Attachment B

Item 1 - Facility Plan (Burns & McDonnell, 2025)

BURNS McDONNELL

CITY OF SEDALIA, MISSOURI

NORTH & CENTRAL WWTPs FACILITY PLAN

REVISION NUMBER A
REVISION DATE: AUGUST 19, 2025

North & Central WWTPs Facility Plan

prepared for

City of Sedalia, Missouri
Facility Plan

Project No. 172636

Revision A
08/19/2025

prepared by

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

INDEX AND CERTIFICATION

City of Sedalia, Missouri

North & Central WWTPs Facility Plan
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Report Index

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 Sedalia, Missouri or others without specific verification or adaptation by the Engineer.

Paul Ward, P.E., MO#2016017691

Date: **August 19, 2025**

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List of Abbreviations

Abbreviation	Term/Phrase/Name
AO	Anaerobic-Oxic
AACE	Association for the Advancement of Cost Engineering
ACH	Air Changes per Hour
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADF	Average Day Flow
AGS	Aerobic Granular Sludge
AHU	Air Handling Unit
AISC	American Institute of Steel Construction
Alum	Aluminum Sulfate
AML	Average Monthly Limit
ARC	Aluminum Rigid Conduit
ARM	Arc flash Reduction Maintenance
ASCE	American Society of Civil Engineers
ATO	Automatic Throw-Over
ATS	Automatic Transfer Switch
AWL	Average Weekly Limit
BFP	Belt Filter Press
BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
BODR	Basis of Design Report
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CBOD	Carbonaceous Biochemical Oxygen Demand
CIP	Capital Improvements Plan
CMU	Concrete Masonry Unit
COD	Chemical Oxygen Demand
DI	Deionized
DO	Dissolved Oxygen
EQ	Equalization
FRP	Fiber-Reinforced Plastic
HVAC	Heating, Ventilation and Air Conditioning

I&C	Instrumentation and Controls
IBC	International Building Code
IES	Illuminating Engineering Society
IPS	Influent Pump Station
IR	Internal Recycle
MCC	Motor Control Center
MCWL	Missouri Clean Water Law
MDNR	Missouri Department of Natural Resources
MGD	Million Gallons per Day
MH	Manhole
MLSS	Mixed Liquor Suspended Solids
MM	Maximum Month
MOP	Manual of Practice (WEF)
NEC	National Electrical Code
NFPA	National Fire Protection Association
NH_3-N	Ammonia-Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
NPW	Non-Potable Water
O&M	Operations and Maintenance
OPC	Opinion of Probable Cost
ORP	Oxidation-Reduction Potential
P&ID	Process and Instrumentation Diagram
PAO	Phosphorus Accumulating Organism
PCS	Plant Control System
PFD	Process Flow Diagram
PLC	Programmable Logic Controller
POC	Pollutants of Concern
R/C	Reinforced Concrete
RAS	Return Activated Sludge
SCADA	Supervisory Control and Data Acquisition
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
SRF	State Revolving Fund
SRT	Solids Retention Time

SWD	Side Water Depth
TKN	Total Kjeldahl Nitrogen
TM	Technical Memorandum
TN	Total Nitrogen
TP	Total Phosphorus
TPO	Thermoplastic Polyolefin
TS	Total Solids
TSS	Total Suspended Solids
UV	Ultraviolet
VFD	Variable Frequency Drive
WAS	Waste Activated Sludge
WEF	Water Environment Federation
WWTP	Wastewater Treatment Plant

Foreword

The City of Sedalia submitted a Facility Plan on February 28, 2025, which included a planned approach to managing the existing North and Central Wastewater Treatment Plants (WWTPs) through construction of a new greenfield North WWTP and providing limited improvements to the existing Central WWTP. Following submission, the opinion of probable cost (OPC) for the City to accomplish all desired work at both plants was updated, and the current OPC for that approach is approximately $74M, which exceeds the established budget and bonding capacity of $60M. This OPC included all cost savings measures that could be identified and is considered the minimum project cost for the approach.

Following Facility Plan submission, the City and Burns & McDonnell (BMcD) continued to evaluate additional means to reduce the OPC for a North and Central Service Area long-term plan. A fourth alternative was identified and developed, which consisted of conveying dry weather North Service Area sewage flows to the Central WWTP and eliminating the North WWTP (this approach has been termed the *Central Consolidation* project). This proposed alternative would consist of a new screening & pump station facility at the existing North WWTP site, including means for wet weather overflows to be directed to the existing North Equalization (EQ) Basin. Peak flows of up to 4.5 MGD would be pumped from the North Service Area to the Central WWTP. Central WWTP would be expanded to a total design flow of 4.0 MGD, which would accommodate North and Central Service Area average day flows of 1.5 MGD and 2.5 MGD, respectively. Note that the Central WWTP is currently permitted for a design flow of 3.03 MGD. This planning effort evaluated current flows and projected future population growth for the Central Consolidation project (Alternative No. 4) to establish the Central Service Area design flow of 2.5 MGD.

The Central Consolidation Project was evaluated similarly to the previous Facility Plan alternatives and was determined to be a more affordable option for the City. Additionally, the City views the consolidation of the two WWTPs into a single facility to be a major advantage that will save the City on operations & maintenance (O&M), labor and administrative expenses.

The City proposes that the previously submitted Facility Plan be superseded with the following amended Facility Plan. This amended plan has been revised to include the Central Consolidation Project as a fourth alternative and previous content that is no longer pertinent to the City's selected alternative has been removed to remove ambiguity.

1.0 Introduction

The City of Sedalia (City) owns and operates three wastewater treatment plants (WWTPs) – the Southeast WWTP, Central WWTP, and North WWTP. The existing North WWTP is in the northern sewershed of Sedalia, located near the intersection of Highway 65 and N. Grand Ave. The Central WWTP serves the central sewershed and is located immediately NW of the Central sewershed boundary. The Southeast WWTP is not included in the scope of this report. A map of the facilities and sewershed boundaries is shown in Figure 1-1.

Due to periods of non-compliance with the North WWTP and Central WWTP National Pollutant Discharge Elimination System (NPDES) permits in recent years, the Missouri Department of National Resources (MDNR) issued an Abatement Order on Consent (AOC) in March 2024. The AOC requires that the City prepare and submit a Facility Plan to address improvements required for the North and Central WWTPs to comply with the Missouri Clean Water Law (MCWL) and all respective permit limits. Additionally, the Facility Plan must include an evaluation of the industrial pretreatment program and provide a framework for improvements – see Appendix C.

The North WWTP was originally constructed in 1946 and was upgraded in 1964 to a trickling filter plant. The WWTP is rated for 2.5 million gallons per day (MGD) and currently treats an average daily flow of 0.71 MGD. In addition to domestic wastewater flows, the WWTP receives flow from industrial and commercial entities. Solids generated onsite are dewatered and hauled to the City's composting facility. The City anticipates both industrial and residential growth in the northern sewershed.

The condition of the nearly 80-year old North WWTP is poor, with equipment aging and deteriorating, and many assets failing. Effluent quality has periodically violated permit limits for biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia, and copper. Additionally, it is anticipated that future permit limits will become more stringent for copper and ammonia, and will include a total phosphorus (TP) limit of 1 mg/L by January 2033. Total nitrogen (TN) removal may be required, or become a goal, within the 20-year planning horizon but has not been forecasted definitively. The AOC requires the North WWTP be in compliance for effluent ammonia and *E. coli* by April 1, 2029; the existing treatment system is unable to achieve the effluent ammonia requirements. A wastewater master plan was completed in 2022, which determined that rehabilitation of the existing North WWTP to meet the proposed limits and provide a resilient treatment facility was not a feasible approach. The approach to addressing needs in the North Service Area includes either constructing a new North WWTP, or pursuing Central Consolidation, which includes pumping of North Service Area sewage flows to the Central

WWTP and elimination of a North WWTP and the associated permitted outfall. The City owns property approximately 0.8 miles northeast of the existing North WWTP, and north of the existing North Equalization (EQ) Basin. This site is assumed to be used for alternatives including a new North WWTP.

The Central WWTP was originally constructed in 1949 as a trickling filter plant but was upgraded to an activated sludge plant in 2001. The Central WWTP is rated for 3.03 MGD and currently treats an average day flow of 1.77 MGD. The facility has aging infrastructure and limited solids handling capacity, resulting in occasional solids accumulation in the secondary treatment process. Areas requiring immediate improvement include influent screening and solids dewatering. The existing automatic mechanical screen has failed and is no longer operational, and the solids dewatering operation consists of a single rental belt filter press that has been in use since January 2024, after the existing permanent dewatering system was taken out of service.

1.1 Purpose

This Facility Plan considers four (4) alternatives for the City to address needs at the North and Central WWTPs, including satisfying the administrative order of consent (AOC) at the existing North WWTP and providing facilities that can meet projected permit limits. Three (3) of these alternatives include building a new North WWTP (each with a different biological process configuration) and providing limited improvements at the Central WWTP to address major deficiencies. The fourth alternative considers eliminating the North WWTP and pumping sewage from the North Service Area to the Central WWTP for consolidated treatment. For the Central WWTP, this report evaluates process improvements to meet projected phosphorus effluent limits, documents the key findings of a condition assessment that was performed in July 2024 and evaluates alternatives to address the deficiencies identified. All alternatives consider means for the City to meet projected effluent phosphorus permit limits by 2033.

An additional scope of work was completed to evaluate the existing pretreatment program and provide the City with recommendations to improve the program. This evaluation is included in Appendix C.

1.2 Concept Design & Budget

The City has selected the Central Consolidation alternative, as recommended in the following sections of this Facility Plan. Following discussion of alternatives, conceptual designs are provided for a new North Screening & Pump Station and improvements at the existing Central WWTP to accommodate the consolidation of the North and Central Service Areas into a single WWTP rated for an average design flow of 4 MGD. As the project moves forward into detailed design, the conceptual design approach may be revised and re-evaluated as necessary to maintain the anticipated project costs at or below the stated bonding capacity of $60M.

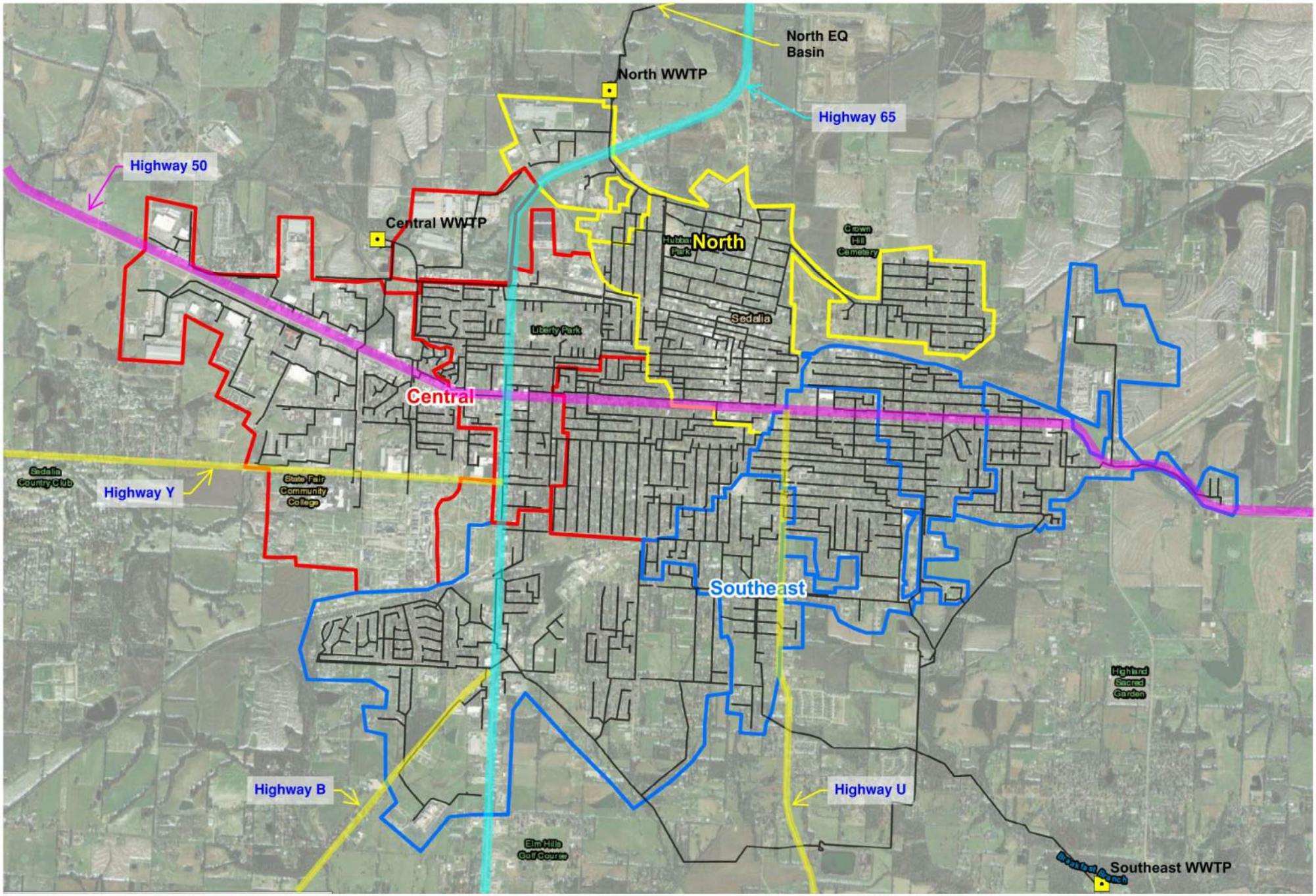

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Figure 1-1

Service Area Map

2.0 North & Central Service Area Basis of Design

The following sections outline the basis of design for the North and Central Service Areas, including a combined basis of design for a Central Consolidation option where flows from both service areas are processed at the Central WWTP.

2.1 North Service Area Basis of Design

The following section includes the proposed design basis for the North Service Area. Operating data from 2019 through 2024 was analyzed to develop a current wastewater quality characterization. In the spring of 2024, multiple weeks of daily wastewater sampling at each of the permitted industries in the North collection basin were conducted to determine the industrial impact on the influent wastewater to the North Plant. Growth in the North Service Area is anticipated, and a design average flow was developed to accommodate future growth.

2.1.1 Population Projection

The City has decided that a design flow of 1.5 MGD is desirable for the new North WWTP. They anticipate industrial and residential growth in the North service area, with average flows after implementation of a new project anticipated to approach 1.0 MGD. A summary of the proposed flows and service area population is shown in Table 2-1 below.

Table 2-1: North WWTP Current and Design Service Population and Avg Flow

Parameter	Service Population	Average Flow, MGD
Current (2024)	3,845 (est)	0.71
Design	8,112 (+ 4,267)[a]	1.50

[a] Growth built into the basis of design assumes municipal strength wastewater contributions.

2.1.2 Current Service Area Flows and Loadings

Influent wastewater quality data from 2019 through 2024 was evaluated to develop the current wastewater flows and loadings from the North Service Area. Statistical analyses used to evaluate the flow and loadings are presented in Table 2-2. The quality of the WWTP operating data was considered questionable due to highly variable influent loadings and peaking factors. During discussions with the City, potential internal recycles, issues with the existing flow meter and lack of totalization capabilities for prolonged periods, and issues maintaining the autosampler were identified as potential sources of error. Additionally, wet weather flows are periodically returned from the wet weather EQ basin, which

may result in dilution of influent concentrations. Alternative methods for establishing the design basis were considered, including estimation of the domestic contribution of the service area using typical per capita loadings based on literature combined with recent industrial sampling campaigns. This method was used to establish the North Service Area design basis.

Table 2-2: Statistical Analyses Used for Flow and Loading Conditions

Parameter	Flow	Pollutant Loading[a]
Minimum	Fifth (5) Percentile	Fifth (5) Percentile
Average Day	Median (50 Percentile)	Median (50 Percentile)
Maximum Month	Max 30-d Running Average	Max 30-d Running Average
Maximum Day	99.7 Percentile	Maximum Value
Peak	Maximum Value	-

[a] Pollutant loading analyses conducted after data trimming as described in TM-1 (Appendix E).

Typical municipal wastewater pollutant loadings were generated using literature values reported in *Wastewater Engineering: Treatment and Resource Recovery* (commonly referred to as Metcalf & Eddy). Peaking factors are required to generate estimated maximum month and maximum day pollutant loadings. Literature values were selected using typical peaking factors as reported in Water Environment Federation (WEF) publication *Design of Water Resource Recovery Facilities, Manual of Practice No. 8* (MOP 8). Based on the calculated influent loadings, it is proposed that the high range of the typical domestic influent loadings be used. Additionally, due to elevated ammonia and TP data points and uncertainty regarding all industrial users in the area, it is proposed that higher than typical peaking factors are used for nutrient loadings. Industrial data was limited to average and maximum analyses due to the limited dataset (8-15 data points per industrial user), and flows and loads were added to the domestic contribution. A summary of industrial contributor pollutant loadings in the North Service Area is provided in Table 2-3, and a summary of the current flows and loadings based on the total data analysis is provided in Table 2-4.

Table 2-3: North Service Area Industrial Contributor Pollutant Loadings

Parameter	Nucor Steel	Stanley Black & Decker	Sierra Bullets	St. Joseph Plastics
TSS, lbs/d				
- Average	2.4	4.6	6.7	175
- Maximum	3.9	10.5	40.6	366
BOD, lbs/d				
- Average	1.8	120	23	74
- Maximum	3.0	141	164	239
NH3-N, lbs/d				
- Average	0.1	0.1	0.1	1.6
- Maximum	0.2	0.2	4.9	2.3
TP, lbs/d				
- Average	0.1	0.9	1.4	0.4
- Maximum	2.6	1.7	3.3	0.9
TKN, lbs/d				
- Average	0.3	11.0	0.5	4.0
- Maximum	0.3	13.9	0.7	5.1

Table 2-4: North Service Area Current Flow & Loadings for Use in Basis of Design

Parameter	Proposed Influent (Literature + Industry)[1]	Peaking Factor	Industrial Contribution
Flow, MGD			
- Average	0.71	-	0.11
- Maximum Month	2.25	3.16	-
- Maximum Day	4.43	6.24	0.32
- Peak	8.51	12.0	-
TSS, lbs/d			
- Average	1,460	-	190
- Maximum Month	2,470	1.69	-
- Maximum Day	3,840	2.63	420
BOD, lbs/d			
- Average	1,220	-	220
- Maximum Month	2,090	1.71	-
- Maximum Day	2,710	2.22	550
NH3-N, lbs/d			
- Average	105	-	1.9
- Maximum Month	160	1.52	-
- Maximum Day	220	2.10	7.6
TP, lbs/d			
- Average	42	-	2.8
- Maximum Month	60	1.43	-
- Maximum Day	85	2.02	8.5
TKN, lbs/d			
- Average	180	-	16
- Maximum Month	280	1.56	-
- Maximum Day	365	2.03	20

[a] Proposed current wastewater quality using high-end per capita loadings per Metcalf & Eddy, and loadings calculated from available industrial contributors.

2.1.3 Future Flow and Loadings

Considering the current average flow of 0.71 MGD, planning for 1.5 MGD will accommodate approximately 0.79 MGD of service area growth. Designing for 1.5 MGD represents an overall growth exceeding two (2) times over the next 20 years. The influent average day and maximum month flows have been scaled up by a factor of 2.11 to arrive at the basis of design. Table 2-5 summarizes the flow and loadings basis of design.

Table 2-5: North Service Area Flow & Loadings Basis of Design

Parameter	Influent Wastewater[a]	Peaking Factor	Industrial Component
Flow, MGD			
- Minimum	0.80	0.53	-
- Average	1.50	-	0.11
- Maximum Month	3.04	2.03	-
- Maximum Day	4.50	3.00	0.32
- Peak	17	11.3	-
TSS, lbs/d			
- Minimum	1,320	0.46	-
- Average	2,870	-	190
- Maximum Month	4,740	1.65	-
- Maximum Day	7,630	2.66	420
BOD, lbs/d			
- Minimum	1,150	0.49	-
- Average	2,330	-	220
- Maximum Month	3,800	1.63	-
- Maximum Day	5,105	2.19	550
NH3-N, lbs/d			
- Minimum	150	0.70	-
- Average	215	-	1.9
- Maximum Month	340	1.58	-
- Maximum Day	450	2.09	7.6
TP, lbs/d			
- Minimum	59	0.70	-
- Average	84	-	2.8
- Maximum Month	125	1.49	-
- Maximum Day	170	2.02	8.5
TKN, lbs/d			
- Minimum	240	0.67	-
- Average	360	-	16
- Maximum Month	560	1.56	-
- Maximum Day	735	2.04	20

[a] Proposed current wastewater quality using high-end per capita loadings per Metcalf & Eddy, and loadings calculated from available industrial contributors.

2.2 North WWTP Regulatory Review

This section provides a schedule of anticipated effluent water quality requirements for the North WWTP. An antidegradation report was generated during the review of new North WWTP alternatives, which established the general requirements anticipated for operating the new facility with a new outfall location. The primary determinations were as follows:

1. Anticipated water quality changes for this site include lower seasonal effluent ammonia anticipated in the NPDES permit issued after construction of the new WWTP, and total phosphorus limit of 1 mg/L in 2033.
2. Since the discharge of the proposed new North WWTP is located north of the existing permitted Outfall 001 and will enter Sewer Branch approximately 1 mile downstream, it is considered a new discharge.

2.2.1 Existing Permit

The North WWTP currently operates under the City's State Operating Permit MO-0023027, provided in Appendix A. Table 2-6 below provides a summary of the water quality requirements of the permit.

Table 2-6: Current NPDES Permit Limits for North WWTP

Parameter	Units	Daily Maximum	Weekly Average	Monthly Average
BOD	mg/L	N/A	45	30
TSS	mg/L	N/A	45	30
Ammonia as N [1] (May 1 – Sept 30)	mg/L	12.1	N/A	2.2
Ammonia as N [1] (Oct 1 – April 31)	mg/L	10.1	N/A	2.9
Oil & Grease	mg/L	15	N/A	10
Copper, Total Recoverable (TR)	ug/L	45.1	-	22.9
Total Phosphorus [2]	mg/L	[2]	N/A	[2]
Total Kjeldahl Nitrogen	mg/L	[2]	N/A	[2]
Nitrite + Nitrate	mg/L	[2]	N/A	[2]
Cadmium, TR	mg/L	3.3	N/A	1.0

[1] Ammonia requirements vary slightly within season; most stringent limit shown above

[2] Monitoring requirement only.

2.2.2 Antidegradation Review

Since the new North WWTP alternatives would have a new outfall located approximately 1-mile north of the existing North WWTP outfall, an antidegradation review was completed. A desktop evaluation was performed to project effluent water quality and assimilative capacity of Sewer Branch. The general findings include:

1. Sewer Branch (Pearl River) is not impaired and is not associated with a Total Maximum Daily Load (TMDL). It is classified as a gaining stream. The new North WWTP will discharge to Sewer Branch, which flows to Muddy Creek, then to Lamine River, and ultimately to the Missouri River. Muddy Creek is impaired for *E. coli* both upstream and downstream of the confluence with Sewer Branch, and is on the 2018 303(d) List of Impaired Waters. The source of impairment is rural non-point source pollution.
2. The New North WWTP ammonia permit limits correspond to the final ammonia limits currently in the existing North WWTP permit (effective April 1, 2029 at existing plant, or immediately upon startup of the new North WWTP).
3. Ammonia limits may become more stringent once the ammonia criteria revisions are finalized, which will result in average day ammonia limits of 0.6 mg/L and 2.1 mg/L, and maximum daily limits of 1.7 mg/L and 5.6 mg/L, in summer and winter months, respectively. The projected BOD and TSS permit limits are 30 mg/L monthly average and 45 mg/L weekly average for both parameters.

2.2.3 Future Permit

Burns & McDonnell and KimHec Environmental Consulting worked with the City and HDR to develop an understanding of current and future projected water quality needs associated with the North WWTP receiving stream (Sewer Branch). An updated set of proposed effluent water quality requirements was developed (Table 2-7).

Table 2-7: Projected Water Quality Requirements for North WWTP NPDES Permit

Parameter	Units	Daily Maximum	Weekly Average	Monthly Average
BOD	mg/L	N/A	45	30
TSS	mg/L	N/A	45	30
Ammonia as N [1,2] (April 1 – Sept 30)	mg/L	10.1	N/A	1.1
Ammonia as N [1,2] (Oct 1 – March 31)	mg/L	10.1	N/A	2.6
E. coli [1]	#/100 ml	N/A	1,030	206
Oil & Grease	mg/L	15	N/A	10
Copper, Total Recoverable (TR) [2, 4]	ug/L	45.1	-	22.9
Total Phosphorus [4,5]	mg/L	[3]	N/A	[3]
Total Kjeldahl Nitrogen	mg/L	[3]	N/A	[3]
Nitrite + Nitrate	mg/L	[3]	N/A	[3]
Chromium VI, Dissolved [4]	mg/L	[3]	N/A	[3]
Cadmium, TR [4]	mg/L	[3]	N/A	[3]

[1] Limits as identified in existing permit, final limits listed above will become effective April 1, 2029 at existing WWTP, and immediately after completion of the new North WWTP.
[2] Future ammonia criteria mandated by the EPA may reduce the effluent requirements to 1.7 mg/L daily maximum and 0.6 mg/L monthly average during the summer months, and 5.6 mg/L daily maximum and 2.1 mg/L monthly average during the winter months.
[3] Monitoring Requirement only.
[4] Identified as a POC at existing WWTP in the June 2022 RPA memorandum from Barr Engineering
[5] TP limit of 1 mg/L as annual average required by January 2033.

2.2.4 Condition of Existing North WWTP Facility

A facilities assessment was conducted in 2022 to help identify deficiencies of the North WWTP. Due to growth projections in the North collection basin, future regulations, performance related issues, and a schedule of compliance for total recoverable copper, ammonia, and *E. coli*, the City decided that rehabilitation of the existing facility is not feasible. The existing site will be abandoned and project alternatives will include either a new North WWTP or consolidation of the North and Central Service Areas to the Central WWTP.

2.3 Central Service Area Basis of Design

The following sections include the proposed design basis for the Central Service Area. Operating data from 2019 through 2024 was analyzed to develop a current wastewater quality characterization. In the spring of 2024, multiple weeks of daily wastewater sampling at each of the permitted industries in the Central Service Area were conducted to determine the industrial impact on the influent wastewater to the

Central WWTP. Projected flows and loadings for the Central Service Area were developed for two general conditions: (1) for a design capacity of 3.03 MGD per the current NPDES permit, and (2) for a projected future Central Service Area flow of 2.5 MGD, based on annual service area growth of approximately 1.7%. The 3.03 MGD Central Service Area flow condition was utilized for evaluating facility improvements associated with the New North WWTP alternatives. The 2.5 MGD Central Service Area condition was considered when developing the approach to the Central Consolidation alternative.

2.3.1 Population Projections

For alternatives including a new North WWTP, the current Central WWTP rated capacity of 3.03 MGD was considered for evaluating facility improvements and remained unchanged. Considering the estimated current service population and current average flow of 1.77 MGD, projections for maximum service population were generated by scaling the current population, based on flow, to the 3.03 MGD rated capacity. When projecting influent conditions for this growth, it was assumed that all additional wastewater received would be similar to typical domestic sewage. New industrial users would need to be evaluated to determine if the plant has adequate capacity to accept anticipated flows and loadings.

For the Central Consolidation alternative, the Central Service Area population was reevaluated and projected based on current population projections, not based on scaling current conditions to the rated capacity of the existing Central WWTP. Based on the United States Census Bureau website, the City of Sedalia has grown at a rate of approximately 0.7% over the last 5 years. Projected service population for the 20-year planning period was developed assuming a conservative growth rate of approximately 1.7%, and assuming all additional growth is similar to domestic sewage. The average flow from the Central Service Area is projected to be approximately 2.5 MGD using this approach.

A summary of the proposed flows and service area population is shown in Table 2-8 below. Note that the per capita flow generated for all conditions is approximately 200 gal/capita-day, and includes industrial contributions, as well as elevated wet weather flows.

Table 2-8: Central WWTP Current and Design Service Population and Avg Flow

Parameter	Service Population	Average Flow, MGD
Current Conditions (2024)	8,820 (est)	1.77
Scaled to Rated Capacity (New North WWTP Alternatives)	15,077 (+ 6,257)[a]	3.03
Based on Projected Growth (Central Consolidation)	12,356 (+ 3,536)[a]	2.50

[a] Growth built into the basis of design assumes municipal strength wastewater contributions.

2.3.2 Current Central Service Area Flows & Loadings

Influent wastewater quality data from 2019 through 2024 was evaluated to develop the current wastewater flows and loadings from the Central Service Area. Statistical analyses used to evaluate the flow and loadings are the same as for the North WWTP and are presented in Table 2-2. The quality of the WWTP operating data was first evaluated without any outlier removal, but peaking factors were higher than typical for municipal WWTPs, and the TSS and BOD loadings based on wastewater quality data were well above the anticipated loadings from the local industries, thus, alternative methods for establishing the design basis were considered. The basis for the Central WWTP used a similar method as the North WWTP – influent loadings were calculated using a combination of typical domestic influent loadings (using Central basin population) and observed industrial loadings (Table 2-9).

Typical municipal wastewater pollutant loadings were generated using literature values reported in *Wastewater Engineering: Treatment and Resource Recovery* (commonly referred to as Metcalf & Eddy). Peaking factors are required to generate estimated maximum month and maximum day pollutant loadings. Literature values were selected using typical peaking factors as reported in WEF publication *Design of Water Resource Recovery Facilities, Manual of Practice No. 8* (MOP 8). Based on the calculated influent loadings, it is proposed that the high range of the typical domestic influent loadings be used. Additionally, due to elevated NH3-N and TP data points (typical concentrations of 40 mg/L and 11 mg/L, respectively) and uncertainty regarding all industrial users in the area, it is proposed that higher than typical peaking factors are used for nutrient loadings. Industrial data was limited to average and maximum analyses due to limited dataset, and average day flows and loads were added to the average and max domestic contributions. For BOD, the maximum industrial load was added to the domestic contributions to account for uncertainty and ensure design sludge dewatering rates are sufficient.

A summary of the current flows and loadings based on this analysis is provided in Table 2-9.

Table 2-9: Central Service Area Current Flow & Loadings for Use in Basis of Design

Parameter	Proposed Influent (Literature + Industry)[a]	Peaking Factor	Industrial Component
Flow, MGD			
- Average	1.77	-	0.28
- Maximum Month	3.06	1.73	-
- Maximum Day	3.92	2.21	0.55
- Peak	6.03	3.40	-
TSS, lbs/d			
- Average	3,130	-	220
- Maximum Month	4,770	1.53	-
- Maximum Day	9,460	3.02	1,580
BOD, lbs/d			
- Average	2,700	-	410
- Maximum Month	4,470	1.65	-
- Maximum Day	5,940	2.20	1,060
NH3-N, lbs/d			
- Average	305	-	73
- Maximum Month	440	1.44	-
- Maximum Day	685	2.25	203
TP, lbs/d			
- Average	155	-	66
- Maximum Month	200	1.23	-
- Maximum Day	290	1.87	125
TKN, lbs/d			
- Average	600	-	127
- Maximum Month	840	1.40	-
- Maximum Day	1,210	2.02	272

[a] Proposed current wastewater quality using high-end per capita loadings per Metcalf & Eddy, and loadings calculated from available industrial contributors.

2.3.3 Future Flow and Loadings

As previously discussed, the Central Service Area growth conditions were evaluated differently for the alternatives that included a new North WWTP and for the Central Consolidation alternative. This approach for the new North WWTP alternatives was taken since the Central WWTP permit would not be modified if a new North WWTP were constructed, as average flow conditions at Central WWTP would not be projected to exceed the current rated capacity of 3.03 MGD. However, for the Central Consolidation alternative, designing the facility to receive the 1.5 MGD design flow from the North Service Area would require an operating permit update for the Central WWTP, as design flow would exceed the current rated capacity. As shown in Section 2.3.2, the new North WWTP alternatives included

an assumed Central WWTP future flow condition of 3.03 MGD to match the current design capacity, while the Central Consolidation alternative considered projected population growth and assumed the Central Service Area wastewater contribution would reach approximately 2.5 MGD over 20 years. Projected future flow and loading conditions were developed for both of these conditions and are shown in Table 2-10 and Table 2-11, respectively. Note that flows and loads were scaled assuming all domestic growth. New industries would need to be evaluated to determine if the WWTP could handle their flow and loadings.

Table 2-10: Central WWTP Flow & Loadings Basis of Design (3.03 MGD Capacity)

Parameter	Influent Wastewater[a]	Peaking Factor	Industrial Component
Flow, MGD			
- Minimum	1.82	0.60	-
- Average	3.03	-	0.28
- Maximum Month	4.32	1.43	-
- Maximum Day	5.20	1.65	0.55
- Peak	7.00	2.31	-
TSS, lbs/d			
- Minimum	2,580	0.50	-
- Average	5,190	-	220
- Maximum Month	8,000	1.54	-
- Maximum Day	15,040	2.90	1,580
BOD, lbs/d			
- Minimum	2,230	0.51	-
- Average	4,330	-	410
- Maximum Month	6,890	1.59	-
- Maximum Day	9,400	2.17	1,060
NH3-N, lbs/d			
- Minimum	275	0.59	-
- Average	465	-	73
- Maximum Month	700	1.51	-
- Maximum Day	1,030	2.22	203
TP, lbs/d			
- Minimum	110	0.51	-
- Average	215	-	66
- Maximum Month	280	1.30	-
- Maximum Day	410	1.91	125
TKN, lbs/d			
- Minimum	440	0.51	-
- Average	860	-	127
- Maximum Month	1,255	1.46	-
- Maximum Day	1,755	2.04	272

[a] Proposed wastewater quality using high-end per capita loadings per Metcalf & Eddy, and loadings calculated from available industrial contributors.

Table 2-11: Central WWTP Flow & Loadings Basis of Design (2.5 MGD Service Area Flow)

Parameter	Influent Wastewater[a]	Peaking Factor	Industrial Component
Flow, MGD			
- Minimum	1.51	0.60	-
- Average	2.50	-	0.28
- Maximum Month	3.79	1.52	-
- Maximum Day	5.20	2.08	0.55
- Peak	6.00	2.40	-
TSS, lbs/d			
- Minimum	2,130	0.49	-
- Average	4,320	-	220
- Maximum Month	6,640	1.54	-
- Maximum Day	12,690	2.94	1,580
BOD, lbs/d			
- Minimum	1,840	0.51	-
- Average	3,640	-	410
- Maximum Month	5,870	1.61	-
- Maximum Day	7,940	2.18	1,060
NH3-N, lbs/d			
- Minimum	230	0.58	-
- Average	400	-	73
- Maximum Month	590	1.48	-
- Maximum Day	880	2.20	203
TP, lbs/d			
- Minimum	90	0.47	-
- Average	190	-	66
- Maximum Month	240	1.26	-
- Maximum Day	360	1.89	125
TKN, lbs/d			
- Minimum	360	0.48	-
- Average	750	-	127
- Maximum Month	1,080	1.44	-
- Maximum Day	1,525	2.03	272

[a] Proposed wastewater quality using high-end per capita loadings per Metcalf & Eddy, and loadings calculated from available industrial contributors.

2.4 North & Central Consolidation Basis of Design

The Central Consolidation alternative considers combining the 1.5 MGD projected North Service Area design flow with the 2.5 MGD projected Central Service Area design flow. This 4.0 MGD total average day flow would be processed at the Central WWTP, and the resulting combined basis of design for the Central Consolidation alternative is provided in Table 2-12 (refer to Table 2-5 and Table 2-11 for individual service area contributions).

Table 2-12: Central Consolidation Flow and Loadings Basis of Design

Parameter	Influent Wastewater[a]	Peaking Factor	Industrial Component
Flow, MGD			
- Minimum	2.31	0.58	-
- Average	4.00	-	0.39
- Maximum Month	6.83	1.71	-
- Maximum Day	9.70	2.43	0.87
- Peak	10.5[a]	2.63	-
TSS, lbs/d			
- Minimum	3,450	0.48	-
- Average	7,190	-	410
- Maximum Month	11,380	1.58	-
- Maximum Day	20,320	2.83	2,000
BOD, lbs/d			
- Minimum	2,990	0.50	-
- Average	5,975	-	630
- Maximum Month	9,670	1.62	-
- Maximum Day	13,040	2.19	1,610
NH3-N, lbs/d			
- Minimum	375	0.61	-
- Average	610	-	75
- Maximum Month	930	1.52	-
- Maximum Day	1,335	2.19	210
TP, lbs/d			
- Minimum	150	0.55	-
- Average	275	-	70
- Maximum Month	365	1.33	-
- Maximum Day	530	1.93	135
TKN, lbs/d			
- Minimum	600	0.54	-
- Average	1,105	-	145
- Maximum Month	1,640	1.48	-
- Maximum Day	2,260	2.05	290

[a] 10.5 MGD peak flow is based on flows entering the Central WWTP Secondary Pumping Station. Peak flow for North Service Area is 17 MGD, with all flows in excess of 4.5 MGD bypassing to the existing North EQ Basins. All Central Service Area flows above 6 MGD are assumed to overflow to the existing wet weather holding volumes, limiting flow to the Central Screening Structure to 6 MGD.

2.4.1 Permit Review

The Central WWTP currently operates under the City's State Operating Permit MO-0023019. Table 2-13 below provides a summary of the current effluent limitations based on the existing design average flow of 3.03 MGD.

Table 2-13: Current NPDES Permit Limits for the Central WWTP

Parameter	Units	MDL/AWL	AML
BOD_5 (May-Oct)	mg/L	10 (AWL)	10
BOD_5 (Nov-Apr)	mg/L	20 (AWL)	20
TSS	mg/L	35	30
pH	SU	6.0 – 9.0	
E. coli	#/100 ml	1,030 (AWL)	206
Ammonia as N (Apr-Sept)	mg/L	3.3	1.2
Ammonia as N (Oct-Mar)	mg/L	8.1	2.7
Total Phosphorus Total Kjeldahl Nitrogen Nitrate + Nitrite	mg/L	[c]	[c]
Oil & Grease	mg/L	[c]	[c]
Copper	ug/L	43.8	16.3

[a] MDL – Maximum Daily Limit, AWL – Average Weekly Limit
[b] AML – Average Monthly Limit
[c] Monitoring only requirement

The City conducted an antidegradation review to support the Central Consolidation Project alternative evaluation. The findings of the review, conducted by HDR, are presented below:

- Consolidating the two facilities meets the intent of Missouri's continuing authority regulations and antidegradation policy as it supports regionalization.
- The proposed expansion of the Central WWTP from 3.03 to 4.0 MGD will not result in an increase in the ambient water quality concentration of the receiving water, as Brushy Creek is effluent dominated. Additionally, consolidating the two facilities will eliminate an existing pollutant load to Sewer Branch (also known as Pearl River). Therefore, the Central Consolidation Project is insignificant.
- With the following exceptions, the existing permit limits are representative of base case effluent limitations for the consolidated flow (i.e., are protective of existing water quality standards):
    - A maximum daily and monthly average ammonia limit of 3.0 mg/L and 1.5 mg/L, respectively, is required from May through October to meet instream dissolved oxygen (DO) criteria.

  - A total phosphorus (TP) limit of 1.0 mg/L is necessary to meet instream DO criteria. For the purpose of the antidegradation review, the TP limit is considered an annual average, which is consistent with MDNR's TP effluent rule.
  - Cadmium effluent limits may be necessary as they are currently included in the North WWTP permit.
- The project is socio and economically important for protecting the environment and preserving the City's ability to serve its current customers and accommodate near-term growth.
- An alternatives analysis was conducted to demonstrate that the Central Consolidation project and decommissioning of the North WWTP is necessary as less and non-degrading alternatives are impracticable or economically inefficient.

Base case effluent limitations presented in the antidegradation review do not account for future regulatory requirements. It is anticipated that MDNR will adopt the U.S. Environmental Protection Agency's (EPA) latest ammonia criteria recommendations within the next year or two. Future ammonia effluent limitations that take into account EPA's latest ammonia criteria recommendations and anti-backsliding are estimated in Table 2-14 below. The final limits may vary depending on several factors including pH and temperature assumptions.

Table 2-14: Estimated Future Ammonia Permit Limits for the Central WWTP

Parameter	Units	MDL	AML
Ammonia as N (Jan)	mg/L	8.1	2.5
Ammonia as N (Feb)	mg/L	8.1	2.2
Ammonia as N (Mar)	mg/L	8.1	1.7
Ammonia as N (Apr)	mg/L	3.3	1.1
Ammonia as N (May)	#/100 ml	3.3	0.9
Ammonia as N (Jun)	mg/L	3.3	0.7
Ammonia as N (Jul)	mg/L	2.3	0.5
Ammonia as N (Aug)	mg/L	2.9	0.6
Ammonia as N (Sept)	mg/L	3.3	08
Ammonia as N (Oct)	mg/L	6.9	1.3
Ammonia as N (Nov)	mg/L	8.1	1.8
Ammonia as N (Dec)	mg/L	8.1	2.2

[a] MDL – Maximum Daily Limit
[b] AML – Average Monthly Limit

3.0 Treatment Alternatives

The following sections include alternative approaches to making improvements in the North and Central Service Areas to achieve treatment and compliance goals for both areas. The first two sections (Sections 3.1 and 3.2) evaluate the North Service Area conveyance and treatment options for an approach that includes construction of a new North WWTP. Limited improvements are also included at the Central WWTP to address facility deficiencies. Three (3) alternatives are included that consider this approach, and vary primarily by the approach to biological treatment. Section 3.3 considers an approach that eliminates a discharging treatment facility from the North Service Area and consolidates treatment of both service area wastewaters at the existing Central WWTP. This approach includes a new screening & pumping system located at the existing North WWTP site, a new force main to convey flows to the Central WWTP, and expansion of the Central WWTP.

3.1 Dewatering Evaluation

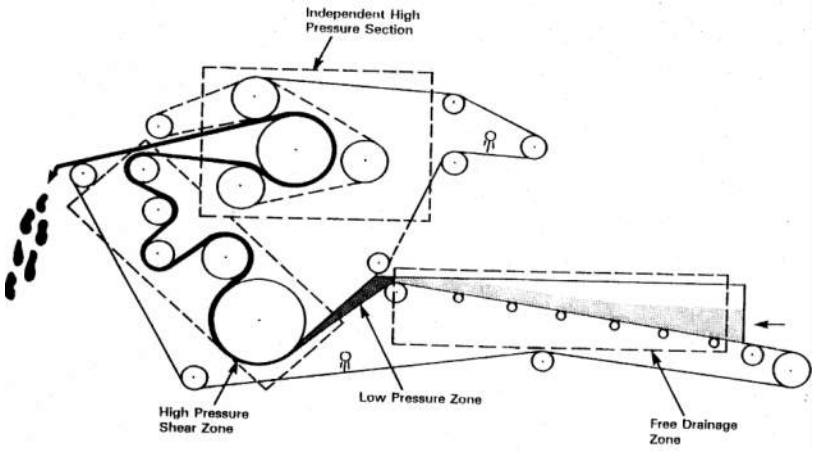
Prior to developing treatment alternatives, an evaluation of dewatering options was conducted to select which technology was preferred by the City. Three dewatering technologies were initially reviewed with the City, including centrifuge, belt filter press (BFP), and screw press. Centrifuges were removed from the evaluation at the first workshop with the City due to concerns with machine wear if grit removal is not included initially, and inability to perform major maintenance activities in-house or without specialized labor. The below evaluation only includes BFP and screw press. A description of each technology is presented below. Each concept includes the same ancillary equipment – aerated sludge storage tanks, positive displacement sludge feed pumps, and polymer feed. Conceptual building layouts were developed for both technologies and included in Appendix D. Since building footprint and equipment costs between BFP and screw press were similar, selection of the dewatering technology will be finalized in the next stage of the project. For the purposes of this report, concept drawings will reflect selection of BFPs.

3.1.1 Belt Filter Press

Belt filter presses dewater biosolids by applying pressure through a series of rollers and belts. Sludge is first chemically conditioned with polymer and allowed to react upstream of the BFP. The conditioned sludge is then fed to a belt within the “filter zone” at the inlet to the BFP. The sludge is conveyed along the belt and then sandwiched by an upper filter belt, before being passed above and below a series of rollers. These rollers put high tension on the belts and squeeze water out of the sludge. The dewatered cake is scraped off the belts and dropped through a discharge chute. BFPs are advantageous for their low energy use, low operating speed, long service life, and lower polymer usage. The disadvantages of BFPs

are the high number of wear items, intensive operator oversite, increased risk of airborne wastewater due to the BFP being open to the atmosphere, and odor issues. Furthermore, cake dryness is low compared to other dewatering technologies, typically between 14-19% solids. Belt filter press manufacturers include Andritz, Alfa Laval, and Komline-Sanderson. Refer to Figure 3-1 for a schematic of a typical BFP.

Figure 3-1: Belt Filter Press Schematic (Courtesy EPA)



The Sedalia WWTPs currently have BFPs and there is operator familiarity with how a BFP is operated and maintained. Each unit would require an inline, variable orifice mixer for polymer injection and mixing upstream of the BFP. WAS is anticipated to be 1-1.5% solids with decanting aerated sludge holding tanks, and the expected cake solids produced are 14-19% total solids (TS). Recommended polymer demand is 8 pounds of polymer per ton of dry solids. Motor size is anticipated at approximately 3-5 horsepower (hp), and approximately 100 gpm of wash water is required.

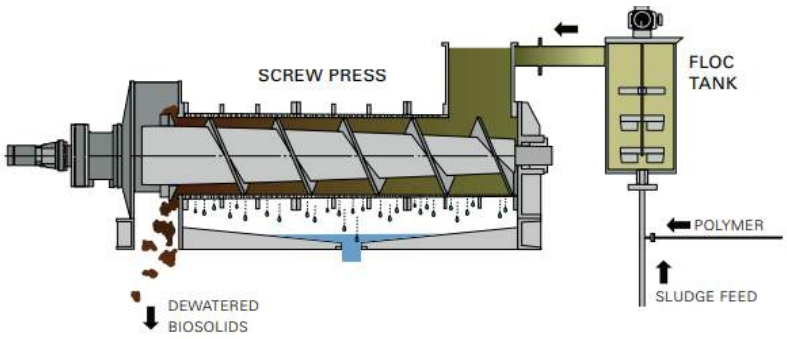
3.1.2 Screw Press

A screw press combines gravity drainage and compression to accomplish solids dewatering. Sludge is pumped to a flocculation tank, upstream of the screw press, where it is combined with polymer for conditioning. From the floc tank, the conditioned sludge is directed through a basket screen where solids are separated from water by gravity. Solids are conveyed through the basket screen along an auger whose shaft diameter progressively increases. The volume available for solids decreases as it travels up the auger, which increases the applied pressure and friction. The cake is conveyed and dropped through the press discharge chute, and the supernatant is collected and conveyed to the headworks.

Screw presses also have low energy usage, and advantages include low operating speed, minimal operator oversite, and enclosed and quiet operation. Disadvantages are high polymer usage and a large footprint.

Screw presses can typically achieve between 15-20% solids concentration. Screw press manufacturers include Schwing, Huber, FKC, and Andritz. Refer to Figure 3-2 for a schematic of a typical screw press.

Figure 3-2: Screw Press Dewatering Schematic (Courtesy of FKC)



Each unit would require an ancillary flocculation tank, adding more control over polymer dosing and mixing, but requiring additional oversite. Floc tank volume is anticipated at approximately 500 gallons. Sludge feed to the unit is anticipated to be 1-1.5% solids with decanting aerated sludge holding tanks, and the expected cake solids produced are 15-20% TS. Recommended polymer demand is 20 pounds of polymer per dry ton of solids. Motor sizes for the screw press and the floc tank mixer are anticipated at approximately 5-10 hp and 2-3 hp, respectively. Wash water required is approximately 70 gpm.

3.2 New North WWTP Alternatives

The existing North WWTP does not have the functionality and longevity to operate effectively or meet the projected effluent limits without significant improvement to the existing facility. A new North WWTP employing biological nutrient removal (BNR) was selected through prior efforts. An alternatives analysis was conducted to evaluate three (3) BNR approaches to meeting the demands of future growth and projected permit limits. One additional BNR approach, Aerobic Granular Sludge (AGS), was preliminarily reviewed and eliminated from the scope of evaluation due to operational complexity and reliance on automated components. Headworks, disinfection, and solids processing components were assumed to be similar for all options, unless the secondary treatment process dictated otherwise. The three treatment alternatives considered are listed in Table 3-1.

Table 3-1: North WWTP Treatment Alternatives

Treatment Alternative
Alternative No. 1: Anaerobic-Oxic (AO) Process
Alternative No. 2: Anaerobic + Intermittent Aeration Process
Alternative No. 3: Oxidation Ditch with Biological Phosphorus Removal

The alternatives were initially developed to address total nitrogen and total phosphorus removal. However, the anticipated permit limits include a TP limit of 1 mg/L and no limit for TN, and concept design was provided for biological phosphorus removal only, with provisions for the future addition of anoxic volume to achieve total nitrogen removal. The phasing of BNR improvements was deemed necessary to provide an affordable North WWTP concept design.

The following sections include descriptions of the facilities associated with each treatment alternative. All alternatives share identical influent screening, influent pumping, provisions for grit removal, UV disinfection and solids processing systems. The common processes are briefly described in Section 3.2.1 and the secondary treatment process alternatives are presented in subsequent sections.

3.2.1 North Conveyance Improvements

For alternatives including a New North WWTP, provisions must be included for conveying wastewater from the existing North WWTP to the new North WWTP site. An existing 24-inch sewer interceptor routes flow from the North Service Area to an influent structure at the existing Sedalia North WWTP. During peak wet weather flow events, influent flows exceed the capacity of the existing Sedalia North WWTP and flow is diverted to the North EQ Basin by a 24-inch gravity interceptor. When peak flows subside, the stored wastewater in the North EQ basin is gradually pumped via the North EQ Lift Station back via a 10-inch force main to the influent structure of the existing Sedalia North WWTP, where it is treated.

The proposed new North WWTP is located east of Georgetown Road and south of Highway H, approximately one (1) mile north of the existing Sedalia North WWTP. Conveyance alternatives were evaluated to determine how to convey both dry weather and wet weather flows to the proposed site. The two options considered were (1) extension of a new gravity interceptor system from the existing system to the new North WWTP, with a new Influent Pump Station located at the new plant property, and (2) construction of a new Influent Pump Station at the existing North WWTP property, with a force main routed to the new North WWTP headworks.

3.2.1.1 Extension of North WWTP Gravity Main

The topography of the area allows for a gravity interceptor to convey flow from the existing plant to the proposed plant site. The proposed improvements for this alternative include reuse of an existing 24-inch gravity interceptor that runs between the existing North WWTP and North EQ Basin. This interceptor is routed through an existing sewer easement to Georgetown Road, where the sewer is generally routed within the right-of-way of the road. The existing interceptor would be tied into a new Wet Weather

Diversion Structure that would allow gravity overflow of excess flow to the EQ Basin. A new 36-inch interceptor will be provided between the Wet Weather Diversion Structure and the new Influent Pump Station located at the new North WWTP.

During detailed design, the new interceptor downstream of the wet weather diversion structure would need to be re-evaluated to determine if a smaller pipe size can be used to reduce capital cost. Reducing the size of this section of interceptor may require installation of a second, parallel interceptor in the future if peak flows to the WWTP are significantly increased, which may not be required until well after 20 years of operation.

3.2.1.2 New Force Main and Pump Station

A force main and pump station alternative was evaluated to route flow from the existing North WWTP to the new North WWTP site. The topography does lend itself to gravity, but the advantage of a pump station and force main is a shallower and smaller diameter pipeline. The pump station would be sized for a maximum capacity of 4.5 MGD and the force main would be 14 inches. Peak wet weather flows in excess of 4.5 MGD would be diverted to the EQ basin using the existing 24-inch interceptor. Note that with this option, a plant sewer return pump station would need to be added to the new North WWTP, as the plant sewer could not be routed to the Influent Pump Station, which would be located approximately 1 mile away.

During discussions with the City, the force main and pump station alternative was considered to not be ideal due to the potential limitations it placed on how future connections were accommodated at the new North WWTP. It was not desirable to require extending new interceptors for that area further towards the existing North WWTP, or limiting new connections to force mains, especially since the topography would dictate a relatively steep, downhill force main run towards the new North WWTP.

3.2.1.3 Proposed Conveyance Alternative

The gravity conveyance alternative was selected due to its flexibility with tying in future gravity mains in the North collection basin, reduction in pumping distance, and maintaining gravity peak flow diversion to the existing North EQ Basin. The alternatives include reuse of the existing 24-inch gravity interceptor, construction of a new Wet Weather Diversion Structure adjacent to the existing wet weather pumping system, and a new 36-inch gravity interceptor between the diversion structure and the new North WWTP. A conceptual layout of the proposed conveyance approach is shown in Figure 3-3.

Figure 3-3: New North WWTP Interceptor to Serve Greenfield Alternatives

3.2.2 Common Improvements for North WWTP

All North WWTP alternatives require a new influent pump station, headworks, disinfection, and solids processing facilities that are generally identical. The existing interceptor will be extended from the existing North WWTP to the new plant property. The existing EQ Basin will continue to be used, and a new Wet Weather Diversion Structure will be provided for the ability to gravity divert as much wet weather flow as possible to the EQ Basin. The gravity interceptor will extend from the new diversion structure to a new Influent Pump Station, which will consist of three (3) new influent pumps and an adjacent valve vault. Influent wastewater is pumped through a short plant force main to the Headworks Structure.

The Headworks Structure includes a new mechanical screening system, consisting of three channels, with one channel containing a 1/4-inch automatic bar screen and washer-compactor, a second channel allocated for a future standby screening system, and a third channel to provide screening system bypass. Screened influent then flows through a common wall splitter structure and to the biological treatment system. The Headworks Structure will be designed to allow the addition of a grit removal system in the future, which would consist of one (1) stacked tray grit removal assembly. When grit removal is incorporated in the future, a new Grit Processing Building will also be provided adjacent to the Headworks Structure and would contain one grit classifier and one grit pump.

Screened influent is split to the downstream biological process. Alternatives No. 1 (AO) and No. 3 (Oxidation Ditch) include a simple mixed liquor splitter after the biological treatment train integral to the biological basin to split flow to the final clarifiers. Alternative No. 2 (Intermittent Aeration) includes a post-aeration splitter structure that has additional process volume and aeration to provide nitrification polishing prior to splitting flow to the final clarifiers. The three (3) biological treatment alternatives share the same clarification configuration and return activated sludge (RAS) & waste activated sludge (WAS) pumping system (RAS/WAS Pump Station). The concept design includes two (2) 70-ft diameter Final Clarifiers. The RAS/WAS Pump Station includes three (3) centrifugal end suction RAS Pumps, two (2) rotary lobe pumps used for WAS pumping, and (2) progressive cavity scum pumps.

Effluent from the secondary treatment process flows to the UV disinfection system and reaeration structure. The UV disinfection system consists of one (1) channel with two (2) banks of UV lamps. The hydraulic profile of the facility will allow retrofit of an effluent filtration system upstream of the UV system if necessary to meet future permit limits (particularly for TP less than 1 mg/L). Disinfected effluent flows to a final effluent structure containing a Parshall flume for flow monitoring and low-profile

effluent reaeration structure to increase dissolved oxygen concentration prior to discharge. Treated effluent will be discharged to a new Sewer Branch outfall.

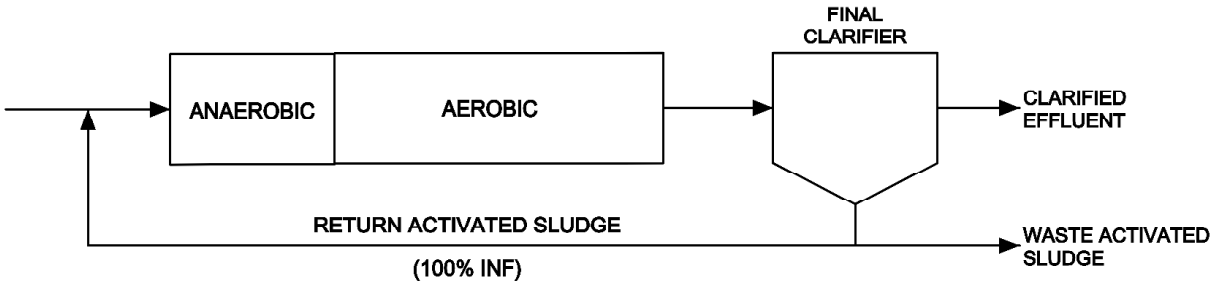
Waste sludge and scum from the secondary treatment process is pumped to an aerated sludge holding system that consists of two (2) aerated holding tanks. The holding tanks include telescoping valves to allow gravity thickening and decant to increase the solids concentration within the tanks. The holding tanks are sized to achieve a total of four (4) days of retention time at maximum month solids production, assuming a 1.5% total solids concentration can be maintained. A solids dewatering building is provided with one (1) dewatering unit and loadout conveyor system. Dewatered sludge is transferred to the City of Sedalia composting facility for final processing and disposal. The dewatering system was evaluated with belt filter press and screw press equipment alternatives, and the alternatives assume that BFPs are utilized due to City preference.

3.2.3 Alternative No. 1 – Anaerobic-Oxic (AO) BNR Process

The AO system is designed to perform biological phosphorus removal and nitrification in dedicated treatment reactors. The anaerobic reactor consists of a single zone with mechanical mixing for optimal biological phosphorus removal. The aerobic zone accomplishes BOD removal and nitrification (ammonia removal).

The biological treatment system consists of two (2) AO trains operated in parallel to accommodate the projected 20-year design basis. The plant layout is configured to have to total of four (4) AO trains in the first plant expansion, and the equivalent of eight (8) trains of process volume at ultimate buildout. Each AO train will be configured to have equivalent volumes and equipment configurations. The concept design considers maximum month conditions with both trains operating in parallel, with a design mixed liquor suspended solids (MLSS) of 4,000 mg/L and an aerobic solids residence time (SRT) of 12 days. The design provides for operation of one (1) train at 4,500-5,000 mg/L MLSS at design conditions in the warmer months to allow one train to be taken offline for maintenance. The AO process has as similar overall reactor footprint to the Intermittent Aeration process, but requires a smaller clarifier splitter structure since it does not include a post-aeration step. The reactor footprint is approximately 25% smaller than the Oxidation Ditch option due to increased operating depth (20 ft vs 15 ft for Oxidation Ditch). Figure 3-4 shows a secondary treatment process flow diagram of the AO process.

Figure 3-4: Alternative No. 1 (AO) Secondary Treatment PFD.



The anaerobic volume is provided with mixing systems only (no aeration). The concept design considers the use of large bubble mixing, which uses compressed air and static diffuser grids within the basins to maintain mixing, or in-basin submersible mechanical mixers. The aeration volume is provided with diffused aeration grids (membrane disc diffusers) and receives air via three (3) aeration blowers. Due to the projected minimum aeration demands at startup, it is recommended that the aeration zones are provided with "swing zones", which include both mixing and aeration systems to allow air to be turned off intermittently during periods of low aeration demand.

The unique treatment structures in Alternative No. 1 include two (2) AO treatment trains, an electrical building serving the process equipment, an aeration blower pad, and clarifier splitter structure.

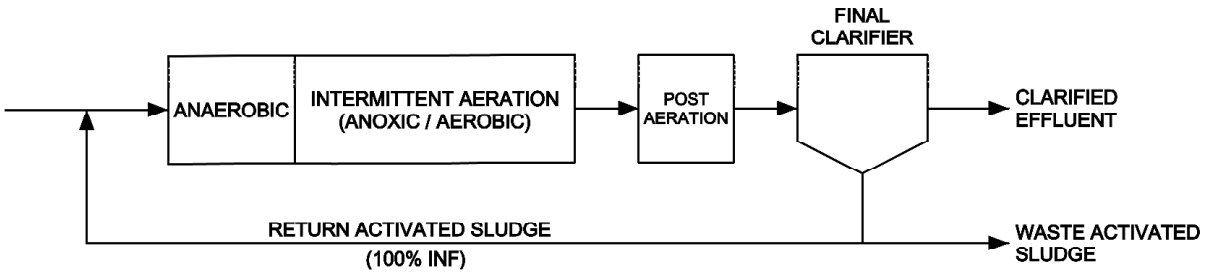
3.2.4 Alternative No. 2 – Anaerobic + Intermittent Aeration

The Anaerobic + Intermittent Aeration process is similar to the AO process, but the aeration volumes is a single zone provided with ability to cycle between anoxic and aerobic phases. The anaerobic zones provide for biological phosphorus removal, while the intermittent aeration zone provides for BOD removal, nitrification, and denitrification in a single reactor. The aeration basin would be sized to accommodate nitrification only at the design loading but could be operated in intermittent aeration mode at lower loadings to save energy and enhance treatment. The intermittent aeration zone is operated to cycle between aerated and non-aerated phases, with the non-aerated phases facilitating denitrification. Due to the cyclic nature of this process, ammonia concentrations within the intermittent aeration zone may fluctuate, resulting in slightly higher effluent ammonia concentrations during anoxic phases. To provide ammonia polishing, the downstream clarifier splitter structure in this alternative is designed as a Post-Aeration Splitter Structure, which is provided with a dedicated aeration system that runs continuously to ensure stable effluent ammonia concentrations.

The biological treatment system consists of two (2) Anaerobic + Intermittent Aeration trains operated in parallel to meet the projected 20-year design basis. The plant layout is configured to have to total of four

(4) biological trains in the first plant expansion, and the equivalent of eight (8) trains of process volume at ultimate buildout. Each train will be configured to have equivalent volumes and equipment configurations. The concept design considers maximum month conditions with both trains operating in parallel, with a design MLSS of 4,000 mg/L and an aerobic SRT of 12 days. The design provides for operation of one (1) train at 4,500-5,000 mg/L MLSS at design conditions in the warmer months to allow one train to be taken offline for maintenance. The Intermittent Aeration process has a similar overall reactor footprint to the AO process but requires a larger clarifier splitter structure since it includes a post-aeration step. The reactor footprint is approximately 25% smaller than the Oxidation Ditch option due to increased operating depth (20 ft vs 15 ft for Oxidation Ditch). Figure 3-5 shows a secondary treatment process flow diagram of the Anaerobic + Intermittent Aeration process.

Figure 3-5: Alternative No. 2 (Intermittent Aeration) Secondary Treatment PFD.



The anaerobic zone is provided with mixing only (no aeration). The intermittent aeration zone is designed to allow full mixing of the entire zone without aeration and would contain full basin mixing capabilities and fine bubble aeration disc diffuser grids. Similar to the AO alternative, the concept design considers the use of large bubble mixing, which uses compressed air and static diffuser grids within the basins to maintain mixing, or in-basin submersible mechanical mixers. The aeration system is served by a blower pad with three (3) aeration blowers.

The unique treatment structures in Alternative No. 2 include two (2) Anaerobic + Intermittent Aeration Basins, electrical building serving the process equipment, an aeration blower pad, and the post-aeration splitter structure.

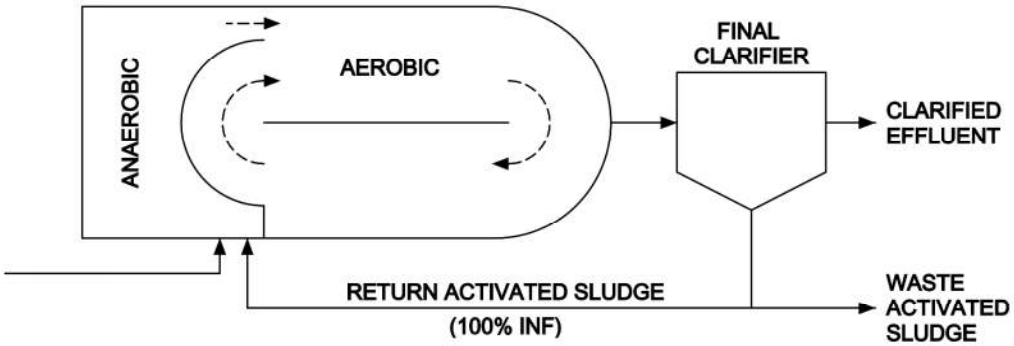
3.2.5 Alternative No. 3 –Oxidation Ditch with BNR

The oxidation ditch process included in Alternative No. 3 operates similarly to the AO processes with respect to inclusion of dedicated anaerobic and aerobic zones to drive biological phosphorus removal and nitrification. However, the oxidation ditch system includes different aeration methods. The treatment

reactors are also constructed with a shallower side water depth and the aerobic portion of the system consists of a racetrack configuration with continuous recirculation.

The biological treatment system consists of two (2) oxidation ditch trains operated in parallel to meet the projected 20-year design basis. The plant layout is configured to have a total of four trains in the first plant expansion, and the equivalent of eight (8) trains at ultimate buildout. Each oxidation ditch train will be configured to have equivalent volumes and equipment configurations. The concept design considers maximum month conditions with both trains operating in parallel, with a design mixed liquor suspended solids (MLSS) of 4,000 mg/L and an aerobic SRT of 12 days. The design provides for operation of one train at 4,500-5,000 mg/L MLSS at design conditions in the warmer months to allow one train to be taken offline for maintenance. However, design provisions for maintenance of the aerators and mixing system may allow for extended operation between having to take an entire basin out of service, as compared to a conventional system with diffused aeration. The Oxidation Ditch process has a footprint that is approximately 25% larger than that of the AO and Intermittent Aeration processes due to operational depth (15 ft vs 20 ft for AO and Intermittent Aeration). Figure 3-6 shows a secondary treatment process flow diagram of the oxidation ditch process.

Figure 3-6: Alternative No. 3 (Oxidation Ditch) Secondary Treatment PFD



A unique aspect of the oxidation ditch system is that mechanical aerator/mixers are included instead of blowers and diffusers. Similar to the other alternatives, mixing of the anaerobic zone is conceptually designed with either large bubble mixing systems or in-basin submersible mechanical mixers. Each oxidation ditch is served by two (2) mechanical aerators, providing a level of redundancy.

The unique treatment structures in Alternative No. 3 include an influent splitter structure downstream of grit removal, two (2) oxidation ditch structures, and an electrical building.

3.2.6 Central WWTP Improvements

The Sedalia Central WWTP was reviewed for opportunities to incorporate phosphorus removal, upgrade the existing influent screening system, and provide a new solids dewatering system. The existing screening system is proposed to be improved by installing two (2) new mechanical screens in the existing screening channels. Dewatering is proposed to include a new dewatering building containing two belt filter presses. The phosphorus removal approach was evaluated as described below.

The Central WWTP does not currently have the ability to remove phosphorus through existing processes and will require upgrades to meet a future permit limit of 1 mg/L. The two general approaches to phosphorus removal at WWTPs include chemical phosphorus removal and biological phosphorus removal. Chemical phosphorus removal consists of feeding a metal salt, such as aluminum sulfate, ferric chloride, or ferric sulfate to convert dissolved phosphate compounds to chemical precipitate that can settle out in the clarification process.

Biological phosphorus removal includes provisions for an anaerobic activated sludge volume upstream of aerated activated sludge processes, which selects for phosphorus accumulating organisms (PAOs). PAOs uptake phosphorus at much higher rates than typical activated sludge biomass. Biological phosphorus removal may not reliably achieve desired effluent TP targets of less than 1 mg/L under typical domestic influent loadings. Further, at facilities with elevated influent TP due to industrial loadings (similar to Central WWTP), biological phosphorus removal may need to be supplemented with chemical phosphorus removal to achieve effluent requirements. Additional evaluation may need to be conducted prior to designing chemical feed systems to account for phosphorus release that may occur in the sludge holding tanks, which may increase the chemical demand.

3.2.6.1 Chemical Phosphorus Removal

The chemical phosphorus removal concept at Central WWTP includes constructing a new Alum Feed Building containing bulk aluminum sulfate storage and an alum chemical feed skid. The chemical storage tank is sized for 8,500 gallons (minimum of 20 days storage at design capacity) to allow the City to receive bulk chemical feed shipments of approximately 4,000-5,000 gallons at a time. Alum would be fed to the discharge compartment of the existing Aeration Basin, upstream of the clarifier splitter structure. Since the chemical precipitate is generated upstream of the clarifiers and removed from the system via the sludge wasting process, there will be a cycling up of inert chemical solids within the activated sludge process. Based on influent TP loading and a design activated sludge SRT of 12 days, a chemical phosphorus removal program is projected to require up to 380 gallons of alum per day, produce approximately 880 lbs per day of chemical solids and increase the mixed liquor suspended solids by

approximately 750 mg/L. In order to accommodate the increased solids production, the City will need to run the dewatering system up to 6-8 hours more per week as compared to running a system without chemical phosphorus removal.

If industrial contributions are successfully reduced through pretreatment agreements, chemical demand may be reduced to approximately 240 gallons per day. To accommodate the increased solids production in this scenario, the City will need to run the dewatering system up to 3-5 hours more per week as compared to running a system without chemical phosphorus removal. A summary of projected chemical use and sludge production is provided in Table 3-2, including scenarios where industrial TP loadings are reduced through implementation of an updated pretreatment program compared to the current base influent loadings.

Table 3-2: Central WWTP Chemical Phosphorus Removal Summary

Parameter	Industrial Pretreatment to Reduce TP Load	Base TP Loading w/o Pretreatment
Alum Storage Tank Volume	8,500 gal	8,500 gal
Alum Feed Rate	10 gph (avg) 25 gph (peak)	16 gph (avg) 25 gph (peak)
Alum Storage Time	30 days	20 days
Average Chemical Solids Production	570 lbs/d	880 lbs/d
Average Inert Chemical MLSS	480 mg/L	750 mg/L

3.2.6.2 Biological Phosphorus Removal Concept

The biological phosphorus removal concept includes conversion of the primary clarifiers to anaerobic reactors to select for PAOs and achieve enhanced removal of phosphorus. Due to elevated influent TP loading associated with local industry, biological phosphorus removal is not anticipated to be capable of achieving an effluent TP concentration of 1 mg/L, which is the anticipated future permit limit for the facility. To achieve the anticipated permit limit, an Alum Feed Building similar to the chemical phosphorus removal option will be required. However, the required alum feed rate would be reduced and would represent an annual savings compared to the chemical phosphorus removal concept.

The conversion of primary clarifiers to anaerobic reactors includes the following:

- Demolition of the existing primary clarifier mechanisms and capping of primary sludge lines.
- Installation of two (2) compact submersible mixers in each converted anaerobic reactor.
- Rerouting of return activated sludge (RAS) to provide dedicated RAS feed points to each anaerobic reactor. Controls considerations may be required to allow for even splitting.
- Due to increased flow associated with relocation of the RAS feed, the Secondary Feed Pumps must be upsized, which will require replacement of all three pumps and associated base elbows.

Conversion of the primary clarifiers would impact the biological treatment system, as upstream removal of BOD and TSS would not occur. The aeration basin would receive higher loadings, which would require additional air, and increase biological sludge production. To achieve the same process SRT, the MLSS must be increased, and the ultimate capacity of the treatment plant may be impacted. Based on preliminary modeling, it is anticipated that the maximum month SRT of the aeration basin may be limited to 9 days, which is relatively low. If the primary clarifiers are converted to anaerobic reactors, the City would need to evaluate performance as the facility approaches 2.5 to 2.7 MGD influent flow.

Based on biological process modeling, the conversion of the primary clarifiers to anaerobic basins would provide some biological phosphorus removal but may not achieve 1 mg/L effluent TP. The SRT and HRT of the converted anaerobic basins are approximately 1 day and 1.25 hours, respectively. Chemical phosphorus removal would be required, but the amount of chemical fed would be reduced compared to the chemical phosphorus removal concept. Chemical phosphorus removal is projected to require up to 240 gallons of alum per day, produce approximately 535 lbs per day of chemical solids, and increase the MLSS by approximately 350 mg/L. In order to accommodate the increased solids production in this scenario, the City will need to run the dewatering system up to 3-4 hours more per week.

If industrial contributions are successfully reduced through pretreatment agreements, chemical demand may be reduced to approximately 85 gallons per day. To accommodate the increased solids production in this scenario, the City will need to run the dewatering system up to 1-2 hours more per week as compared to running a system without chemical phosphorus removal. A summary of projected chemical use and sludge production is provided in Table 3-3 including scenarios where industrial TP loadings are reduced through implementation of an updated pretreatment program compared to the current base influent loadings.

Table 3-3: Central WWTP Biological Phosphorus Removal Summary

Parameter	Industrial Pretreatment to Reduce TP Load	Base TP Loading w/o Pretreatment
Alum Storage Tank Volume	5,500 gal	7,500 gal
Alum Feed Pump Capacity, ea	3.5 gph (avg) 20 gph (max)	10 gph (avg) 20 gph (max)
Alum Storage Time	60 days	30 days
Average Chemical Solids Production	200 lbs/d	535 lbs/d
Average Inert Chemical MLSS	135 mg/L	350 mg/L
Anaerobic Basin Volume (Converted Primary Clarifiers)	85,000 gal (each) 170,000 gal (total)	
No. of Anaerobic Mixers	2 (each basin) 4 (total)	
New Secondary Feed Pump Capacity	5 MGD (each)	

3.2.6.3 Phosphorus Removal Approach

As both chemical and biological phosphorus removal options require the construction of a similarly sized Alum Feed Building, the biological phosphorus removal option (additional conversion of primary clarifiers to anaerobic basins) has a much higher associated capital cost. Further, the impact of removing the primary clarifiers on secondary treatment capacity should be further evaluated prior to making a decision regarding conversion.

Industrial users have been identified in the Central Service Area that contribute elevated phosphorus loads, which have a significant impact on the Central WWTP influent total phosphorus loading. Based on available water quality data, industry contributes up to 40-45% of the total influent TP load. The City is currently working on developing an updated industrial pretreatment program, which may result in better control of TP in industrial discharges to the sanitary sewer.

3.3 Central Consolidation - Alternative No. 4

The fourth alternative considers consolidation of the treatment system at the Central WWTP to process North and Central Service Area sewage flows. The existing North WWTP would be taken out of service and a new screening and pumping facility would be constructed at the existing property. A new conveyance system (a combination of force main and gravity main) would be constructed between the existing North WWTP and existing Central WWTP. The Central WWTP would be expanded, including

additional activated sludge volume, chemical phosphorus removal, a third clarifier, expanded UV disinfection capacity, a new effluent reaeration structure, and a new solids dewatering building.

3.3.1 North Conveyance Improvements

For the Central Consolidation alternative, the existing North WWTP will be decommissioned, but the site will remain active with a new screening and pumping systems to allow dry weather flows from the North Service Area to be conveyed to the existing Central WWTP. Peak flows in excess of 4.5 MGD will be diverted to the existing North EQ Basin, similar to current operations. The general systems included at the existing North WWTP property are a new influent channel with wet weather diversion, mechanical screening, influent wet well with submersible pumps, and valve vault with a magnetic flow meter. Refer to Exhibit 004C101 for an overall site plan of the proposed improvements at the existing North WWTP site.

The new North Screening & Pump Station would be designed to provide wet weather overflow upstream of the screening process to limit the approximate screening and pumping capacity to 4.5 MGD. All excess flow is diverted to the existing North EQ Basin through the existing 24-inch overflow gravity main. During dry weather conditions, the existing wet weather pumping system adjacent to the North EQ Basin would be used to transfer equalized wastewater back to the screening system.

Sewage is conveyed to the Central WWTP through a new force main and gravity main dedicated to North Service Area flows. The new conveyance system will be approximately 2 miles long and will discharge at the Central WWTP downstream of the existing Central Screening structure. This will allow the screening system at the Central WWTP to be reused to serve the Central Service Area only, eliminating the need to construct a larger, consolidated headworks system that would serve both service areas.

3.3.2 Central WWTP Improvements

The North service area conveyance system discharges at the Central WWTP downstream of the existing screening system. This strategy allows the Central Service Area wastewater flows to be managed through the existing wet weather diversion and influent screening systems, mitigating the need to construct a new, consolidated headworks to handle all North and Central Service Area flows. The existing Central Screening Structure consists of three screening channels, with one out of service mechanical screen, one manually-cleaned bar rack, and one bypass channel. The existing screening enclosure will be removed and the existing mechanical bar screen demolished. Two (2) new mechanical bar screens will be installed in the outer channels, and a new manually-cleaned bar rack provided to replace the existing unit. The

mechanical bar screens will be provided with winterization components (integral heating unit), and will discharge directly to dumpsters below.

The existing primary clarifiers will be abandoned-in-place, and a new influent line will be installed to divert wastewater directly to the Secondary Pump Station. Screened wastewater streams from the Central Screening Structure and North Gravity Main will combine at a new manhole upstream of the Secondary Pump Station. The existing pump station consists of two (2) submersible-style wet wells: one for secondary pumping to the existing Aeration Basin No. 1, and the other for RAS/WAS pumping. The RAS/WAS pumping wet well will be converted to an additional secondary pumping wet well containing new pumps dedicated to a new Aeration Basin No. 2 (a new RAS/WAS Pump Station will be provided as described below). Two separate pump control systems will be provided to allow the City to control pumping rate between the two Aeration Basins.

The existing secondary treatment system will be expanded with a new Aeration Basin No. 2 and Secondary Clarifier No. 3. Based on the consolidated loadings, Aeration Basin No. 2 is recommended to be approximately 35% larger than the existing Aeration Basin No. 1 to provide a maximum month solids retention time (SRT) of 12 days at design conditions. During detailed design, reducing the volume of Aeration Basin No. 2 to match the existing Aeration Basin No. 1 will be considered as a cost savings measure. The new Secondary Clarifier No. 3 will be provided with the same dimensions as the existing Secondary Clarifiers. A new Clarifier Splitter Structure will be provided between the Aeration Basins and Secondary Clarifiers and will include four (4) effluent chambers to allow the City to add a fourth Secondary Clarifier in the future. A pipe stub out will also be provided in the influent chamber to allow a third Aeration Basin to be added in a future project.

Note that based on the phosphorus evaluation in the preceding sections for Alternatives No. 1-3, Alternative No. 4 includes provisions for chemical phosphorus removal using alum. Phosphorus removal will be provided with a new aluminum sulfate (alum) feed system with two (2) chemical storage tanks. The storage tanks will be located outdoors in a concrete containment area covered with a pre-engineered metal canopy and provided with heat trace and insulation for freeze protection. The chemical feed building will include two chemical feed skids, one dedicated to each Aeration Basin. The alum feed lines will be routed to the effluent box of each Aeration Basin.

A new RAS/WAS Pump Station will be constructed between the existing Secondary Clarifier No. 2 and the new Secondary Clarifier No. 3. The pump station will be a submersible-type configuration, with three (3) RAS Pumps and two (2) WAS Pumps. RAS will be discharged into two (2) headers that

provided dedicated RAS service to each Aeration Basin. WAS will be routed in the yard and tied into the existing 8-inch WAS line, which discharges into the existing Solids Holding Tanks. The existing holding tanks will be reused as-is.

The existing UV Disinfection Building does not have adequate disinfection capacity to process the combined North and Central Service Area flows, which will have a peak day flow of 10.5 MGD. To accommodate the additional flow, the two (2) existing UV channels will be widened from 1.67 feet wide to 2.67 feet wide and new UV disinfection equipment will be installed. The expansion is anticipated to be possible while retaining the existing building. The effluent weir system will be evaluated and modified as necessary to maintain appropriate liquid level within the new channels.

The existing cascade aeration system is not adequate for the new design flow and effluent DO requirement. A new effluent structure will be provided that includes a Parshall flume for monitoring effluent flow, and low-profile reaeration system to maintain a minimum effluent DO of 6 mg/L.

The existing aerated Solids Holding Tanks and associated sludge blowers will be reused to store and aerate waste sludge between dewatering operations and over weekends. A new Sludge Pump Station will be provided adjacent to the storage tanks, consisting of three (3) positive displacement pumps and two (2) discharge lines that will be routed to two (2) new belt filter presses located in a new Solids Dewatering Building. The existing Sludge Digestion Complex will remain onsite but will no longer have any active wastewater process components. The new Solids Dewatering Building will be located in an area directly north of the existing Peak Flow Sedimentation Basin. An existing City utility storage area will require demolition to provide space for construction. A truck loadout area will be provided adjacent to the new Solids Dewatering Building.

A new electrical utility service will be provided for the Central WWTP, including a new Electrical Distribution Building, utility transformer, and backup generator.

Refer to Exhibits 004C151 & 004C152 for an overall site plan and yard plan, respectively, for the proposed Central WWTP improvements.

4.0 Alternatives Evaluation & Recommended Project

All four alternatives were evaluated by developing conceptual opinions of probable cost (OPCs), approximate operations and maintenance (O&M) costs, and scoring each alternative across a range of weighted scoring criteria.

4.1.1 Comparison of Opinion of Probable Costs

Conceptual OPCs and O&M costs were developed for all four alternatives. Operation, maintenance, equipment replacement, and capital costs were used to develop a net present value (NPV) for each of the treatment alternatives. The NPV assumes construction would commence in 2026 and considers O&M costs over a 20-year operating period. The NPV analysis compares future cash flows (construction and O&M costs) in present dollar equivalents. The results of NPV analysis are shown in Table 4-1.

Table 4-1: NPV Summary of Alternatives

Alternative	NPV ($M 2026)	Construction Cost ($M 2026)	O&M Cost	
			$M 2026	$M 20-yr NPV
Alternative No. 1[a] New North WWTP AO Process	$114.6	$73	$1.9	$41.6
Alternative No. 2[a] New North WWTP Intermittent Aeration	$114.0	$72	$2.0	$42.0
Alternative No. 3[a] New North WWTP Oxidation Ditch	$114.7	$74	$1.9	$40.7
Alternative No. 4[b] Central Consolidation	$98.3	$60	$1.7	$38.3

[a] Alternatives No. 1-3 include a new 1.5 MGD North WWTP, and limited improvements at the Central WWTP. The Central WWTP maintains a permitted design flow of 3.03 MGD for these alternatives.
[b] Alternative No. 4 includes consolidating the North and Central Service Areas for treatment at the existing Central WWTP, with improvements proposed at the Central WWTP to accommodate an updated permitted design flow of 4.0 MGD, including allocations of 1.5 MGD and 2.5 MGD for the North and Central Service Areas, respectively.

4.1.2 Alternatives Scoring

A workshop was held with the City to discuss the alternatives analysis and preliminary scoring developed by BMcD. The scoring methodology is a "balanced scorecard" approach that considers operability, maintainability, expandability, and cost factors. During the workshop, scoring was adjusted based on feedback from the City. Table 4-2 shows the scoring summary after the conclusion of the workshop. In the scoring, larger positive numbers indicate better scoring, and the categories were assigned scores from 1 to 4. Alternative No. 4 (Central Consolidation) scored the most favorably, primarily due to its reduced mechanical and instrumentation and controls (I&C) complexity associated with removing an entire WWTP from City purview, reduced capital cost, and the ability to either reduce the total number of plant operations staff or dedicate existing staff to the operations of a single facility. Alternatives No. 1-3 have reduced chemical costs due to the inclusion of biological phosphorus removal at the North WWTP, while Alternative No. 4 relies completely on chemical phosphorus removal for the consolidated Central WWTP. The O&M costs across all alternatives were projected to be similar, but the Central WWTP has the potential for reduced operating costs in the future if biological phosphorus removal is included as a future project. Once the chemical feed program is instituted and the City works with industrial dischargers to reduce TP load at Central WWTP, an evaluation is recommended in the future to decide whether adding biological phosphorus removal to the Central WWTP is a feasible long-term option to reduce ongoing O&M expenditures associated with chemical feed.

Table 4-2: Summary of Biological Treatment Alternatives Scoring

Category	**Alt. No. 1** AO	**Alt. No. 2** Intermittent Aeration	**Alt. No. 3** Oxidation Ditch	**Alt. No. 4** Central Consolidation
Site Footprint	2	2	1	4
Amenable to Intensification[1]	4	1	3	1
Prevalence in Industry	4	3	4	4
Operational Flexibility	4	3	3	2
Mechanical Complexity (2x Weighting)	1 (x2) = 2	1 (x2) = 2	3 (x2) = 6	4 (x2) = 8
I&C Complexity	1	1	3	4
Staffing Requirements	1	1	1	4
Capital Cost (3x Weighting)	3 (x3) = 9	3 (x3) = 9	3 (x3) = 9	4 (x3) = 12
O&M (2x Weighting)	3 (x2) = 6	3 (x2) = 6	3 (x2) = 6	3 (x2) = 6
TOTAL	**33**	**28**	**36**	**45**

1 Intensification is the expansion of treatment capacity without construction of additional process volume.

4.2 Recommended Facilities

Based on the alternatives analysis, scoring and subsequent discussions with the City, Alternative No. 4 (Central Consolidation) has been selected as the preferred option. The subsequent sections detail the required improvements and estimated costs for the preferred alternative. Note that a set of preliminary layout exhibits, process flow diagrams, hydraulic profile, and one-line diagrams have been provided in Appendix D.

Due to heightened budgetary concerns (refer to Section 5.0), the conceptual design will be re-evaluated in the beginning, and throughout, the detailed design phase to identify means of maintaining the project budget within the City's bonding capacity.

4.2.1 Civil Site - North Screening & Pump Station

Two (2) potential locations were evaluated for the new North Screening & Pump Station, Valve Vault, and Electrical Building facilities on the east side of the existing North WWTP site. The existing North WWTP is located east of Sewer Branch in the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area Zone AE, commonly referred to as the floodplain, depicted on Flood Insurance Rate Map (FIRM) number 29159C0301D, effective November 30, 2023. The proposed alternatives are located outside of the floodplain.

Alternative 1 is located in the northeast corner of the existing North WWTP site, on City-owned property, where an existing maintenance yard is currently located. The City would need to extend their existing power and water service lines to this location. Construction of the proposed facilities at this location would require the City to relocate equipment and materials currently stored in the maintenance yard. The existing 24-inch wet weather gravity main and existing 10-inch North EQ Basin return force main would need to be tied into the new Screening & Pump Station structure. This alternative requires a slightly longer proposed 16-inch sanitary sewer force main leaving the site, a longer extension of the existing 24-inch North interceptor sewer and longer access road, compared to Alternative 2.

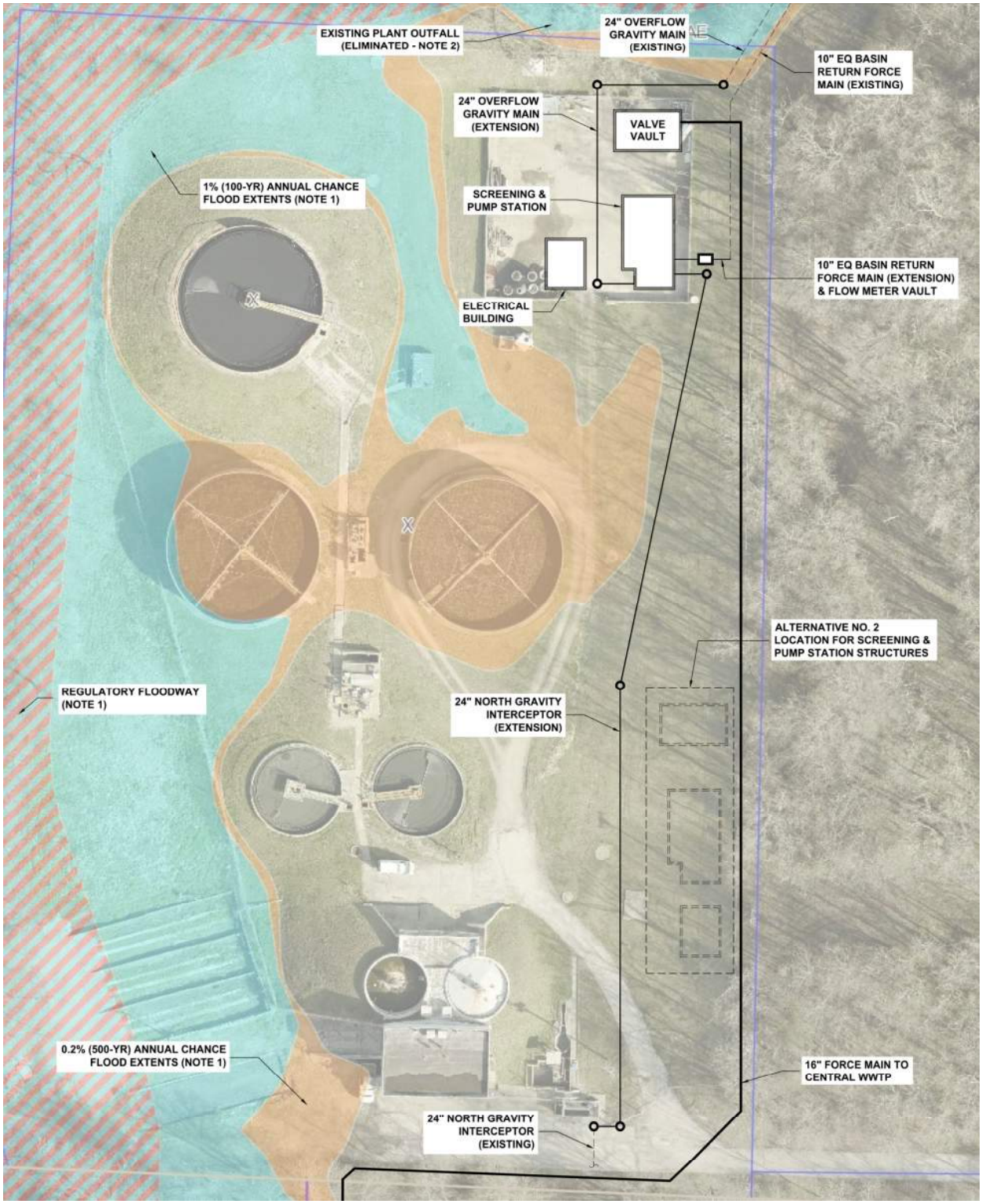
Alternative 2 is located in the southeast corner of the existing North WWTP site, on City-owned property. The City may be able to utilize the existing service lines to the plant for power and water. Similarly to Alternative 1, the existing 24-inch wet weather gravity main and 10-inch North EQ Basin return force main would require tie-in to the new structure. This alternative provides for a small reduction in length for the proposed 16-inch sanitary sewer force main leaving the site, a reduction in length for the 24-inch north interceptor sewer extension, and shorter access road, compared to Alternative 1. Construction sequencing may be more difficult due to existing infrastructure being more congested in this area.

When the North WWTP is decommissioned, the existing 24-inch wet weather gravity main that conveys wastewater to the existing North WWTP Equalization Basin and existing pump station & force main that convey wastewater from the existing equalization basin would remain in service to optimize use of the existing equalization basin infrastructure.

General access to the North Screening & Pump Station facility will reuse the existing North WWTP access road from Georgetown Road; new drives will be provided to access the new infrastructure. The locations considered for the new North Screening & Pump Station, Valve Vault, and Electrical Building facilities are shown in Figure 4-1 and on Exhibit 004C101. Alternative 1 is the City's preferred alternative due to ease of construction (less congested area). Final siting will be determined during detailed design.

The proposed project includes reusing the existing 24-inch wet weather gravity main between the existing North WWTP and North EQ Basin, and tying it into the new North Screening & Pump Station at the proposed wet weather overflow channel. The existing 10-inch North EQ Basin return force main will also be reused and tied into the influent channel. Both wet weather lines may require temporary rerouting during construction to allow the new North Screening & Pump Station to be built.

Figure 4-1: Proposed Locations for North Screening & Pump Station Structures



4.2.2 Civil Site - Central WWTP

The existing Central WWTP site includes wastewater treatment processes, a concrete peak flow sedimentation basin, and earthen wet weather equalization basin. The existing Central WWTP is located east of Brushy Creek and north of Brushy Creek Tributary 1 in the FEMA Zone AE floodplain, as depicted on FIRM number 29159C0284D, effective November 30, 2023. Refer to Appendix D for a more detailed conceptual site plan for the Central WWTP, which shows floodplain delineation. A conceptual site plan is shown in Figure 4-2. The effective FEMA models for Brushy Creek and Brushy Creek Tributary 1 were obtained from the City of Sedalia through their Missouri State Emergency Management Agency (MoSEMA) floodplain mapping contact. The following active components of the existing Central WWTP are located within the FEMA Zone AE extents:

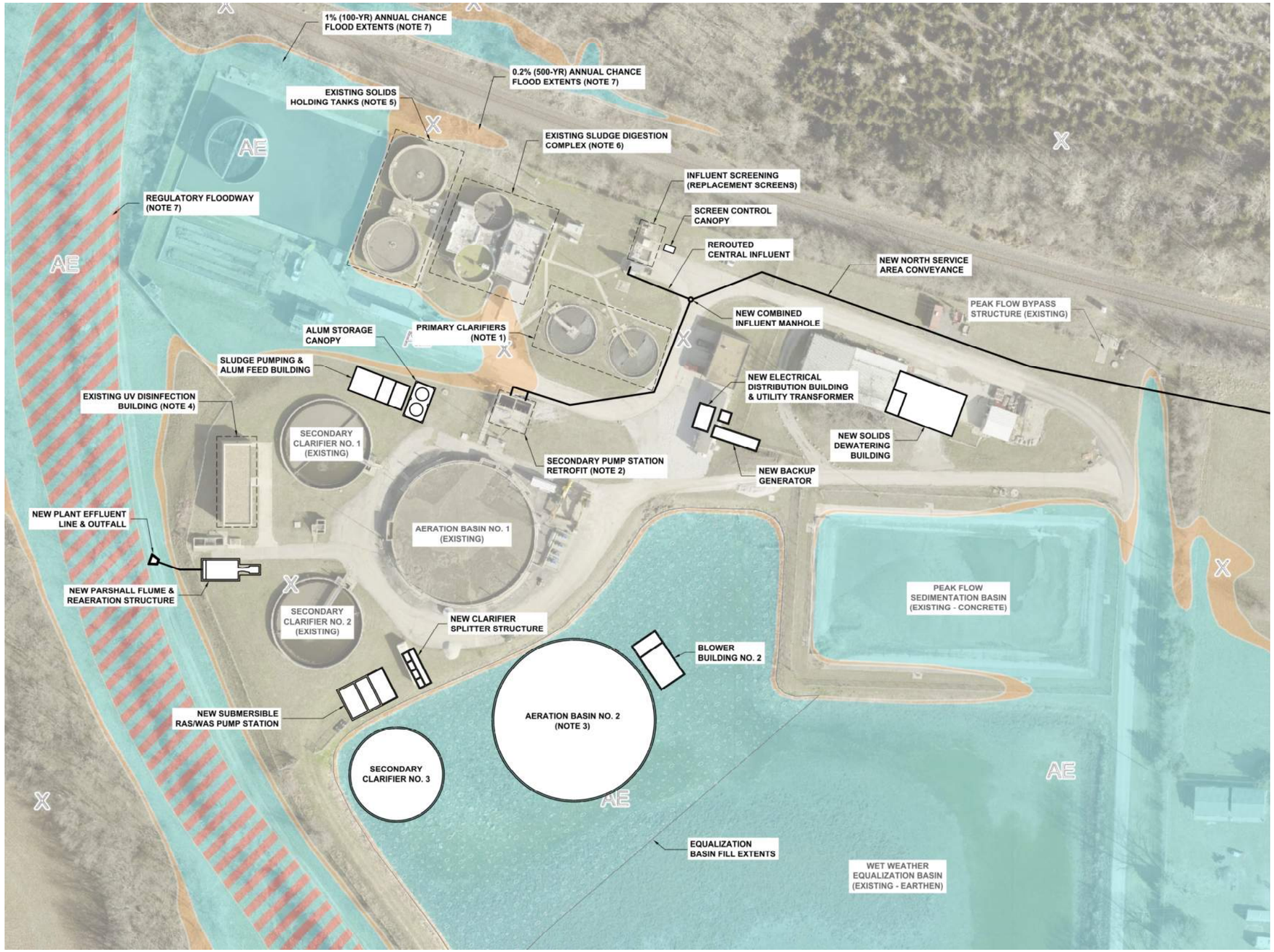
- Wet Weather Equalization Basin
- Peak Flow Sedimentation Basin
- Central WWTP Outfall

Proposed improvements will be elevated such that structures and equipment are one foot above the base flood elevation to meet City floodplain development requirements and MDNR requirements. The City's Floodplain Management Ordinance (Ord. No. 11910, § 2, 10-2-2023) requires non-residential construction to be elevated to 1 foot above the base flood elevation while, Missouri 10 CSR 20-8.140(2)(B) requires wastewater facility structures, electrical equipment, and mechanical equipment to be protected from physical damage by not less than the 100-year flood elevation. The following proposed improvements are anticipated to be within the existing FEMA Zone AE floodplain extents:

- Aeration Basin No. 2, Blower Building No. 2, Secondary Clarifier No. 3
- New Central WWTP Outfall

Note that the Sludge Pumping & Alum Feed Building is shown adjacent to the FEMA floodplain and design impacts must be evaluated during detailed design.

Figure 4-2: Conceptual Central WWTP Site Plan (refer to Appendix D for additional detail)



The new Solids Dewatering Building is planned to be constructed in a location currently occupied by City storage facilities. These existing structures will be demolished in preparation for construction. An access road and parking area will be included adjacent to the Solids Dewatering Building.

The existing Wet Weather Equalization Basin will be partially filled to provide adequate space for the new secondary treatment components (secondary clarifier, aeration basin, and blower building). At the beginning of detailed design, a geotechnical investigation will be initiated to determine the appropriate approach to excavation, backfilling, and preparation of the infill area for construction. These requirements should be evaluated as early as possible to identify unforeseen design and schedule impacts. A new plant effluent outfall structure will be located on the east bank of Brushy Creek and will be designed to minimize obstruction. The new Sludge Pumping & Alum Feed Building will be sited within, or adjacent to, this zone.

Proposed improvements will be sited to balance impacts to the regulatory floodplain and flood protection requirements. Preliminary floodplain modeling was performed in HEC-RAS Version 6.6 to conceptually determine the impact of the proposed improvements on the 1% annual chance flood elevation, commonly referred to as the base flood elevation (BFE) or the 100-year flood elevation. The Brushy Creek and Brushy Creek Tributary 1 model files acquired from the City of Sedalia were run as the Duplicate Effective models. An Existing Conditions model was developed for Brushy Creek only, where an additional cross section was added to represent a possible location for the new Sludge Pumping & Alum Feed Building. The existing grade for this added cross section was interpolated between modeled cross sections, and the right overbank was supplemented with 2024 1-foot contour data provided by the City. Ineffective flow areas were established based on engineering judgement for this added cross section.

Proposed Conditions models were developed for both Brushy Creek and Brushy Creek Tributary 1. The proposed fill within the existing wet weather equalization basin and for the Sludge Pumping & Alum Building was modeled by altering the ground surface elevation in the Proposed Conditions models to represent the finished grade elevation. The new plant outfall is anticipated to be designed to minimize impact to the cross-sectional flow area of Brushy Creek. Therefore, this proposed outfall structure was not modeled. The HEC-RAS model results are summarized in Table 4-3 for Brushy Creek between the Union Pacific Railroad and Main Street and for Brushy Creek Tributary 1 between the confluence with Brushy Creek and Metallic Lane. These preliminary model results demonstrate no rise in the BFE.

Table 4-3: Preliminary Floodplain Modeling Results

Flooding Source	Model River Station	Lettered Cross Section	1% Annual Chance Flood Elevation (ft)			
			Duplicate Effective	Existing Conditions	Proposed Conditions	Change[1] (ft)
Brushy Creek	Union Pacific Railroad					
	19706		789.30	789.30	789.30	0.00
	19847.6	L	789.46	789.46	789.46	0.00
	19947.8[2]		0.00	790.03	790.03	0.00
	20057.8		789.97	789.68	789.68	0.00
	20210.9	M	790.59	790.51	790.51	0.00
	20479.7		791.79	791.76	791.76	0.00
	20761.5		793.20	793.19	793.19	0.00
	21068.1	N	794.20	794.20	794.20	0.00
	Main Street					
Brushy Creek Tributary 1	Confluence with Brushy Creek					
	29.4		790.72	N/A	790.72	0.00
	109.5		793.06	N/A	793.06	0.00
	195.4	A	794.90	N/A	794.90	0.00
	381.8		0.00	N/A	0.00	0.00
	427.4		801.24	N/A	801.24	0.00
	487.3	B	801.27	N/A	801.27	0.00
	567.1		801.28	N/A	801.28	0.00
	654.4		801.29	N/A	801.29	0.00
	Metallic Lane					

[1] Proposed Conditions minus Existing Conditions, or Duplicate Effective if Existing Conditions is not applicable.
[2] Added cross section

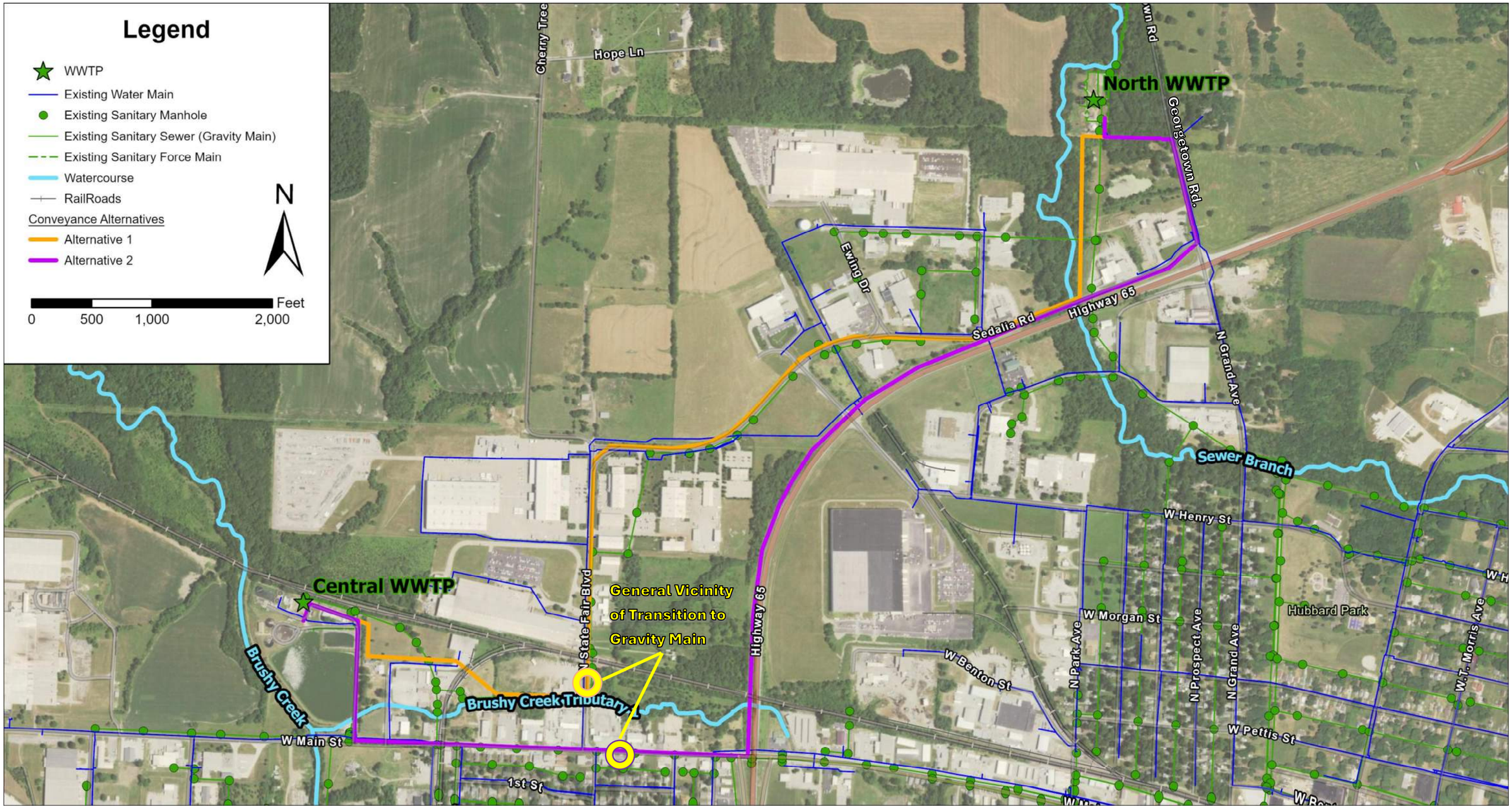
4.2.3 North Force Main Alignment

A new 16-inch force main will be routed from the proposed North Screening & Pump Station facility to the existing Central WWTP. The force main will discharge to a new gravity main at a location upstream of the Central WWTP, and that 24-inch gravity main will discharge to a new influent manhole at Central WWTP that also combines screened influent from the Central WWTP Screening Structure and filtrate from the new Central WWTP Solids Dewatering Building. The location of the transition to a gravity main will be determined during detailed design, but may be located near the intersection of N Main St. and N State Fair Blvd.

Previous planning efforts had considered terminating a new North Service Area force main into an existing Central Service Area manhole, which would commingle flows from both service areas. However, the Central Service Area collection system experiences surcharging during wet weather due to inflow and infiltration (I/I) issues and the existing Central Screening structure is not capable of processing the additional North Service Area flows from the North Pump Station (peak flows up to 4.5 MGD).

Two alternatives for conveying screened flow from the proposed North Screening & Pump Station facility to the Central WWTP for treatment were evaluated as shown in Figure 4-3. Alternatives considered property acquisition, roads, waterway crossings, and water main crossings. Further evaluation of the proposed routes will be conducted during detailed design to inform the selection of a final conveyance route.

Figure 4-3: North Service Area Force Main Alignment



4.2.4 Structural

A summary of structural materials of construction for each unit process is provided in Table 4-4. Note that reference exhibits are provided in Appendix D.

Table 4-4: Summary of Structural Materials of Construction (New Structures)

Building/Structure	Reference Exhibit(s)	Materials of Construction
North Screening & Pump Station	120D101	• Liquid Containing Reinforced Concrete Walls • Reinforced Concrete Mat Foundation
North Valve Vault	140D101	• Liquid Containing Reinforced Concrete Walls • Reinforced Concrete Mat Foundation
North Electrical Building	n/a	• Double Wythe Masonry Cavity Walls[1] • Reinforced Concrete Strip Footing • Flat TPO Roof Membrane on Precast Concrete Roof
Central Screening Structure	200D101	• Reinforced Concrete Mat Foundation (Control Panels) • Pre-Engineered Metal Canopy (Control Panels)
Aeration Basin No. 2	280D101	• Liquid Containing Reinforced Circular Concrete Walls • Reinforced Concrete Mat Foundation
Blower Building No. 2	320D101	• Pre-Engineered Metal Building • Reinforced Concrete Strip Footing
Clarifier Splitter Structure	360D101	• Liquid Containing Reinforced Concrete Walls • Reinforced Concrete Mat Foundation
Secondary Clarifier No. 3	400D101	• Liquid Containing Reinforced Circular Concrete Walls • Reinforced Concrete Mat Foundation
Effluent Parshall Flume & Reaeration Structure	460D101	• Liquid Containing Reinforced Concrete Walls • Reinforced Concrete Mat Foundation
RAS/WAS Pump Station	520D101	• Liquid Containing Reinforced Concrete Walls • Reinforced Concrete Mat Foundation
Electrical Distribution Building	800E101	• Double Wythe Masonry Cavity Walls[1] • Reinforced Concrete Strip Footing (Building) • Flat TPO Roof Membrane on Precast Concrete Roof • Reinforced Concrete Mat Foundation (Transformer & Backup Generator)
Sludge Pumping & Alum Feed Building	560D101	• Double Wythe Masonry Cavity Walls[1] • Reinforced Concrete Strip Footings • Flat TPO Roof Membrane on Precast Concrete Roof • Pre-Engineered Metal Canopy (Alum Storage Area)
Solids Dewatering Building	640D101	• Double Wythe Masonry Cavity Walls[1] • Reinforced Concrete Strip Footing • Flat TPO Roof Membrane on Precast Concrete Roof

[1] Refer to Architectural description in Section 4.2.5.
[2] All structures not preceded by "North" are located at the Central WWTP.
[3] Structural precast concrete roof panels anticipated to be double tee or hollowcore panel construction.

Final structural design will conform to the following codes and standards:

- ASCE 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- ACI 350: Code Requirements for Environmental Engineering Concrete Structures
- ACI 318: Building Code Requirements for Structural Concrete
- ACI 530: Building Code Requirements for Masonry Structures
- AISC 360: Specifications for Structural Steel Buildings
- International Building Code – 2021 Edition (as amended by City of Sedalia)

During detailed design, a geotechnical investigation will be conducted to determine the appropriate approach to structural foundation design and soil improvement.

4.2.5 Architectural

The North Screening & Pump Station facility at the existing North WWTP site will include an Electrical Building that houses electrical gear and controls enclosures. The remainder of the new facilities will be at-grade and below-grade structures containing process equipment.

The Central WWTP improvements will include four new buildings: Blower Building No. 2, Electrical Distribution Building, Sludge Pumping & Alum Feed Building with storage canopy, and Solids Dewatering Building. Additionally, building improvements are proposed to the existing UV Disinfection Building and Sludge Digestion Complex, including door replacements and roof repairs/replacements as necessary. All process equipment and connections will be removed from the Sludge Digestion Complex to mitigate NFPA 820 classification concerns, but the building will remain available for City use, including continued, limited use for electrical and controls use.

Wastewater treatment buildings are generally moist, corrosive environments; therefore masonry construction is recommended to withstand these environments. Where appropriate, pre-engineered metal buildings or canopies may be used. Structural roofing systems on masonry buildings will generally be precast concrete (typically double tee or hollowcore panel).

The typical exterior walls of masonry buildings will be constructed using double-wythe masonry cavity walls comprised of 8” CMU, 2.5” semi-rigid mineral wool, 1.5” air space, and a 4” masonry veneer. In lieu of 8” CMU, cast-in-place concrete may be used in certain situations.

Building roofs will be flat thermoplastic polyolefin (TPO) roof membranes over coverboard and code compliant tapered rigid insulation. The roofs will drain into prefinished aluminum scuppers, conductor

heads, downspouts, and overflow scuppers. Parapets will be designed to provide fall protection and will have prefinished aluminum coping.

Buildings will be secured with lockable fiber-reinforced plastic (FRP) doors that are corrosion resistant. Egress doors will be provided as required by code. Fire extinguishers will be provided and specified to meet occupancy requirements.

4.2.6 Process Concept Design

The following sections include descriptions of unit processes included in the concept Central Consolidation Project. Conceptual process flow diagrams, hydraulic profile, site plans, and process plan drawings are included in Appendix D (see Table 4-5 for a list of exhibits).

Table 4-5: Appendix D List of Exhibits

Exhibit	Title
004C101	Overall Site Plan – North Screening & Pump Station
004C151	Overall Site Plan – Central WWTP Improvements
004C152	Preliminary Yard Piping Plan – Central WWTP Improvements
004D601	Process Flow Diagram – North Screening & Pump Station
004D651	Liquid Process Flow Diagram – Central WWTP Improvements
004D652	Solids Process Flow Diagram – Central WWTP Improvements
004D653	Conceptual Hydraulic Profile
120D101	North Screening & Pump Station – Diversion, Screening & Wet Well General Process Plan
200D101	Central Consolidation – Central Screening Structure New Screens & Concrete Surface
240D101	Central Consolidation – Secondary Pumping Improvements General Process Plan
320D101	Central Consolidation – Blower Building No. 2 General Process Plan
360D101	Central Consolidation – Clarifier Splitter Structure General Process Plan
440DD101	Central Consolidation – UV Disinfection Bldg General Demo Plan
440D101	Central Consolidation – UV Disinfection Bldg General Process Plan
460D101	Central Consolidation – Effluent Parshall Flume & Reaeration General Process Plan
520D101	Central Consolidation – RAS/WAS Pump Station General Process Plan
560D101	Central Consolidation – Sludge Pumping & Alum Feed Building General Process Plan
640D101	Central Consolidation – Solids Dewatering Building General Process Plan
800E101	Central Consolidation – Electrical Distribution Building General Plan
E010-E016	One-Line Diagrams
E021	Plant Network Architecture Diagram

4.2.6.1 North Screening & Pump Station

A new screening and pump station system will be constructed at the existing North WWTP site to allow North Service Area wastewater to be screened and subsequently pumped to the Central WWTP. The North Screening & Pump Station includes an influent channel, wet weather overflow box, three (3) screening channels, and a dual compartment wet well. The influent channel is configured to allow up to 4.5 MGD of sewage flow to pass through the screening channels and into the wet well. When flow exceeds 4.5 MGD and the liquid level rises in the influent channel, wastewater will flow over a static weir opposite the screening channels and bypass to the existing North EQ Basin. If the wet well surcharges, an automatic weir gate along the overflow weir will open downward to allow additional flow into the bypass system and relieve surcharge conditions.

The screening system consists of three (3) channels, two (2) containing mechanical bar screens in a duty / standby configuration, and a third channel provided with a manually cleaned bar rack. The mechanical bar screens will have 1/4" spacing between bars and will operate automatically based on liquid level within the channels. Screenings will discharge directly into roll-off containers located below the top of the screen units. The screening system will be located outdoors, and the mechanical bar screens will be provided with winterization features, including a unit heater. Manually-operated slide gates are provided on the upstream and downstream ends of each screening channel. A summary of the screening system design is provided in Table 4-6.

Table 4-6: North Screening Design Summary

Parameter	Value
No. of Mechanical Bar Screens	2
Opening Size, inches	0.25
Capacity ea, MGD	4.5
Channel Width, ft	2
Channel Depth, ft	5

Screened wastewater passes into an effluent channel and is discharged into a two-compartment wet well structure. A manually operated slide gate is provided at each discharge between effluent channel and wet well to allow isolation of each wet well. Further, a manually operated slide gate is provided between the two wet wells to allow liquid level within both compartments to equalize. Each wet well compartment includes two (2) submersible pumps installed on guide rails to facilitate removal. Space is provided between each set of pumps to allow the installation of a third pump in each wet well for future expansion. The design capacity of the pump station is approximately 4.5 MGD, with a design pumping capacity of

1.5 MGD for each pump. The structure will be covered with a reinforced concrete slab with hatches to provide maintenance access for pump removal and replacement. A valve and meter vault will be located adjacent to the wet well to provide access to the pump discharge valves and North Service Area flow meter. The 16-inch force main will be routed from the valve vault to the Central WWTP, as described in Section 4.2.3. Note that the force main will be converted to a 24-inch gravity main prior to reaching the Central WWTP, at a location that will be determined during detailed design. A summary of the North Pump design conditions is provided in Table 4-7.

Table 4-7: North Pumping Design Summary

Parameter	Value
Number of Pumps	4 (3 duty / 1 standby)
Type of Pump	Wet-Pit Submersible
North Pump Capacity	1,040 gpm (each) 3,120 gpm (total)

See Drawing Nos. 120D101 and 140D101 in Appendix D for concept plans of the North Screening & Pump Station and Valve Vault structures, respectively. A new electrical building will be constructed adjacent to the structures to provide power and controls.

4.2.6.2 Central Wet Weather Holding System

The Central WWTP receives wastewater at the Peak Flow Bypass Structure, including a 27-inch interceptor and two (2) 12-inch force mains. Dry weather flows are directed to the WWTP through a 27-inch influent line, and the City has the ability to divert peak wet weather flows directly to the Peak Flow Sedimentation Basin through a 24-inch bypass line.

The Peak Flow Sedimentation Basin is a concrete basin with approximately 1.5 million gallons (MG) of storage volume. The Peak Flow Sedimentation Basin is connected to the Peak Flow Equalization Basin, which is an earthen lagoon with approximately 12 million gallons of storage volume (not including any accumulated sludge or other debris). Stored wastewater from these basins is transferred back to the Peak Flow Bypass Structure via the existing Basin Drain Pump Station, which is a duplex submersible pump station. The proposed project is not impacting the mechanical functionality of Peak Flow Bypass Structure and Basin Drain Pump Station, and these systems will continue to operate as they are currently.

The proposed project does require filling in a portion of the Peak Flow Equalization Basin to support the addition of Aeration Basin No. 2, Blower Building No. 2, and Secondary Clarifier No. 3. Refer to Exhibit 004C151 for an approximate fill boundary for the Peak Flow Equalization Basin. The preliminary fill

volume reduces the overall surface area of the equalization basin by approximately 25-30%, which is anticipated to reduce the storage volume of the Peak Flow Equalization Basin to 8.4-9 MG. The City is currently planning a cleanout of sludge from the Peak Flow Equalization Basin to maintain optimal storage volume.

4.2.6.3 Central Screening Improvements

Since the North Service Area 24-inch gravity main will discharge downstream of the Central Screening process, the existing Central Screening Structure will remain dedicated to handling flows generated in the Central Service Area only.

Due to inoperability of the existing mechanical screen at the Central WWTP, new screens are proposed. The proposed system includes two new mechanical bar screens retrofitted into the existing screening channels. The new mechanical screens will be installed in the two outer channels, the third inner channel will be provided with a replacement manual bar rack.

Mechanical bar screens with ¼-inch bar spacing and direct discharge to dumpsters are proposed. Mechanical screens will be installed with appropriate winterization features to allow for outdoors installation. An extended concrete surface will be provided around the existing screening structure to allow dumpsters to be maneuvered under each screening unit and to facilitate maintenance of the screening drives and rotating assemblies. Refer to drawing 200D101 in Appendix D for a conceptual plan layout of the screen replacement. Refer to Table 4-8 for a summary of the Central Screening design.

Table 4-8: Central Screening Design Summary

Parameter	Value
No. of Mechanical Bar Screens	2
Opening Size, inches	0.25
Capacity ea, MGD	6.0
Channel Width, ft	3
Channel Depth, ft	4

The existing Primary Clarifiers will be taken out of service and abandoned in place. A new screened influent line will be constructed to divert wastewater around the Primary Clarifiers to a new influent manhole upstream of the existing Secondary Pump Station. This manhole will provide a discharge point for screened influent from the Central Screening System, the new North Service Area gravity main, and the new dewatering filtrate plant sewer. The new manhole will then discharge into the retrofitted Secondary Pump Station, which will have two inlet pipes to each side of the wet well.

4.2.6.4 Central Secondary Pump Station Improvements

The existing Secondary Pump Station consists of two wet wells that serve two purposes: (1) dedicated Secondary Pumps that discharge to the existing Aeration Basin No. 1, and (2) a set of RAS/WAS Pumps. The proposed concept includes demolition of the RAS/WAS Pumping equipment and retrofit of a second line up of Secondary Pumps that will be dedicated to feeding the new Aeration Basin No. 2. Incoming flow will be provided into each wet well compartment, and a new cross-connection will be provided between the wet wells to equalize operating level. Each of these three openings will be provided with an isolation gate to allow each wet well to be taken out of service.

The existing Secondary Pumps (Nos. 1, 2, and 3) will remain in service and continue to serve Aeration Basin No. 1. The flow meter for this service will be upsized to an 18" or 20" meter. The new Secondary Pumps (No. 4, 5, and 6) will be designed to pump up to 6 MGD of wastewater to the new Aeration Basin No. 2 with two (2) pumps in service. A new dedicated flow meter will be provided for this service. The control system will include the ability to independently control influent flow to each aeration basin, which will accommodate the base option where Aeration Basin No. 2 will be larger than Aeration Basin No.1, as recommended in the following section. New discharge check valves and isolation valves will be installed in the existing valve vault to serve the new Secondary Pump lineup. Table 4-9 summarizes the new Secondary Pump design parameters. Refer to Exhibit 240D101 for a general process layout for the retrofitted Secondary Pump Station.

Table 4-9: Secondary Pumping Design Summary

Parameter	Value
Number of Pumps	3 (2 duty / 1 standby)
Type of Pump	Wet-Pit Submersible
WWTP Influent Pump Capacity	2,085 gpm (each) 4,170 gpm (total)
Speed Control	Variable Frequency Drive

4.2.6.5 Central Aeration Basin No. 2

A new Aeration Basin No. 2 is proposed to expand the biological treatment capacity of the Central WWTP, while also providing additional mechanical redundancy. The new basin will be configured similarly to existing Aeration Basin No. 1 and will include floating mixers and perimeter-installed, retrievable diffuser rack assemblies that are interchangeable with existing Aeration Basin No. 1. The Aeration Basin No. 2 structure will be circular, with similar operating depth as Aeration Basin No. 1 (approximately 17 ft sidewater depth).

Dedicated secondary influent and RAS lines will discharge into an influent box and overflow into Aeration Basin No. 2. Perimeter stainless steel aeration piping will be provided around the basin to feed each diffuser rack assembly. Each diffuser rack drop assembly will be provided with an isolation butterfly valve and quick disconnects to facilitate diffuser rack removal. The diffuser racks will be installed on guiderail masts. An effluent box is provided with extended overflow weir to limit the elevation change within the basin across the range of anticipated influent flows. The effluent box also contains an alum feed discharge point for chemical phosphorus removal. The effluent box will be covered with a solid checker-plate to retain heat and prevent the chemical feed piping from freezing. Mixed liquor from each Aeration Basin will be conveyed through dedicated pipes to the new Clarifier Splitter Structure.

The ideal sizing for Aeration Basin No. 2 includes an aerobic solids retention time (SRT) of 12 days and maximum mixed liquor suspended solids (MLSS) concentration of 3,750-3,800 mg/L. Based on the design loading conditions at maximum month conditions and maintaining the same operating depth as existing Aeration Basin No. 1, the proposed Aeration Basin No. 2 has an inner diameter of 150 feet, which is 20 feet larger than Aeration Basin No. 1 (equivalent to approximately 35% larger). During detailed design as the opinion of probable cost (OPC) is further refined, the City will maintain the option to consider providing an Aeration Basin No. 2 design that is identical to Aeration Basin No. 1 as a cost savings measure (results in an SRT of 9-10 days at the basis of design).

Aeration Basin No. 2 will be served by new Blower Building No. 2, which will be configured similarly to the existing Blower Building. Three (3) turbo blowers will be provided in a two (2) duty, one (1) standby configuration. Aeration Basin No. 2 blower control will be independent of the existing Aeration Basin No. 1 control system. During detailed design, the ability to operate the system with intermittent aeration will be considered to facilitate nitrogen removal when plant loadings are below the design condition.

A summary of baseline 150-ft diameter Aeration Basin No. 2 concept design is provided in Table 4-10 and Table 4-11. The concept design considers maximum month conditions with both Aeration Basin

No. 1 and Aeration Basin No. 2 operating in parallel, with a design mixed liquor suspended solids (MLSS) of 3,800 mg/L and an aerobic SRT of 12 days. Refer to conceptual drawings 280D101 and 320D101 for general plan layouts for Aeration Basin No. 2 and Blower Building No. 2, respectively.

Table 4-10: Biological Treatment System Design Summary

Parameter	Value
No. of Aeration Basins	2 (1 existing, 1 new)
Basin Design Volumes:	1.67 MG (existing) 2.24 MG (new) 3.91 MG total
Max Month MLSS	3,800 mg/L
Max Month SRT	12 days

Table 4-11: Secondary Treatment Process Equipment Summary

Parameter	Value
No. of Floating Mixers	1 (Existing Basin No. 1) 3 (New Basin No. 2)
Design Horsepower, Aeration Basin No. 1	75 hp (existing)
Design Horsepower, Aeration Basin No. 2	25 hp each (new)
No. of Turbo Blowers	3 per basin (3 new, 3 existing)
Design Horsepower	150 hp (each)
Design Airflow, scfm	2,700 (each)

4.2.6.6 Central Secondary Clarifier No. 3

A new Clarifier Splitter Structure will be provided to receive mixed liquor from the Aeration Basins and evenly distribute flow between two (2) existing secondary clarifiers and new Secondary Clarifier No. 3. The existing effluent line from Aeration Basin No. 1 will be rerouted to the splitter structure and upsized to 24 inches. A new 30-inch mixed liquor line will be routed between Aeration Basin No. 2 and the splitter structure. A third inlet line will be pre-installed to allow a third aeration basin to be added in the future. The Clarifier Splitter Structure will include four (4) effluent boxes, which will allow existing Secondary Clarifiers No. 1 and No. 2, new Secondary Clarifier No. 3, and a future Secondary Clarifier No. 4 to be connected. The three active effluent boxes will include manually-operated slide gates, and a stop plate will be provided for the fourth box.

Secondary Clarifier No. 3 will be constructed in a similar configuration as the existing clarifiers. This includes an integrated scum pumping box with one (1) submersible chopper pump. The new clarifier will have a diameter of 75-ft, similar to the existing clarifiers. Refer to conceptual drawings 360D101 and 400D101 for general plan layouts for the Clarifier Splitter Structure and Secondary Clarifier No. 3, respectively. A design summary of the new secondary clarifier is provided in Table 4-12.

Table 4-12: Secondary Clarifier Process Equipment Summary

Parameter	Value
No. of Secondary Clarifiers	3 (1 new, 2 existing)
Secondary Clarifier Diameter	75 ft
Sidewater Depth	12 ft
Surface Overflow Rate (SOR)	800 gal/sf-d
Solids Loading Rate (SLR)[1]	35 lbs/sf-d

[1] SLR calculated at peak flow, 3,800 mg/L MLSS, and 1Q_{avg} RAS Flow

4.2.6.7 Central RAS/WAS Pump Station

A new submersible-style return activated sludge (RAS) and waste activated sludge (WAS) pump station is included in the concept design. Three (3) RAS pumps, and two (2) WAS pumps will be installed in a common wet well. The RAS Pumps are provided in a 2 duty / 1 standby configuration, with one pump dedicated to each Aeration Basin and a swing unit to accommodate maintenance outages. The wet well and valve vault are provided with space to add a fourth RAS Pump which would accommodate a third Aeration Basin. The design capacity is approximately 3 MGD, or 150% of the design influent wastewater flow. The WAS Pumps are provided in a 1 duty / 1 standby configuration. WAS pumps are sized to accommodate excess wasting and could transition from intermittent to continuous wasting at future flow conditions. A summary of the RAS and WAS pumping is provided in Table 4-13 below. Refer to Exhibit 520D101 for a general process plan layout of the RAS/WAS Pump Station.

Table 4-13: RAS/WAS Pump Station Design Summary

Parameter	Value
No. of RAS Pumps	3 (2 Duty / 1 Standby)
RAS Pump Capacity ea	2,080 gpm
No. of WAS Pumps	2 (1 Duty / 1 Standby)
WAS Pump Capacity ea	100 gpm

4.2.6.8 Central Aluminum Sulfate (Alum) Feed Building & Storage

Chemical phosphorus removal will be provided to meet the anticipated 2033 effluent phosphorus limit. Aluminum sulfate (alum) will be fed to the effluent box of each Aeration Basin to allow mixing in the transfer piping and Clarifier Splitter Structure prior to reaching the secondary clarification process.

The concept design provides two (2) fiber-reinforced plastic (FRP) storage tanks, each with a storage volume of 8,500 gallons. The storage tanks will be located outdoors in a concrete containment area covered with a pre-engineered metal canopy. All exterior tanks and piping will be provided with heat-trace and insulation to protect from freezing. Refer to Exhibit 560D101 for a general process plan layout of the Alum Feed Building & Storage Canopy. A brief design summary is shown below in Table 4-14.

Table 4-14: Alum Feed System Design Summary

Parameter	Value
No. of Alum Feed Pumps	2 (1 duty / 1 standby)
Alum Feed Pump Capacity ea	35 gph
No. of Alum Storage Tanks	2
Alum Storage Tank Volume	8,500 gallons
Projected Alum Storage at Design	30 days

4.2.6.9 Central Ultraviolet (UV) Disinfection Expansion

The existing UV Disinfection system must be expanded to process a new peak flow of 10.5 MGD. The existing UV channels are 1.67-ft wide x 32-ft long and include a downstream static weir assembly for maintaining appropriate water level within the channels. The UV channels will be expanded by demolishing the existing concrete divider and constructing channels that are anticipated to be 2.67-ft wide. During detailed design, the effluent weir will be evaluated to determine if a static option is available or if a dynamic flow control approach may be required. Preliminary coordination with the UV system manufacturer indicates a static weir is likely feasible. The UV system will be designed to meet the 10.5 MGD peak flow capacity with all banks in service and meet the maximum month flow capacity of 6.85 MGD with one bank out of service. Each channel will be provided with automatic slide gates for isolation. Refer to Exhibits 440DD101 and 440D101 for general demolition and process plan layouts for the UV system expansion, respectively. A summary of conceptual UV design parameters is provided in Table 4-15.

Table 4-15: UV Facility Design Summary

Parameter	Value
No. of Channels	2
No. of UV Banks per Channel	2
Design Capacity, MGD	6.85 (3 Banks) 10.5 (4 Banks)
Minimum UV Transmittance, %	60
Effluent Disinfection Standard:	
E. Coli (30-d Geometric Mean)	206 CFU/100 mL
E. Coli (Daily Max)	1,030 CFU/100mL
Minimum UV Dose, mJ/cm^2	30

4.2.6.10 Central Parshall Flume & Reaeration Structure

Due to the anticipated 6 mg/L effluent dissolved oxygen limit, the existing cascade aeration structure is not sufficient. A new Parshall Flume & Reaeration Structure will be provided to replace the existing effluent structure. Due to limited hydraulic profile, a low-head reaeration system is proposed in lieu of a conventional step cascade aeration design. This includes a static, stainless steel assembly installed in a concrete structure requiring only 2 feet of hydraulic drop. No mechanical equipment is required. Refer to Exhibit 460D101 for a general process plan layout of the Parshall Flume & Reaeration Structure.

4.2.6.11 Central New Plant Outfall

A new plant outfall is proposed to be constructed to reduce hydraulic losses and simplify construction associated with the new Parshall Flume & Reaeration Structure, in addition to minimizing creek obstruction. The new outfall will be located within 100 feet of the existing plant outfall. Following construction, the existing plant outfall will be abandoned.

4.2.6.12 Central Solids Processing

Waste sludge from the RAS/WAS Pump Station and scum from the clarifiers is conveyed to two (2) existing Solids Holding Tanks. Each holding tank is 54-ft diameter with a sidewall depth of 8 feet, with an operating volume of approximately 140,000 gallons each. Each tank is served by a floating mixer, decant line, and coarse bubble aeration system. The coarse bubble aeration system for each tank is served by a dedicated 20 hp positive displacement blower. In coordination with the City, these systems are assumed to be in serviceable condition and are not anticipated to be modified for this project.

A new Sludge Pump Station will be provided to transfer sludge from the existing Solids Holding Tanks to the new Solids Dewatering Building. Three (3) positive displacement sludge pumps will be provided with

the ability to have dedicated pumping service from either holding tank. Two (2) 6-inch BFP feed lines will be provided to independently pump sludge to each Belt Filter Press. The pumps will be arranged such that the middle pump can be operated to serve either Solids Holding Tank and either Belt Filter Press.

Sludge will be pumped from the bottom of the Sludge Holding Tanks to the Solids Dewatering Building, which contains two (2) belt filter presses, two (2) polymer feed skids, two (2) wash water booster pumps, and a conveyor system. Polymer dosages will be as recommended by the specific dewatering equipment manufacturer but are anticipated between 8-20 lbs dry polymer/dry ton of sludge. Dewatered solids will discharge from the dewatering unit onto a horizontal sludge conveyor followed by an inclined sludge conveyor, which will discharge into a dumpster or truck. Dewatering filtrate will be returned to the plant sewer which terminates at the influent manhole upstream of the Secondary Pump Station. Refer to Exhibit 560D101 for a general process plan layout of the Sludge Pump Station, and Exhibit 640D101 for a general process plan layout of the Solids Dewatering Building. A summary of the solids handling parameters is shown in Table 4-16.

Table 4-16: Dewatering Summary Design Summary

Parameter	Value
Design WAS Solids Loading	6,950 lbs/d (average) 11,050 lbs/d (max month)
No. of Sludge Holding Tanks	2 (existing)
Total Volume	280,000 gal
Solids Content	1.0-1.5% TS
Hydraulic Retention Time	4-5 days (average) 2-3 days (max month)
No. of Blowers	2 (existing) (1 Duty per Tank)
Capacity	20 hp
No. of Sludge Feed Pumps	3
Sludge Feed Pump Capacity, ea	280 gpm
No. of Belt Filter Presses	2
Capacity ea, lb/hr	1,400
Average Operating Time, hrs/wk	15-20 (2 units in service) 35-40 (1 unit in service)
Max Month Operating Time, hrs/wk	25-30 (2 units in service) 55-60 (1 unit in service)
No. of Wash Water Booster Pumps	2 (1 per Belt Filter Press)
No. of Polymer Skids	2 (1 per Belt Filter Press)
No. of Polymer Feed Pumps	2 per Skid (Duty/Standby)

4.2.6.13 Process Flow Diagrams

Preliminary process flow diagrams (PFDs) were developed for the liquid and solids processes. The liquid PFD and solids PFD are included in the conceptual drawings in Appendix D. Refer to Exhibit 004D601 for the North Screening & Pump Station PFD, and Exhibits 004D651 & 004D652 for the Central WWTP Liquid and Solids PFDs, respectively.

4.2.7 Yard Piping and Plant Hydraulics

The proposed project requires a significant amount of new and replacement yard piping. Pumped process lines include the secondary feed lines to the Aeration Basins, RAS/WAS and scum lines, sludge feed lines to the BFPs, and BFP filtrate drain line. Critical gravity systems are located downstream of the Aeration Basins and through to the plant outfall. Increasing the peak flow capacity from approximately 6-7 MGD to 10.5 MGD requires upsizing most of the existing lines. Staging of construction and maintenance of plant operations will be a critical component of the detailed design and construction planning activities. Refer to Exhibit 004C152 for the Central WWTP yard piping plan and Exhibit 004D653 for the conceptual Central WWTP hydraulic profile.

4.2.8 Plant Utilities

The North Screening & Pump Station will include yard hydrants for washdown service and natural gas heating for the new North Electrical Building. No waste streams are produced that require a plant sewer.

The Central WWTP improvements will include new operating spaces that require potable water for occupied spaces, process use and washdown. Natural gas is assumed to be utilized for heating, and plant sewer connections will be provided as needed for collecting return streams from major unit processes and building drains.

4.2.8.1 Plant Sewer

At the Central WWTP, new plant sewer connections will be included at the Sludge Pump Station & Alum Feed Building, Blower Building No. 2, and the Solids Dewatering Building. During detailed design, inclusion of structure drains will be considered for below grade structures on a case-by-case basis for convenience. New plant sewer connections will be tied into any existing plant sewer with adequate capacity, or directly to the Secondary Pump Station. The Solids Dewatering Building has a larger plant sewer demand and will be routed directly to the new influent manhole upstream of the Secondary Pumping Station. The projected maximum filtrate production with both BFPs in service is approximately 500 gpm.

4.2.8.2 Potable Water

Typical potable water demand at the Central WWTP will consist of general process washdown, polymer dilution water, and belt filter press wash water. Additional intermittent demand includes eye-washes and/or safety showers located near chemical feed systems (alum feed and polymer feed systems). At maximum throughput, the BFP wash water demand and polymer dilution water demand is anticipated to be 60-120 gpm and 80 gpm, respectively. The existing Central WWTP potable water service is assumed to have adequate capacity to accommodate these demands based. The existing service capacity will be evaluated during detailed design.

Water demand at the North Screening & Pump Station is limited to intermittent wash down service. The existing water service is adequate for this purpose.

4.2.9 Heating, Ventilation and Air Conditioning (HVAC)

For electrical rooms, air handling units (AHU) will be provided to maintain temperatures in the 60 deg F to 80 deg F range. For process areas in buildings, and where required in below grade locations, makeup air units (either roof- or grade-mounted) will be provided to meet air change requirements based on hazardous classifications. In addition, process areas will be provided with heating systems to keep space temperatures above freezing. Conceptual level HVAC design for each building and structure is summarized in Table 4-17.

Existing mechanical equipment in the UV Disinfection Building will be evaluated and replaced-in-kind as necessary. Existing mechanical equipment in the Sludge Digestion Complex will be evaluated and recommendations made for replacement. Since process connections will no longer be active in that space, NFPA 820 should no longer apply, and any ventilation requirements will be driven by building code.

Table 4-17 Summary of HVAC Concept Level Requirements

Building	HVAC Equipment[1]	NFPA Area Classification[2]	Ventilation Rate
North Plant Screening & Pump Station and Valve Vault	Wet Well: No Equipment Needed	Class 1 Division 1 Table 4.2.2, Row 14, Line a	Not Required
	Valve Vault: No Equipment Needed	Class 1 Division 2 Table 4.2.2, Row 29, Line a	Not Required
North Plant Electrical Building	Exterior Wall Mount 3-ton AHU with integrated 5 kW electric heater	Unclassified	N/A
Central Plant Electrical Distribution Building	Electrical Room: Packaged 5-ton AHU with integrated 9 kW electric heater	Unclassified	Not Required
Central Plant Blower Building No. 2	Blower Room: Exhaust Fans & Control Dampers	Unclassified	N/A
	Electrical Room: Packaged 10-ton AHU with integrated 15 kW electric heater	Unclassified	N/A
Central Plant RAS/WAS Pump Station	Wet Well: No Equipment Needed	Class 1 Division 1 Table 6.2.2(a), Row 10, Line a	Not Required
	Valve Vault & Meter Vault: No Equipment Needed	Class 1 Division 2 Table 6.2.2(a), Row 9, Line a	Not Required
Central Plant Sludge Pump Station and Alum Feed Building	Chemical Room: 150 MBH Makeup Air Unit and Exhaust Fan for Process Area	Unclassified	1 CFM/ft^2
	Pump Room: 300 MBH Makeup Air Unit and Exhaust Fan	Unclassified Table 6.2.2, Row 9, Line b	6 ACH
	Electrical Room: Packaged 5-ton AHU with integrated 9 kW electric heater	Unclassified	Not Required
Central Plant Solids Dewatering Building	Process Room: 400 MBH Makeup Air Unit and Exhaust Fan	Unclassified Table 6.2.2, Row 12, Line c	6 ACH
	Electrical Room: Packaged 5-ton AHU with integrated 9 kW electric heater	Unclassified	Not Required

*ACH = air changes per hour, AHU = air handling unit
[1] Equipment selections for HVAC equipment are preliminary for approximate electrical load sizing and will be updated in design phase.
[2] Table references from 2024 Edition of NFPA 820.

Final design of HVAC, plumbing, and other mechanical systems will conform to the following codes:

- International Building Code – 2021 Edition (as amended by City of Sedalia)
- Existing Building Code – 2021 Edition
- International Mechanical Code – 2021 Edition
- National Electrical Code – 2020 Edition
- Plumbing Code – 2021 Edition
- International Fire Code – 2021 Edition
- 2024 NFPA 820 – Fire Protection in Wastewater Treatment & Collection Facilities

4.2.10 Electrical Power

The North Screening & Pump Station will have a new 480Y/277V, 3-phase, 4-wire utility service and pad mounted transformer installed by Evergy. All new distribution equipment will be housed in the conditioned electrical building. A non-automatic manual transfer switch and portable generator connection will be installed to provide emergency power generation during power failures or as required for utility/plant outages. Remote monitoring of the site will be communicated via SCADA. Refer to Exhibit E010 for the conceptual one-line diagram for the North Screening & Pump Station site.

At the Central WWTP, a new centralized Electrical Distribution Building would be constructed to provide power to the new buildings and existing electrical distribution equipment. The upgraded service will be provided by Evergy, and a new 13.2kV - 480V 3-phase, 4-wire pad mounted utility transformer will be required. Installation of a new 3000A switchboard with integral automatic transfer controller will be provided as the main distribution equipment for the wastewater treatment facility. A new 2 MW, 480/277V, 3-phase diesel generator will be installed to provide plant wide emergency power generation during power failures or as required for utility/plant outages. The new switchboard located in the Electrical Distribution Building will supply feeder circuits to the following buildings/structures (refer to Exhibit E012 for Electrical Distribution Building One-Line Diagram):

- Re-feed existing MCC-2 (refer to Exhibit E011).
- Re-feed Control/Admin Building 75kVA Transformer (refer to Exhibit E012).
- Re-feed Existing Headworks Structure Transformer (refer to Exhibit E012).
- New Blower Building No. 2 AB2-MCC-001 (refer to Exhibit E015).
- New Sludge Pumping & Alum Feed Building SLG-MCC-002 (refer to Exhibit E014).
- New Dewatering Building SLG-MCC-001 (refer to Exhibit E013).

- New 480V Power Panel for the existing Digester Complex Building Power Panel SDC-PDP-001 (refer to Exhibit E012).

Providing the new plant distribution equipment in a new building will allow for the removal of Existing MCC-1 located in the Digester Complex Building, which has reached the end of its service life. Design will include a 250A, 480V, 3-phase, 3-wire circuit from a new switchboard to provide power within the Existing Digester Complex Building. A new feeder will be installed to a new 480Y/277V Power Distribution Panel with 480V-208Y/120V transformer and 208Y/120V, 3-phase, 4-wire small power panelboard to provide power to upgraded HVAC and future equipment determined by the City.

New motor control centers (MCC) will be installed in the following buildings:

- New Sludge Pumping & Alum Feed Building (refer to Exhibit E014).
- New Blower Building No. 2 (refer to Exhibit E015).
- New Solids Dewatering Building (refer to Exhibit E013).

Each new building will have a 480V-208Y/120V transformer and 208Y/120V, 3-phase, 4-wire small power panelboard to provide house power to the building and adjacent structures.

New feeders and branch circuits will be copper conductor. New panelboards, MCC's and switchboards will be tin-plated copper bus. New transformers will be copper windings unless aluminum windings are preferred for corrosion resistance. All above grade conduit will be aluminum rigid conduit (ARC). Conduit located below grade will be Schedule 40 PVC. Below grade conduits that route from building to building across the site will be encased in concrete or PVC-coated rigid galvanized steel if direct-buried. In-ground pull boxes will be installed for cable pulling.

Site and building light fixtures will contain LED lamps and foot-candle levels will be designed to Illuminating Engineering Society (IES) recommendations. Light poles will be aluminum type and foundations will be concrete or auger type depending on soil conditions. On/off control of site lighting will be by individual luminaire and/or central photocell dependent on site location. Building interiors and other enclosed accessible structures will have emergency egress lighting with 90-minute battery backup.

Refer to Central WWTP Preliminary Electrical One-Line Diagrams within the appendices for additional information. Final electrical design will conform to the 2020 edition of the National Electrical Code (NEC), NFPA 70.

4.2.11 Instrumentation and Controls (I&C)

The anticipated control philosophies and instrumentation associated with the Central Consolidation treatment processes are included in Table 4-18.

Table 4-18: Instrumentation and Controls for Major Unit Processes

Unit Process	Instrumentation	Control Philosophy
North Screening Channels	Level Transmitters Automatic Gate	Level monitored upstream and downstream of screens to inform vendor controls. Level monitored in influent channel to monitor for wet weather overflow conditions. Downstream North Pump Station wet well level used as secondary initiation of wet weather mode to protect against prolonged surcharging. Automatic bypass gate in influent channel will lower during this condition.
North Pump Station	Level Transmitters Level Floats Flow Meter	Level-Based Flow Control with maximum allowable wastewater flow set to 4.5 MGD.
Central Influent Screening	Level Transmitters	Differential level incorporated into vendor controls for screen operation and alarms.
Secondary Pump Stations	Level Transmitters Level Floats Flow Meter	Level-Based Flow Control with dedicated pumping operation for each wet well to provide independent feed to each Aeration Basin.
Aeration Basin No. 2 & Blower Building No. 2	Dissolved Oxygen (DO)	Blower Control is based on DO concentration. Detailed design will consider adding intermittent aeration capabilities to enhance nitrogen removal.
RAS/WAS Pump Station	Flow Meters	RAS, and WAS to be provided with flow monitoring. RAS and WAS flow to be maintained based on flow setpoint. Independent RAS pumping will be provided to each Aeration Basin with adjustable flow setpoints.
Secondary Clarifier No. 3	Torque Switches	Secondary Clarifier No. 3 will be provided with manufacturer controls, including torque switches to prevent equipment damage due to over torque.
UV Disinfection & Effluent Structure	UV Transmittance Flow Measurement Level Transmitters	Automatic UV output adjustment based on flow & UV transmittance. Number of banks in operation will be automatically controlled. Upgraded Parshall Flume with ultrasonic transmitter for flow measurement.
Sludge Pump Station	Flow Meter	Sludge Pump operation will be integrated with vendor-provided BFP control system. Pump speed will be controlled to maintain desired flow setpoint.
Solids Dewatering System	Flow Meter Vendor Specific	Solids Dewatering System will be controlled by vendor-provided control system.

The plant control system common infrastructure for the Central WWTP will be comprised of a site-wide fiber-optic network interconnecting each of the major process buildings and associated PLC cabinets using managed Ethernet network switches. Operator client nodes, such as OITs and workstations, will be placed within operator control rooms and other key locations as needed for the associated plant processes. Generally, the network will be of modern design employing redundancy in both the network infrastructure and associated host servers. The North Screening & Pump Station will be provided with wireless communication to allow monitoring of the process from the Central WWTP. Refer to Exhibit E021 for an overall Plant Network Architecture Diagram.

The conceptual approach to integrating existing equipment and process I/O, controls systems, and related I&C components is based on assumptions made due to lack of detailed information available during this planning effort. The approach to I&C integration between existing and new systems will be evaluated during detailed design, and the overall approach may be changed based on subsequent review of existing infrastructure.

4.2.12 Decommissioning of the Existing North WWTP

The existing North WWTP will be, at a minimum, decommissioned as required per MDNR, including having process influent piping and effluent piping plugged to prevent wastewater intrusion and flow out of the plant outfall. After completion of the project, the existing North WWTP outfall will be eliminated. The 24-inch interceptor will be rerouted to the new North Screening & Pump Station structure, and all existing North WWTP process structures will be abandoned. All mechanical systems will be decommissioned and no wastewater will flow through them or to the existing outfall. The plant will also be de-energized and buildings hardened for security purposes. During detailed design, a plan will be developed to handle stormwater runoff and mitigate collection of water in existing basins and/or structures. As design progresses, additional plant demolition will be evaluated to determine what can be included within the project budget. Full plant demolition is not currently included in the proposed project due to budget constraints and will be re-evaluated as project costs are refined and if additional funding is identified as the design progresses.

5.0 Opinion of Probable Costs

A conceptual opinion of probable cost (OPC) was developed for the new North Screening & Pump Station, conveyance improvements to pump North Service Area flows to the Central WWTP, and improvements to the existing Central WWTP. The conceptual OPC was developed to an AACE Level 4 estimate and is summarized in Table 5-1.

Table 5-1: OPC Capital Costs for Central Consolidation Scope

Project Component	OPC Capital Cost
Base Project	
North Screening & Pump Station + North Conveyance to Central WWTP Central WWTP Expansion	$60,000,000
SRF Loan Closing	$1,500,000
MDNR Wastewater Incentive Grant	($1,500,000)
Baseline Total Capital Cost (2026 Dollars)	**$60,000,000**

These cost opinions are based primarily on our judgment combined with information from past experience, vendors, and published sources. Since Burns & McDonnell has no control over weather, cost, availability of labor, availability of material and equipment, labor productivity, construction contractor's procedures and methods, unavoidable delays, economic conditions, government regulations and laws (including the interpretation thereof), impacts to costs or schedule that may occur as a result of new tariffs or other executive actions, competitive bidding or market conditions, and other factors affecting such opinions or projections, Burns & McDonnell does not guarantee the actual rates, costs, etc. will not vary from the opinions and projections developed herein.

A contingency allowance has been incorporated into the labor, material, rental, and equipment costs for this project to account for miscellaneous and unforeseen expenses. These may arise from site conditions, design details, or components that typically remain undefined until the later stages of detailed design. The overall cost also reflects contractor markups and engineering services. Specific inclusions under this allowance are geotechnical evaluations, deep foundation requirements, land surveys, permitting processes and associated fees, utility connections to the site, and applicable taxes.

An escalation allowance has also been included in the labor, material, rental, and equipment costs to accommodate anticipated increases in pricing that may occur leading up to and during the early phases of construction.

Operation, maintenance, equipment replacement, and capital costs were used to develop a net present value (NPV) for each of the alternatives. The NPV assumes the construction project would begin in 2026 and considers O&M costs through the planning period. The NPV analysis compares future cash flows (construction and O&M costs) in present dollar equivalents, assuming an inflation rate of 3.0%, and discount rate of 4.5%. The results of the NPV analysis are shown in Table 5-2 below.

Table 5-2: NPV of Central Consolidation Project

NPV ($M 2026)	Construction Cost ($M 2026)	O&M Cost	
		$M 2026	$M 20-year NPV
$98.3	$60.0	$1.7	$38.3

1. Includes capital and projected O&M cost for Central Consolidation Improvements for use in alternative evaluation and project selection. Does not represent a total utility O&M cost associated with actual operation of facilities and should not be used for budgetary planning purposes.

6.0 Project Funding and Schedule

6.1 Project Funding

Based on discussions with the City of Sedalia, funding for the project utilizing the State Revolving Fund (SRF) is desired. The project has already been included in Sedalia's capital improvements plan (CIP) plan and O&M budget. The OPC developed for baseline compliance projects ($60M) aligns with the City's current bonding capacity ($60M). Demolition of the existing North WWTP is currently excluded from the proposed scope of work, but the facility will be decommissioned and abandoned as appropriate to eliminate the existing plant outfall. As detailed design is developed, inclusion of the North WWTP demolition will be re-evaluated. The scope and approach to the proposed Central Consolidation project will continue to be refined and re-evaluated as the project moves into detailed design to help identify design changes, additional funding opportunities, and cost refinements. During detailed design, additional scope items will be considered as made possible by budget and funding constraints. Changes to the design basis, design approach, overall scope of improvements and funding avenues will be communicated to MDNR throughout the design process as necessary.

As part of the initial stages of the facilities design scope of work, the City will coordinate with the design-builder to complete and submit any relevant applications and forms for a loan request to complete the SRF requirements.

6.2 Project Schedule

The preliminary project schedule is shown in Table 6-1. The City's specific design-build procurement model is understood to be designed to maximize interaction between the Owner's Advisor, the Design-Builder, and City staff. The final schedule of proposed improvements will be evaluated at design milestones and if/when project design approach or scope changes occur. Schedule changes will be communicated to and coordinated with MDNR.

Table 6-1: Project Delivery Schedule

Project Milestone	Start	Completion
60% Design & Phase 2 Pricing Development - New North Screening & Pump Station - New North Service Area Force Main & Gravity Main - Central WWTP Improvements	September 2025	June 2026
Procurement	July 2026	October 2026
Final Design & Construction - North Screening & Pump Station - Central WWTP Improvements - North Service Area Force Main & Gravity Main[1]	October 2026	January 2029

[1] Final connections of the North Service Area Force Main & Gravity Main will be made and placed into service at the completion of the North Screening & Pump Station and Central WWTP Improvements.

The improvements proposed in this Facility Plan are part of the City's Capital Improvement Plan and all regulatory impacts must be evaluated comprehensively prior to finalizing any new permit condition. We would like to work in coordination with the Department to formulate future permit conditions consistent with the City's plan. The costs of implementing the City's planned improvements will drive timing and schedules. Alternative implementation dates for certain parameters may also be necessary based on affordability for the City's ratepayers, available funding, further water quality studies, undue financial burden to the facility or its indirect dischargers, or any alternative schedule in a subsequently negotiated enforceable order.

APPENDIX A – NPDES PERMITS

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 RSMo, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.:	MO-0023027
Owner:	City of Sedalia
Address:	200 S. Osage Avenue, Sedalia, MO 65301
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Sedalia North WWTP
Facility Address:	23985 Georgetown Road, Sedalia, MO 65301
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

authorizes activities pursuant to the terms and conditions of this permit in accordance with the Missouri Clean Water Law and/or the National Pollutant Discharge Elimination System; it does not apply to other regulated activities.

FACILITY DESCRIPTION

See Page 2

November 1, 2023
Effective Date

October 31, 2028
Expiration Date

John Hoke, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #001 – POTW
The use or operation of this facility shall be by or under the supervision of a Certified "A" Operator.
Trash grinder / manual bar screen / aerated grit chamber / flow equalization basin / 2 primary clarifiers / 2 high rate trickling filters / 1 final clarifier / defoamer / 4 sludge drying beds / 2 anaerobic digesters / sludge belt press / biosolids are land applied or are composted.

Design population equivalent is 25,000.
Design flow is 2.5 million gallons per day.
Actual flow is 1.2 million gallons per day.
Design sludge production is 2,016 dry tons/year.

Legal Description:	Sec. 28, T46N, R21W, Pettis County
UTM Coordinates:	X=479120, Y=4286815
Receiving Stream:	Sewer Branch (C)
First Classified Stream and ID:	Sewer Branch (C) (860)
USGS Basin & Sub-watershed No.:	(10300103-0406)

Outfall #002 – Discharge from this outfall is no longer authorized, and shall be subject to 40 CFR 122.41(m) and reported according to 40 CFR 122.41(m)(3)(i) & (ii).

Permitted Feature INF – Influent Monitoring Location – Headworks

Legal Description:	Sec. 28, T46N, R21W, Pettis County
UTM Coordinates:	X=479125, Y=4286630

Permitted Feature SM1 – Instream Monitoring – Downstream (~0.3 miles) – bridge over Sewer Branch on Georgetown Road – See Special Condition #20.

Legal Description:	Sec. 28, T46N, R21W, Pettis County
UTM Coordinates:	X=479199, Y=4287181

OUTFALL #001	TABLE A-1. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall 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 **April 1, 2029**. These interim effluent limitations in **Table A-1** are effective beginning **November 1, 2023** and remain in effect through **March 31, 2029** 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
eDMR Limit Set: M						
Flow	MGD	*		*	once/weekday***	24 hr. total
Biochemical Oxygen Demand$_5$	mg/L		45	30	once/week	composite**
Total Suspended Solids	mg/L		45	30	once/week	composite**
Ammonia as N (January)	mg/L	12.1		3.1	once/week	composite**
Ammonia as N (February)	mg/L	10.1		2.9	once/week	composite**
Ammonia as N (March)	mg/L	10.1		2.9	once/week	composite**
Ammonia as N (April)	mg/L	10.1		2.3	once/week	composite**
Ammonia as N (May)	mg/L	12.1		2.2	once/week	composite**
Ammonia as N (June)	mg/L	12.1		2.2	once/week	composite**
Ammonia as N (July)	mg/L	10.1		2.2	once/week	composite**
Ammonia as N (August)	mg/L	12.1		2.2	once/week	composite**
Ammonia as N (September)	mg/L	12.1		2.2	once/week	composite**
Ammonia as N (October)	mg/L	12.1		2.9	once/week	composite**
Ammonia as N (November)	mg/L	12.1		3.1	once/week	composite**
Ammonia as N (December)	mg/L	10.1		2.9	once/week	composite**
Oil & Grease	mg/L	15		10	once/month	grab
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	calculated
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Total Nitrogen (**Note 1, Page 4**)	mg/L	*		*	once/month	calculated
Cadmium, Total Recoverable	µg/L	3.3		1.0	once/month	composite**
Copper, Total Recoverable	µg/L	45.1		22.9	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 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.

*** Once each weekday means: Monday, Tuesday, Wednesday, Thursday, and Friday.

OUTFALL #001	TABLE A-1. (Continued) INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall 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 **April 1, 2029**. These interim effluent limitations in **Table A-1** are effective beginning **November 1, 2023** and remain in effect through **March 31, 2029** 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	
		MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR Limit Set: M						
pH – Units****	SU	6.5		9.0	once/week	grab

EFFLUENT PARAMETER(S)	UNITS	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand$_5$ – Percent Removal (**Note 2**)	%	65	once/month	calculated
Total Suspended Solids – Percent Removal (**Note 2**)	%	65	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 28, 2023.

**** pH is measured in pH units and is not to be averaged.

Note 1 – Total Nitrogen consists of Total Kjeldahl Nitrogen and Nitrate + Nitrite.

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-2. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **April 1, 2029**. 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
eDMR Limit Set: M						
Flow	MGD	*		*	once/weekday***	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 3, Page 6**)	#/100mL		1,030	206	once/week	grab
Ammonia as N (January)	mg/L	12.1		3.1	once/week	composite**
Ammonia as N (February)	mg/L	10.1		2.7	once/week	composite**
Ammonia as N (March)	mg/L	10.1		2.7	once/week	composite**
Ammonia as N (April)	mg/L	10.1		2.3	once/week	composite**
Ammonia as N (May)	mg/L	12.1		1.9	once/week	composite**
Ammonia as N (June)	mg/L	12.1		1.5	once/week	composite**
Ammonia as N (July)	mg/L	10.1		1.1	once/week	composite**
Ammonia as N (August)	mg/L	12.1		1.3	once/week	composite**
Ammonia as N (September)	mg/L	12.1		1.7	once/week	composite**
Ammonia as N (October)	mg/L	12.1		2.6	once/week	composite**
Ammonia as N (November)	mg/L	12.1		3.1	once/week	composite**
Ammonia as N (December)	mg/L	10.1		2.7	once/week	composite**
Oil & Grease	mg/L	15		10	once/month	grab
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	calculated
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Total Nitrogen (**Note 1, Page 6**)	mg/L	*		*	once/month	calculated
Cadmium, Total Recoverable	µg/L	3.3		1.0	once/month	composite**
Copper, Total Recoverable	µg/L	45.1		22.9	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE MAY 28, 2029.

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** Once each weekday means: Monday, Tuesday, Wednesday, Thursday, and Friday.

OUTFALL #001	TABLE A-2. (Continued) FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **April 1, 2029**. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR Limit Set: M						
pH – Units****	SU	6.5		9.0	once/week	grab

EFFLUENT PARAMETER(S)	UNITS	MONTHLY AVERAGE MINIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand$_5$ – Percent Removal (**Note 2**)	%	65	once/month	calculated
Total Suspended Solids – Percent Removal (**Note 2**)	%	65	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE MAY 28, 2029.

**** pH is measured in pH units and is not to be averaged.

Note 1 – Total Nitrogen consists of Total Kjeldahl Nitrogen and Nitrate + Nitrite.

Note 2 – Influent sampling for BOD_5 and TSS is not required during periods of land application when the facility does not discharge effluent. 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 3 – 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).

OUTFALL #001	TABLE A-3. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-3** shall become effective on **November 1, 2023** 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
eDMR 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 MAY 28, 2024.

* 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 4 – The Chronic WET test shall be conducted once per permit cycle during the year 2024. 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 **November 1, 2023** 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
eDMR Limit Set: IM						
Biochemical Oxygen Demand$_5$ (**Note 2**)	mg/L			*	once/month	composite**
Total Suspended Solids (**Note 2**)	mg/L			*	once/week	composite**
Ammonia as N	mg/L	*		*	once/month	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	calculated
Nitrite + Nitrate	mg/L	*		*	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 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 2 – Influent sampling for BOD_5 and TSS is not required during periods of land application when the facility does not discharge effluent. 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 **November 1, 2023** 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
eDMR Limit Set: DM						
Hardness, Total	mg/L	*		*	once/quarter *****	grab
MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE JANUARY 28, 2024.						

* Monitoring requirement only.
***** See table below for quarterly sampling requirements.

Quarterly Minimum Sampling Requirements			
Quarter	**Months**	**Hardness**	**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

D. SCHEDULE OF COMPLIANCE

Ammonia and *E.coli*

The facility shall attain compliance with final effluent limitations for Ammonia and *E. coli* as soon as possible but in no case later than **April 1, 2029**.

1. 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.

2. By **April 1, 2029**, the permittee shall attain compliance with the final effluent limits for Ammonia and *E. coli*.

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. Annual reports required per Standard Conditions Part III Section K shall be submitted online to the Department via the Department's eDMR system as an attachment. This supersedes Standard Conditions Part III Section K #4. EPA reports shall continue to be submitted online via the Central Data Exchange system.

F. SPECIAL CONDITIONS

1. Electronic Discharge Monitoring Report (eDMR) Submission System. Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting of effluent monitoring data and any report required by the permit (unless specifically directed otherwise by the permit) shall be submitted by the permittee via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data about the NPDES program. All reports uploaded into the system shall be reasonably named so they are easily identifiable, such as "WET Test Chronic Outfall 002 Jan 2023," or "Outfall 004 Daily Data Mar 2025."
   (a) eDMR Registration Requirements. The permittee must register with the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.

Registration and other information regarding MoGEM can be found at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. Information about the eDMR system can be found at https://dnr.mo.gov/water/business-industry-other-entities/reporting/electronic-discharge-monitoring-reporting-system-edmr. The first user shall register as an Organization Official and the association to the facility must be approved by the Department. Regarding Standard Conditions Part I, Section B, #7, the eDMR system is currently the only Department approved reporting method for this permit unless a waiver is granted by the Department. See paragraph (c) below.

(b) Electronic Submissions. To access the eDMR system, use the following link in your web browser: https://apps5.mo.gov/mogems/welcome.action. If you experience difficulties with using the eDMR system you may contact edmr@dnr.mo.gov or call 855-789-3889 or 573-526-2082 for assistance.

(c) Waivers from Electronic Reporting. The permittee must electronically submit compliance monitoring data and reports unless a waiver is granted by the Department in compliance with 40 CFR Part 127. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: https://dnr.mo.gov/document-search/electronic-discharge-monitoring-report-waiver-request-form-mo-780-2692. The Department will either approve or deny this electronic reporting waiver request within 120 calendar days.

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 "C – No Discharge" 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) See sufficiently sensitive test method requirements in Standard Conditions Part I, Section A, No. 4 regarding proper testing and method minimum levels used for sample analysis.
   (c) The permittee shall not report a sample result as "Non-Detect" without also reporting the method minimum level of the test. Reporting as "Non Detect" without also including the method minimum level, will be considered failure to report, which is a violation of this permit.
   (d) The permittee shall provide the "Non-Detect" sample result using the less than symbol and the method minimum level (e.g., <50 µg/L, if the method minimum level for the parameter is 50 µg/L).
   (e) Where the permit contains a Department determined Minimum Quantification 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.
   (f) For the daily maximum, the facility shall report the highest value. If the highest value was a non-detect, use the less than "<" symbol and the laboratory's highest method minimum level.
   (g) For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.
   (h) For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.
   (i) When *E. coli* is not detected above the method minimum level, the permittee must report the data qualifier signifying less than detection limit for that parameter (e.g., <1 #/100mL, if the method minimum level is 1 #/100mL). For reporting a geometric mean based on a mix of detected and non-detected values, use one-half of the detection limit (instead of zero) for non-detects when calculating geometric means.
   (j) See the Fact Sheet Appendix - Non-Detect Example Calculations for further guidance.

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 continue to implement and update if necessary, the 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 https://dnr.mo.gov/document-search/capacity-management-operations-maintenance-plan-editable-template. Additional information regarding the Departments' CMOM Model is available at https://dnr.mo.gov/print/document-search/pub2574. This program shall cover the collection systems serving the City of Sedalia's permitted wastewater treatment plants.

   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 City of Sedalia's permitted wastewater treatment plants for the previous year.
   (b) A summary of the general maintenance and repairs to the collection system serving the City of Sedalia's permitted wastewater treatment plants for the previous year.
   (c) A summary of any planned maintenance and repairs to the collection system serving the City of Sedalia's permitted wastewater treatment plants 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 Northeast Regional Office during normal business hours or by using the online Sanitary Sewer Overflow/Facility Bypass Application located at: https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-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.

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 ensure 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. The flow equalization basin shall be operated and maintained to ensure its structural integrity, which includes maintaining adequate freeboard and keeping the berms free of deep-rooted vegetation, animal dens, or other potential sources of damage.

15. The facility shall ensure that adequate provisions are provided to prevent or minimize surface water intrusion into the flow equalization basin and to divert stormwater runoff around the flow equalization basin and protect embankments from erosion.

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:
      i. The fathead minnow, *Pimephales promelas* (Survival and Growth Test Method 1000.0).
      ii. 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 laboratory shall not chemically dechlorinate the sample.
(e) The Allowable Effluent Concentration (AEC) is 100%, the dilution series is: 100%, 50%, 25%, 12.5%, and 6.25%.
(f) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
(g) 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. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be implemented upon permit issuance. Through implementation of the SWPPP, the permittee shall 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 June 2015.
(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;
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 F.17.
(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.

19. Biosolids Composting Requirements for General Public Use:
(a) Applicability. A sewage sludge compost product will be considered suitable for general public use when the permittee meets the requirements under this permit special condition. General public use means the compost is for crops and vegetation including use in residential areas, public use areas and for horticulture, silviculture and agricultural uses.
(b) Composting Facility Description.
(1) Raw materials will consist of dewatered sewage sludge or biosolids, wood chips, yard waste or other compostable materials.
(c) If the compost is to be distributed to the public it shall meet the Class A requirements for pathogen reduction by having undergone one of the Processes to Further Reduce Pathogens found in Appendix B of 40 CFR 503.
(d) The permittee will maintain a detailed operations plan for the composting process.
(e) Information Sheet for Users.
An information/instruction sheet shall be provided to each user of compost to provide information on the origin of the compost, appropriate application rates, and other pertinent information for proper handling and use of the compost.
(f) Annual Use Rate. Compost that is land applied by the permit holder shall not exceed the most restrictive of the following criteria:
(1) Application rates shall not exceed the annual plant available nutrient requirements for nitrogen and phosphorus based on the vegetation to be grown, a realistic crop yield goal, soil testing results and testing of the compost for nutrient content.
(2) Application rate shall not exceed 20 dry tons per acre per year.
(g) One Time or Occasional Use Rates.
Compost that is used by the permit holder for soil amendments or land reclamation shall not exceed a total of 200 dry tons per acre on either a one time basis or a cumulative total over a five year period. Subsequent application rates shall not exceed the annual use rate listed above. The compost shall be incorporated into the soil by tillage practices as soon as practical after application.
(h) Final Compost Monitoring.
Composite samples of the final compost product shall be collected at representative locations and monitored as described in 40 CFR 503 and Standard Conditions Part III.
(i) Records and Reporting Requirements.
(1) Time, locations and results shall be recorded for each monitoring requirement and maintained for at least five years. Copies of these records shall be made available to the Department upon request.
(2) The total quantity of compost distributed during the year must be recorded.
(3) An annual report shall be submitted by February 19th summarizing compost activities monitoring. A copy of the individual laboratory reports and daily records need not be submitted unless requested by the Department. The reports shall be submitted to the Department via eDMR and to the EPA Region VII office as part of the annual sludge report.
(j) Composted sewage sludge that does not meet the requirements for general public use may still be land applied in accordance with permit Standard Conditions Part III.

20. Receiving Water Monitoring Conditions
    (a) Downstream receiving water samples should be taken at the location 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.
    (b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream 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:
        (1) If turbidity in the stream increases notably; or
        (2) If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hour.
    (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.

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) The permittee shall continue to develop local limits as necessary and effectively enforce such limits, per 40 CFR 403.5(c)(1). 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 **May 1, 2024**, pursuant to 40 CFR 122.44(j)(2)(ii). All POTWs are required to use Form 780-2954, Part I, to complete the local limits review under 40 CFR 122.44(j)(2)(ii), and Part II of the form as needed for the detailed reevaluation of local limits. See instructions for both Parts I and II, respectively, for the review and reevaluation. Please contact the Department's pretreatment coordinator for further guidance. Should revision of local limits be deemed necessary, it is recommended that revisions follow the US Environmental Protection Agency's guidance document *Local Limits Development Guidance*. EPA833-R04-002A. July 2004.

G. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty 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. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0023027
SEDALIA NORTH WWTP

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.

Part I – Facility Information

Application Date: 10/02/2020
Expiration Date: 03/31/2021

Facility Type and Description: POTW - Trash grinder / aerated grit chamber / flow equalization basin / 2 primary clarifiers / 2 high rate trickling filters / 1 final clarifier / defoamer / 2 anaerobic digesters / sludge belt press / biosolids are land applied or are composted

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#001	3.875	Equivalent to Secondary	Domestic

Comments:
Changes in this permit for Outfall #001 include the addition of Total Nitrogen monitoring, the addition of final limits for Total Recoverable Cadmium, the revision of effluent limits for Ammonia and Total Recoverable Copper, the revision of sampling and reporting frequency for Oil & Grease, Total Recoverable Copper, and Total Recoverable Cadmium from quarterly to monthly, and the removal of Chromium VI and the Acute WET test. See Part II of the Fact Sheet for further information regarding the addition, revision, and removal of effluent parameters. Special conditions were updated to include the revision of the inflow and infiltration reporting requirements condition, the revision of the reporting of Non-detects condition, the revision of the bypass reporting requirements condition, the revision to the all-weather access road condition, the revision to the pretreatment requirements condition, the revision to the receiving water monitoring condition, the revision to the SWPPP condition, the revision to the Biosolids Compost Requirements condition, the revision of the Electronic Discharge Monitoring Report (eDMR) Submission System condition, and the removal of the Acute WET test condition.

Part II – Effluent Limitations and Monitoring Requirements

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.

OUTFALL #001 - RECEIVING STREAM INFORMATION

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Sewer Branch	C	860	AHP(WWH), WBC-B, SCR, HHP, IRR, LWP	10300103-0406	0

*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.:

AHP = Aquatic Habitat Protection - To ensure the protection and propagation of fish, shellfish, and wildlife. AHP is further subcategorized as:

WWH = Warm Water Habitat;
CLH = Cool Water Habitat;
CDH= Cold Water Habitat;
EAH = Ephemeral Aquatic Habitat;
MAH = Modified Aquatic Habitat;
LAH = Limited Aquatic Habitat.

This permit uses Aquatic Life Protection effluent limitations in 10 CSR 20-7.031 Table A for all aquatic 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 is further subcategorized as:

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 - Application of water to cropland or directly to cultivated plants that may be used for human or livestock consumption;
LWP = Livestock and wildlife protection - Maintenance of conditions in waters to support health in livestock and wildlife;
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
Sewer Branch	0	0	0

MIXING CONSIDERATIONS

MIXING CONSIDERATIONS TABLE:

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(I)(a)]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B(I)(b)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
0	0	0	0	0	N/A

Receiving Water Body's Water Quality

- ✓ This facility does not discharge to a 303(d) listed stream or to a stream with an EPA approved TMDL.

- ✓ The Department conducted a stream survey on September 10, 2013 at four locations near this facility: instream immediately above Outfall #001, instream approximately 0.3 miles downstream from Outfall #001, instream approximately 0.8 miles downstream from Outfall #001 and at Outfall #001. The following use designations of the receiving stream were impaired by the discharge: AQL for 1.3 miles at the location 0.8 miles downstream of Outfall #001. The Department surveyor noted that there was excessive benthic and suspended algae, but also noted that cattle have access to this stream segment.

CHANGES TO EFFLUENT LIMITATIONS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit/ Frequency	Sampling Frequency	Reporting Frequency	Sample Type ****
Ammonia (January)	mg/L	2, 3	12.1		3.1	7.5/2.9	1/week	monthly	C
Ammonia (February) (Interim)	mg/L	2, 3	10.1		2.9	7.5/2.9	1/week	monthly	C
Ammonia (February) (Final)	mg/L	2, 3	10.1		2.7	10.1/2.9	1/week	monthly	C
Ammonia (March) (Interim)	mg/L	2, 3	10.1		2.9	7.5/2.9	1/week	monthly	C
Ammonia (March) (Final)	mg/L	2, 3	10.1		2.7	10.1/2.9	1/week	monthly	C
Ammonia (April)	mg/L	2, 3	10.1		2.3	5.5/2.2	1/week	monthly	C
Ammonia (May) (Interim)	mg/L	2, 3	12.1		2.2	5.2/2.2	1/week	monthly	C
Ammonia (May) (Final)	mg/L	2, 3	12.1		1.9	12.1/2.2	1/week	monthly	C
Ammonia (June) (Interim)	mg/L	2, 3	12.1		2.2	5.2/2.2	1/week	monthly	C
Ammonia (June) (Final)	mg/L	2, 3	12.1		1.5	12.1/2.2	1/week	monthly	C
Ammonia (July) (Interim)	mg/L	2, 3	10.1		2.2	5.2/2.2	1/week	monthly	C
Ammonia (July) (Final)	mg/L	2, 3	10.1		1.1	10.1/2.2	1/week	monthly	C
Ammonia (August) (Interim)	mg/L	2, 3	12.1		2.2	5.2/2.2	1/week	monthly	C
Ammonia (August) (Final)	mg/L	2, 3	12.1		1.3	12.1/2.2	1/week	monthly	C
Ammonia (September) (Interim)	mg/L	2, 3	12.1		2.2	5.2/2.2	1/week	monthly	C
Ammonia (September) (Final)	mg/L	2, 3	12.1		1.7	12.1/2.2	1/week	monthly	C
Ammonia (October) (Interim)	mg/L	2, 3	12.1		2.9	7.5/2.9	1/week	monthly	C
Ammonia (October) (Final)	mg/L	2, 3	12.1		2.6	12.1/2.9	1/week	monthly	C
Ammonia (November)	mg/L	2, 3	12.1		3.1	7.5/2.9	1/week	monthly	C
Ammonia (December) (Interim)	mg/L	2, 3	10.1		2.9	7.5/2.9	1/week	monthly	C
Ammonia (December) (Final)	mg/L	2, 3	10.1		2.7	10.1/2.9	1/week	monthly	C
Oil & Grease	mg/L	1, 3	15		10	1/quarter	1/month	monthly	G
Total Nitrogen	mg/L	7	*		*	***	1/month	monthly	M
Cadmium, TR	µg/L	2, 3	3.3		1.0	*/*	1/month	monthly	C
Copper, TR	µg/L	2, 3	45.1		22.9	37.6/17	1/month	monthly	C

* - 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
E = 24-hr. estimate
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. These limits were established in the oldest permit in the Department's electronic files, which was issued in 1992.

- **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. These limits were established in the oldest permit in the Department's electronic files, which was issued in 1992.

- ***Escherichia coli (E. coli)***. Monthly average of 206 per 100 mL as a geometric mean and Weekly Average of 1,030 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 with Whole Body Contact Recreation (B) 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. No mixing considerations allowed; therefore, WLA = appropriate criterion.

  The Department previously followed the 2007 Ammonia Guidance method for derivation of ammonia limits. However, the EPA's Technical Support Document for Water Quality-based Toxic Controls (TSD) establishes other alternatives to limit derivation. The Department has determined that the approach established in Section 5.4.2 of the TSD, which allows for direct application of both the acute and chronic wasteload allocations (WLA) as permit limits for toxic pollutants, is more appropriate limit derivation approach. Using this method for a discharge to a waterbody where mixing is not allowed, the criterion continuous concentration (CCC) and the criterion maximum concentration (CMC) will equal the chronic and acute WLA respectively. The WLAs are then applied as effluent limits, per Section 5.4.2 of the TSD, where the CMC is the Daily Maximum and the CCC is the Monthly Average. The direct application of both acute and chronic criteria as WLA is also applicable for facilities that discharge into receiving waterbodies with mixing considerations. The CCC and CMC will need to be calculated into WLA with mixing considerations using the mass-balance equation:

$$Ce = \frac{(Qe + Qs)C - (Qs \times Cs)}{(Qe)}$$

  Where C = downstream concentration Ce = effluent concentration
  Cs = upstream concentration Qe = effluent flow
  Qs = upstream flow

  In the event that mixing considerations derive an AML less stringent than the MDL, the AML and MDL will be equal and based on the MDL.

Month	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
January	2.8	7.8	3.1	12.1
February	4.0	7.9	2.7	10.1
March	10.6	7.9	2.7	10.1
April	17.0	7.9	2.3	10.1
May	22.0	7.8	1.9	12.1
June	26.0	7.8	1.5	12.1
July	28.9	7.9	1.1	10.1
August	28.0	7.8	1.3	12.1
September	24.1	7.8	1.7	12.1
October	17.5	7.8	2.6	12.1
November	11.6	7.8	3.1	12.1
December	4.9	7.9	2.7	10.1

* Ecoregion data (Central Irregular Plains)

January
Chronic WLA: Ce = ((3.875 + 0)3.1 – (0 * 0.01)) / 3.875
Ce = 3.1

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 3.1 mg/L
MDL = WLAa = 12.1 mg/L

February
Chronic WLA: Ce = ((3.875 + 0)2.7 – (0 * 0.01)) / 3.875
Ce = 2.7

Acute WLA: Ce = ((3.875 + 0)10.1 – (0 * 0.01)) / 3.875
Ce = 10.1

AML = WLAc = 2.7 mg/L
MDL = WLAa = 10.1 mg/L

March
Chronic WLA: Ce = ((3.875 + 0)2.7 – (0 * 0.01)) / 3.875
Ce = 2.7

Acute WLA: Ce = ((3.875 + 0)10.1 – (0 * 0.01)) / 3.875
Ce = 10.1

AML = WLAc = 2.7 mg/L
MDL = WLAa = 10.1 mg/L

April
Chronic WLA: Ce = ((3.875 + 0)2.3 – (0 * 0.01)) / 3.875
Ce = 2.3

Acute WLA: Ce = ((3.875 + 0)10.1 – (0 * 0.01)) / 3.875
Ce = 10.1

AML = WLAc = 2.3 mg/L
MDL = WLAa = 10.1 mg/L

May
Chronic WLA: Ce = ((3.875 + 0)1.9 – (0 * 0.01)) / 3.875
Ce = 1.9

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 1.9 mg/L
MDL = WLAa = 12.1 mg/L

June
Chronic WLA: Ce = ((3.875 + 0)1.5 – (0 * 0.01)) / 3.875
Ce = 1.5

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 1.5 mg/L
MDL = WLAa = 12.1 mg/L

July
Chronic WLA: Ce = ((3.875 + 0)1.1 – (0 * 0.01)) / 3.875
Ce = 1.1

Acute WLA: Ce = ((3.875 + 0)10.1 – (0 * 0.01)) / 3.875
Ce = 10.1

AML = WLAc = 1.1 mg/L
MDL = WLAa = 10.1 mg/L

August
Chronic WLA: Ce = ((3.875 + 0)1.3 – (0 * 0.01)) / 3.875
Ce = 1.3

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 1.3 mg/L
MDL = WLAa = 12.1 mg/L

September
Chronic WLA: Ce = ((3.875 + 0)1.7 – (0 * 0.01)) / 3.875
Ce = 1.7

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 1.7 mg/L
MDL = WLAa = 12.1 mg/L

October
Chronic WLA: Ce = ((3.875 + 0)2.6 – (0 * 0.01)) / 3.875
Ce = 2.6

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 2.6 mg/L
MDL = WLAa = 12.1 mg/L

November
Chronic WLA: Ce = ((3.875 + 0)3.1 – (0 * 0.01)) / 3.875
Ce = 3.1

Acute WLA: Ce = ((3.875 + 0)12.1 – (0 * 0.01)) / 3.875
Ce = 12.1

AML = WLAc = 3.1 mg/L
MDL = WLAa = 12.1 mg/L

December
Chronic WLA: Ce = ((3.875 + 0)2.7 – (0 * 0.01)) / 3.875
Ce = 2.7

Acute WLA: Ce = ((3.875 + 0)10.1 – (0 * 0.01)) / 3.875
Ce = 10.1

AML = WLAc = 2.7 mg/L
MDL = WLAa = 10.1 mg/L

- **Oil & Grease**. Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrate + Nitrite, & Total Nitrogen**. Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite are required per 10 CSR 20-7.015(9)(D)8. Effluent monitoring for Total Nitrogen is required per 10 CSR 20-6.010(8)(B). Total Nitrogen consists of Total Kjeldahl Nitrogen and Nitrate + Nitrite.

- **pH**. 6.5-9.0 SU. pH limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the in-stream Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU.

- **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 BOD_5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 65% 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 BOD_5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 65% 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. Downstream water hardness of 358 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.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Cadmium	0.891	0.856
Copper	0.960	0.960

Conversion factors for Cd are hardness dependent. Values calculated using equation found in Section 1.3 of EPA 823-B-96-007 and hardness = 358 mg/L.

✓ **Cadmium, Total Recoverable**. Protection of Aquatic Life Acute Criteria = 16.442 µg/L, Chronic Criteria = 1.87 µg/L. The hardness value of **358 mg/L** represents the 50th percentile (median) for Sewer Branch.

Acute AQL: e^(1.0166 * ln358 – 3.062490) * (1.136672 – ln358 *0.041838) = 16.442 µg/L [at hardness 358]
Chronic AQL: e^(0.7977 * ln358 – 3.909) * (1.101672 – ln358*0.041938) = 1.87 µg/L

TR Conversion: AQL/Translator = 16.442 / 0.891 = 18.461
TR Conversion: AQL/Translator = 1.87 / 0.856 = 2.186

Acute WLA: Ce = ((3.868 cfs + 0 cfs) * 18.461 – (0 cfs * 0 background)) / 3.868 cfs = 18.461
Chronic WLA: Ce = ((3.868 cfs + 0 cfs) * 2.186 – (0 cfs * 0 background)) / 3.868 cfs = 2.186

LTAa: WLAa * LTAa multiplier = 18.461 * 0.091 = 1.671 [CV: 3.157, 99th percentile]
LTAc: WLAc * LTAc multiplier = 2.186 * 0.139 = 0.303 [CV: 3.157, 99th percentile]

Use most protective LTA: 0.303

Daily Maximum: MDL = LTA * MDL multiplier = 0.303 * 11.047 = 3.3 µg/L [CV: 3.157, 99th percentile]
Monthly Average: AML = LTA * AML multiplier = 0.303 * 3.368 = 1.0 µg/L [CV: 3.157, 95th percentile, n=4]

✓ **Copper, Total Recoverable**. Protection of Aquatic Life Acute Criteria = 44.68 µg/L, Chronic Criteria = 26.631 µg/L. The hardness value of **358 mg/L** represents the 50th percentile (median) for Sewer Branch.

Acute AQL: e^(1.0166 * ln358 – 3.062490) * (1.136672 – ln358 *0.041838) = 44.68 µg/L [at hardness 358]
Chronic AQL: e^(0.7977 * ln358 – 3.909) * (1.101672 – ln358*0.041938) = 26.631 µg/L

TR Conversion: AQL/Translator = 44.68 / 0.96 = 46.541
TR Conversion: AQL/Translator = 26.631 / 0.96 = 27.741

Acute WLA: Ce = ((3.868 cfs + 0 cfs) * 46.541 – (0 cfs * 0 background)) / 3.868 cfs = 46.541
Chronic WLA: Ce = ((3.868 cfs + 0 cfs) * 27.741 – (0 cfs * 0 background)) / 3.868 cfs = 27.741

LTAa: WLAa * LTAa multiplier = 46.541 * 0.332 = 15.47 [CV: 0.576, 99th percentile]
LTAc: WLAc * LTAc multiplier = 27.741 * 0.54 = 14.976 [CV: 0.576, 99th percentile]

Use most protective LTA: 14.976

Daily Maximum: MDL = LTA * MDL multiplier = 14.976 * 3.008 = 45.1 µg/L [CV: 0.576, 99th percentile]
Monthly Average: AML = LTA * AML multiplier = 14.976 * 1.529 = 22.9 µg/L [CV: 0.576, 95th percentile, n=4]

Whole Effluent Toxicity

- **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.

  ✓ Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Class C waters are 100%, 50%, 25%, 12.5%, & 6.25%.

Sampling Frequency Justification: The Department has determined that previously established sampling and reporting frequency is sufficient to characterize the facility's effluent and be protective of water quality, except for Oil & Grease, Cadmium, and Copper, which were increased to monthly. These parameters were increased to ensure compliance with the limits and also to provide additional data at the next permit renewal. Monthly sampling is required for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite per 10 CSR 20-7.015(9)(D)8.B. Weekly sampling is required for *E. coli*, per 10 CSR 20-7.015(9)(D)7.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.

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*, and Oil & Grease in accordance with recommended analytical methods. 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.

CHANGES TO INFLUENT MONITORING:

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/week	monthly	C

* - Monitoring requirement only.
*** - Parameter not previously established in previous state operating permit.
**** - C = Composite
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

Influent Parameters

- **Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (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 BOD_5 and 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, and Nitrite + Nitrate parameters were established to match the required sampling frequency of these parameters in the effluent, per 10 CSR 20-7.015(9)(D)8. Ammonia was set to monthly to match the frequency for influent sampling for Total Phosphorus and Total Kjeldahl Nitrogen, and Nitrite + Nitrate. The sampling and reporting frequencies for influent BOD_5 and TSS have been established to provide the Department adequate data to ensure the facility is meeting the percent removal requirement.

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 (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/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 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 sampling frequency from the previous permit.

Sampling Type Justification: For the purposes of instream data collection, and as the downstream 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 June 7 & 8, 2022, 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 equivalent to 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. . Based upon review of the Report of Compliance Inspection for the inspection conducted on June 7 & 8, 2022, the inspector noted evidence of an excursion (foam in the receiving stream) of this criterion on June 7, 2022. The foam in the receiving stream was due to non-operational defoamer pump. The equipment was fixed on June 8, 2022 and foam was not observed in the receiving stream.

(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 III – 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)].

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 using new DMR data and new ecoregional pH and Temperature data. The Department previously followed the 2007 Ammonia Guidance method for derivation of ammonia limits. However, the EPA's Technical Support Document for Water Quality-based Toxic Controls (TSD) establishes other alternatives to limit derivation. The Department has determined that the approach established in Section 5.4.2 of the TSD, which allows for direct application of both the acute and chronic wasteload allocations (WLA) as permit limits for toxic pollutants, is more appropriate limit derivation approach. Using this method for a discharge to a waterbody where mixing is not allowed, the criterion continuous concentration (CCC) and the criterion maximum concentration (CMC) will equal the chronic and acute WLA respectively. The WLAs are then applied as effluent limits, per Section 5.4.2 of the TSD, where the CMC is the Daily Maximum and the CCC is the Monthly Average. The direct application of both acute and chronic criteria as WLA is also applicable for facilities that discharge into receiving waterbodies with mixing considerations. The CCC and CMC will need to be calculated into WLA with mixing considerations using the mass-balance equation. The newly established limitations are still protective of water quality.

  - **Total Recoverable Copper**. Effluent limitations were re-calculated for Copper using new DMR data and new stream hardness data. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (new DMR data and new stream hardness data). This new information justifies the application of a less stringent effluent limitation at the time of permit issuance. Also, the revision of the effluent limit also meets the requirements of the safety clause, as the revision of the effluent limit will not result in a violation of a water quality standard.

- **Total Dissolved Chromium VI**. A reasonable potential analysis for Chromium VI was calculated using new DMR data. As a result of a Reasonable Potential Analysis, it was determined that there is no reasonable potential to cause an excursion of water quality standards for Chromium VI in the receiving stream. Please see **Appendix – RPA Results** for more information. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (new DMR data). This new information justifies the application of a less stringent effluent limitations at the time of permit issuance. Also, the revision of the effluent limits also meets the requirements of the safety clause, as the revision of the effluent limits will not result in a violation of a water quality standard.

- **Acute Whole Effluent Toxicity (WET) test**. The previous permit included requirements to conduct an Acute WET test once per year. The permit writer conducted a reasonable potential determination for all anticipated pollutants and established numeric effluent limitations where reasonable potential exists. Also, the facility has passed previous Acute WET tests. The permit writer determined the facility does not have reasonable potential to exceed narrative water quality standards for acute toxicity at this time and the Acute WET testing requirements have been removed from this permit. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (previous passing WET tests). This new information justifies the removal of the test at the time of permit issuance. Also, the removal of the test also meets the requirements of the safety clause, as the removal will not result in a violation of a water quality standard.

o 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 indicated "There Shall Be No Discharge of Floating Solids or Visible Foam in Other Than Trace Amounts" under each table. The statement was not evaluated against actual site conditions therefore, this general criteria was re-assessed. It was determined that this facility does not discharge solids or foam in amounts which would indicate reasonable potential, therefore the statement was removed. Each general criteria was assessed for 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 https://dnr.mo.gov/document-search/antidegradation-implementation-procedure.

✓ No degradation was proposed in this permit action 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 when a higher level authority is available by submitting information as part of the application 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 or compost biosolids in accordance with Standard Conditions III and Special Condition #19.

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.

Facility Performance History:

✓ The facility is currently under enforcement action. The enforcement action is due to failure to comply with effluent limits.

CONTINUING AUTHORITY:

Each application for an operating permit shall identify the person, as that term is defined in section 644.016(15), RSMo, that is the owner of, operator of, or area-wide management authority for a water contaminant source, point source, wastewater treatment facility, or sewer collection system. This person shall be designated as the continuing authority and shall sign the application. By doing so, the person designated as the continuing authority acknowledges responsibility for compliance with all permit conditions.

10 CSR 20-6.010(2) establishes preferential levels for continuing authorities: Levels 1 through 5 (with Level 1 as the highest level), and generally requires permits to be issued to a higher preference continuing authority if available. A Level 3, 4, or 5 applicant may constitute a continuing authority by showing that Level 1 and Level 2 authorities are not available; do not have jurisdiction; are forbidden by state statute or local ordinance from providing service to the person; or that the Level 3, 4, or 5 applicant has met one of the requirements listed in paragraphs (2)(C)1.–7. of 10 CSR 20-6.010(2). The seven options in paragraphs (2)(C)1.–7. for a lower-level authority to demonstrate that it is the valid continuing authority are:

1. A waiver from the existing higher authority declining the offer to accept management of the additional wastewater or stormwater;
2. A written statement or a demonstration of non-response from the higher authority;
3. A to-scale map showing all parts of the legal boundary of the facility's property are beyond 2000 feet from the collection (sewer) system operated by the higher preference authority;
4. A proposed connection or adoption charge by the higher authority that would equal or exceed what is economically feasible for the applicant, which may be in the range of one hundred twenty percent (120%) of the applicant's cost for constructing or operating a wastewater treatment system;
5. A proposed service fee on the users of the system by the higher authority that is above what is affordable for existing homeowners in that area;
6. Terms for connection or adoption by the higher authority that would require more than two (2) years to achieve full sewer service; or
7. A demonstration that the terms for connection or adoption by the higher authority are not viable or feasible to homeowners in the area.

Permit applicants that are Levels 3, 4, and 5 must, as part of their application, identify their method of compliance with this regulation. The following are the methods to comply.

- No higher level authorities are available to the facility;

- No higher level authorities have jurisdiction;

- Higher level authorities are forbidden by state statute or local ordinance from providing service to the person;

- The existing higher level authority is available to the facility, however the facility has proposed the use of a lower preference continuing authority and has submitted one of the following as part of their application provided it does not conflict with any area-wide management plan approved under section 208 of the Clean Water Act or by the Missouri Clean Water Commission. (See Fact Sheet Appendix - Continuing Authority for more information on these options):
  - A waiver from the existing higher authority;
  - A written statement or a demonstration of non-response from the higher authority;
  - A to-scale map showing all parts of the legal boundary of the facility's property are beyond 2000 feet from the collection (sewer) system operated by the higher preference authority;
  - Documentation that the proposed connection or adoption charge by the higher authority would equal or exceed what is economically feasible for the applicant, which may be in the range of one hundred twenty percent (120%) of the applicant's cost for constructing or operating a wastewater treatment system;
  - Documentation that the proposed service fee on the users of the system by the higher authority is above what is affordable for existing homeowners in that area;
  - Documentation that the terms for connection or adoption by the higher authority would require more than two (2) years to achieve full sewer service;

- A demonstration that the terms for connection or adoption by the higher authority are not viable or feasible to homeowners in the area;

✓ The continuing authority listed on the application is a municipality. The applicant has shown that:

- o A higher level authority is not available to the facility;

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 can be provided upon request to the Department.

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: https://dnr.mo.gov/document-search/electronic-discharge-monitoring-report-waiver-request-form-mo-780-2692. 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.

OPERATOR CERTIFICATION REQUIREMENTS:

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 with population equivalents greater than 200 and are owned or operated by or for municipalities, public sewer districts, counties, public water supply districts, private sewer companies regulated by the Public Service Commission and state or federal agencies.

✓ This facility is required to have a certified operator as it has a population equivalent greater than 200 and is owned or operated by or for a municipality, public sewer district, county, public water supply district, private sewer company regulated by the PSC, state or federal agency.

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: James C. Barb
Certification Number: 5684
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.

OPERATIONAL CONTROL TESTING:

Missouri Clean Water Commission regulation 10 CSR 20-9.010 requires certain publicly 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 publicly owned treatment works and privately owned facilities regulated by the Public Service Commission has a calculated 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.
    - o 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)
pH – Anaerobic Digester	Daily (M-F)
Temperature –Anaerobic Digester	Daily (M-F)

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.

REASONABLE POTENTIAL (RP):

Federal regulation [40 CFR Part 122.44(d)(1)(i)] and State Regulation [10 CSR 20-7.015(9)(A)2] 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.

A reasonable potential analysis (RPA) is a numeric RP decision calculated using effluent data provided by the facility for parameters that have a numeric Water Quality Standard (WQS).

Reasonable potential determinations (RPD) are based on physical conditions of the site as provided in Sections 3.1.2, 3.1.3, and 3.2 of the TSD using best professional judgement. An RPD consists of evaluating visual observations for compliance with narrative criteria, non-numeric information, or small amounts of numerical data (such as 3 data points supplied in the application). Narrative criteria with RP typically translate to a numeric WQS, so a parameter's establishment being based on narrative criteria does not necessarily make the decision an RPD vs RP—how the data is collected does, however. When insufficient data is received to make a determination on RP based on numeric effluent data, the RPD decisions are based on best professional judgment considering the sources of influent wastewater, type of treatment, and historical overall management of the site.

- ✓ An RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS.**

- ✓ A RPD was made for Oil & Grease, that a potential to violate water quality standards exists. Please see Derivation and Discussion of Limits.

- ✓ A RPD was made for the Acute WET test, that a potential to violate water quality standards does not exist.

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.

✓ Equivalent to Secondary Treatment is 65% removal [40 CFR Part 133.105(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 https://dnr.mo.gov/document-search/capacity-management-operations-maintenance-plan-editable-template. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at https://dnr.mo.gov/print/document-search/pub2574. 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 Ammonia and *E. coli*. This permit continues the existing ten (10) year schedule of compliance that was established in the permit issued in 2019. The schedule should provide adequate time to evaluate operations, obtain an engineering report, hold a bond election, obtain a construction permit and implement upgrades required to meet effluent limits. Due to the medium economic burden on this community of the cost of compliance and associated difficulty in raising the necessary funding, the schedule was established in the previous permit at 10 years in accordance with the Department's "Schedule of Compliance, Policy for Staff Drafting Operating Permits".

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 https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/wastewater/construction-engineering.

✓ The permittee does not have a Department approved Sewer Extension Authority Supervised Program.

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 June 2015], 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 (https://dnr.mo.gov/document-search/antidegradation-implementation-procedure).

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: https://dnr.mo.gov/forms-applications.

✓ 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 (https://dnr.mo.gov/document-search/form-b2-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-more-100000-gallons-day-mo-780-1805) 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/document-search/no-exposure-certification-exclusion-npdes-stormwater-permitting-under-missouri-clean-water-law-mo-780-2828) to the Department's Water Protection Program, Operating Permits Section. Upon receipt 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 a Chronic 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 from what was previously permitted as Outfall #002 – flow equalization basin.

- o The permittee has met the criteria as established in 40 CFR 122.41(m)(4)(i)(A), (B), and (C).

Part IV – 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 publicly-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 Sedalia

New Permit Requirements			
Sedalia SE WWTP – Monthly sampling for Total Hardness instream Sedalia North WWTP – Monthly sampling for Oil & Grease, Total Recoverable Copper, and Total Recoverable Cadmium Sedalia Central WWTP – Monthly sampling for Total Hardness instream and monthly sampling for Total Recoverable Copper			
Estimated Annual Cost	Annual Median Household Income (MHI)	Estimated Monthly User Rate	User Rate as a Percent of MHI
$1,056	$48,047	$48.29	1.21%

Part V – 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 does not contain requirements for a water quality standard that has changed twenty-five percent or more since the previous operating permit.

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 May 26, 2023 to June 26, 2023. No responses received.

DATE OF FACT SHEET: OCTOBER 4, 2023

COMPLETED BY:

BRANT FARRIS, ENVIRONMENTAL PROGRAM SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT
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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.)	2.5
Design Flow (avg. day) or peak month's flow (avg. day) whichever is larger	1 pt. / MGD or major fraction thereof. (Max 10 pts.)	2.5
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, lake or reservoir area supporting whole body contact recreation	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	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	
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	12
Carbon regeneration	4	
Total from page **ONE (1)**	----	49

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Solids Handling		
Sludge Holding	5	5
Anaerobic digestion	10	10
Aerobic digestion	6	
Evaporative sludge drying	2	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	
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)**	---	49
Grand Total	---	87

☒ - 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 N – Summer (mg/L)	12.1	8.26	1.3	8.26	24.00	4.7/1.1	0.42	1.76	YES
Ammonia as N – Winter (mg/L)	10.1	63.50	2.7	63.50	25.00	21.2/0.7	0.95	3.00	YES
Cadmium, Total Recoverable (µg/L)	18.46	157.51	2.19	157.51	17	14/0.028	3.16	11.3	Yes
Copper, Total Recoverable (µg/L)	46.54	141.60	27.74	141.60	17	59.8/1	0.58	2.4	Yes
Chromium VI, Dissolved (µg/L)	16	9.43	11	9.43	17	5/1.15	0.43	1.9	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 – Non-Detect Example Calculations:

Example: Permittee has four samples for Pollutant X which has a method minimum level of 5 mg/L and is to report a Daily Maximum and Monthly Average.

Week 1 = 11.4 mg/L
Week 2 = Non-Detect or <5.0 mg/L
Week 3 = 7.1 mg/L
Week 4 = Non-Detect or <5.0 mg/L

For this example, use subpart (h) - For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

11.4 + 0 + 7.1 + 0 = 18.5 ÷ 4 (number of samples) = 4.63 mg/L.

The Permittee reports a Monthly Average of 4.63 mg/L and a Daily maximum of 11.4 mg/L (Note the < symbol was dropped in the answers).

Example: Permittee has five samples for Pollutant Y that has a method minimum level of 9 µg/L and is to report a Daily Maximum and Monthly Average.

Day 1 = Non-Detect or <9.0 µg/L
Day 2 = Non-Detect or <9.0 µg/L
Day 3 = Non-Detect or <9.0 µg/L
Day 4 = Non-Detect or <9.0 µg/L
Day 5 = Non-Detect or <9.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(9 +9 +9 +9 +9) ÷ 5 (number of samples) = <9 µg/L.

The Permittee reports a Monthly Average of <9.0 µg/L (retain the 'less than' symbol) and a Daily Maximum of <9.0 µg/L.

Example: Permittee has four samples for Pollutant Z where the first two tests were conducted using a method with a method minimum level of 4 µg/L and the remaining two tests were conducted using a different method that has a method minimum level of <6 µg/L and is to report a Monthly Average and a Weekly Average.

Week 1 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <4.0 µg/L
Week 3 = Non-Detect or <6.0 µg/L
Week 4 = Non-Detect or <6.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(4 + 4 + 6 + 6) ÷ 4 (number of samples) = <5 µg/L. (Monthly)

The facility reports a Monthly Average of <5.0 µg/L and a Weekly Average of <6.0 µg/L.

APPENDIX – Non-Detect Example Calculations (Continued):

Example: Permittee has five samples for Pollutant Z where the first two tests were conducted using a method with a method minimum level of 4 µg/L and the remaining three tests were conducted using a different method that has a method minimum level of <6 µg/L and is to report a Monthly Average and a Weekly Average.

Week 1 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <6.0 µg/L
Week 3 = Non-Detect or <6.0 µg/L
Week 4 = Non-Detect or <6.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(4 + 4 + 6 + 6 + 6) ÷ 5 (number of samples) = <5.2 µg/L. (Monthly)
(4 + 6) ÷ 2 (number of samples) = <5 µg/L. (Week 2)

The facility reports a Monthly Average of <5.2 µg/L and a Weekly Average of <6.0 µg/L (report highest Weekly Average value)

Example: Permittee has four samples for Pollutant Z where the tests were conducted using a method with a method minimum level of 10 µg/L and is to report a Monthly Average and Daily Maximum. The permit lists that Pollutant Z has a Department determined Minimum Quantification Level (ML) of 130 µg/L.

Week 1 = 12 µg/L
Week 2 = 52 µg/L
Week 3 = Non-Detect or <10 µg/L
Week 4 = 133 µg/L

For this example, use subpart (h) - For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

For this example, (12 + 52 + 0 + 133) ÷ 4 (number of samples) = 197 ÷ 4 = 49.3 µg/L.

The facility reports a Monthly Average of 49.3 µg/L and a Daily Maximum of 133 µg/L.

Example: Permittee has five samples for *E. coli* which has a method minimum level of 1 #/100mL and is to report a Weekly Average (seven (7) day geometric mean) and a Monthly Average (thirty (30) day geometric mean).

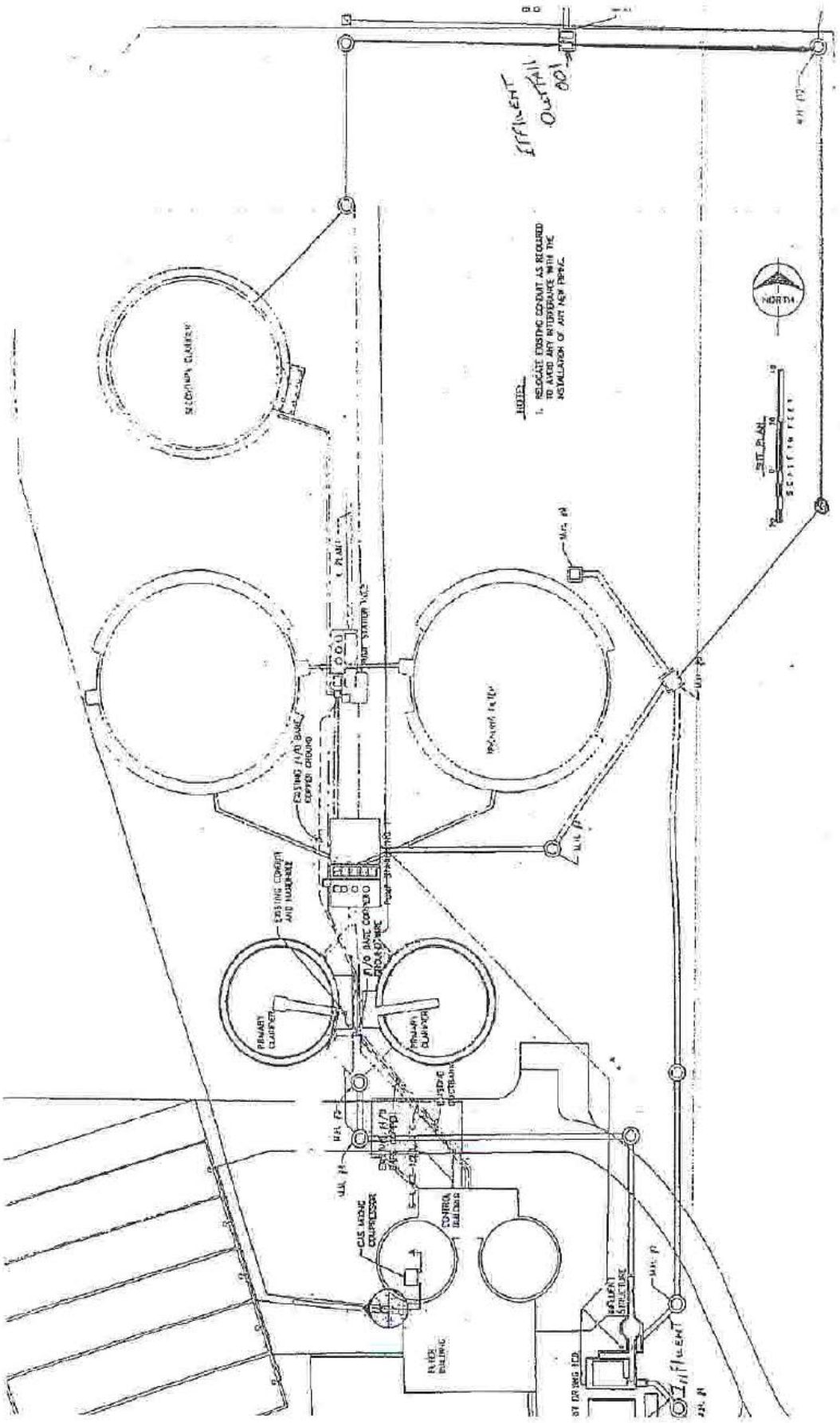
Week 1 = 102 #/100mL
Week 2 (Monday) = 400 #/100mL
Week 2 (Friday) = Non-Detect or <1 #/100mL
Week 3 = 15 #/100mL
Week 4 = Non-Detect or <1 #/100mL

For this example, use subpart (i) - When E. coli is not detected above the method minimum level, the permittee must report the data qualifier signifying less than detection limit for that parameter (e.g., <1 #/100mL, if the method minimum level is 1 #/100mL). For reporting a geometric mean based on a mix of detected and non-detected values, use one-half of the detection limit (instead of zero) for non-detects when calculating geometric means. 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.

The Monthly Average (30 day Geometric Mean) = 5th root of (102)(400)(0.5)(15)(0.5) = 5th root of 153,000 = 10.9 #/100mL.
The 7 day Geometric Mean = 2nd root of (400)(0.5) = 2nd root of 200 = 14.1 #/100mL. (Week 2)

The Permittee reports a Monthly Average (30 day Geometric Mean) of 10.9 #/100mL and a Weekly Average (7 day geometric mean) of 102 #/100mL (report highest Weekly Average value)

APPENDIX – PROCESS FLOW DIAGRAM:



APPENDIX – COST ANALYSIS FOR COMPLIANCE:

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

Sedalia North WWTP, Permit Renewal
City of Sedalia
Missouri State Operating Permit #MO-0023027

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

The permit requires compliance with new monthly sampling frequency for Oil & Grease, Total Recoverable Copper, and Total Recoverable Cadmium, from quarterly to monthly.

Connections
The number of connections was reported by the permittee on the permit renewal applications for the Sedalia North WWTP, Sedalia Central WWTP, and the Sedalia SE WWTP.

Connection Type	Number
Residential	8,993
Commercial	1,331
Industrial	12
Total	**10,336**

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 (https://dnr.mo.gov/document-search/financial-questionnaire-mo-780-2511) 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. Though the Department has made attempts to gather financial information from the City of Sedalia; no information has been provided. The Department has relied heavily on readily available data to complete this analysis. 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 Sedalia	
Current Monthly User Rates per 5,000 gallons*	$48.28
Median Household Income (MHI)[1]	$48,047
Current Annual Operating Costs (excludes depreciation)	$5,308,228

*User Rates were obtained from the City of Sedalia's November 14, 2022 Ordinances Appendix A – City Fee Schedule.
§ Current annual operating costs were obtained from the City of Sedalia Audited Financial Statements dated March 31, 2022.

(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
Oil & Grease	Monthly¥	$75 X 8	$600
Total Recoverable Copper	Monthly¥	$22 X 8	$176
Total Recoverable Cadmium	Monthly¥	$22 x 8	$176
Total metal concentration analysis	Monthly¥	$13 x 8	$104
Total Estimated Annual Cost of New Permit Requirements			$1,056

¥ - was previously quarterly

Criterion 2B Table. Estimated Costs for New Permit Requirements		
(1)	Estimated Annual Cost	$1,056
(2)	Estimated Monthly User Cost for New Requirements [2]	$0.01
	Estimated Monthly User Cost for New Requirements as a Percent of MHI [3]	0.000%
	Estimated Monthly User Cost for New Requirements for Sedalia Central WWTP	$0.00
	Estimated Monthly User Cost for New Requirements for Sedalia SE WWTP	$0.00
(3)	Total Monthly User Cost*	$48.29
	Total Monthly User Cost as a Percent of MHI [4]	1.21%

* 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.

Metals Limits
Metals dissolve in water and are easily absorbed by fish and other aquatic organisms. Small concentrations can be toxic because metals undergo bioconcentration, which means that their concentration in an organism is higher than in water. Metal toxicity produces adverse biological effects on an organism's survival, activity, growth, metabolism, or reproduction. Metals can be lethal or harm the organism without killing it directly. Adverse effects on an organism's activity, growth, metabolism, and reproduction are examples of sub-lethal effects.

In order for a metal to be toxic, it needs to enter the body of the exposed organism and interact with the surface or interior of cells. The pathways by which this happens includes diffusion into the bloodstream via the gills and skin, as fish become exposed by drinking water or eating sediments contaminated with the metal, or eating other animals or plants that became exposed to the metal. Humans become exposed to metals via analogous pathways: diffusion into the bloodstream via the lungs and skin, drinking contaminated water, and eating contaminated food.

The effluent limits for metals have been added to the permit to protect 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.

(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 this 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 Sedalia

No.	Administrative Unit	Sedalia City	Missouri State	United States
1	Population (2021)	21,696	6,141,534	329,725,481
2	Percent Change in Population (2000-2021)	6.7%	9.8%	17.2%
3	2021 Median Household Income (in 2022 Dollars)	$48,047	$65,928	$74,545
4	Percent Change in Median Household Income (2000-2021)	-4.5%	-1.1%	1.1%
5	Median Age (2021)	36.2	38.8	38.4
6	Change in Median Age in Years (2000-2021)	0.4	2.7	3.1
7	Unemployment Rate (2021)	6.1%	4.5%	5.5%
8	Percent of Population Below Poverty Level (2021)	18.0%	12.8%	12.6%
9	Percent of Household Received Food Stamps (2021)	13.6%	10.1%	11.4%
10	(Primary) County Where the Community Is Located	Pettis 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 Sedalia 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) 2021 MHI in 2021 Dollar: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2021 Inflation-Adjusted Dollars). https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2021.B19013.
   (B) 2000 MHI in 1999 Dollar: (1) For United States, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-1 Part 1. United States Summary, Table 5. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) For Missouri State, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-27, Missouri, Table 10. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (C) 2022 CPI, 2021 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2022) Consumer Price Index - All Urban Consumers, U.S. City Average. All Items. 1982-84=100 (unadjusted) - CUUR0000SAO. https://data.bls.gov/cgi-bin/surveymost?bls.
   (D) 2021 MHI in 2022 Dollar = 2021 MHI in 2021 Dollar x 2022 CPI /2021 CPI; 2000 MHI in 2021 Dollar = 2000 MHI in 1999 Dollar x 2022 CPI /1999 CPI.
   (E) Percent Change in Median Household Income (2000-2021) = (2021 MHI in 2022 Dollar - 2000 MHI in 2022 Dollar) / (2000 MHI in 2022 Dollar).
2. ($1,056/10,336)/12 = $0.01 (Estimated Monthly User Cost for New Requirements)
3. ($0.01/($48,047/12))100% = 0.00% (New Sampling Only)
4. ($48.29/($48,047/12))100% = 1.21% (Total User Cost)
5. (A) Total Population in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2021.B01003.
   (B) 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. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) 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. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Percent Change in Population (2000-2021) = (Total Population in 2021 - Total Population in 2000) / (Total Population in 2000).
6. Median Age in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2021.B01002.
   (B) 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/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) 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. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Change in Median Age in Years (2000-2021) = (Median Age in 2021 - Median Age in 2000).
7. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, S2301: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. https://data.census.gov/cedsci/table?q=unemployment&tid=ACSST5Y2021.S2301.
8. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2021.S1701.
9. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S2201: Food Stamps/Supplemental Nutrition Assistance Program (SNAP) - Universe: Households. https://data.census.gov/cedsci/table?q=S2201&tid=ACSST5Y2021.S2201.

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 RSMo, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.:	MO-0023019
Owner:	City of Sedalia
Address:	200 S. Osage Avenue, Sedalia, MO 65301
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Sedalia Central WWTP
Facility Address:	3000 West Main, Sedalia, MO 65301
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

authorizes activities pursuant to the terms and conditions of this permit in accordance with the Missouri Clean Water Law and/or the National Pollutant Discharge Elimination System; it does not apply to other regulated activities.

FACILITY DESCRIPTION

See Page 2

November 1, 2023
Effective Date

October 31, 2028
Expiration Date

John Hoke, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #001 – POTW
The use or operation of this facility shall be by or under the supervision of a Certified "A" Operator.
Peak flow basin / flow equalization basin / mechanical bar screen / aerated grit chamber / 2 primary clarifiers / influent lift station / activated sludge basin / 2 final clarifiers / UV disinfection / step re-aeration / gravity belt sludge thickener / 2 anaerobic digesters / belt filter press / 2 aerated sludge holding tanks / sludge drying bed / biosolids are land applied or are composted

Design population equivalent is 30,300.
Design flow is 3.03 million gallons per day.
Actual flow is 2.02 million gallons per day.
Design sludge production is 1,008 dry tons/year.

Legal Description:	Sec. 31, T46N, R21W, Pettis County
UTM Coordinates:	X=476975, Y=4285353
Receiving Stream:	Brushy Creek (P)
First Classified Stream and ID:	Brushy Creek (P) (859)
USGS Basin & Sub-watershed No.:	(10300103-0405)

Outfall #002 – Discharges from this outfall is no longer authorized, and shall be subject to 40 CFR 122.41(m) and reported according to 40 CFR 122.41(m)(3)(i) & (ii).

Permitted Feature INF – Influent Monitoring Location – Headworks

Legal Description:	Sec. 32, T46N, R21W, Pettis County
UTM Coordinates:	X=477118, Y=4285424

Permitted Feature SM1 – Eliminated

Permitted Feature SM2 – Instream Monitoring – Downstream – ~ 400 feet downstream of Outfall #001 on Brushy Creek, prior to railroad crossing over Brushy Creek – See Special Condition #22

Legal Description:	Sec. 31, T46N, R21W, Pettis County
UTM Coordinates:	X=476969, Y=4285488

OUTFALL #001	TABLE A-1. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-1** shall become effective on **November 1, 2023** 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
eDMR Limit Set: M						
Flow	MGD	*		*	once/weekday***	24 hr. total
Biochemical Oxygen Demand$_5$ (May-Oct)	mg/L		10	10	once/week	composite**
Biochemical Oxygen Demand$_5$ (Nov-Apr)	mg/L		20	20	once/week	composite**
Total Suspended Solids	mg/L	35		30	once/week	composite**
E. coli (**Note 1**)	#/100mL		1,030	206	once/week	grab
Ammonia as N (January)	mg/L	8.1		2.9	once/week	composite**
Ammonia as N (February)	mg/L	8.1		2.9	once/week	composite**
Ammonia as N (March)	mg/L	8.1		2.9	once/week	composite**
Ammonia as N (April)	mg/L	3.3		1.5	once/week	composite**
Ammonia as N (May)	mg/L	3.3		1.5	once/week	composite**
Ammonia as N (June)	mg/L	3.3		1.5	once/week	composite**
Ammonia as N (July)	mg/L	3.3		1.2	once/week	composite**
Ammonia as N (August)	mg/L	3.3		1.4	once/week	composite**
Ammonia as N (September)	mg/L	3.3		1.5	once/week	composite**
Ammonia as N (October)	mg/L	8.1		2.7	once/week	composite**
Ammonia as N (November)	mg/L	8.1		2.9	once/week	composite**
Ammonia as N (December)	mg/L	8.1		2.9	once/week	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	calculated
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
Total Nitrogen (**Note 2**)	mg/L	*		*	once/month	calculated
Total Recoverable Copper	µg/L	43.8		16.3	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 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.

*** Once each weekday means: Monday, Tuesday, Wednesday, Thursday, and Friday.

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 – Total Nitrogen consists of Total Kjeldahl Nitrogen and Nitrate + Nitrite.

OUTFALL #001	TABLE A-1. (Continued) FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-1** shall become effective on **November 1, 2023** 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	
		MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR Limit Set: M						
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 3**)	%	85	once/month	calculated
Total Suspended Solids – Percent Removal (**Note 3**)	%	85	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 28, 2023.

**** pH is measured in pH units and is not to be averaged.

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.

OUTFALL #001	TABLE A-2. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **November 1, 2023** 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		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR Limit Set: Q						
Oil & Grease	mg/L	*		*	once/quarter *****	grab

MONITORING REPORTS SHALL BE SUBMITTED **QUARTERLY**; THE FIRST REPORT IS DUE JANUARY 28, 2024.

* Monitoring requirement only.

***** See table below for quarterly sampling requirements.

Quarterly Minimum Sampling Requirements			
Quarter	**Months**	**Oil & Grease**	**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 #001	TABLE A-2. WHOLE EFFLUENT TOXICITY FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall number(s) as specified in the application for this permit. The final effluent limitations in **Table A-2** shall become effective on **November 1, 2023** 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			MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR Limit Set: WA						
Acute Whole Effluent Toxicity (**Note 4**)	TU_a	0.3			once/year	composite**
ACUTE WET TEST MONITORING REPORTS SHALL BE SUBMITTED **ANNUALLY**; THE FIRST REPORT IS DUE JULY 28, 2024.						
eDMR Limit Set: WC						
Chronic Whole Effluent Toxicity (**Note 5**)	TU_c	*			once/permit cycle	composite**
CHRONIC WET TEST REPORTS SHALL BE SUBMITTED **ONCE PER PERMIT CYCLE**; THE FIRST REPORT IS DUE JULY 28, 2025.						

* 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 - This effluent limit is below the analytical instrumentation quantification level (ML). The Department has determined the current acceptable ML for Acute Whole Effluent Toxicity (WET) test to be 1.0 TUa when using Freshwater Test Method 2000.0, 2002.0, 2019.0 in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA-821-R-02-012. Fifth Edition, October 2002. U.S. EPA; and U.S. EPA Whole Effluent Toxicity Methods Errata Sheet, EPA 821-R-02-012-ES. December 2016.* The permittee will conduct analyses in accordance with these methods and report actual analytical values. Measured values greater than the ML of 1.0 TUa will be considered violations of the permit; and values less than or equal to the minimum quantification level of 1.0 TUa will be considered to be in compliance with the permit limitation. The ML does not authorize a toxic discharge. See Special Condition #16 for additional requirements.

Note 6 – The Chronic WET test shall be conducted once per permit cycle during the year 2024. See Special Condition #17 for additional requirements.

PERMITTED FEATURE INF	TABLE B-1. INFLUENT MONITORING REQUIREMENTS

The monitoring requirements in **Table B-1** shall become effective on **November 1, 2023** 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		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
eDMR 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	calculated
Nitrite + Nitrate	mg/L	*		*	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 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 – 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 SM2	TABLE C-1. INSTREAM MONITORING REQUIREMENTS

The monitoring requirements in **Table C-1** shall become effective on **November 1, 2023** 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
eDMR Limit Set: DM						
Hardness, Total	mg/L	*		*	once/month	grab

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE DECEMBER 28, 2023.

* 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. Annual reports required per Standard Conditions Part III Section K shall be submitted online to the Department via the Department's eDMR system as an attachment. This supersedes Standard Conditions Part III Section K #4. EPA reports shall continue to be submitted online via the Central Data Exchange system.

E. SPECIAL CONDITIONS

1. Electronic Discharge Monitoring Report (eDMR) Submission System. Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting of effluent monitoring data and any report required by the permit (unless specifically directed otherwise by the permit) shall be submitted by the permittee via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data about the NPDES program. All reports uploaded into the system shall be reasonably named so they are easily identifiable, such as "WET Test Chronic Outfall 002 Jan 2023," or "Outfall 004 Daily Data Mar 2025."
   (a) eDMR Registration Requirements. The permittee must register with the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due. Registration and other information regarding MoGEM can be found at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. Information about the eDMR system can be found at https://dnr.mo.gov/water/business-industry-other-entities/reporting/electronic-discharge-monitoring-reporting-system-edmr. The first user shall register as an Organization Official and the association to the facility must be approved by the Department. Regarding Standard Conditions Part I, Section B, #7, the eDMR system is currently the only Department approved reporting method for this permit unless a waiver is granted by the Department. See paragraph (c) below.
   (b) Electronic Submissions. To access the eDMR system, use the following link in your web browser: https://apps5.mo.gov/mogems/welcome.action. If you experience difficulties with using the eDMR system you may contact edmr@dnr.mo.gov or call 855-789-3889 or 573-526-2082 for assistance.
   (c) Waivers from Electronic Reporting. The permittee must electronically submit compliance monitoring data and reports unless a waiver is granted by the Department in compliance with 40 CFR Part 127. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: https://dnr.mo.gov/document-search/electronic-discharge-monitoring-report-waiver-request-form-mo-780-2692. The Department will either approve or deny this electronic reporting waiver request within 120 calendar days.

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 "C – No Discharge" 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) See sufficiently sensitive test method requirements in Standard Conditions Part I, Section A, No. 4 regarding proper testing and method minimum levels used for sample analysis.
   (c) The permittee shall not report a sample result as "Non-Detect" without also reporting the method minimum level of the test. Reporting as "Non Detect" without also including the method minimum level, will be considered failure to report, which is a violation of this permit.
   (d) The permittee shall provide the "Non-Detect" sample result using the less than symbol and the method minimum level (e.g., <50 µg/L, if the method minimum level for the parameter is 50 µg/L).
   (e) Where the permit contains a Department determined Minimum Quantification 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.
   (f) For the daily maximum, the facility shall report the highest value. If the highest value was a non-detect, use the less than "<" symbol and the laboratory's highest method minimum level.
   (g) For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.
   (h) For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

(i) When *E. coli* is not detected above the method minimum level, the permittee must report the data qualifier signifying less than detection limit for that parameter (e.g., <1 #/100mL, if the method minimum level is 1 #/100mL). For reporting a geometric mean based on a mix of detected and non-detected values, use one-half of the detection limit (instead of zero) for non-detects when calculating geometric means.
(j) See the Fact Sheet Appendix - Non-Detect Example Calculations for further guidance.

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 continue to implement and update if necessary, the 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 https://dnr.mo.gov/document-search/capacity-management-operations-maintenance-plan-editable-template. Additional information regarding the Departments' CMOM Model is available at https://dnr.mo.gov/print/document-search/pub2574.

   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 requirements for the annual report are contained in the Sedalia North WWTP's Missouri State Operating Permit #MO-0023027, and the city's report shall be submitted via eDMR entry for the Sedalia North WWTP.

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 Northeast Regional Office during normal business hours or by using the online Sanitary Sewer Overflow/Facility Bypass Application located at: https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-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.

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 ensure 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. The flow equalization basin shall be operated and maintained to ensure their structural integrity, which includes maintaining adequate freeboard and keeping the berms free of deep-rooted vegetation, animal dens, or other potential sources of damage.

15. The facility shall ensure that adequate provisions are provided to prevent or minimize surface water intrusion into the flow equalization basin and to divert stormwater runoff around the flow equalization basin and protect embankments from erosion.

16. 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:
      i. The fathead minnow, *Pimephales promelas* (Acute Toxicity EPA Test Method 2000.0).

ii. 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 laboratory shall not chemically dechlorinate the sample.

(e) The Allowable Effluent Concentration (AEC) is 100%; the dilution series is: 100%, 50%, 25%, 12.5%, and 6.25%.

(f) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.

(g) 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.

(h) Accelerated Testing Trigger: If the regularly scheduled acute WET test exceeds the TU_a limit, the permittee shall conduct accelerated follow-up WET testing as prescribed in the following conditions. Results of the follow-up accelerated WET testing shall be reported in TU_a. This permit requires the following additional toxicity testing if any one test result exceeds a TU_a limit.

(1) A multiple dilution test shall be performed for both test species within 60 calendar days of becoming aware the regularly scheduled WET test exceeded a TU_a limit, and once every two weeks thereafter until one of the following conditions are met:

i. Three <u>consecutive</u> multiple-dilution tests are below the TU_a limit. No further tests need to be performed until next regularly scheduled test period.

ii. A total of three multiple-dilution tests exceed the TU_a limit.

(2) Follow-up tests do not negate an initial test result.

(3) The permittee shall submit a summary of all accelerated WET test results for the test series along with complete copies of the laboratory reports as received from the laboratory within 14 calendar days of the availability of the third test exceeding a TU_a limit.

(i) TIE/TRE Trigger: The following shall apply upon the exceedance of the TU_a limit in three accelerated follow-up WET tests. The permittee should contact the Department within 14 calendar days from availability of the test results to ascertain as to whether a TIE or TRE is appropriate. If the permittee does not contact the Department upon the third follow up test exceeding a TU_a limit, a toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE) is automatically triggered. The permittee shall submit a plan for conducting a TIE or TRE within 60 calendar days of the date of the automatic trigger or the Department's direction to perform either a TIE or TRE. The plan shall be based on EPA Methods and include a schedule for completion. This plan must be approved by the Department before the TIE or TRE is begun.

17. <u>Chronic Whole Effluent Toxicity (WET)</u> 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:

i. The fathead minnow, *Pimephales promelas* (Survival and Growth Test Method 1000.0).

ii. 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 laboratory shall not chemically dechlorinate the sample.

(e) The Allowable Effluent Concentration (AEC) is 100%, the dilution series is: 100%, 50%, 25%, 12.5%, and 6.25%.

(f) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.

(g) 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.

18. Expanded Effluent Testing

Permittee must sample and analyze for the pollutants listed in 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 (MO-780-1805 dated 10-20), Part D – Expanded Effluent Testing Data, #18. The permittee shall provide this data with the permit renewal application. A minimum of three samples taken within four and one-half years prior to the date of the permit application must be provided. 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 minimum level is at or below the level of the applicable water quality criterion for the measured pollutant or pollutant parameter; or 2) the method minimum level is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or 3) the method has the lowest minimum level of the analytical methods approved under 40 CFR part 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.

19. Stormwater Pollution Prevention Plan (SWPPP): A SWPPP must be implemented upon permit issuance. Through implementation of the SWPPP, the permittee shall 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 June 2015.

(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;
      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 E.19
   (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.

20. 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.

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 the City's pretreatment activities during the previous calendar year. The requirements for the annual report are contained in the Sedalia North WWTP's Missouri State Operating Permit #MO-0023027, and the city's report shall be submitted via eDMR entry for the Sedalia North WWTP.

22. Receiving Water Monitoring Conditions
    (a) Downstream receiving water samples should be taken at the location specified on Page 2 of this permit. In the event that a safe, accessible location is not present at the location 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.
    (b) When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream 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:
        (1) If turbidity in the stream increases notably; or
        (2) If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hour.
    (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.

23. Biosolids Composting Requirements for General Public Use:
    (a) Applicability. A sewage sludge compost product will be considered suitable for general public use when the permittee meets the requirements under this permit special condition. General public use means the compost is for crops and vegetation including use in residential areas, public use areas and for horticulture, silviculture and agricultural uses.
    (b) Composting Facility Description.
        (1) Raw materials will consist of dewatered sewage sludge or biosolids, wood chips, yard waste or other compostable materials.

(c) If the compost is to be distributed to the public it shall meet the Class A requirements for pathogen reduction by having undergone one of the Processes to Further Reduce Pathogens found in Appendix B of 40 CFR 503.
(d) The permittee will maintain a detailed operations plan for the composting process.
(e) Information Sheet for Users.
An information/instruction sheet shall be provided to each user of compost to provide information on the origin of the compost, appropriate application rates, and other pertinent information for proper handling and use of the compost.
(f) Annual Use Rate. Compost that is land applied by the permit holder shall not exceed the most restrictive of the following criteria:
    (1) Application rates shall not exceed the annual plant available nutrient requirements for nitrogen and phosphorus based on the vegetation to be grown, a realistic crop yield goal, soil testing results and testing of the compost for nutrient content.
    (2) Application rate shall not exceed 20 dry tons per acre per year.
(g) One Time or Occasional Use Rates.
Compost that is used by the permit holder for soil amendments or land reclamation shall not exceed a total of 200 dry tons per acre on either a one time basis or a cumulative total over a five year period. Subsequent application rates shall not exceed the annual use rate listed above. The compost shall be incorporated into the soil by tillage practices as soon as practical after application.
(h) Final Compost Monitoring.
Composite samples of the final compost product shall be collected at representative locations and monitored as described in 40 CFR 503 and Standard Conditions Part III.
(i) Records and Reporting Requirements.
    (1) The requirements for the annual report are contained in the Sedalia North WWTP's Missouri State Operating Permit #MO-0023027, and the city's report shall be submitted via eDMR entry for the Sedalia North WWTP. The reports shall be submitted to the EPA Region VII office as part of the annual sludge report.
(j) Composted sewage sludge that does not meet the requirements for general public use may still be land applied in accordance with permit Standard Conditions Part III.

F. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty 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. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0023019
SEDALIA CENTRAL WWTP

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.

Part I – Facility Information

Application Date: 10/02/2020
Expiration Date: 03/31/2021

Facility Type and Description: POTW - Peak flow basin / flow equalization basin / mechanical bar screen / aerated grit chamber / 2 primary clarifiers / influent lift station / activated sludge basin / 2 final clarifiers / UV disinfection / step re-aeration / gravity belt sludge thickener / 2 anaerobic digesters / belt filter press / 2 aerated sludge holding tanks / sludge drying bed / biosolids are land applied or are composted

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#001	4.688	Secondary	Domestic

Comments:
Changes in this permit for Outfall #001 include the addition of Total Nitrogen monitoring, the revision of Ammonia limits, the revision of Copper limits, the revision of the Acute WET test from monitoring to a Daily Maximum limit, the revision of Oil & Grease from limits to monitoring only, and the removal of Nickel, Zinc, Boron, Chloride + Sulfate, and Fluoride. Changes in this permit for Permitted Feature INF include the addition of BOD and TSS monitoring. Changes in this permit include the elimination of Permitted Feature SM1. Changes in this permit for Permitted Feature SM2 include the revision of Total Hardness sampling frequency from quarterly to monthly. See Part II of the Fact Sheet for further information regarding the addition, revision, and removal of influent, instream, and effluent parameters. Special conditions were updated to include the revision of inflow and infiltration reporting requirements, revision of reporting of Non-detects, revision of the bypass reporting requirements, revision of the pretreatment requirements, revision of instream monitoring requirements, and revision of the Electronic Discharge Monitoring Report (eDMR) Submission System.

Part II – Effluent Limitations and Monitoring Requirements

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.

OUTFALL #001 - RECEIVING STREAM INFORMATION

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Brushy Creek	P	859	AHP(WWH), WBC-B, SCR, IRR, LWP	10300103-0405	0
Muddy Creek	P	853	AHP(WWH), WBC-B, SCR, IRR, LWP		~ 3 [303(d) List]

*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.:

AHP = Aquatic Habitat Protection - To ensure the protection and propagation of fish, shellfish, and wildlife. AHP is further subcategorized as:

WWH = Warm Water Habitat;
CLH = Cool Water Habitat;
CDH= Cold Water Habitat;
EAH = Ephemeral Aquatic Habitat;
MAH = Modified Aquatic Habitat;
LAH = Limited Aquatic Habitat.

This permit uses Aquatic Life Protection effluent limitations in 10 CSR 20-7.031 Table A for all aquatic 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 is further subcategorized as:

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 - Application of water to cropland or directly to cultivated plants that may be used for human or livestock consumption;
LWP = Livestock and wildlife protection - Maintenance of conditions in waters to support health in livestock and wildlife;
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
Brushy Creek	0.1	0.1	1.0

MIXING CONSIDERATIONS

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 Water Body's Water Quality

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. Muddy Creek is listed on the 2018 Missouri 303(d) List for *E. coli*.
  - o This facility is not considered to be a source of the above listed pollutant or considered to contribute to the impairment of Muddy Creek as the source is listed as Rural Non-Point Source.
- ✓ This facility discharges to a stream with an EPA approved TMDL. The TMDL for Muddy Creek and Brushy Creek was approved February 11, 2002. Pollutants of concern were BOD, Ammonia, and TSS. The source of the impairment was the Sedalia Central WWTP. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL.

CHANGES TO EFFLUENT LIMITATIONS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Ammonia as N (July)	mg/L	2, 3	3.3		1.2	3.6/1.4	1/month	monthly	C
Ammonia as N (August)	mg/L	2, 3	3.3		1.4	3.6/1.4	1/month	monthly	C
Ammonia as N (October)	mg/L	2, 3	8.1		2.7	8.1/2.9	1/month	monthly	C
Oil & Grease	mg/L	1, 3	*		*	15/10	1/quarter	quarterly	G
Copper, Total Recoverable	µg/L	1, 3	43.8		16.3	37.7/18.0	1/month	monthly	G
Total Nitrogen	mg/L	7	*		*	***	1/quarter	quarterly	M
Acute Whole Effluent Toxicity	TUa	1, 9	0.3			*	1/year	annually	C
Chronic Whole Effluent Toxicity	TUc	1, 9	*			*	1/permit cycle	1/permit cycle	C

* - 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
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)**.
  - o **Biochemical Oxygen Demand (BOD_5) Summer**. Operating permit retains 10 mg/L as a Summer Weekly Average and 10 mg/L as a Summer Monthly Average from the previous permit. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL. Therefore, no further BOD reductions are required to meet the goal of the TMDL; and, this operating permit retains the final effluent limits for BOD from the previous permit, as the use designation AQL was restored under these permit limits.
  - o **Biochemical Oxygen Demand (BOD_5) Winter**. Operating permit retains 20 mg/L as a Winter Weekly Average and 20 mg/L as a Winter Monthly Average from the previous permit. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL. Therefore, no further BOD reductions are required to meet the goal of the TMDL; and, this operating permit retains the final effluent limits for BOD from the previous permit, as the use designation AQL was restored under these permit limits.

- **Total Suspended Solids (TSS)**. Operating permit retains 35 mg/L as a Weekly Average and 30 mg/L as a Monthly Average. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL. Therefore, no further TSS reductions are required to meet the goal of the TMDL; and, this operating permit retains the final effluent limits for TSS from the previous permit, as the use designation AQL was restored under these permit limits.

- ***Escherichia coli (E. coli)***. Monthly average of 206 per 100 mL as a geometric mean and Weekly Average of 1,030 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 with Whole Body Contact Recreation (B) 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**. The effluent limits of the previous permit were compared to the Department's current method for derivation of ammonia limits, see table below. The limits from the Department's current ammonia derivation method were determined to be less stringent than the previous permit with the exception of the Average Monthly Limits for July, August, and October.

MONTH	Previous Permit Limits		Water Quality Based Effluent Limit (WQBEL)	
	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average
January	8.1	2.9	12.1	3.3
February	8.1	2.9	10.1	2.9
March	8.1	2.9	10.1	2.9
April	3.3	1.5	10.1	2.5
May	3.3	1.5	12.1	2.0
June	3.3	1.5	12.1	1.6
July	3.3	1.5	10.1	1.2
August	3.3	1.5	12.1	1.4
September	3.3	1.5	12.1	1.8
October	8.1	2.9	12.1	2.7
November	8.1	2.9	12.1	3.3
December	8.1	2.9	10.1	2.9

Green cells are final effluent limits (Table A-1)

- **Total Ammonia Nitrogen (WQBEL)**.

  The Department's current method for derivation of ammonia: 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. No mixing considerations allowed; therefore, WLA = appropriate criterion.

  The Department previously followed the 2007 Ammonia Guidance method for derivation of ammonia limits. However, the EPA's Technical Support Document for Water Quality-based Toxic Controls (TSD) establishes other alternatives to limit derivation. The Department has determined that the approach established in Section 5.4.2 of the TSD, which allows for direct application of both the acute and chronic wasteload allocations (WLA) as permit limits for toxic pollutants, is more appropriate limit derivation approach. Using this method for a discharge to a waterbody where mixing is not allowed, the criterion continuous concentration (CCC) and the criterion maximum concentration (CMC) will equal the chronic and acute WLA respectively. The WLAs are then applied as effluent limits, per Section 5.4.2 of the TSD, where the CMC is the Daily Maximum and the CCC is the Monthly Average. The direct application of both acute and chronic criteria as WLA is also applicable for facilities that discharge into receiving waterbodies with mixing considerations. The CCC and CMC will need to be calculated into WLA with mixing considerations using the mass-balance equation:

$$Ce = \frac{(Qe + Qs)C - (Qs \times Cs)}{(Qe)}$$

Where C = downstream concentration Ce = effluent concentration
Cs = upstream concentration Qe = effluent flow
Qs = upstream flow

Month	Temp (˚C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
January	2.8	7.8	3.1	12.1
February	4.0	7.9	2.7	10.1
March	10.6	7.9	2.7	10.1
April	17.0	7.9	2.3	10.1
May	22.0	7.8	1.9	12.1
June	26.0	7.8	1.5	12.1
July	28.9	7.9	1.1	10.1
August	28.0	7.8	1.3	12.1
September	24.1	7.8	1.7	12.1
October	17.5	7.8	2.6	12.1
November	11.6	7.8	3.1	12.1
December	4.9	7.9	2.7	10.1

* Ecoregion data (Central Irregular Plains)

January
Chronic WLA: Ce = ((4.6965 + 0.25)3.1 – (0.25 * 0.01)) / 4.6965
Ce = 3.3

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 3.3 mg/L
MDL = WLAa = 12.1 mg/L

February
Chronic WLA: Ce = ((4.6965 + 0.25)2.7 – (0.25 * 0.01)) / 4.6965
Ce = 2.9

Acute WLA: Ce = ((4.6965 + 0.0025)10.1 – (0.0025 * 0.01)) / 4.6965
Ce = 10.1

AML = WLAc = 2.9 mg/L
MDL = WLAa = 10.1 mg/L

March
Chronic WLA: Ce = ((4.6965 + 0.25)2.7 – (0.25 * 0.01)) / 4.6965
Ce = 2.9

Acute WLA: Ce = ((4.6965 + 0.0025)10.1 – (0.0025 * 0.01)) / 4.6965
Ce = 10.1

AML = WLAc = 2.9 mg/L
MDL = WLAa = 10.1 mg/L

April
Chronic WLA: Ce = ((4.6965 + 0.25)2.3 – (0.25 * 0.01)) / 4.6965
Ce = 2.5

Acute WLA: Ce = ((4.6965 + 0.0025)10.1 – (0.0025 * 0.01)) / 4.6965
Ce = 10.1

AML = WLAc = 2.5 mg/L
MDL = WLAa = 10.1 mg/L

May
Chronic WLA: Ce = ((4.6965 + 0.25)1.9 – (0.25 * 0.01)) / 4.6965
Ce = 2

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 2 mg/L
MDL = WLAa = 12.1 mg/L

June
Chronic WLA: Ce = ((4.6965 + 0.25)1.5 – (0.25 * 0.01)) / 4.6965
Ce = 1.6

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 1.6 mg/L
MDL = WLAa = 12.1 mg/L

July
Chronic WLA: Ce = ((4.6965 + 0.25)1.1 – (0.25 * 0.01)) / 4.6965
Ce = 1.2

Acute WLA: Ce = ((4.6965 + 0.0025)10.1 – (0.0025 * 0.01)) / 4.6965
Ce = 10.1

AML = WLAc = 1.2 mg/L
MDL = WLAa = 10.1 mg/L

August
Chronic WLA: Ce = ((4.6965 + 0.25)1.3 – (0.25 * 0.01)) / 4.6965
Ce = 1.4

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 1.4 mg/L
MDL = WLAa = 12.1 mg/L

September
Chronic WLA: Ce = ((4.6965 + 0.25)1.7 – (0.25 * 0.01)) / 4.6965
Ce = 1.8

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 1.8 mg/L
MDL = WLAa = 12.1 mg/L

October
Chronic WLA: Ce = ((4.6965 + 0.25)2.6 – (0.25 * 0.01)) / 4.6965
Ce = 2.7

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 2.7 mg/L
MDL = WLAa = 12.1 mg/L

November
Chronic WLA: Ce = ((4.6965 + 0.25)3.1 – (0.25 * 0.01)) / 4.6965
Ce = 3.3

Acute WLA: Ce = ((4.6965 + 0.0025)12.1 – (0.0025 * 0.01)) / 4.6965
Ce = 12.1

AML = WLAc = 3.3 mg/L
MDL = WLAa = 12.1 mg/L

December
Chronic WLA: Ce = ((4.6965 + 0.25)2.7 – (0.25 * 0.01)) / 4.6965
Ce = 2.9

Acute WLA: Ce = ((4.6965 + 0.0025)10.1 – (0.0025 * 0.01)) / 4.6965
Ce = 10.1

AML = WLAc = 2.9 mg/L
MDL = WLAa = 10.1 mg/L

- **Total Ammonia Nitrogen (Previous Permit Limits): Summer**. The previous operating permit had 3.3 mg/L as a Summer Weekly Average and 1.5 mg/L as a Summer Monthly Average. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL. Therefore, no further Ammonia reductions are required to meet the goal of the TMDL; and the previous operating permit (issued 2019) retained the final effluent limits for Ammonia from the previous permit (2011), as the use designation AQL was restored under these limits.

- **Total Ammonia Nitrogen (Previous Permit Limits): Winter**. The previous operating permit had 8.1 mg/L as a Winter Weekly Average and 2.9 mg/L as a Winter Monthly Average. Brushy Creek (P) (859) is a Category 2A stream and is no longer impaired and fully supports the use designation of AQL. Therefore, no further Ammonia reductions are required to meet the goal of the TMDL; and the previous operating permit (issued 2019) retained the final effluent limits for Ammonia from the previous permit (2011), as the use designation AQL was restored under these limits.

- **Oil & Grease**. During the drafting of this permit, the permit writer reviewed DMR data submitted by the permittee. Additionally, no evidence of an excursion of the water quality standard 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 the water quality standard. 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 water quality standard. Data will be reviewed at renewal to reassess this determination.

- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrate + Nitrite, & Total Nitrogen**. Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite are required per 10 CSR 20-7.015(9)(D)8. Effluent monitoring for Total Nitrogen is required per 10 CSR 20-6.010(8)(B). Total Nitrogen consists of Total Kjeldahl Nitrogen and Nitrate + Nitrite.

- **pH**. 6.0-9.0 SU. The permit writer has made a reasonable potential determination based on the assimilative capacity of the receiving stream that the discharge will not cause or contribute to the excursion of the water quality standard for pH instream. Therefore, effluent limitations as required by 10 CSR 20-7.015 are substituted for the pH water quality criteria of 6.5-9.0 SU.

- **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 BOD_5 and 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 BOD_5 and 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. Downstream water hardness of 335.5 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 instream 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.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Copper	0.960	0.960

✓ **Copper, Total Recoverable**. Protection of Aquatic Life Acute Criteria = 42.029 µg/L, Chronic Criteria = 25.195 µg/L. The hardness value of **335.5 mg/L** represents the 50th percentile (median) for Brushy Creek (P).

Acute AQL: e^(1.0166 * ln335.5 – 3.062490) * (1.136672 – ln335.5 *0.041838) = 42.029 µg/L [at hardness 335.5]
Chronic AQL: e^(0.7977 * ln335.5 – 3.909) * (1.101672 – ln335.5*0.041938) = 25.195 µg/L

TR Conversion: AQL/Translator = 42.029 / 0.96 = 43.78
TR Conversion: AQL/Translator = 25.195 / 0.96 = 26.244

Acute WLA: Ce = ((4.688 cfs + 0.003 cfs) * 43.78 – (0.003 cfs * 0 background)) / 4.688 cfs = 43.808
Chronic WLA: Ce = ((4.688 cfs + 0.025 cfs) * 26.244 – (0.025 cfs * 0 background)) / 4.688 cfs = 26.384

LTAa: WLAa * LTAa multiplier = 43.808 * 0.175 = 7.653 [CV: 1.192, 99th percentile]
LTAc: WLAc * LTAc multiplier = 26.384 * 0.323 = 8.522 [CV: 1.192, 99th percentile]

Use most protective LTA: 7.653

Daily Maximum: MDL = LTA * MDL multiplier = 7.653 * 5.725 = 43.8 µg/L [CV: 1.192, 99th percentile]
Monthly Average: AML = LTA * AML multiplier = 7.653 * 2.127 = 16.3 µg/L [CV: 1.192, 95th percentile, n=4]

Whole Effluent Toxicity

- **Acute Whole Effluent Toxicity**. The permit writer has determined that this facility has reasonable potential to cause toxicity in the receiving stream as the facility reported a TUa >1.

  Acute AQL: 0.3 TUa

  The AEC is (4.688 CFS / (0.0025 CFS +4.688 CFS)) = 100%

  Acute WLA: Ce = ((4.688 CFS + 0.025 cfs) * 0.3 – (0.025 cfs * 0 background)) / 4.688 CFS = 0.3

  LTAa: WLAa * LTAa multiplier = 0.3 * 0.321 = 0.096 [CV: 0.6, 99th percentile]

  Daily Maximum: MDL = LTA * MDL multiplier = 0.096 * 3.114 = 0.3 TU [CV: 0.6, 99th percentile]
  The limit established in this permit is below the detection limit for this test; the compliance value is set at 1.0 TUa.

- **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.

  ✓ Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Class P (with default Mixing Considerations) are 100%, 50%, 25%, 12.5%, & 6.25%.

Sampling Frequency Justification: The Department has determined that previously established sampling and reporting frequency is sufficient to characterize the facility's effluent and be protective of water quality, except that Copper was increased to monthly, as the additional sampling will provide the Department additional data to determine if the discharge is meeting Water Quality Standards and the calculated effluent limits. Monthly sampling is required for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite per 10 CSR 20-7.015(9)(D)8.B. Weekly sampling is required for *E. coli*, per 10 CSR 20-7.015(9)(D)7.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*, and Oil & Grease in accordance with recommended analytical methods. 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.

CHANGES TO INFLUENT MONITORING:

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

* - Monitoring requirement only.
*** - Parameter not previously established in previous state operating permit.
**** - C = Composite
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

Influent Parameters

- **Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (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 BOD_5 and 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, and Nitrite + Nitrate parameters were established to match the required sampling frequency of these parameters in the effluent, per 10 CSR 20-7.015(9)(D)8. Ammonia was set to monthly to match the frequency for influent sampling for Total Phosphorus and Total Kjeldahl Nitrogen, and Nitrite + Nitrate. The sampling and reporting frequencies for influent BOD_5 and TSS have been established to provide the Department adequate data to ensure the facility is meeting the percent removal requirement.

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 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

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 parameter in the effluent.

Sampling Type Justification: For the purposes of instream data collection, and as the downstream 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 June 7 and 8, 2022, 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 effluent limits that are more stringent than 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 III – 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)].

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.

  - **Oil and Grease**. The permit writer conducted a reasonable potential determination using new DMR data. The previous permit had final effluent limits of 15 mg/L as a daily maximum and 10 mg/L as a monthly average. During the drafting of this permit, the permit writer reviewed DMR data submitted by the permittee. Additionally, no evidence of an excursion of the water quality standard 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 the water quality standard. Therefore, the permit writer has made a determination that the discharge does not have the reasonable potential to cause or contribute to an excursion of the standard and has removed the final effluent limits from this permit and added monitoring only requirements. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (new DMR data). This new information justifies the application of a less stringent effluent limitation at the time of permit issuance. Also, the removal of the effluent limit and addition of a monitoring only requirement also meets the requirements of the safety clause, as the revision will not result in a violation of a water quality standard.

  - **Instream Total Phosphorus and Total Nitrogen Monitoring**. The previous permit contained upstream instream monitoring requirements for Total Phosphorus and Total Nitrogen. The Department has made a determination that monitoring of background nutrients is not needed. This permit is still protective of water quality and this determination will be reassessed at the time of renewal.

  - **Total Recoverable Copper**. Effluent limitations were re-calculated for Copper using new DMR data and new stream hardness data. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (new DMR data and new stream hardness data). This new information justifies the application

of a less stringent effluent limitation at the time of permit issuance. Also, the revision of the effluent limit also meets the requirements of the safety clause, as the revision of the effluent limit will not result in a violation of a water quality standard.

- **Total Recoverable Nickel, Zinc, Boron; Chloride + Sulfate, and Fluoride**. A reasonable potential analysis for Nickel, Zinc, Boron, Chloride + Sulfate, and Fluoride was calculated using new DMR data and new instream hardness data. As a result of a Reasonable Potential Analysis, it was determined that there is no reasonable potential to cause an excursion of water quality standards for Nickel, Zinc, Boron, Chloride + Sulfate, and Fluoride in the receiving stream. Please see **Appendix – RPA Results** for more information. These parameters were removed from the permit. This backsliding is justified as there is information available which was not available at the time of the previous permit issuance (new DMR data and new instream hardness data). This new information justifies the removal of the monitoring requirements at the time of permit issuance. Also, the removal of the monitoring requirements also meets the requirements of the safety clause, as the removal of the monitoring requirements will not result in a violation of a water quality standard.

- **Removal of Upstream Permitted Feature SM1 (Nutrient Monitoring)**. The previous permit had Permitted Feature SM1, which contained instream monitoring requirements for Total Phosphorus, Ammonia, Total Kjeldahl Nitrogen, and Nitrate + Nitrite. The Department has made a determination that monitoring of background nutrients is not needed. This permit is still protective of water quality and this determination will be reassessed at the time of renewal. Also, the removal of the permitted feature meets the requirements of the safety clause, as the removal of the permitted feature will not result in a violation of a water quality standard.

o The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b).

- The previous permit indicated "There Shall Be No Discharge of Floating Solids or Visible Foam in Other Than Trace Amounts" under each table. The statement was not evaluated against actual site conditions therefore, this general criteria was re-assessed. It was determined that this facility does not discharge solids or foam in amounts which would indicate reasonable potential, therefore the statement was removed. Each general criteria was assessed for 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 https://dnr.mo.gov/document-search/antidegradation-implementation-procedure.

✓ No degradation was proposed in this permit action 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 when a higher level authority is available by submitting information as part of the application 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 or compost biosolids in accordance with Standard Conditions III and Special Condition #23.

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.

Facility Performance History:

- ✓ The facility is not currently under Water Protection Program enforcement action. This facility was last inspected on June 7 and 8, 2022. The inspection showed the following unsatisfactory features: failure to meet effluent limits, failure to meet 85% removal efficiency for BOD and TSS, failure to submit timely and accurate DMRs, failure to provide operational monitoring records, failure to submit timely 2020 and 2021 Biosolids reports, failure to submit a timely 2021 Acute WET test, failure to perform wastewater testing using an approved method, failure to maintain the flow equalization basin to be free of deep-rooted vegetation, and failure to conduct monthly SWPPP site inspections per the permit.

CONTINUING AUTHORITY:

Each application for an operating permit shall identify the person, as that term is defined in section 644.016(15), RSMo, that is the owner of, operator of, or area-wide management authority for a water contaminant source, point source, wastewater treatment facility, or sewer collection system. This person shall be designated as the continuing authority and shall sign the application. By doing so, the person designated as the continuing authority acknowledges responsibility for compliance with all permit conditions.

10 CSR 20-6.010(2) establishes preferential levels for continuing authorities: Levels 1 through 5 (with Level 1 as the highest level), and generally requires permits to be issued to a higher preference continuing authority if available. A Level 3, 4, or 5 applicant may constitute a continuing authority by showing that Level 1 and Level 2 authorities are not available; do not have jurisdiction; are forbidden by state statute or local ordinance from providing service to the person; or that the Level 3, 4, or 5 applicant has met one of the requirements listed in paragraphs (2)(C)1.–7. of 10 CSR 20-6.010(2). The seven options in paragraphs (2)(C)1.–7. for a lower-level authority to demonstrate that it is the valid continuing authority are:

1. A waiver from the existing higher authority declining the offer to accept management of the additional wastewater or stormwater;
2. A written statement or a demonstration of non-response from the higher authority;
3. A to-scale map showing all parts of the legal boundary of the facility's property are beyond 2000 feet from the collection (sewer) system operated by the higher preference authority;
4. A proposed connection or adoption charge by the higher authority that would equal or exceed what is economically feasible for the applicant, which may be in the range of one hundred twenty percent (120%) of the applicant's cost for constructing or operating a wastewater treatment system;
5. A proposed service fee on the users of the system by the higher authority that is above what is affordable for existing homeowners in that area;
6. Terms for connection or adoption by the higher authority that would require more than two (2) years to achieve full sewer service; or
7. A demonstration that the terms for connection or adoption by the higher authority are not viable or feasible to homeowners in the area.

Permit applicants that are Levels 3, 4, and 5 must, as part of their application, identify their method of compliance with this regulation. The following are the methods to comply.

- o No higher level authorities are available to the facility;

- o No higher level authorities have jurisdiction;

- o Higher level authorities are forbidden by state statute or local ordinance from providing service to the person;

- o The existing higher level authority is available to the facility, however the facility has proposed the use of a lower preference continuing authority and has submitted one of the following as part of their application provided it does not conflict with any area-wide management plan approved under section 208 of the Clean Water Act or by the Missouri Clean Water Commission. (See Fact Sheet Appendix - Continuing Authority for more information on these options):
  - A waiver from the existing higher authority;
  - A written statement or a demonstration of non-response from the higher authority;
  - A to-scale map showing all parts of the legal boundary of the facility's property are beyond 2000 feet from the collection (sewer) system operated by the higher preference authority;

- Documentation that the proposed connection or adoption charge by the higher authority would equal or exceed what is economically feasible for the applicant, which may be in the range of one hundred twenty percent (120%) of the applicant's cost for constructing or operating a wastewater treatment system;
- Documentation that the proposed service fee on the users of the system by the higher authority is above what is affordable for existing homeowners in that area;
- Documentation that the terms for connection or adoption by the higher authority would require more than two (2) years to achieve full sewer service;
- A demonstration that the terms for connection or adoption by the higher authority are not viable or feasible to homeowners in the area;

✓ The continuing authority listed on the application is a municipality, and therefore a Level 3 Authority. There is no approved Clean Water Act Section 208 plan in Pettis County. The applicant has shown that:

- A higher level authority is not available to the facility;

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 can be provided upon request to the Department.

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: https://dnr.mo.gov/document-search/electronic-discharge-monitoring-report-waiver-request-form-mo-780-2692. 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.

OPERATOR CERTIFICATION REQUIREMENTS:

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 with population equivalents greater than 200 and are owned or operated by or for municipalities, public sewer districts, counties, public water supply districts, private sewer companies regulated by the Public Service Commission and state or federal agencies.

✓ This facility is required to have a certified operator as it has a population equivalent greater than 200 and is owned or operated by or for a municipality, public sewer district, county, public water supply district, private sewer company regulated by the PSC, state or federal agency.

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: James C. Barb
Certification Number: 5684
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.

OPERATIONAL CONTROL TESTING:
Missouri Clean Water Commission regulation 10 CSR 20-9.010 requires certain publicly 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 publicly owned treatment works and privately owned facilities regulated by the Public Service Commission has a calculated 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.
  - o 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)
Temperature – Mixed Liquor (sample contact and reaeration basins for contact stabilization)	Daily (M-F)
pH – Anaerobic Digester	Daily (M-F)
Temperature –Anaerobic Digester	Daily (M-F)

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.

REASONABLE POTENTIAL (RP):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] and State Regulation [10 CSR 20-7.015(9)(A)2] 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.

A reasonable potential analysis (RPA) is a numeric RP decision calculated using effluent data provided by the facility for parameters that have a numeric Water Quality Standard (WQS).

Reasonable potential determinations (RPD) are based on physical conditions of the site as provided in Sections 3.1.2, 3.1.3, and 3.2 of the TSD using best professional judgement. An RPD consists of evaluating visual observations for compliance with narrative criteria, non-numeric information, or small amounts of numerical data (such as 3 data points supplied in the application). Narrative criteria with RP typically translate to a numeric WQS, so a parameter's establishment being based on narrative criteria does not necessarily make the decision an RPD vs RP—how the data is collected does, however. When insufficient data is received to make a determination on RP based on numeric effluent data, the RPD decisions are based on best professional judgment considering the sources of influent wastewater, type of treatment, and historical overall management of the site.

- ✓ An RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS.**
- ✓ A RPD was made for Oil & Grease, that a potential to violate water quality standards does not exist. Please see Derivation and Discussion of Limits.
- ✓ A RPD was made for Acute Whole Effluent Toxicity, that a potential to violate water quality standards exists. Please see Derivation and Discussion of Limits.

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 https://dnr.mo.gov/document-search/capacity-management-operations-maintenance-plan-editable-template. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at https://dnr.mo.gov/print/document-search/pub2574. 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.

✓ 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 https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/wastewater/construction-engineering.

✓ The permittee does not have a Department approved Sewer Extension Authority Supervised Program.

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 June 2015], 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 (https://dnr.mo.gov/document-search/antidegradation-implementation-procedure).

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: https://dnr.mo.gov/forms-applications.

- ✓ 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 (https://dnr.mo.gov/document-search/form-b2-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-more-100000-gallons-day-mo-780-1805) 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/document-search/no-exposure-certification-exclusion-npdes-stormwater-permitting-under-missouri-clean-water-law-mo-780-2828) to the Department's Water Protection Program, Operating Permits Section. Upon receipt 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:

✓ 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.
  - o The permittee has met the criteria as established in 40 CFR 122.41(m)(4)(i)(A), (B), and (C).

Part IV – 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 publicly-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 Sedalia

New Permit Requirements			
Sedalia SE WWTP – Monthly sampling for Total Hardness instream Sedalia North WWTP – Monthly sampling for Oil & Grease, Total Recoverable Copper, and Total Recoverable Cadmium Sedalia Central WWTP – Monthly sampling for Total Hardness instream and monthly sampling for Total Recoverable Copper			
Estimated Annual Cost	Annual Median Household Income (MHI)	Estimated Monthly User Rate	User Rate as a Percent of MHI
$456	$48,047	$48.29	1.21%

Part V – 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 does not contain requirements for a water quality standard that has changed twenty-five percent or more since the previous operating permit.

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 August 4, 2023 to September 4, 2023. No responses received.

DATE OF FACT SHEET: OCTOBER 4, 2023

COMPLETED BY:

BRANT FARRIS, ENVIRONMENTAL PROGRAM SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT
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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
Design Flow (avg. day) or peak month's flow (avg. day) whichever is larger	1 pt. / MGD or major fraction thereof. (Max 10 pts.)	3
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, lake or reservoir area supporting whole body contact recreation	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	3
Flow equalization	5	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	
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	12
Carbon regeneration	4	
Total from page **ONE (1)**	----	58

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Solids Handling		
Sludge Holding	5	5
Anaerobic digestion	10	10
Aerobic digestion	6	
Evaporative sludge drying	2	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)**	----	42
Total from page **ONE (1)**	---	58
Grand Total	---	100

☒ - 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 N – Summer (mg/L)	12.1	276.31	1.3	262.48	24.00	50.3/0.13	1.87	5.50	YES
Ammonia as N – Winter (mg/L)	10.1	181.62	2.7	172.53	21.00	42.2/0.17	1.29	4.31	YES
Copper, Total Recoverable (µg/L)	43.78	151.11	26.24	150.40	16	32/1.4	1.19	4.7	Yes
Nickel, Total Recoverable (µg/L)	1307.23	57.51	145.24	57.24	16	30/7	0.41	1.9	No
Zinc, Total Recoverable (µg/L)	334.83	215.86	332.11	214.85	16	105/6	0.46	2.1	No
Boron, Total Recoverable (µg/L)	n/a	1210.01	2000	1204.37	15	660/172	0.37	1.8	No
Chloride + Sulfate (mg/L)	1000	808.20	n/a	808.63	14	531.1/237.9	0.24	1.5	No
Fluoride (mg/L)	n/a	2.00	4	1.99	14	1.23/0.37	0.29	1.6	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 – Non-Detect Example Calculations:

Example: Permittee has four samples for Pollutant X which has a method minimum level of 5 mg/L and is to report a Daily Maximum and Monthly Average.

Week 1 = 11.4 mg/L
Week 2 = Non-Detect or <5.0 mg/L
Week 3 = 7.1 mg/L
Week 4 = Non-Detect or <5.0 mg/L

For this example, use subpart (h) - For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

11.4 + 0 + 7.1 + 0 = 18.5 ÷ 4 (number of samples) = 4.63 mg/L.

The Permittee reports a Monthly Average of 4.63 mg/L and a Daily maximum of 11.4 mg/L (Note the < symbol was dropped in the answers).

Example: Permittee has five samples for Pollutant Y that has a method minimum level of 9 µg/L and is to report a Daily Maximum and Monthly Average.

Day 1 = Non-Detect or <9.0 µg/L
Day 2 = Non-Detect or <9.0 µg/L
Day 3 = Non-Detect or <9.0 µg/L
Day 4 = Non-Detect or <9.0 µg/L
Day 5 = Non-Detect or <9.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(9 +9 +9 +9 +9) ÷ 5 (number of samples) = <9 µg/L.

The Permittee reports a Monthly Average of <9.0 µg/L (retain the 'less than' symbol) and a Daily Maximum of <9.0 µg/L.

Example: Permittee has four samples for Pollutant Z where the first two tests were conducted using a method with a method minimum level of 4 µg/L and the remaining two tests were conducted using a different method that has a method minimum level of <6 µg/L and is to report a Monthly Average and a Weekly Average.

Week 1 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <4.0 µg/L
Week 3 = Non-Detect or <6.0 µg/L
Week 4 = Non-Detect or <6.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(4 + 4 + 6 + 6) ÷ 4 (number of samples) = <5 µg/L. (Monthly)

The facility reports a Monthly Average of <5.0 µg/L and a Weekly Average of <6.0 µg/L.

APPENDIX – Non-Detect Example Calculations (Continued):

Example: Permittee has five samples for Pollutant Z where the first two tests were conducted using a method with a method minimum level of 4 µg/L and the remaining three tests were conducted using a different method that has a method minimum level of <6 µg/L and is to report a Monthly Average and a Weekly Average.

Week 1 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <4.0 µg/L
Week 2 = Non-Detect or <6.0 µg/L
Week 3 = Non-Detect or <6.0 µg/L
Week 4 = Non-Detect or <6.0 µg/L

For this example, use subpart (g) - For reporting an average based on all non-detected values, remove the "<" sign from the values, average the values, and then add the "<" symbol back to the resulting average.

(4 + 4 + 6 + 6 + 6) ÷ 5 (number of samples) = <5.2 µg/L. (Monthly)
(4 + 6) ÷ 2 (number of samples) = <5 µg/L. (Week 2)

The facility reports a Monthly Average of <5.2 µg/L and a Weekly Average of <6.0 µg/L (report highest Weekly Average value)

Example: Permittee has four samples for Pollutant Z where the tests were conducted using a method with a method minimum level of 10 µg/L and is to report a Monthly Average and Daily Maximum. The permit lists that Pollutant Z has a Department determined Minimum Quantification Level (ML) of 130 µg/L.

Week 1 = 12 µg/L
Week 2 = 52 µg/L
Week 3 = Non-Detect or <10 µg/L
Week 4 = 133 µg/L

For this example, use subpart (h) - For reporting an average based on a mix of detected and non-detected values (not including *E. coli*), assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

For this example, (12 + 52 + 0 + 133) ÷ 4 (number of samples) = 197 ÷ 4 = 49.3 µg/L.

The facility reports a Monthly Average of 49.3 µg/L and a Daily Maximum of 133 µg/L.

Example: Permittee has five samples for *E. coli* which has a method minimum level of 1 #/100mL and is to report a Weekly Average (seven (7) day geometric mean) and a Monthly Average (thirty (30) day geometric mean).

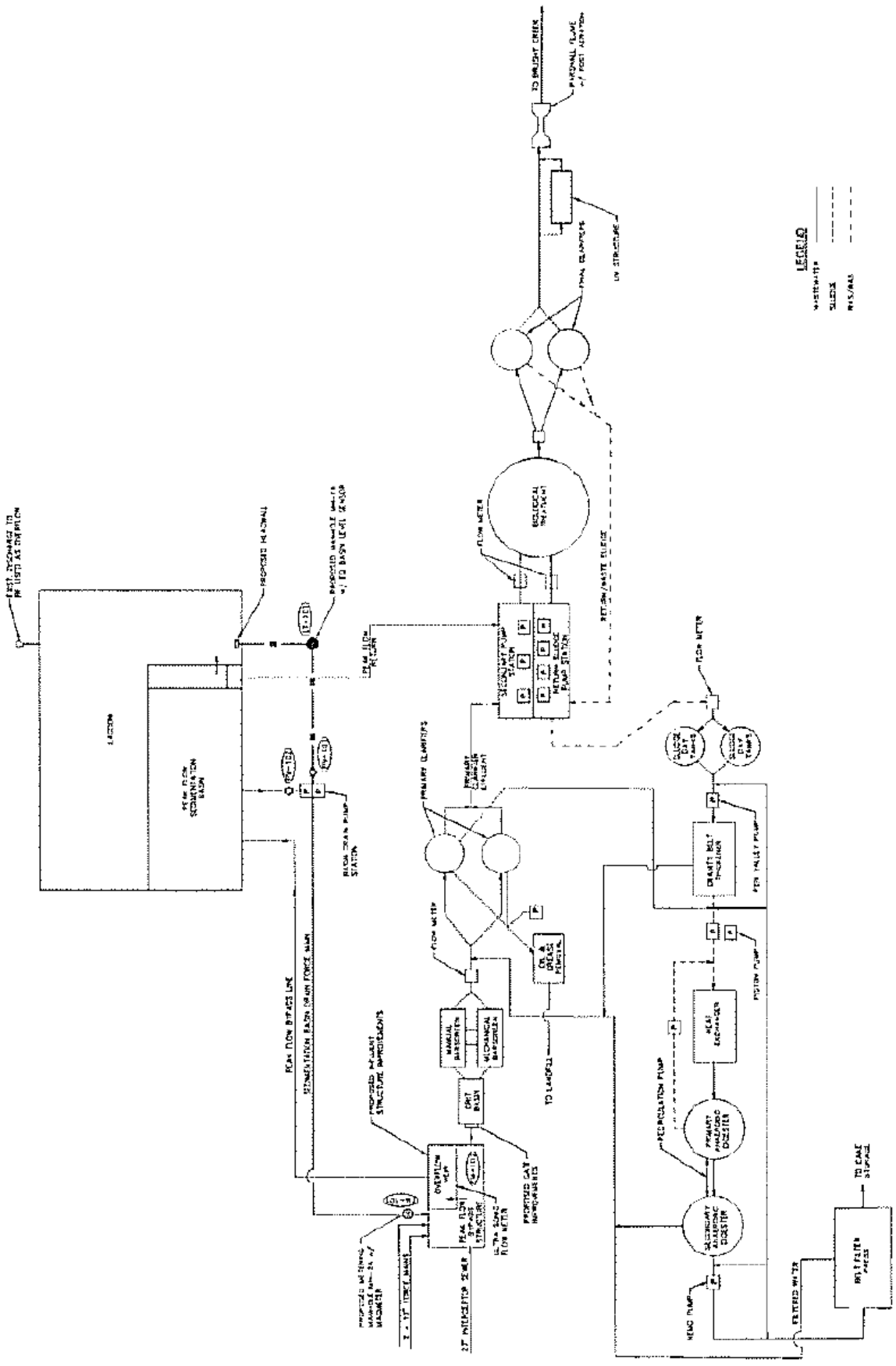
Week 1 = 102 #/100mL
Week 2 (Monday) = 400 #/100mL
Week 2 (Friday) = Non-Detect or <1 #/100mL
Week 3 = 15 #/100mL
Week 4 = Non-Detect or <1 #/100mL

For this example, use subpart (i) - When E. coli is not detected above the method minimum level, the permittee must report the data qualifier signifying less than detection limit for that parameter (e.g., <1 #/100mL, if the method minimum level is 1 #/100mL). For reporting a geometric mean based on a mix of detected and non-detected values, use one-half of the detection limit (instead of zero) for non-detects when calculating geometric means. 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.

The Monthly Average (30 day Geometric Mean) = 5th root of (102)(400)(0.5)(15)(0.5) = 5th root of 153,000 = 10.9 #/100mL.
The 7 day Geometric Mean = 2nd root of (400)(0.5) = 2nd root of 200 = 14.1 #/100mL. (Week 2)

The Permittee reports a Monthly Average (30 day Geometric Mean) of 10.9 #/100mL and a Weekly Average (7 day geometric mean) of 102 #/100mL (report highest Weekly Average value)

APPENDIX – PROCESS FLOW DIAGRAM:



APPENDIX – COST ANALYSIS FOR COMPLIANCE:

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

Sedalia Central WWTP, Permit Renewal
City of Sedalia
Missouri State Operating Permit #MO-0023019

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

The permit requires compliance with new monthly monitoring requirements for Total Recoverable Copper at Outfall #001 and Total Hardness at Permitted Feature SM2.

Connections
The number of connections for the Sedalia North WWTP, Sedalia Central WWTP, and the Sedalia SE WWTP were reported by the permittee on the permit renewal applications.

Connection Type	Number
Residential	8,993
Commercial	1,331
Industrial	12
Total	**10,336**

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 (https://dnr.mo.gov/document-search/financial-questionnaire-mo-780-2511) 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. Though the Department has made attempts to gather financial information from the City of Sedalia; no information has been provided. The Department has relied heavily on readily available data to complete this analysis. 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 Sedalia	
Current Monthly User Rates per 5,000 gallons*	$48.28
Median Household Income (MHI)[1]	$48,047
Current Annual Operating Costs (excludes depreciation)	$5,308,228

*User Rates were obtained from the City of Sedalia's November 14, 2022 Ordinances Appendix A – City Fee Schedule.
§ Current annual operating costs were obtained from the City of Sedalia Audited Financial Statements dated March 31, 2022.

(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
Total Hardness - Instream	Monthly¥	$22 x 8	$176
Total Recoverable Copper	Monthly¥	$22 x 8	$176
Total metal concentration analysis	Monthly¥	$13 x 8	$104
Total Estimated Annual Cost of New Permit Requirements			$456

¥ - previously quarterly

Criterion 2B Table. Estimated Costs for New Permit Requirements		
(1)	Estimated Annual Cost	$456
(2)	Estimated Monthly User Cost for New Requirements [2]	$0.00
	Estimated Monthly User Cost for New Requirements as a Percent of MHI [3]	0.000%
	Estimated Monthly User Cost for New Requirements for Sedalia North WWTP	$0.01
	Estimated Monthly User Cost for New Requirements for Sedalia SE WWTP	$0.00
(3)	Total Monthly User Cost*	$48.29
	Total Monthly User Cost as a Percent of MHI [4]	1.21%

* 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.

Metals Limits
Metals dissolve in water and are easily absorbed by fish and other aquatic organisms. Small concentrations can be toxic because metals undergo bioconcentration, which means that their concentration in an organism is higher than in water. Metal toxicity produces adverse biological effects on an organism's survival, activity, growth, metabolism, or reproduction. Metals can be lethal or harm the organism without killing it directly. Adverse effects on an organism's activity, growth, metabolism, and reproduction are examples of sub-lethal effects.

In order for a metal to be toxic, it needs to enter the body of the exposed organism and interact with the surface or interior of cells. The pathways by which this happens includes diffusion into the bloodstream via the gills and skin, as fish become exposed by drinking water or eating sediments contaminated with the metal, or eating other animals or plants that became exposed to the metal. Humans become exposed to metals via analogous pathways: diffusion into the bloodstream via the lungs and skin, drinking contaminated water, and eating contaminated food.

The effluent limits for metals have been added to the permit to protect 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.

(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 this 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 Sedalia

No.	Administrative Unit	Sedalia City	Missouri State	United States
1	Population (2021)	21,696	6,141,534	329,725,481
2	Percent Change in Population (2000-2021)	6.7%	9.8%	17.2%
3	2021 Median Household Income (in 2022 Dollars)	$48,047	$65,928	$74,545
4	Percent Change in Median Household Income (2000-2021)	-4.5%	-1.1%	1.1%
5	Median Age (2021)	36.2	38.8	38.4
6	Change in Median Age in Years (2000-2021)	0.4	2.7	3.1
7	Unemployment Rate (2021)	6.1%	4.5%	5.5%
8	Percent of Population Below Poverty Level (2021)	18.0%	12.8%	12.6%
9	Percent of Household Received Food Stamps (2021)	13.6%	10.1%	11.4%
10	(Primary) County Where the Community Is Located	Pettis 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 Sedalia 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

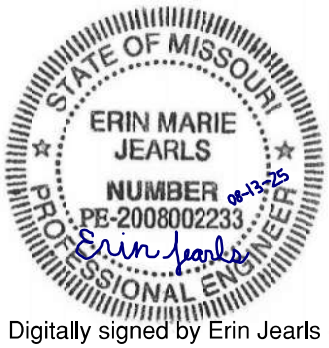
1. (A) 2021 MHI in 2021 Dollar: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2021 Inflation-Adjusted Dollars). https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2021.B19013.
   (B) 2000 MHI in 1999 Dollar: (1) For United States, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-1 Part 1. United States Summary, Table 5. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) For Missouri State, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-27, Missouri, Table 10. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (C) 2022 CPI, 2021 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2022) Consumer Price Index - All Urban Consumers, U.S. City Average. All Items. 1982-84=100 (unadjusted) - CUUR0000SAO. https://data.bls.gov/cgi-bin/surveymost?bls.
   (D) 2021 MHI in 2022 Dollar = 2021 MHI in 2021 Dollar x 2022 CPI /2021 CPI; 2000 MHI in 2021 Dollar = 2000 MHI in 1999 Dollar x 2022 CPI /1999 CPI.
   (E) Percent Change in Median Household Income (2000-2021) = (2021 MHI in 2022 Dollar - 2000 MHI in 2022 Dollar) / (2000 MHI in 2022 Dollar).
2. ($456/10,336)/12 = $0.00 (Estimated Monthly User Cost for New Requirements)
3. ($0.00/($48,047/12))100% = 0.000% (New Sampling Only)
4. ($48.29/($48,047/12))100% = 1.21% (Total User Cost)
5. (A) Total Population in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2021.B01003.
   (B) 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. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) 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. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Percent Change in Population (2000-2021) = (Total Population in 2021 - Total Population in 2000) / (Total Population in 2000).
6. Median Age in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2021.B01002.
   (B) 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/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) 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. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Change in Median Age in Years (2000-2021) = (Median Age in 2021 - Median Age in 2000).
7. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, S2301: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. https://data.census.gov/cedsci/table?q=unemployment&tid=ACSST5Y2021.S2301.
8. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2021.S1701.
9. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S2201: Food Stamps/Supplemental Nutrition Assistance Program (SNAP) - Universe: Households. https://data.census.gov/cedsci/table?q=S2201&tid=ACSST5Y2021.S22

APPENDIX B - ANTIDEGRADATION REPORT

Antidegradation Review

City of Sedalia
Sedalia Central WWTP
HDR Project Number 10399730

August 2025



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1 Introduction

The City of Sedalia, Missouri (City) has three wastewater treatment plants (WWTPs), the North WWTP (MO-0023027), Central WWTP (MO-0023019), and Southwest WWTP (MO-0101567). As documented in the City's Abatement Order on Consent (AOC, 2024-WPCB-1873), both the North and Central WWTPs have performance-related issues requiring significant upgrades to remain functional and in compliance.

The North WWTP was originally constructed in 1946 and was upgraded in 1964 to a trickling filter plant. The plant is rated for 2.5 MGD and currently treats an average daily flow of 0.9 MGD. The north service area has a significant number of industrial and commercial users. The North WWTP discharges into Pearl River (also known as Sewer Branch), which is a Class C waterbody. The Pearl River is not Clean Water Act (CWA) 303(d) impaired and is not subject to a Total Maximum Daily Load (TMDL).

The Central WWTP was originally constructed as a trickling filter plant but was upgraded to an activated sludge facility in 2001. The plant is rated at 3.03 MGD and currently treats an average day flow of 1.9 MGD. The Central WWTP discharges into Brushy Creek, which is a Class P waterbody. A TMDL was completed for Brushy Creek in 2002 for low dissolved oxygen with the following pollutants of concern: biochemical oxygen demand (BOD), ammonia, and total suspended solids (TSS). However, the current National Pollutant Discharge Elimination System (NPDES) permit for the Central WWTP (expires October 31, 2028) states that Brushy Creek is no longer impaired and fully supports the use designation of aquatic life.

The City determined the most cost-effective solution for addressing its wastewater needs is to consolidate the North and Central WWTPs into a single facility at the existing Central WWTP site. Therefore, the City is proposing to decommission the North WWTP and upgrade and expand the Central WWTP to a design flow of 4.0 MGD. The proposed design flow of 4.0 MGD reflects the current demand while maintaining capacity for development in the area.

To support this approach, MoDNR's TMDL and Modeling Unit developed a QUAL2K model to identify effluent pollutant concentrations for the Central WWTP that are protective of Missouri's minimum DO criterion of 5.0 mg/L at the expanded design flow. Results of the modeling effort are summarized in MDNR's April 11, 2025 memorandum titled, "QUAL2K effluent targets for Sedalia Central Wastewater Treatment Plant" (hereinafter referred to as the "QUAL2K memorandum").

2 Antidegradation Approach

Antidegradation reviews are required for all new or expanded discharges to evaluate the impacts on water quality and designated beneficial uses. The purpose of an antidegradation review is to prevent any lowering of water quality unless it is necessary to support important socio-economic growth in the service area. Per Missouri's 2016 Antidegradation Implementation Procedures (AIP), antidegradation reviews are typically conducted on a pollutant-by-pollutant basis following one of three pathways:

- Tier 1 Review – Tier 1 reviews generally apply to pollutants that are 303(d) impaired. For Tier 1 pollutants, the only requirement is that the expanded facility does not cause or contribute to the impairment.
- Tier 2 Analysis of Alternatives – The core of a Tier 2 review consists of an analysis of alternatives, which is a structured evaluation of the feasibility of no-discharge options, non-degrading discharge alternatives, technological options that protect the beneficial uses (base case), and less degrading technology options beyond base case.
- Tier 2 Insignificant – New and expanding facilities are exempt from the alternatives analysis if the new discharge does not result in significant degradation.

The proposed expansion of the Central WWTP is insignificant as demonstrated in Section 4. However, an analysis of alternatives and demonstration of social and economic importance will also be provided in Sections 5 and 6 to demonstrate that the proposed treatment technology is both necessary and important.

3 Pollutants of Concern

Missouri's AIP defines pollutants of concern (POC) as "discharged pollutants, or pollutants proposed for discharge that effect beneficial uses in waters of the state." For the purposes of this antidegradation review, the following POCs were identified based on their presence in the existing permits for both the Central and North WWTPs:

- Biological oxygen demand (BOD_5)
- Total suspended solids (TSS)
- Dissolved oxygen (DO)
- pH
- Ammonia
- Total phosphorus (TP)
- Total nitrogen (TN) including nitrite + nitrate and total Kjeldahl nitrogen (TKN)
- *Escherichia coli (E. coli)*
- Oil & grease
- Cadmium and Copper

4 Demonstration of Insignficance

The proposed expansion of the Central WWTP to accommodate the consolidation of the North and Central WWTPs is insignificant based on two criteria outlined in Missouri's 2016 AIP. First, consolidating the two facilities represents a non-degrading pollution control measure as the Central WWTP is effectively serving as a regional wastewater collection and treatment system. Discharging to a regional wastewater collection and treatment system is explicitly identified in the AIP as an example of a non- or less-degrading pollution control measure. Environmental benefits of regionalizing the treatment systems are summarized below:

- The total design flow for the two individual facilities is 5.53 MGD exceeds the proposed design flow of 4.0 MGD for the expanded Central WWTP. This will result in an overall net reduction in the permitted pollutant loading to the environment.
- Decommissioning the North WWTP will reduce the pollutant load to Sewer Branch (also known as Pearl River).
- The regionalized WWTP will have a better effluent quality than either the existing North or Central WWTPs.

In addition to the consolidation benefits, the proposed expansion of the Central WWTP is considered insignificant per the AIP as it will "not result in an increase in the ambient water quality concentration of the receiving water after mixing." Brushy Creek is effluent dominated with a 7Q10 critical low flow of just 0.1 cfs. As effluent quality at the expanded Central WWTP will either remain the same or improve, pollutant concentrations in Brushy Creek will not increase, resulting in no degradation.

5 Analysis of Alternatives

40 CFR 131.12 ensures that states will only make a finding that lowering water quality is necessary after conducting an analysis of alternatives that evaluates a range of non-degrading and minimally degrading practicable alternatives that have potential to prevent or minimize the degradation associated with the proposed activity.[1] For purposes of conducting an analysis of alternatives (i.e., demonstration of necessity), CWA Section 131.3(n) defines "practicable" to mean "technologically possible, able to be put into practice, and economically viable." Per Missouri's AIP, as "a non-binding rule-of-thumb, alternatives less than 120 percent of the base cost of pollution control measures are economically efficient" (i.e., "economically viable").

[1] EPA. 80 Fed. Reg. 51048 (August 21, 2015)

5.1 Base Case Effluent Limits

Although "base case effluent limits" are not explicitly discussed in the AIP, they reflect the AIP's definition of "base cost of pollution control," which is "the cost of controls required to protect existing uses and achieve the highest statutory and regulatory requirements, i.e., the more stringent of water quality-based effluent limits for existing use protection or technology-based effluent limits." For purposes of this antidegradation review, base case effluent limits were estimated from current permit limits at the Central WWTP, recommendations in the QUAL2K memorandum[2], and water quality-based effluent limit (WQBEL) calculations for select parameters (Table 1). In general, the base case effluent limits were estimated as the most stringent of these three sets of limits. Specific considerations for individual POCs are summarized below.

5.1.1 Biological oxygen demand (BOD_5)

The recommended BOD_5 limits in the QUAL2K memorandum are less stringent than those in the current permit for the Central WWTP. Therefore, the BOD_5 base case effluent limits were set equal to the existing average monthly limits (AML) and average weekly limits (AWL).

5.1.2 Total suspended solids (TSS)

The recommended AML for TSS in the QUAL2K memorandum is more stringent than the current permit for the Central WWTP for the months of May through October. Therefore, the TSS base case AML was set equal to the QUAL2K recommendation for the period of May through October. All other TSS base case limits, including the maximum daily limit (MDL) and AML for the winter period, were set equal to existing permit limits.

5.1.3 Dissolved oxygen (DO)

Per recommendations in the QUAL2K memorandum, the base case effluent limit for DO was set to a minimum of 6.0 mg/L. However, it should be noted that DO itself is not a pollutant. Low or extremely high levels of DO can be detrimental to aquatic ecosystems and are often associated with pollutants such as BOD or ammonia.

5.1.4 pH

The pH limits are not anticipated to change with the expanded design flow. Therefore, base case pH limits are based on the existing permit.

5.1.5 Ammonia

Base case ammonia limits were set to the most limiting of the following:

- Current permit limits – Current permit limits were derived from the existing toxicity-based ammonia criteria using EPA's "Technical Support Document for

[2] Recommended effluent limitations in the QUAL2K memorandum are only applicable for the months of May through October.

Water Quality-based Toxics Control" (TSD, EPA/505/2-90-001). MoDNR no longer uses the TSD methodology to derive ammonia limits; however, existing limits may still be applicable due to CWA anti-backsliding provisions.

- QUAL2K memorandum – The recommended ammonia limits in the QUAL2K memorandum are intended to protect the instream DO minimum criterion of 5.0 mg/L during the months of May through October.
- WQBELs – The WQBELs for ammonia were derived based on the existing ammonia criteria using MoDNR's "2020 Total Ammonia Nitrogen Criteria Implementation Guidance."

The City understands the base case ammonia limits are not fully protective of the U.S. Environmental Protection Agency's (EPA) 2013 ammonia criteria recommendations, which will likely be adopted by MoDNR within the next few years. Until EPA's 2013 ammonia criteria recommendations are adopted in rule, base case effluent limits shall be derived from the current applicable water quality criteria. Although the base case effluent limits do not reflect EPA's 2013 ammonia criteria recommendations, all the alternatives presented within this report will be capable of achieving the future ammonia effluent limits based on EPA's 2013 recommendations.

5.1.6 Total phosphorus (TP)

The base case phosphorus limit at the Central WWTP is driven by both the QUAL2K memorandum and effluent regulations at 10 CSR 20-7(B)2.A. Both the QUAL2K memorandum and effluent regulations include a TP limit of 1.0 mg/L. Although the QUAL2K memo suggests the TP limit be expressed as an AML (1.0 mg/L) and MDL (1.5 mg/L), MoDNR typically expresses nutrient limits as an annual average to account for the practical difficulties in controlling nutrient discharges on a daily or monthly basis. Additionally, the QUAL2K memorandum states the "assumed TP limits were incorporated into the model for consistency with TP effluent regulations at 10 CSR 20-7.015(B)2.A," which expresses TP limits as an annual average.

5.1.7 Total nitrogen (TN)

Although TN and other forms of nitrogen including nitrite + nitrate and TKN were identified as POCs based on monitoring requirements within the Central WWTP permit, effluent limitations are not anticipated at this time as there are currently no regulatory drivers.

5.1.8 *Escherichia coli* (*E. coli*)

Base case effluent limits for *E. coli* are based on the existing permit requirements, which include protections for whole body contact recreation (Category B) in Brushy Creek.

5.1.9 Oil & grease

The current Central WWTP permit has monitoring only requirements for oil & grease based on a reasonable potential determination (RPD). For purposes of conducting the analysis of alternatives, base case oil & grease limits were set at 15 mg/L as a MDL and

10 mg/L as an AML. These limits are recognized as proper for protecting the narrative criteria established in 10 CSR 20-7.013(4)(B).

5.1.10 Cadmium

Although cadmium is not included in the existing Central WWTP permit, cadmium limits are included in the North WWTP permit. Base case effluent limits for cadmium were estimated based on hardness and mixing assumptions in the current Central WWTP permit at the expanded design flow using EPA's TSD methodology. It should be noted that conventional wastewater treatment plants are not designed to remove cadmium, which is typically best addressed through pretreatment programs.

5.1.11 Copper

Copper limits were recalculated based on the expanded design flow using the same mixing and hardness assumptions in the current Central WWTP permit. The proposed increase in design flow had no impact on the limits; therefore, base case effluent limits for copper are equal to the existing permit requirements. It should be noted that conventional wastewater treatment plants are not designed to remove copper, which is typically best addressed through pretreatment programs.

Table 1. Base Case Effluent Limits

Pollutant	Units	Current Permit		QUAL2K Memo		WQBEL		Base Case	
		MDL/AWL	AML	MDL/AWL	AML	MDL/AWL	AML	MDL/AWL	AML
BOD_5 (May-Oct)	mg/L	10 (AWL)	10	15	10	--	--	10 (AWL)	10
BOD_5 (Nov-Apr)	mg/L	20 (AWL)	20	--	--	--	--	20 (AWL)	20
TSS (May-Oct)	mg/L	35	30	35	20	--	--	35	20
TSS (Nov-Apr)	mg/L	35	30	--	--	--	--	35	30
DO	mg/L	--	--	6.0 (min)		--	--	6.0 (min)	
pH	SU	6.0 – 9.0		--	--	--	--	6.0 – 9.0	
E. coli	#/100mL	1,030	206	--	--	--	--	1,030	206
Ammonia (Jan)	mg/L	8.1	2.9	--	--	12.1	3.4	8.1	2.9
Ammonia (Feb)	mg/L	8.1	2.9	--	--	10.1	2.9	8.1	2.9
Ammonia (Mar)	mg/L	8.1	2.9	--	--	10.1	2.9	8.1	2.9
Ammonia (Apr)	mg/L	3.3	1.5	--	--	10.1	2.5	3.3	1.5
Ammonia (May)	mg/L	3.3	1.5	3.0	1.5	12.1	2.1	3.0	1.5
Ammonia (Jun)	mg/L	3.3	1.5	3.0	1.5	12.1	1.6	3.0	1.5
Ammonia (Jul)	mg/L	3.3	1.2	3.0	1.5	10.1	1.2	3.0	1.2
Ammonia (Aug)	mg/L	3.3	1.4	3.0	1.5	12.1	1.4	3.0	1.4
Ammonia (Sep)	mg/L	3.3	1.5	3.0	1.5	12.1	1.8	3.0	1.5
Ammonia (Oct)	mg/L	8.1	2.7	3.0	1.5	12.1	2.7	3.0	1.5
Ammonia (Nov)	mg/L	8.1	2.9	--	--	12.1	3.4	8.1	2.9
Ammonia (Dec)	mg/L	8.1	2.9	--	--	10.1	2.9	8.1	2.9
TP	mg/L	--	--	1.5	1.0	--	--	1.0 (annual average)	
Oil & Grease	mg/L	--	--	--	--	15	10	15	10
Cadmium	µg/L	--	--	--	--	3.2	1.0	3.2	1.0
Copper	µg/L	43.8	16.3	--	--	43.8	16.3	43.8	16.3

5.2 Treatment Alternatives

In addition to the proposed treatment alternative (i.e., base case), two less degrading treatment alternatives were evaluated along with one non-degrading alternative as summarized below. All alternatives are capable of meeting or exceeding base case limits shown in Section 5.1.

5.2.1 Alternative #1 (Base Case) – Central WWTP Expansion

The base case includes expanding the total capacity of the existing Central WWTP to accommodate a combined 4 MGD of average day flow from the North and Central Service Areas. The project will include a new North Screening & Pump Station system, which will convey North Service Area wastewater directly to the Central WWTP Secondary Pump Station. The Central WWTP improvements will include adding a second Aeration Basin, a third Secondary Clarifier and expanding the existing UV disinfection process. A new effluent reaeration structure is required to meet the projected effluent DO requirement. A new dewatering building will be constructed to provide permanent sludge processing capacity. The estimated total net present value (NPV) of Alternative #1 is $98 million.

5.2.2 Alternative #2 (Less Degrading) – Central WWTP Expansion with Tertiary Filtration

Alternative No. 2 includes the addition of a tertiary filtration process that will improve the effluent quality with respect to BOD, TSS, and TP beyond what is required for the proposed permit limits. This includes the construction of a new secondary effluent pumping station due to limited hydraulic gradient between the existing clarification and disinfection processes. The new filtration process would consist of two pre-manufactured disk filtration assemblies housed in a new process building with electrical room. Due to site constraints, this new process may require working within the floodplain. All improvements associated with the base case would also be included. The estimated NPV of Alternative #2 is $114 million.

5.2.3 Alternative #3 (Less Degrading) – Membrane Bioreactor Facility

Alternative No. 3 includes the addition of a membrane bioreactor (MBR) to the Central WWTP to provide effluent that is very low in BOD and TSS. This includes the construction of a new MBR tank containing membrane cassettes, as well as a new process building to house permeate pumps, clean-in-place chemical feed equipment, MBR blowers, and process controls equipment. Due to the sensitivity of the membranes to grit and particulate, a new combined headworks facility is also required to provide fine screening and grit removal. Most improvements associated with the base case would be included, excluding the third Secondary Clarifier, and requiring a reduced design volume for the new Aeration Basin. The estimated NPV of Alternative #3 is $137.

5.2.4 Alternative #4 (Non-Degrading) – Effluent Irrigation

Effluent irrigation was evaluated to determine whether it represented a feasible non-degrading alternative to the proposed expansion. Effluent irrigation can be achieved by applying treated effluent to farmland and other agricultural areas. The effluent that is used for irrigation purposes must meet minimum secondary treatment standards prior to application. For this alternative, it is assumed average daily flows above the existing rated capacity would be directed to an irrigation system. Since the proposed Central WWTP would increase the average daily rated flow from 3.03 MGD to 4.0 MGD, the effluent irrigation system would be sized to convey an average daily flow of 0.97 MGD.

According to 10 CSR 20-8.200, application rates of irrigated WWTF effluent can be as high as 24-inches per area of land but may be limited by values determined in soils report and loading design. Due to the unknown locations of potential irrigation, a conservative irrigation application rate of half of the 24-inch application guideline (12-inch) was used.

Some of the limitations associated with effluent irrigation are as follows:

- Adverse soil conditions, topography, permeability, and land use will increase the land area needed for irrigation.
- Specific soil uptake rates of nutrients should not be exceeded; otherwise, irrigation water runoff can lead to nutrients being discharged to nearby water bodies.
- Land availability in proximity to the Central WWTP.

An average daily effluent flow of 0.97 MGD results in a total annual irrigation flow of approximately 0.35 billion gallons. If 12-inch is applied per square foot of land per year, this requires roughly 1,087 acres need for irrigation purposes. According to a 2023 Missouri Farm Land Values Opinion Survey conducted by MU Extension in collaboration with the USDA National Agricultural Statistics Service (NASS), the average price for non-irrigated cropland is $8,618 per acre. Based on this estimated value, the City would be required to purchase approximately $9.4 million of land just for irrigation purposes. Additionally, 105 days of storage are required for effluent irrigation. Furthermore, this does not include the cost for pumping and irrigation equipment to the application site. Nor would this alternative negate the need for planned upgrades to the existing Central WWTP.

5.3 Alternatives Evaluation

An alternatives evaluation should consider both the practicability and economic efficiency of an alternative. Practicability of alternatives is considered by evaluating the effectiveness, reliability, and potential impacts on the overall natural environment resulting from the implementation of the alternatives. Missouri's antidegradation guidance suggests that as a *non-binding rule of thumb*, alternatives costing less than 120% of the base case are considered economically efficient. Guidance also suggests lost opportunity costs can also be a consideration when evaluating economic efficiency.

5.3.1 Practicability

The base case and both less-degrading alternatives are considered practicable as they will achieve compliance with water quality standards and are technically feasible. However, the non-degrading Alternative #4 is not considered practicable as acquiring over 1,000 acres of cropland within a reasonable distance of the WWTP is likely infeasible due to limited availability of farmland.

5.3.2 Economic Efficiency

Economic efficiency considerations for each of alternatives relative to base case are discussed below.

- Alternative #2 – Expansion of the Central WWTP with tertiary filtration is estimated to cost approximately 116% of the base case. Although this is within the *non-binding rule of thumb* threshold of 120%, the estimated additional $16 million in costs would likely yield negligible water quality benefits as base case is already designed to meet modeled limits of 10 mg/L BOD and 20 mg/L TSS as average monthly limits. Additionally, tertiary filtration would provide no additional water quality benefits with respect to ammonia. It is also important to note that this alternative significantly exceeds the City's $60 million funding capacity. For these reasons, Alternative #2 is not considered economically efficient.
- Alternative #3 – A membrane bioreactor is estimated to cost approximately 140% of the base case, greatly exceeding the *non-binding rule of thumb* threshold of 120%. Therefore, Alternative #3 is not considered economically efficient.
- Alternative #4 – Effluent irrigation is estimated to cost approximately $9.4 million in land acquisition without consideration for other costs such as storage, pumping, and irrigation equipment. This cost would be on top of base case costs as facility upgrades would still be required. The water quality benefits of irrigation would be negligible as this alternative would only cap flows at existing levels and would not improve effluent quality. Effluent irrigation also represents a lost opportunity cost to address other water quality issues. For these reasons, Alternative #4 is not considered economically efficient.

Per the analysis presented above, the only practicable and economic efficient alternative is the base case (Table 2).

Table 2. Analysis of Alternatives Summary

	Capital Cost, $M	O&M, $M	Present Worth, $M	Economically Efficent	Practicable
Base Case Alternative #1:	$60	$38	$98	Yes	Yes
Less Degrading Alternative #2:	$72	$42	$114	No	Yes
Less Degrading Alternative #3:	$85	$52	$137	No	Yes
Non-Degrading Alternative #4: Irrigation[1]	>$9.4+cost of base case	Not estimated	>$9.4+cost of base case	No	No

[1.] Costs of irrigation would be on top of costs for base case. Additionally, costs were only estimated for land and do not include costs for storage, pumping, or irrigation equipment. Total costs associated with irrigation are likely significantly greater than $9.4 million. Complete costs not evaluated as acquiring sufficient acreage is likely impracticable.

6 Demonstration of Social and Economic Importance

The proposed project is necessary to address aging infrastructure issues at both the City's North and Central WWTP. It will enable decommissioning the North WWTP and provide critical needed improvements to the Central WWTP. Without the proposed project water quality conditions in both the Pearl River and Brushy Creek would be expected to deteriorate as the City would be challenged to continue meeting its NPDES permit effluent limitations. The project will also enable the City to meet anticipated future ammonia limitations. Therefore, this project is important for protecting the environment and preserving the City's ability to serve its current customers and accommodate near-term growth.

The affected community for this project includes the residents and customers of the City of Sedalia. The City has experienced approximately 6.9% increase in population from 2000 to 2020 (Table 3). Growth projections through 2038 planning period show the City's service area expanding both in terms of physical area and population density. The design flow of 4.0 MGD for the proposed Central WWTP improvements correlates with the anticipated population and sewer service area growth with the build-out capacity of the WWTP and the elimination of wet weather inflow and infiltration.

The Sedalia Central WWTP expansion and upgrades will allow for economic growth and development in the region and provide an opportunity for regionalization for discharges that are currently on septic systems. The expansion will also help accommodate future industrial growth in areas to the north of Sedalia. It also aligns with Sedalia's current capacity to fund new wastewater upgrade projects. In 2024, the voters approved a $60 million bond to support improvements needed to address issues at both the North and Central WWTPs.

Table 3. City of Sedalia Population Growth Between 2000 and 2020

Census Year	Population	% Change Since 2000
2000	20,329	--
2010	21,387	5.2%
2020	21,725	6.9%

Source: US Census Bureau

7 Heritage Review

A Natural Heritage Review was performed for the project area affected by the proposed expansion in this antidegradation review (Appendix A). The Heritage Review considers potential risk to species listed under the Federal Endangered Species Act and may also include records for species listed Endangered by the state, or Missouri species and/or Natural Communities of Conservation Concern within or near the defined project area. High level findings of the review are summarized below:

- Natural Heritage records identify no wildlife preserves, no designated wilderness area or critical habitats, and no federal-listed species records within the project area, or in the public land sections or sections adjacent.
- Natural Heritage records indicate the following state-ranked species near the project area:
    - Prairie Dandelion – Ranked as S2 meaning it is imperiled in the state.
    - Long-tailed Weasel – Ranked as S3 meaning it is vulnerable in the state.

Measures should be taken to minimize potential for significant habitat effects from the proposed expansion project as discussed in the Natural Heritage Review.

8 Conclusion

The City is proposing to expand the existing Central WWTP to accommodate a combined 4 MGD of average daily flow from the North and Central Service Areas. The proposed project includes improvements to the Central WWTP and will result in decommissioning the North WWTP. By consolidating treatment from the North and Central Service Areas, the proposed project meets the intent of Missouri's continuing authority regulations and antidegradation policy as it supports regionalization. Furthermore, the proposed expansion of the Central WWTP from 3.03 to 4.0 MGD will not result in an increase in the ambient water quality concentration of the receiving water after mixing as Brushy Creek is effluent dominated. For these reasons, the proposed project satisfies the intent and purpose of Missouri's antidegradation procedures. Although not required, an alternatives analysis was also conducted to demonstrate that the proposed project is necessary as less and non-degrading alternatives are impracticable or economically inefficient.

Appendix A

Natural Heritage Review

Missouri Department of Conservation
Science Branch
P. O. Box 180
Jefferson City, MO 65102
Prepared by: Nina Fogel
NaturalHeritageReview@mdc.mo.gov
(573) 522 - 4115 ext. 3182

Natural Heritage Review Report

July 22, 2025

John Christiansen
HDR
john.christiansen2@hdrinc.com

NHR ERT ID:	17268	NHR ERT Level:	2
Project type:	Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Effluent Discharge, Effluent discharge -renewal or modification of discharge to stream		
Location/Scope:	T46NR21WS31		
County:	Pettis		
Project Title:	Sedalia Central WWTP Expansion		
Query received:	6/20/2025		

This NATURAL HERITAGE REVIEW is not a site clearance letter. Rather, it identifies public lands and records of sensitive resources located close to and/or potentially affected by the proposed project. If project plans or location change, this report may no longer be valid. Because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, reports include information about records near but not necessarily on the project site. Lack of an occurrence record does not mean that a sensitive species or natural community is not present on or near the project area. On-site verification is the responsibility of the project. These records serve as one reference and additional information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Look for additional information about the biological and habitat needs of records listed to avoid or minimize impacts. More information is at Natural Areas | Missouri Department of Conservation (mo.gov) and Missouri Fish and Wildlife Information System (MOFWIS).

Level 3: Records of federal-listed (also state-listed) species or critical habitats near the project site:

Natural Heritage records identify no wildlife preserves, no designated wilderness areas or critical habitats, and no federal-listed species records within the project area, or in the public land survey section or sections adjacent.

FEDERAL LIST species/habitats are protected under the Federal Endangered Species Act. **Contact U.S. Fish & Wildlife Service** (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; 573-234-2132) for Endangered Species Act coordination and concurrence information).

Level 2: Records of state-listed (not federal-listed) endangered species AND / OR state-ranked (not state-listed endangered) species and natural communities of conservation concern. The Department tracks these species and natural communities due to population declines and/or apparent vulnerability.

Natural Heritage records indicate the following state-ranked species near the project area:

Scientific Name	Common Name	State Rank	Proximity (miles)	Primary Habitat
Nothocalais cuspidata	Prairie Dandelion	S2	<3	Grassland native prairie, Glade complex
Neogale frenata	Long-tailed Weasel	S3	<5	Habitat generalist, Savanna/Shrub/Woodland matrix, Forest matrix, Grassland matrix

State Rank Definitions:

- S1: Critically imperiled in the state because of extreme rarity of or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically, 5 or fewer occurrences or very few remaining individuals (<1,000).
- S2: Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (6 to 20 occurrences or few remaining individuals).
- S3: Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
- S4: Uncommon but not rare, and usually widespread in the nation or state. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.
- S#S#: Range Rank: A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status.
- ?: Denotes inexact or uncertain numeric rank.
- SU: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

There are no regulatory requirements associated with this status, however we encourage voluntary stewardship to minimize the risk of further decline that could lead to listing.

STATE ENDANGERED species are protected under the Wildlife Code of Missouri (3CSR10-4.111).
See the Missouri Species And Communities Of Conservation Concern Checklist (mo.gov) for a complete list.

General recommendations related to this project or site, or based on information about the historic range of species (unrelated to any specific Natural Heritage records):

- **Water Use, Transfer and Channel Activities:** Potential impacts to fish, forest and wildlife resources can be minimized or avoided by placing new lines in areas that have already been developed or disturbed, using existing utility line easements, or placing lines along existing roads. Maintenance activities that occur within the existing footprint of the water line are less likely to affect fish, forest, and wildlife resources. Following best management practices and Clean Water Act Permit conditions, if required, also help minimize potential for significant habitat effects. Stream and drainage crossings are concerns, and every effort should be made to avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds during maintenance activities. Please see Best Management Practices for Construction and Development Projects Affecting Missouri Rivers and Streams (mo.gov).
    - Revegetation is an important part of managing utility corridors and can have significant resource impacts depending on the techniques used. Revegetation of disturbed areas is recommended to minimize erosion; use native plant species compatible with the local landscape and wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive, exotic perennials such as crown vetch and *sericea lespedeza*. Maintenance of ground cover in utility corridors can have significant implications for sensitive resources. Native plant species typically require low maintenance over the long term, and provide more benefits to native wildlife. Utility corridors can provide wildlife travel corridors, food sources, and types of low-growing plant diversity sometimes rare in adjoining land. Mowing and maintenance schedules should consider nesting seasons, and diversity in plant composition.

- **Karst:** Pettis County has known karst geologic features (e.g. caves, springs, and sinkholes, all characterized by subterranean water movement). Few karst features are recorded in Natural Heritage records, and ones not noted here may be encountered at the project site or affected by

the project. Cave fauna (many of which are species of conservation concern) are influenced by changes to water quality, so check your project site for any karst features and make every effort to protect groundwater in the project area. Please see Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat (mo.gov).

- Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, larvae, and aquatic plant material may be moved to new sites on boats or construction equipment, so inspect and clean equipment thoroughly before moving between project sites.
  - Remove any mud, soil, trash, plants (or plant material) or animals from equipment before leaving any water body or work area.
  - Drain water from boats and machinery that has operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
  - When possible, wash and rinse equipment thoroughly with hard spray or HOT water (≥140° F, typically available at do-it-yourself carwash sites), and dry in the hot sun before using again.

These recommendations are ones project managers might prudently consider based on a general understanding of species needs and landscape conditions. Natural Heritage records largely reflect sites visited by specialists in the last 30 years. Many privately owned tracts have not been surveyed and could host remnants of species once but no longer common.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION REVIEW SUMMARY / REQUEST

FOR DEPARTMENT USE ONLY	
APP NO.	
FEE RECEIVED	CHECK NO.
DATE RECEIVED	

1. FACILITY

NAME			COUNTY
Sedalia Central WWTP			Pettis
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
3000 West Main	Sedalia	MO	65301
PERMIT NUMBER	PROPOSED DESIGN FLOW	SIC / NAICS CODE	
MO0023019	4.0	4952	

2. OWNER

NAME			
City of Sedalia			
ADDRESS	CITY	STATE	ZIP CODE
200 S. Osage Avenue	Sedalia	MO	65301
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	

3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(2).

NAME	SECRETARY OF STATE CHARTER NUMBER		
City of Sedalia			
ADDRESS	CITY	STATE	ZIP CODE
200 S. Osage Avenue	Sedalia	MO	65301
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	

4. CONSULTANT

PREPARER NAME	COMPANY NAME		
John Christiansen	HDR		
ADDRESS	CITY	STATE	ZIP CODE
3610 Buttonwood Drive	Columbia	MO	65201
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	
john.christiansen2@hdrinc.com		573-886-8931	

5. RECEIVING WATER BODY SEGMENT #1

NAME
Brushy Creek

5.1 Upper end of segment – Location of discharge
UTM: X= 476975, Y= 4285353 OR Lat _____, Long _____

5.2 Lower end of segment –
UTM: X= 475956, Y= 4289279 OR Lat _____, Long _____

Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of a segment, "a segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies."

6. WATER BODY SEGMENT #2 (IF APPLICABLE, Use another form if a third segment is needed)

NAME

6.1 Upper end of segment – End of Segment #1
UTM: X= _____, Y= _____ OR Lat _____, Long _____

6.2 Lower end of segment –
UTM: X= _____, Y= _____ OR Lat _____, Long _____

7. DECHLORINATION

If chlorination and dechlorination is the existing or proposed method of disinfection treatment, will the effluent discharged be equal to or less than the Water Quality Standards for Total Residual Chlorine stated in Table A1 of 10 CSR 20-7.031?

☐ Yes ☐ No – What is the proposed method of disinfection?

Based on the disinfection treatment system being designed for total removal of Total Residual Chlorine, minimal degradation for Total Residual Chlorine is assumed and the facility will be required to meet the water quality based effluent limits. These compliance limits for Total Residual Chlorine are much less than the method detection limit of 0.13 mg/L.

8. SUMMARIZE THE FEASIBILITY OF CONSTRUCTING A NO-DISCHARGE TREATMENT WASTEWATER FACILITY

According to the Antidegradation Implementation Procedure Sections I.B. and II.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.

The proposed project is a regionalization effort as it includes decommissioning the North WWTP and consolidating flows at the Central WWTP. Therefore, the proposed project represents a non-degrading pollution control measure. However, effluent irrigation was also evaluated as a non-degrading alternative for the proposed incremental increase in design flow of 0.97 MGD. Some of the limitations associated with effluent irrigation are as follows: 1) adverse soil conditions, topography, permeability, and land use will increase the land area for irrigation, 2) specific soil uptake rates of nutrients should not be exceeded; otherwise irrigation water runoff can lead to nutrients being discharged to nearby water bodies, and 3) land availability in proximity to the Central WWTP.

A 0.97 MGD flow results in a total annual irrigation flow of approximately 0.35 billion gallons. If 12-inch is applied per square foot of land per year, this requires roughly 1,087 acres need for irrigation purposes. A 2023 University of Missouri Farmland Values Opinion Survey indicated an average cost of irrigated cropland in Missouri of $8,618. Based on this estimated value, the District would be required to purchase approximately $9.4 million of land just for irrigation purposes. Additionally, 105 days of storage are required for effluent irrigation. Furthermore, this does not include the cost for pumping and irrigation equipment to the application site. Therefore, based on the increase cost and above noted limitations associated with obtaining the necessary amount of land need for this option, it is clear that this alternative is not practicable or economically feasible.

9. ADDITIONAL REQUIREMENTS

Complete and submit the following with this submittal:

- ☐ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website
- ☑ Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website
- ☑ Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary.
- ☐ If applicable, submit a copy of any Existing Water Quality data used in this process. Include the date range of the data, source(s) of the data, and location of data collection relative to the outfall. If using your own collected water quality data, submit a copy of the Quality Assurance Project Plan (QAPP) approved by the department's Watershed Protection Section. For more detailed information, see the Missouri Antidegradation Implementation Procedure (AIP), Section II.A.1.

10. PATH / TIER REVIEW ATTACHMENTS ENCLOSED

Path A: Tier 2 – Non-Degradation Mass Balance	☐ **Yes**	☐ **No**
Path B: Tier 2 – Minimal Degradation	☐ **Yes**	☐ **No**
Path C: Tier 2 – Significant Degradation	☑ **Yes**	☐ **No**
Path D: Tier 1 – Preliminary Review Request	☐ **Yes**	☐ **No**
Path E: Temporary Degradation	☐ **Yes**	☐ **No**

11. APPLICANT PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS

Preliminary effluent limits for the proposed project are dependent upon the path selected:

Applicable Pollutants of Concern	Concentration*		Path / Tier Review Attachment Used for POC Evaluation	Average Monthly Limit	Daily Maximum Limit or Average Weekly Limit
	mg/L	µg/L			
BOD_5	X		Tier 2 - Significant	10 sum/20 winter	10 sum/20 winter
TSS	X		Tier 2 - Significant	20	35
Ammonia (Summer)	X		Tier 2 - Significant	1.2-1.5	3.0-3.3
Ammonia (Winter)	X		Tier 2 - Significant	1.5-2.9	3.0-8.1
Total Phosphorus	X		Tier 2 - Significant	1.0 (ann avg)	

* Place an X in appropriate box for the concentration units for each Pollutant of Concern.

12. PROPOSED PROJECT SUMMARY

The City is proposing to expand the existing Central WWTP to accommodate a combined 4 MGD of average daily flow from the North and Central Service Areas. The proposed project includes improvements to the Central WWTP and will result in decommissioning the North WWTP. By consolidating treatment from the North and Central Service Areas, the proposed project meets the intent of Missouri's continuing authority regulations and antidegradation policy as it supports regionalization. Furthermore, the proposed expansion of the Central WWTP from 3.03 to 4.0 MGD will not result in not result in an increase in the ambient water quality concentration of the receiving water after mixing as Brushy Creek is effluent dominated. For these reasons, the proposed project satisfies the intent and purpose of Missouri's antidegradation procedures.

The project will include a new North Screening & Pump Station system, which will convey North Service Area wastewater directly to the Central WWTP Secondary Pump Station. The Central WWTP improvements will include adding a second Aeration Basin, a third Secondary Clarifier and expanding the existing UV disinfection process. A new effluent reaeration structure is required to meet the projected effluent DO requirement. A new dewatering building will be constructed to provide permanent sludge processing capacity.

Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri must comply with the requirements set forth in the *New Technology Definitions and Requirements fact sheet*.

13. CONTINUING AUTHORITY WAIVER (For New Discharges)

In accordance with 10 CSR 20-6.010(2)(C), applicants proposing use of a lower preference continuing authority, when the higher level authority is available, must submit a waiver from the existing higher authority one or other documentation for the department's review, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or by the Missouri Clean Water Commission. Is the waiver necessary? ☐ Yes ☑ No
If yes, provide a copy.

14. APPLICATION FEE

☐ CHECK NUMBER ☐ JETPAY CONFIRMATION NUMBER

15. SIGNATURE

I am authorized and hereby certify that I am familiar with the information contained in this document and to the best of my knowledge and belief such information is true, complete and accurate.

SIGNATURE	DATE
	8/12/2025
PRINT NAME	TITLE
David Carani	Consultant

PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: ☐ **OWNER** ☐ **CONTINUING AUTHORITY** ☑ **CONSULTANT**

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION REVIEW SUMMARY
PATH C: TIER 2 – SIGNIFICANT DEGRADATION

1. FACILITY

NAME	COUNTY
Sedalia Central WWTP	Pettis

2. SUMMARY OF THE POLLUTANTS OF CONCERN

Pollutants of Concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section II.A. and assumed or demonstrated to cause significant degradation. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031(2).

What are the proposed pollutants of concern and their respective effluent limits that the selected treatment option will comply with:

Pollutants of Concern*	Concentration*		Base Case Limit	Basis (WQS, WLA, ELG, Other)**
	mg/L	µg/L		
BOD_5	X		10-20 AML, 10-20 AWL	WQS (QUAL2K model)
TSS	X		20-30 AML, 35 AWL	WQS (QUAL2K model)
Ammonia (Summer)	X		1.2-1.5AML,3.0-3.3AWL	WQS/WLA†
Ammonia (Winter)	X		1.5-2.9AML,3.0-8.1AWL	WQS/WLA†
Total Nitrogen	X		NA	NA
Total Phosphorus	X		1.0 (annual average)	Effluent Rule
DO	X		<6.0	WQS (QUAL2K model)
pH	X		6.0-9.0	WQS
Oil & Grease	X		10 AML, 15 MDL	WQS
Cadmium, TR		X	1.0 AML, 3.2 MDL	WQS‡
Copper, TR		X	16.3 AML, 43.8 MDL	WQS‡
†Limits subject to site-spec. factors (e.g., pH)				
‡Subject RP analysis and CV per EPA TSD				

* Place an X in appropriate box for the concentration units for each Pollutant of Concern

** Provide the Basis for the Base Case Limit: WQS – Water Quality Standard, WLA – Wasteload Allocation, ELG – Effluent Limit Guideline, or describe other.

3. IDENTIFYING ALTERNATIVES

Supply a summary of the non-discharging alternatives considered. "For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided," as stated in the Antidegradation Implementation Procedure Section II.B.1. These alternatives include no-discharge. Attach all supportive documentation in the Antidegradation Review report.

Feasibility of non-discharging alternatives (regionalization, land application, subsurface irrigation, and recycling or reuse):

Regionalization - This project is a regionalization project as it is consolidating flows from the North and Central Service Areas and will result in decommissioning the North WWTP.

Effluent Irrigation - Land application through irrigation is considered impracticable and not economically efficient. It would require acquiring over 1,000 acres of cropland which is likely infeasible due to limited availability. Additionally, effluent irrigation is estimated to cost approximately $9.4 million in land acquisition without consideration for other costs such as storage, pumping, and irrigation equipment. This cost would be on top of base case costs as facility upgrades would still be required. The water quality benefits of irrigation would be negligible as this alternative would only cap flows at existing levels and would not improve effluent quality. Effluent irrigation also represents a lost opportunity cost to address other water quality issues.

Minimum of three (preferably five or more) discharging alternatives* ranging from less-degrading to degrading including Preferred Alternative (All treatment levels for POCs must at a minimum meet water quality standards):

Discharging Alternative #	Treatment Type	Description
1	Central WWTP expansion (Base)	Second aeration basin, third secondary clarifier, expanded UV
2	Base case with tertiary filtration	Consists of two pre-manufactured disk filtration assemblies
3	Membrane bioreactor facility	Construction of a new MBR tank containing membrane cassettes
4		
5		
6		

* Same technology may be multiple alternatives as you have the base unit and add to it with more capacity to provide additional treatment.

4. DETERMINATION OF THE REASONABLE ALTERNATIVE

Per the Antidegradation Implementation Procedure Section II.B.2, "a reasonable alternative is one that is practicable, economically efficient and affordable." Provide basis and supporting documentation in the Antidegradation Review report. **Please do not write "See Report" for any box below.**

Practicability Summary:

"The practicability of an alternative is considered by evaluating the effectiveness, reliability, and potential environmental impacts," according to the Antidegradation Implementation Procedure Section II.B.2.a. Examples of factors to consider, including secondary environmental impacts, are given in the Antidegradation Implementation Procedure Section II.B.2.a.

The base case and both less-degrading alternatives are considered practicable as they will achieve compliance with water quality standards and are technically feasible. However, the non-degrading alternative (effluent irrigation) is not considered practicable as acquiring over 1,000 acres of cropland within a reasonable distance of the WWTP is likely infeasible due to limited availability of farmland.

Economic Efficiency Basis:

What is the design life cycle for the comparison? 20

What interest rate was used in the present worth calculations?

Economic Efficiency Summary:

Alternatives that are deemed practicable must undergo a direct cost comparison in order to determine economic efficiency. Means to determine economic efficiency are provided in the Antidegradation Implementation Procedure Section II.B.2.b.

Expansion of the Central WWTP with tertiary filtration (Alt #2) is estimated to cost approximately $114 million or 116% of the base case. Although this is within the non-binding rule of thumb threshold of 120%, the estimated additional $16 million in costs would likely yield negligible water quality benefits as base case is already designed to meet modeled limits of 10 mg/L BOD and 20 mg/L TSS as average monthly limits. Additionally, tertiary filtration would provide no additional water quality benefits with respect to ammonia. The estimated additional $16 million also represents an opportunity cost as the loss of this savings limits the City's ability to address other pressing water quality issues including collection system improvements to reduce inflow and infiltration or improving its other WWTPs. For these reasons, Alternative #2 is not considered economically efficient.

A membrane bioreactor (Alt #3) is estimated to cost approximately $137 million or 140% of the base case, greatly exceeding the non-binding rule of thumb threshold of 120%. Therefore, Alternative #3 is not considered economically efficient.

TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)

PARAMETERS	Alternatives #					
	1	2	3	4	5	6
BOD_5 – mg/L	10-20	<10	<10			
TSS – mg/L	20-30	<20	<20			
Ammonia (Summer) – mg/L	1.2-1.5	1.2-1.5	<1.2-1.5			
Ammonia (Winter) – mg/L	1.5-2.9	1.5-2.9	<1.5-2.9			
E. Coli – #/100 mL	206	206	206			
Total Nitrogen – mg/L	--	--	--			
Total Phosphorus – mg/L	1	1	1			
Construction Cost – $	60M	72M	85M			
Operating Cost – $	38M	42M	52M			
Present Worth – $	98M	114M	137M			
Ratio present worth to base case	100%	116%	140%			

Affordability Summary:

Alternatives identified as most practicable and economically efficient are considered affordable if the applicant does not supply an affordability analysis. An affordability analysis per the Antidegradation Implementation Procedure Section II.B.2.c, "may be used to determine if the alternative is too expensive to reasonably implement."

NA

Justification for Preferred Alternative:

The preferred alternative (Alternative #1) represents the most cost-effective solution to effectively and reliably meet the City's wastewater needs.

Reasons for Rejecting the other Evaluated Alternatives:

Alternatives #2 and #3 are not considered economically efficient. Additionally, the costs associated with these alternatives limits the City's ability to address other pressing water quality issues including collection system improvements to reduce inflow and infiltration or improving its other WWTPs. Effluent irrigation (Alternative #4) is not considered practicable.

Comments/Discussion:

The City determined the most cost-effective solution for addressing its wastewater needs is to consolidate the North and Central WWTPs into a single facility at the existing Central WWTP site. Therefore, the City is proposing to decommission the North WWTP and upgrade and expand the Central WWTP to a design flow of 4.0 MGD. The proposed design flow of 4.0 MGD reflects the current demand while maintaining capacity for development in the area.

5. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

If the preferred alternative will result in significant degradation, then it must be demonstrated that it will allow important economic and social development in accordance to the Antidegradation Implementation Procedure Section II.E. Social and Economic Importance is defined as the social and economic benefits to the community that will occur from any activity involving a new or expanding discharge.

Identify the affected community:

The affected community is defined in 10 CSR 20-7.031(2)(B) as the community "in the geographical area in which the waters are located. Per the Antidegradation Implementation Procedure Section II.E.1, "the affected community should include those living near the site of the proposed project as well as those in the community that are expected to directly or indirectly benefit from the project."

The affected community includes the residents and customers of the City of Sedalia.

Identify relevant factors that characterize the social and economic conditions of the affected community:

Examples of social and economic factors are provided in the Antidegradation Implementation Procedure Section II.E.1., but specific community examples are encouraged.

The City has experienced an approximately 6.9% increase in population since 2000. Growth projections through 2038 planning period show the City's service area expanding both in terms of physical area and population density. The design flow of 4.0 MGD for the proposed Central WWTP improvements correlates with the anticipated population and sewer service area growth with the build-out capacity of the WWTP and elimination of wet weather inflow and infiltration.

Describe the important social and economic development associated with the project:

Determining benefits for the community and the environment should be site specific and in accordance with the Antidegradation Implementation Procedure Section II.E.1.

The proposed project necessary to address aging infrastructure issues at both the City's North and Central WWTP. It will enable decommissioning the North WWTP and provide critical needed improvements to the Central WWTP. Without the proposed project water quality conditions in both the Pearl River and Brushy Creek would be expected to deteriorate as the City would be challenged to continue meeting its NPDES permit effluent limitations. The project will also enable the City to meet anticipated future ammonia limitations. Therefore, this project is important for protecting the environment and preserving the City's ability to serve future growth.

PROPOSED PROJECT SUMMARY:

The City of Sedalia's North and Central WWTPs both have performance-related issues requiring significant upgrades to remain fully functional. Originally constructed in 1946, the North WWTP is a trickling filter plant with a rated capacity of 2.5 MGD that discharges to the Pearl River (also known as Sewer Creek). The Central WWTP, which was upgraded to a trickling filter plant in 2001, has a rated capacity of 3.03 MGD and discharges to Brushy Creek. The City determined the most cost-effective solution for addressing its wastewater needs is to consolidate the North and Central WWTPs into a single facility at the existing Central WWTP site. Therefore, the City is proposing to decommission the North WWTP and upgrade and expand the Central WWTP to a design flow of 4.0 MGD. The proposed design flow of 4.0 MGD reflects the current demand while maintaining capacity for development in the area. In addition to preserving capacity for future growth, decommissioning the North WWTP and upgrading the Central WWTP will result in significant environmental benefits for both the Pearl River and Brushy Creek.

Attach the Antidegradation Review report and all supporting documentation. This is a technical document, which must be signed, sealed and dated by a registered professional engineer of Missouri.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION: REGIONALIZATION AND NO-DISCHARGE EVALUATION

REGIONALIZATION AND NO-DISCHARGE EVALUATION

According to the Antidegradation Implementation Procedure Sections I.B. and II.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.

Please refer to the *No-Discharge Alternative Evaluation* fact sheet for examples of information to provide to justify common reasons for not pursuing regionalization or no-discharge land application. If sufficient information is not provided on this form to demonstrate that these alternatives are not feasible, a more detailed evaluation of no-discharge options may have to be submitted.

Additional pages may be attached if more room is needed.

1. FACILITY:

NAME	COUNTY
Sedalia Central WWTP	Pettis

2. EVALUATION OF REGIONALIZATION (Complete all applicable reasons why regionalization was not pursued)

2.1 Regionalization Feasibility:

A. What is the distance to connect to the closest municipality's line or other facility's line? NA (see 2.2)

B. List facilities contacted about possible regionalization. NA (see 2.2)

C. Is there any planning or zoning in the area regarding development and services? NA (see 2.2)

D. Who would have the responsibility to maintain the sewer connection line? NA (see 2.2)

E. What is the estimated cost for piping and pumps to regionalize? NA (see 2.2)

F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.
NA (see 2.2)

G. Does a regional facility have the capacity to treat the additional effluent from this project? NA (see 2.2)

H. Were land owners contacted for rights to an easement? ☐ Yes ☑ No

I. Describe the easement issues:
NA (see 2.2)

2.2 Summarize why regionalization was not a practicable or economically efficient alternative

The proposed project is a regionalization effort as it includes decommissioning the North WWTP and consolidating flows at the Central WWTP. Environmental benefits of regionalizing the treatment systems are summarized below:

- The total design flow for the two facilities is 5.53 MGD exceeds the proposed design flow of 4.0 MGD for the expanded Central WWTP. This will result in an overall net reduction in the permitted pollutant loading.
- Decommissioning the North WWTP will reduce the pollutant load to Sewer Branch (also known as Pearl River).
- The regionalized WWTP will have a higher effluent quality than either the existing North or Central WWTPs.

3. EVALUATION OF NO-DISCHARGE LAND APPLICATION

Check all applicable reasons why no-discharge land application was not pursued:

☑ **3.1 Land Availability and Cost:**

A. Is land available for land application? ☐ Yes ☑ No

If not, explain: Acquiring over 1,000 acres within a reasonable distance of the WWTP is likely infeasible

If yes, answer the following:

B. How many acres are required for land application of the effluent? 1,087 acres

C. Provide a breakdown of the capital cost for any necessary additional land, piping, pumps, and irrigation equipment?

Refer to cost discussion in 3.4 below

D. Were long-term costs evaluated and compared for upgrading to a mechanical plant with future Water Quality Standards changes (i.e. mussel ammonia, bacteria, TP, TN) versus cost for a land application system? ☐ Yes ☑ No

E. Were land owners contacted for rights to an easement? ☐ Yes ☑ No

F. Describe the easement issues:

☐ **3.2 Zoning or Suitability of Site in Proximity to Neighboring Sites or Waterbodies:**

A. Was drip or subsurface irrigation evaluated as opposed to surface application? ☐ Yes ☐ No

B. Does the county ordinance specifically restrict land application, surface and subsurface? ☐ Yes ☐ No

C. Can a vegetated buffer be installed to reduce necessary buffer distances? ☐ Yes ☐ No

D. Are there other steps or considerations that can be made?

☐ **3.3 Unsuitability of Geology or Soils**

A. Is a geohydrologic evaluation, county soils survey map, or other resource showing suitability and application rates included with this application? ☐ Yes ☐ No

B. Is it cost-effective to bring in additional soils? ☐ Yes ☐ No

C. Can the application rate be decreased to a suitable rate? ☐ Yes ☐ No

D. Were subsurface application alternatives (e.g. low pressure pipe, drip) considered? ☐ Yes ☐ No

E. If collapse potential is a concern, was using a liner or alternative site evaluated? ☐ Yes ☐ No

3.4 Summarize why no-discharge land application was not a practicable or economically efficient alternative

Due to the unknown locations of potential irrigation, a conservative irrigation application rate of half of the 24-inch application guideline (12-inch) was used. Some of the limitations associated with effluent irrigation are as follows: 1) adverse soil conditions, topography, permeability, and land use will increase the land area for irrigation, 2) specific soil uptake rates of nutrients should not be exceeded; otherwise irrigation water runoff can lead to nutrients being discharged to nearby water bodies, and 3) land availability in proximity to the Central WWTP. An average daily effluent flow of 0.97 MGD (delta of increasing design flow from 3.03 to 4.0 MGD) results in a total annual irrigation flow of approximately 0.35 billion gallons. If 12-inch is applied per square foot of land per year, this requires roughly 1,087 acres need for irrigation purposes. According to a 2023 Missouri Farm Land Values Opinion Survey conducted by MU Extension in collaboration with the USDA National Agricultural Statistics Service (NASS), the average price for non-irrigated cropland is $8,618 per acre. Based on this estimated value, the District would be required to purchase approximately $9.4 million of land just for irrigation purposes. Additionally, 105 days of storage are required for effluent irrigation. Furthermore, this does not include the cost for pumping and irrigation equipment to the application site. Nor would this alternative negate the need for planned upgrades to the existing Central WWTP. While upgrades for a 3.03 MGD facility versus a 4 MGD might result in some cost savings, they would likely be minimal and would not offset the costs of irrigation. Therefore, based on the increased cost and above noted limitations associated with obtaining the necessary amount of land needed for this option, it is clear this alternative is not practicable or economically feasible.

4. DOCUMENTATION

4.1 Is any other written correspondence or documentation included with this application to provide further justification for not pursuing a no-discharge option or regionalization?

- [x] No
- [ ] Yes:
  - [ ] A letter from an existing higher preference continuing authority waiving preferential status where service is not available in accordance with 10 CSR 20-6.0 10 (2) or if capacity is not available.
  - [ ] A letter from the existing higher preference continuing authority stating that the regional facility has no interest in taking flow from the new or expanded facility.
  - [ ] A letter from the regional municipality stating that the project area is outside city limits and annexation would be required.
  - [ ] Council meeting minutes.
  - [ ] Correspondence with land owners regarding easement rights.
  - [ ] Correspondence with land owners regarding land for sale or lease.
  - [ ] Letters from the community or a consulting engineer regarding availability, proximity, and location of suitable land and the reasonable cost of such land.
  - [ ] Documentation of recent land sales or appraisals.
  - [ ] Calculations for sizing a land application system.
  - [ ] Detailed cost estimates for a land application system or regionalization including lift stations, piping, easements, liners, and/or connection costs.
  - [ ] Geohydrologic evaluation or other soils report.
  - [ ] Copy of a county or city ordinance.
  - [ ] Verification of funding from State Revolving Fund, which does not fund projects outside city limits.
  - [ ] Other:

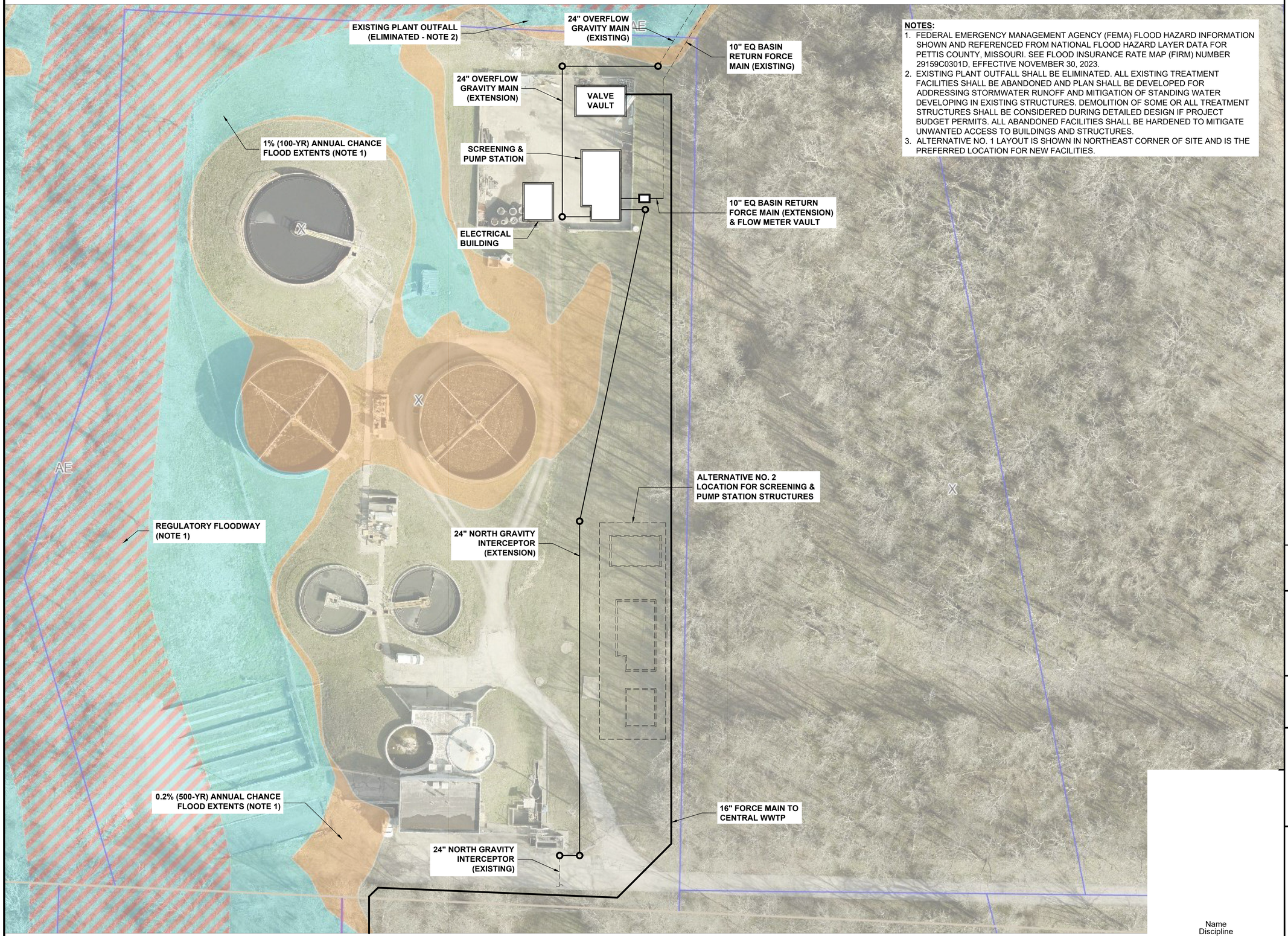
APPENDIX C - INDUSTRIAL PRETREATMENT EVALUATION

Project Name	**Pretreatment Program Independent Audit**
Client	City of Sedalia (through Burns & McDonnell)
Project Location	Sedalia, Missouri
Date of Submittal	1/31/2025
Notes	*KimHEC (contracted through Burns & McDonnell) provided an independent audit of the City of Sedalia's Pretreatment Program including legal authority, enforcement response plan, local limits, industrial user control mechanisms, and program data. Recommendations were developed to bring the program into compliance with state and federal requirements and to improve the effectiveness of the program in protecting the publicly owned treatment works from interference, pass through, and disruption caused by nondomestic discharge. A list of recommendations and an implementation schedule are provided below.*

Table 1. Pretreatment Program recommendations for City of Sedalia based on an independent audit.

Program Component	Recommendation	Schedule
Legal Authority	Update Pretreatment Program legal authority to submit to MDNR for approval by the end of 2025. Notify and present updates to significant industrial users (SIUs).	By end of 2025
ERP	Update the Enforcement Response Plan and submit to MDNR for approval by the end of 2025. Improvements are needed to incrementally escalate enforcement and to align enforcement mechanisms with the updated legal authority.	By end of 2025
Pretreatment Data	Create a comprehensive sample plan to collect monitoring data from industrial users and wastewater treatment plants with sufficiently sensitive reporting limits.	By end of 2025
Local Limits	Confirm loadings of currently permitted and potentially permitted SIUs; confirm allocations for each industrial user and incorporate into control mechanisms.	By end of 2025
IU Determinations and Permitting	Re-issue existing permits and issue new permits for significant industrial users. (Expiring permits will be re-issued by 1/1/2026 and new IU permits will be issued by the end of the first quarter 2026.)	By 1st Quarter 2026

APPENDIX D – CONCEPTUAL EXHIBITS



NOTES:

1. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD INFORMATION SHOWN AND REFERENCED FROM NATIONAL FLOOD HAZARD LAYER DATA FOR PETTIS COUNTY, MISSOURI. SEE FLOOD INSURANCE RATE MAP (FIRM) NUMBER 29159C0301D, EFFECTIVE NOVEMBER 30, 2023.
2. EXISTING PLANT OUTFALL SHALL BE ELIMINATED. ALL EXISTING TREATMENT FACILITIES SHALL BE ABANDONED AND PLAN SHALL BE DEVELOPED FOR ADDRESSING STORMWATER RUNOFF AND MITIGATION OF STANDING WATER DEVELOPING IN EXISTING STRUCTURES. DEMOLITION OF SOME OR ALL TREATMENT STRUCTURES SHALL BE CONSIDERED DURING DETAILED DESIGN IF PROJECT BUDGET PERMITS. ALL ABANDONED FACILITIES SHALL BE HARDENED TO MITIGATE UNWANTED ACCESS TO BUILDINGS AND STRUCTURES.
3. ALTERNATIVE NO. 1 LAYOUT IS SHOWN IN NORTHEAST CORNER OF SITE AND IS THE PREFERRED LOCATION FOR NEW FACILITIES.

no.	date	by	ckd	description

NORTH

0 16' 32' 64'
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co., Inc
LICENSE NO. 000165

date	detailed
MAY 2025	P. WARD
designed	checked
P. WARD	CHECKER

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
OVERALL SITE PLAN
NORTH SCREENING & PUMP STATION

project	contract
172636	

drawing **004C101** rev. **A**

sheet of sheets

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Discipline
License No.

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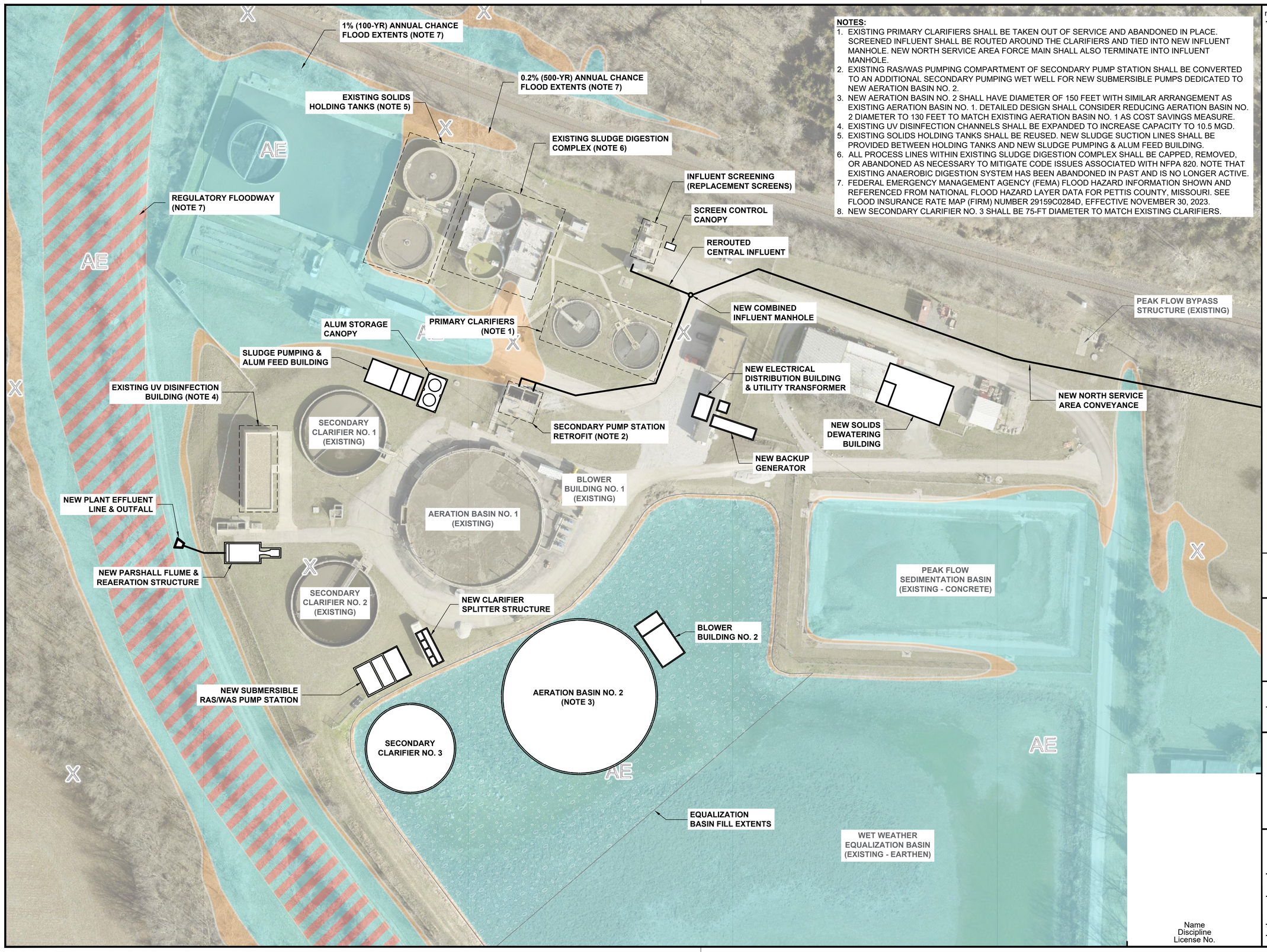

NOTES:

1. EXISTING PRIMARY CLARIFIERS SHALL BE TAKEN OUT OF SERVICE AND ABANDONED IN PLACE. SCREENED INFLUENT SHALL BE ROUTED AROUND THE CLARIFIERS AND TIED INTO NEW INFLUENT MANHOLE. NEW NORTH SERVICE AREA FORCE MAIN SHALL ALSO TERMINATE INTO INFLUENT MANHOLE.
2. EXISTING RAS/WAS PUMPING COMPARTMENT OF SECONDARY PUMP STATION SHALL BE CONVERTED TO AN ADDITIONAL SECONDARY PUMPING WET WELL FOR NEW SUBMERSIBLE PUMPS DEDICATED TO NEW AERATION BASIN NO. 2.
3. NEW AERATION BASIN NO. 2 SHALL HAVE DIAMETER OF 150 FEET WITH SIMILAR ARRANGEMENT AS EXISTING AERATION BASIN NO. 1. DETAILED DESIGN SHALL CONSIDER REDUCING AERATION BASIN NO. 2 DIAMETER TO 130 FEET TO MATCH EXISTING AERATION BASIN NO. 1 AS COST SAVINGS MEASURE.
4. EXISTING UV DISINFECTION CHANNELS SHALL BE EXPANDED TO INCREASE CAPACITY TO 10.5 MGD.
5. EXISTING SOLIDS HOLDING TANKS SHALL BE REUSED. NEW SLUDGE SUCTION LINES SHALL BE PROVIDED BETWEEN HOLDING TANKS AND NEW SLUDGE PUMPING & ALUM FEED BUILDING.
6. ALL PROCESS LINES WITHIN EXISTING SLUDGE DIGESTION COMPLEX SHALL BE CAPPED, REMOVED, OR ABANDONED AS NECESSARY TO MITIGATE CODE ISSUES ASSOCIATED WITH NFPA 820. NOTE THAT EXISTING ANAEROBIC DIGESTION SYSTEM HAS BEEN ABANDONED IN PAST AND IS NO LONGER ACTIVE.
7. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD INFORMATION SHOWN AND REFERENCED FROM NATIONAL FLOOD HAZARD LAYER DATA FOR PETTIS COUNTY, MISSOURI. SEE FLOOD INSURANCE RATE MAP (FIRM) NUMBER 29159C0284D, EFFECTIVE NOVEMBER 30, 2023.
8. NEW SECONDARY CLARIFIER NO. 3 SHALL BE 75-FT DIAMETER TO MATCH EXISTING CLARIFIERS.

no.	date	by	ckd	description

NORTH

0 22' 44' 88'
SCALE IN FEET

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
OVERALL SITE PLAN
CENTRAL WWTP IMPROVEMENTS

project	contract
172636	

drawing **004C151** rev. **A**

sheet of sheets

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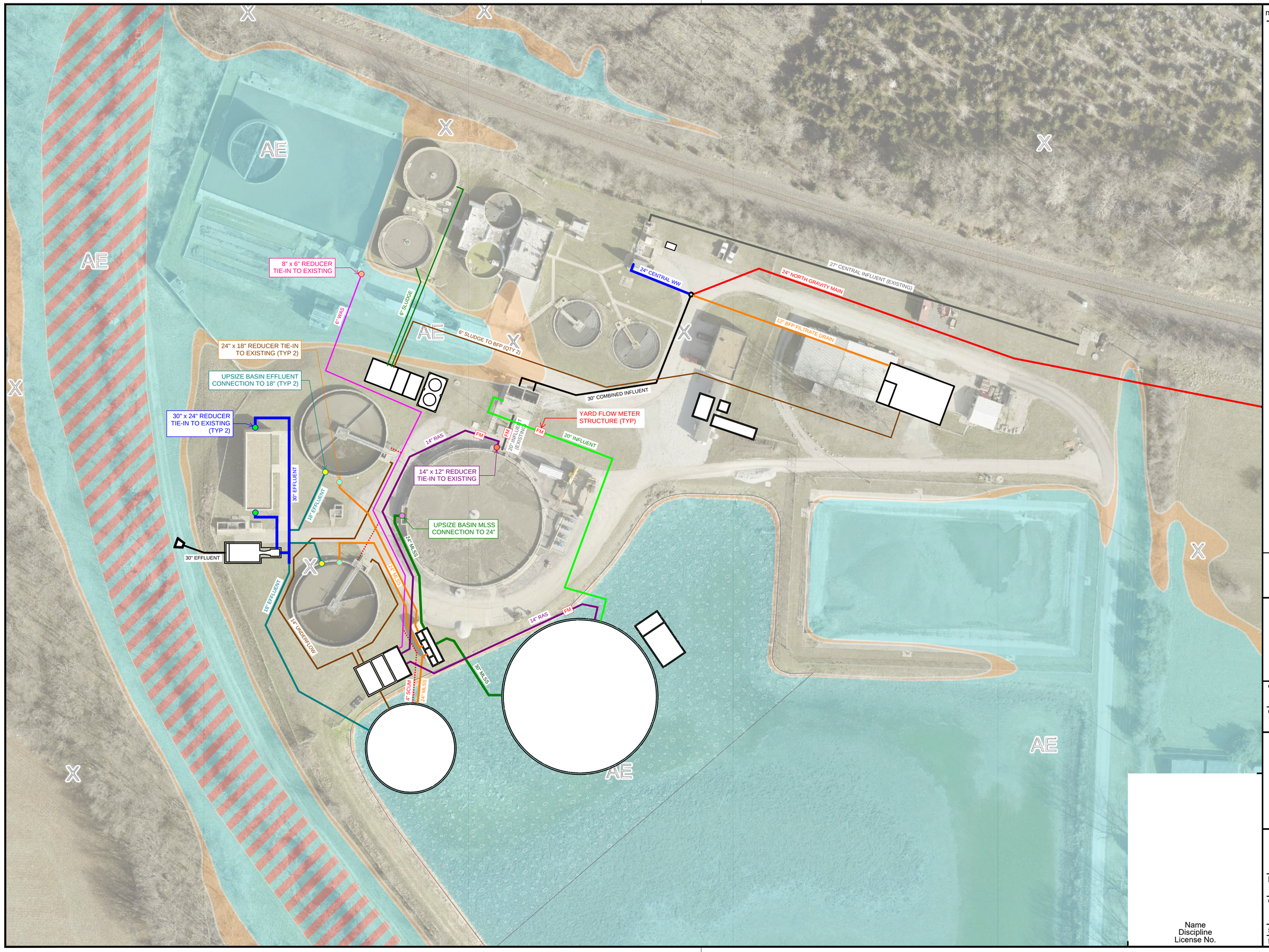

no.	date	by	ckd	description

NORTH

0 22' 44' 88'
SCALE IN FEET

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designed	checked
P. WARD	CHECKER

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
PRELIMINARY YARD PIPING PLAN
CENTRAL WWTP IMPROVEMENTS

project	contract
172636	

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Discipline
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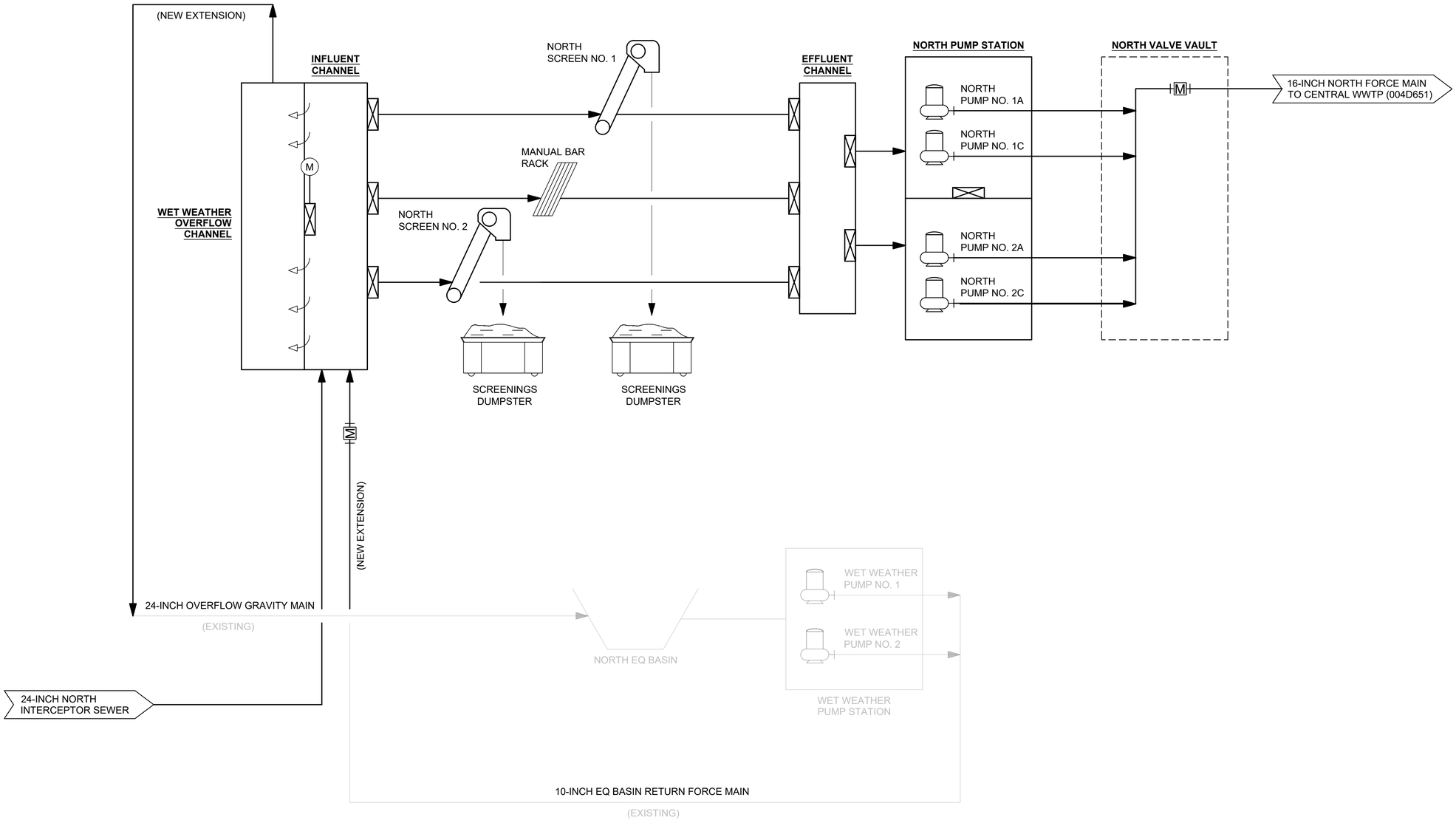

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

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Burns & McDonnell Engineering Co., Inc
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date	detailed
MAY 2025	P. WARD
designed	checked
P. WARD	CHECKER

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
PROCESS FLOW DIAGRAM
NORTH SCREENING & PUMP STATION

project	contract
172636	

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Discipline
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24-INCH NORTH GRAVITY MAIN (004D601)

RAS NO. 1 (004D652)

ALUM NO. 1 (004D652)

INFLUENT SCREEN NO. 1

INFLUENT CHANNEL

EFFLUENT CHANNEL

SECONDARY PUMP STATION

DIVERSION STRUCTURE

CENTRAL SERVICE AREA INTERCEPTOR SEWER

MANUAL BAR RACK

INFLUENT MANHOLE

WET WEATHER OVERFLOW

INFLUENT SCREEN NO. 2

SEC PUMP NO. 1

SEC PUMP NO. 2

SEC PUMP NO. 3

SEC PUMP NO. 4

SEC PUMP NO. 5

SEC PUMP NO. 6

AERATION BASIN NO .1

PEAK FLOW SEDIMENTATION BASIN & EQ BASIN

SCREENINGS DUMPSTERS

BFP FILTRATE FROM SOLIDS DEWATERING (004D652)

AERATION BLOWERS (TYP 3)

RAS NO. 2 (004D652)

ALUM NO. 2 (004D652)

(TYP 3 - 1 PER CLARIFIER)

UNDERFLOW (004D652)

SCUM (004D652)

SECONDARY CLARIFIER NO. 1

SECONDARY CLARIFIER NO. 2

SECONDARY CLARIFIER NO. 3

FLOATING MIXER (TYP 3)

AERATION BASIN NO .2

(UV BYPASS)

FINGER WEIRS

UV DISINFECTION CHANNEL NO. 1

UV DISINFECTION CHANNEL NO. 2

EXISTING UV BUILDING

PARSHALL FLUME & REAERATION

PLANT OUTFALL TO BRUSHY CREEK

CLARIFIER SPLITTER STRUCTURE

AERATION BLOWER NO. 4

AERATION BLOWER NO. 5

AERATION BLOWER NO. 6

NOTES:

1. EXISTING UV DISINFECTION CHANNELS SHALL BE WIDENED TO ACCOMMODATE HIGHER CAPACITY UV BANKS.
2. SECONDARY INFLUENT FLOW METERS SHALL BE LOCATED IN YARD IN BELOW GRADE METER VAULT STRUCTURES.
3. 16-INCH NORTH FORCE MAIN CONVERTS TO 24-INCH GRAVITY MAIN AT A LOCATION TO BE DETERMINED ALONG THE NORTH SERVICE AREA CONVEYANCE ROUTE.

Name
Discipline
License No.

no.	date	by	ckd	description

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MAY 2025	P. WARD
designed	checked
P. WARD	CHECKER

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
LIQUID PROCESS FLOW DIAGRAM
CENTRAL WWTP IMPROVEMENTS

project	contract
172636	

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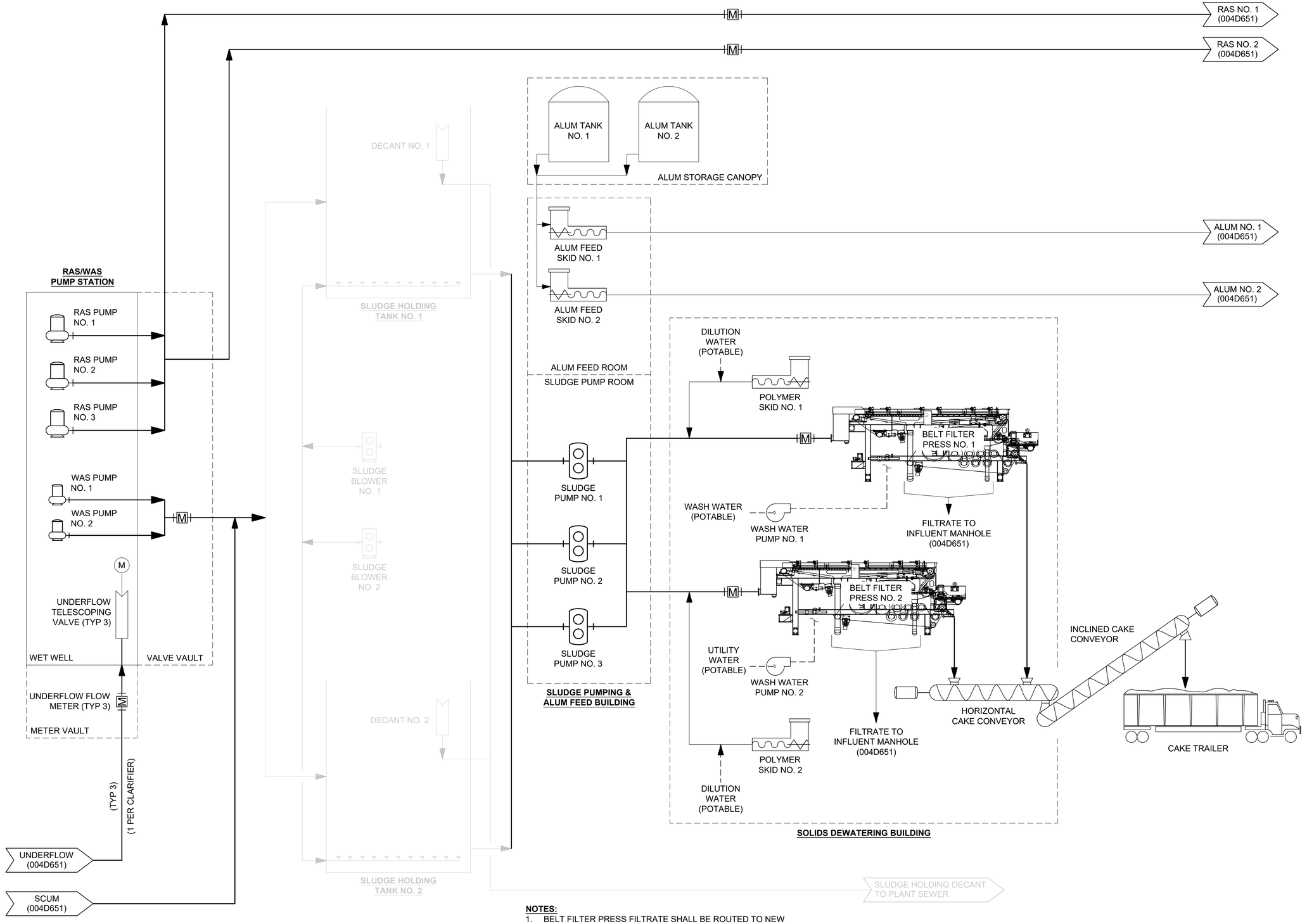

NOTES:

1. BELT FILTER PRESS FILTRATE SHALL BE ROUTED TO NEW MANHOLE UPSTREAM OF SECONDARY PUMP STATION.
2. RAS FLOW METERS SHALL BE LOCATED IN YARD IN BELOW GRADE METER VAULT STRUCTURES.

Name
Discipline
License No.

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

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date	detailed
MAY 2025	P. WARD
designed	**checked**
P. WARD	CHECKER

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CENTRAL CONSOLIDATION
SOLIDS PROCESS FLOW DIAGRAM
CENTRAL WWTP IMPROVEMENTS

project	contract
172636	

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sheet of sheets

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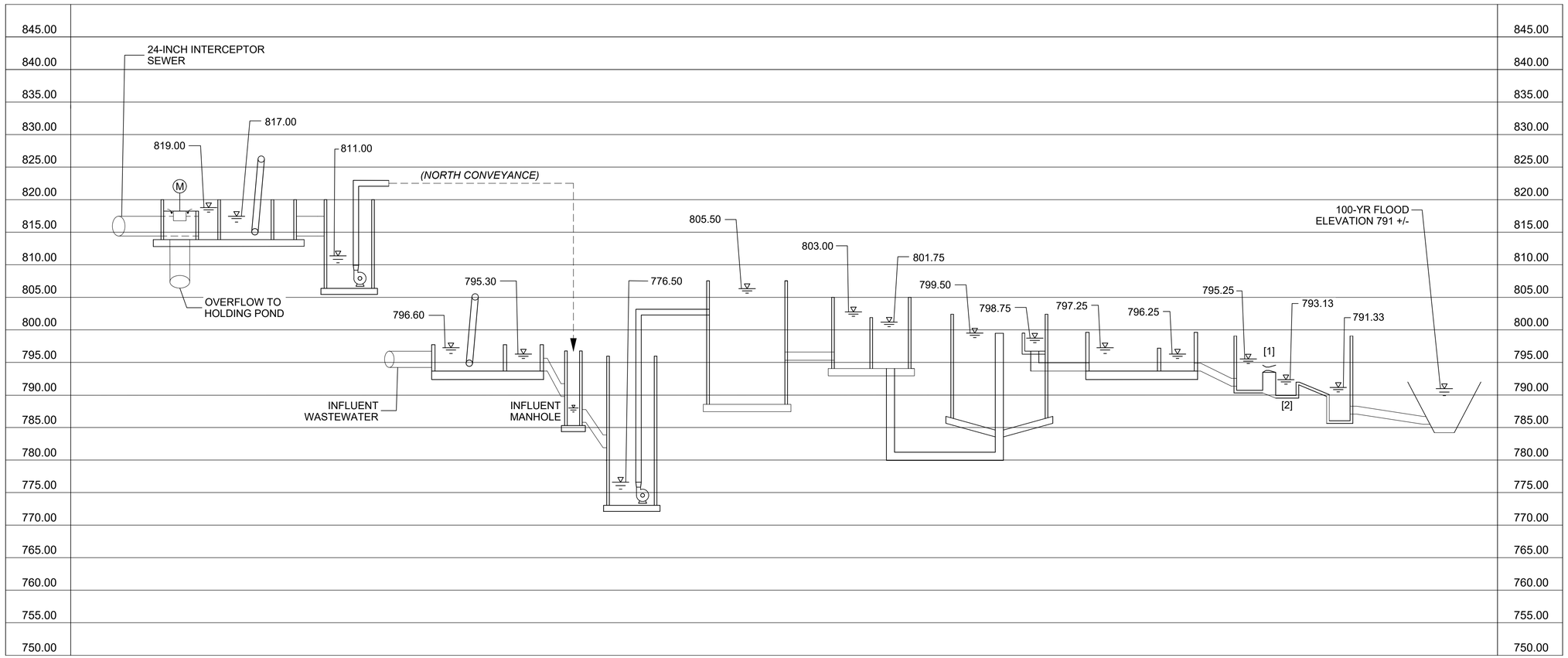

NORTH SCREENING & PUMP STATION	CENTRAL SCREENING	SECONDARY PUMP STATION	AERATION BASINS	CLARIFIER SPLITTER STRUCTURE	SECONDARY CLARIFIERS	UV DISINFECTION	EFFLUENT PARSHALL FLUME & REAERATION	OUTFALL TO BRUSHY CREEK

NORTH WET WEATHER DIVERSION & SCREENING STRUCTURE	NORTH PUMP STATION	CENTRAL SCREENING	SECONDARY PUMP STATION (EXISTING STRUCTURE)	AERATION BASINS	CLARIFIER SPLITTER STRUCTURE	SECONDARY CLARIFIERS	UV DISINFECTION CHANNELS	EFFLUENT PARSHALL FLUME & REAERATION STRUCTURE
TOP OF WALL EL 820.00	TOP OF WALL EL 820.00	TOP OF CHANNEL EL 797.60	TOP OF WALL EL 796.00	TOP OF WALL EL 807.50	TOP OF WALL EL 805.00	TOP OF WALL EL 802.50	TOP OF WALL EL 799.62	TOP OF WALL EL 798.00
OVERFLOW WEIR TO POND EL 817.00	TOP OF FOUNDATION EL 806.00	BOTTOM OF CHANNEL EL 793.60	TOP OF FOUNDATION EL 773.00	TOP OF FOUNDATION EL 788.50	TOP OF FOUNDATION EL 794.00	TOP OF FOUNDATION EL 787.50	TOP OF FOUNDATION EL 794.00	TOP OF FOUNDATION EL 786.00
WEIR GATE FULLY OPEN EL 815.50	PUMP 1 ON EL 811.00		PUMP ON EL 778.00	EFFLUENT WEIR EL 805.02	SPLITTER WEIR EL 802.25	LAUNDER WEIR EL 799.50	FINGER WEIR EL 797.00	PARSHALL FLUME EL 794.00
WEIR GATE FULLY CLOSED EL 817.00	PUMPS OFF EL 810.00		PUMPS OFF EL 776.00					REAERATION WEIR EL 792.00
TOP OF FOUNDATION EL 814.00								

AVERAGE DAY FLOW (NORTH PUMP STATION) = 1.5 MGD
AVERAGE DAY FLOW (CENTRAL SCREENING) = 2.5 MGD
AVERAGE DAY FLOW (COMBINED) = 4.0 MGD
PEAK FLOW (NORTH PS) = 4.5 MGD
PEAK FLOW (CENTRAL SCREENING) = 6.0 MGD
PEAK FLOW (COMBINED) = 10.5 MGD

LEGEND

802.58
799.25

PWL- PEAK WATER SURFACE ELEVATION

AWL- AVERAGE WATER SURFACE (TBD - NOT SHOWN)

NOTES:

1. 3-FT PARSHALL FLUME
2. 18-FT WEIR

Name
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no.	date	by	ckd	description

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
CONCEPTUAL HYDRAULIC PROFILE

project	contract
172636	

drawing **004D653** rev. **A**

sheet of sheets
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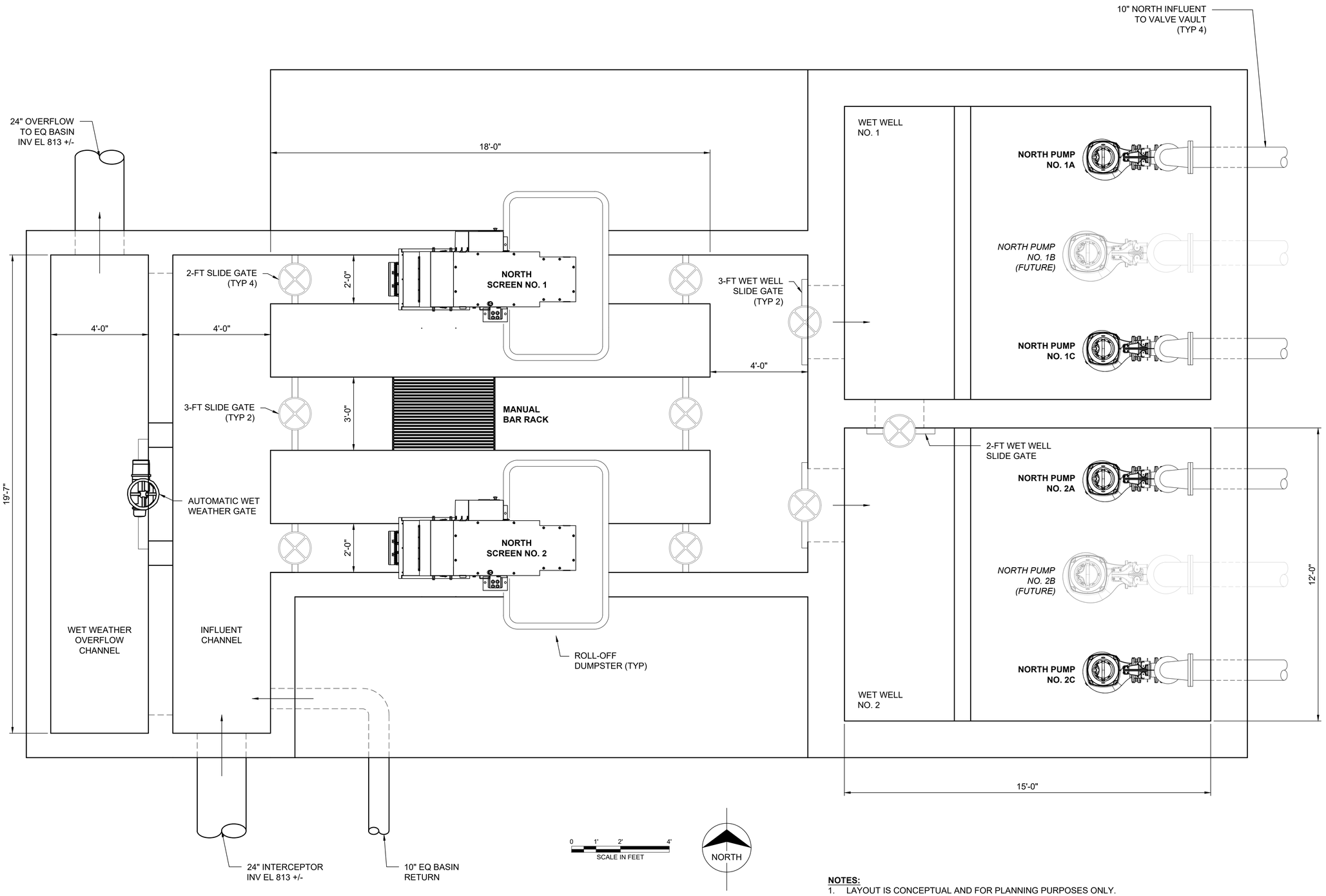

NOTES:
1. LAYOUT IS CONCEPTUAL AND FOR PLANNING PURPOSES ONLY.

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NORTH & CENTRAL WWTP FACILITY PLAN
NORTH SCREENING & PUMP STATION
DIVERSION, SCREENING & WET WELL
GENERAL PROCESS PLAN

project	contract
172636	

drawing **120D101** — rev. **A**

sheet of sheets

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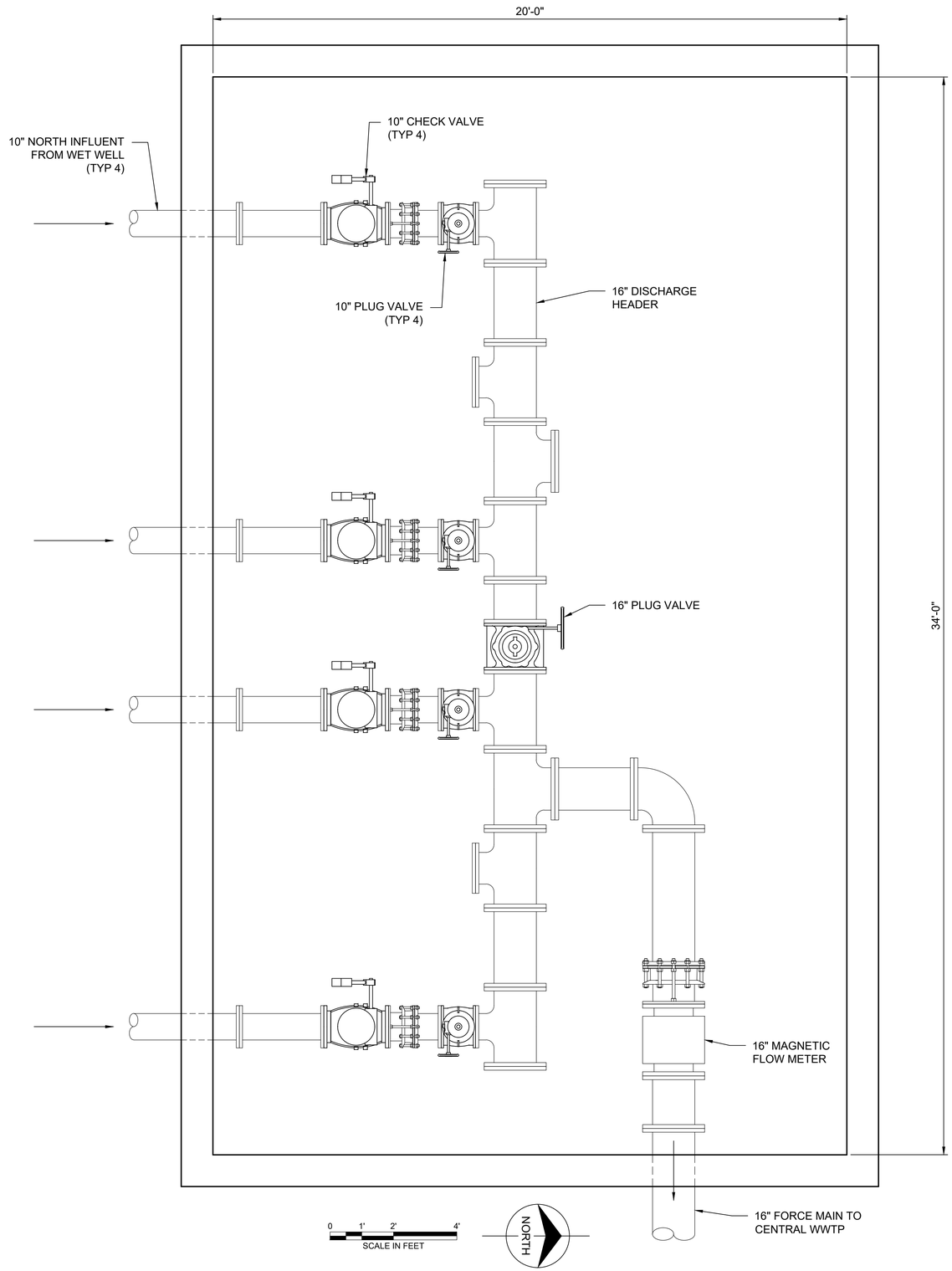

NOTES:

1.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
NORTH SCREENING & PUMP STATION
VALVE VAULT
GENERAL PROCESS PLAN

project	contract
172636	

drawing **140D101** rev. **A**

sheet of sheets

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License No.

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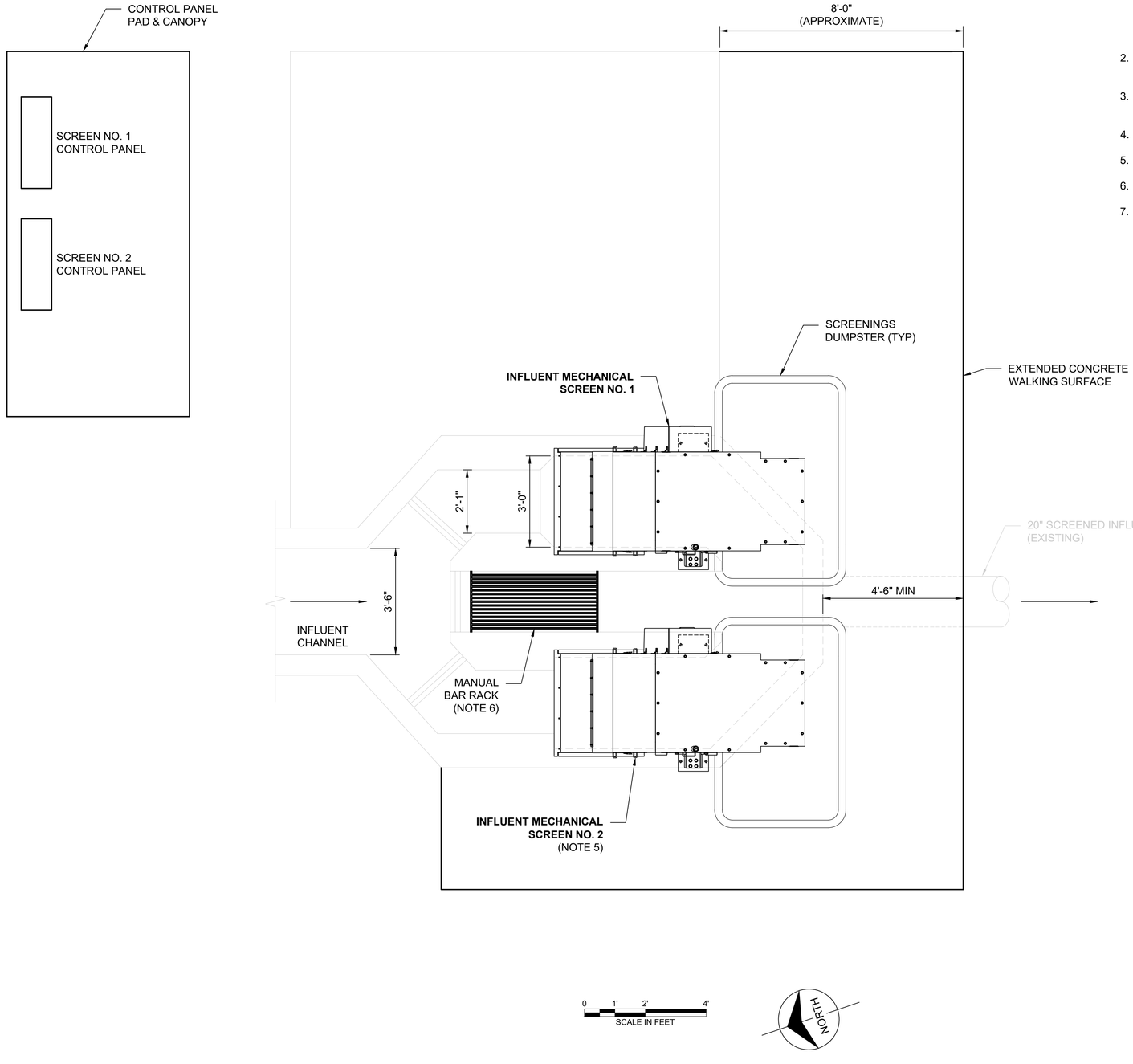

NOTES:

1. EXTENDED CONCRETE SURFACE SHALL BE PROVIDED TO ALLOW ROLLING OF SCREENINGS DUMPSTERS FROM SCREEN DISCHARGE TO ACCESS DRIVE FOR RETRIEVAL BY GARBAGE TRUCK. EXISTING CONCRETE SURFACE SHALL BE MODIFIED AS NECESSARY TO ALLOW FREE ROLLING. HANDRAIL SHALL BE PROVIDED AS NECESSARY FOR FALL PROTECTION.
2. NEW CONDUIT SHALL BE INSTALLED IN NEW CONCRETE SURFACE SURROUNDING BYPASS CHANNEL TO ALLOW AUTOMATIC SCREEN NO. 2 AND ASSOCIATED CONTROL PANEL TO BE INSTALLED.
3. EXISTING ENCLOSURE SHALL BE DEMOLISHED AND EXISTING CONCRETE CHANNEL AND SURROUNDING STRUCTURE MODIFIED AS NECESSARY TO ACCEPT NEW SCREENING EQUIPMENT.
4. EXISTING BURIED PIPING AND CONDUIT SHALL BE PROTECTED DURING CONSTRUCTION.
5. NEW EFFLUENT GATE OR STOP PLATE SHALL BE PROVIDED DOWNSTREAM OF NEW AUTOMATIC SCREEN NO. 2.
6. EXISTING MANUALLY CLEANED BAR RACK SHALL BE REMOVED AND REPLACED.
7. EXISTING 20-INCH SCREENED INFLUENT SHALL BE UPSIZED TO 24-INCH IN YARD.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
CENTRAL SCREENING STRUCTURE
NEW SCREENS & CONCRETE SURFACE

project	contract
172636	

drawing **200D101** rev. **A**

sheet of sheets

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Discipline
License No.

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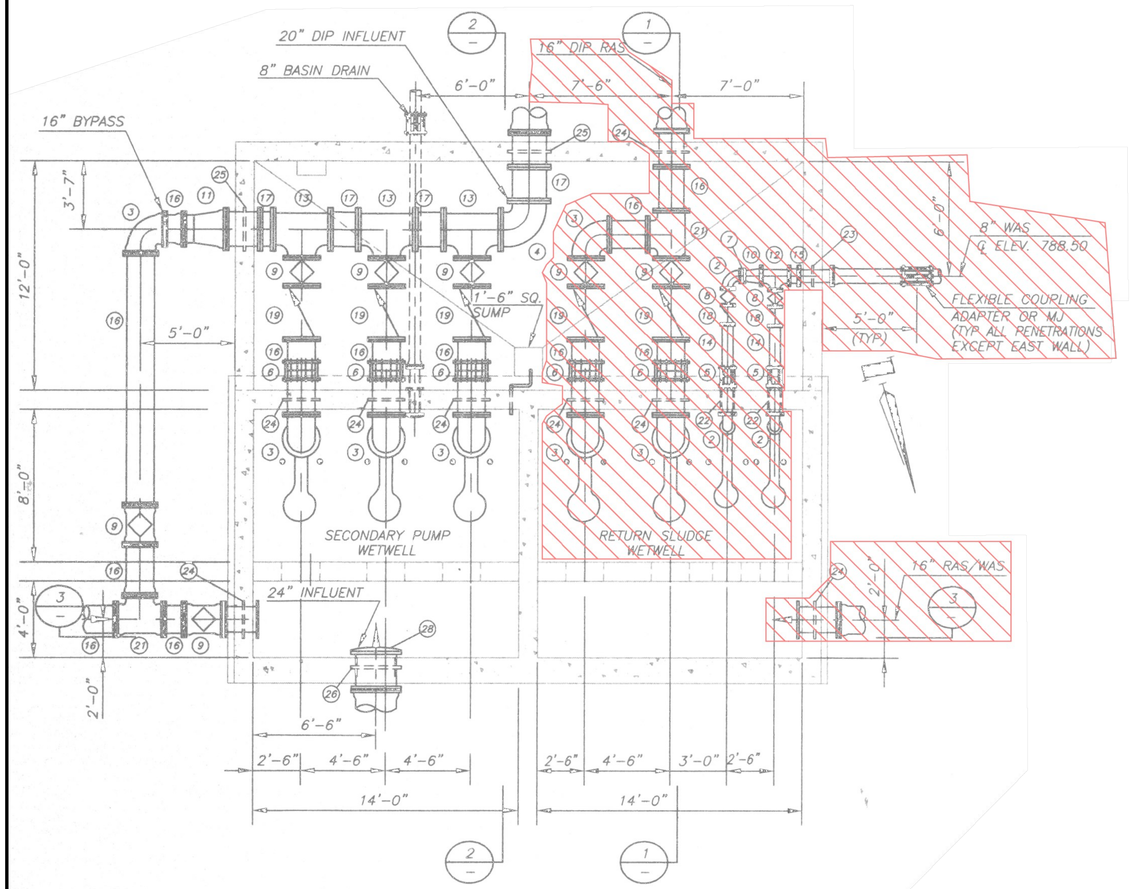
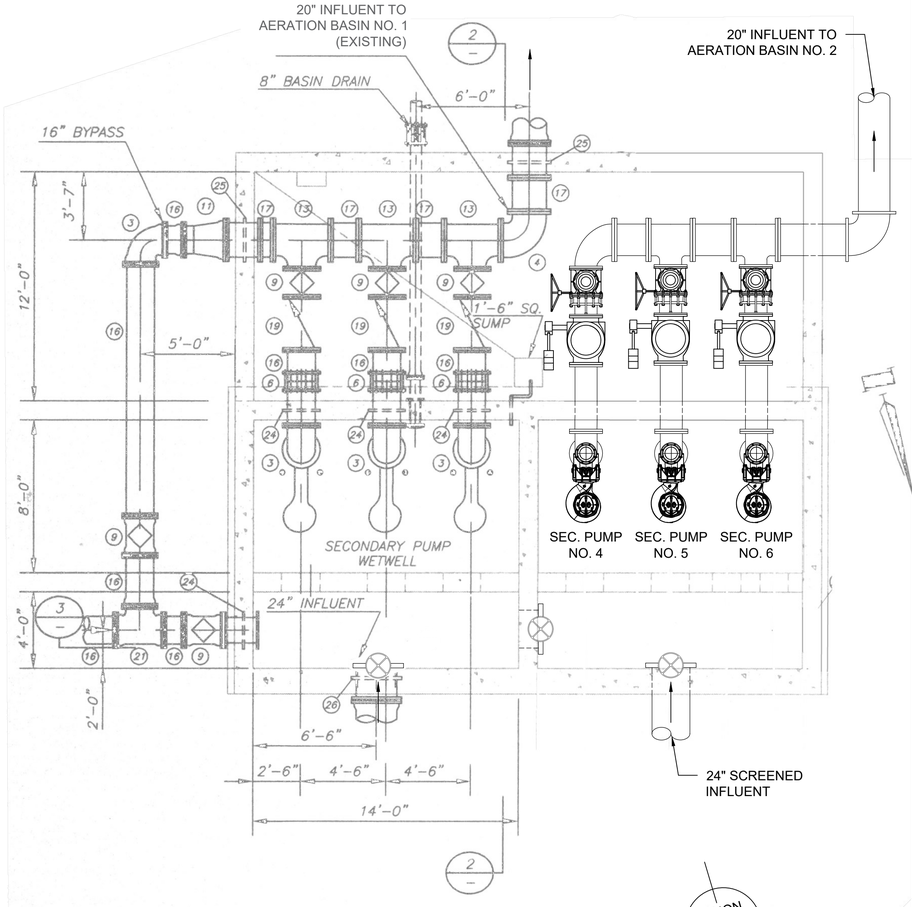
NOTES:

1. EXISTING INFLUENT LINE TO AERATION BASIN NO. 1 SHALL HAVE EXISTING FLOW METER UPSIZED TO 20 INCHES. NEW INFLUENT LINE TO AERATION BASIN NO. 2 SHALL BE PROVIDED. EACH PUMPING SET SHALL BE INDEPENDENTLY CONTROLLED TO ALLOW DIRECT CONTROL OVER PUMPING RATE TO EACH AERATION BASIN.



DEMOLITION PLAN



IMPROVEMENTS PLAN

NORTH

0 2' 4' 8'
SCALE IN FEET

Name
Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
SECONDARY PUMPING IMPROVEMENTS
GENERAL PROCESS PLAN

project	contract
172636	

drawing **240D101 – A** rev.

sheet of sheets

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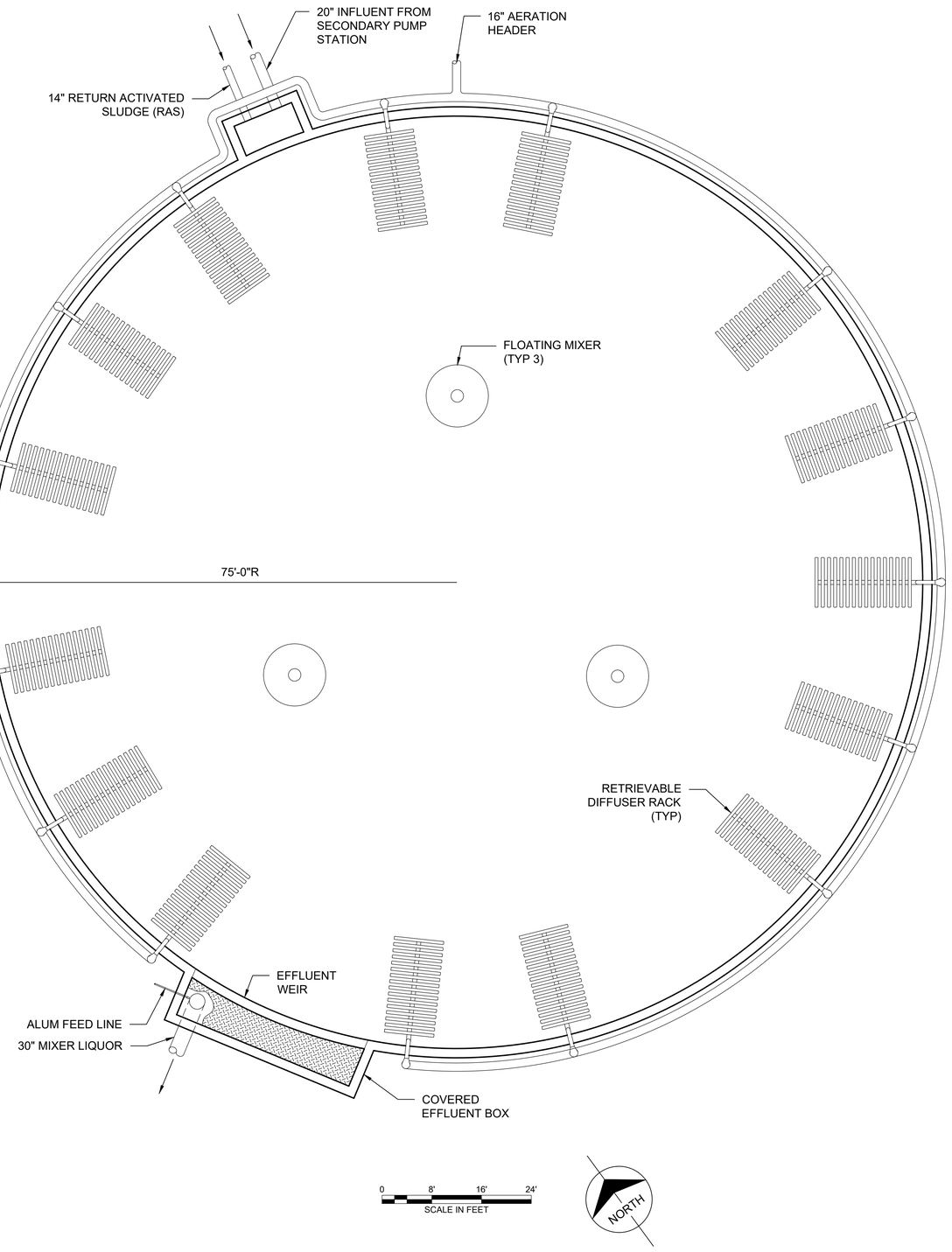
NOTES:
1. REDUCED AERATION BASIN SIZING SHALL BE CONSIDERED DURING DETAILED DESIGN TO MATCH THE DIMENSIONS OF THE EXISTING AERATION BASIN.



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Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
AERATION BASIN NO. 2
GENERAL PROCESS PLAN

project	contract
172636	

drawing **280D101** rev. **A**

sheet of sheets

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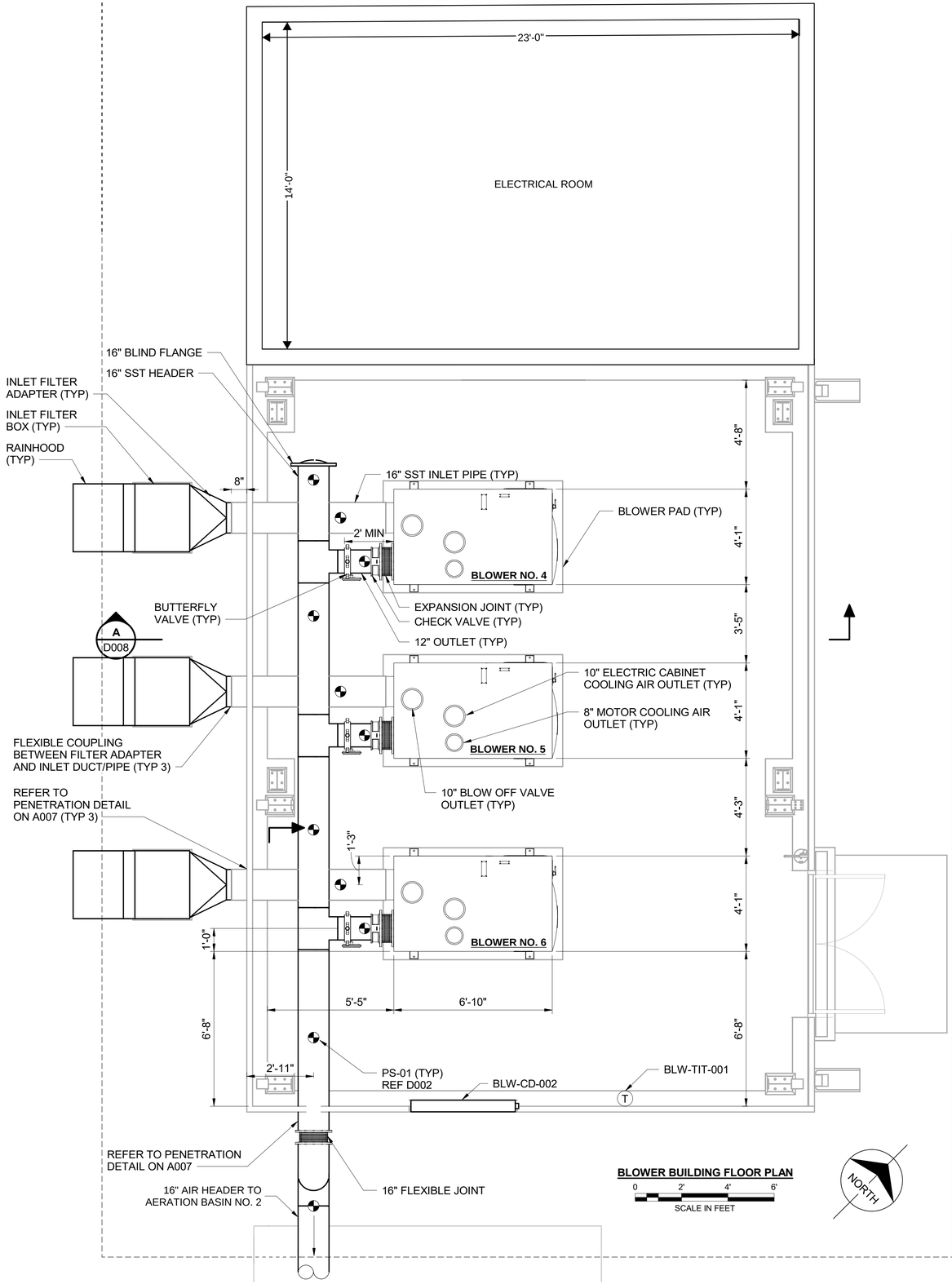

GENERAL NOTES:

1. AIR PIPING TO BE 304 STAINLESS STEEL SCH 10 UNLESS OTHERWISE NOTED.

no.	date	by	ckd	description

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P. WARD	

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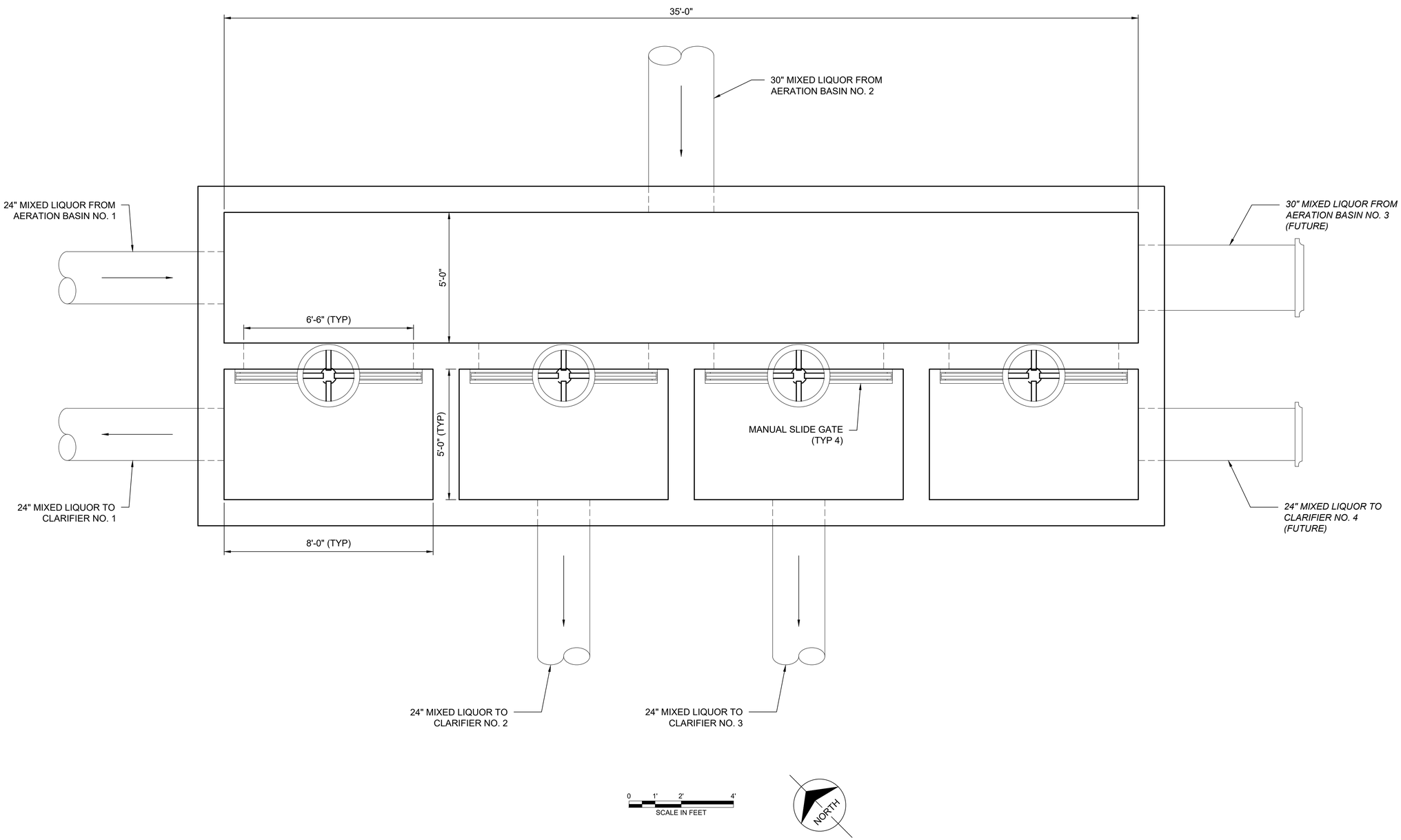
CENTRAL CONSOLIDATION
BLOWER BUILDING NO. 2
GENERAL PROCESS PLAN

project	contract
172636	

drawing **320D101** — **rev. A**

sheet of sheets
file

NOTES:
1.



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Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
CLARIFIER SPLITTER STRUCTURE
GENERAL PROCESS PLAN

project	contract
172636	

drawing **360D101** — rev. **A**

sheet of sheets

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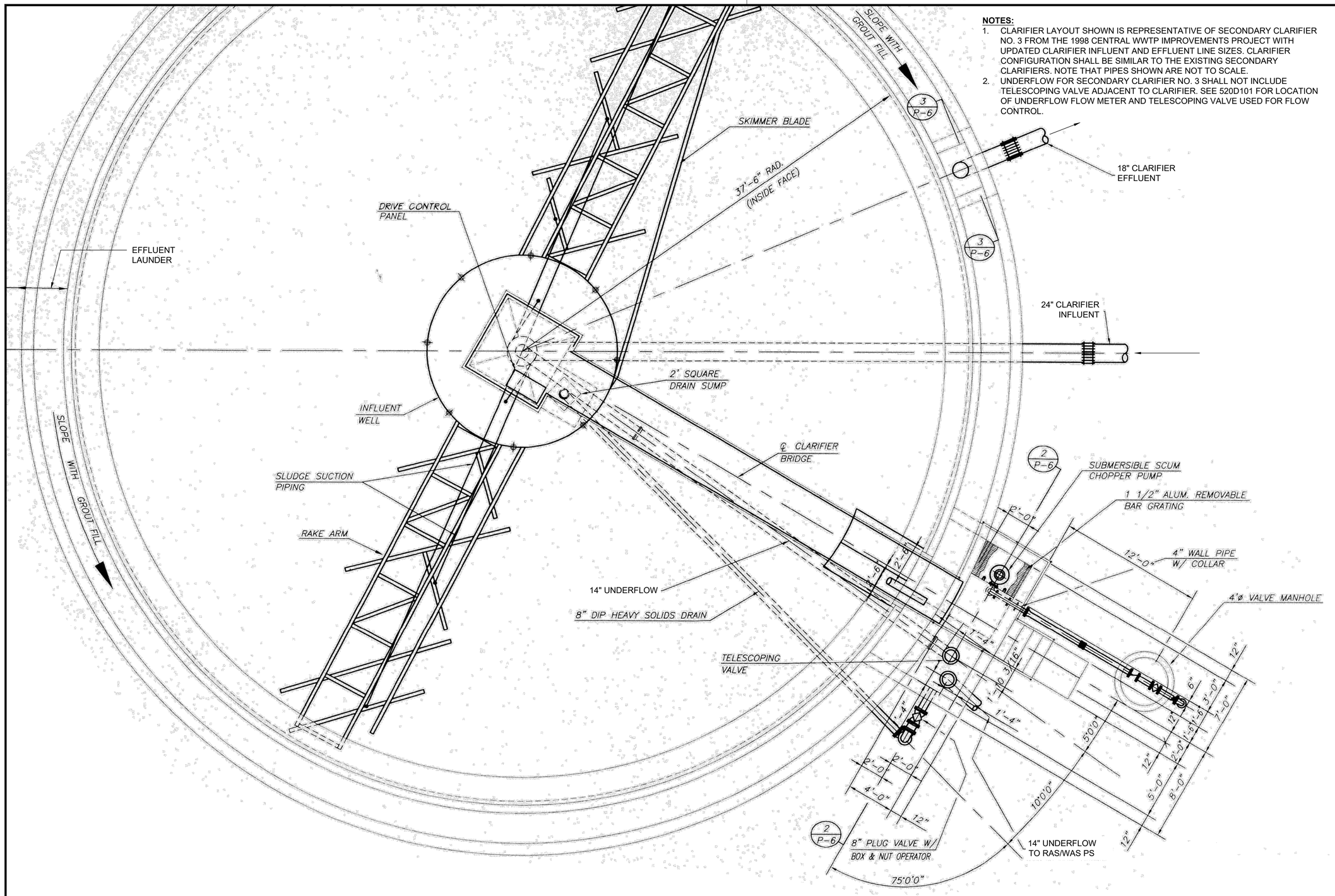
NOTES:

1. CLARIFIER LAYOUT SHOWN IS REPRESENTATIVE OF SECONDARY CLARIFIER NO. 3 FROM THE 1998 CENTRAL WWTP IMPROVEMENTS PROJECT WITH UPDATED CLARIFIER INFLUENT AND EFFLUENT LINE SIZES. CLARIFIER CONFIGURATION SHALL BE SIMILAR TO THE EXISTING SECONDARY CLARIFIERS. NOTE THAT PIPES SHOWN ARE NOT TO SCALE.
2. UNDERFLOW FOR SECONDARY CLARIFIER NO. 3 SHALL NOT INCLUDE TELESCOPING VALVE ADJACENT TO CLARIFIER. SEE 520D101 FOR LOCATION OF UNDERFLOW FLOW METER AND TELESCOPING VALVE USED FOR FLOW CONTROL.



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NORTH

Name
Discipline
License No.

no.	date	by	ckd	description

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
SECONDARY CLARIFIER NO. 3
GENERAL PROCESS PLAN

project	contract
172636	

drawing **400D101** rev. **A**

sheet of sheets

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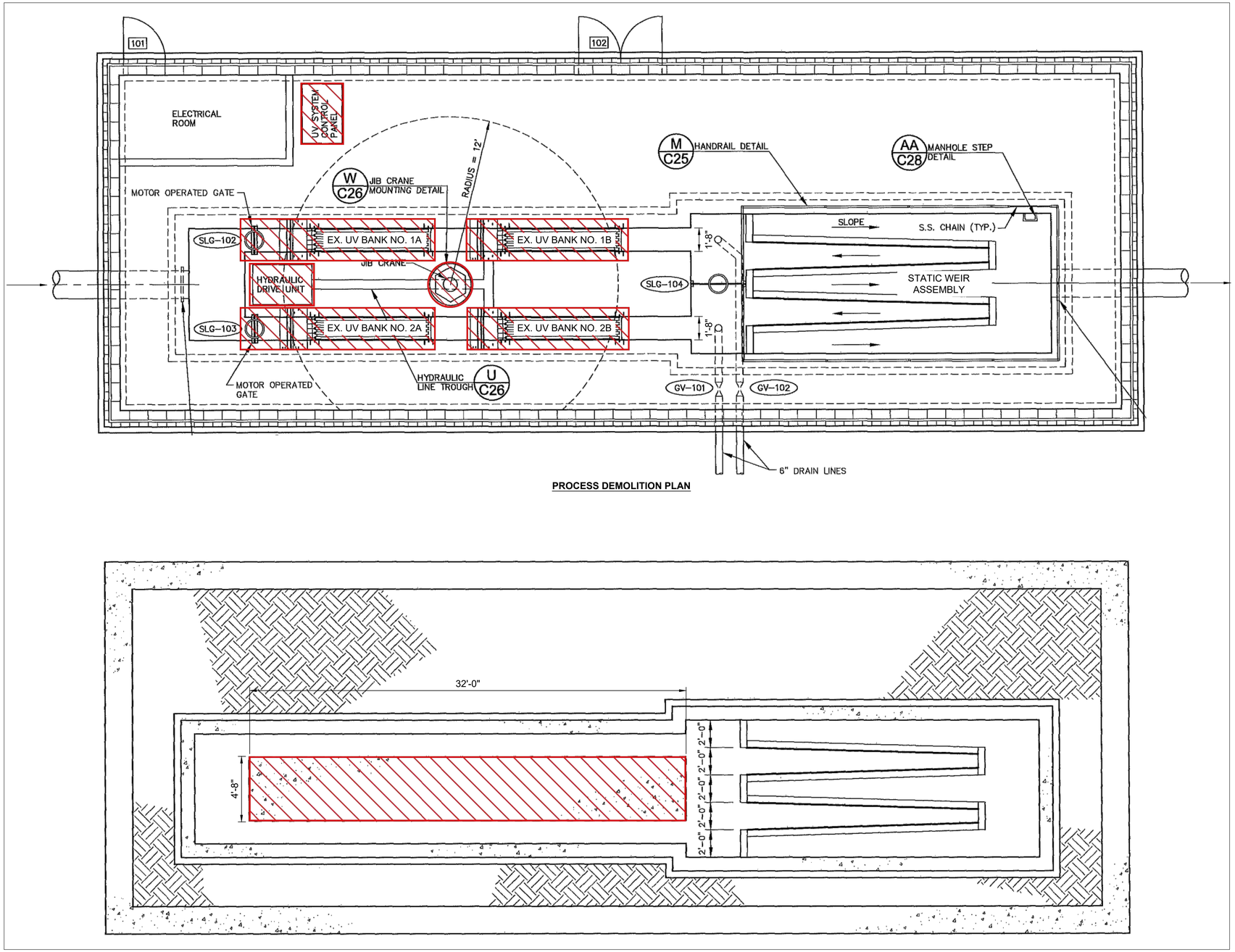
NOTES:
1. ALL UV PROCESS EQUIPMENT SHALL BE DEMOLISHED. INTERIOR CONCRETE CHANNEL DIVIDER SHALL BE DEMOLISHED TO ALLOW CONSTRUCTION OF WIDER CHANNELS.



PROCESS DEMOLITION PLAN

STRUCTURE DEMOLITION PLAN

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SCALE IN FEET

NORTH

Name
Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
ULTRAVIOLET (UV) DISINFECTION BLDG
GENERAL DEMO PLAN

project	contract
172636	

drawing **440DD101** rev. **A**

sheet of sheets

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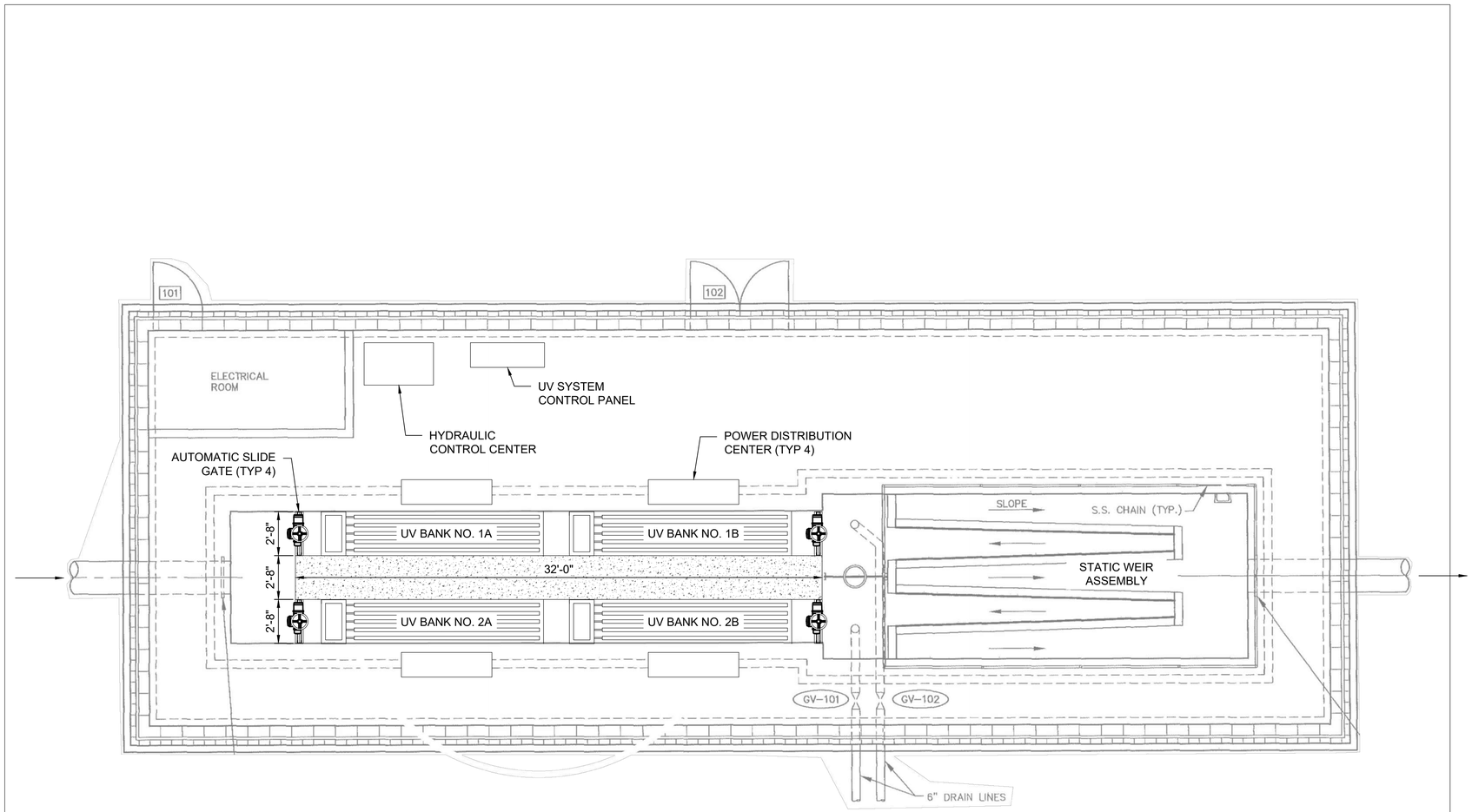
NOTES:

1. ALL UV PROCESS EQUIPMENT SHALL BE DEMOLISHED. INTERIOR CONCRETE CHANNEL DIVIDER SHALL BE DEMOLISHED TO ALLOW CONSTRUCTION OF WIDER CHANNELS.
2. DOWNSTREAM STATIC WEIR ASSEMBLY MAY REQUIRE REPLACEMENT TO ACCOMMODATE PEAK FLOW OF 10.5 MGD.



no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
ULTRAVIOLET (UV) DISINFECTION BLDG
GENERAL PROCESS PLAN

project	contract
172636	

drawing **440D101** rev. **A**

sheet of sheets

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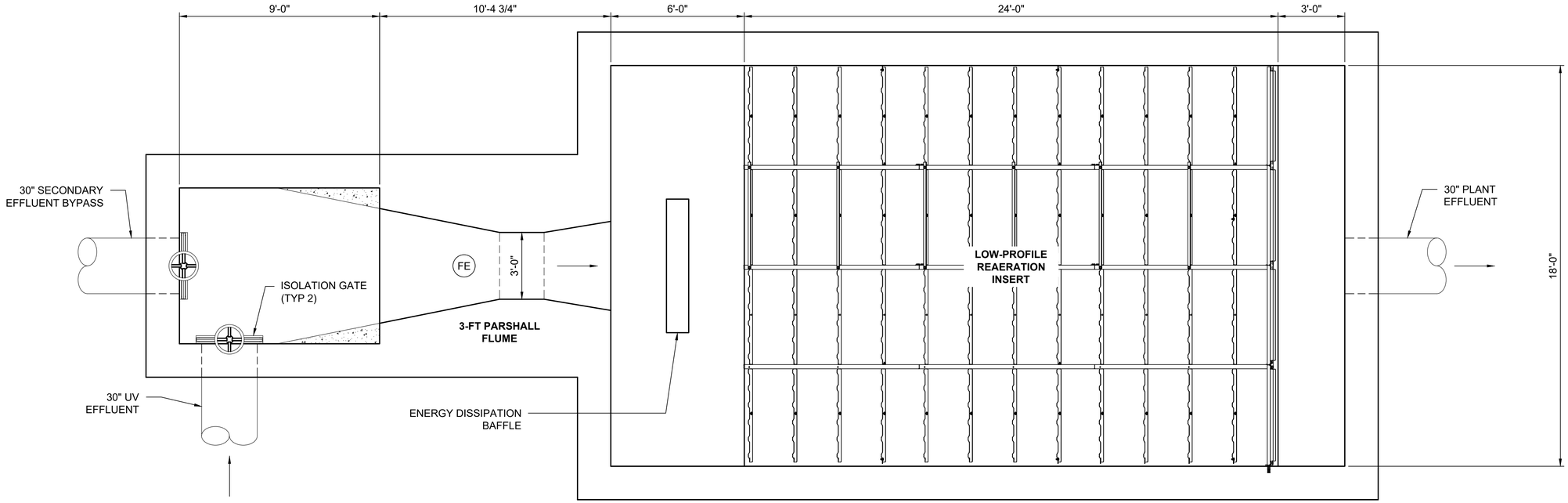

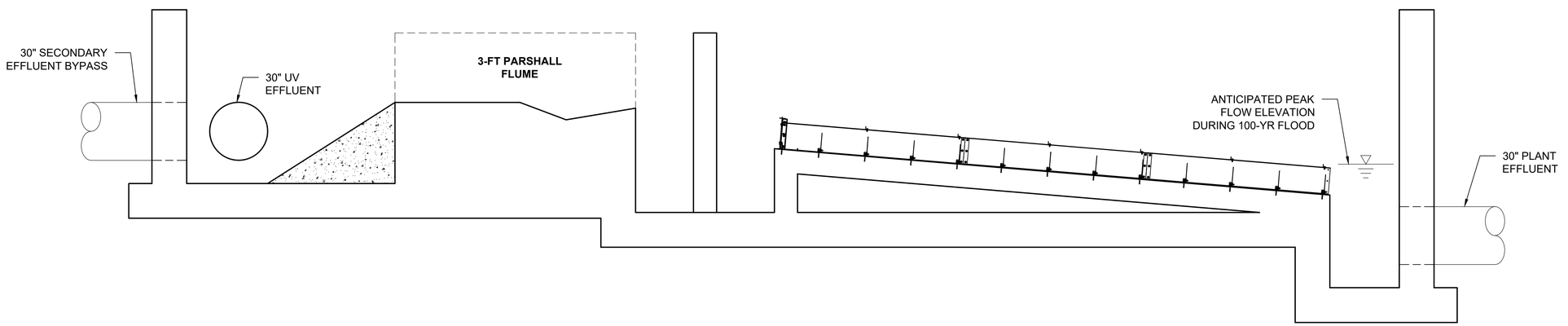

NOTES:
1.

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SCALE IN FEET

NORTH

Name
Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
EFFLUENT PARSHALL FLUME & REAERATION
GENERAL PROCESS PLAN

project	contract
172636	

drawing **460D101** rev. **A**

sheet of sheets

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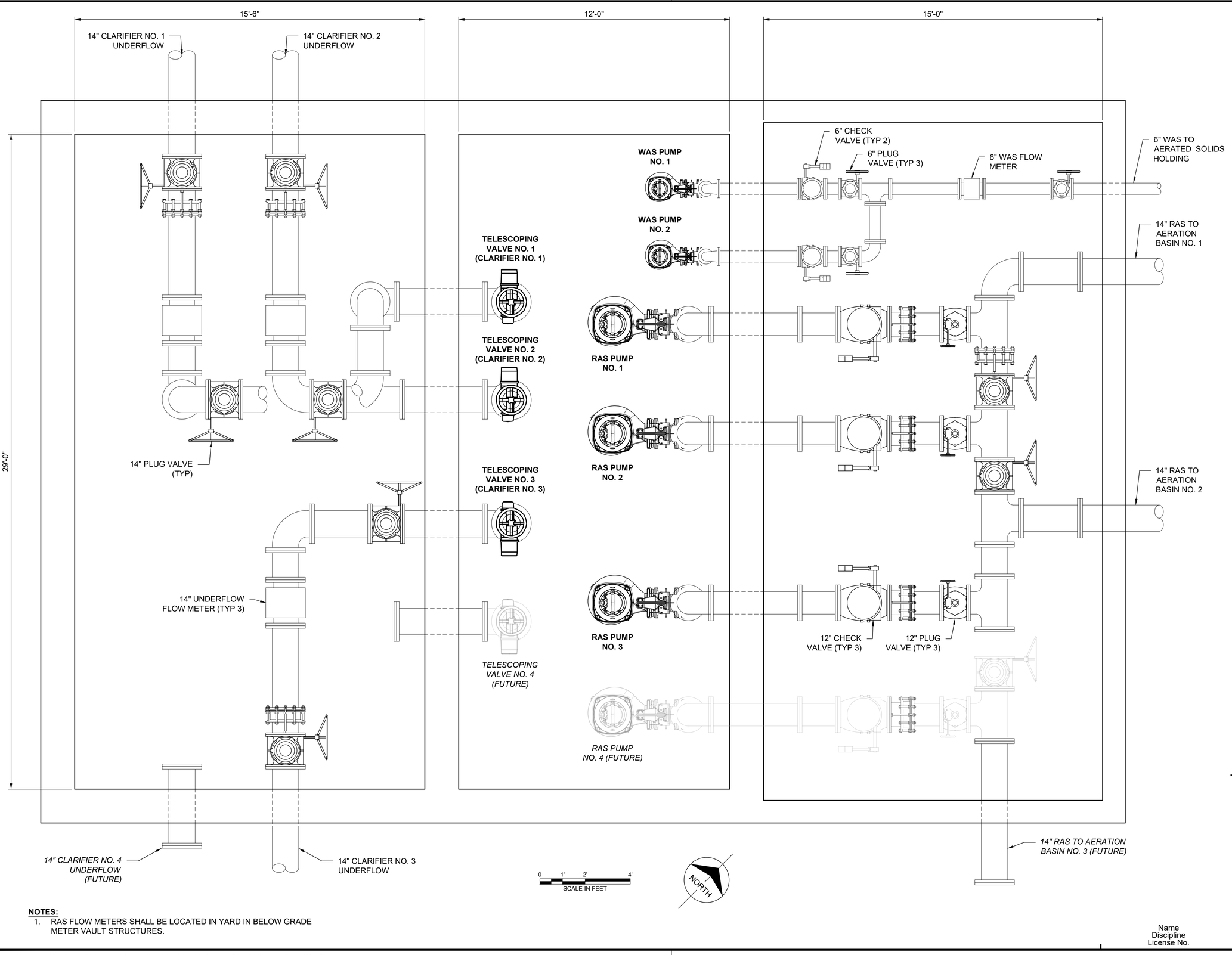

NOTES:

1. RAS FLOW METERS SHALL BE LOCATED IN YARD IN BELOW GRADE METER VAULT STRUCTURES.

Name
Discipline
License No.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
RAS/WAS PUMP STATION
GENERAL PROCESS PLAN

project	contract
172636	

drawing **520D101** — rev. **A**

sheet of sheets
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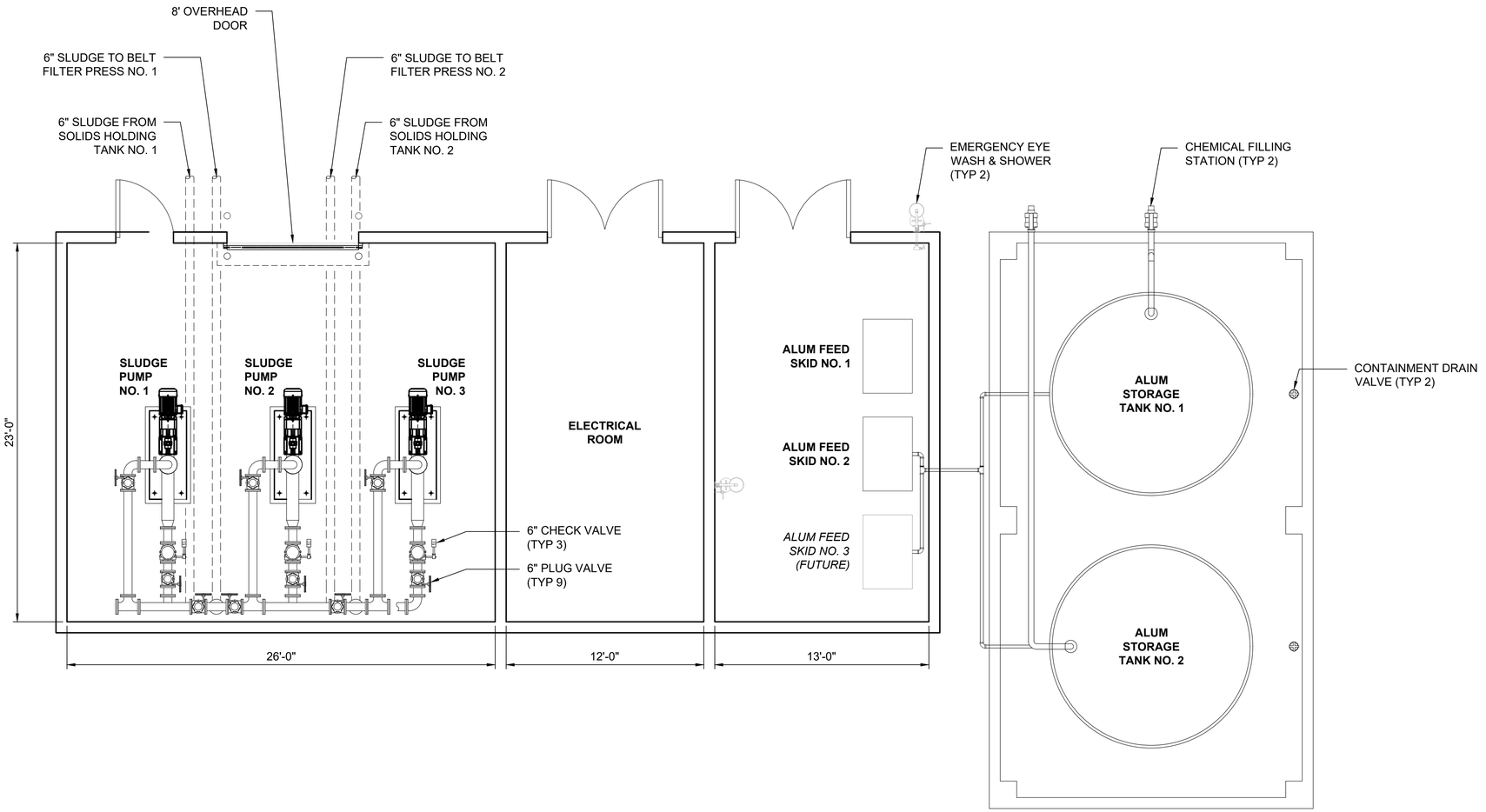

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SCALE IN FEET

NORTH

NOTES:

1. ALUM STORAGE AREA SHALL BE COVERED WITH PRE-ENGINEERED METAL CANOPY AND PROVIDED WITH CONCRETE CONTAINMENT STRUCTURE.
2. EXTERIOR CHEMICAL FEED PIPING SHALL BE HEAT-TRACED AND INSULATED. CHEMICAL STORAGE TANKS SHALL BE HEAT-TRACED FIBER REINFORCED PLASTIC (FRP) WITH FACTORY-APPLIED SPRAY INSULATION.

no.	date	by	ckd	description

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NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
SLUDGE PUMPING & ALUM FEED BUILDING
GENERAL PROCESS PLAN

project	contract
172636	

drawing **560D101** rev. **A**

sheet of sheets

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Discipline
License No.

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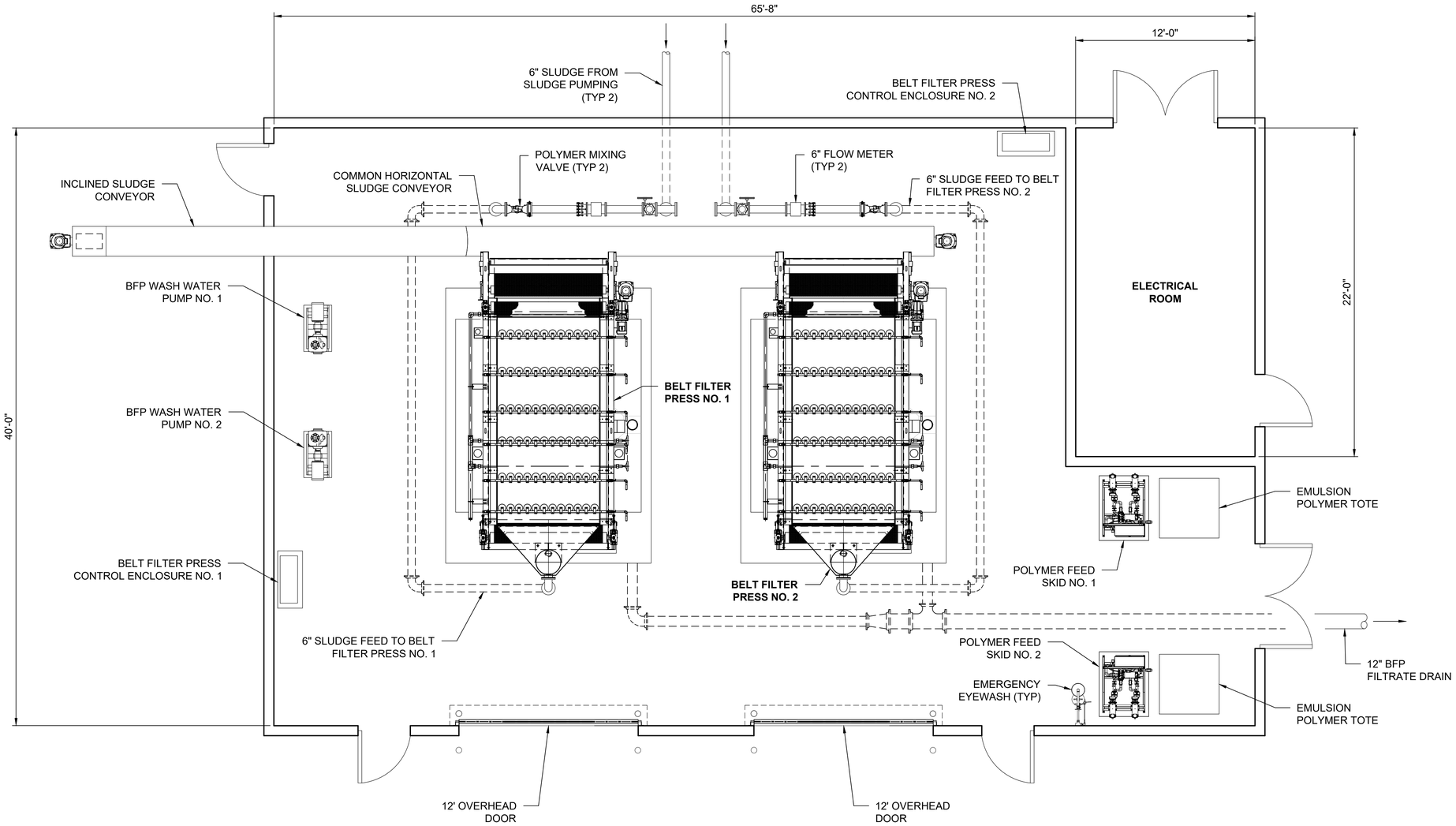


NOTES:
1. POLYMER PIPING SHALL BE FIELD ROUTED FROM POLYMER FEED SKID TO POLYMER MIXING VALVES.
2. WASH WATER SUPPLY LINES ARE NOT SHOWN.
3. PROCESS AREA SHALL BE VENTILATED AT AIR FLOW RATE EQUIVALENT TO SIX (6) AIR CHANGES PER HOUR TO ACHIEVE UNCLASSIFIED SPACE PER NFPA 820.

0 2' 4' 8'
SCALE IN FEET

NORTH

Name
Discipline
License No.

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co., Inc
LICENSE NO. 000165

date	detailed
MAY 2025	P. WARD
designed	checked
P. WARD	CHECKER

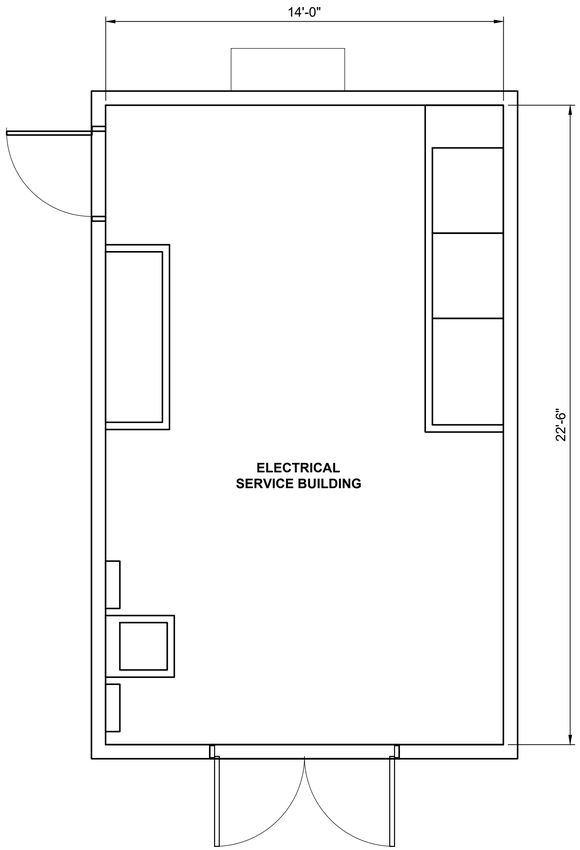
SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

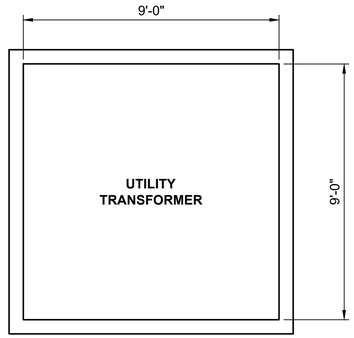
NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
SOLIDS DEWATERING BUILDING
GENERAL PROCESS PLAN

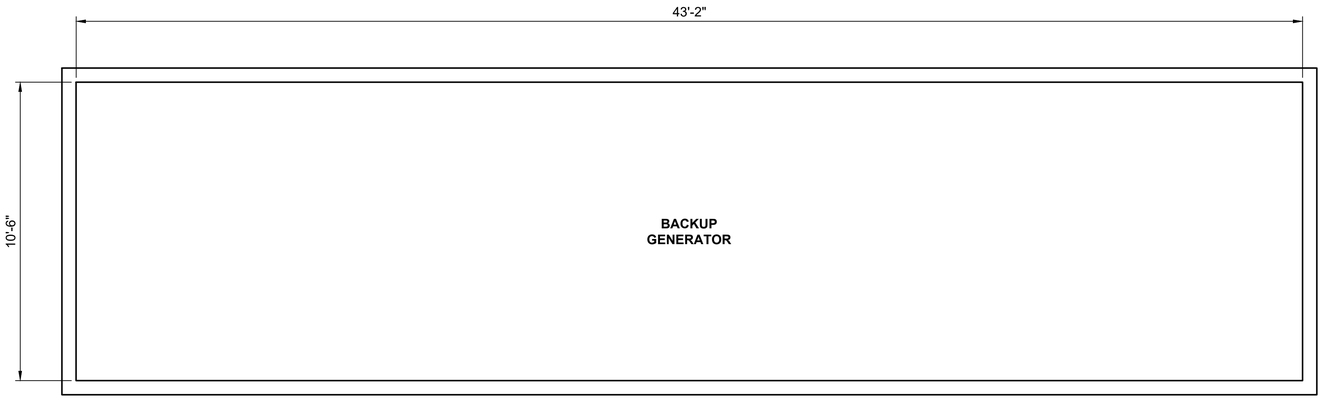
project	contract
172636	

drawing **640D101** rev. **A**

sheet of sheets
file 172636_640D101_SDB.dwg







NOTES:
1. BACKUP GENERATOR FOOTPRINT BASED ON PROVIDING ADEQUATE POWER TO RUN ALL EQUIPMENT AND UNIT PROCESSES. GENERATOR WILL BE SIZED PER PLANT DEMAND DURING DETAILED DESIGN.
2. LOCATION OF UTILITY TRANSFORMER TO BE DETERMINED DURING DETAILED DESIGN TO COMPLY WITH EVERGY REQUIREMENTS.

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JULY 2025	J. RECKART
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J. RECKART	CHECKER

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PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
CENTRAL CONSOLIDATION
ELECTRICAL DISTRIBUTION BUILDING
GENERAL PLAN

project	contract
172636	

drawing **800E101** — rev. **A**

sheet of sheets
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PAD MOUNTED
UTILITY TRANSFORMER
XXX KVA-480Y/277V, 3-PHASE,
4-WIRE, 60 HZ, XXX% Z
(ESTIMATED)

ELECTRIC UTILITY

KWH UTILITY METER

OWNER

480V RATED, 400A, 3P
NEMA 4X, GENERATOR
OUTLET

MANUAL TRANSFER CONTROLLER

S1 S2 ON OFF

2

S1 AVAILABLE

S2 AVAILABLE

S1 CONNECTED

S2 CONNECTED

S1 TRIPPED

S2 TRIPPED

NSP-MTS-001
400A, 3P, XXKAIC
NEMA 1 ENCLOSURE
SOLID NEUTRAL,
SERVICE ENTRANCE RATED,
OPEN TRANSITION,
NON-AUTOMATIC

XXXA
3P

SPD

BONDING JUMPER

G

N

#3/0 BC

GENERAL NOTE:

1. ALL VFD'S INSTALLED SHALL BE 18-PULSE.

EQUIPMENT TAGGING

1 TERMINATION BOX FOR SPLICING SUBMERSIBLE CABLES TO FIELD CABLES. NEMA 4X SST ENCLOSURE WITH BACK PANEL.

VFD ABBREVIATIONS:

CT CONSTANT TORQUE
VT VARIABLE TORQUE

TRANSFER SWITCH OPERATION:

1. WHEN THE SWITCH IS IN SOURCE MODE "S1" THE TRANSFER SWITCH SHALL BE SWITCHED TO NORMAL UTILITY.
2. WHEN THE SWITCH IS IN SOURCE MODE "S2" THE TRANSFER SWITCH SHALL BE SWITCHED OVER TO TEMPORARY GENERATOR.
3. IF KEYED SWITCH IS IN THE "ON" POSITION, SOURCE IS CONNECTED TO LOAD. IN THE "OFF" POSITION, ALL SOURCES ARE DISCONNECTED FROM LOAD.
4. TEMPORARY GENERATOR SHALL BE ENERGIZED WITH CONFIRMED PHASE ROTATION PRIOR TO SWITCHING TO MODE "S2".
5. WHEN UTILITY POWER IS RESTORED, THE OPERATOR SHALL RE-TRANSFER TO UTILITY MODE "S1".

POWER DISTRIBUTION PANEL NSP-PDP-001

EPM

MLO

400A MAIN BUS, MAIN LUG ONLY (MLO), 480V, 3-PHASE, 3-WIRE, 60 HZ, 65 KAIC, NEMA 1

90A 3P | 90A 3P | 90A 3P | 90A 3P | 30A 3P | 30A 3P | 60A 3P | SPACES TO 42-POLES

SPD

N

G

#3/0 BC TO GROUND LOOP

VFD NSP-VFD-101 (VT)	VFD NSP-VFD-201 (VT)	VFD NSP-VFD-301 (VT)	VFD NSP-VFD-401 (VT)	SCREEN SYSTEM MAIN CONTROL PANEL NSP-MCP-101	SCREEN SYSTEM MAIN CONTROL PANEL NSP-MCP-102	NSP-XF-001 30KVA XFMR 480V-208Y/120V 3-PHASE, 4-WIRE, 60 HZ	100A 3P SPD
1	1	1	1				
30	30	30	30	5	5		
NORTH PLANT SUBMERSIBLE PUMP NSP-P-101	NORTH PLANT SUBMERSIBLE PUMP NSP-P-201	NORTH PLANT SUBMERSIBLE PUMP NSP-P-301	NORTH PLANT SUBMERSIBLE PUMP NSP-P-401	NORTH PLANT SCREEN MOTOR NSP-SCR-101	NORTH PLANT SCREEN MOTOR NSP-SCR-102	LIGHTING PANEL NSP-LP-001	

NORTH SCREEN PLANT (NSP) ONE-LINE DIAGRAM

no.	date	by	ckd	description

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J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
NORTH SCREEN PLANT
NSP-PDP-001 ONE-LINE DIAGRAM

project	contract
172636	

drawing **E010** – rev. **0**

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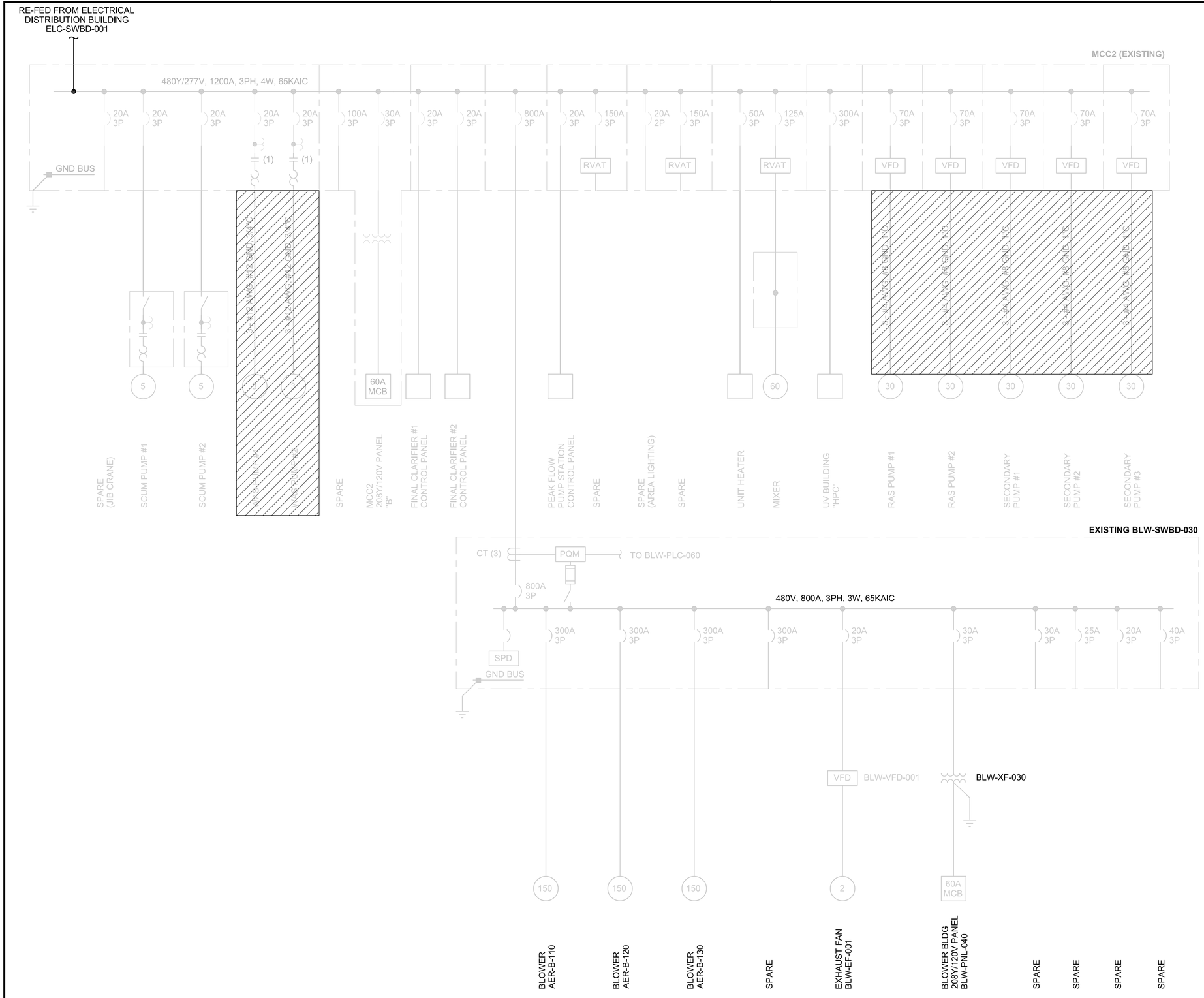

EXISTING MCC-2 AND EXISTING BLW-SWBD-030 ONE-LINE DIAGRAM

no.	date	by	ckd	description

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designed	checked
J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
EXISTING MCC-2, EXISTING BLW-SWBD-030 ONE-LINE DIAGRAMS

project	contract
172636	

drawing **E011** – rev. **0**

sheet of sheets

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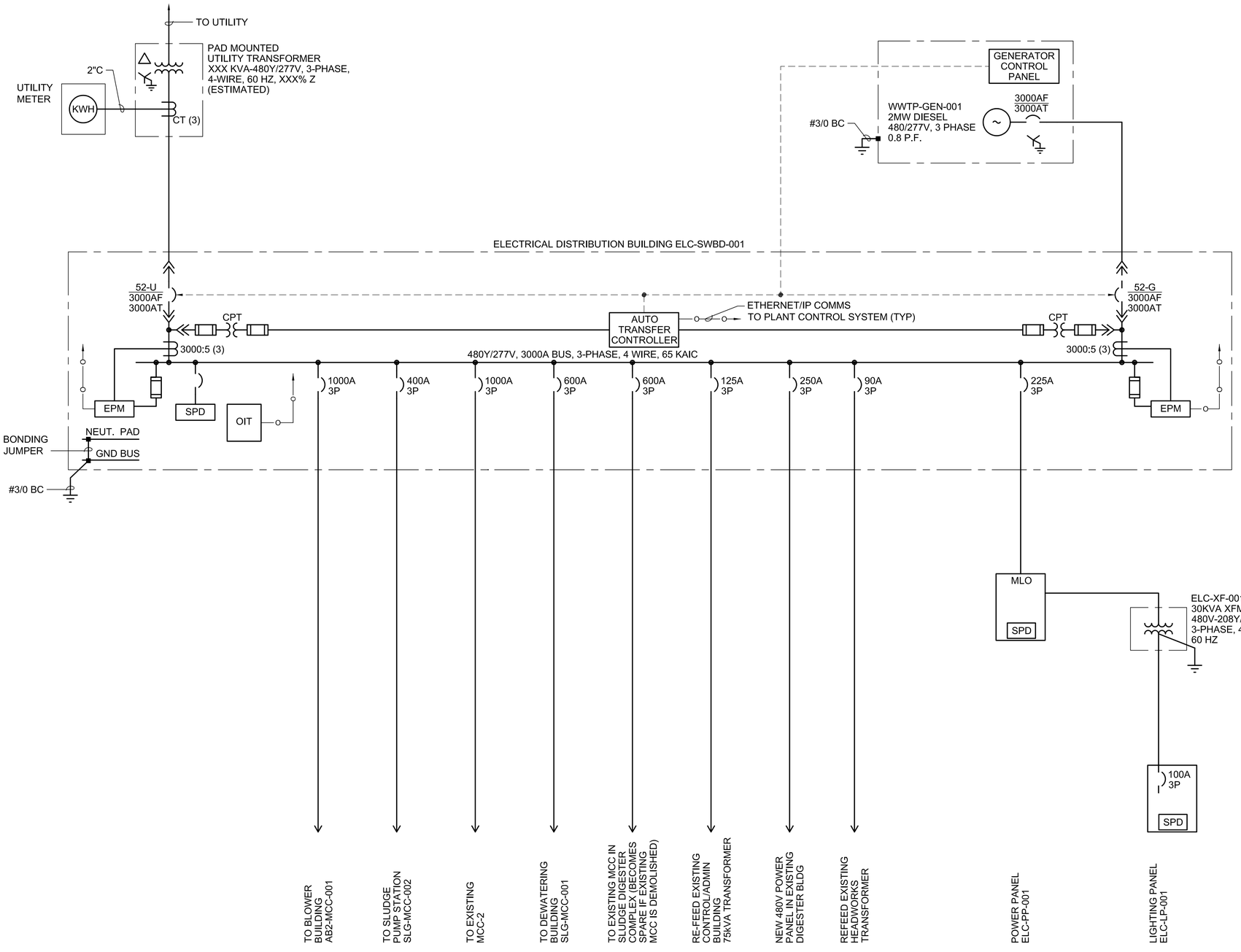

ELECTRICAL DISTRIBUTION BUILDING ELC-SWBD-001 ONE-LINE DIAGRAM

no.	date	by	ckd	description

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816-333-9400
Burns & McDonnell Engineering Co., Inc
LICENSE NO. 000165

date	detailed
JULY, 2025	J. RECKART
designed	checked
J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
ELECTRICAL DISTRIBUTION BUILDING
ELC-SWBD-001 ONE-LINE DIAGRAM

project	contract
172636	

drawing **E012** – rev. **0**

sheet of sheets

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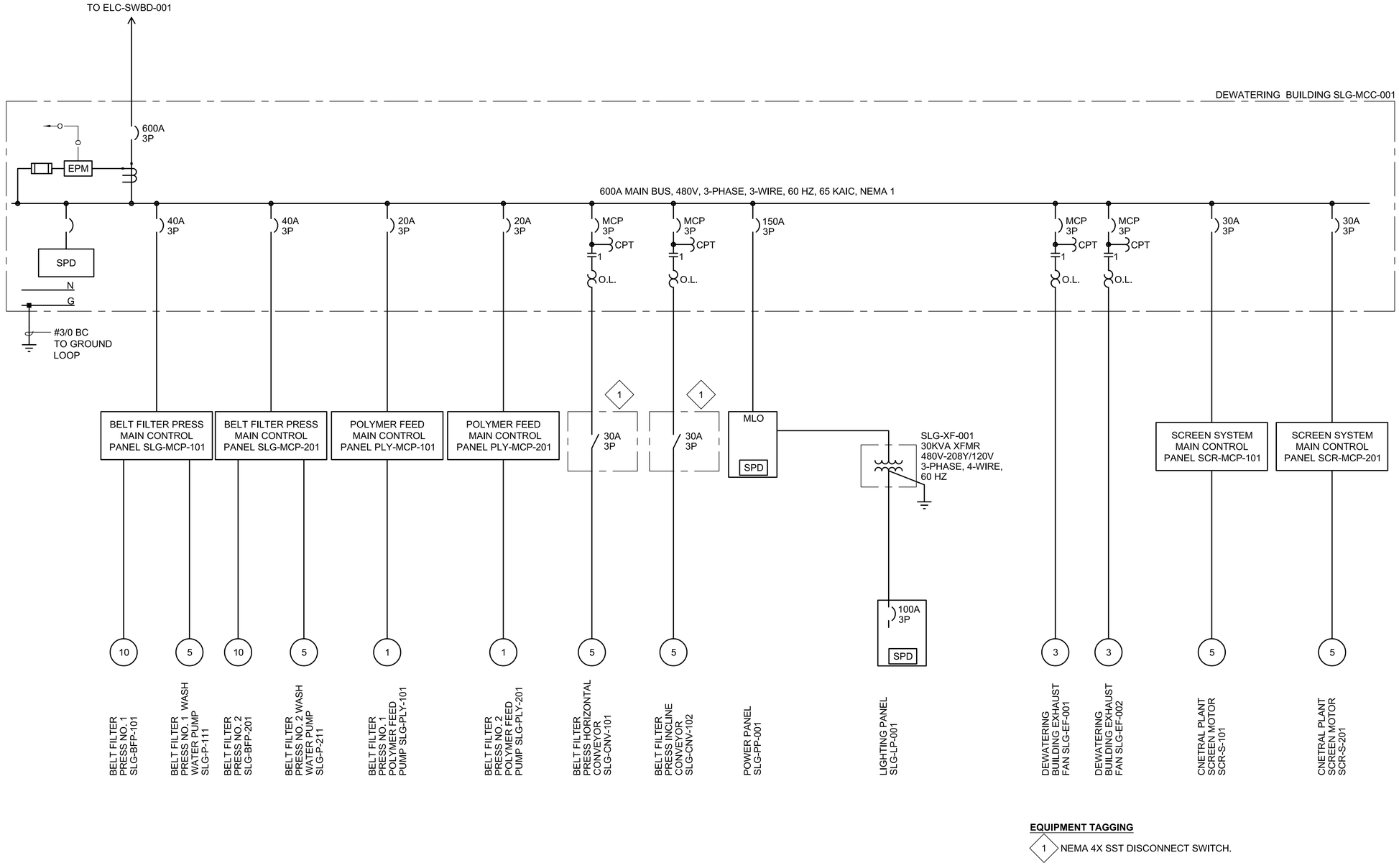

EQUIPMENT TAGGING

1 NEMA 4X SST DISCONNECT SWITCH.

DEWATERING BUILDING SLG-MCC-001 ONE-LINE DIAGRAM

no.	date	by	ckd	description

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designed	checked
J. RECKART	XXXX

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Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
DEWATERING BUILDING SLG-MCC-001
ONE-LINE DIAGRAM

project	contract
172636	

drawing **E013** – rev. **0**

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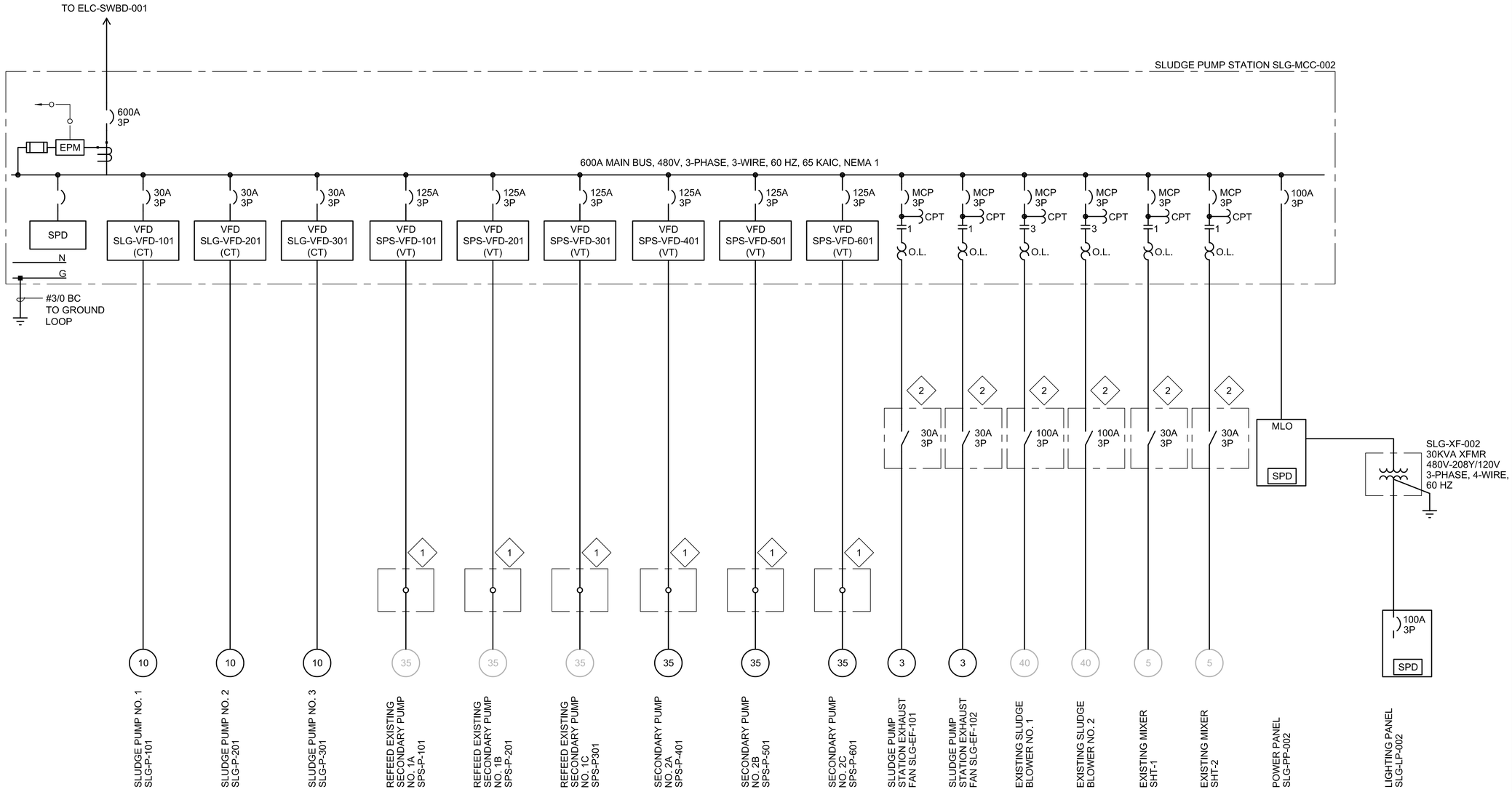

SLUDGE PUMP STATION SLG-MCC-002 ONE-LINE DIAGRAM

EQUIPMENT TAGGING

1. TERMINATION BOX FOR SPLICING SUBMERSIBLE CABLES TO FIELD CABLES. NEMA 4X SST ENCLOSURE WITH BACK PANEL.
2. NEMA 4X SST DISCONNECT SWITCH.

VFD ABBREVIATIONS:

CT CONSTANT TORQUE
VT VARIABLE TORQUE

GENERAL NOTE:

1. ALL VFD'S INSTALLED WITHIN THE MCC SHALL BE 18-PULSE.

no.	date	by	ckd	description

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J. RECKART	XXXX

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Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
SLUDGE PUMP STATION SLG-MCC-002
ONE-LINE DIAGRAM

project	contract
172636	

drawing **E014** – rev. **0**

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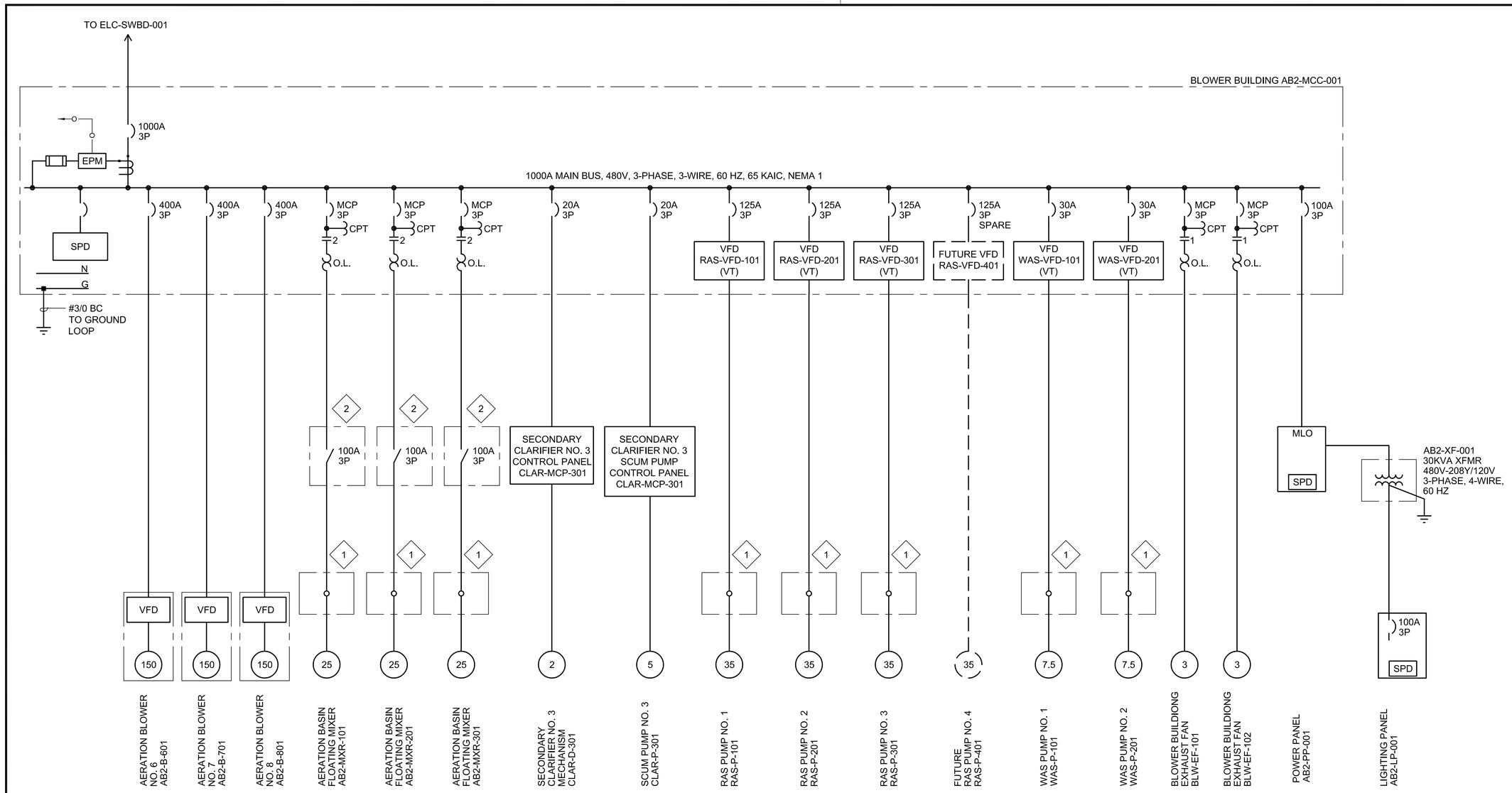

EQUIPMENT TAGGING

1. TERMINATION BOX FOR SPLICING SUBMERSIBLE CABLES TO FIELD CABLES. NEMA 4X SST ENCLOSURE WITH BACK PANEL.
2. NEMA 4X SST DISCONNECT SWITCH.

VFD ABBREVIATIONS:

CT CONSTANT TORQUE
VT VARIABLE TORQUE

GENERAL NOTE:

1. ALL VFD'S INSTALLED WITHIN THE MCC SHALL BE 18-PULSE.

BLOWER BUILDING AB2-MCC-001 ONE-LINE DIAGRAM

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

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9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co., Inc
LICENSE NO. 000165

date	detailed
JULY, 2025	J. RECKART
designed	checked
J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
BLOWER BUILDING AB2-MCC-001
ONE-LINE DIAGRAM

project	contract
172636	

drawing **E015** – rev. **0**

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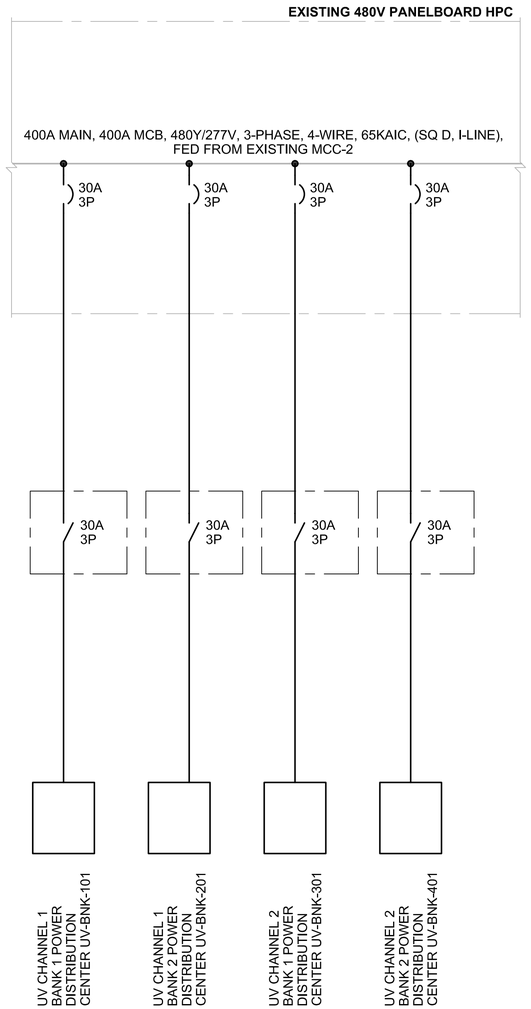

MODIFICATIONS FOR NEW UV SYSTEM POWER DISTRIBUTION CENTERS TO EXISTING 480V PANELBOARD HPC

GENERAL NOTE:

1. REMOVE EXISTING 20A/3P BREAKERS IN EXISTING PANELBOARD HPC (POLES 11,12,13, 14) FEEDING THE EXISTING TROJAN UV SYSTEM. REPLACE WITH NEW 30A/3P BREAKERS MATCHING PANELBOARD MANUFACTURER.

no.	date	by	ckd	description

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816-333-9400
Burns & McDonnell Engineering Co., Inc
LICENSE NO. 000165

date	detailed
JULY, 2025	J. RECKART
designed	checked
J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
UV BUILDING EXISTING HPC
PARTIAL ONE-LINE DIAGRAM

project	contract
172636	

drawing **E016** – rev. **0**

sheet of sheets

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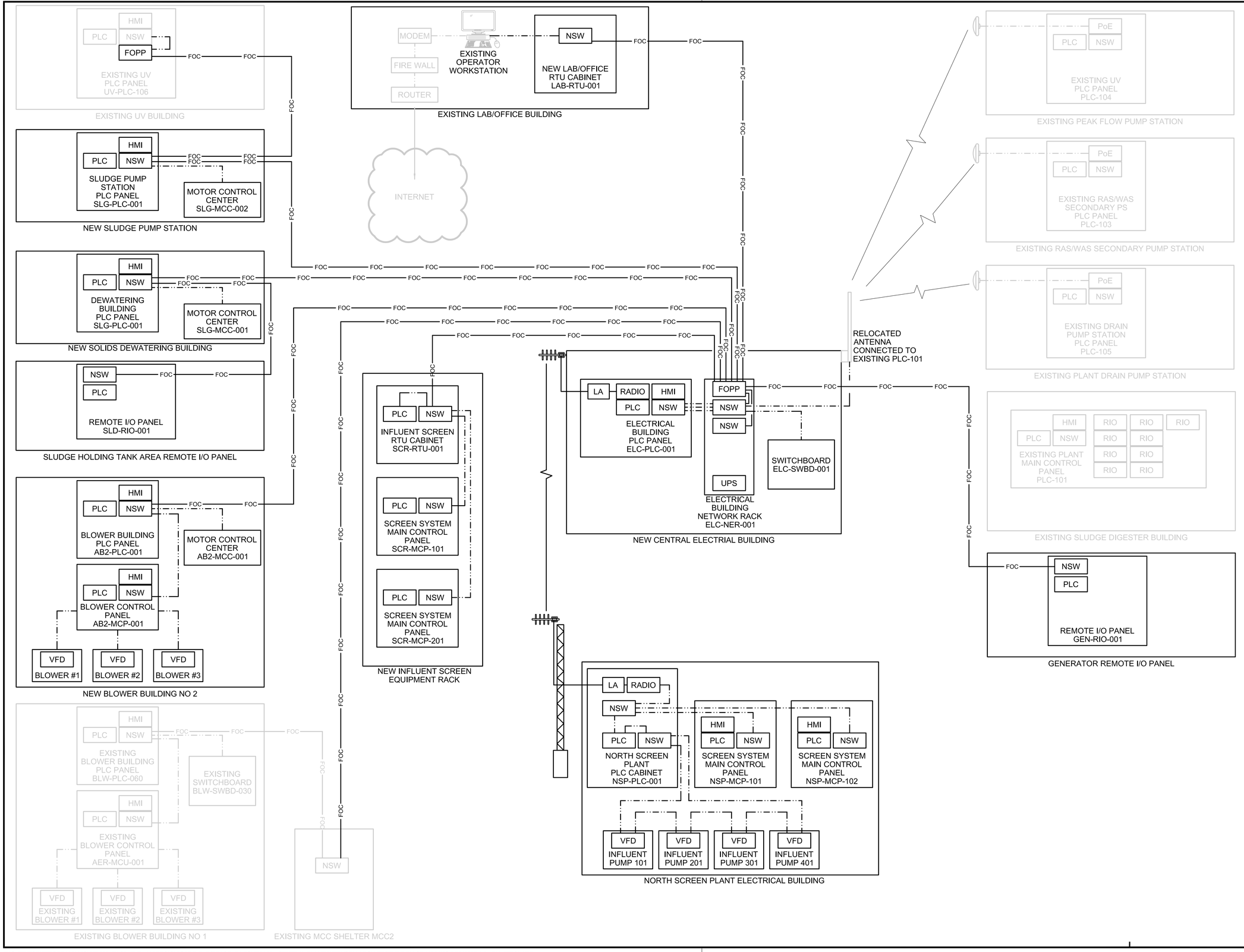

no.	date	by	ckd	description

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816-333-9400
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date	detailed
JULY, 2025	J. RECKART
designed	checked
J. RECKART	XXXX

SEDALIA
Let's Cross Paths
PETTIS COUNTY, MISSOURI

NORTH & CENTRAL WWTP FACILITY PLAN
ELECTRICAL
CENTRAL WASTEWATER TREATMENT PLANT NETWORK ARCHITECTURE DIAGRAM

project	contract
172636	

drawing **E021** – rev. **0**

sheet of sheets

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