8	464	14705	496	15719				
20		4.4			4.4			167	6128				
21	0.01	3.9			3.9			496	16133				
22		4.2			4.2			425	14887				
23		4.1			4.1			396	13541				
24		4.5			4.5	572	21467	702	26346				
25		3.7			3.7			414	12775				
26		3.8			3.8	448	14198	492	15592				
27		3.8			3.8			430	13628				
28		3.6			3.6			552	16573				
29		3.4			3.4			714	20246				
30		3.3			3.3			434	11945				
31		3.3			3.3			722	19871				
Total	**0.46**	**3.8**	**Average**		**3.8**		**12570**		**13804**				

February 2018		Wastewater Flows				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		3.1			3.1	416	10755	532	13754				
2		3.5			3.5	491	14332	470	13719				
3		3.4			3.4			386	10945				
4	0.01	3.5			3.5			1175	34298				
5		3.5			3.5			6155	179664				
6		3.1			3.1			2044	52846	213.0	5507	43.9	1135
7		3.6			3.6	499	14982	796	23899				
8		3.7			3.7	678	20922	802	24748				
9		3.5			3.5	463	13515	472	13778				
10		3.6			3.6			328	9848				
11		3.2			3.2			56	1481				
12		3.5			3.5			724	21134				
13		3.2			3.2			881	23512				
14		3.0			3.0			222	5554				
15		3.4			3.4	478	13554	366	10378				
16		3.8			3.8	647	20505	760	24086				
17	0.33	4.4			4.4			288	10568				
18		3.8			3.8			430	13628				
19	0.93	6.7			6.7			356	19893				
20	1.19	13.3			13.3			582	64557				
21		13.5			13.5	<100	11248	95	10696				
22	0.15	9.3			9.3								
23	1.33	10.2			10.2								
24	0.79	14.9			14.9			231	28705				
25		11.5			11.5			41	3884				
26		10.8			10.8			27	2432				
27	0.20	9.5			9.5			30	2393				
28	0.01	8.5			8.5	84	5983	70	4962				
Total	**4.94**	**6.1**	**Average**		**6.1**		**13977**		**24052**				

March 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		8.6			8.6	<80.0	5731	110	7890				
2		9.0			9.0	129	9683	121	9082				
3		6.6			6.6			22	1189				
4	0.22	5.5			5.5			115	5275				
5		5.8			5.8			129	6240				
6		6.4			6.4			102	5444	28.6	1527	9.2	491
7		6.1			6.1	113	5749	86	4355				
8		4.4			4.4	222	8147	181	6642				
9		4.6			4.6	171	6560	226	8670				
10		4.7			4.7			50	1960				
11		4.2			4.2			37	1307				
12		4.0			4.0			242	8073				
13		4.3			4.3			98	3507				
14		4.0			4.0	262	8740	174	5805				
15		3.8			3.8	214	6782	212	6719				
16	0.11	3.8			3.8	237	7511	225	7131				
17		3.1			3.1			75	1939				
18	0.01	3.9			3.9			179	5822				
19	0.11	3.7			3.7			304	9381				
20	0.10	3.8			3.8			83	2643				
21		3.8			3.8	184	5831	108	3423				
22		3.8			3.8	342	10839	405	12835				
23		3.6			3.6	274	8227	318	9548				
24		3.5			3.5			111	3240				
25	0.13	3.7			3.7			117	3610				
26	0.25	4.0			4.0			83	2782				
27	2.29	9.4			9.4			108	8467				
28	0.01	8.9			8.9	97	7170	71	5292				
29	0.33	8.4			8.4	105	7356	110	7706				
30		6.4			6.4	184	9821	237	12650				
31	0.04	6.0			6.0			38	1902				
Total	**3.60**	**5.2**	**Average**		**5.2**		**7725**		**5824**				

April 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.24	5.6			5.6			38	1775				
2	0.02	5.6			5.6			68	3185				
3	0.03	6.1			6.1			90	4579	27.5	1399	2.8	142
4		5.2			5.2	218	9454	173	7503				
5		4.7			4.7	267	10466	268	10505				
6	0.07	4.3			4.3	252	9037	216	7746				
7	0.01	4.8			4.8			78	3102				
8		4.7			4.7			42	1646				
9		4.7			4.7			59	2297				
10		4.3			4.3			334	11978				
11		4.1			4.1	275	9403	130	4445				
12		4.4			4.4	253	9284	242	8880				
13	0.05	4.2			4.2	382	13381	306	10719				
14		3.9			3.9			296	9628				
15		3.9			3.9			54	1740				
16		4.2			4.2			79	2781				
17		3.9			3.9			188	6115				
18		3.9			3.9	166	5399	123	4001				
19		4.1			4.1	315	10771	368	12583				
20		4.1			4.1	341	11660	308	10532				
21	0.32	3.9			3.9			141	4586				
22	0.34	6.1			6.1			140	7122				
23		4.8			4.8			38	1505				
24		4.0			4.0			210	7006				
25	1.03	5.6			5.6	160	7473	94	4390				
26		6.2			6.2	244	12617	254	13134				
27		4.9			4.9	196	8010	185	7560				
28		4.8			4.8			37	1461				
29		4.5			4.5			42	1557				
30		4.4			4.4			64	2330				
Total	**2.11**	**4.7**	**Average**		**4.7**		**9746**		**5880**				

May 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.2			4.2			62	2172				
2	0.06	4.1			4.1	212	7249	97	3317	36.6	1252	8.4	287
3	0.45	5.9			5.9	270	13286	277	13630				
4		5.1			5.1	281	11952	275	11697				
5		4.3			4.3			58	2062				
6	0.06	3.5			3.5			157	4583				
7		4.0			4.0			97	3226				
8		4.2			4.2			118	4133				
9		4.0			4.0	257	8574	166	5538				
10	0.08	3.8			3.8	265	8398	284	9001				
11		3.7			3.7	254	7838	238	7344				
12		4.1			4.1			60	2052				
13		3.6			3.6			78	2342				
14	0.20	3.6			3.6			79	2372				
15	0.71	6.3			6.3			198	10403				
16		4.6			4.6	179	6867	160	6138				
17	0.17	4.2			4.2	317	11104	327	11454				
18		4.0			4.0	336	11209	284	9474				
19		4.1			4.1			93	3166				
20	1.22	7.3			7.3			91	5559				
21		7.7			7.7			107	6871				
22		7.0			7.0			83	4816				
23	0.31	7.0			7.0			60	3474				
24	0.21	6.3			6.3	156	8197	190	9983				
25		5.9			5.9	209	10284	202	9940				
26		5.0			5.0			250	10425				
27		3.8			3.8			282	8937				
28		3.3			3.3			242	6660				
29		4.4			4.4			99	3633				
30	0.02	4.3			4.3	197	7065	112	4017				
31	0.03	4.0			4.0	324	10809	301	10041				
Total	**3.52**	**4.8**	**Average**		**4.8**		**9449**		**6402**				

June 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.2			4.2	286	10018	308	10789				
2		4.1			4.1			286	9779				
3		5.4			5.4			60	2702				
4		3.4			3.4			96	2722				
5		3.4			3.4			154	4367	38.0	1078	8.7	247
6		3.7			3.7	202	6233	219	6758				
7		3.7			3.7	328	10121	312	9628				
8		3.7			3.7	338	10430	300	9257				
9		3.8			3.8			136	4310				
10		3.6			3.6			85	2552				
11		3.5			3.5			155	4524				
12	1.23	6.0			6.0			142	7106				
13		6.2			6.2	143	7394	111	5740				
14		4.6			4.6	250	9591	270	10358				
15		4.2			4.2	300	10508	223	7811				
16		3.8			3.8			138	4373				
17		3.6			3.6			233	6996				
18		3.7			3.7			63	1929				
19		3.5			3.5			93	2715				
20	1.27	4.8			4.8	218	8727	95	3803				
21		5.0			5.0	193	8048	212	8840				
22		4.1			4.1	330	11284	192	6565				
23		4.1			4.1			71	2428				
24	0.20	4.9			4.9			60	2452				
25		4.6			4.6			52	1995				
26	0.29	4.4			4.4			70	2569				
27		5.7			5.7	218	10363	52	2448				
28		4.1			4.1	230	7865	229	7830				
29		4.0			4.0			234	7806				
30		3.3			3.3			74	2037				
Total	**2.99**	**4.2**	**Average**		**4.2**		**9215**		**5440**				

July 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.8			4.8			83	3303				
2		4.3			4.3			65	2331				
3	0.68	3.8			3.8			116	3676				
4		3.5			3.5			257	7502				
5		3.5			3.5	192	5604	196	5721				
6		3.9			3.9	183	5952	216	7026				
7		3.6			3.6			266	7986				
8		3.1			3.1			228	5895				
9		3.6			3.6			44	1321				
10		3.4			3.4			58	1645	31.4	890	7.0	198
11		3.8			3.8	165	5229	89	2821				
12		3.7			3.7	225	6943	254	7838				
13	0.10	3.7			3.7	298	9196	314	9689				
14		3.6			3.6			83	2486				
15	0.07	3.4			3.4			66	1857				
16		4.1			4.1			62	2103				
17	0.02	3.9			3.9			71	2293				
18		3.9			3.9	443	14409	430	13986				
19	0.10	4.2			4.2	493	17269	474	16603				
20		3.8			3.8	392	12423	335	10617				
21		4.1			4.1			309	10566				
22		3.6			3.6			87	2612				
23		3.6			3.6			71	2132				
24		3.8			3.8			107	3391				
25		3.5			3.5	388	11326	160	4670				
26	0.01	3.7			3.7			312	9628				
27		3.6			3.6	347	10418	296	8887				
28		3.7			3.7			61	1882				
29	0.04	4.8			4.8			69	2762				
30	0.02	4.2			4.2			94	3293				
31		4.0			4.0			102	3403				
Total	**1.04**	**3.8**	**Average**		**3.8**		**9877**		**5481**				

August 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		4.0			4.0	243	8106	68	2268				
2		4.0			4.0	418	13944	294	9808				
3		3.9			3.9	373	12132	275	8945				
4		3.6			3.6			48	1441				
5		3.8			3.8			72	2282				
6		3.6			3.6			115	3453				
7	0.36	4.3			4.3			75	2690	47.8	1714	8.9	319
8		4.4			4.4	127	4660	48	1743				
9	0.13	3.8			3.8	315	9983	265	8398				
10		3.5			3.5	334	9749	255	7443				
11		4.0			4.0			91	3049				
12	0.09	3.7			3.7			54	1651				
13	0.35	3.9			3.9			52	1675				
14	0.47	4.1			4.1			53	1795				
15	0.57	6.7			6.7	176	9835	82	4582				
16		5.7			5.7	182	8652	191	9080				
17	0.56	8.1			8.1	249	16821	236	15943				
18		5.9			5.9			36	1771				
19	2.26	9.1			9.1			45	3385				
20	0.01	9.0			9.0			54	4053				
21		8.3			8.3			36	2464				
22		7.4			7.4	103	6357	32	2000				
23	0.60	7.6			7.6	137	8684	132	8367				
24		7.6			7.6	166	10522	158	10015				
25		6.4			6.4			32	1708				
26		5.1			5.1			33	1404				
27		4.9			4.9			61	2493				
28		4.9			4.9			65	2636				
29		4.9			4.9			47	1900				
30	1.22	6.3			6.3	257	13503	276	14502				
31		6.9			6.9	189	10876	196	11279				
Total	**6.62**	**5.5**	**Average**		**5.5**		**10273**		**4975**				

September 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		5.8			5.8			50	2419				
2		4.7			4.7			214	8388				
3		4.4			4.4			179	6569				
4		4.6			4.6			54	2052				
5	0.07	6.1			6.1	156	7936	67	3409	41.0	2086	5.5	280
6	1.20	8.7			8.7	196	14221	203	14729				
7	0.46	10.1			10.1								
8	0.33	10.6			10.6			37	3236				
9		8.5			8.5			13	943				
10		7.4			7.4			25	1561				
11		6.4			6.4			26	1409				
12		5.8			5.8	112	5418	37	1809				
13		5.6			5.6	177	8267	146	6819				
14		5.0			5.0	199	8298	187	7798				
15		4.7			4.7			75	2920				
16		4.7			4.7			66	2567				
17		5.4			5.4			42	1892				
18		6.2			6.2			35	1810				
19		5.3			5.3	132	5835	48	2122				
20		4.5			4.5	337	12648	345	12948				
21	0.15	5.5			5.5	234	10734	229	10504				
22		4.6			4.6			69	2632				
23		4.2			4.2			49	1727				
24		4.0			4.0			62	2068				
25	0.02	4.0			4.0			118	3936				
26		3.9			3.9	201	6538	95	3090				
27		2.9			2.9	497	12020	322	7788				
28		2.8			2.8	323	7543	208	4857				
29		3.0			3.0			81	2037				
30		3.2			3.2			62	1641				
Total	**2.23**	**5.4**	**Average**		**5.4**		**9042**		**4334**				

October 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1		2.9			2.9			83	1995				
2		2.8			2.8			100	2335	38.7	904	4.6	107
3		2.9			2.9	202	4886	51	1233				
4	0.27	3.2			3.2	196	5231	65	1735				
5		3.4			3.4	170	4821	64	1815				
6	0.68	3.8			3.8			58	1838				
7	0.14	6.2			6.2			47	2410				
8		5.4			5.4			30	1351				
9	0.36	4.7			4.7			31	1196				
10	0.02	5.0			5.0	131	5463	39	1605				
11		4.1			4.1	108	3693	65	2223				
12	0.18	3.5			3.5	139	4057	51	1474				
13	0.13	3.8			3.8			75	2361				
14	0.07	3.7			3.7			69	2129				
15	0.01	3.8			3.8			30	951				
16		4.4			4.4			53	1934				
17		3.4			3.4	165	4679	55	1548				
18		3.1			3.1	215	5559	114	2947				
19	0.30	3.7			3.7	178	5493	75	2327				
20		3.5			3.5			63	1839				
21		3.2			3.2			56	1495				
22		2.8			2.8			101	2359				
23		3.2			3.2			68	1815				
24		3.3			3.3	206	5670	75	2064				
25	0.27	3.9			3.9	295	9595	178	5790				
26		3.1			3.1	233	6024	110	2844				
27		3.4			3.4			60	1701				
28		2.9			2.9			57	1379				
29		3.0			3.0			61	1514				
30		3.1			3.1			54	1396				
31		2.5			2.5	209	4358	61	1272				
Total	**2.43**	**3.6**	**Average**		**3.6**		**5348**		**1964**				

November 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.33	3.8			3.8	218	6909	125	3962				
2	0.01	3.4			3.4	196	5558	122	3459				
3	0.27	2.9			2.9			45	1098				
4	0.04	4.5			4.5			44	1651				
5	0.15	4.1			4.1			120	4103				
6		3.8			3.8			178	5641	40.5	1284	3.0	95
7		2.2			2.2	212	3890	64	1174				
8	0.12	3.4			3.4	221	6267	140	3970				
9		3.0			3.0	240	6005	178	4454				
10		3.2			3.2			76	2028				
11		3.2			3.2			87	2322				
12	0.14	3.4			3.4			136	3856				
13		3.7			3.7			77	2376				
14		5.8			5.8	131	6337	40	1935				
15		3.8			3.8	213	6750	188	5958				
16						348		198					
17		3.1			3.1			40	1034				
18	0.07	3.1			3.1			34	879				
19		3.3			3.3			64	1761				
20		2.7			2.7			64	1441				
21		3.1			3.1	169	4369	53	1370				
22		2.9			2.9			99	2394				
23	0.15	2.9			2.9			134	3241				
24		3.0			3.0			54	1351				
25	0.01	3.0			3.0			45	1126				
26		3.1			3.1			45	1163				
27		3.0			3.0			72	1801				
28		2.8			2.8	313	7309	81	1892				
29		2.7			2.7	269	6057	188	4233				
30	0.73	2.9			2.9	364	8804	302	7304				
Total	**2.02**	**3.3**	**Average**		**3.3**		**6205**		**2723**				

December 2018		Wastewater Flow				Influent Load							
Date	Rainfall (in)	WWTP Discharge (MGD)	To Basin (MGD)	Basin Discharge (MGD)	Total System (MGD)	BOD(5) (mg/l)	BOD(5) (lb/day)	TSS (mg/l)	TSS (lb/day)	TKN (mg/l)	TKN (lb/day)	Phosph (mg/l)	Phosph (lb/day)
1	0.34	6.8			6.8			27	1509				
2		5.0			5.0			54	2252				
3		4.4			4.4			41	1490				
4		3.9			3.9			57	1838	39.7	1291	4.9	159
5		3.3			3.3	154	4238	40	1101				
6		3.3			3.3	246	6770	186	5119				
7		3.0			3.0	328	8207	278	6956				
8		3.2			3.2			130	3469				
9		3.8			3.8			52	1648				
10		3.1			3.1			71	1836				
11		2.9			2.9			114	2757				
12		3.4			3.4	216	6125	70	1985				
13	0.33	3.4			3.4	417	11685	282	7902				
14		4.0			4.0	456	15212	354	11809				
15		3.3			3.3			68	1871				
16		3.1			3.1			43	1112				
17		3.0			3.0			52	1301				
18		3.3			3.3			61	1679				
19		3.1			3.1	258	6670	71	1836				
20	0.01	2.3			2.3			356	6829				
21		3.2			3.2	490	13077	526	14038				
22		2.9			2.9			76	1838				
23		3.1			3.1			140	3620				
24		2.7			2.7			88	1982				
25		2.2			2.2			78	1431				
26	0.38	2.6			2.6	142	3079	47	1026				
27	0.40	6.1			6.1			424	21571				
28		4.0			4.0	185	6172	132	4404				
29		4.0			4.0			46	1535				
30		3.0			3.0			46	1151				
31	1.23	9.0			9.0			74	5554				
Total	**2.69**	**3.7**	**Average**		**3.7**		**8124**		**4014**				