DESIGN PROFESSIONAL SERVICES AGREEMENT
FOR PROJECT NUMBER 81001000 / CONTRACT NUMBER 1678
ROCKY BRANCH WWTP FACILITY PLAN
WATER SERVICES DEPARTMENT

CITY OF KANSAS CITY, MISSOURI

This design professional services agreement is between KANSAS CITY, MISSOURI, a constitutionally chartered municipal corporation ("City"), and _____ ("Design Professional"). City and Design Professional agree as follows:

PART I

SPECIAL TERMS AND CONDITIONS

Sec. 1. Project description.

A. The services to be provided under this Agreement are for the following project (Project) and purpose: The Water Services Department wishes to contract with a Design professional to provide a Facility Plan, which will include a projections for future flows and loads, current design capacity evaluation, current plant condition, and recommendations for upgrades, repairs, and process improvements for the Rocky Branch Wastewater Treatment Plant at 500 NE 132nd Street, Kansas City, MO 64165.

Sec. 2. Services to be performed by Design Professional. Design Professional shall perform the following Scope of Services:

A. Design Professional shall perform Scope of Services listed on **Attachment A**.

B. Submit all documents, including plans, design drawings, specifications, reports, maps, models and renderings in the form requested by City. A list with the specific requirements is included in **Attachment B.**

C. City shall have the right to inspect and review the work being done and to consult with Design Professional at any reasonable time. Conferences will be held at the request of City or Design Professional.

D. If it is determined to be in the best interest of the work, Design Professional shall replace the project manager or any other employee of the Design Professional, Subcontractors, Suppliers or other persons or organizations performing or furnishing any of the work on the project upon written request by the City.

E. City's General Conditions shall be furnished to Design Professional prior to signing this Agreement. If the General Conditions are modified, City will notify Design Professional. If the Scope of Services performed by Design Professional under this Agreement includes construction phase services, then Design Professional shall perform such additional tasks set forth in the General Conditions, including approval of Change Orders, and shall comply with the limitations set forth in the General Conditions, except as otherwise amended.

Sec. 3. Term. Unless sooner terminated as provided herein, and unless specific dates for providing services are identified in this Agreement, this Agreement shall remain in force for a period which may reasonably be required for the completion of the services to be provided by Design Professional under the Scope of Services. Work under this agreement shall begin upon written Notice to Proceed.

Sec. 4. Compensation and Reimbursables.

A. The maximum amount that City shall pay Design Professional under this Agreement is $_____, as follows:

1. $_____ for the services performed by Design Professional under this Agreement.

2. For Design Professional services described in the Scope of Services, City shall pay Design Professional compensation amounting to actual salary of personnel for time charges directly to the project, times an Approved Multiplier. The multiplier to be used shall not exceed 3.04. The Approved Multiplier shall also apply to the Design Professional subcontractors listed in the "Non-Construction Subcontractors Listing" found in **Attachment G**. A schedule of position classifications and the salary range for each position is included as a part of **Attachment C.**

   A schedule of expenses and position classifications with the billing rate for each position is included as a part of **Attachment C**. Design Professional and approved subcontractors may negotiate to revise their Schedules of Hourly Rates and Expenses annually and will submit the revised Schedule of Hourly Rates and Expenses to the City each year that this Agreement is in effect. Revisions will only be made after 12 months have passed from the contract execution date or the most recent rate revision. Subject to City approval, the revised Schedule of Hourly Rates and Expenses shall become effective with regard to this Agreement and the Services performed under any particular Contract Amendments on the date the City approves the revised Schedule. *Note: List reimbursable expenses, if any, allowed under this Agreement. Be certain to delete this note before your final Agreement document is printed.*

a. Actual reasonable expenses incurred by Design Professional directly related to Design Professional's performance under this Agreement, to include only the following, in an amount not to exceed $_____. The following are the reimbursable expenses that City has approved: $_____.

3. Design Professionals' maximum amount shown in Sec. 4, Compensation and Reimbursables, includes a total allowance amount of $_____ for Optional Services not yet authorized by the City that may be required throughout the course of work. This allowance amount will not be utilized by Design Professional unless specifically authorized in writing by the City to perform Optional Services. Optional Services will not be performed, nor is the Design Professional approved to utilize any allowance monies unless the City provides written authorization to Design Professional that includes the scope of work for each optional task to be performed and a maximum billing limit for compensation that has been mutually agreed upon.

4. Compensation for all Optional Services will be based on the actual salary of office personnel for time charges directly to the project, times an approved multiplier. The multiplier to be used shall not exceed 3.04. Engineering Fee Summary and schedule of position classifications and the salary range for each position is included as a part of **Attachment C**. The amount billed for each Optional
   Service shall not exceed the amount established for it without further written authorization. Additional amounts for Optional Services may be authorized, if deemed by CITY to be necessary, as the work progresses.

5. City is not liable for any obligation incurred by Design Professional except as approved under the provisions of this Agreement.

B. Method of Payment.
   Design Professional shall invoice City Monthly setting forth the total effort expended on an hourly basis and all actual reasonable expenses incurred and allowed under this Agreement. City, upon approving the invoice, shall remit payment.

C. Condition Precedent to Payment.

   It shall be a condition precedent to payment of any invoice from Design Professional that Design Professional is in compliance with, and not in breach or default of, all terms, covenants and conditions of this Agreement. If damages are sustained by City as a result of breach or default by Design Professional, City may withhold payment(s) to Design Professional for the purpose of set off until such time as the exact amount of damages due City from Design Professional may be determined, and

D. No request for payment will be processed unless the request is in proper form, correctly computed, and is approved as payable under Agreement. City is not liable for any obligation incurred by Design Professional except as approved under the provisions of this Agreement.

E. No request for payment will be processed unless it is accompanied by a copy of the most recent 00485.01 M/WBE Monthly Utilization Report submitted to the City's Human Relations Department.

Sec. 5. Notices. All notices required by this Agreement shall be in writing and sent to the following:

City:

Water Services Department
Wes Minder, Director
Address: 4800 E. 63rd Street, Kansas City, MO 64130
Phone: (816) 513-0504
E-mail address: Wes.Minder@kcmo.org

Design Professional:

_____
Contact: _____
Address: _____
Phone: (__) ___-____
E-mail address: _____

All notices are effective (a) when delivered in person, (b) upon confirmation of receipt when transmitted by facsimile transmission or by electronic mail, (c) upon receipt after dispatch by registered or certified mail, postage prepaid, (d) on the next business day if transmitted by overnight courier (with confirmation of delivery), or (e) three (3) business days after the date of mailing, whichever is earlier.

Sec. 6. Merger. This Agreement consists of Part I, Special Terms and Conditions and any Attachments and any documents incorporated by reference; and Part II, Standard Terms and Conditions. This Agreement, including any Attachments and incorporated documents, constitutes the entire agreement between City and Design Professional with respect to this subject matter.

Sec. 7. Conflict Between Agreement Parts. In the event of any conflict or ambiguity between the Special Terms and Conditions of Part I and the Standard Terms and Conditions of Part II of this Agreement, Part I will be controlling.

Sec. 8. Responsibilities of City. City shall:

A. Make available to Design Professional all existing records, maps, plans, and other data possessed by City when such are necessary, advisable, or helpful to Design Professional in the completion of the work under this Agreement.

B. If required or upon recommendation of Design Professional, retains the services of a soils/geotechnical consultant.

C. Designate in writing a person to act as City representative with respect to the work to be performed under this Agreement; with such person having complete authority to transmit instructions, receive information, interpret and define City's policies and decisions with respect to the materials, equipment elements and systems pertinent to the work covered by this Agreement, and the responsibility to be available to inspect and review the work and to consult with Design Professional at any reasonable time.

D. Provide standard City forms as required.

E. Provide City – Licensed Geographical Information System Data set forth in **Attachment E**, incorporated into this Agreement.

Sec. 9. Attachments to Part I. The following documents are attachments to Part I of this Agreement and are attached hereto and incorporated herein by this reference:

Attachment A – Scope of Services (See Exhibit B)
Attachment B – Electronic Format Requirements
Attachment C – Engineering Fee Summary and Schedule of Position Classifications
Attachment D – CREO Documents
HRD Form 6: HRD Instructions for Requests for Qualifications/Proposals
HRD Form 8: Contractor Utilization Plan/Request for Waiver

HRD Form 10: Timetable for MBE/WBE Utilization
HRD Form 11: Request for Modification or Substitution
00450.01 Letter of Intent to Subcontract
01290.14 Contractor Affidavit for Final Payment
01290.15 Subcontractor Affidavit for Final Payment

Attachment E – Licensed Geographical Information System Data
Attachment F – Employee Eligibility Verification Affidavit
Attachment G – Non-Construction Subcontractors Listing
Attachment H – Non-Construction Application for Payment
Attachment I – CREO KC Affirmative Action Program Affidavit

Sec. 10. Subcontracting. Design Professional agrees that it will only subcontract with the subcontractor(s) it has listed on the "Non-Construction Subcontractors Listing" form under **Attachment G.**

Sec. 11. Contract Information Management System. Design Professional shall comply with City's Contract Information Management System requirements. Design Professional shall use City's Internet web based Contract Information Management System/Project Management Communications Tool provided by City and protocols included in that software during the term of this Contract. Design Professional shall maintain user applications to City's provided system for all personnel, subcontractors or suppliers as applicable.

Sec. 12. Minority and Women's Business Enterprises. City is committed to ensuring that minority and women's business enterprises (M/WBE) participate to the maximum extent possible in the performance of City contracts. If M/WBE participation goals have been set for this Agreement, Design Professional agrees to comply with all requirements of City's M/WBE Program as enacted in City's Code Sections 3-421 through 3-469 and as hereinafter amended. Design Professional shall make its good faith efforts in carrying out this policy by implementing its contractor utilization plan, which is attached as **Attachment D**. If Design Professional fails to achieve the M/WBE goals stated in its contractor utilization plan, as amended, the City will sustain damages, the exact extent of which would be difficult or impossible to ascertain or estimate at the time of execution of this contract. Therefore, in order to liquidate those damages, the monetary difference between the amount of the M/WBE goals set forth in this contractor utilization plan, as amended, and the amount actually paid to qualified MBEs and WBEs for performing a commercially useful function will be deducted from the Design Professional's payments as liquidated damages. In determining the amount actually paid to qualified MBEs and WBEs, no credit will be given for the portion of participation that was not approved by the Director of City's Civil Rights and Equal Opportunity Division, unless the Director determines that the Design Professional acted in good faith. No deduction for liquidated damages will be made when, for reasons beyond the control of the Design Professional, the M/WBE participation stated in the Contractor Utilization Plan, as amended and approved by the Director, is not met.

Sec. 13. Professional services certification. Code Section 2-83, prohibiting Agreements with certain attorneys, architects, engineers and other professionals thereunder, shall apply to this Agreement. Design Professional certifies that it is not an architect, engineer, or other professional, exclusive of medical doctors or appraisers, who at the time of the issuance of the Agreement, serves as an expert witness for any litigation against City, and that it will not serve as an expert witness for any litigation against City during the term of this Agreement.

Sec. 14. Effectiveness; Date. This Agreement will become effective when the City's Director of Finance has signed it. The date this Agreement is signed by the City's Director of Finance will be deemed the date of this Agreement.

Each party is signing this Agreement on the date stated opposite that party's signature.

THIS AGREEMENT CONTAINS INDEMNIFICATION PROVISIONS

DESIGN PROFESSIONAL

I hereby certify that I have authority to execute this document on behalf of Design Professional

Date:_____

By: _____

Name: _____

Title: _____

KANSAS CITY, MISSOURI

Date:_____

By: _____

Name: _____

Title: _____

_____

Assistant City Attorney

I hereby certify that there is a balance, otherwise unencumbered, to the credit of the appropriation to which the foregoing expenditure is to be charged, and a cash balance, otherwise unencumbered, in the Treasury, to the credit of the fund from which payment is to be made, each sufficient to meet the obligation hereby incurred.

_____

Director of Finance Date

PART II

STANDARD TERMS AND CONDITIONS

Sec. 1. General Indemnification.

A. For purposes of this Section 1 only, the following terms shall have the meanings listed:

1. **Claims** means all claims, damages, liability, losses, costs and expenses, court costs and reasonable attorneys' fees, including attorneys' fees incurred by the City in the enforcement of this indemnity obligation.

2. **Design Professional's Agents** means Design Professional's officers, employees, subcontractors, subconsultants, successors, assigns, invitees, and other agents.

3. **City** means City, its Program Manager/Construction Advisor and any of their agents, officials, officers and employees.

B. Design Professional's obligations under this Section with respect to indemnification for acts or omissions, including negligence, of City shall be limited to the coverage and limits of General (not Professional) Liability insurance that Design Professional is required to procure and maintain under this Agreement. Design Professional affirms that it has had the opportunity to recover the costs of the liability insurance required in this Agreement in its contract price.

C. Design Professional shall defend, indemnify and hold harmless City from and against all Claims arising out of or resulting from all acts or omissions in connection with this Agreement caused in whole or in part by Design Professional or Design Professional's Agents, regardless of whether or not caused in part by an act or omission, including negligence, of City. Design Professional is not obligated under this Section to indemnify City for the sole negligence of City.

D. Nothing in this section shall apply to indemnification for professional negligence which is specified in a separate provision of this Agreement.

E. In no event shall the language in this section constitute or be construed as a waiver or limitation of the City's rights or defenses with regard to sovereign immunity, governmental immunity, or other official immunities and protections as provided by the federal and state constitutions or by law.

Sec. 2. Indemnification for Professional Negligence.

Design Professional shall indemnify, and hold harmless City and any of its agencies, officials, officers, or employees from and against all claims, damages, liability, losses, costs, and expenses, including court costs and reasonable attorneys' fees, to the extent caused by any negligent acts, errors, or omissions of the Design Professional, its officers, employees, subconsultants, subcontractors, successors, assigns, invitees and other agents, in the performance of professional services under this Agreement. Design Professional is not obligated under this Section to indemnify City for the negligent acts of City or any of its agencies, officials, officers, or employees.

Sec 3. Insurance.

A. Design Professional shall procure and maintain in effect throughout the duration of this Agreement, and for a period of two (2) years thereafter, insurance coverage not less than the types and amounts specified below. In the event that additional insurance, not specified herein, is required during the term of this Agreement, Design Professional shall supply such insurance at City's cost. Policies containing a Self-Insured Retention are unacceptable to City unless City approves in writing the Design Professional Self-Insured Retention.

1. Commercial General Liability Insurance: with limits of $1,000,000 per occurrence and $2,000,000 aggregate, written on an "occurrence" basis. The policy shall be written or endorsed to include the following provisions:

a. Severability of Interests Coverage applying to Additional Insureds

b. Per Project Aggregate Liability Limit or, where not available, the aggregate limit shall be $2,000,000

c. No Contractual Liability Limitation Endorsement

d. Additional Insured Endorsement, ISO form CG20 10, or its equivalent

2. Worker's Compensation Insurance: as required by statute, including Employers Liability with limits of:

Workers Compensation Statutory
Employers Liability

$100,000 accident with limits of:
$500,000 disease-policy limit
$100,000 disease-each employee

3. Commercial Automobile Liability Insurance: with a limit of $1,000,000 written on an "occurrence" basis, covering owned, hired, and non-owned automobiles. If the Design Professional owns vehicles, coverage shall be provided on an "any auto" basis. If the Design Professional does not own any vehicles, coverage shall be provided on a "hired autos" and "nonowned autos" basis. The insurance will be written on a Commercial Business Auto form, or an acceptable equivalent, and will protect against claims arising out of the operation of motor vehicles, as to acts done in connection with the Agreement, by Design Professional.

4. Professional Liability Insurance with limits Per Claim/Annual Aggregate of $1,000,000.

B. The Commercial General Liability Insurance specified above shall provide that City and its agencies, officials, officers, and employees, while acting within the scope of their authority, will be named as additional insureds for the services performed under this Agreement. Design Professional shall provide to City at execution of this Agreement a certificate of insurance showing all required endorsements and additional insureds. The certificates of insurance will contain a provision stating that should any of the policies described in the certificate be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions.

C. The Commercial General Liability and Commercial Automobile Liability insurance specified above shall contain a cross-liability or severability of interest clause or endorsement and shall contain a provision or endorsement that the costs of providing the insureds a defense and appeal, including attorneys' fees, as insureds, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's responsibility. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance. With respect to Commercial Automobile Liability, Commercial General Liability, and any Umbrella Liability Insurance, Design Professional shall require its insurance carrier(s) to waive all rights of subrogation against City and its agencies, officials, officers, and employees.

D. All insurance coverage must be written by companies that have an A.M. Best's rating of "A-V" or better, and are licensed or approved by the State of Missouri to do business in Missouri.

E. Design Professional's failure to maintain the required insurance coverage will not relieve Contractor of its contractual obligation to indemnify the City pursuant to Sections 1 and 2. If the coverage afforded is cancelled or

changed or its renewal is refused, Design Professional shall give at least 30 days prior written notice to City. In the event of Design Professional's failure to maintain the required insurance in effect, City may order Design Professional to immediately stop work, and upon ten (10) days notice and an opportunity to cure, may pursue its remedies for breach of this Agreement as provided for herein and by law.

F. In no event shall the language in this Section constitute or be construed as a waiver or limitation of the City's rights or defenses with regard to sovereign immunity, governmental immunity, or other official immunities and protections as provided by the federal and state constitutions or by law.

Sec. 4. Design Standards and Endorsement.

A. Except as otherwise directed in writing by City, in the performance of services under this Agreement, Design Professional shall comply with all design standards required by federal, state, local laws or codes including but not limited to all applicable provisions of:

1. Title II of the 2010 ADA Standards for Accessible Design as amended from time to time;
2. the Clean Air Act(42 U.S.C. 7401 *et seq.* and the Clean Water Act (33 U.S.C. 1251 *et seq.*
3. the Missouri Clean Water Law (Chapter 644 RSMo) together with any accompanying regulation(s) contained in the Missouri Code of State Regulations (CSR Title 10), as well as any implementing permits; and
4. Kansas City Code Sec. 3-71. LEED gold standard.

Design Professional shall notify and explain to City any applicable exceptions under these acts.

B. Design Professional shall use all design standards recognized and used in the industry in the performance of services under this agreement. Design Professional shall endorse all plans and specifications, or estimates, and engineering data furnished under this Agreement if prepared by Design Professional. All subcontractors as appropriate shall endorse their respective plans and specifications, or estimates, and engineering data furnished for the Plan or Project.

C. Design Professional shall monitor quality assurance for their design services and shall revise the design and plans at their own expense in case of error or oversight in design by Design Professional or any subcontractor to Design Professional.

Sec. 5. Copyright and Ownership of Documents.

A. Design Professional shall on its behalf and on behalf of its employees and agents, promptly communicate and disclose to City all computer programs, documentation, software and other copyrightable works and all discoveries, improvements and inventions conceived, reduced to practice or made by Design Professionals or its agents, whether solely or jointly with others, during the term of this Agreement resulting from or related to any work Design Professional or its agents may do on behalf of City or at its request. All inventions and copyrightable works that Design Professional is obligated to disclose shall be and remain entirely the property of City. It is agreed that all inventions and copyrightable works are works made for hire and shall be the exclusive property of City. Design Professional hereby assigns to City any rights it may have in such copyrightable works. Design Professional shall cooperate with City in obtaining any copyrights or patents.

B. Original documents, including plans, specifications, reports, maps, models and renderings, including electronic media, prepared or obtained under the terms of this

Agreement shall be delivered to and become the property of City and basic survey notes, diaries, sketches, charts, computations and other data shall be made available upon request by City without restriction or limitation of their use. There shall be no legal limitations upon City in the subsequent use of the documents or ideas developed in the documents. In the event that any of the documents are reused by City, the nameplates or other identification to the Design Professional will be removed and the Design Professional will be released of subsequent liabilities. In the event that any of the design drawings are reused or modified by City, the name plates or other identification to the Design Professional will be removed.

Sec. 6. Governing Law.

This Contract shall be construed and governed in accordance with the laws of the State of Missouri without giving effect to Missouri's choice of law provisions. The City and Design Professional: (1) submit to the jurisdiction of the state and federal courts located in Jackson County, Missouri; (2) waive any and all objections to jurisdiction and venue; and (3) will not raise forum non conveniens as an objection to the location of any litigation.

Sec. 7. Compliance with Laws.

Design Professional shall comply with all federal, state and local laws, ordinances and regulations applicable to the work and this Agreement.

Sec. 8. Termination for Convenience.

A. City may, at any time upon ten (10) days notice to Design Professional specifying the effective date of termination, terminate this Agreement, in whole or in part. If this Agreement is terminated by City, City shall be liable only for payment for services rendered before the effective date of termination. Design Professional shall prepare an accounting of the services performed and money spent by Design Professional up to the effective date of termination and shall return to City any remaining sums within thirty (30) days of such date.

B. If this Agreement is terminated prior to Design Professional's completion of services, all work or materials prepared or obtained by Design Professional pursuant to this Agreement shall become City's property.

C. If this Agreement is terminated prior to Design Professional's completion of the services to be performed hereunder, Design Professional shall return to City and sums paid in advance by City for services that would otherwise have had to be rendered between the effective date of termination and the original ending date of the Agreement. Design Professional shall prepare an accounting of the services performed and money spent by Design Professional up to the effective date of termination and shall return to City any remaining sums within thirty (30) days of such date.

Sec. 9. Default and Remedies.

If Design Professional shall be in default or breach of any provision of this Agreement, City may terminate this Agreement, suspend City's performance, withhold payment or invoke any other legal or equitable remedy after giving Design Professional notice and opportunity to correct such default or breach.

Sec. 10. Waiver.

Waiver by City of any term, covenant, or condition hereof shall not operate as a waiver of any subsequent breach of the same or of any term, covenant or condition. No term, covenant, or condition of this Agreement can be waived except by written consent of City, and forbearance or indulgence by City in any regard whatsoever shall not constitute a waiver of same to be performed by Design Professional to which the same may apply and, until complete performance by Design Professional of the term, covenant or

condition, City shall be entitled to invoke any remedy available to it under this Agreement or by law despite any such forbearance or indulgence.

Sec. 11. Acceptance.

No payment made under this Agreement shall be proof of satisfactory performance of the Agreement, either wholly or in part, and no payment shall be construed as acceptance of deficient or unsatisfactory work.

Sec. 12. Modification.

Unless stated otherwise in this Agreement, no provision of this Agreement may be waived, modified or amended except in writing signed by City.

Sec. 13. Headings; Construction of Agreement.

The headings of each section of this Agreement are for reference only. Unless the context of this Agreement clearly requires otherwise, all terms and words used herein, regardless of the number and gender in which used, shall be construed to include any other number, singular or plural, or any other gender, masculine, feminine or neuter, the same as if such words had been fully and properly written in that number or gender.

Sec. 14. Severability of Provisions.

Except as specifically provided in this Agreement, all of the provisions of this Agreement shall be severable. In the event that any provision of this Agreement is found by a court of competent jurisdiction to be unconstitutional or unlawful, the remaining provisions of this Agreement shall be valid unless the court finds that the valid provisions of this Agreement are so essentially and inseparably connected with and so dependent upon the invalid provisions(s) that it cannot be presumed that the parties to this Agreement could have included the valid provisions without the invalid provision(s); or unless the court finds that the valid provisions, standing alone, are incapable of being performed in accordance with the intentions of the parties.

Sec. 15. Records.

A. For purposes of this section:

1. "City" shall mean the City Auditor, the City's Internal Auditor, the City's Director of Civil Rights and Equal Opportunity Department, the City Manager, the City department administering this Contract and their delegates and agents.

2. "Record" shall mean any document, book, paper, photograph, map, sound recordings or other material, regardless of physical form or characteristics, made or received in connection with this Contract and all Contract amendments and renewals.

B. Design Professional shall maintain and retain all Record for a term of five (5) years that shall begin after the expiration or termination of this Contract and all Contract amendments. City shall have a right to examine or audit all Records and Design Professional shall provide access to City of all Records upon ten (10) days written notice from the City.

C. The books, documents and records of Design Professional in connection with this Agreement shall be made available to the City Auditor, the City's Internal Auditor, the City's Director of Civil Rights and Equal Opportunity Department and the City department administering this Agreement within ten (10) days after the written request is made.

Sec. 16. Affirmative Action.

If this Contract exceeds $300,000.00 and Design Professional employs fifty (50) or more people, Design Professional shall comply with City's Affirmative Action requirements in accordance with the provisions of Chapter 3 of City's Code, the rules and regulations relating to those sections, and any additions or

amendments thereto; in executing any Contract subject to said provisions, Design Professional warrants that it has an affirmative action program in place and will maintain the affirmation action program in place for the duration of the Contract. Design Professional shall not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or ancestry, disability, sexual orientation, gender identity or age in a manner prohibited by Chapter 3 of City's Code. Design Professional shall:

1. Execute and submit the City of Kansas City, Missouri CREO Affirmative Action Program Affidavit warranting that the Contractor has an affirmative action program in place and will maintain the affirmative action program in place for the duration of the Contract.

2. Submit, in print or electronic format, a copy of Design Professional's current certificate of compliance to the City's Civil Rights and Equal Opportunity Department (CREO) prior to receiving the first payment under the Contract, unless a copy has already been submitted to CREO at any point within the previous two calendar years. If, and only if, Design Professional does not possess a current certification of compliance, Design Professional shall submit, in print or electronic format, a copy of its affirmative action program to CREO prior to receiving the first payment under the Contract, unless a copy has already been submitted to CREO at any point within the previous two calendar years.

3. Require any Subcontractor awarded a subcontract exceeding $300,000.00 to affirm that Subcontractor has an affirmative action program in place and will maintain the affirmative action program in place for the duration of the subcontract.

4. Obtain from any Subcontractor awarded a subcontract exceeding $300,000.00 a copy of the Subcontractor's current certificate of compliance and tender a copy of the same, in print or electronic format, to CREO within thirty (30) days from the date the subcontract is executed. If, and only if, Subcontractor does not possess a current certificate of compliance, Design Professional shall obtain a copy of the Subcontractor's affirmative action program and tender a copy of the same, in print or electronic format, to CREO within thirty (30) days from the date the subcontract is executed.

City has the right to take action as directed by City's Civil Rights and Equal Opportunity Department to enforce this provision. If Design Professional fails, refuses or neglects to comply with the provisions of Chapter 3 of City's Code, then such failure shall be deemed a total breach of this Contract and this Contract may be terminated, canceled or suspended, in whole or in part, and Design Professional may be declared ineligible for any further contracts funded by City for a period of one (1) year. This is a material term of this Contract.

Sec. 17. Tax Compliance.

Design Professional shall provide proof of compliance with the City's tax ordinances administered by the City's commissioner of revenue as a precondition to the City making the first payment under this Agreement or any Agreement renewal when the total Agreement amount exceeds $160,000.00. If Design Professional performs work on an Agreement that is for a term longer than one year, the Design Professional also shall submit to the city proof of compliance with the City's tax ordinances administered by the City's commissioner of revenue as a condition precedent to the city making final payment under the Agreement.

Sec. 18. Assignability and Subcontracting.

(a) Assignability. Design Professional shall not assign or transfer any part or all of Design Professional's obligation or interest in this Contract without prior written approval of City. If Design Professional shall assign or transfer any of its obligations or interests under this Contract without the City's prior written approval, it shall constitute a material breach of this Contract. This provision shall not

prohibit Design Professional from subcontracting as otherwise provided for herein.

(b) Subcontracting. Design Professional shall not subcontract any part or all of Design Professional's obligations or interests in this Contract unless the subcontractor has been identified in a format required by City. If Design Professional shall subcontract any part of Design Professional's obligations or interests under this Contract without having identified the subcontractor, it shall constitute a material breach of this Contract. The utilization of subcontractors shall not relieve Design Professional of any of its responsibilities under the Contract, and Design Professional shall remain responsible to City for the negligent acts, errors, omissions or neglect of any subcontractor and of such subcontractor's officers, agents and employees. City shall have the right to reject, at any point during the term of this Contract, any subcontractor identified by Design Professional, and to require that any subcontractor cease working under this Contract**.** City's right shall be exercisable in its sole and subjective discretion. City shall not be obligated to pay or be liable for payment of any monies which may be due to any subcontractor. Design Professional shall include in any subcontract a requirement that the subcontractor comply with all requirements of this Contract in performing Design Professional's services hereunder.

Sec. 19. Conflicts of Interest.

Design Professional certifies that no officer or employee of City has, or will have, a direct or indirect financial or personal interest in this Agreement, and that no officer or employee of City, or member of such officer's or employee's immediate family, either has negotiated, or has or will have an arrangement, concerning employment to perform services on behalf of Design Professional in this Agreement.

Sec. 20. Conflict of Interest - Certification.

Design Professional certifies that Design Professional is not an expert witness for any party in litigation against the City at the time of the issuance of this Contract.

Sec. 21. Buy American Preference.

It is the policy of the city that any manufactured goods or commodities used or supplied in the performance of any city Agreement or any subcontract hereto shall be manufactured or produced in the United States whenever possible.

Sec. 22. Independent Contractor.

Design Professional is an independent contractor and is not City's agent. Design Professional has no authority to take any action or execute any documents on behalf of City.

Section 23. Employee Eligibility Verification.

If this Contract exceeds five thousand dollars($5,000.00), Design Professional shall execute and submit an affidavit, in a form prescribed by City, affirming that Design Professional does not knowingly employ any person in connection with the contracted services who does not have the legal right or authorization under federal law to work in the United States as defined in 8 U.S. C. § 1324a(h)(3). Design Professional shall attach to the affidavit documentation sufficient to establish Design Professional's enrollment and participation in an electronic verification of work program operated by the United States Department of Homeland Security (E-Verify) or an equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, under the Immigration Reform and Control Act of 1986. Design Professional may obtain additional information about E-Verify and enroll at

www.dhs.gov/xprevprot/program/gc_1185221678150.shtm . For those Design Professionals enrolled in E-Verify, the first and last pages of the E-Verify Memorandum of Understanding that Design Professional will obtain upon successfully enrolling in the program shall constitute sufficient documentation for purposes of complying with this Section. Design Professional shall submit affidavit and attachments to City prior to execution of the contract, or at any point during the term of the Contract if requested by City.

Sec. 24. Quality Services Assurance Act. Design Professional certifies Design Professional will pay all employees who will work on this Contract in the city limits of Kansas City, Missouri at least $13.75 per hour in compliance with the City's Quality Services Assurance Act, Section 3-66, Code of Ordinances or City has granted Contractor an exemption.

Sec. 25. Anti-Discrimination Against Israel. If this Contract exceeds $100,000.00 and Design Professional employs at least ten employees, pursuant to Section 34.600, RSMo., by executing this Contract, Design Professional certifies it is not currently engaged in and shall not, for the duration of this contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel.

ATTACHMENT A

SCOPE OF SERVICES (SEE EXHIBIT B)

EXHIBIT B

BASE SCOPE OF SERVICES

Design Professional: TBD
Owner: City of Kansas City, Missouri
Project: 81001000 Rocky Branch WWTP Facility Plan
Contract No: 1678

I. GENERAL

The following paragraphs provide a general description of the WORK required of this Scope of Services. Subsequent paragraphs describe in detail the professional services to be provided by DESIGN PROFESSIONAL (DP).

The Project. The Water Services Department wishes to contract with a DP to provide a Facility Plan, which will include a projections of future flows and loads, current design capacity evaluation, current plant condition, and recommendations for upgrades, repairs, and process improvements for the Rocky Branch Wastewater Treatment Plant at 500 NE 132nd Street, Kansas City, MO 64165. The Facility Plan should also contemplate the 2017 Wastewater Master Plan's TM7 to determine if additional modifications are required.

A. Background Information and General Description of Activities.

1. The CITY, acting through WSD, is undertaking this project to develop a Facility Plan for its Rocky Branch WWTP to account for changing conditions in the service area and be able to address future regulatory requirements.
2. Previous reports, including the 2017 Wastewater Master Plan's TM7, operations data, lab data, and as-built drawings shall be made available to the DP, as available.
3. DP shall use e-Builder document management system.
4. DP shall use a cost loaded scheduling system such as Microsoft Project or P6.
5. DP shall provide an S curve with invoice.
6. DP shall submit meeting agendas and expected DP attendees at least 3 days prior to each meeting and distribute draft meeting minutes within one business day of the meeting.
7. DP shall review existing geotech reports and indicate if additional borings are necessary.
8. Any I&C work will be performed per WWTD I&C standards.
9. DP shall prepare a recommendation for phasing for proposed work and recommendation on delivery methods based on constructability, risk, funding, uncertainty of projects, and other recommended factors.

B. Follow-On Phases. At the discretion of the CITY and after completion of the Project, the DP may be requested to provide other services, including additional design work,

construction phase services, and providing a resident project representative (RPR) during construction of improvements at the Rocky Branch WWTP and other associated locations.

C. Coordination. The DP shall coordinate as necessary with regulators, Army Corp of Engineers, Department of Planning and Development, other utilities, City vendors, City consultants contracted to complete other projects for the City that could impact the Rocky Branch WWTP, potentially including Regulatory Compliance Assistance, SCADA project, Storm Water Utility/Engineering, Todd Creek WWTP project team, MARC, Planning and Development Department, potential Industrial Users City of Smithville, the Smart Sewer Program, and City contractors.

D. Task Series Listing. This Basic Scope of Services is organized under the following Task Series:

1. Task Series 100 - Project Management and Administration
2. Task Series 200 - Site Investigation, Review of Existing Work, and Review of Previous Projects
3. Task Series 300 - Facility Plan
4. Task Series 400 - Envision^{TM} Sustainability Design

E. Construction Procurement. 100% Design documents developed by DP will be of sufficient detail for the CITY to obtain bids through a conventional bidding process. Preliminary Design Documents (Facility Plan) shall be of sufficient detail for the CITY to obtain bids through the standard CITY fixed fee design-build process.

F. Travel. DP may request pre-approval of non-local travel. The CITY's Project Manager may approve or disprove the travel expense. Any travel request after the fact shall be denied.

G. Explicit Responsibilities. The Scope of Services explicitly sets forth what DP will perform and does not implicitly put any additional responsibilities or duties upon DP. The DP agrees to provide the specific Basic Services as identified herein. Work not specifically discussed herein shall not be performed without an amendment or shall be provided as Optional Services upon written authorization from the CITY.

H. Closeout. Design Professional will provide deliverables and requested backup files. HRD completion forms and other required documents will be submitted before final payment.

I. Capital, Annual, and Total Ownership Cost Opinions. All opinions of probable construction cost developed will generally follow the recommendations of the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97 with regard to methodology and accuracy. Since DP has no control over the cost of labor, material or equipment furnished by others not under contract to DP, DP's opinion of probable cost for construction, of the Work will be made on the basis of experience and qualifications as a DP. DP does not guarantee that proposals, bids or actual project costs will not vary from DP's opinions of probable cost. The cost opinions' level of accuracy presented by DP will be as noted for in subsequent paragraphs of this Scope of Services. All opinions of probable construction, operations, and maintenance costs will be made on the basis of experience and qualification as a DP. DP does not guarantee that actual operations and maintenance costs will not vary from the DP's opinions of probable

operations and maintenance costs. DP will utilize design-build cost estimators and best practices from the construction community and design community to develop their capital cost model. DP will utilize O&M specialists in the development of the O&M model. Resumes for the cost estimators and O&M specialists will be provided to WSD for approval before cost estimating tasks begin. DP shall immediately notify the PM if the estimates are over the construction budget after initial QA. City reserves the right to call a cost estimate review meeting at WSD offices or the DP offices where the cost estimating team is based. Project Workplan include the "below the line factors" for each estimate.

II. PROJECT MILESTONES AND CITY REVIEW REQUIREMENTS

A. Project Milestones and CITY Review Requirements

1. Task Series 100 shall be completed within 270 days following the CITY's issuance of a Notice To Proceed, NTP, to the DP
2. Task Series 200 shall be completed within 90 days following the CITY's issuance of a NTP.
3. Task Series 300 shall be completed within 270 days of the CITY's issuance of a NTP.
4. Task Series 400 shall be completed within 270 days following the CITY's issuance of a NTP.
5. All tasks identified in this Scope of Services, except those identified as Optional Services, shall be performed within 270 calendar days of the written Notice to Proceed. The completion schedule will be extended by the CITY for delays beyond the control of the DP as approved by the CITY.
6. DP may suggest schedule modifications to the scope of work

B. The CITY hereby commits to review deliverables and provide comments within fourteen (14) calendar days after receipt of deliverables from DP. CITY will endeavor to provide consolidated written review comments to DP within a fourteen (14) calendar day period. A review meeting will be scheduled and conducted by DP no more than fourteen (14) calendar days after receipt of written consolidated CITY review comments, unless a mutually agreed upon date outside this schedule window is selected.

III. BASIC SCOPE OF SERVICES

The following Task Series describe the Basic Scope of Services to be provided by the DP under the Project.

TASK SERIES 100 - PROJECT MANAGEMENT AND ADMINISTRATION

The purpose of Project Management and Administration will be to manage, direct and oversee each element of Basic Services identified herein and subcontractors employed by the DP in completion of the Work. The following management activities will be provided by DP.

Task 101 Project Management Services

Provide project administration management services necessary throughout the project to successfully manage and complete the Work, including project correspondence and consultation with CITY Staff; supervision and coordination of services; implementation of a project specific Work Plan; scheduling and assignment of personnel resources; continuous monitoring of work progress; and maintenance of project controls.

Task 102 Monthly Invoicing and Project Status Reports (PSRs)

Prepare and submit monthly invoices (showing, by task, staff name including office location, classification, direct hourly rate, multiplier, and hours worked on each task) on a form acceptable to the CITY and provide a monthly project status report which shall accompany the monthly invoice submittal. If applicable, a list of the tasks in progress or completed shall be attached with each invoice. The monthly progress status reports shall document work progress, the percentage of completed work, earned value, schedule status, and budget status. The monthly project status report shall identify work performed by DP, the work activities anticipated to be performed the next month, action items required by CITY, previous decision items, potential to go over budget along with corrective actions, and potential project scope variances with corrective actions. A short narrative shall be provided to describe the work activity performed for each task within each Task Series. DP shall provide WSD with a narrative description of individuals' work, if requested. PSRs shall include a table containing the date of the most recent invoice from each subcontractor included in this invoice to the City. DP shall obtain reasoning from any subcontractor for invoice being greater than 30 days old.

Task 103 Subconsultant Agreements and Administration

Prepare a scope, budget, schedule, and agreement for its subconsultants involved in the Project. Conduct coordination meetings as required to prepare subconsultant agreements, to review deliverables, and to execute the defined scope of work. Provide administration of subconsultant agreements and subconsultant work including deliverables, subcontractor invoicing, and schedule maintenance. Prepare monthly M/WBE subcontractor utilization reports and submit in the required format to the CITY's Human Relations Department. Workplan should describe the DP's methods for subcontractor management. DP is encouraged to utilize task orders.

Task 104 Quality Control

DP's Quality Control Program will be implemented on all phases of the project to provide an independent review of the work. Quality control reviews will include checks for conformance with regulatory agency requirements, completeness and correctness of evaluations, design accuracy, feasibility of implementing recommendations, and adherence to contract requirements.

Task 105 Project Kickoff Meeting

After Notice to Proceed is given by CITY, DP shall organize and conduct a Project Kickoff Meeting with the CITY to review and establish project goals, lines of communication, project procedures, DP's proposed Work Plan, and other logistics of project execution, including anticipated Project schedule, cost loaded schedule, and expected MBE/WBE utilization schedule, and content of subsequent monthly progress meetings. Prepare and submit an agenda to CITY

Staff 3 business days prior to the meeting and prepare and distribute the meeting minutes within 1 business day of the meeting date.

Task 106 Work Plan

1. **Work Plan Format.** DP shall prepare a written draft Work Plan. The Work Plan for the project includes, at a minimum the following:
   a. A summary of dedicated key team members roles and responsibilities, including all task managers, field crew leaders and their contact information. Any major changes in personal assignments from the RFP should be noted and approved of by the CITY.
   b. A summary of the Project's scope of services.
   c. Detailed cost-loaded schedule for performance of all work.
   d. Sustainable planning and design goals, objective and processes.
   e. Define any issues requiring special coordination with CITY, and/or adjacent projects.
   f. DPs methods for subcontractor management and preventing scope creep.
   g. Section on cost estimating methods including "below the line factors for each planned estimated" and details on the utilization of parametric values.
2. **Submitting Work Plan. S**ubmit the draft Work Plan (a single electronic file in portable document format – PDF) within 7 calendar days of the notice to proceed. CITY will review the draft Work Plan and provide comments within 7 calendar days of receipt of the draft Work Plan. Revise the draft Work Plan as necessary to respond to CITY's comments and submit an electronic PDF file including a Gantt chart in Microsoft Project within 14 calendar days of receipt of CITY's comments. The Work Plan shall be updated and maintained throughout the Project, with updates provided to CITY when requested.

Task 107 Progress Meetings

Participate in up to (TBD) monthly progress meetings with CITY to provide updates of work progress, budget and schedule status, current issues, variances in the potential scope of work, review Action Items, Decision Logs, and potential cost savings proposals. Anticipated future activities and CITY action items will be discussed. DP will prepare and submit an agenda to CITY 3 days prior to each meeting and prepare/distribute meeting minutes within 1 business day of the meeting.

TASK SERIES 200 - SITE INVESTIGATION, REVIEW OF EXISTING WORK, AND REVIEW OF PREVIOUS PROJECTS

Task 201 Flows and Loads Evaluation

DP will review the estimating Wastewater Masterplan projections and compare them to actual data. DP shall utilize population projects as well as utilize expected land use for the near term, medium term, and full build out. DP will coordinate with City Planning and Developing for expected growth rate in the Plant's watersheds and as well as MARC projections. DP will discuss potential commercial and industrial developments in the watershed. DP will review City's internal regulatory timeline and provide commentary. DP will assist in developing

additional plant sampling to meet regulations and anticipated regulations. DP shall finalize the projects in a report.

Task 202 Review Existing Documents and Drawings

Perform a compilation and review of pertinent existing documents including but not limited to: provided schematics, existing site plans, scanned as-built drawings, hard copy as-built drawings, flood plain and flood way data, existing geotech reports, and other sources provided by the CITY. DP will perform a preliminary survey of the proposed work site(s) with CITY staff.

Task 203 Site Investigations

DP will perform a visual inspection and review of existing non-destructive testing and perform additional non-destructive testing where practical. DP will use inspections and testing data to determine the remaining useful life of fixed and rotating assets and compare them to CITY's asset standards. DP will then perform a Utility Survey of CITY property around Rocky Branch WWTP. The Utility Survey will verify the location of existing utilities (gas, electric, water, sanitary sewer, storm sewer both above and below grade. DP will map process piping both above and below grade. DP will assist the CITY in transferring the site piping data into the City's GIS. DP will identify and document valves, meters, and sensors. DP will use existing as-builts and site sketches/drawings as a baseline to determine what assets exist and their general location. DP will investigate both lagoon areas to determine their availability for removal and land use in any future WWTP expansions. It is anticipated that a site survey will not be required, and DP will using existing drawings as basis of design.

Task 204 Geotechnical Investigations

DP will review existing geotechnical reports to determine if they are sufficient. If the DP or CITY recommends, the DP will provide geotechnical engineering services including exploratory field work, laboratory and field testing, and preparation of geotechnical reports. The geotechnical report shall include professional interpretations/opinion of the probable soils to be encountered. The DP will drill test wells at locations at the Rocky Branch WWTP and coordinate with the Army Corp of Engineers at locations within the critical zone of the levy, if applicable. The DP will perform a yield analysis on each test well and other recommended work. DP may make use of previous geotechnical reports. The geotechnical investigations will be sufficient to complete detailed design of new assets at Rocky Branch WWTP. The results of the geotechnical investigations shall be prepared in a report.

Report - A geotechnical report shall be prepared and shall discuss the general soil, well information, and ground water conditions underlying the site; present the relevant engineering properties of the existing soils; provide excavation and earthwork recommendations, including minimum setbacks from adjacent structures, and recommend design criteria and parameters for pipe bedding and other earth supported improvements. The report shall also provide an analysis of existing pavement materials to determine bearing capacities and suitability for long term reliability so that pavement removal/replacement areas can be determined in coordination with existing street and curb conditions and utility impacts. Submit initial geotechnical report to CITY for review and comment. Revise the report to address review comments and include the final

report as an appendix to the Facility Plan Report. The final geotechnical report will be submitted in both PDF and TIFF formats.

Task 205 Geotechnical Investigations

DP will review existing geotechnical reports to determine if they are sufficient. If the DP or CITY recommends, the DP will provide geotechnical engineering services including exploratory field work, laboratory and field testing, and preparation of geotechnical reports. The geotechnical report shall include professional interpretations/opinion of the probable soils to be encountered. The DP will drill test wells at locations at the Rocky Branch WWTP and coordinate with the Army Corp of Engineers at locations within the critical zone of the levy, if applicable. The DP will perform a yield analysis on each test well and other recommended work. DP may make use of previous geotechnical reports. The geotechnical investigations will be sufficient to complete detailed design of new assets at Rocky Branch WWTP. The results of the geotechnical investigations shall be prepared in a report.

Report - A geotechnical report shall be prepared and shall discuss the general soil, well information, and ground water conditions underlying the site; present the relevant engineering properties of the existing soils; provide excavation and earthwork recommendations, including minimum setbacks from adjacent structures, and recommend design criteria and parameters for pipe bedding and other earth supported improvements. The report shall also provide an analysis of existing pavement materials to determine bearing capacities and suitability for long term reliability so that pavement removal/replacement areas can be determined in coordination with existing street and curb conditions and utility impacts. Submit initial geotechnical report to CITY for review and comment. Revise the report to address review comments and include the final report as an appendix to the Facility Plan Report. The final geotechnical report will be submitted in both PDF and TIFF formats.

Task 206 Load Study and Electrical Work

DP will review feeds from Missouri Public Service Commission (PSC) and Platte-Clay Electric Cooperative, switchgear, substations, and MCCs. DP will develop a complete load study on each MCC, substation, transformers, other electrical equipment, switchgear, and feeds. DP will update the Rocky Branch WWTP one-line diagram with existing conditions. DP will use this information in developing phasing and recommended improvements in particular requirements to bring existing facilities up to current codes and maintain redundant feeds.

Task 207 Field Review Meeting

Conduct one on-site field review meetings with CITY staff. This meeting is to be held following completion of the site investigations. The purpose of this meeting is to review existing conditions to confirm previous investigations.

Task 208 BIM Development

DP will develop a BIM of the existing condition, with the City's standard protocol. The model will incorporate information from all tasks in Series 200, including a drone Lidar scan for the plant site. BIM development will have a coordination meeting with City staff after Lidar Scans during model development to assist the DP team.

Task 209 Facility Loading Capacity Tool

DP will apply to Rocky Branch WWTP the methodology developed for the Todd Creek WWTP that will allow KC Water to compare anticipated loading to actual to allow annual adjustment of the timing of facility improvements within the KC Water CIP. This method will consider loading increase to the Rocky Branch WWTP based on the status of planned developments and other internal and external contributors to be identified by the DP. The method will balance competing objectives, including reduce operational risks, reduce project execution risks, and maximizing the delay of future improvements. DP will then use the same tool for the Fishing River WWTP service area.

TASK SERIES 300 - FACILITY PLAN

Task 301 Existing Assets

DP shall submit an engineering report that evaluates the remaining life of each asset, and the issues that need to be addressed.

Task 302 Hydraulic and Process Capacity

A hydraulic capacity, and organic waste load analysis for the current system will be conducted. DP will develop a BioWin model to be provide to the CITY to evaluate the probability of the plant meeting current and planned water quality limits with current and projected loading with and without Project Diode and other planned industrial developments coming online. DP will develop loading analysis with seasonal variations explored. CITY reserves to right to have DP perform sensitivity analysis on more uncertain parameters. DP shall review the model with City.

Task 303 Alternative Evaluation Review

DP shall submit a report that contains an average of 3 alternatives at a 10 % Design evaluated for each asset/process (2 ownership chosen and 1 DP selected). DP and PM will meet and review the proposed alternatives before the alternatives are developed. Each alternative should include, but not be limited to: initial process flow diagrams, an AAEE level 4 total cost of ownership, operation and operability, and a discussion on the ability of the alternative to meet future permitting requirements, and its ability to be cost effectively phased. Alternatives shall be evaluated using the CITY's quadruple bottom line process, and a discussion of the DP's recommended alternative will be included.

Discipline		**10% Conceptual**
	%	**Narrative**
Process	60	Process flow diagrams, integrated liquid and solids model with documentation of model parameters and scenarios. Draft anti-degradation analysis.
Site Civil	2	Major piping and earth moving sketched out, updated siting Major buildings/structures
Geotechnical	10	Borings planned
Structural	2	Areas of structural rehabilitation identified and foundation type of new facilities identified
Mechanical (process piping)	10	Major piping draw as 1 lines

Discipline		10% Conceptual
	%	Narrative
HVAC	2	Identify areas to heat and cool, draft NFPA determination
Plumbing	1	Identify plumbing needs
Architectural		-
Electrical and misc I&C	2	Power study of existing equipment and draft load table for equipment, scada connectivity method determine, physical radio path study complete if applicable
P&IDs	30	Draft below the line (process) equipment and instruments.
Sequences of Operation, Control Block Description, Control Description Narrative	0	-
Floor Plans	30	Draft floor plans and Demolition
Asset Management	0	-
Cost Estimate	10	Per AACE

Task 304 SRF Loan Application and Environmental Permitting

After the development of the three alternatives for conceptual designs, DP shall begin on the relevant environmental permitting for the project to facilitate the City applying for state revolving fund (SRF) funding. DP shall also assist the City in applying for SRF funds. Previous SRF application information will be provided by the City.

Task 305 Final Report

DP shall submit a Final Report consisting of a Facility Plan and conceptual design report that conforms to all requirements of 10 CSR 20-8.110 Engineering – Reports, Plans and Specifications (Missouri Code of State Regulations) and specifically to all requirements of Section (4) Engineering Reports or Facility Plan. The Final Report must include a phasing plan on when to implement projects based on but not limited to the need for increased capacity, more stringent effluent limits, asset lifecycle, etc. It should also have enough information to develop a Class 4 cost estimate, and recommended project delivery methods to complete the work. The Final Report should also consist of considerations of changes required to update the 2017 Master Plan, and TM7, as applicable to the Rocky Branch WWTP. The data presented in the Facility Plan is the basis for the detailed design of the construction plans and specifications.

TASK SERIES 400 – ENVISION™ SUSTAINABILITY DESIGN

Task 401 Envision™ Credits

The DP shall review the predetermined Envision™ credits based on the appropriate project type as provided in the KC Water Sustainability Playbook. The DP shall evaluate the credits, along with the Project Manager, at each scoped phase of design and construction phase covered by the contract. The DP shall utilize the Conversation Guide and update the Sustainability Tracking Spreadsheet with each evaluation. Following the final evaluation the DP shall provide a memorandum and the Sustainability Tracking Spreadsheet summarizing how the project met the sustainability goals set for the project and how the project increased sustainability using the selected Tier 1 credits. Envision™ certification is not included in this scope, but DP shall review

the Envision™ credit support documentation requirements from the Envision Guidance Manual. If the CITY decides to move forward with Envision™ verification, additional DP support services will be provided as Optional Services. However, the DP shall be responsible for the Envision™ credit scores reported during this Project. All Envision™ credit scoring shall be completed by or under supervision of a certified Envision™ Sustainability Professional (ENV SP). After the selection of the design alternative to take to full design, the City shall determine the envision tier for the project.

IV. OPTIONAL SERVICES

Any work requested by the CITY that is not specifically stated in one of the Basic Scope of Services listed above will be classified as Optional Services. DP's contract maximum upper limit for compensation includes a total allowance amount of $X for Optional Services not yet authorized by CITY that may be required throughout the course of the WORK. This allowance amount shall not be utilized by DP unless specifically authorized in writing by the CITY to perform Optional Services. Optional Services will not be performed, nor is the DP approved to utilize any of the allowance amount, unless the CITY provides written authorization to DP that includes the scope of work for each Optional Service to be performed and a maximum billing limit for compensation that has been mutually agreed upon. Optional Services will include, but not limited to:

A. Meetings with local, State, or Federal agencies beyond those contemplated under the Basic Scope of Services.

B. Appearances at public hearings or before special boards beyond those contemplated under the Basic Scope of Services.

C. Special Consultants or independent professional associates requested or authorized by CITY.

D. Tagging of existing equipment in the Rocky Branch WWTP.

E. Development of the transient plan (Startup and Commissioning) and Project Acceptance Methodology

F. Startup and Commissioning assistance such as post final competition operations assistance, development of Standard Operating Procedures (SOPs), collecting new assets for entry into WSD's computerized maintenance management system (CMMS), collection and entry of preventative maintenance (PM) into WSD's CMMS, develop recommended backups for WSD to have on hand, develop failure defense plans (failure modes effects analysis), develop recommended key performance indicators (KPI), development of operations shift sheet, recommended placement of laminated SOPs, process training, training of each of WWTD's maintenance group, duty station training/assistance during handover, electronic O&M consolidating training and other information, and controls programming testing.

G. Creation of AutoCAD or BIM as-builts.

H. Completing an additional Site Survey.

I. Observing factory acceptance tests and/or field retesting of equipment that fails to pass the initial test.

J. Provision, through a subcontract, of laboratory and field testing required during construction and of any special reports or studies on materials and equipment requested by CITY beyond those testing activities identified in the Basic Services.

K. Services for making revisions to drawings and specifications made necessary by the acceptance of substitutions proposed by the CONTRACTOR; and services after the award of the construction contract for evaluating and determining the acceptability of substitutions proposed by the CONTRACTOR.

L. Special reports requested by CITY concerning facilities operation and personnel matters during the operation startup period.

M. Revision of previously accepted studies, reports, design documents or Construction Contract Documents when such revisions are required by changes in laws, rules, regulations ordinances, codes or orders enacted subsequent to the preparation of such studies, reports, documents or designs; or are required by any other causes beyond DP's control.

N. Evaluation of unusually complex or unreasonably numerous claims submitted by the CONTRACTOR or others in connection with the Work.

O. Acceleration of the progress schedule involving services beyond normal working hours

P. Further development and verification of Envision^{TM} credits through conceptual to final design.

Q. Services for making revisions to Construction Contract Documents and project rebidding arising from actual bids prices being greater than CITY's budget.

R. Services resulting from significant delays, changes or price increases caused directly or indirectly by shortages of materials, equipment, or energy.

S. Preparation for litigation, arbitration, or other legal or administrative proceedings; and appearances in court or at arbitration sessions in connection with bid protests, change orders, or construction incidents.

T. Assist the CITY in feasibility analysis and design of water reuse unit process and conveyance. Assist KC Water in setting up a water reuse utility.

U. Assisting CITY with appraisal and/or acquisition of additional easements or re-zoning.

V. Revising Contract Documents or assisting with re-bidding the Project due to actual bid prices being greater than the CITY’s budget.

W. Special inspections as dictated by any adopted building code or amendment thereto of the City of Kansas City, Missouri.

X. Phase 1 and 2 environmental, survey work, and negotiations for property acquisition.

Y. Commissioning and Startup Assistance

Z. Changes in the general scope, extent, design, or character of the Project, including, but not limited to:

1. Changes in size or complexity;

2. Method of financing or availability of funding;

AA. Additional work necessary for WWTD to fulfill its commitments.

BB. Assistance in evaluating and completing Developer RFI, development of project limits, and other development support.

CC. Flood plain mitigation

DD. Evaluation of odor control for equipment protection.

EE. Additional DP support services to support Envision^{TM} verification

FF. 30% Design

GG. Final Design

HH. Bidding Services

II. Construction Phase Services

V. CITY'S RESPONSIBILITIES

CITY will furnish, as required by Basic Services and not at the expense of the DP, the following items:

A. Provide assistance by placing at DP's disposal available information pertinent to the assignment, including previous reports, drawings, specifications, O&M records and any other data relative thereto. Provide said information within thirty (30) calendar days of receipt of a written request by DP.

B. CITY's Project Manager will provide the services of at least one CITY employee who has the right of entry to and knowledge of the existing facilities. Site visits will be required on multiple occasions over the course of the Project.

C. CITY's Project Manager will coordinate meetings between City staff and the DP.

D. Operate all existing equipment, valves or other systems necessary for functional or performance testing required by DP.

E. Obtain property title searches and title reports, and purchasing property if needed for construction of new facilities.

F. Provide DP will private property access agreements with current property owners to perform field investigations.

G. Bidding Services. CITY will provide the following bidding phase services:

1. Prepare agenda and conduct the pre-bid conference.
2. Advertise project Construction Contract Documents, including addenda.
3. Prepare Bid Tabulation. Provide copies of bids to DP for evaluation.
4. The CITY will reproduce, and submit Construction Contract Documents and construction permit application to MDNR for approval. City shall pay for all permit fees.

(End of Scope of Services)

ATTACHMENT B

ELECTRONIC DATA REQUIREMENTS

A. Kansas City Plan Room - Electronic Format Requirements and Naming Conventions

1. In addition to other deliverables included in this Contract, items listed below are requirements to accommodate posting bids documents, plans and specifications on the Kansas City Plan Room.
2. Prime Design Professional/Consultant and Sub-Consultants shall adhere to the following electronic format requirements and use the naming conventions as set out below:
   a. **Drawings/plans**
      (1) Drawings/plans should be rendered as 200-300 dpi **PDF Format** images. No files may be larger than 5 megabytes in size. Plans/Drawings numbering should follow Form 00015 List of Drawings.
      (2) File names may not include any symbols such as **< > : . " / \ | ? ' & # % ^ * ( ) [ ] { } +**
      (3) FILE NAMES: Plans/Drawings numbering should follow Form 00015 List of Drawings. All plans should be named in the following manner: three digit sequential number-brief descriptor. For example: 001-Cover.**pdf** or 002-arc1.**pdf**
   b. **CSI specification sections (project manuals)**
      (1) CSI specification sections should be named by division, using DIV as a prefix. For example:
         (a) DIV01.PDF (Technical, Project Specific)
         (b) DIV02.PDF
         (c) DIV03.PDF
   c. Summary:
      (1) Division 00 and 01 in Microsoft Word or Excel
      (2) Division 2-16 in PDF Format
      (3) Completed document originals of Plans and Diagrams of project must be submitted as 200-300 dpi **PDF Format** images.

B. Contract Information Management System - Project Web Requirements

1. The City will utilize a web based contract information management system/project management tool in the administration of this Contract. This web based application database is a collaboration tool selected and provided by City, which will allow all project team members continuous access through the Internet to important contract/project data as well as up to the minute decision and approval status information.
2. Design Professional shall provide and shall require its sub-consultants to provide its management personnel assigned to this Contract with access to personal computers and the Internet on a daily basis.
3. Design Professional shall conduct Project controls, outlined by the City utilizing the web based application database selected and provided by City. **This designated web based application database will be provided by the** Design Professional to its sub-consultants. No additional software will be required. City will assist Design Professional in providing training of sub-Consultant's personnel.

4. Design Professional shall have and shall require its sub-consultants the responsibility for visiting the Project web site on a daily basis, and as necessary to be kept fully appraised of Contract/Project developments, for correspondence, assigned tasks and other matters that transpire on the site.
    a. These may include but are not limited to: Contracts, Contract Exhibits, Contract Amendments, Drawing Issuances, Addenda, Bulletins, Permits, Insurance & Bonds, Safety Program Procedures, Safety Notices, Accident Reports, Personnel Injury Reports, Schedules, Site Logistics, Progress Reports, Daily Logs, Non-Conformance Notices, Quality Control Notices, Punch Lists, Meeting Minutes, Requests for Information, Submittal Packages, Substitution Requests, Monthly Payment Request Applications, Supplemental Instructions, Owner Variation Directives, Potential Variation Orders, Variation Order Requests, Variation Orders, and the like.
    b. All supporting data including but not limited to shop drawings, product data sheets, manufacturer data sheets and instructions, method statements, safety MSDS sheets, Substitution Requests and required documentation will be submitted in digital format via the web based application database selected and provided by City.

C. Electronic File Requirements – Closeout

1. All documents (including as-built drawings) shall be converted or scanned into the Adobe Acrobat (.PDF) file format and uploaded to the web based application database selected and provided by City.
2. In addition to the standard closeout submittal requirements detailed elsewhere in the Contract Documents, the Prime Design Professional/Consultant and Sub-Consultants shall also submit all closeout documents including but not limited to all "As-Built Drawings", catalog cuts and Owner's Operation and Maintenance manuals in digital format.

D. Project Management Communications - Construction

1. The Contractor shall use the Internet web based contract information management system/project management communications tool selected and provided by City, and protocols included in that software during the term of this Contract. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited.
3. Training: City's software service provider will provide a group training sessions scheduled by City, the cost of which is included in the initial user's fee. Users are required to attend the scheduled training sessions they are assigned. Requests for specific scheduled classes will be on a first come first served basis for available spaces. Companies may also obtain group training from City's software service provider at their own expense.
4. Support: City's software service provider will provide on-going support through on-line help files.
5. Project Archive: The archive shall be available to each team member at a nominal cost. The archive set will contain only documents that the firm has security access to during

construction. All legal rights in any discovery process are retained. Archive material shall be ordered from City's software service provider.

6. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the project specified herein.
7. Purpose: The intent of using a project management communication tool is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files.
8. Authorized Users: Access to the web site will be by individuals who are licensed users.
   a. Individuals may use the User Application included in these specifications or may request the User Application.
   b. Authorized users will be contacted directly by the web site provider, who will assign the temporary user password.
   c. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.
9. Administrative Users: Administrative users have access and control of user licenses and all posted items. **DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!** Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).

E. KC Water Digital Data Submittal Standard

Purpose

In an effort to streamline the process of updating KC Water's Geographic Information System (GIS), KC Water is requiring digital copies of the "Approved for Construction" drawings and "Construction Record Drawings".

Information is to be provided in a format that adheres to the requirements outlined below.

1. **Required Submittals Types**
   a. **Approved for Construction Drawings**

      Prior to the release of the project for construction (Notice to Proceed), digital copies of the Approved for Construction Drawings must be provided to the KC Water project manager. CAD and PDF files shall be provided along with a hard copy of the record drawings.

      If a change in the hard copy prints is requested then the digital files shall be revised and resubmitted to ensure that all changes are reflected in both the hard copy and digital versions of the files.

      (1) KC Water projects require a digital copy of the CAD file used to generate the Approved for Construction Drawings.

      (2) The delivered CAD files must follow the KC Water CAD file standards. A CAD template file will be provided by KC Water's project manager at the start of the

project along with a description of the CAD layers and object data elements that are required to be in the CAD file.

2. **Submittal Specifications**
   a. All submitted CAD files must be spatially referenced to the North American Datum (NAD) 1983 State Plane Missouri West FIPS 2403 US Feet coordinate system. All CAD files shall be submitted in AutoCAD .dwg format with information drawn on the approved CAD layers.
   b. All CAD files shall be submitted with the object data tables included in the CAD template populated.
   c. In the case of an incomplete submission the digital copies may be returned for correction with comments.
3. **Questions/Technical Support**
   In the instance of a technical error, question, or discrepancy in the process please contact:

   GIS Manager
   Water.GIS@kcmo.org

4. **CAD Layers and Object Data Tables:**
   The general layout CAD file must have the required object data elements populated. All object data elements per asset type shall be populated.

   For a list of the required CAD layers, object data tables, and attribute codes, please reference the current version at the time of contract award of the Kansas City Water Services Department (KCWSD) CAD Design Standards and Specifications.

ATTACHMENT C

ENGINEER FEE SUMMARY AND
SCHEDULE OF POSITION CLASSIFICATIONS

ATTACHMENT D

CREO DOCUMENTS

1. HRD Form 6: Design Professional Contract Instructions
2. 00450 HRD Form 08: Contractor Utilization Plan & Request for Waiver
3. 00460 HRD Form 10: Timetable for MBE/WBE Utilization
4. 00470 HRD Form 11: Request for Modification or Substitution
5. 00450.01: HRD Letter of Intent to Subcontract
6. 01290.14: Contractor Affidavit for Final Payment
7. 01290.15: Subcontractor Affidavit for Final Payment

HRD INSTRUCTIONS
FOR REQUESTS FOR QUALIFICATIONS/PROPOSALS

PART A. MINORITY/WOMEN BUSINESS ENTERPRISE REQUIREMENTS

I. City's MBE/WBE Program.

A. The City has adopted a Minority/Women Business Enterprise ("MBE/WBE") Program (Sections 4-421 through 3-469, Code of Ordinances) (the "Program") to implement the City's policy of supporting the fullest possible participation in City contracts and change orders of firms owned and controlled by minorities and women. Each construction project may have an MBE and/or WBE goal for participation. An MBE or WBE goal is a numerical objective the City has set for the contract. Goals are stated as a percentage of contract dollars. For example, if an MBE goal for a contract is 10% and a Proposer submits a proposal of $100,000, the goal for MBE participation would equal $10,000. The specific MBE/WBE goals on this project are set forth elsewhere in the proposal specifications.

B. By submitting a proposal, the Proposer agrees, as a material term of the contract, to carry out the City's MBE/WBE Program by making good faith efforts to include certified MBE/WBEs in the project work to the extent of the goals listed for the project and to the fullest extent consistent with submitting the best proposal to the City. Proposer agrees that the Program is incorporated into this document and agrees to follow the Program. Although it is not a requirement that a Proposer in fact meet or exceed both the MBE and WBE Goals, it is a requirement for approval of the proposal that a Proposer objectively demonstrate to the City that good faith efforts have been made to meet the Goals.

C. The following HRD Forms are attached and must be used for MBE/WBE submittals:

1. Affidavit of Intended Utilization (HRD Form 13); and
2. Contractor Utilization Plan/Request for Waiver (HRD Form 8); and
3. Letter of Intent to Subcontract (HRD Form 00450.01); and
4. Timetable for MBE/WBE Utilization (HRD Form 10); and
5. Request for Modification or Substitution (HRD Form 11); and
6. Contractor Affidavit for Final Payment (Form 01290.14); and
7. Subcontractor Affidavit for Final Payment (Form 01290.15).

Warning: The City only gives MBE/WBE credit for a Proposer's use of City certified MBE/WBEs. A certified MBE/WBE firm is a firm that has been certified by the City's Human Relations Department as such. An MBE/WBE firm must be certified before the date on which the contractor utilization plan is due. Certified MBEs and WBEs are listed in the M/W/DBE Kansas City Mo. Online Directory, which is available on the City's website at www.kcmo.org. Before a Proposer submits a proposal, Proposer should contact HRD and consult the directory to make sure any firm proposed for use for

MBE/WBE participation has been certified.

II. Required Submissions with Proposal.

A. Proposer must submit the following document with its proposal:

1. **Affidavit of Intended Utilization (HRD Form 13).** This form states a Proposer's intent to use certified MBE/WBEs in the performance of the contract.

III. Required Submissions Prior to Contract Award.

A. Proposer must submit the following documents prior to contract award.

1. **Contractor Utilization Plan/Request for Waiver (HRD Form 8).** This form states a Proposer's plan to use specific certified MBE/WBEs in the performance of the contract and includes the following:

   a. The work to be performed by each MBE/WBE and the amounts each is to be paid for the work; and

   b. The name, address, race or ethnic origin, gender and employer identification number or social security number of each MBE/WBE that will perform the work.

   c. An automatic request for waiver in the event Proposer has not met or exceeded the MBE and/or WBE goals for the contract but believes that it has made good faith efforts to meet or exceed the goals and desires a waiver of the goals. If a waiver is requested, HRD will examine the Proposer's documentation of good faith efforts and make a recommendation to grant or deny the waiver. HRD will recommend a waiver be granted only if the Proposer has made good faith efforts to obtain MBE/WBE participation.

2. **Letter(s) of Intent to Subcontract (HRD Form 00450.01)**. A letter must be provided from each MBE/WBE listed on the Contractor Utilization Plan. These letters verify that the MBE/WBE has agreed to execute a formal agreement for the work and indicate the scope of work to be performed and the price agreed upon for the work.

IV. Additional Required Submissions when Requested by City.

A. Proposer must submit the following documents when requested by City:

1. **Timetable for MBE/WBE Utilization (HRD Form 10).**

2. **Documentation of good faith efforts.**

V. Required Monthly Submissions during term of Contract.

A. Proposers must submit the following document on a monthly basis if awarded the contract:

1. **M/WBE Monthly Utilization Report (HRD Form 00485.01).** This report must be submitted to the Director by the 15th of each month. Failure to submit timely reports

may result in delays in processing of current and future contract approvals and payment applications.

VI. Required Submittals for Final Contract Payment.

A. Proposer must submit the following documents with its request for final payment under the contract:

1. **Contractor Affidavit for Final Payment (Form 01290.14)**
2. **Subcontractor Affidavit(s) for Final Payment (Form 01290.15)**

VII. Additional Submittals.

A. Proposer may be required to make additional submittals during the term of the Contract, including **Request for Modification or Substitution (HRD Form 11)**. Refer to Section X, Modification of the Contractor Utilization Plan or Substitution of an MBE/WBE, for additional instructions on when this form must be submitted.

VIII. MBE/WBE Participation Credit.

A. The following shall be credited towards achieving the goals:

1. The total contract dollar amount that a prime contractor has paid or is obligated to pay to a subcontractor that is a certified MBE or WBE, except as otherwise expressly provided for herein.
2. The total contract dollar amount that a prime contractor that is a certified MBE or WBE performed itself.
3. Sixty percent (60%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supplier who is a certified MBE or WBE.
4. Ten percent (10%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supply broker who is a certified MBE or WBE.
5. One hundred percent (100%) of the total dollar amount paid or to be paid by a prime contractor to a manufacturer of construction supplies who is a certified MBE or WBE.
6. Subcontractor participation with a lower tier MBE/WBE subcontractor using one of the above methods of participation.

B. **NO CREDIT**, however, will be given for the following:

1. Participation in a contract by a MBE or WBE that does not perform a commercially useful function as defined by the Program; and
2. Any portion of the value of the contract that an MBE or WBE subcontractor subcontracts back to the prime contractor or any other contractor who is not a qualified MBE/WBE; and
3. Materials and supplies used on the contract unless the MBE/WBE is responsible for

negotiating the price, determining quality and quantity, ordering the materials and installing (where applicable) and paying for material itself; and

4. Work performed by an MBE or WBE in a scope of work other than that in which the MBE or WBE is currently certified.

IX. Methods for Securing Participation of MBE/WBEs and Good Faith Efforts.

A. A Proposer is required to make good faith efforts to achieve the MBE/WBE goals. Good faith efforts are efforts that, given all relevant circumstances, a Proposer actively and aggressively seeking to meet the goals can reasonably be expected to make. Good faith efforts must be made before the Proposer submits a Contractor Utilization Plan/Request for Waiver (HRD Form 8). However, efforts made to increase participation of MBEs and WBEs following submission of the CUP can be considered as evidence of good faith efforts to meet the goals.

B. In evaluating good faith efforts, the Director of HRD will consider whether the Proposer has performed the following, along with any other relevant factors:

1. 1. Advertised for at least 15 calendar days prior to the bid or proposal due date opportunities to participate in the contract in general circulation media, trade and professional association publications, small and minority business media, and publications of minority and women's business organizations which are included in a list along with their current contact information identified on the directory as the list of publications available to publish such advertisements, which list shall be updated by HRD no less than every three (3) months.

2. Sent written notices at least fifteen (15) calendar days prior to the bid or proposal due date containing the information required in section (9) below, by certified mail, e-mail, or facsimile, to at least 80% of MBEs and WBEs which are included in a list along with their contact information identified on the directory as the list of organizations available to receive such notices, which list shall be updated by HRD no less than every three (3) months.

3. Sent written notices, containing the information required by section (9) below, by certified mail, e-mail or facsimile, to at least 80% of MBEs and WBEs listed on the directory certified in the applicable scopes of work for the particular bid soliciting their participation in the contract at least 15 calendar days prior to the bid or proposal due date.

4. Attempted to identify portions of the work for qualified MBE and/or WBE participation in order to increase the likelihood of meeting the goals, including breaking down contracts into economically feasible units that take into consideration the capacity of available MBEs/WBEs appearing on the HRD directory.

5. At any time prior to submission of the CUP or submittal of a request for modficiation of a CUP, requested assistance in achieving the goals from the Director and acted on the Director's recommendations.

6. Conferred with certified MBEs and WBEs which inquired about or responded to the

bid solicitation and explained to such MBEs and WBEs the scope and requirements of the work for which their bids or proposals were solicited, and if not all certified MBEs and WBEs in the particular scopes listed on the directory have inquired about or responded to the bid solicitation for each scope of work, then contact by certified mail, e-mail or telephone the greater of ten (10) or 80% of additional certified MBEs and WBEs in the particular scopes of work listed on the directory and offer to confer wich such MBEs and WBEs for such particular scope of work and request such MBEs and WBEs to submit a proposal.

7. Attempted to negotiate in good faith with certified MBEs and WBEs which responded to the bid solicitation or those certified MBEs and WBEs that were conferred with as contemplated in section (6) above, and other qualified MBEs and WBEs, at the option fo the bidder, proposer, or contractor, as applicable, to perform specific subcontracts; not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities by the bidder, proposer, or contractor; in the event an MBE or WBE is the low bid, but rejected as unqualified, the bidder, proposer, or contractor and the director or board, as applicable, shall provide sound reasons for rejecting such MBE or WBE.
8. Attended pre-bid meeting when such meetings were indicated in the solicitation of bids or otherwise by the bidder, proposer, or contractor, as applicable or by the director provided the director provides written direction to the bidder, proposer, or contractor at the time the goals are recommended.
9. Written notices and advertisements to be provided pursuant to sections (1), (2) and (3) above shall include the following information:
    a. The bid due date;
    b. The name of the project;
    c. The address or general location of the project;
    d. The location of plans and specifications for viewing;
    e. Contact information of the prime contractor;
    f. A general description of the scopes of work that are the subject of the solicitation;
    g. The goals established for the applicable contract, and if the goals are still subject to board approval, then a statement that the goals as stated are preliminary and are subject to board approval;
    h. If the project or any portion of the project is subject to prevailing wage then a statement that all or a portion of the project will be subject to the prevailing wage, as applicable; and if only a portion of the scopes are subject to prevailing wage, then identification of such scopes provided that such scopes are known as of the time of bid solicitation;
    i. The date and time of any pre-bid meeting(s), if any, which have been

scheduled by the bidder, proposer, or contractor as of the bid solicitation; and

j. Any other information deemed relevant by the bidder, proposer, or contractor, as applicable, or the director to the extent the director provides written direction to the bidder, proposer, or contractor of such additional information at the time the goals are recommended by the director.

C. A Proposer will be required to give the City documentation to prove that it made good faith efforts. The Proposer will be contacted by the City with further instructions about when this documentation must be submitted.

X. Modification of the Contractor Utilization Plan or Substitution of an MBE/WBE.

A. A Proposer may need to substitute an MBE and/or WBE or request that the amount of MBE/WBE participation listed in its Contractor Utilization Plan be modified. Proposer must file a **Request for Modification or Substitution (HRD Form 11) prior to actual substitution and within a reasonable time after learning that a modification or substitution is necessary.** The Director may approve substitutions or modifications and upon approval, the modifications and substitutions will become an amendment to the Contractor Utilization Plan. Modifications or substitutions may be approved when:

1. The Director finds that the Proposer made and provided evidence of good faith efforts to substitute the MBE/WBE listed on the Contractor Utilization Plan with other certified MBE/WBEs for the scope of work or any other scope of work in the contract; and

2. The Proposer or Contractor has not attempted intentionally to evade the rquirements of the program and it is in the best interests of the City to allow a modification or substitution; and

3. The Director also finds one of the following:

   a. The listed MBE/WBE is non-responsive or cannot perform; or

   b. The listed MBE/WBE has increased its previously quoted price to the bidder, proposer or contractor without a corresponding change in the scope of the work; or

   c. The listed MBE/WBE has committed a material default or breach of its contract with the contractor; or

   d. Requirements of the scope of work of the contract have changed and render subcontracting not feasible or not feasible at the levels required by the goals established for the contract; or

   e. The listed MBE/WBE is unacceptable to the contracting department; or

   f. The listed MBE/WBE thereafter had its certification revoked; or

B. A modification shall not be made unless the modification or substitution has first been requested and approved by the Director.

XI. Appeals.

A. In conformance with the Act, appeals may be made to the City Fairness in Construction Board or Fairness in Professional Services and Goods Board on the following:

1. The grant or denial of a Request for Waiver;
2. Substitution for an MBE/WBE listed on a Contractor Utilization Plan;
3. Modification of the percentage of MBE/WBE participation on a Contractor Utilization Plan;
4. Liquidated Damages;
5. The amount of MBE/WBE credit the Contractor may receive for MBE/WBE participation identified in the contractor utilization plan.

B. Any appeal must be filed in writing with the Director within fifteen (15) calendar days of notice of the determination. Mailing, faxing, personal delivery or posting at HRD of determinations shall constitute notice. The appeal shall state with specificity why the Proposer or Contractor believes the determination is incorrect

C. Failure to file a timely appeal shall constitute a waiver of a Proposer's or Contractor's right to appeal such determination and such person shall be estopped to deny the validity of any determination which could have been timely appealed.

XII. Access to Documents and Records.

A. By submitting a proposal, each Proposer agrees to permit the City, its duly authorized agents or employees, access at all reasonable times to all books and business records of Proposer as may be necessary to ascertain compliance with the requirements of this document and the Act, within ten (10) calendar days of the date of the written request.

B. All Proposers agree to cooperate with the contracting department and HRD in studies and surveys regarding the MBE/WBE program.

XIII. Miscellaneous.

A. A Proposer or Contractor shall bear the burden of proof with regard to all issues on appeal.

B. In the event of any conflict between this document and the Program, the provisions of the Program shall control. The terms used in this document are defined in the Program.

C. Oral representations are not binding on the City.

D. The City Council may waive the requirements of this document and the Program and award the contract to the best proposer if the City Council determines a waiver is in the best interests of the City.

XIV. Liquidated Damages – MBE/WBE Program.

A. If Contractor fails to achieve the MBE/WBE goals stated in its Contractor Utilization Plan, as amended, the City will sustain damages, the exact extent of which would be

difficult or impossible to ascertain. Therefore, in order to liquidate those damages, the monetary difference between either (1) the amount of the MBE/WBE goals set forth in the Contractor Utilization Plan, as amended, or (2) the goals established (whichever is lower) and the amount actually paid to qualified MBEs and WBEs for performing a commercially useful function will be deducted from the Contractor's payments as liquidated damages. In determining the amount actually paid to qualified MBEs and WBEs, no credit will be given for the portion of participation that was not approved by the Director, unless the Director determines that the Contractor acted in good faith. No deduction for liquidated damages will be made when, for reasons beyond the control of the Contractor, the MBE/WBE participation stated in the Contractor Utilization Plan, as amended and approved by the Director is not met.

CONTRACTOR UTILIZATION PLAN/REQUEST FOR WAIVER

Project Number _____

Project Title _____

_____ _____
(Department Project) Department

_____
(Bidder/Proposer)

STATE OF _____)
) ss
COUNTY OF _____)

I, _____, of lawful age and upon my oath state as follows:

1. This Affidavit is made for the purpose of complying with the provisions of the MBE/WBE submittal requirements on the above project and the MBE/WBE Program and is given on behalf of the Bidder/Proposer listed below. It sets out the Bidder/Proposer's plan to utilize MBE and/or WBE contractors on the project.

2. The project goals are **_____ % MBE** and **_____ % WBE.** Bidder/Proposer assures that it will utilize a minimum of the following percentages of MBE/WBE participation in the above project:

BIDDER/PROPOSER PARTICIPATION:_____% MBE _____% WBE

3. The following are the M/WBE subcontractors whose utilization Bidder/Proposer warrants will meet or exceed the above-listed Bidder/Proposer Participation. Bidder/Proposer warrants that it will utilize the M/WBE subcontractors to provide the goods/services described in the applicable Letter(s) of Intent to Subcontract, copies of which shall collectively be deemed incorporated herein). ***(All firms must currently be certified by Kansas City, Missouri)***

   a. Name of M/WBE Firm _____
   Address _____
   Telephone No. _____
   I.R.S. No. _____

b. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

c. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

d. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

e. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

f. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

(List additional M/WBEs, if any, on additional page and attach to this form)

4. The following is a breakdown of the percentage of the total contract amount that Bidder/Proposer agrees to pay to each listed M/WBE:

MBE/WBE BREAKDOWN SHEET

MBE FIRMS:

Name of MBE Firm	Supplier/Broker/Contractor	Subcontract Amount*	Weighted Value**	% of Total Contract
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTAL MBE $ / TOTAL MBE %: $_____ _____%

_____

WBE FIRMS:

Name of WBE Firm	Supplier/Broker/Contractor	Subcontract Amount*	Weighted Value**	% of Total Contract
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

TOTAL WBE $ / TOTAL WBE %: $_____ _____%

_____

*"Subcontract Amount" refers to the dollar amount that Bidder/Proposer has agreed to pay each M/WBE subcontractor as of the date of contracting and is indicated here solely for the purpose of calculating the percentage that this sum represents in proportion to the total contract amount. Any contract amendments and/or change orders changing the total contract amount may alter the amount due an M/WBE under their subcontract for purposes of meeting or exceeding the Bidder/Proposer participation.

**"Weighted Value" means the portion of the subcontract amount that will be credited towards meeting the Bidder/Proposer participation. See HRD Forms and Instructions for allowable credit and special instructions for suppliers.

5. Bidder/Proposer acknowledges that the monetary amount to be paid each listed M/WBE for their work, and which is approved herein, is an amount corresponding to the percentage of the total contract amount allocable to each listed M/WBE as calculated in the MBE/WBE Breakdown Sheet. Bidder/Proposer further acknowledges that this amount may be higher than

the subcontract amount listed therein as change orders and/or amendments changing the total contract amount may correspondingly increase the amount of compensation due an M/WBE for purposes of meeting or exceeding the Bidder/Proposer participation

6. Bidder/Proposer acknowledges that it is responsible for considering the effect that any change orders and/or amendments changing the total contract amount may have on its ability to meet or exceed the Bidder/Proposer participation. Bidder/Proposer further acknowledges that it is responsible for submitting a Request for Modification or Substitution if it will be unable to meet or exceed the Bidder/Proposer participation set forth herein.

7. If Bidder/Proposer has not achieved both the M/WBE goal(s) set for this Project, Bidder/Proposer hereby requests a waiver of the MBE and/or WBE goal(s) that Bidder/Proposer has failed to achieve

8. Bidder/Proposer will present documentation of its good faith efforts, a narrative summary detailing its efforts and the reasons its efforts were unsuccessful when requested by the City.

9. I hereby certify that I am authorized to make this Affidavit on behalf of the Bidder/Proposer named below and who shall abide by the terms set forth herein:

Bidder/Proposer primary contact: _____
Address: _____
_____
Phone Number: _____
Facsimile number: _____
E-mail Address: _____

By: _____
Title: _____
Date: _____
(Attach corporate seal if applicable)

Subscribed and sworn to before me this _____ day of _____, 20__.

My Commission Expires: _____ _____
Notary Public

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

LETTER OF INTENT TO SUBCONTRACT

Check one:

Original LOI: ☐

Updated LOI: ☐

Project Name/Title _____

Project Location/Number _____

PART I: Prime Contractor_____ agrees to enter into a contractual agreement with M/W/DBE/Section 3 Subcontractor _____ who will provide the following goods/services in connection with the above-reference contract: [Insert a brief narrative describing goods/services to be provided. Broad Categorizations (e.g., "electrical," "plumbing," etc.) or the listing of NAICS Codes in which M/W/DBE Subcontractor is certified are insufficient and may result in denial of this Letter of Intent to Subcontract.]

_____

_____

_____

for an estimated amount of $_____ (or _____% of the total estimated contract value.)

M/WBE Vendor type:

☐ Subcontractor/manufacturer (counts as 100% of contract value towards goals)

☐ Supplier (counts as 60% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)

☐ Broker (counts as 10% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)

M/W/DBE/Section 3 Subcontractor is, to the best of Prime Contractor's knowledge, currently certified with the City of Kansas City's Human Relations Department to perform in the capacities indicated herein. Prime Contractor agrees to utilize M/W/DBE Subcontractor in the capacities indicated herein, and M/W/DBE Subcontractor agrees to work on the above-referenced contract in the capacities indicated herein, contingent upon award of the contract to Prime Contractor.

PART 2: This section is to be completed by the M/W/DBE subcontractor listed above. Please attach additional sheets as needed for more than one intended sub-tier contract. **IMPORTANT: Falsification of this document will result in denial and other remedies available under City Code.**

Select one:

☐ The M/W/DBE Subcontractor listed above **IS NOT** subcontracting any portions of the above-stated scope of work(s). (Continue to Part 3.)

☐ The M/W/DBE Subcontractor listed above **IS** subcontracting certain portions of the above stated scope of work(s) to:

(1) Company name: _____

Full address: _____
Street number and name City, State and Zip Code

Primary contact: _____
Name Phone

a) This subcontractor is (circle one): MBE WBE DBE N/A

i: If this subcontractor is an M/W/DBE certified with the City of Kansas City, Missouri, a separate Letter of Intent must be attached to this document.

ii. If this subcontractor is NOT a certified M/W/DBE certified with the City of Kansas City, Missouri, the firm must still be listed for reporting purposes but a Letter of Intent is not required.

b) Scope of work to be performed: _____

c) The dollar value of this agreement is: _____

PART 3:

NOTE: SIGNATURES AND NOTARIZATIONS REQUIRED FOR NEW LETTERS OF INTENT (LOI); <u>SIGNATURES ONLY</u> FOR UPDATED LOI (ADDING VALUE TO EXISTING CONTRACT).

PRIME CONTRACTOR BUSINESS NAME: _____

_____ _____
Signature: Prime Contractor Print Name

_____ _____
Title Date

State of)

County of)

I, _____, state that the above and foregoing is based on my best knowledge and belief.

Subscribed and sworn to before me, a notary public, on this day of _____ , 20____

My Commission Expires: _____ _____
Notary Public

STAMP:

MWDBE SUBCONTRACTOR BUSINESS NAME: _____

_____ _____
Signature: Prime Contractor Print Name

_____ _____
Title Date

State of)

County of)

I, _____, state that the above and foregoing is based on my best knowledge and belief.

Subscribed and sworn to before me, a notary public, on this day of _____ , 20____

My Commission Expires: _____ _____
Notary Public

STAMP:

TIMETABLE FOR MBE/WBE UTILIZATION

(This form should be submitted to the City after contract award.)

I, _____, acting in my capacity as _____
(Name) *(Position with Firm)*
of _____, with the submittal of this Timetable, certify that
(Name of Firm)
the following timetable for MBE/WBE utilization in the fulfillment of this contract is correct and true to the best of my knowledge.

ALLOTTED TIME FOR THE COMPLETION OF THIS CONTRACT
(Check one only)

15 days	___	75 days	___	135 days	___
30 days	___	90 days	___	150 days	___
45 days	___	105 days	___	165 days	___
60 days	___	120 days	___	180 days	___

Other _____ (Specify)

Throughout _____ Beginning 1/3 _____
Middle 1/3 _____ Final 1/3 _____
Beginning 1/3 _____% Middle 1/3 _____% Final 1/3 _____%

PLEASE NOTE: Any changes in this timetable require approval of the Human Relations Department in advance of the change.

If you have any questions regarding the completion of this form, please contact the Department of Human Relations at: (816) 513-1818**.**

_____
(Signature)

_____
(Position with Firm)

_____
(Date)

REQUEST FOR MODIFICATION OR SUBSTITUTION

*(This Form **must** be submitted to HRD to request substitutions for an MBE/WBE listed in the Contractor Utilization Plan or for modification of the amount of MBE/WBE participation listed in the Contractor Utilization Plan. This Form shall be an amendment to the Contractor Utilization Plan.)*

BIDDER/PROPOSER/CONTRACTOR: _____
ADDRESS: _____
PROJECT NUMBER OR TITLE: _____
AMENDMENT/CHANGE ORDER NO: (if applicable) _____

Project Goals:	_____% MBE	_____% WBE
Contractor Utilization Plan:	_____% MBE	_____% WBE

1. I am the duly authorized representative of the above Bidder/Contractor/Proposer and am authorized to request this substitution or modification on behalf of the Bidder/Contractor/Proposer.

2. I hereby request that the Director of HRD recommend or approve: (check appropriate space(s))

   a. ____ A substitution of the certified MBE/WBE firm _____,
   (Name of new firm)
   to perform _____,
   (Scope of work to be performed by new firm)

   for the MBE/WBE firm _____ which is currently
   (Name of old firm)
   listed on the Bidder's/Contractor's/Proposer's Contractor Utilization Plan to

   perform the following scope of work: _____.
   (Scope of work of old firm)

   b. ____A modification of the amount of MBE/WBE participation currently listed on the Bidder's/Contractor's/Proposer's Contractor Utilization Plan from

   _____ % MBE_____% WBE *(Fill in % of MBE/WBE Participation currently listed on Contractor Utilization Plan)*

   TO

   _____% MBE _____% WBE *(Fill in New % of MBE/WBE Participation requested for Contractor Utilization Plan)*

   c. Attach 00450.01 Letter of Intent to Subcontract letter for each new MBE/WBE to be added.
   d. Attach a copy of the most recent 00485.01 or on-line M/WBE Monthly Utilization Report

3. Bidder/Contractor/Proposer states that a substitution or modification is necessary because: (check applicable reason(s))

___The MBE/WBE listed on the Contractor Utilization Plan is non-responsive or cannot perform.

___The MBE/WBE listed on the Contractor Utilization Plan has increased its previously quoted price without a corresponding change in the scope of work.

___The MBE/WBE listed on the Contractor Utilization Plan has committed a material default or breach of its contract.

___Requirements of the scope of work of the contract have changed and make subcontracting not feasible or not feasible at the levels required by the goals established for the contract.

___The MBE/WBE listed on the Contractor Utilization Plan is unacceptable to the City contracting department.

___Bidder/Contractor/Proposer has not attempted intentionally to evade the requirements of the Act and it is in the best interests of the City to allow a modification or substitution.

4. The following is a narrative summary of the Bidder's/Contractor's/Proposer's good faith efforts exhausted in attempts to substitute the MBE/WBE firm named above which is currently listed on the Contractor Utilization Plan with other qualified, certified MBE/WBE firms for the listed scope of work or any other scope of work in the project:

_____
_____
_____
_____
_____
_____
_____
_____
_____

5. Bidder/Proposer/Contractor will present documentation when requested by the City to evidence its good faith efforts.

Dated:_____ _____
(Bidder/Proposer/Contractor)

_____
By: (Authorized Representative)

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CONTRACTOR AFFIDAVIT FOR FINAL PAYMENT

Project Number _____

Project Title _____

STATE OF _____)
)SS
COUNTY OF _____)

The Undersigned, _____ of lawful
(Name)
age, being first duly sworn, states under oath as follows:

1. I am the _____ of _____who is the general
(Title) (CONTRACTOR)
CONTRACTOR for the CITY on Project No. _____ and Project Title _____.

2. All payrolls, material bills, use of equipment and other indebtedness connected with the Work for this Project have been paid and all Claims of whatever nature have been satisfied, as required by the Contract.

3 (✓) ____Prevailing wage does not apply; or

(✓) ____All provisions and requirements set forth in Chapter 290, Section 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with these provisions and requirements and the Annual Wage Order contained in the Contract in carrying out the Contract and Work. CONTRACTOR has fully complied with the requirements of the prevailing wage law as required in the Contract and has attached affidavits from all Subcontractors on this Project, regardless of tier, affirming compliance with the prevailing wage law as stipulated in the Contract.

4. I hereby certify that (a) at project completion and pursuant to contractor's final request for payment, contractor achieved (_____%) Minority Business Enterprise (MBE) participation and (_____%) Women Business Enterprise (WBE) participation on this contract, and (b) listed herein are the names of all certified M/WBE subcontractors, regardless of tier, with whom I, or my subcontractors contracted.

1. Name of MBE/WBE Firm _____
Address _____
_____
Telephone Number (_____) _____
IRS Number _____
Area/Scope*of Work _____
Subcontract Final Amount _____

2. Name of MBE/WBE Firm _____
Address _____
_____
Telephone Number (_____) _____
IRS Number _____
Area/Scope*of Work_____
Subcontract Final Amount _____

List additional subcontractors, if any, on a similar form and attach to the bid.

Supplier** Final Amount: _____

*Reference to specification sections or bid item number.

(✓) ____ Met or exceeded the Contract utilization goals; or
(✓) ____ Failed to meet the Contract utilization goals (attach waiver, substitution or modification); or
(✓) ____ No goals applied to this Project.

5. CONTRACTOR certifies that each Subcontractor has received full payment for its respective work in connection with the Contract.

6. If applicable, I hereby certify that (a) at project completion and pursuant to contractor's final request for payment, contractor achieved, company-wide, at least ten percent (10%) minority workforce participation and two percent (2%) women workforce participation and (2) a true and accurate copy of my final project workforce monthly report (HRD Form 00485.02 and final company-wide workforce monthly report (HRD Form 00485.03) are attached. **NOTE: This paragraph is only applicable if you completed a construction contract that was estimated by the City, prior to solicitation, as requiring more than 800 construction labor hours and costing in excess of $324,000.01. If applicable you MUST attach copies of your final monthly workforce reports.**

7. This affidavit is made in behalf of the CONTRACTOR for the purpose of securing from Kansas City, Missouri, the certification of completion of the Project and receiving payment therefore.

8. If the Contract amount exceeded $150,000, CONTRACTOR has submitted proof of compliance with the City tax ordinances administered by the City's Commissioner of Revenue and has on file proof of tax compliance from all Subcontractors. If the Contract term exceeded one (1) year, CONTRACTOR has provided proof of compliance with the City tax ordinances administered by the City's Commissioner of Revenue prior to receiving final payment and has on file proof of tax compliance from all Subcontractors prior to the Subcontractor receiving final payment from CONTRACTOR.

CONTRACTOR_____

By _____
(Authorized Signature)

Title _____

On this _____ day of _____, _____, before me

appeared _____, to me personally known to be the

_____of the_____,

and who executed the foregoing instrument and acknowledged that (s)he executed the same on behalf of

_____ as its free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year first above written.

My commission expires:

_____ _____
Notary Public

SUBCONTRACTOR AFFIDAVIT FOR FINAL PAYMENT

Project Number _____

Project Title _____

STATE OF MISSOURI)

) ss:

COUNTY OF _____)

After being duly sworn the person whose name and signature appears below hereby states under penalty of perjury that:

1. I am the duly authorized officer of the business indicated below (hereinafter Subcontractor) and I make this affidavit on behalf of Subcontractor in accordance with the requirements set forth in Section 290.290, RSMo. Subcontractor has completed all of the Work required under the terms and conditions of a subcontract as follows:

Subcontract with: _____, Contractor

Work Performed: _____

Total Dollar Amount of Subcontract and all Change Orders: $_____

City Certified ☐MBE ☐ WBE ☐ DBE ☐ NA
List certifications: _____

2. Subcontractor fully complied with the provisions and requirements of the Missouri Prevailing Wage Law set forth in Sections 290.210, RSMo through 290.340, RSMo.

Business Entity Type:
(___) Missouri Corporation
(___) Foreign Corporation
(___) Fictitious Name Corporation
(___) Sole Proprietor
(___) Limited Liability Company
(___) Partnership
(___) Joint Venture
(___) Other (Specify)

Subcontractor's Legal Name and Address

_____

_____
Phone No. _____
Fax: _____
E:mail:_____
Federal ID No._____

I hereby certify that I have the authority to execute this affidavit on behalf of Subcontractor.

By: _____ _____
(Signature) (Print Name)

_____ _____
(Title) (Date)

NOTARY

Subscribed and sworn to before me this _____ day of _____, 20_____.

My Commission Expires:_____ By_____

_____ _____
Print Name Title

ATTACHMENT E

CITY – LICENSED GEOGRAPHICAL INFORMATION SYSTEM DATA

CITY will provide licensed materials for Geographical Information Systems to be used for the project as follows:

Grant of License. CITY grants to DESIGN PROFESSIONAL and DESIGN PROFESSIONAL hereby accepts, upon the express terms and conditions contained in this Agreement, a non-exclusive License to use the information described herein in the form produced and maintained by the Geographical Information System produced and maintained by City.

License Materials. The materials licensed for use by DESIGN PROFESSIONAL under this Agreement are the forms which can be read or manipulated by computer of the geographical and physical characteristic information collected and assimilated in the records of City ("Licensed Materials").

Use of Licensed Materials. Subject to the terms, conditions and prohibitions of this Agreement, DESIGN PROFESSIONAL shall be entitled to use the information contained in the Licensed Materials to accomplish the scope of services provided by DESIGN PROFESSIONAL. At the completion of the Agreement, DESIGN PROFESSIONAL shall return all materials to the CITY, and shall permanently remove the Licensed Materials from any media used by DESIGN PROFESSIONAL. At the end of the Agreement, DESIGN PROFESSIONAL shall provide a written certification that all materials are returned and that all Licensed Materials, including copies, have been removed from the equipment or media of DESIGN PROFESSIONAL.

Transfer of Licensed Materials. This license is expressly nontransferable and DESIGN PROFESSIONAL shall not transfer any interest, entitlement or obligation under this Agreement to any other person or entity.

Data. The data and information contained in the Licensed Materials shall be those files and systems as recorded and existing as of the time DESIGN PROFESSIONAL requests the information.

Title. The custody and title and all other rights and interests in the Licensed Materials are and shall at all times remain with the CITY and with the Offices or officials of the CITY having official custody of the Licensed Materials.

Not Public Records. The database in the form of the Licensed Materials is proprietary, intellectual property of the CITY and shall not be considered or deemed as open, public records, except as provided in §256.670, RSMo. DESIGN PROFESSIONAL shall and hereby expressly agrees that it will, recognize the property interests of CITY and CITY agrees that it is not,

pursuant to this License, a custodian of any open, public records, except as may exist pursuant to §256.670 RSMo.

Access to Materials. Pursuant to the terms and conditions of this agreement, DESIGN PROFESSIONAL shall be provided access to obtain the Licensed Materials in a periodic basis for the term of this Agreement. As provided in this Agreement, DESIGN PROFESSIONAL, shall be entitled to any Modifications, updates, renewals or additional data or information under the License granted by this Agreement.

Updated Material and Modifications. CITY shall in accordance with this Agreement and upon request of the DESIGN PROFESSIONAL provide to DESIGN PROFESSIONAL updates to or modifications of all or any specific parts of the data or information in the Licensed Materials. Any such updates or modifications provided by CITY shall be covered by and subject to each and all of the terms and conditions of this Agreement. Furthermore, upon completion or termination of this Agreement, DESIGN PROFESSIONAL, will provide to CITY in a compatible form, updated information developed during the execution of the Scope of Services provided by DESIGN PROFESSIONAL.

Data Contents. The data contained in the materials licensed by CITY to DESIGN PROFESSIONAL under this Agreement shall include that information necessary to allow DESIGN PROFESSIONAL to perform scope of services outlined in the Agreement.

Waiver. The waiver of any breach of any provision of this license shall not constitute a waiver of any subsequent breach of the same or other provisions of the Agreement.

Modifications. Any modification to the rights provided herein for licensed materials shall be in writing executed by each party.

ATTACHMENT F

EMPLOYEE ELIGIBILITY VERIFICATION AFFIDAVIT

(Required for any contract with the City of Kansas City, Missouri in excess of $5,000.00)

STATE OF _____)
) ss
COUNTY OF _____)

On this _____ day of _____, 20___, before me appeared _____, personally known by me or otherwise proven to be the person whose name is subscribed on this affidavit and who, being duly sworn, stated as follows:

I am of sound mind, capable of making this affidavit, and personally swear or affirm that the statements made herein are truthful to the best of my knowledge. I am the _____ (title) of _____ (business entity) and I am duly authorized, directed or empowered to act with full authority on behalf of the business entity in making this affidavit.

I hereby swear or affirm that the business entity does not knowingly employ any person in connection with the contracted services who does not have the legal right or authorization under federal law to work in the United States as defined in 8 U.S.C. § 1324a(h)(3).

I hereby additionally swear or affirm that the business entity is enrolled in an electronic verification of work program operated by the United States Department of Homeland Security (E-Verify) or an equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, under the Immigration Reform and Control Act of 1986, and that the business entity will participate in said program with respect to any person hired by the business entity to perform any work in connection with the contracted services. I have attached hereto documentation sufficient to establish the business entity's enrollment and participation in the required electronic verification of work program.

I am aware and recognize that unless certain contractual requirements are satisfied and affidavits obtained as provided in Section 285.530, RSMo, the business entity may face liability for violations committed by its subcontractors, notwithstanding the fact that the business entity may itself be compliant.

I acknowledge that I am signing this affidavit as the free act and deed of the business entity and that I am not doing so under duress.

_____
Affiant's signature

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public

My Commission expires:

ATTACHMENT G

Non-Construction Subcontractors Listing

Contractor shall submit Subcontractor information on this form prior to Subcontractor beginning Work. Contractor shall update this listing and keep it current for the life of the Contract.

	Company Name Contact Name and Email	Address Phone No. and Fax No.
1.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
2.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
3.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
4.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
5.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
6.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
7.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
8.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
9.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____
10.	Name:_____ Email:	Address:_____ _____ Phone:_____ Fax:_____

Contractor – Company Name: _____
Submitted By: _____
Title: _____
Telephone No.: _____
Fax No.: _____
E-mail: _____
Date: _____

NON-CONSTRUCTION APPLICATION FOR PAYMENT

ATTACHMENT H

Project Number _____

Contract Number _____

Project Title _____

Final Payment ☐

Application Number: _____ Date:_____

Ordinance Number: _____ Ordinance Date:_____

Design Professional/Contractor: City PO Number: _____

Legal Name _____

Mail Address: _____

City, ST Zip _____

Vendor Number _____

Application for Work Accomplished: From _____ To: _____

Name of Kansas City, MO Project Mgr: _____

Kansas City, MO Contract Administrator: _____

Original Contract Amount	[1]	$0.00		
Net by Amendments ___ through ___	[2]	$0.00		
Optional Services Amount in Contract	[3]	$0.00		
Net by Optional Services Authorizations ___ through ___	[4]	$0.00		
Unathorized Optional Services Amount Remaining (3-4)	[5]	$0.00		
Maximum Obligation Authorized ([1+2+4] - [3])			[6]	$0.00
Total Work Completed to Date			[7]	$0.00
Total Previous Payment Applications			[8]	$0.00
PAYMENT DUE CONTRACTOR (7-8)			[9]	$0.00

Instructions to Design Professional/Contractor:

1. Complete and sign this Application and attach the following items: A) **documentation** of expenses (direct payroll, direct expenses, and sub-consultants) per contract (ie.services performed; actual salary of personnel for time charges directly to the project; and/or actual reasonable expenses incurred, AND, B) a photocopy of your most recent **00485.01 HRD MWBE Monthly Utilization Report** submitted to Human Relations Dept., if required by contract, AND C) Monthly Progress Report, if required by contract.
2. If this is the First application for payment and if Contract amount exceeds $150,000.00, then also attach proof of tax compliance (**Revenue Clearance Letter**).
3. If this is the Final application for payment, then also attach: **01290.14 Contractor Affidavit for Final Payment; 01290.15 Subcontractor Affidavit for Final Payment,** if required by contract; and proof of tax compliance (**Revenue Clearance Letter**).
4. Submit current insurance certificate for the following policies General Liability, Automobile, Workers Compensation and Professional Liability upon renewal.

5. Submit Application to:

Water Services Department
Name, Project Manager
4800 E 63rd St
Kansas City, MO 64130

Contractor:

Submitted By: _____ Signature: _____ Date:_____

Phone: _____ Fax: _____ E-mail:_____

Kansas City:

Approved By: _____ Project Manager Date:_____

Approved By: _____ Director or Designee Date:_____

ATTACHMENT I

AFFIRMATIVE ACTION PROGRAM AFFIDAVIT

(required for any contractor with 50 or more employees and
a contract with the City of Kansas City, Missouri, in excess of $300,000.00)

STATE OF _____)
) ss
COUNTY OF _____)

On this _____ day of _____, 20___, before me appeared _____, personally known by me or otherwise proven to be the person whose name is subscribed on this affidavit and who, being duly sworn, stated as follows:

I am of sound mind, capable of making this affidavit, and personally swear or affirm that the statements made herein are truthful to the best of my knowledge. I am the _____ (title) of _____ (business entity) and I am duly authorized, directed or empowered to act with full authority on behalf of the business entity in making this affidavit.

I hereby swear or affirm that [*enter business entity name*] has an affirmative action program (the "Program") in place and will maintain the Program for the duration of its contract with the City of Kansas City, Missouri ("City") as required by Chapter 3 of the City's Code of Ordinances.

I hereby additionally swear or affirm that attached hereto is a true copy of the Program.

I hereby additionally swear or affirm that the business entity shall not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or ancestry, disability, sexual orientation, gender identity or age in a manner prohibited by Chapter 3 of the City's Code of Ordinances.

I acknowledge that I am signing this affidavit as the free act and deed of the business entity and that I am not doing so under duress.

_____
Affiant's signature

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public

My Commission expires:

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-0048305
Owner:	City of Kansas City
Address:	4800 East 63rd Street, Kansas City, MO 64130
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	KC Rocky Branch WWTP
Facility Address:	500 NE 132nd Street, Kansas City, MO 64165
Legal Description:	See Page 2
UTM Coordinates:	See Page 2
Receiving Stream:	See Page 2
First Classified Stream and ID:	See Page 2
USGS Basin & Sub-watershed No.:	See Page 2

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

See Page 2

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas.

September 1, 2021
Effective Date

Edward B. Galbraith, Director, Division of Environmental Quality

August 31, 2026
Expiration Date

Chris Wieberg, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #001 – Eliminated

Outfall #002 – Discharges from these outfalls are 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).

Outfall #003 – POTW
The use or operation of this facility shall be by or under the supervision of a Certified "B" Operator.
Basket screen / influent pump station / 2-cell wet weather earthen holding basin / grit vortex / manual bar screen / 2 extended aeration basins / 2 final clarifiers / UV disinfection / cascade step reaeration / aerobic sludge digester / sludge is transported to the KC Blue River WWTP for digestion/land application / facility does not have materials stored or conduct operations in a manner that would cause the discharge of pollutants via stormwater

Design population equivalent is 20,000.
Design flow is 2.8 million gallons per day.
Actual flow is 1.5 million gallons per day.
Design sludge production is 426 dry tons/year.

Legal Description:	Sec. 11, T52N, R33W, Clay County
UTM Coordinates:	X=364210, Y=4355542
Receiving Stream:	Rocky Branch (C)
First Classified Stream and ID:	Rocky Branch (C) (3326)
USGS Basin & Sub-watershed No.:	(10240012-0708)

Permitted Feature INF – Influent Monitoring Location – Headworks

Legal Description:	Sec. 11, T52N, R33W, Clay County
UTM Coordinates:	X=364298, Y=4355320

OUTFALL #003	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 **September 1, 2021** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: M						
Flow	MGD	*		*	once/weekday***	24 hr. total
Biochemical Oxygen Demand$_5$	mg/L		20	10	once/week	composite**
Total Suspended Solids	mg/L		25	15	once/week	composite**
E. coli (**Note 1, Page 4**)	#/100mL		1,030	206	once/week	grab
Ammonia as N (Apr 1 – Sep 30)	mg/L	2.4		1.2	once/week	composite**
Ammonia as N (Oct 1 – Mar 31)		4.6		2.3	once/week	composite**
Oil & Grease	mg/L	*		*	once/month	grab
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**
EFFLUENT PARAMETER(S)	**UNITS**	**MINIMUM**		**MAXIMUM**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
pH – Units****	SU	6.5		9.0	once/week	grab
EFFLUENT PARAMETER(S)	**UNITS**	**DAILY MINIMUM**		**MONTHLY AVERAGE MINIMUM**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
Dissolved Oxygen	mg/L	*		*	once/week	grab
EFFLUENT PARAMETER(S)			**UNITS**	**MONTHLY AVERAGE MINIMUM**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
Biochemical Oxygen Demand$_5$ – Percent Removal (**Note 2, Page 4**)			%	85	once/month	calculated
Total Suspended Solids – Percent Removal (**Note 2, Page 4**)			%	85	once/month	calculated

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE OCTOBER 28, 2021. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

* Monitoring requirement only.

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

*** Once each weekday means: Monday, Tuesday, Wednesday, Thursday & Friday, except for the nine Federal legal holidays (New Years, Martin Luther King Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving, and Christmas)

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

PERMITTED FEATURE INF	TABLE B-1. INFLUENT MONITORING REQUIREMENTS

The monitoring requirements in **Table B-1** shall become effective on **September 1, 2021** and remain in effect until expiration of the permit. The influent wastewater shall be monitored by the permittee as specified below:

PARAMETER(S)	UNITS	MONITORING REQUIREMENTS				
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Limit Set: IM						
Biochemical Oxygen Demand$_5$ (**Note 2**)	mg/L			*	once/month	composite**
Total Suspended Solids (**Note 2**)	mg/L			*	once/week	composite**
Ammonia as N	mg/L	*		*	once/month	composite**
Total Phosphorus	mg/L	*		*	once/month	composite**
Total Kjeldahl Nitrogen	mg/L	*		*	once/month	composite**
Nitrite + Nitrate	mg/L	*		*	once/month	composite**

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE OCTOBER 28, 2021.

* 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 1 – Effluent limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

Note 2 – Influent sampling for BOD_5 and TSS is not required when the facility does not discharge effluent during the reporting period. Samples are to be collected prior to any treatment process. Calculate Percent Removal by using the following formula: [(Average Influent –Average Effluent) / Average Influent] x 100% = Percent Removal. Influent and effluent samples are to be taken during the same month. The Average Influent and Average Effluent values are to be calculated by adding the respective values together and dividing by the number of samples taken during the month. Influent samples are to be collected as a 24-hour composite sample, composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

C. 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.

D. 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.
   (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/mogem. Information about the eDMR system can be found at https://dnr.mo.gov/env/wpp/edmr.htm. 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. Only permittees with an approved waiver request may submit monitoring data and reports on paper to the Department for the period that the approved electronic reporting waiver is effective. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. The Department will either approve or deny this electronic reporting waiver request within 120 calendar days.

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.

4. Report as no-discharge when a discharge does not occur during the report period.

5. Reporting of Non-Detects:
   (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
   (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
   (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
   (d) Where the permit contains a Minimum Level (ML) and the permittee is granted authority in the permit to report zero in lieu of the < ML for a specified parameter (conventional, priority pollutants, metals, etc.), then zero (0) is to be reported for that parameter.
   (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.
   (f) When a parameter is not detected above ML, the permittee must report the data qualifier signifying less than ML for that parameter (e.g., < 50 µg/L, if the ML for the parameter is 50 µg/L). For reporting an average based on a mix of values detected and not detected, assign a value of "0" for all non-detects for that reporting period and report the average of all the results.

D. SPECIAL CONDITIONS (continued)

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 has developed a comprehensive program for maintenance and repair of the collection system. The permittee's program is consistent with the US EPA's Guide for Evaluating Capacity, Management, Operation, And Maintenance Plan Performance Criteria (CMOM) Programs at Sanitary Sewer Collection Systems (Document number EPA 305-B-05-002). The permittee shall continue to implement the CMOM Program in accordance with the federal consent decree entered in the matter of the *United States v. The City of Kansas City, Missouri, 4:10-cv-0497*, including any amendment thereto. The permittee shall continue to submit an Annual Report to the Department on the same date it submits the report to the EPA.

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 Kansas City Regional Office during normal business hours or by using the online Sanitary Sewer Overflow/Facility Bypass Application located at: https://dnr.mo.gov/mogem/ or the Environmental Emergency Response spill-line at 573-634-2436 outside of normal business hours. Once an electronic reporting system compliant with 40 CFR Part 127, the National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, is available all bypasses must be reported electronically via the new system. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

10. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.

11. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.

12. An all-weather access road to the treatment facility shall be maintained.

13. The outfall sewer shall be protected and maintained against the effects of floodwater, ice, or other hazards as to reasonably insure its structural stability, freedom from stoppage, and that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.

14. The 2-cell wet weather earthen holding basin and biosolids earthen storage basins 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 2-cell wet weather earthen holding basin and biosolids earthen storage and to divert stormwater runoff around the 2-cell wet weather earthen holding basin and biosolids earthen storage and protect embankments from erosion.

16. The permittee shall perform a minimum of four whole effluent toxicity tests in the four and one-half year period prior to the next permit renewal application. The four tests shall consist of two chronic toxicity tests and two acute toxicity tests in accordance with Special Conditions #17 and #18.

D. SPECIAL CONDITIONS (continued)

17. 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.

18. 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.

19. 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 02-19), 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.

D. SPECIAL CONDITIONS (continued)

20. 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. The requirements for the annual report are contained in the KC Blue River WWTP's Missouri State Operating Permit #MO-0024911.
    (b) The permittee is currently working to complete a technical local limit evaluation. The requirements and timelines are contained in the KC Blue River WWTP's Missouri State Operating Permit #MO-0024911.
    (c) 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.

21. The permittee shall update their pretreatment program to incorporate the requirements of 10 CSR 20-6.100, effective October 30, 2012, which adopted the 2005 "Streamlining" revisions to the federal pretreatment rule, 40 CFR 403. This update to city code will include at the minimum the "required streamlining" 40 CFR 403 rule updates.

22. Sewer Extension Authority Supervised Program

    The Department approved the Sewer Extension Authority Supervised Program for the City of Kansas City to regulate and approve construction of sanitary sewers and pump stations, which are tributary to this wastewater treatment facility on December 19, 2019. The City of Kansas City shall act as the continuing authority for the operation, maintenance, and modernization of the constructed collection system. This approval may be modified or revoked by the Department if the wastewater collection, transportation, or treatment facilities reach their design capacity, if the treatment facility falls into chronic noncompliance with the permit, or if the permittee fails to follow the terms and conditions of the submitted and approved program.

    This permit may be reopened and modified or alternatively revoked and reissued to incorporate new or modified conditions to the Sewer Extension Authority Supervised Program, if information indicates changes are necessary to assure compliance with Missouri's Clean Water Law and associated regulations. When any of the above mentioned conditions occur, the permittee will be notified prior to any modifications of this permit condition. Plans and specifications for all projects which include a proposed sanitary sewer overflow must be submitted to the Department to provide record information for location and size of the sanitary sewer overflow.

    An annual report on the Sewer Extension Authority Supervised Program is required under the conditions of the KC Blue River WWTP's Missouri State Operating Permit #MO-0024911. Please see **Appendix – Sewer Extension Authority Supervised Program Reauthorization Letter** for applicable conditions.

    The Department's Water Protection Program's Engineering Section will reevaluate the City's Sewer Extension Authority Supervised Program for reauthorization when they file an application for permit renewal to determine if it is current, complete, and meets the requirements of 10 CSR 20-8 Minimum Design Standards. Once the Sewer Extension Authority Supervised Program is reauthorized or denied, this condition will be updated accordingly.

E. 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-0048305
KC ROCKY BRANCH 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: 09/06/2016
Expiration Date: 03/04/2017

Facility Type and Description: POTW - Basket screen / influent pump station / 2-cell wet weather earthen holding basin / grit vortex / manual bar screen / 2 extended aeration basins / 2 final clarifiers / UV disinfection / cascade step reaeration / aerobic sludge digester / sludge is transported to the KC Blue River WWTP for digestion/land application / facility does not have materials stored or conduct operations in a manner that would cause the discharge of pollutants via stormwater

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#003	4.34	Secondary	Domestic

Comments:
Changes in this permit for Outfall #003 include the addition of Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite, the revision of Ammonia limitations, the revision of Oil & Grease from limits to monitoring only, and the removal of Temperature. Changes in this permit for Permitted Feature INF include the addition of Ammonia, Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite. 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 addition of inflow and infiltration reporting requirements, reporting of Non-detects, bypass reporting requirements, pretreatment requirements, and the Electronic Discharge Monitoring Report (eDMR) Submission System.

Part II – Effluent Limitations and Monitoring Requirements

OUTFALL #003 – 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 #003 - RECEIVING STREAM INFORMATION

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Rocky Branch	C	3326	AQL, WBC-B, SCR, HHP, IRR, LWW	10240012-0708	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.:
AQL = Protection of aquatic life (Current narrative use(s) are defined to ensure the protection and propagation of fish shellfish and wildlife, which is further subcategorized as: WWH = Warm Water Habitat; **CDF** = Cold-water fishery (Current narrative use is cold-water habitat.); **CLF** = Cool-water fishery (Current narrative use is cool-water habitat); EAH = Ephemeral Aquatic Habitat; MAH = Modified Aquatic Habitat; LAH = Limited Aquatic Habitat. This permit uses AQL effluent limitations in 10 CSR 20-7.031 Table A for all habitat designations unless otherwise specified.)

10 CSR 20-7.031(1)(C)2.: Recreation in and on the water
WBC = Whole Body Contact recreation where the entire body is capable of being submerged;
WBC-A = Whole body contact recreation that supports swimming uses and has public access;
WBC-B = Whole body contact recreation that supports swimming;
SCR = Secondary Contact Recreation (like fishing, wading, and boating).

10 CSR 20-7.031(1)(C)3. to 7.:
HHP (formerly HHF) = Human Health Protection as it relates to the consumption of fish;
IRR = Irrigation for use on crops utilized for human or livestock consumption;
LWW = Livestock and wildlife watering (Current narrative use is defined as LWP = Livestock and Wildlife Protection);
DWS = Drinking Water Supply;
IND = Industrial water supply

10 CSR 20-7.031(1)(C)8-11.: Wetlands (10 CSR 20-7.031 Table A currently does not have corresponding habitat use criteria for these defined uses)
WSA = Storm- and flood-water storage and attenuation; WHP = Habitat for resident and migratory wildlife species;
WRC = Recreational, cultural, educational, scientific, and natural aesthetic values and uses; WHC = Hydrologic cycle maintenance.

10 CSR 20-7.031(6): **GRW** = Groundwater

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Rocky 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

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

✓ This facility discharges to a stream with an EPA approved Permit in Lieu of TMDL.

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 (April 1 – September 30)	mg/L	8	2.4		1.2	3.7/1.4	1/week	monthly	C
Ammonia as N (October 1 – March 31)	mg/L	8	4.6		2.3	7.5/2.9	1/week	monthly	C
Oil & Grease	mg/L	1, 3	*		*	15/10	1/month	monthly	G
Total Phosphorus	mg/L	1	*		*	***	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	***	1/month	monthly	C
Nitrite + Nitrate	mg/L	1	*		*	***	1/month	monthly	C
Acute Whole Effluent Toxicity	TUa	1, 9	*			% Survival	2 acute and 2 chronic for next permit renewal		C
Chronic Whole Effluent Toxicity	TUc	1, 9	*			***			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 #003 – 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 20 mg/L as a Weekly Average and 10 mg/L as a Monthly Average. Please see the attached Permit In Lieu of TMDL.

- **Total Suspended Solids (TSS)**. Operating permit retains 25 mg/L as a Weekly Average and 15 mg/L as a Monthly Average. Please see the attached Permit In Lieu of TMDL.

- ***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**.

  April 1 – September 30: Operating permit limits are 2.4 mg/L as a Daily Maximum and 1.2 mg/L as a Monthly Average.
  October 1 – March 31: Operating permit retains 4.6 mg/L as a Daily Maximum and 2.3 mg/L as a Monthly Average.

  Please see the attached Permit In Lieu of TMDL.

- **Total Phosphorus and Total Nitrogen (Speciated)**. Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrite + Nitrate are required per 10 CSR 20-7.015(9)(D)8.

- **pH**. 6.5-9.0 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.

- **Dissolved Oxygen**. Operating permit retains monitoring only as a Daily Minimum and as a Monthly Average Minimum. Please see the attached Permit In Lieu of TMDL.

- **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.

Whole Effluent Toxicity

- **Acute Whole Effluent Toxicity**. Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards.

  - ✓ Acute Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

- **Chronic Whole Effluent Toxicity**. Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards.

  - ✓ Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

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 Ammonia and Dissolved Oxygen which were returned to the frequency (once per week) established in the Permit-In-Lieu of TMDL. 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 and Chronic Whole Effluent Toxicity – The permittee shall perform a minimum of four whole effluent toxicity tests in the four and one-half year period prior to the next permit renewal application. The four tests shall consist of two chronic toxicity tests and two acute toxicity tests.

Sampling Type Justification: As per 10 CSR 20-7.015, samples collected for mechanical plants shall be a 24 hour composite sample. Grab samples, however, must be collected for pH, *E. coli*, Oil & Grease, and Dissolved Oxygen, 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		Monthly Average	Previous Permit Frequency / Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
TSS	mg/L	1			*	1/month	1/week	monthly	C
Ammonia as N	mg/L	1	*		*	***	1/month	monthly	C
Total Phosphorus	mg/L	1	*		*	***	1/month	monthly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	***	1/month	monthly	C
Nitrite + Nitrate	mg/L	1	*		*	***	1/month	monthly	C

* - Monitoring requirement only.
*** - 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, Nitrite + Nitrate, and Ammonia parameters were established to match the required sampling frequency of these parameters in the effluent, per [10 CSR 20-7.015(9)(D)8.]. The sampling and reporting frequency for influent BOD_5 have been established to match the required sampling frequency of these parameters in the effluent. The sampling and reporting frequency for influent TSS have has been established per the requirement of 10 CSR 20-9.010(5)(B)2.

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.

OUTFALL #003 – 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 May 17, 2016, no evidence of an excursion of this criterion has been observed by the Department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, this facility utilizes secondary treatment technology and is currently in compliance with secondary treatment technology based effluent limits established in 40 CFR 133 and there has been no indication to the Department that the stream has had issues maintaining beneficial uses as a result of this discharge. Based on the information reviewed during the drafting of this permit, these final effluent limitations appear to have protected against the excursion of this criterion in the past. Therefore, the discharge does not have the reasonable potential to cause or contribute to an excursion of this criterion.
(B) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.
(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses. Please see (A) above as justification is the same.
(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life. This permit contains final effluent limitations which are protective of both acute and chronic toxicity for various pollutants that are either expected to be discharged by domestic wastewater facilities or that were disclosed by this facility on the application for permit coverage. Based on the information reviewed during the drafting of this permit, it has been determined if the facility meets final effluent limitations established in this permit, there is no reasonable potential for the discharge to cause an excursion of this criterion.
(E) Waters shall provide for the attainment and maintenance of water quality standards downstream including waters of another state. Please see (D) above as justification is the same.
(F) There shall be no significant human health hazard from incidental contact with the water. Please see (D) above as justification is the same.
(G) There shall be no acute toxicity to livestock or wildlife watering. Please see (D) above as justification is the same.
(H) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community. Please see (A) above as justification is the same.
(I) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247. The discharge from this facility is made up of treated domestic wastewater. No evidence of an excursion of this criterion has been observed by the Department in the past and the facility has not disclosed any other information related to the characteristics of the discharge on their permit application which has the potential to cause or contribute to an excursion of this narrative criterion. Additionally, any solid wastes received or produced at this facility are wholly contained in appropriate storage facilities, are not discharged, and are disposed of offsite. This discharge is subject to Standard Conditions Part III, which contains requirements for the management and disposal of sludge to prevent its discharge. Therefore, this discharge does not have reasonable potential to cause or contribute to an excursion of this criterion.

Part 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)], or is an existing facility.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(o); 40 CFR Part 122.44(l)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

✓ Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.

- Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance.

  - **Oil and Grease**. The previous permit had final effluent limits of 15 mg/L as a daily maximum and 10 mg/L as a monthly average. 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. The permit is still protective of water quality.

  - **Temperature**. The Department has concluded that domestic wastewater treatment facilities have no reasonable potential to exceed Water Quality Standards for temperature. Due to the fact that this facility will have a minimal effect on temperature this parameter has been removed from the permit.

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

  - **General Criteria**. The previous permit contained a special condition which described a specific set of prohibitions related to general criteria found in 10 CSR 20-7.031(4). In order to comply with 40 CFR 122.44(d)(1), the permit writer has conducted reasonable potential determinations for each general criterion and established numeric effluent limitations where reasonable potential exists. While the removal of the previous permit special condition creates the appearance of backsliding, since this permit establishes numeric limitations where reasonable potential to cause or contribute to an excursion of the general criteria exists the permit maintains sufficient effluent limitations and monitoring requirements in order to protect water quality, this permit is equally protective as compared to the previous permit. Therefore, given this new information, and the fact that the previous permit special condition was not consistent with 40 CFR 122.44(d)(1), an error occurred in the establishment of the general criteria as a special condition of the previous permit. Please see Part VI – Effluent Limits Determination for more information regarding the reasonable potential determinations for each general criterion related to this facility.

ANTIDEGRADATION:
In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)], for domestic wastewater discharge with new, altered, or expanding discharges, the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. In accordance with Missouri's water quality regulations for antidegradation [10 CSR 20-7.031(3)], degradation may be justified by documenting the socio-economic importance of a discharge after determining the necessity of the discharge. Facilities must submit the antidegradation review request to the Department prior to establishing, altering, or expanding discharges. See http://dnr.mo.gov/env/wpp/permits/antideg-implementation.htm

✓ No degradation proposed and no further review necessary. Facility did not apply for authorization to increase pollutant loading or to add additional pollutants to their discharge.

For stormwater discharges, the stormwater BMP chosen for the facility, through the antidegradation analysis performed by the facility, must be implemented and maintained at the facility. Failure to implement and maintain the chosen BMP alternative is a permit violation; see SWPPP.

✓ The facility does not have stormwater discharges or the stormwater outfalls onsite have no industrial exposure.

AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:
As per [10 CSR 20-6.010(2)(C)], …An applicant may utilize a lower preference continuing authority by submitting, as part of the application, when a higher level authority is available, must submit information to the Department for review and approval, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or any other regional sewage service and treatment plan approved for higher preference authority by the Department.

BIOSOLIDS & SEWAGE SLUDGE:
Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

✓ Permittee is not authorized to land apply biosolids. Sludge/biosolids are transported to the KC Blue River WWTP.

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 May 17, 2016. The conditions of the facility at the time of inspection were found to be satisfactory.

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. This final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online. In an effort to aid facilities in the reporting of applicable information electronically, the Department has created several new forms including operational control monitoring forms and an I&I location and reduction form. These forms are optional and found on the Department's website at the following locations:

Operational Monitoring Lagoon: http://dnr.mo.gov/forms/780-2801-f.pdf
Operational Monitoring Mechanical: http://dnr.mo.gov/forms/780-2800-f.pdf
I&I Report: http://dnr.mo.gov/forms/780-2690-f.pdf

Per 40 CFR 127.15 and 127.24, permitted facilities may request a temporary waiver for up to 5 years or a permanent waiver from electronic reporting from the Department. To obtain an electronic reporting waiver, a permittee must first submit an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. Each facility must make a request. If a single entity owns or operates more than one facility, then the entity must submit a separate request for each facility based on its specific circumstances. An approved waiver is non-transferable.

The Department must review and notify the facility within 120 calendar days of receipt if the waiver request has been approved or rejected [40 CFR 124.27(a)]. During the Department review period as well as after a waiver is granted, the facility must continue submitting a hard-copy of any reports required by their permit. The Department will enter data submitted in hard-copy from those facilities allowed to do so and electronically submit the data to the EPA on behalf of the facility.

✓ The permittee/facility is currently using the eDMR data reporting system.

NUMERIC LAKE NUTRIENT CRITERIA

✓ This facility does not discharge into a lake watershed where numeric lake nutrient criteria are applicable.

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 a (B) Certification Level. Please see **Appendix - Classification Worksheet**. Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator's Name: Brent Herring
Certification Number: 15178
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 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)
Dissolved Oxygen – Aerobic 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 ANALYSIS (RPA):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard.

In accordance with [40 CFR Part 122.44(d)(1)(iii)] if the permit writer determines that any given pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

✓ An RPA was not conducted for this facility. Effluent limits were established in the 2005 Permit-In-Lieu of TMDL

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 permittee has developed and is currently implementing a program for maintenance and repair of the collection system. The permittee shall continue to submit annual reports by March 31st as required by the federal consent decree entered in the matter of United States vs. City of Kansas City, Missouri, No. 4:10-CV-0497.

SCHEDULE OF COMPLIANCE (SOC):
Per 644.051.4 RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement, or if prohibited by other statute or regulation. A SOC includes an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the Clean Water Act, and 40 CFR §122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR § 122.47(a)(1), 10 CSR 20-7.031(11), and 10 CSR 20-7.015(9), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, a SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR § 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit that was not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study that may result in site-specific criteria or alternative effluent limits. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance to Permit Writers in developing SOCs, and attain a greater level of consistency, on April 9, 2015 the Department issued an updated policy on development of SOCs. This policy provides guidance to Permit Writers on the standard time frames for schedules for common activities, and guidance on factors that may modify the length of the schedule such as a Cost Analysis for Compliance.

✓ This permit does not contain an SOC.

SEWER EXTENSION AUTHORITY SUPERVISED PROGRAM:
In accordance with [10 CSR 20-6.010(6)(A)], the Department may grant approval of a permittee's Sewer Extension Authority Supervised Program. These approved permittees regulate and approve construction of sanitary sewers and pump stations, which are tributary to this wastewater treatment facility. The permittee shall act as the continuing authority for the operation, maintenance, and modernization of the constructed collection system. See http://dnr.mo.gov/env/wpp/permits/sewer-extension.htm.

✓ The permittee's Sewer Extension Authority Supervised Program has been reauthorized. Please see **Appendix – Sewer Extension Authority Supervised Program Reauthorization Letter** for applicable conditions.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

✓ The City of Kansas City submitted a No Exposure Certification for Exclusion from NPDES Stormwater Permitting to the Department on December 20, 2018. At this time, the permittee is not required to develop and implement a SWPPP. This exclusion will be reevaluated at the time of renewal.

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 not calculated.

WLA MODELING:
There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

✓ A WLA study was either not submitted or determined not applicable by Department staff.

WHOLE EFFLUENT TOXICITY (WET) TEST:
A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES). WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures that the provisions in the 10 CSR 20-6.010(8)(A) and the Water Quality Standards 10 CSR 20-7.031(4)(D),(F),(G),(J)2.A & B are being met. Under [10 CSR 20-6.010(8)(B)], the Department may require other terms and conditions that it deems necessary to assure compliance with the Clean Water Act and related regulations of the Missouri Clean Water Commission. In addition the following MCWL apply: §§§644.051.3 requires the Department to set permit conditions that comply with the MCWL and CWA; 644.051.4 specifically references toxicity as an item we must consider in writing permits (along with water quality-based effluent limits, pretreatment, etc…); and 644.051.5 is the basic authority to require testing conditions. WET test will be required by facilities meeting the following criteria:

- ☒ Facility is a designated Major.
- ☐ Facility continuously or routinely exceeds its design flow.
- ☐ Facility that exceeds its design population equivalent (PE) for BOD_5 whether or not its design flow is being exceeded.
- ☐ Facility (whether primarily domestic or industrial) that alters its production process throughout the year.
- ☐ Facility handles large quantities of toxic substances, or substances that are toxic in large amounts.
- ☐ Facility has Water Quality-based Effluent Limitations for toxic substances (other than NH_3)
- ☒ Facility is a municipality with a Design Flow ≥ 22,500 gpd.
- ☐ Other – please justify.

✓ The permittee is required to conduct WET test for this facility.

40 CFR 122.41(M) - BYPASSES:
The federal Clean Water Act (CWA), Section 402 prohibits wastewater dischargers from "bypassing" untreated or partially treated sewage (wastewater) beyond the headworks. A bypass is defined as an intentional diversion of waste streams from any portion of a treatment facility, [40 CFR 122.41(m)(1)(i)]. Additionally, Missouri regulation 10 CSR 20-7.015(9)(G) states a bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending, to waters of the state. Only under exceptional and specified limitations do the federal regulations allow for a facility to bypass some or all of the flow from its treatment process. Bypasses are prohibited by the CWA unless a permittee can meet all of the criteria listed in 40 CFR 122.41(m)(4)(i)(A), (B), & (C). Any bypasses from this facility are subject to the reporting required in 40 CFR 122.41(l)(6) and per Missouri's Standard Conditions I, Section B, part 2.b. Additionally, Anticipated Bypasses include bypasses from peak flow basins or similar devices designed for peak wet weather flows.

✓ This facility does not anticipate bypassing.

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. However, the facility chose to waive the finding of affordability requirement; therefore, no Cost Analysis for Compliance was conducted.

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.

PERMIT SYNCHRONIZATION:
The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than 4 years old, that data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit.

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 July 9, 2021 to August 9, 2021. No responses received.

DATE OF FACT SHEET: AUGUST 11, 2021

COMPLETED BY:

BRANT FARRIS, ENVIRONMENTAL SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT
(660) 385-8019
brant.farris@dnr.mo.gov

Appendices

APPENDIX - CLASSIFICATION WORKSHEET:

Item	Points Possible	Points Assigned
Maximum Population Equivalent (P.E.) served , peak day	1 pt./10,000 PE or major fraction thereof. (Max 10 pts.)	2
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	
Reoccurring deviations or excessive variations of more than 200 percent in strength and/or flow	4	(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	3
Primary Treatment		
Primary clarifiers	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)**	----	50

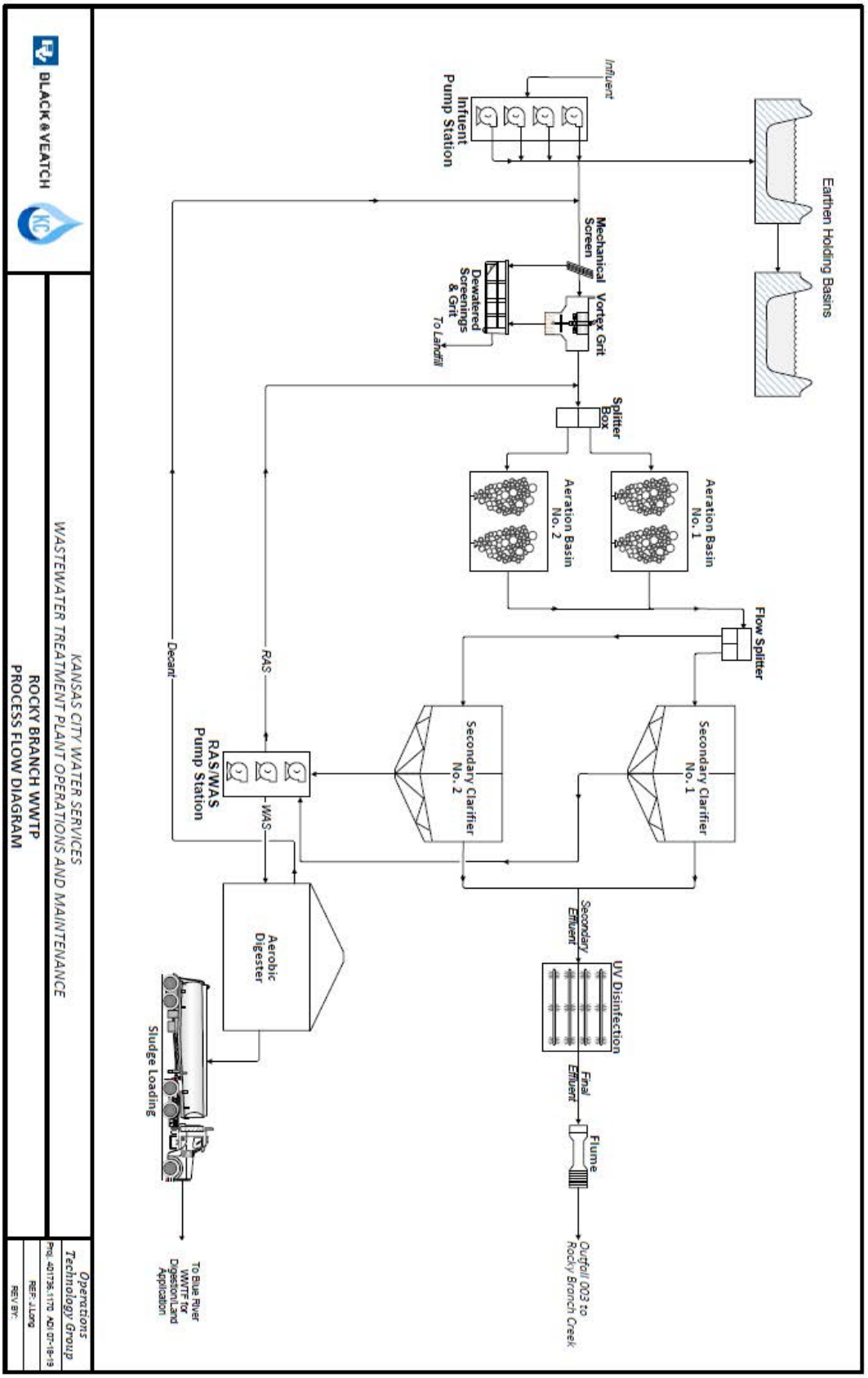
† - does not count towards total as this section counts the highest value only

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Solids Handling		
Sludge Holding	5	
Anaerobic digestion	10	
Aerobic digestion	6	6
Evaporative sludge drying	2	
Mechanical dewatering	8	
Solids reduction (incineration, wet oxidation)	12	
Land application	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	5
More advanced determinations, such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	7	
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	
Total from page **TWO (2)**	----	15
Total from page **ONE (1)**	---	50
Grand Total	---	65

☐ - A: 71 points and greater
☒ - B: 51 points – 70 points
☐ - C: 26 points – 50 points
☐ - D: 0 points – 25 points

APPENDIX – ALTERNATIVE: Process flow diagram



APPENDIX – 2005 PERMIT-IN-LIEU OF TMDL:

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0048305
Owner: Address:	City of Kansas City – Water Services Department 4800 East 63rd Street, Kansas City, MO 64130
Continuing Authority: Address:	Same as above Same as above
Facility Name: Address:	KC, Rocky Branch Sewage Treatment Plant 500 NE 132nd Street, Kansas City, MO 64165
Legal Description:	SW ¼, NE ¼, Sec. 11, T52N, R33W, Clay County
Receiving Stream: First Classified Stream and ID: USGS Basin & Sub-watershed No.:	Rocky Branch Creek (C) Rocky Branch Creek (C)(03326) (10240012-120001)

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

See page 2

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

October 5, 2001
Effective Date

November 10, 2005
Revised Date

Doyle Childers, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

October 4, 2006
Expiration Date

Edward Galbraith, Director of Staff, Clean Water Commission

MO 780-0041 (10-93)

FACILITY DESCRIPTION (continued)

Outfall #001 – POTW - SIC #4952
Contact stabilization/sludge may be land applied, landfilled or incinerated
Design population equivalent is 7,500.
Design flow is 750,000 gallons per day. Actual flow is 900,000 gallons per day.
Design sludge production is 187.5 dry tons/year.

Outfall #002 – POTW – SIC #4952
Two-cell lagoon used during peak flows or for polishing of effluent.
Flow is dependent upon precipitation.

Outfall #003 – POTW - SIC #4952
Extended aeration/sedimentation/sludge may be land applied, landfilled or incinerated.
Design population equivalent is 20,000.
Design flow is 2.0 MGD.
Design sludge production is 426 dry tons/year.

Outfall #S1 Instream Monitoring
Instream monitoring one-quarter mile downstream of outfall #003, or alternate nearby location approved by the department.

PAGE NUMBER 3 of 9

PERMIT NUMBER MO-0048305

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Outfall #001						
Flow	MGD	*		*	once/weekday****	24 hr. total
Biochemical Oxygen Demand$_5$**	mg/L		45	30	once/week	24 hr. comp.
Total Suspended Solids**	mg/L		45	30	once/week	24 hr. comp.
pH – Units	SU	***		***	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE March 28, 2004.						
Outfall #002 (Note 1)						
Flow	MGD	*		*	once/discharge/day	24 hr. estimate
Biochemical Oxygen Demand$_5$**	mg/L		30	15	once/week	24 hr. comp.
Total Suspended Solids**	mg/L		35	20	once/week	24 hr. comp.
pH – Units	SU	***		***	once/week	grab
Ammonia as N	mg/L	6		3	once/week	grab
Temperature	°F	*		*	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE December 28, 2005.						
Outfall #003						
Flow	MGD	*		*	once/weekday****	24 hr. total
Biochemical Oxygen Demand$_5$**	mg/L		20	10	once/week	24 hr. comp.
Total Suspended Solids**	mg/L		25	15	once/week	24 hr. comp.
pH – Units	SU	***		***	once/week	grab
Dissolved Oxygen	mg/L	*		*	once/week	grab
Ammonia as N	mg/L				once/week	grab
Summer (April 1 – Oct. 31)		2.4		1.2		
Winter (Nov. 1 – March 31)		4.6		2.3		
Temperature	°F	*		*	once/week	grab
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE December 28, 2005. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
Outfall #003 Whole Effluent Toxicity (WET) Test	% Survival	See Special Conditions			once/year	24 hr. composite
MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE October 28, 2006.						

B. STANDARD CONDITIONS

IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED Parts I & III STANDARD CONDITIONS DATED October 1, 1980 and August 15, 1994, AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS					PAGE NUMBER 4 of 9 PERMIT NUMBER MO-0048305	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Outfall #S1						
Dissolved Oxygen	mg/L	*		*	once/quarter*****	grab
pH – Units	SU	*		*	once/quarter*****	grab
Temperature	°C	*		*	once/quarter*****	grab
Ammonia as N	mg/L	*		*	once/quarter*****	grab
MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE October 28, 2006.						

MO 780-0010 (8/91)

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

* Monitoring requirement only.
** This facility is required to meet a removal efficiency of 85% or more.
*** pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.0-9.0 pH units.
**** Once/weekday means: Monday, Tuesday, Wednesday, Thursday, Friday, except the nine Federal holidays.
***** Sample once per quarter during the months of March, June, September and December.

Note 1 – Monitor only when discharge occurs.

C. SPECIAL CONDITIONS

1. This permit may be reopened and modified, or alternatively revoked and reissued, to:
   (a) 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 Clean Water Act, 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) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
   (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

   The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

2. All outfalls must be clearly marked in the field.

3. Changes in Discharges of Toxic Substances

   The permittee shall notify the Director as soon as it knows or has reason to believe:
   (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
      (1) One hundred micrograms per liter (100 µg/L);
      (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,5 dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
      (3) Five (5) times the maximum concentration value reported for the pollutant in the permit application;
      (4) The level established in Part A of the permit by the Director.
   (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant, which was not reported in the permit application.

C. SPECIAL CONDITIONS (continued)

4. Report as no-discharge when a discharge does not occur during the report period.

5. Composite samples shall be collected as a single aliquot once per hour for 24 hours. Each aliquot shall be of equal volume (not flow weighted).

6. Sludge and Biosolids Use For Domestic Wastewater Treatment Facilities
   (a) Permittee shall comply with the pollutant limitations, monitoring, reporting, and other requirements in accordance with the attached permit Standard Conditions.
   (b) If sludge is not removed by a contract hauler, permittee is authorized to land apply biosolids. Permit Standard Conditions, Part III shall apply to the land application of biosolids. Permittee shall notify the department at least 180 days prior to the planned removal of biosolids. The department may require submittal of a biosolids management plan for department review and approval as determined appropriate on a case-by-case basis.

7. General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
   (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;
   (b) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
   (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;
   (d) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
   (e) There shall be no significant human health hazard from incidental contact with the water;
   (f) There shall be no acute toxicity to livestock or wildlife watering;
   (g) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
   (h) 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.

8. Whole Effluent Toxicity (WET) tests shall be conducted as follows:

SUMMARY OF WET TESTING FOR THIS PERMIT				
OUTFALL	A.E.C. %	FREQUENCY	SAMPLE TYPE	MONTH
#003	100	Annually	24 hr. composite	August

   (a) Test Schedule and Follow-Up Requirements

      (1) Perform a SINGLE-dilution test in the months and at the frequency specified above. For tests which are successfully passed, submit test results USING THE DEPARTMENT'S WET TEST REPORT FORM #MO-780-1899 along with complete copies of the test reports as received from the laboratory, including copies of chain-of-custody forms within 30 calendar days of availability to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102. If the effluent passes the test, do not repeat the test until the next test period.
         (a) For discharges of stormwater, samples shall be collected within three hours from when discharge first occurs.
         (b) Samples submitted for analysis of stormwater discharges shall be collected as a grab.
         (c) For discharges of non-stormwater, samples shall be collected only when precipitation has not occurred for a period of forty-eight hours prior to sample collection. In no event shall sample collection occur simultaneously with the occurrence of precipitation.
         (d) A twenty-four hour composite sample shall be submitted for analysis of non-stormwater discharges.

C. SPECIAL CONDITIONS (continued)

(e) Upstream receiving water samples, where required, shall be collected upstream from any influence of the effluent where downstream flow is clearly evident.
(f) Samples submitted for analysis of upstream receiving water may be collected as either a grab or twenty-four-hour composite as appropriate to the nature of the discharge.
(g) Chemical and physical analysis of the upstream control 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.
(h) Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analyses performed upon any other effluent concentration.
(i) All chemical analyses included in the Missouri Department of Natural Resources WET test report form #MO-780-1899 shall be performed and results shall be recorded in the appropriate field of the report form.
(j) Where flow-weighted composite sample is required for analysis, the samples shall be composited at the laboratory where the test is to be performed.
(k) Where in stream testing is required downstream from the discharge, sample collection shall occur immediately below the established Zone of Initial Dilution in conjunction with or immediately following a release or discharge.
(l) Samples submitted for analysis of downstream receiving water may be collected as either a grab or twenty-four-hour composite as appropriate to the nature of the discharge.
(m) All instream samples, including downstream samples, shall be tested for toxicity at the 100% concentration in addition to any other assigned AEC for in-stream samples.

(2) All failing test results along with complete copies of the test reports as received from the laboratory, INCLUDING THOSE TESTS CONDUCTED UNDER CONDITION (3) BELOW, shall be reported to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the availability of the results.

(3) If the effluent fails the test, a multiple dilution test shall be performed within 30 calendar days and biweekly thereafter, until one of the following conditions are met:
(a) THREE CONSECUTIVE MULTIPLE-DILUTION TESTS PASS. No further tests need to be performed until next regularly scheduled test period.
(b) A TOTAL OF THREE MULTIPLE-DILUTION TESTS FAIL.

(4) Failure of at least three multiple-dilution tests during any period of accelerated monitoring violates the permit narrative requirement for aquatic life protection.

(5) The permittee shall submit a CONCISE summary of all test results for the test series to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the third failed test.

(6) Additionally, the following shall apply upon failure of the third MULTIPLE DILUTION test: A toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE) is automatically triggered. The permittee shall contact THE WATER PROTECTION PROGRAM within 14 calendar days from availability of the test results to ascertain as to whether a TIE or TRE is appropriate. The permittee shall submit a plan for conducting a TIE or TRE to the WATER PROTECTION PROGRAM within 60 calendar days of the date of DNR's direction to perform either a TIE or TRE. This plan must be approved by DNR before the TIE or TRE is begun. A schedule for completing the TIE or TRE shall be established in the plan approval.

(7) Upon DNR's approval, the TIE/TRE schedule may be modified if toxicity is intermittent during the TIE/TRE investigations. A revised WET test schedule may be established by DNR for this period.

(8) If a previously completed TIE has clearly identified the cause of toxicity, additional TIEs will not be required as long as effluent characteristics remain essentially unchanged and the permittee is proceeding according to a DNR approved schedule to complete a TRE and reduce toxicity. Regularly scheduled WET testing as required in the permit, without the follow-up requirements, will be required during this period.

C. SPECIAL CONDITIONS (continued)

(9) When WET test sampling is required to run over one DMR period, each DMR report shall contain a copy of the Department's WET test report form that was generated during the reporting period.
(10) Submit a concise summary in tabular format of all test results with the annual report.

(b) PASS/FAIL procedure and effluent limitations:
(1) To pass a single-dilution test, mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level; p = 0.05) than that observed in the upstream receiving-water control sample. Where upstream receiving water is not available mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level; p = 0.05) than that observed in the laboratory control. The appropriate statistical tests of significance shall be consistent with the most current edition of METHODS FOR MEASURING THE ACUTE TOXICITY OF EFFLUENTS AND RECEIVING WATERS TO FRESHWATER AND MARINE ORGANISMS or other Federal guidelines as appropriate or required.
(2) To pass a multiple-dilution test:
(a) For facilities with a computed percent effluent at the edge of the zone of initial dilution, Allowable Effluent Concentration (AEC), OF 30% OR LESS THE AEC must be less than three-tenths (0.3) of the LC_{50} concentration for the most sensitive of the test organisms; **OR**,
(b) For facilities with an AEC greater than 30% the LC50 concentration must be greater than 100%; **AND**,
(c) all effluent concentrations equal to or less than the AEC must be nontoxic. Mortality observed in all effluent concentrations equal to or less than the AEC shall not be significantly different (at the 95% confidence level; p = 0.05) than that observed in the upstream receiving-water control sample. Where upstream receiving water is not available mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level; p = 0.05) than that observed in the laboratory control. The appropriate statistical tests of significance shall be consistent with the most current edition of METHODS FOR MEASURING THE ACUTE TOXICITY OF EFFLUENTS AND RECEIVING WATERS TO FRESHWATER AND MARINE ORGANISMS or other federal guidelines as appropriate or required. Failure of one multiple-dilution test may be considered an effluent limit violation.

(c) Test Conditions
(1) Test Type: Acute Static non-renewal
(2) Test species: Ceriodaphnia dubia and Pimephales promelas (fathead minnow). Organisms used in WET testing shall come from cultures reared for the purpose of conducting toxicity tests and cultured in a manner consistent with the most current USEPA guidelines. All test animals shall be cultured as described in the most current edition of METHODS FOR MEASURING THE ACUTE TOXICITY OF EFFLUENTS AND RECEIVING WATERS TO FRESHWATER AND MARINE ORGANISMS.
(3) Test period: 48 hours at the "Acceptable Effluent Concentration" (AEC) specified above.
(4) When dilutions are required, upstream receiving stream water shall be used as dilution water. If upstream water is unavailable or if mortality in the upstream water exceeds 10%, "reconstituted" water will be used as dilution water. Procedures for generating reconstituted water will be supplied by the MDNR upon request.
(5) Single-dilution tests will be run with:
(a) Effluent at the AEC concentration;
(b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
(c) reconstituted water.
(6) Multiple-dilution tests will be run with:
(a) 100%, 50%, 25%, 12.5%, and 6.25% effluent, unless the AEC is less than 25% effluent, in which case dilutions will be 4 times the AEC, two times the AEC, AEC, 1/2 AEC and 1/4 AEC;
(b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
(c) reconstituted water.
(7) If reconstituted-water control mortality for a test species exceeds 10%, the entire test will be rerun.
(8) If upstream control mortality exceeds 10%, the entire test will be rerun using reconstituted water as the dilutant.

C. SPECIAL CONDITIONS (continued)

D. RECEIVING WATER MONITORING CONDITIONS

1. Downstream samples should be taken immediately (10 yards or less) below the established sampling point of one quarter mile downstream of outfall 003. In the event that a safe, accessible location is not present at this location, 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. The upstream receiving water sample should be collected at a point upstream from any influence of the effluent, where the water is visibly flowing down stream.

2. When conducting in-stream monitoring, the permittee shall record observations that include: the time of day, weather conditions, unusual stream/lake characteristics (e.g., septic conditions, algae growth, etc.), the stream segment (e.g., riffle, pool or run) or the lake depth from where the sample was collected. These observations shall be submitted with the sample results.

3. Samples shall not be collected from areas with especially turbulent flow, still water or from the stream bank, unless these conditions are representative of the stream reach or no other areas are available for sample collection. Sampling should not be made when significant precipitation has occurred recently. The sampling event should be terminated and rescheduled if any of the following conditions occur:
   - If turbidity in the stream increases notably; or
   - If rainfall over the past two weeks exceeds 2.5 inches or exceeds 1 inch in the last 24 hours

4. 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.

5. To obtain accurate measurements, D.O., temperature and pH analyses should be performed on-site in the receiving stream where possible. However, due to high flow conditions, access, etc., it may be necessary to collect a sample in a bucket or other container. When this is necessary, care must be taken not to aerate the sample upon collection. If for any reason samples must be collected from an alternate site from the one listed in the permit, the permittee shall report the location with the sample results.

6. Dissolved oxygen measurements are to be taken during the period from one hour prior to sunrise to one and one-half hour after sunrise.

7. If water quality standards are being attained consistently during a five-year period, the department will confirm the results with an assessment. If the assessment verifies that water quality standards are being achieved, the permit requirement for in-stream monitoring will be removed.

8. Please contact the department if you need additional instructions or assistance.

SUMMARY OF TEST METHODOLOGY FOR WHOLE-EFFLUENT TOXICITY TESTS

Whole-effluent-toxicity test required in NPDES permits shall use the following test conditions when performing single or multiple dilution methods. Any future changes in methodology will be supplied to the permittee by the Missouri Department of Natural Resources (MDNR). Unless more stringent methods are specified by the DNR, the procedures shall be consistent with the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.

Test conditions for Ceriodaphnia dubia:

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light, 8 h dark
Size of test vessel:	30 mL (minimum)
Volume of test solution:	15 mL (minimum)
Age of test organisms:	<24 h old
No. of animals/test vessel:	5
No. of replicates/concentration:	4
No. of organisms/concentration:	20 (minimum)
Feeding regime:	None (feed prior to test)
Aeration:	None
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$)
Test acceptability criterion:	90% or greater survival in controls

Test conditions for (Pimephales promelas):

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light/ 8 h dark
Size of test vessel:	250 mL (minimum)
Volume of test solution:	200 mL (minimum)
Age of test organisms:	1-14 days (all same age)
No. of animals/test vessel:	10
No. of replicates/concentration:	4 (minimum) single dilution method 2 (minimum) multiple dilution method
No. of organisms/concentration:	40 (minimum) single dilution method 20 (minimum) multiple dilution method
Feeding regime:	None (feed prior to test)
Aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min.
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$)
Test Acceptability criterion:	90% or greater survival in controls

BOD and Ammonia-Nitrogen effluent limits were derived from a 2002 WLA study which was noted in the 2002 Water Quality Review Sheet. See Appendix – 2002 Water Quality Review Sheet below.

APPENDIX – 2002 WATER QUALITY REVIEW SHEET:

Missouri Department of Natural Resource
Water Pollution Control Program
Planning Section

Water Quality Review Sheet

Determination of Effluent Limits

FACILITY INFORMATION

FACILITY NAME: KC, Rocky Branch STP NPDES #: MO0048305

FACILITY TYPE/DESCRIPTION: POTW, Contact Stabilization, 2 cell lagoon/sludge Incineration

ECOREGION: Central Irregular Plains 8- DIGIT HUC: 10240012 COUNTY: Clay

Central Irregular Plains
Mississippi Alluvial Plains
Osage Plains
Ozark Highlands

LEGAL DESCRIPTION: SW¼, NW1/4 S-11, T52N, R33W LATITUDE/LONGITUDE: 39 20 02.9 /-094 34 22.9 DMS

WATER QUALITY HISTORY:

OUTFALL CHARACTERISTICS

OUTFALL	DESIGN FLOW (CFS)	TREATMENT TYPE	RECEIVING WATERBODY	OTHER
001	3.1	Contact Stabilization	Rocky Branch	
002	For peak flow only	2C-Lagoon	Rocky Branch	

RECEIVING WATERBODY INFORMATION

WATERBODY	CLASS	7Q10(CFS)	*DESIGNATED USES	OTHER CHARACTERISTICS
Rocky Branch	C	0	AQL, LWW	Proposed for 303(d)
Wilkerson Cr	C	0	ÁQL, LWW	

*Cool Water Fishery (CLF), Cold Water Fishery (CDF), Irrigation (IRR), Industrial (IND), Boating & Canoeing (BTG), Drinking Water Supply (DWS), Whole Body Contact Recreation (WBC), Protection of Warmwater Aquatic Life and Human Health (AQL), Livestock & Wildlife Watering (LWW)

COMMENTS: Rocky Branch is on the proposed 2002 303(d) list for excess BOD impairment. A 0.4-mile segment just downstream of KC, Rocky Br. WWTF was identified polluted. The proposal was approved by the Missouri CWC, but it is still awaiting EPA approval.

MIXING CONSIDERATIONS

Mixing Zone.
Length of ¼ miles. (10 CSR 20-7.031(4) 5 B (I).

Zone of Initial Dilution (Z.I.D.). Not allowed.

PERMIT LIMITS AND INFORMATION

TMDL WATERSHED: (Y OR N)		W.L.A. STUDY CONDUCTED: (Y OR N)	y	DISINFECTION REQUIRED: (Y OR N)	N	DISINFECTION WAIVER: (Y, N, NA)	N/A

WET TEST (Y OR N): Y FREQUENCY: ONCE/YEAR A.E.C. 100% LIMIT: _____

PARAMETER (UNIT)	PERIOD	MAXIMUM DAILY LIMIT	AVERAGE MONTHLY LIMIT	MONITORING FREQUENCY	SAMPLE TYPE
outfall 001					
Flow (MGD)		*		Once/weekdays	24 Hr Total
Dissolved Oxygen (mg/l)		*		Weekly	Grab
Temperature (F)		*		Weekly	
pH (su)		6.5 - 9	6.5 - 9	Weekly	Grab
BOD5 (mg/l)		20	10	Weekly	Grab
Ammonia-nitrogen (mg/l)	April 1- Oct 31	2.4	1.2	Weekly	Grab
	Nov 1 – Mar 30	4.6	2.3	Weekly	Grab
TSS (mg/l)		25	15	weekly	Composite 24 Hr
total phosphorus (mg/l)		*		Monthly	Grab
Kjeldhal Nitrogen (mg/l)		*		Monthly	Grab
NO3-N & NO2-N (mg/l)		*		Monthly	Grab
Total Nitrogen (mg/l)		*		Mohthly	Grab
Outfall 002					
Flow (MGD)	Note 1	*		Once per event/24 Hr	24 hr Total
Temperature (F)		*			
pH (su)		6.5 - 9	6.5 - 9	Daily	Grab
BOD5 (mg/l)		30	15	Daily	Grab
TSS		35	20	Daily	Grab
Ammonia-Nitrogen (mg/l)		6	3	Daily	Grab

* Indicates “monitoring only”.

Note 1: Outfall 002 should discharge only at peak flows after the hydraulic capacity of the treatment plant is reached. During such periods, the instream flow should be taken at a point 100 feet upstream of outfall 001.

Please report the date, time, and location for each parameter sampled along with the average daily flow (actual flow measured or estimated, not design flow). All the parameters should be sampled on the same day and within no more than a 2-hour period. If dissolved oxygen (DO) is to be sampled, sampling should take place at dawn. If discharge is contingent to storm events, rainfall should be measured every time there is a discharge.

Instream monitoring:

No instream monitoring is required at this time, except for stream flow monitoring during Lagoon discharge (Outfall 002).

Derivation and Discussion of Limits

BOD and Ammonia-Nitrogen effluent limits were derived from a WLA study. The results of the study and the corresponding Maximum Daily & Average Monthly Limits are summarized in the table below.

	Outfall #	WLA (mg/l)	LTA	MDL (mg/l)	AML (mg/l)
BOD	Outfall 001 Outfall 002	20 mg/l 30	6.4 9.6	20 30	10 15
NH3-N	Outfall 001 Outfall 002	1.5 mg/l 3.7	0.8 1.9	2.4 6	1.2 3

Peak flow limits (outfall 002) were determined based on a discharge of 0.5 cfs (0.32 MGD), and stream design flow of 1 cfs (0.64 MGD) for Rocky Branch and 1.5 cfs (1 MGD) for Wilkerson Creek. There should be no discharge from outfall 002 when stream flow is less than 0.3 MGD.

Reviewer: MD
Date: October 31, 2002
Unit Chief: Mohsen Dkhili

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

Part I – General Conditions
Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
   a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
   b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.

2. **Monitoring Requirements**.
   a. Records of monitoring information shall include:
      i. The date, exact place, and time of sampling or measurements;
      ii. The individual(s) who performed the sampling or measurements;
      iii. The date(s) analyses were performed;
      iv. The individual(s) who performed the analyses;
      v. The analytical techniques or methods used; and
      vi. The results of such analyses.
   b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.

3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

4. **Test Procedures**. The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is "sufficiently sensitive" when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.

5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
   a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
   b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

Section B – Reporting Requirements

1. **Planned Changes.**
   a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
      i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
      ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
      iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
      iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.

2. **Non-compliance Reporting.**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

b. The following shall be included as information which must be reported within 24 hours under this paragraph.
   i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
   ii. Any upset which exceeds any effluent limitation in the permit.
   iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.

c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.

3. **Anticipated Noncompliance**. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.

4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.

5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.

6. **Other Information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

7. **Discharge Monitoring Reports.**
   a. Monitoring results shall be reported at the intervals specified in the permit.
   b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
   c. Monitoring results shall be reported to the Department no later than the 28th day of the month following the end of the reporting period.

Section C – Bypass/Upset Requirements

1. **Definitions.**
   a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
   b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
   c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. **Bypass Requirements.**
   a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.
   b. Notice.
      i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
      ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
   c. Prohibition of bypass.
      i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
         1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
         3. The permittee submitted notices as required under paragraph 2. b. of this section.
      ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.

3. **Upset Requirements.**
   a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
   b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      ii. The permitted facility was at the time being properly operated; and
      iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
   c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
   a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
   b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement

imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed $10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

2. **Duty to Reapply.**
   a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
   b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
   c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. **Proper Operation and Maintenance**. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

6. **Permit Actions.**
   a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
      i. Violations of any terms or conditions of this permit or the law;
      ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
      iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
      iv. Any reason set forth in the Law or Regulations.
   b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. **Permit Transfer.**
   a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
   b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
   c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.

8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
    a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
    d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

12. **Closure of Treatment Facilities.**
    a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
    b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.

13. **Signatory Requirement.**
    a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
MAY 1, 2013

PART II - SPECIAL CONDITIONS – PUBLICLY OWNED TREATMENT WORKS
SECTION A – INDUSTRIAL USERS

1. Definitions

Definitions as set forth in the Missouri Clean Water Laws and approved by the Missouri Clean Water Commission shall apply to terms used herein.

Significant Industrial User (SIU). Except as provided in the *General Pretreatment Regulation* 10 CSR 20-6.100, the term Significant Industrial User means:

1. All Industrial Users subject to Categorical Pretreatment Standards; and
2. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the Publicly-Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's or for violating any Pretreatment Standard or requirement.

Clean Water Act (CWA) is the the federal Clean Water Act of 1972, 33 U.S.C. § 1251 et seq. (2002).

2. Identification of Industrial Discharges

Pursuant to 40 CFR 122.44(j)(1), all POTWs shall identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging to the POTW subject to Pretreatment Standards under section 307(b) of the CWA and 40 CFR 403.

3. Application Information

Applications for renewal or modification of this permit must contain the information about industrial discharges to the POTW pursuant to 40 CFR 122.21(j)(6)

4. Notice to the Department

Pursuant to 40 CFR 122.42(b), all POTWs must provide adequate notice of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging these pollutants; and
2. Any substantial change into the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For purposes of this paragraph, adequate notice shall include information on:
   i. the quality and quantity of effluent introduced into the POTW, and
   ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

For POTWs without an approved pretreatment program, the notice of industrial discharges which was not included in the permit application shall be made as soon as practicable. For POTWs with an approved pretreatment program, notice is to be included in the annual pretreatment report required in the special conditions of this permit. Notice may be sent to:

Missouri Department of Natural Resources
Water Protection Program
Attn: Pretreatment Coordinator
P.O. Box 176
Jefferson City, MO 65102

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
August 1, 2019

PART III – BIOSOLIDS AND SLUDGE FROM DOMESTIC TREATMENT FACILITIES

SECTION A – GENERAL REQUIREMENTS

1. PART III Standard Conditions pertain to biosolids and sludge requirements under the Missouri Clean Water Law and regulations for domestic and municipal wastewater and also incorporates federal sludge disposal requirements under 40 CFR Part 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR Part 503 for domestic biosolids and sludge.
2. PART III Standard Conditions apply only to biosolids and sludge generated at domestic wastewater treatment facilities, including public owned treatment works (POTW) and privately owned facilities.
3. Biosolids and Sludge Use and Disposal Practices:
    a. The permittee is authorized to operate the biosolids and sludge generating, treatment, storage, use, and disposal facilities listed in the facility description of this permit.
    b. The permittee shall not exceed the design sludge/biosolids volume listed in the facility description and shall not use biosolids or sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
    c. For facilities operating under general operating permits that incorporate Standard Conditions PART III, the facility is authorized to operate the biosolids and sludge generating, treatment, storage, use and disposal facilities identified in the original operating permit application, subsequent renewal applications or subsequent written approval by the department.
4. Biosolids or Sludge Received from other Facilities:
    a. Permittees may accept domestic wastewater biosolids or sludge from other facilities as long as the permittee's design sludge capacity is not exceeded and the treatment facility performance is not impaired.
    b. The permittee shall obtain a signed statement from the biosolids or sludge generator or hauler that certifies the type and source of the sludge
5. Nothing in this permit precludes the initiation of legal action under local laws, except to the extent local laws are preempted by state law.
6. This permit does not preclude the enforcement of other applicable environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable biosolids or sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act or under Chapter 644 RSMo.
8. In addition to Standard Conditions PART III, the Department may include biosolids and sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Exceptions to Standard Conditions PART III may be authorized on a case-by-case basis by the Department, as follows:
    a. The Department may modify a site-specific permit following permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR § 124.10, and 40 CFR § 501.15(a)(2)(ix)(E).
    b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR Part 503.

SECTION B – DEFINITIONS

1. Best Management Practices are practices to prevent or reduce the pollution of waters of the state and include agronomic loading rates (nitrogen based), soil conservation practices, spill prevention and maintenance procedures and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food, feed or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR Part 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with 40 CFR Part 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Feed crops are crops produced primarily for consumption by animals.
8. Fiber crops are crops such as flax and cotton.
9. Food crops are crops consumed by humans which include, but is not limted to, fruits, vegetables and tobacco.
10. Industrial wastewater means any wastewater, also known as process wastewater, not defined as domestic wastewater. Per 40 CFR Part 122.2, process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. Land application of industrial wastewater, residuals or sludge is not authorized by Standard Conditions PART III.
11. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological contact systems, and other similar facilities. It does not include wastewater treatment lagoons or constructed wetlands for wastewater treatment.
12. Plant Available Nitrogen (PAN) is nitrogen that will be available to plants during the growing seasons after biosolids application.
13. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
14. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs), sewage sludge incinerator ash, or grit/screenings generated during preliminary treatment of domestic sewage.
15. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen or concrete lined basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
16. Septage is the sludge pumped from residential septic tanks, cesspools, portable toilets, Type III marine sanitation devices, or similar treatment works such as sludge holding structures from residential wastewater treatment facilities with design populations of less than 150 people. Septage does not include grease removed from grease traps at a restaurant or material removed from septic tanks and other similar treatment works that have received industrial wastewater. The standard for biosolids from septage is different from other sludges. See Section H for more information.

SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES

1. Biosolids or sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and the requirements of Standard Conditions PART III or in accordance with Section A.3.c., above.
2. The permittee shall operate storage and treatment facilities, as defined by Section 644.016(23), RSMo, so that there is no biosolids or sludge discharged to waters of the state. Agricultural storm water discharges are exempt under the provisions of Section 644.059, RSMo.
3. Mechanical treatment plants shall have separate biosolids or sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove biosolids or sludge from these storage compartments on the required design schedule is a violation of this permit.

SECTION D – BIOSOLIDS OR SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR BY CONTRACT HAULER

1. Permittees that use contract haulers, under the authority of their operating permit, to dispose of biosolids or sludge, are responsible for compliance with all the terms of this permit. Contract haulers that assume the responsibility of the final disposal of biosolids or sludge, including biosolids land application, must obtain a Missouri State Operating Permit unless the hauler transports the biosolids or sludge to another permitted treatment facility.
2. Testing of biosolids or sludge, other than total solids content, is not required if biosolids or sludge are hauled to a permitted wastewater treatment facility, unless it is required by the accepting facility.

SECTION E – INCINERATION OF SLUDGE

1. Please be aware that sludge incineration facilities may be subject to the requirements of 40 CFR Part 503 Subpart E, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or, if the ash is determined to be hazardous, with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, mass of sludge incinerated and mass of ash generated. Permittee shall also provide the name of the ash disposal facility and permit number if applicable.

SECTION F – SURFACE DISPOSAL SITES AND BIOSOLIDS AND SLUDGE LAGOONS

1. Please be aware that surface disposal sites of biosolids or sludge from wastewater treatment facilities may be subject to other laws including the requirements in 40 CFR Part 503 Subpart C, Missouri Air Conservation Commission regulations under 10 CSR 10, and solid waste management regulations under 10 CSR 80, as applicable.
2. Biosolids or sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain biosolids or sludge storage lagoons as storage facilities, accumulated biosolids or sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of biosolids or sludge removed will be dependent on biosolids or sludge generation and accumulation in the facility. Enough biosolids or sludge must be removed to maintain adequate storage capacity in the facility.
    a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of biosolids or sludge on the bottom of the lagoon, upon prior approval of the Department; or
    b. Permittee shall close the lagoon in accordance with Section I.

SECTION G – LAND APPLICATION OF BIOSOLIDS

1. The permittee shall not land apply biosolids unless land application is authorized in the facility description, the special conditions of the issued NPDES permit, or in accordance with Section A.3.c., above.
2. This permit only authorizes "Class A" or "Class B" biosolids derived from domestic wastewater to be land applied onto grass land, crop land, timber, or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
3. Class A Biosolids Requirements: Biosolids shall meet Class A requirements for application to public contact sites, residential lawns, home gardens or sold and/or given away in a bag or other container.
4. Class B biosolids that are land applied to agricultural and public contact sites shall comply with the following restrictions:
    a. Food crops that touch the biosolids/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of biosolids.
    b. Food crops below the surface of the land shall not be harvested for 20 months after application of biosolids when the biosolids remain on the land surface for four months or longer prior to incorporation into the soil.
    c. Food crops below the surface of the land shall not be harvested for 38 months after application of biosolids when the biosolids remain on the land surface for less than four months prior to incorporation into the soil.
    d. Animal grazing shall not be allowed for 30 days after application of biosolids.
    e. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of biosolids.
    f. Turf shall not be harvested for one year after application of biosolids if used for lawns or high public contact sites in close proximity to populated areas such as city parks or golf courses.
    g. After Class B biosolids have been land applied to public contact sites with high potential for public exposure, as defined in 40 CFR § 503.31, such as city parks or golf courses, access must be restricted for 12 months.
    h. After Class B biosolids have been land applied public contact sites with low potential for public exposure as defined in 40 CFR § 503.31, such as a rural land application or reclamation sites, access must be restricted for 30 days.

5. Pollutant limits
    a. Biosolids shall be monitored to determine the quality for regulated pollutants listed in Table 1, below. Limits for any pollutants not listed below may be established in the permit.
    b. The number of samples taken is directly related to the amount of biosolids or sludge produced by the facility (See Section J, below). Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to achieve pollutant concentration below those identified in Table 1, below.
    c. Table 1 gives the ceiling concentration for biosolids. Biosolids which exceed the concentrations in Table 1 may not be land applied.

TABLE 1

Biosolids ceiling concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

d. Table 2 below gives the low metal concentration for biosolids. Because of its higher quality, biosolids with pollutant concentrations below those listed in Table 2 can safely be applied to agricultural land, forest, public contact sites, lawns, home gardens or be given away without further analysis. Biosolids containing metals in concentrations above the low metals concentrations but below the ceiling concentration limits may be land applied but shall not exceed the annual loading rates in Table 3 and the cumulative loading rates in Table 4. The permittee is required to track polluntant loading onto application sites for parameters that have exceeded the low metal concentration limits.

TABLE 2

Biosolids Low Metal Concentration	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	100
Zinc	2,800

e. Annual pollutant loading rate.

Table 3

Biosolids Annual Loading Rate	
Pollutant	Kg/ha (lbs./ac) per year
Arsenic	2.0 (1.79)
Cadmium	1.9 (1.70)
Copper	75 (66.94)
Lead	15 (13.39)
Mercury	0.85 (0.76)
Nickel	21 (18.74)
Selenium	5.0 (4.46)
Zinc	140 (124.96)

f. Cumulative pollutant loading rates.

Table 4

Biosolids Cumulative Pollutant Loading Rate	
Pollutant	Kg/ha (lbs./ac)
Arsenic	41 (37)
Cadmium	39 (35)
Copper	1500 (1339)
Lead	300 (268)
Mercury	17 (15)
Nickel	420 (375)
Selenium	100 (89)
Zinc	2800 (2499)

6. Best Management Practices. The permittee shall use the following best management practices during land application activities to prevent the discharge of biosolids to waters of the state.
   a. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under § 4 of the Endangered Species Act or its designated critical habitat.
   b. Apply biosolids only at the agronomic rate of nitrogen needed (see 5.c. of this section).
   c. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop

nitrogen removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kgTN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.

i. PAN can be determined as follows:

(Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).

[1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis.

ii. Crop nutrient production/removal to be based on crop specific nitrogen needs and realistic yield goals. **NOTE:** There are a number of reference documents on the Missouri Department of Natural Resources website that are informative to implement best management practices in the proper management of biosolids, including crop specific nitrogen needs, realistic yields on a county by county basis and other supporting references.

iii. Biosolids that are applied at agronomic rates shall not cause the annual pollutant loading rates identified in Table 3 to be exceeded.

d. Buffer zones are as follows:

i. 300 feet of a water supply well, sinkhole, water supply reservoir or water supply intake in a stream;

ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstandingstate resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;

iii. 150 feet of dwellings or public use areas;

iv. 100 feet (35 feet if biosolids application is down-gradient or the buffer zone is entirely vegetated) of lake, pond, wetlands or gaining streams (perennial or intermittent);

v. 50 feet of a property line. Buffer distances from property lines may be waived with written permission from neighboring property owner.

vi. For the application of dry, cake or liquid biosolids that are subsurface injected, buffer zones identified in 5.d.i. through 5.d.iii above, may be reduced to 100 feet. The buffer zone may be reduced to 35 feet if the buffer zone is permanently vegetated. Subsurface injection does not include methods or technology reflective of combination surface/shallow soil incorporation.

e. Slope limitation for application sites are as follows:

i. For slopes less than or equal to 6 percent, no rate limitation;

ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels;

iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.

iv. Dry, cake or liquid biosolids that are subsurface injected, may be applied on slopes not to exceed 20 percent. Subsurface injection does not include the use of methods or technology reflective of combination surface/shallow soil incorporation.

f. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.

g. Biosolids may be land applied to sites with soil that are snow covered, frozen, or saturated with liquid when site restrictions or other controls are provided to prevent pollutants from being discharged to waters of the state during snowmelt or stormwater runoff. During inclement weather or unfavorable soil conditions use the following management practices:

i. A maximum field slope of 6% and a minimum 300 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be utilized for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not include the use of mthods or technology refletive of combination surface/shallow soil incorporation;

ii. A maximum field slope of 2% and 100 feet grass buffer between the application site and waters of the state. A 35 feet grass buffer may be used for the application of dry, cake or liquid biosolids that are subsurface injected. Subsurface injection does not included the use of methods or technology refletive of combination surface/shallow soil incorporation;

iii. Other best management practices approved by the Department.

SECTION H – SEPTAGE

1. Haulers that land apply septage must obtain a state permit. An operating permit is not required for septage haulers who transport septage to another permitted treatment facility for disposal.
2. Do not apply more than 30,000 gallons of septage per acre per year or the volume otherwise stipulated in the operating permit.
3. Septic tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to mechanical treatment facilities.
4. Septage must comply with Class B biosolids regarding pathogen and vector attraction reduction requirements before it may be applied to crops, pastures or timberland. To meet required pathogen and vector reduction requirements, mix 50 pounds of hydrated lime for every 1,000 gallons of septage and maintain a septage pH of at least 12 pH standard units for 30 minutes or more prior to application.
5. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.
6. As residential septage contains relatively low levels of metals, the testing of metals in septage is not required.

SECTION I– CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical and lagoons) and sludge or biosolids storage and treatment facilities. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all sludges and/or biosolids. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6. 010 and 10 CSR 20 – 6.015.
3. Biosolids or sludge that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
    a. Biosolids and sludge shall meet the monitoring and land application limits for agricultural rates as referenced in Section G, above.
    b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
    c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre. Alternative, site-specific application rates may be included in the closure plan for department consideration.
        i. PAN can be determined as follows:
        (Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).
        [1] Volatilization factor is 0.7 for surface application and 1 for subsurface application. Alternative volitalization factors and mineralization rates can be utilized on a case-by-case basis
4. Domestic wastewater treatment lagoons with a design treatment capacity less than or equal to 150 persons, are "similar treatment works" under the definition of septage. Therefore the sludge within the lagoons may be treated as septage during closure activities. See Section B, above. Under the septage category, residuals may be left in place as follows:
    a. Testing for metals or fecal coliform is not required.
    b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
    c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Biosolids or sludge left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, and unless otherwise approved, the lagoon berm shall be demolished, and the site shall be graded and contain ≥70% vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion. Alternative biosolids or sludge and soil mixing ratios may be included in the closure plan for department consideration.
6. Lagoon and earthen structure closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200.
7. When closing a mechanical wastewater plant, all biosolids or sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
    a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain ≥70% vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate

surface water drainage without creating erosion.

b. Hazardous Waste shall not be land applied or disposed during mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations pursuant to 10 CSR 25.

c. After demolition of the mechanical plant, the site must only contain clean fill defined in Section 260.200.1(6) RSMo as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill, reclamation, or other beneficial use. Other solid wastes must be removed.

8. If biosolids or sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or I, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR Part 503, Subpart C.

SECTION J – MONITORING FREQUENCY

1. At a minimum, biosolids or sludge shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

TABLE 5

Biosolids or Sludge produced and disposed (Dry Tons per Year)	Monitoring Frequency (See Notes 1, and 2)		
	Metals, Pathogens and Vectors, Total Phosphorus, Total Potassium	Nitrogen TKN, Nitrogen PAN[1]	Priority Pollutants[2]
319 or less	1/year	1 per month	1/year
320 to 1650	4/year	1 per month	1/year
1651 to 16,500	6/year	1 per month	1/year
16,501+	12/year	1 per month	1/year

[1] Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

[2] Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) are required only for permit holders that must have a pre-treatment program. Monitoring requirements may be modified and incorporated into the operating permit by the Department on a case-by-case basis.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids. This data shall be used to calculate the dry tons of sludge applied per acre.
Note 2: Table 5 is not applicable for incineration and permit holders that landfill their sludge.

2. Permittees that operate wastewater treatment lagoons, peak flow equalization basins, combined sewer overflow basins or biosolids or sludge lagoons that are cleaned out once a year or less, may choose to sample only when the biosolids or sludge is removed or the lagoon is closed. Test one composite sample for each 319 dry tons of biosolids or sludge removed from the lagoon during the reporting year or during lagoon closure. Composite sample must represent various areas at one-foot depth.
3. Additional testing may be required in the special conditions or other sections of the permit.
4. Biosolids and sludge monitoring shall be conducted in accordance with federal regulation 40 CFR § 503.8, Sampling and analysis.

SECTION K – RECORD KEEPING AND REPORTING REQUIREMENTS

1. The permittee shall maintain records on file at the facility for at least five years for the items listed in Standard Conditions PART III and any additional items in the Special Conditions section of this permit. This shall include dates when the biosolids or sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
2. Reporting period
   a. By February 19th of each year, applicable facilities shall submit an annual report for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and biosolids or sludge disposal facilities.
   b. Permittees with wastewater treatment lagoons shall submit the above annual report only when biosolids or sludge are removed from the lagoon during the report period or when the lagoon is closed.
3. Report Form. The annual report shall be prepared on report forms provided by the Department or equivalent forms approved by the Department.
4. Reports shall be submitted as follows:
   Major facilities, which are those serving 10,000 persons or more or with a design flow equal to or greater than 1 million gallons per day or that are required to have an approved pretreatment program, shall report to both the Department and EPA if the facility land applied, disposed of biosolids by surface disposal, or operated a sewage sludge incinerator. All other facilities shall maintain their biosolids or sludge records and keep them available to Department personnel upon request. State reports shall be submitted to the address listed as follows:

   DNR regional or other applicable office listed in the
   permit (see cover letter of permit)
   ATTN: Sludge Coordinator

Reports to EPA must be electronically submitted online via the Central Data Exchange at: https://cdx.epa.gov/ Additional information is available at: https://www.epa.gov/biosolids/compliance-and-annual-reporting-guidance-about-clean-water-act-laws

5. Annual report contents. The annual report shall include the following:
    a. Biosolids and sludge testing performed. If testing was conducted at a greater frequency than what is required by the permit, all test results must be included in the report.
    b. Biosolids or sludge quantity shall be reported as dry tons for the quantity produced and/or disposed.
    c. Gallons and % solids data used to calculate the dry ton amounts.
    d. Description of any unusual operating conditions.
    e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
        i. This must include the name and address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
        ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
    f. Contract Hauler Activities:
    If using a contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate biosolids or sludge use permit.
    g. Land Application Sites:
        i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
        ii. If the "Low Metals" criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
        iii. Report the method used for compliance with pathogen and vector attraction requirements.
        iv. Report soil test results for pH and phosphorus. If no soil was tested during the year, report the last date when tested and the results.

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Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FACILITY NAME	
ROCKY BRANCH WWTP	
PERMIT NO. *MO-0048305*	COUNTY *CLAY*

APPLICATION OVERVIEW

Form B2 has been developed in a modular format and consists of Parts A, B and C and a Supplemental Application Information (Parts D, E, F and G) packet. All applicants must complete Parts A, B and C. Some applicants must also complete parts of the Supplemental Application Information packet. The following items explain which parts of Form B2 you must complete. Submittal of an incomplete application may result in the application being returned.

BASIC APPLICATION INFORMATION

A. Basic Application Information for all Applicants. All applicants must complete Part A.

B. Additional Application Information for all Applicants. All applicants must complete Part B.

C. Certification. All applicants must complete Part C.

SUPPLEMENTAL APPLICATION INFORMATION

D. Expanded Effluent Testing Data. A treatment works that discharges effluent to surface water of the United States and meets one or more of the following criteria must complete *Part D - Expanded Effluent Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

E. Toxicity Testing Data. A treatment works that meets one or more of the following criteria must complete *Part E - Toxicity Testing Data*:

1. Has a design flow rate greater than or equal to 1 million gallons per day.
2. Is required to have or currently has a pretreatment program.
3. Is otherwise required by the permitting authority to provide the information.

F. Industrial User Discharges and Resource Conservation and Recovery Act / Comprehensive Environmental Response, Compensation and Liability Act Wastes. A treatment works that accepts process wastewater from any significant industrial users, also known as SIUs, or receives a Resource Conservation and Recovery Act or CERCLA wastes must complete *Part F - Industrial User Discharges and Resource Conservation and Recovery Act /CERCLA Wastes*.

SIUs are defined as:

1. All Categorical Industrial Users, or CIUs, subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations 403.6 and 40 Code of Federal Regulations 403.6 and 40 CFR Chapter 1, Subchapter N.
2. Any other industrial user that meets one or more of the following:
   - i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions).
   - ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant.
   - iii. Is designated as an SIU by the control authority.
   - iv. Is otherwise required by the permitting authority to provide the information.

G. Combined Sewer Systems. A treatment works that has a combined sewer system must complete *Part G - Combined Sewer Systems*.

ALL APPLICANTS MUST COMPLETE PARTS A, B and C

RECEIVED

SEP 06 2016

Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

FORM B2 – APPLICATION FOR AN OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED 9-6-16	FEE SUBMITTED 0 BB

PART A – BASIC APPLICATION INFORMATION

1. THIS APPLICATION IS FOR:

☐ An operating permit for a new or unpermitted facility. Construction Permit # _____
(Please include completed Antidegradation Review or request to conduct an Antidegradation Review, see instructions)

☒ An operating permit renewal: Permit #MO- *0048305* Expiration Date *04/04/2017*

☐ An operating permit modification: Permit #MO-_____ Reason: _____

1.1 Is the appropriate fee included with the application (see instructions for appropriate fee)? ☒ YES ☐ NO

2. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE	
Rocky Branch WWTP		*816-513-7200*	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP
500 NE 132nd Street	*Kansas City*	*MO*	*64165*

2.1 LEGAL DESCRIPTION (Facility Site): *SW* ¼, *NE* ¼, ¼, Sec. *11*, T *52N*, R *33W* COUNTY *Clay*

2.2 UTM Coordinates Easting (X): *2803905.45* Northing (Y): *1143899.49*
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

2.3 Name of receiving stream: *Rocky Branch Creek*

2.4 Number of Outfalls: *1* wastewater outfalls, *0* stormwater outfalls, *1* instream monitoring sites

3. OWNER

NAME	E-MAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE	
City of Kansas City		*816-513-0504*	
ADDRESS	CITY	STATE	ZIP
4800 East 63rd Street	*Kansas City*	*MO*	*64130*

3.1 Request review of draft permit prior to Public Notice? ☒ YES ☐ NO

3.2 Are you a Publically Owned Treatment Works (POTW)? ☒ YES ☐ NO

3.3 Are you a Privately Owned Treatment Facility? ☐ YES ☒ NO

3.4 Are you a Privately Owned Treatment Facility regulated by the Public Service Commission (PSC)? ☐ YES ☒ NO

4. CONTINUING AUTHORITY: Permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.

NAME	EMAIL ADDRESS	TELEPHONE WITH AREA CODE	
SAME			
ADDRESS	CITY	STATE	ZIP

If the Continuing Authority is different than the Owner, please include a copy of the contract agreement between the two parties and a description of the responsibilities of both parties within the agreement.

5. OPERATOR

NAME	TITLE	CERTIFICATE NUMBER (IF APPLICABLE)
Hans B. Newsom	*Utility Superintendent*	*6075*
E-MAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE	
hans.newsom@kcmo.org	*816-513-7225*	

6. FACILITY CONTACT

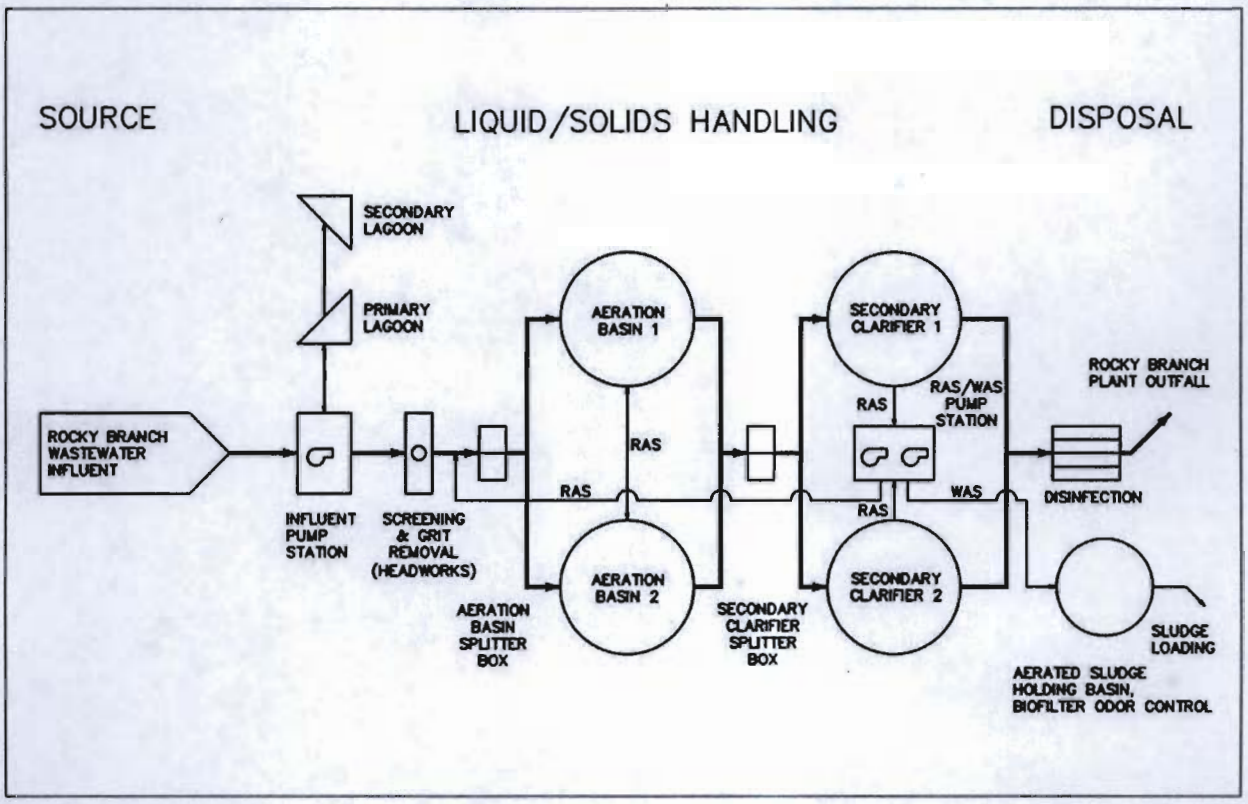
NAME	TITLE		
Hans B. Newsom	*Utility Superintendent*		
E-MAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
hans.newsom@kcmo.org	*816-513-7225*		
ADDRESS	CITY	STATE	ZIP CODE
7300 Hawthorne	*Kansas City*	*MO*	*64120*

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION

7.1 Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant. Show all of the treatment units, including disinfection (e.g. – Chlorination and Dechlorination), influents, and outfalls. Indicate any treatment process changes in the routing of wastewater during dry weather and peak wet weather. Include a brief narrative description of the diagram. Attach sheets as necessary.



FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION (continued)

7.2 Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information.

a. The area surrounding the treatment plant, including all unit processes.
b. The location of the downstream landowner(s). (See Item 10.)
c. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.
d. The actual point of discharge.
e. Wells, springs, other surface water bodies and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.
f. Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.
g. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, or disposed.

7.3 Facility SIC Code: *4952* . | Discharge SIC Code: *4952* .

7.4 Number of people presently connected or population equivalent (P.E.): *9,140* Design P.E. *20,000*

7.5 Connections to the facility:

Number of units presently connected:

Homes *4,350* Trailers _____ Apartments _____ Other (including industrial) _____

Number of Commercial Establishments: _____

7.6 Design Flow *2.8 MGD* | Actual Flow *1.48 MGD*

7.7 Will discharge be continuous through the year? Yes ☒ No ☐

Discharge will occur during the following months: *JAN - DEC* How many days of the week will discharge occur? *7 days a week*

7.8 Is industrial waste discharged to the facility? Yes ☐ No ☒

If yes, please describe the number and types of industries that discharge to your facility.

Refer to the APPLICATION OVERVIEW to determine whether additional information is needed for Part F.

7.9 Does the facility accept or process leachate from landfills?: Yes ☐ No ☒

7.10 Is wastewater land applied? Yes ☐ No ☒

If yes, is Form I attached? Yes ☐ No ☐

7.11 Does the facility discharge to a losing stream or sinkhole? Yes ☐ No ☒

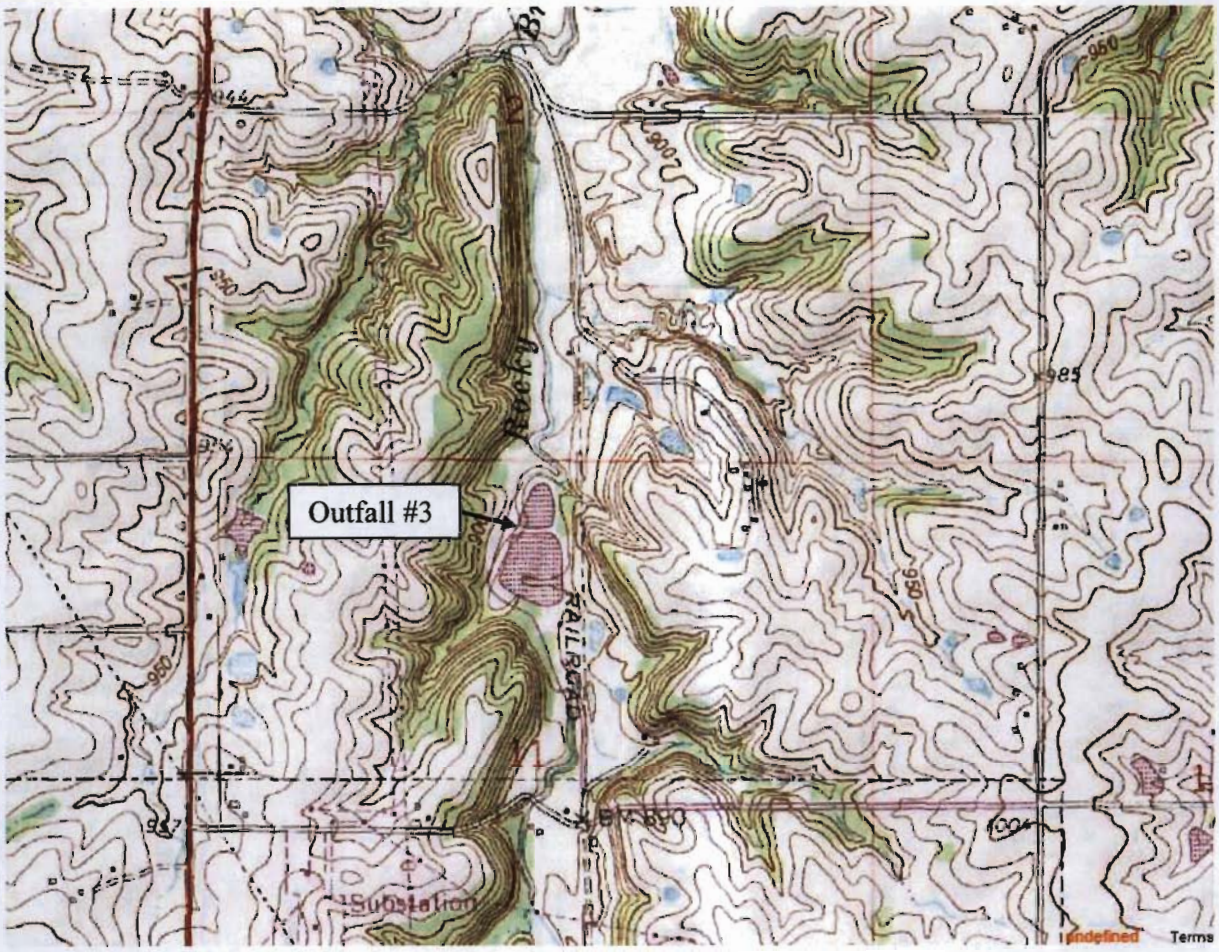
7.12 Has a wasteload allocation study been completed for this facility? Yes ☐ No ☒

8. LABORATORY CONTROL INFORMATION

LABORATORY WORK CONDUCTED BY PLANT PERSONNEL

Lab work conducted outside of plant.	Yes ☒	No ☐
Push–button or visual methods for simple test such as pH, settleable solids.	Yes ☒	No ☐
Additional procedures such as Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, titrations, solids, volatile content.	Yes ☒	No ☐
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	Yes ☐	No ☒
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph.	Yes ☐	No ☒

7.2 Topographic Map



FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART A – BASIC APPLICATION INFORMATION

9. SLUDGE HANDLING, USE AND DISPOSAL

9.1 Is the sludge a hazardous waste as defined by 10 CSR 25? Yes ☐ No ☒

9.2 Sludge production (Including sludge received from others): Design Dry Tons/Year *426* Actual Dry Tons/Year *97*

9.3 Sludge storage provided: *75398* Cubic feet; *112* Days of storage; *1.2* Average percent solids of sludge;

☐ No sludge storage is provided. ☐ Sludge is stored in lagoon.

9.4 Type of storage:

☐ Holding Tank ☐ Building
☐ Basin ☐ Lagoon
☐ Concrete Pad ☒ Other (Please describe) *Aerobic Digester*

9.5 Sludge Treatment:

☒ Anaerobic Digester ☐ Storage Tank ☐ Lime Stabilization ☐ Lagoon *Activated*
☐ Aerobic Digester ☐ Air or Heat Drying ☐ Composting ☒ Other (Attach Description) *Sludge*

9.6 Sludge use or disposal:

☒ Land Application ☐ Contract Hauler ☒ Hauled to Another Treatment Facility ☐ Solid Waste Landfill
☐ Surface Disposal (Sludge Disposal Lagoon, Sludge Held For More Than Two Years) ☐ Incineration
☐ Other (Attach Explanation Sheet) _____

9.7 Person responsible for hauling sludge to disposal facility:
☐ By Applicant ☒ By Others (complete below)

NAME	E-MAIL ADDRESS
Ace Pipe Cleaning, Inc	*office@acepipe.com*

ADDRESS	CITY	STATE	ZIP CODE
4000 E Truman Road	*Kansas City*	*MO*	*64127*

CONTACT PERSON	TELEPHONE WITH AREA CODE	PERMIT NO.
Brian Carpenter	*816-241-2891*	MO- *SS08-4409*

9.8 Sludge use or disposal facility:
☒ By Applicant ☐ By Others (Please complete below)

NAME	E-MAIL ADDRESS
Birmingham WWTP Land Application Facility	

ADDRESS	CITY	STATE	ZIP CODE
10801 NE 28th Street	*Kansas City*	*MO*	*64161*

CONTACT PERSON	TELEPHONE WITH AREA CODE	PERMIT NO.
Timothy Walters	*816-719-0469*	MO- *0049531*

9.9 Does the sludge or biosolids disposal comply with Federal Sludge Regulation 40 CFR 503?
☒ Yes ☐ No (Please explain)

END OF PART A

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART B – ADDITIONAL APPLICATION INFORMATION

10. COLLECTION SYSTEM

10.1 Length of sanitary sewer collection system in miles
51.8 miles

10.2 Does significant infiltration occur in the collection system? ☐ Yes ☒ No
If yes, briefly explain any steps underway or planned to minimize inflow and infiltration:

During a previous permit cycle the City developed a Long-Term Control Plan (LTCP) to be implemented by the Overflow Control Program. The State of Missouri approved the City's LTCP on April 14, 2010. Portions of the City's LTCP are memorialized in a consent decree between the City and the EPA (DOJ) dated May 5, 2010. The Consent and LTCP contain projects for I&I reduction in the Northern and Northwestern Watersheds for a 30% targeted reduction that are to be completed and operational by 12/31/2023. The Rocky Branch Service Area is contained within these watersheds.

11. BYPASSING

Does any bypassing occur anywhere in the collection system or at the treatment facility? Yes ☐ No ☒
If yes, explain:

12. OPERATION AND MAINTENANCE PERFORMED BY CONTRACTOR(S)

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of the contractor?
Yes ☐ No ☒
If Yes, list the name, address, telephone number and status of each contractor and describe the contractor's responsibilities. (Attach additional pages if necessary.)

NAME	
MAILING ADDRESS	
TELEPHONE NUMBER WITH AREA CODE	EMAIL ADDRESS
RESPONSIBILITIES OF CONTRACTOR	

13. SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION

Provide information about any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses for each.

Planned screen replacement for Rocky Branch. Screen has been obtained and is in City storage but tentative schedule has not been developed yet.

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART B – ADDITIONAL APPLICATION INFORMATION

14. EFFLUENT TESTING DATA

Applicants must provide effluent testing data for the following parameters. Provide the indicated effluent data **for each outfall through which effluent is discharged**. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least **three samples** and must be no more than four and one-half years apart.

Outfall Number

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)	*6.7*	S.U.	—	S.U.	*59*
pH (Maximum)	*8.7*	S.U.	—	S.U.	*59*
Flow Rate	*10.7*	MGD	*1.4*	MGD	*366*

*For pH report a minimum and a maximum daily value

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
		Conc.	Units	Conc.	Units	Number of Samples		
Conventional and Nonconventional Compounds								
BIOCHEMICAL OXYGEN DEMAND (Report One)	BOD_5	*9*	mg/L	*3*	mg/L	*53*	*SM5210B*	*2*
	$CBOD_5$	—	mg/L	—	mg/L	—	—	—
E. COLI		*122*	#/100 mL	*15*	#/100 mL	*31*	*SM9223A.B*	*10*
TOTAL SUSPENDED SOLIDS (TSS)		*23*	mg/L	*6*	mg/L	*54*	*SM2540D*	*1*
AMMONIA (as N)		*0.8*	mg/L	*0.3*	mg/L	*14*	*SM4500-NH3C*	*0.13*
CHLORINE* (TOTAL RESIDUAL, TRC)		*83*	mg/L	*58*	mg/L	*22*	*EPA300.0*	*0.014*
DISSOLVED OXYGEN		*15.0*	mg/L	*7.8*	mg/L	*236*	HACH 10360	
OIL and GREASE		*2*	mg/L	*0.9*	mg/L	*12*	*SM5520B*	*1.4*
OTHER			mg/L		mg/L			

*Report only if facility chlorinates

END OF PART B

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART C – CERTIFICATION

15. CERTIFICATION

All applicants must complete the Certification Section. This certification must be signed by an officer of the company or city official. All applicants must complete all applicable sections as explained in the Application Overview. By signing this certification statement, applicants confirm that they have reviewed the entire form and have completed all sections that apply to the facility for which this application is submitted.

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PRINTED NAME	OFFICIAL TITLE (MUST BE AN OFFICER OF THE COMPANY OR CITY OFFICIAL)
Terry Leeds	*Water Services Department Director*

SIGNATURE

TELEPHONE NUMBER WITH AREA CODE
816-513-0504

DATE SIGNED
09/02/16

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

Send Completed Form to:

Department of Natural Resources
Water Protection Program
ATTN: NPDES Permits and Engineering Section
P.O. Box 176
Jefferson City, MO 65102

END OF PART C
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH PARTS OF FORM B2 YOU MUST COMPLETE.

Do not complete the remainder of this application, unless at least one of the following statements applies to your facility:

1. Your facility design flow is equal to or greater than 1,000,000 gallons per day.
2. Your facility is a pretreatment treatment works.
3. Your facility is a combined sewer system.

Submittal of an incomplete application may result in the application being returned. Permit fees for returned applications shall be forfeited. Permit fees for applications being processed by the department that are withdrawn by the applicant shall be forfeited.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part D applies to the treatment works.

If the treatment works has a design flow greater than or equal to 1 million gallons per day or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information **for each outfall through which effluent is discharged**. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum, effluent testing data must be based on at least **three pollutant scans** and must be no more than four and one-half years apart.

Outfall Number (Complete Once for Each Outfall Discharging Effluent to Waters of the State.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS AND HARDNESS											
ANTIMONY											
ARSENIC											
BERYLLIUM											
CADMIUM											
CHROMIUM III											
CHROMIUM VI											
COPPER											
LEAD											
MERCURY											
NICKEL											
SELENIUM											
SILVER											
THALLIUM											
ZINC											
CYANIDE											
TOTAL PHENOLIC COMPOUNDS											
HARDNESS (as $CaCO_3$)											
VOLATILE ORGANIC COMPOUNDS											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMOFORM											
CARBON TETRACHLORIDE											
CHLOROBENZENE											

PENDING:
Samples will be collected in August, October and December 2016

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
CHLORODIBROMO-METHANE											
CHLOROETHANE											
2-CHLORO-ETHYLVINYL ETHER											
CHLOROFORM											
DICHLOROBROMO-METHANE											
1,1-DICHLORO-ETHANE											
1,2-DICHLORO-ETHANE											
TRANS-1,2-DICHLOROETHYLENE											
1,1-DICHLORO-ETHYLENE											
1,2-DICHLORO-PROPANE											
1,3-DICHLORO-PROPYLENE											
ETHYLBENZENE											
METHYL BROMIDE											
METHYL CHLORIDE											
METHYLENE CHLORIDE											
1,1,2,2-TETRA-CHLOROETHANE											
TETRACHLORO-ETHANE											
TOLUENE											
1,1,1-TRICHLORO-ETHANE											
1,1,2-TRICHLORO-ETHANE											
TRICHLORETHYLENE											
VINYL CHLORIDE											
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL											
2-CHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
4,6-DINITRO-O-CRESOL											
2,4-DINITROPHENOL											
2-NITROPHENOL											
4-NITROPHENOL											

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
PENTACHLOROPHENOL											
PHENOL											
2,4,6-TRICHLOROPHENOL											
BASE-NEUTRAL COMPOUNDS											
ACENAPHTHENE											
ACENAPHTHYLENE											
ANTHRACENE											
BENZIDINE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											
3,4-BENZO-FLUORANTHENE											
BENZO(GH) PHERYLENE											
BENZO(K) FLUORANTHENE											
BIS (2-CHLOROTHOXY) METHANE											
BIS (2-CHLOROETHYL) – ETHER											
BIS (2-CHLOROISO-PROPYL) ETHER											
BIS (2-ETHYLHEXYL) PHTHALATE											
4-BROMOPHENYL PHENYL ETHER											
BUTYL BENZYL PHTHALATE											
2-CHLORONAPH-THALENE											
4-CHLORPHENYL PHENYL ETHER											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIBENZO (A,H) ANTHRACENE											
1,2-DICHLORO-BENZENE											
1,3-DICHLORO-BENZENE											
1,4-DICHLORO-BENZENE											
3,3-DICHLORO-BENZIDINE											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO-*48305*	*003*

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples		
2,4-DINITRO-TOLUENE											
2,6-DINITRO-TOLUENE											
1,2-DIPHENYL-HYDRAZINE											
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLO-PENTADIENE											
HEXACHLOROETHANE											
INDENO (1,2,3-CD) PYRENE											
ISOPHORONE											
NAPHTHALENE											
NITROBENZENE											
N-NITROSODI-PROPYLAMINE											
N-NITROSODI-METHYLAMINE											
N-NITROSODI-PHENYLAMINE											
PHENANTHRENE											
PYRENE											
1,2,4-TRICHLOROBENZENE											

Use this space (or a separate sheet) to provide information on other pollutants not specifically listed in this form.

END OF PART D

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO-*48305*	*003*

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWs, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

A. POTWs with a design flow rate greater than or equal to 1 million gallons per day
B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403)
C. POTWs required by the permitting authority to submit data for these parameters

- At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years: *0* chronic *5* acute

Complete the following chart **for the last three whole effluent toxicity tests.** Allow one column per test. Copy this page if more than three tests are being reported.

	Most Recent	2ND Most Recent	3RD Most Recent
A. Test Information			
Test Method Number	*EPA821-C-02-006*	*EPA821-C-02-006*	*EPA821-R-02-012*
Final Report Number	*60224832*	*60201507*	*1414630*
Outfall Number	*003*	*003*	*003*
Dates Sample Collected	*8/2/2016*	*8/26/2015*	*8/19/2014*
Date Test Started	*8/3/2016*	*8/27/2015*	*8/20/2014*
Duration	*48 hrs*	*48 hrs*	*48 hrs*
B. Toxicity Test Methods Followed			
Manual Title	*US EPA Manual*	*US EPA Manual*	*US EPA Manual*
Edition Number and Year of Publication	*Nov 2002*	*Nov 2002*	*Nov 2002*
Page Number(s)			
C. Sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used			
24-Hour Composite	*X*	*X*	*X*
Grab			
D. Indicate where the sample was taken in relation to disinfection (Check all that apply for each)			
Before Disinfection			
After Disinfection	*X*	*X*	*X*
After Dechlorination			
E. Describe the point in the treatment process at which the sample was collected			
Sample Was Collected:	*Final Effluent*	*Final Effluent*	*Final Effluent*
F. Indicate whether the test was intended to assess chronic toxicity, acute toxicity, or both			
Chronic Toxicity			
Acute Toxicity	*X*	*X*	*X*
G. Provide the type of test performed			
Static	*X*	*X*	*X*
Static-renewal			
Flow-through			
H. Source of dilution water. If laboratory water, specify type; if receiving water, specify source			
Laboratory Water			
Receiving Water	*X*	*X*	*X*

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA (continued)

	Most Recent	2ND Most Recent	3RD Most Recent
I. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh Water	*X*	*X*	*X*
Salt Water			
J. Percentage of effluent used for all concentrations in the test series			
	100%	*100%*	*100%*
K. Parameters measured during the test (State whether parameter meets test method specifications)			
pH	*7.29 s.u.*	*7.23 s.u.*	*7.4 s.u.*
Salinity			
Temperature	*25 C*	*25 C*	*24.6 C*
Ammonia	*0.77 mg/L*	*0.50 mg/L*	*0.13 mg/L*
Dissolved Oxygen	*8.10 mg/L*	*8.40 mg/L*	*8.8 mg/L*
L. Test Results			
Acute:			
Percent Survival in 100% Effluent	*100% / 100%*	*100% / 100%*	*100% / 10%*
LC_{50}	*>100% / >100%*	*>100% / >100%*	*>100% / 73.50%*
95% C.I.			
Control Percent Survival	*100% / 100%*	*100% / 100%*	*100% / 100%*
Other (Describe)			
Chronic:			
NOEC			
IC_{25}			
Control Percent Survival			
Other (Describe)			
M. Quality Control/ Quality Assurance			
Is reference toxicant data available?	*Yes*	*Yes*	*Yes*
Was reference toxicant test within acceptable bounds?	*Yes*	*Yes*	*Yes*
What date was reference toxicant test run (MM/DD/YYYY)?	*7/13/16*	*8/18/2015*	*8/19/2014*
Other (Describe)			

Is the treatment works involved in a toxicity reduction evaluation? ☐ Yes ☒ No

If yes, describe:

If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date Submitted (MM/DD/YYYY) *Submitted 9/28/2015 and 9/20/2014; 2016 data will be submitted 9/28/2016*

Summary of Results (See Instructions)

2014: Ceriodaphnia dubia passed; Pimephales prometas failed
2015 and 2016: All passed

END OF PART E

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

Refer to the APPLICATION OVERVIEW to determine whether Part F applies to the treatment works.

18. GENERAL INFORMATION

18.1 Does the treatment works have, or is it subject to, an approved pretreatment program?

☒ Yes ☐ No

18.2 Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works:

Number of non-categorical SIUs *0*

Number of CIUs *0*

19. INDUSTRIES CONTRIBUTING MORE THAN 5 PERCENT OF THE ACTUAL FLOW TO THE FACILITY OR OTHER SIGNIFICANT INDUSTRIAL USERS INFORMATION

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME

MAILING ADDRESS	CITY	STATE	ZIP

19.1 Describe all of the industrial processes that affect or contribute to the SIU's discharge

19.2 Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.

Principal Product(s):

Raw Material(s):

19.3 Flow Rate

a. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd ☐ Continuous ☐ Intermittent

b. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.

gpd ☐ Continuous ☐ Intermittent

19.4 Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local Limits ☐ Yes ☐ No

b. Categorical Pretreatment Standards ☐ Yes ☐ No

If subject to categorical pretreatment standards, which category and subcategory?

19.5 Problems at the Treatment Works attributed to waste discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

☐ Yes ☐ No

If Yes, describe each episode

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

20. RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE

20.1 Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail or dedicated pipe? ☐ Yes ☒ No

20.2 Method by which RCRA waste is received. (Check all that apply)
☐ Truck ☐ Rail ☐ Dedicated Pipe

20.3 Waste Description

EPA Hazardous Waste Number	Amount (volume or mass)	Units

21. CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER

21.1 Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?
☐ Yes ☒ No
Provide a list of sites and the requested information for each current and future site.

21.2 Waste Origin. Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

21.3 List the hazardous constituents that are received (or are expected to be received). Included data on volume and concentration, if known. (Attach additional sheets if necessary)

21.4 Waste Treatment

a. Is this waste treated (or will it be treated) prior to entering the treatment works?
☐ Yes ☐ No

If Yes, describe the treatment (provide information about the removal efficiency):

b. Is the discharge (or will the discharge be) continuous or intermittent?
☐ Continuous ☐ Intermittent

If intermittent, describe the discharge schedule:

END OF PART F
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME	PERMIT NO.	OUTFALL NO.
Rocky Branch WWTP	MO- *48305*	*003*

PART G – COMBINED SEWER SYSTEMS

Refer to the APPLICATION OVERVIEW to determine whether Part G applies to the treatment works. *NOT APPLICABLE*

22. GENERAL INFORMATION

22.1 System Map. Provide a map indicating the following: (May be included with basic application information.)

A. All CSO Discharges.

B. Sensitive Use Areas Potentially Affected by CSOs. (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems and Outstanding Natural Resource Waters.)

C. Waters that Support Threatened and Endangered Species Potentially Affected by CSOs.

22.2 System Diagram. Provide a diagram, either in the map provided above or on a separate drawing, of the Combined Sewer Collection System that includes the following information:

A. Locations of Major Sewer Trunk Lines, Both Combined and Separate Sanitary.

B. Locations of Points where Separate Sanitary Sewers Feed into the Combined Sewer System.

C. Locations of In-Line or Off-Line Storage Structures.

D. Locations of Flow-Regulating Devices.

E. Locations of Pump Stations.

22.3 Percent of collection system that is combined sewer

22.4 Population served by combined sewer collection system

22.5 Name of any satellite community with combined sewer collection system

23. CSO OUTFALLS. COMPLETE THE FOLLOWING ONCE FOR EACH CSO DISCHARGE POINT

23.1 Description of Outfall

a. Outfall Number

b. Location

c. Distance from Shore (if applicable) _____ ft

d. Depth Below Surface (if applicable) _____ ft

e. Which of the following were monitored during the last year for this CSO?

☐ Rainfall ☐ CSO Pollutant Concentrations ☐ CSO

☐ CSO Flow Volume ☐ Receiving Water Quality

f. How many storm events were monitored last year?

23.2 CSO Events

a. Give the Number of CSO Events in the Last Year Events ☐ Actual ☐ Approximate

b. Give the Average Duration Per CSO Event

Hours ☐ Actual ☐ Approximate

c. Give the Average Volume Per CSO Event

Million Gallons ☐ Actual ☐ Approximate

d. Give the minimum rainfall that caused a CSO event in the last year _____ inches of rainfall

23.3 Description of Receiving Waters

a. Name of Receiving Water

b. Name of Watershed/River/Stream System

c. U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)

d. Name of State Management/River Basin

e. U.S. Geological Survey 8- Digit Hydrologic Cataloging Unit Code (If Known)

23.4 CSO Operations

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable state water quality standard.)

END OF PART G

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

TECHNICAL MEMORANDUM NO. 7

ROCKY BRANCH SERVICE AREA

CITY OF KANSAS CITY, MISSOURI

WASTEWATER MASTER PLAN

KANSAS CITY
MISSOURI

PROJECT NO. 79893

AUGUST 2017

PREPARED BY:

BURNS McDONNELL

Taliaferro & Browne, Inc.
Engineering - Landscape Architecture - Surveying

CUSTOM ENGINEERING
MECHANICAL & ELECTRICAL ENGINEERING

Technical Memorandum No. 7
Rocky Branch Service Area

prepared for

Water Services Department
City of Kansas City, Missouri
Wastewater Master Plan

Project No. 79893

August 2017

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri
and
Taliaferro & Browne, Inc.
Kansas City, Missouri

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
A	Amperes
A2O	Anaerobic-Anoxic-Oxic
AC/HR	Air Changes per Hour
ADF	Average Day Flow
ATS	Advanced Technology Services, Inc. *or* Automatic Transfer Switch
Avg + 3SD	Average Plus Three Standard Deviations
BFP	Backflow Preventer
BMcD	Burns & McDonnell
BNR	Biological Nutrient Removal
BOD_5	5-day Biochemical Oxygen Demand
cfs	Cubic Feet per Second
CHNL	Channel
CIP	Capital Improvement Plan
COD	Chemical Oxygen Demand
CP	Control Panel
CSR	Code of State Regulations
d	Day
DCIA	Directly Connected Impervious Area
DO	Dissolved Oxygen
DTM	Digital Terrain Model
DX	Direct Expansion

Abbreviation	Term/Phrase/Name
EF	Exhaust Fan
EPDM	Ethylene Propylene Diene Monomer
ES	Executive Summary
EUH	Electric Unit Heater
F	Fan
FEMA	Federal Emergency Management Agency
fps	Feet per Second
ft	Feet
G&A	General & Administrative
gpd	Gallons per Day
gph	Gallons per Hour
gpm	Gallons per Minute
H_2S	Hydrogen Sulfide
HMI	Human Machine Interface
hp	Horsepower
HVAC	Heating, Ventilation, & Air Conditioning
HWH	Hot Water Heater
I/I	Inflow & Infiltration
IC	Installed Cost
ICI	Industrial, Commercial, Institutional
IE	Installed Equipment Cost
IR	Internal Recycle

Abbreviation	Term/Phrase/Name
IT	Information Technology
KCMO	City of Kansas City, Missouri
KCP&L	Kansas City Power & Light Company
kV	Kilovolt
kVa	Kilovolt-ampere
kWh	Kilowatt-hour
lbs	Pounds
LCP	Local Control Panel
lf	Linear Feet
LP	Lighting Panel *or* Panelboard
m	Meter
MARC	Mid-America Regional Council
MCC	Motor Control Center
MDNR	Missouri Department of Natural Resources
mg/L	Milligram per Liter
MGD	Million Gallons Per Day
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MOD	Module
MOP	Manual of Practice (WEF Publications)
MPC	Mini Power Center
MVA	Megavolt-ampere

Abbreviation	Term/Phrase/Name
N	Nitrogen
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
NPW	Non-potable Water
O&M	Operations & Maintenance
OCP	Overflow Control Program
ORP	Oxidation-Reduction Potential
P	Phosphorus
PDDC	Power and Data Distribution Center Panelboard
PDP	Power Distribution Panel
PLC	Programmable Logic Controller
PRV	Powered Roof Ventillator
Q	Flow (liquid)
QBL	Quadruple Bottom Line
RAS	Return Activated Sludge
RB	Rocky Branch
SCADA	Supervisory Control & Data Acquisition
scfm	Standard Cubic Feet per Minute
SCS	Soil Conservation Service
sf	Square Feet
SLR	Solids Loading Rate

Abbreviation	Term/Phrase/Name
SOP	Standard Operating Procedure
SOR	Surface Overflow Rate
SRT	Solids Retention Time
SSH	Safety Shower
SSO	Sanitary Sewer Overflow
SSS	Sanitary Sewer System
T	Transformer
TAN	Total Ammonia Nitrogen
TC	Todd Creek
TCC	Total Construction Cost
TKN	Total Kjeldahl Nitrogen
TM	Technical Memorandum
TN	Total Nitrogen
TP	Total Phosphorus *or* Transformer
TSS	Total Suspended Solids
TUC	Total Unmarked Up Cost
USEPA	United States Environmental Protection Agency
UH	Unit Heater
UV	Ultraviolet
V	Volt
VFD	Variable Frequency Drive
WAC	Wall-mounted Air Conditioner

Abbreviation	Term/Phrase/Name
WAS	Waste Activated Sludge
WEF	Water Environment Federation
WLR	Weir Loading Rate
WSD	Kansas City, Missouri Water Services Department
WWMP	Wastewater Master Plan
WWTP	Wastewater Treatment Plant
XFMR	Transformer

ES 7 EXECUTIVE SUMMARY

ES 7.1 Content and Purpose

This technical memorandum describes the condition, capacity, alternatives evaluation, and recommended improvements for the Rocky Branch Service Area for both the collection system and the wastewater treatment facility. The evaluation period extends to 2035. Recommendations developed as a part of this Wastewater Master Plan (WWMP) effort have been incorporated with infrastructure needs driven by the City of Kansas City's Overflow Control Program (OCP) and resulted in a comprehensive wastewater capital improvements plan provided in Technical Memorandum No. 18 (TM-18).

ES 7.2 Service Area

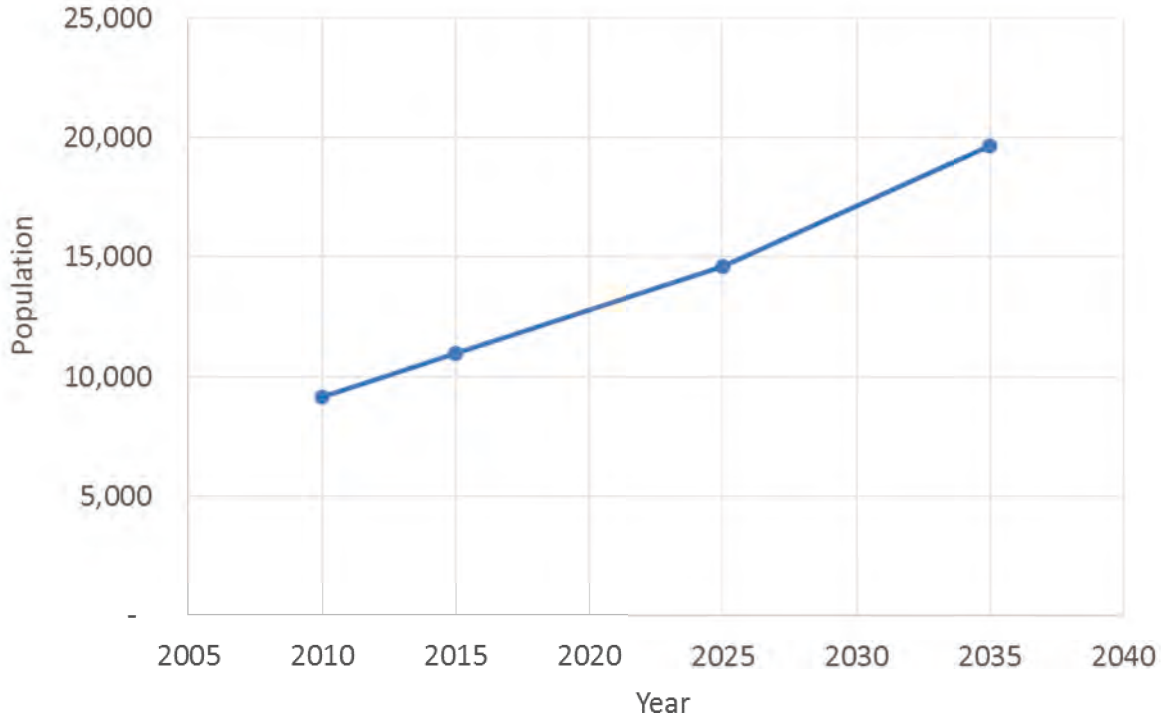
The Rocky Branch Service Area covers 11 square miles and consists of an area centered on I-435 and U.S. Highway 169. The southern boundary lies just north of MO-152 east and the Rocky Branch WWTP lies just north of the northern boundary. The western boundary is generally North Robinhood Lane and the eastern boundary is approximately North Agnes Avenue. Figure 7-1 provides the general area included in the Rocky Branch Service Area. The Rocky Branch WWTP also receives flow from the decommissioned Northland Mobile Home Park WWTP and from the City of Smithville. Table ES 7-1 provides a summary of wastewater infrastructure within the service area:

Table ES 7-1: Summary of Existing Wastewater Infrastructure

Infrastructure	Quantity	Units	Comments
Separate Sanitary Sewer	50	Miles	
Combined Sewer	0	Miles	
Pump Stations	1	Ea	Excludes PS at plant
Force Mains	9,200	lf	
Treatment Plants	1	Ea	2.8 MGD Permitted Capacity

Population projections were used to develop forecasts of flow and loadings through 2035; refer to Figure ES 7-1 below of population projections through 2035. If the forecasted 2035 average day flow (ADF) was greater or equal to the current permitted design flow, the corresponding loadings were used for preliminary sizing of WWTP improvements in the future. Per direction from WSD, if the forecasted 2035 ADF was less than the current permitted design flow, the current permitted flow was used for sizing improvements. If the permitted flow was higher, the loadings were scaled up by the ratio of the permitted design flow to forecasted 2035 ADF. For Rocky Branch WWTP, the forecasted 2035 ADF was higher than the permitted design flow, and the loadings were not adjusted.

Figure ES 7-1: Population Forecast for Rocky Branch Service Area



The design influent flows and pollutant loadings used for sizing improvements is shown in Table ES 7-2. Additional influent characterization is recommended and maximum month peak factors for pollutant loading need to be revisited to confirm any future basis of design.

Table ES 7-2: Service Area Evaluated Influent Flow and Pollutant Loadings

Parameter	Average Day	Maximum Month	Peak
Flow, MGD	2.9	7.2	15.7
TSS, lbs/d	4,360	6,530	26,400
BOD_5, lbs/d	3,550	5,320	11,300
TAN, lbs/d	550	830	1,400
TKN, lbs/d	880	1,320	2,240
TP, lbs/d	120	180	600

ES 7.3 Treatment Plant Analysis Results

The capacities of the Rocky Branch WWTP were evaluated from both a hydraulic and treatment basis. The hydraulic capacities of the major process interconnecting piping were also developed. The treatment capacities for the biological treatment and final clarification process are based upon meeting the current discharge permit requirements during a maximum month pollutant loading condition. The analysis was

performed using a combination of Missouri Department of Natural Resources (MDNR) design guidelines, *Ten States Standards* guidelines, and industry-accepted approaches. Table ES 7-3 summarizes the capacities of the current treatment facility.

Table ES 7-3: Summary of Rocky Branch WWTP Capacities

Process/Piping System	Capacity, MGD	Basis
Influent Screens	9.2	Channel Velocity
Grit Basins	11.7	Inlet Velocity
Piping System: Grit Basins to Aeration Basins	13.9	Hydraulic
Aeration Basins	4.0[a]	SRT and Maximum MLSS
Aeration Blowers	1.5[b]	Oxygen Transfer
Piping System: Aeration Basins to Final Clarification	35.1	Hydraulic
Final Clarification	13.6[c]	Solids Loading Rate
Piping System: Final Clarification to UV Disinfection	125	Hydraulic
UV Disinfection	10.0	Manufacturer Rating
Piping System: UV Disinfection to Rocky Branch Creek	55.6	Hydraulic

Notes:
a Aeration basin capacity based on an 8-day SRT and maximum MLSS of 4,000 mg/L during a maximum month pollutant loading and average day flow condition.
b Aeration blower capacity based on peak day pollutant loading condition.
c Final basin capacity based on evaluated conditions at permitted capacity, maximum month pollutant loadings, and RAS recycle rate to maintain design MLSS (see Section 7.4.1.5).

The condition of the Rocky Branch WWTP was reviewed through a combination of a site inspection, a review of work orders, discussions with operations and maintenance staff, and vibration testing for specific critical assets within the WWTP. Table ES 7-4 provides an overview of the equipment condition rating system used during the condition assessment site visits. Table ES 7-5 summarizes the condition of the major facilities and processes.

Table ES 7-4: Equipment Condition Rating System

Rating Number	Rating Term	Rating Description
1	Very Good Condition	Virtually no defects; appears well maintained
2	Moderate Deterioration	Some defects in equipment; some maintenance performed
3	Significant Deterioration	Numerous defects in equipment; little maintenance performed
4	Virtually Unserviceable	Beyond repair; remove or replace as applicable

Table ES 7-5: Summary of Liquid Treatment Facilities Condition

Major Facilities/Unit Processes	Condition Rating
Influent Pump Station	2
Screening & Grit Removal (Headworks)	2
Blower Building	2
Aeration Basins	1
Secondary Clarifiers	1
UV Disinfection[a]	1
RAS/WAS/Scum Pump Station[b]	2
Control/Laboratory Building	2

Notes:
a Return Activated Sludge (RAS)/Waste Activated Sludge (WAS).
b Ultraviolet (UV).

Facility operations were reviewed, including standard operating procedure reviews, multiple site visits, coordination with plant staff, and operational data analyses. Using information collected from these tasks, potential plant performance improvements were identified. Table ES 7-6 lists a summary of the improvements, including potential benefits, risks, and cost implications associated with each proposed improvement. Improvements to management procedures related to plant operations were also identified, these include use of a centralized data management tool, updating and utilizing standard operating procedures (SOPs), investing in a process control library, improving data sharing amongst plant staff, and having northland plant operators.

Table ES 7-6: Treatment Plant Process and Operations Optimization Summary

	Plant Process	Improvement	Benefits	Concerns	Cost Implications
Process	Odor Control Equipment	Bring odor control system back into service	Reduce odors from influent pump station, headworks building and aerobic digester	The functional condition of the odor system is unknown	-
	Influent Gates	Open fully when not using gate to isolate aeration basin	Provide equal flow distribution and mitigate short-circuiting	None	None
	DO Control System	Utilize existing automated DO control system in the aeration basin to maintain no more than 1.5-2.0 mg/L.	Reduce electricity consumption of aeration system	None	Dependent on state of existing system
Operations	Staff Technical Training	Encourage staff to review O&M manual for Rocky Branch WWTP	Staff become more familiar with on-site equipment and improve understanding of WWTP processes	None	None
	DO Control System	Routinely verify calibration of in-basin DO meters with calibrated field instrument	Improve efficiency and compliance	N/A	Negligible
	Data Management	Utilize commercially-available data management software	Centralized database of laboratory and field data, as well as better and faster data auditing; automated report generation; and centralized, secure, auditable, historical data archiving	N/A	Cost of software package
		Provide operational data to on-site staff from central laboratory. Provide internet connectivity.	Provide staff with additional information to promote more informed process control decisions.	N/A	Negligible
	Process Control	Develop and implement a process management plan	Improves on-site process control and technical oversight	N/A	$100,000-$150,000

Anticipated regulatory requirements were evaluated, and more stringent ammonia removal requirements are anticipated around the year 2025, with total phosphorus and nitrogen limits predicted to be established in 2025 and 2035, respectively. Rocky Branch WWTP currently utilizes aeration basins for secondary treatment, including BOD_5 removal and nitrification. The ultimate performance of the secondary treatment system is dependent on final clarifier TSS and BOD_5 removal efficiency, as inadequate removal of activated sludge TSS may result in permit exceedance due to particulate BOD_5. Other existing major unit deficiencies were identified based on design flow rates and loading conditions. Table ES 7-7 provides a summary of the existing unit process capacities as well as anticipated future capacity requirements based on nutrient removal requirements.

Table ES 7-7: Rocky Branch WWTP Existing Capacity and Anticipated Design Needs

Unit Process	Existing Capacity	Future Capacity Required	Additional Capacity Needed
Influent Pump Station	9.2 MGD	9.6 MGD	0.4 MGD
Mechanical Screens	9.2 MGD	9.6 MGD	0.4 MGD
Grit Removal	11.7 MGD	9.6 MGD	-
Biological Treatment Basins[a]	2.1 MGD	2.9 MGD	0.8 MGD
Final Clarification			
- Hydraulic Loading	15.7 MGD	9.6 MGD	-
- Solids Loading[a]	11.3 MGD	9.6 MGD	-
Disinfection	10.0 MGD	9.6 MGD	-

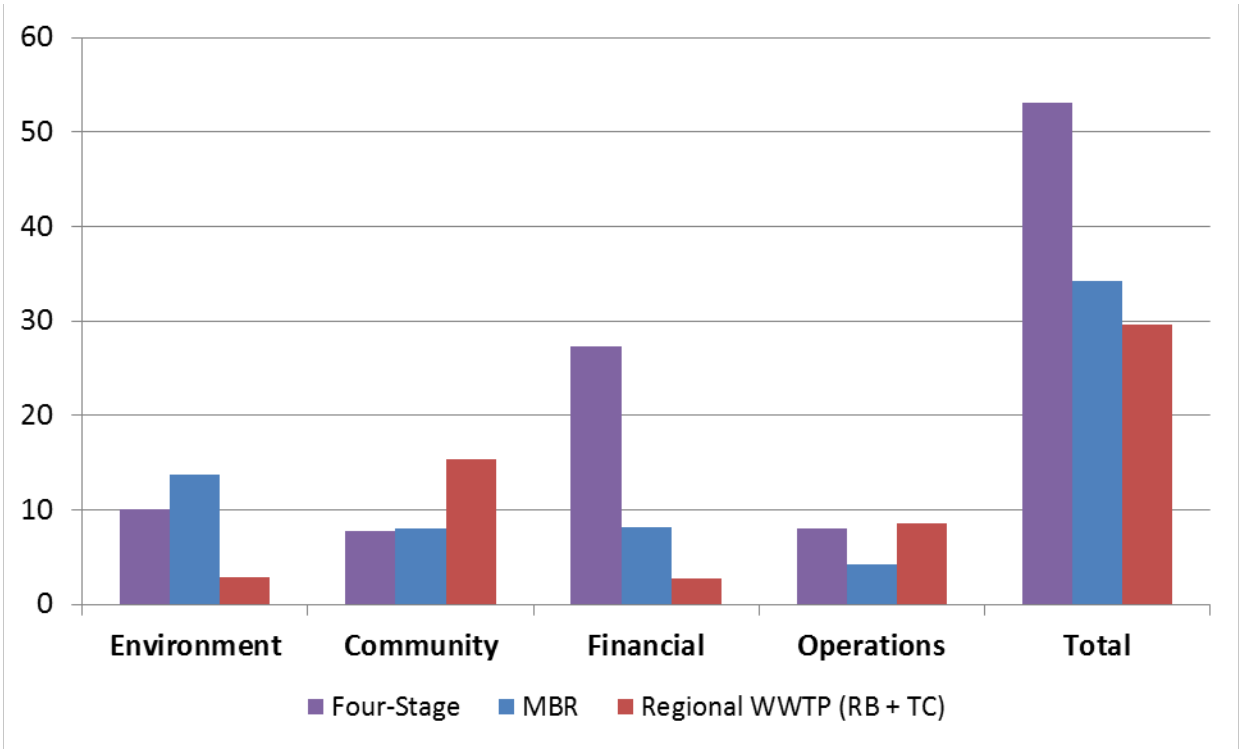
Notes:

a Existing and required capacities are based on anaerobic, anoxic, and aerobic zones required to meet future permit limits. Previous capacities were based on existing permit conditions.

b Solids loading assumes MLSS of 4,600 mg/L (includes MLSS contribution from chemical phosphorus removal) and RAS recycle rate of 1Q

Three alternatives were assessed for treating future flows and meeting future water quality requirements, including a four-stage Bardenpho system, retrofitting the existing facility into a membrane bioreactor (MBR) plant, and a new Regional WWTP for the Rocky Branch and Todd Creek service areas. A quadruple bottom line (QBL) analysis was conducted to determine the preferred alternative; factors including operational complexity, impact on the environment and community, and financial considerations were evaluated. Figure ES 7-2 presents a summary of the scores for each alternative. Of the three alternatives, the four-stage Bardenpho scored greatest in the QBL analysis.

Figure ES 7-2: QBL Scoring for Rocky Branch Potential Treatment Alternatives



The alternative of building a new regional plant that would combine the Rocky Branch, Todd Creek, and Smithville Waste Water Treatment Plants was also reviewed. The capital cost for this alternative was the highest for both Rocky Branch (RB) and Todd Creek (TC), as seen in Table ES 7-8 below. Because of this, no further analysis was performed.

Table ES 7-8: Summary of Costs for Rocky Branch WWTP Alternatives

Alternative	NPV ($M 2015)	Capital Cost ($M 2015)
Rocky Branch Four-Stage Bardenpho	$17.8M	$11.6M
Rocky Branch MBR Retrofit	$35.7M	$25.9M
Regionalization (RB + TC)[a]	$46.6M	$38.1M
Smithville Regionalization (RB + TC + Smithville)[b]	-	$66.0M

Notes:

a Cost represents fraction of total Regional WWTP based on ratio of flow from Rocky Branch Service to total regional flow for Rocky Branch and Todd Creek Service Areas (2.9/6.2 ratio). Total NPV and Capital Cost for Regional WWTP is approximately $99.4M and $81.3M, respectively.

b Cost represents fraction of total Smithville Regional WWTP based on ratio of flow from Rocky Branch Service to total regional flow for Rocky Branch, Todd Creek, and Smithville Service Areas (2.9/7.2 ratio). Total Capital Cost for Regional WWTP is approximately $163.8M.

ES 7.4 Pump Station Condition Assessment

The single pump station serving the Rocky Branch Service Area is recently constructed and was excluded from the condition assessment scope.

ES 7.5 Collection System Analysis Results

The Rocky Branch WWTP is served by a separate sanitary sewer collection system. WSD is currently implementing the Overflow Control Plan to reduce the occurrence of wet-weather sewer overflows in the combined sewer and separate sanitary sewer systems. The hydraulic and hydrologic model developed for the WWMP was not calibrated due to a lack of flow monitoring data. Hence, the level of service analysis utilized static peaks, based on the average dry weather flow and 5-year 24-hr volume. The WWMP recommends flow metering and calibration of the model and revaluation of system performance, stress testing, and review of capital improvement projects.

The WWMP evaluated the performance and capacity of the Rocky Branch WWTP collection system with respect to the following:

- Sewer capacity,
- Potential for overflow at manholes, and
- Potential for water-in-basements.

Based on the static model, the hydraulic grade line does not exceed the crown of the pipe or manhole rim elevations in any portion of the model. Therefore, the model does not indicate a likelihood for manhole SSOs or WIB for the planning years 2015, 2025, and 2030. Based on the historical data, a few basement flooding complaints have occurred. Field observations of basement flooding episodes may result from storms larger than the 5-year level of service.

WSD policy is to establish capital projects for new interceptor sewers 24-inches in diameter and larger. In order to determine potential future locations for new interceptor sewer, undeveloped areas without existing interceptor sewers were identified throughout the Rocky Branch service area. Capital improvement projects were identified based on the analysis of the areas identified for future development. A developed area greater than 0.95 square miles is needed to require an interceptor 24 inch and larger. No undeveloped areas in the Rocky Branch without access to sanitary sewer service are larger than 0.95 square miles. Based on the analysis, there are no CIP project needs identified for the collection systems in the Rocky Branch service area.

ES 7.6 Recommendations

The Rocky Branch Service Area requires improvements and upgrades in order to provide an adequate level of service with regard to both conveyance and treatment through the planning horizon of 2035. A review of these needs has resulted in a total of $37.9M in suggested improvements as summarized in Table ES 7-9 below and in Technical Memorandum 18.

Table ES 7-9: Rocky Branch Recommended Capital Improvements Through 2035

Project Category	Capital Cost
OCP	$4.9M
Collection System	$0.1M
Sanitary Pump Stations	$5.6M
WWTP	$27.3M

7.1 INTRODUCTION

7.1.1 Scope of Assessment

This memorandum provides a description of condition, capacity, alternatives evaluation, and recommended improvements for the wastewater collection system, pumping, and treatment facilities that serve the Rocky Branch Service Area. The following information provides a summary of the specific scope items developed for this component of the Wastewater Master Plan (WWMP):

1. Growth Forecasts:
   a. Develop a growth forecast for each Service Area based on a combination of the 2010 census population numbers, population projections developed by the Overflow Control Program (OCP), the Mid-America Regional Council (MARC), and land use, growth projections provided by the City of Kansas City, Missouri (KCMO), and other data provided by the KCMO Water Services Department (WSD).
2. Collection System Capacity Evaluation:
   a. Develop a static desktop model for analysis of the separate sanitary sewer (SSS) service areas within the Rocky Branch Service Area. A static model was recommended because of the nature and lack of availability of monitoring data for this Service Area. The model will consider pipe sizes 10 inches and larger.
   b. Analyze the existing system using the five-year Soil Conservation Service (SCS) Type II, 24-hour design storm for the SSS areas to identify flow restrictions, sanitary sewer overflows (SSOs), and basement backup cases.
   c. Perform similar analyses for forecast years 2025 and 2035. Models will incorporate projected population growth as well as developed areas within the specific service areas.
3. Pump Stations Condition Assessment:
   a. Perform a condition assessment of the wastewater and flood pump stations within the Service Area.
4. Collection System Needs and Evaluation of Alternatives:
   a. Identify and develop planning level costs for collection system improvement alternatives based on the results of the analysis of the current, 2025, and 2035 systems.
   b. Rank alternatives in consultation with the city and identify a recommended improvement plan.
   c. Estimate costs for any changes to OCP-planned SSO control measures brought on by this analysis.
5. Treatment Plant Flow, Loadings, and Condition Assessment:

a. Develop current wastewater treatment plant flow and loadings.
b. Use population projections and other available and appropriate development information to project future flow and loadings for the 2025 and 2035 projection dates.
c. Assess the treatment capacity of the wastewater treatment facilities under current permit conditions based on current operations records, discussions with staff, field observations, other recent investigations, and a comparison to applicable standards and criteria.
d. Assess the current condition of the wastewater treatment facilities based on a field inspection of the process, mechanical, electrical, architectural, and structural elements, evaluation of vibration testing data of key assets, review of Hansen work order records, and a discussion with operating staff familiar with the facility. Identify areas suffering from corrosion issues due to exposure to corrosive environments.

6. Treatment Plant Needs Identification and Evaluation of Alternatives:
   a. Project the capability of the treatment facilities to accommodate future flows and loadings and projected future permit requirements as established in Technical Memorandum 3.
   b. Identify needs at the treatment facilities to meet future flows, loadings, and permit requirements.
   c. Identify a long list of alternatives to address the identified needs.
   d. Perform a workshop to reduce the long list to a short list of preferred alternatives.
   e. Perform a detailed analysis of the short list options based, in part, on the Decision Making Process as described in Technical Memorandum 2.
   f. Review treatment plant operations and provide recommendations, where appropriate, for cost savings and performance improvement measures.
7. Service Area Improvements Plan:
   a. Conduct a workshop with WSD to develop a Service Area Improvements Plan, where the results of the short-listed alternatives are discussed, and a final consensus on the recommended plan and scheduling is made based on priority ratings.
8. Prepare a Final Technical Memorandum summarizing the findings, conclusions, and outcomes of these activities.

7.1.2 Service Area Description

The Rocky Branch Service Area covers 11 square miles and consists of an area centered on I-435 and U.S. Highway 169. The southern boundary lies just north of MO-152 and the Rocky Branch WWTP lies just north of the northern boundary. The western boundary is generally north of Robinhood Lane and the eastern boundary is approximately at north Agnes Avenue. Figure 7-1 provides the general area included

in the Rocky Branch Service Area. The Rocky Branch WWTP also receives flow from the decommissioned Northland Mobile Home Park WWTP and from the City of Smithville.

Rocky Branch WWTP

ROCKY BRANCH SERVICE AREA

Legend

- STORMWATER PUMP STATION
- WASTEWATER PUMP STATION
- TREATMENT PLANT
- Rocky Branch
- KANSAS CITY, MO
- WATERSHED

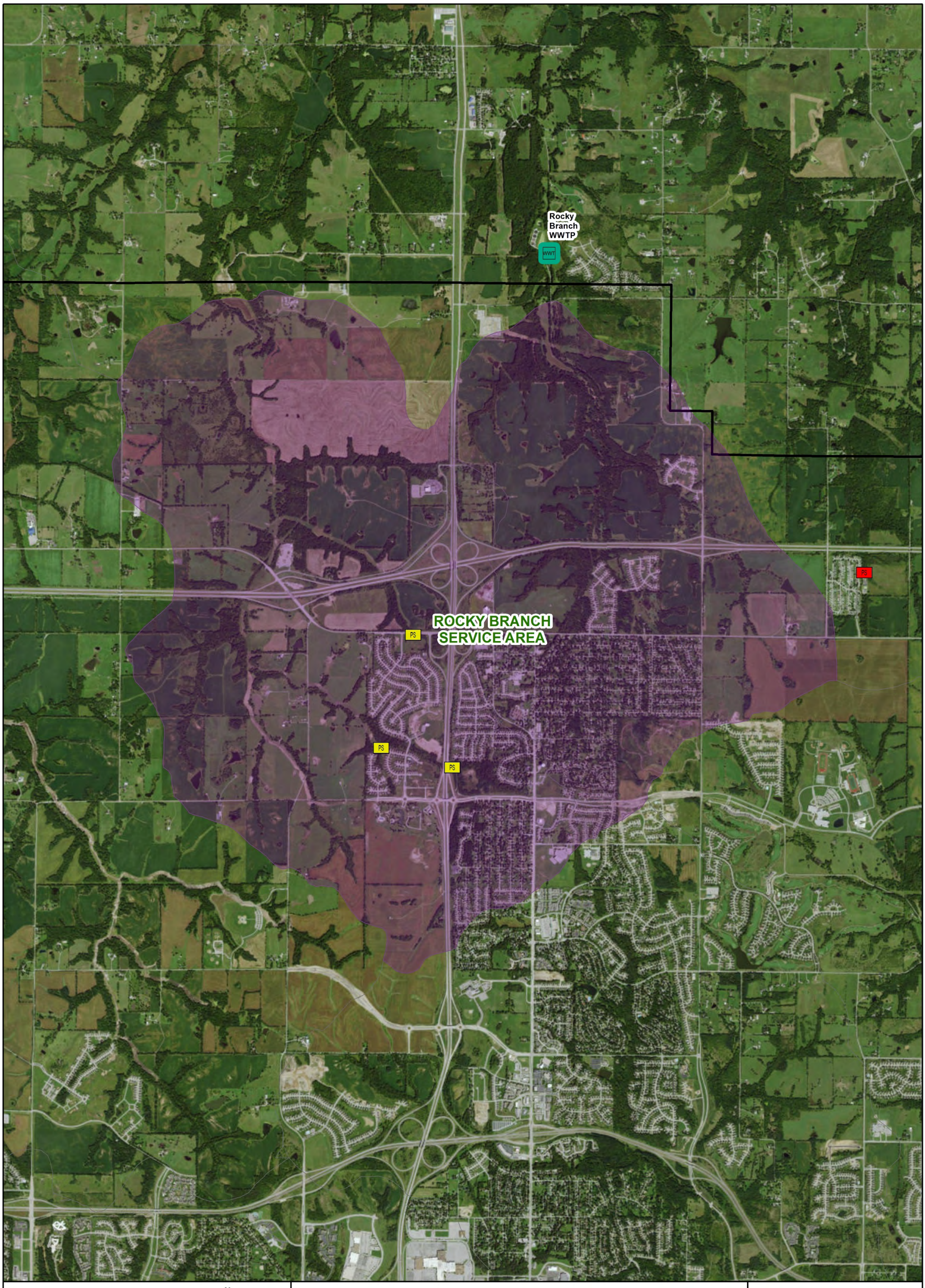
N

0 0.1 0.2 0.4 0.6 0.8 1 Mile

KC WATER SERVICES

BURNS McDONNELL

FIGURE 7-1
ROCKY BRANCH SERVICE AREA



Legend

- PS — STORMWATER PUMP STATION
- PS — WASTEWATER PUMP STATION
- WWT — TREATMENT PLANT
- Rocky Branch
- KANSAS CITY, MO
- WATERSHED

N

0 0.1 0.2 0.4 0.6 0.8 1 Mile

KC WATER SERVICES

BURNS McDONNELL

FIGURE 7-2
ROCKY BRANCH SERVICE AREA

7.2 GROWTH FORECASTS

This chapter includes a review and projection of the service area population. The WWMP scope included the consideration of the Water Master Plan forecasts as a basis for the WWMP projection. Ultimately, several sources of data were used in conjunction with direction from the WSD. The following sections provide a summary of the evaluation system wide and values specific for the Rocky Branch Service Area.

7.2.1 Forecasted Conditions

The development of population forecasts considered forecasts developed in previous studies including:

- "Task 300: Water Demand Forecast Memorandum," Black & Veatch, May 2013
- United States Census Data, 2010
- Growth projections developed by the Mid-America Regional Council
- "Wastewater Master Plan, Phase I," Bucher, Willis & Ratliff, April 2005
- Service Area Population Projections, Forecast Development Memo, September 4, 2014 Kansas City, Missouri, Overflow Control Program

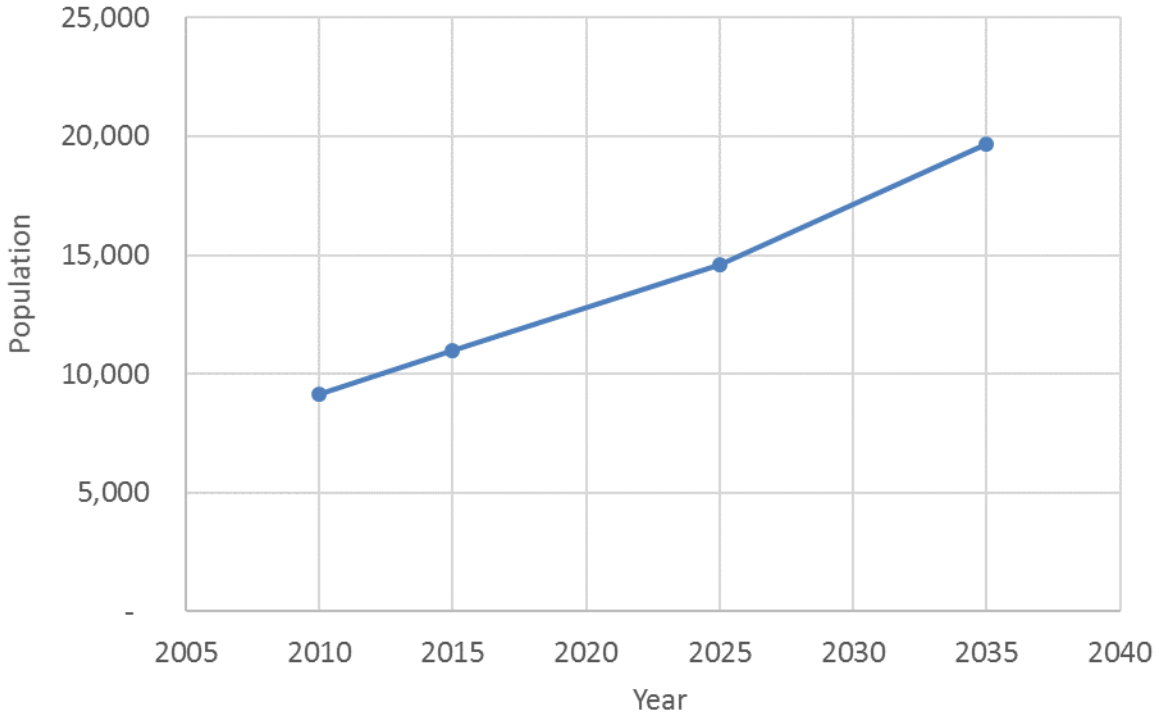
As a result of a review of these projections and extensive discussions with WSD, the population forecast for the WWMP planning area in aggregate will match forecasts developed earlier by OCP which generally follows the forecast developed by the 2005 Phase I Wastewater Master Plan. Within the three northern (Todd Creek, Rocky Branch and Fishing River) service areas, however, their aggregate population forecast will utilize the forecast developed for those same areas by MARC. This approach better reflects the higher growth rates expected to occur within the three northern service areas through the WWMP planning period.

Table 7-1 and Figure 7-3 provide the forecasted population for the Rocky Branch Service Area based on the approach described in this section.

Table 7-1: Population Forecast for Rocky Branch Service Area

Year	Population
2010	9,140
2015	10,960
2025	14,610
2035	19,670

Figure 7-3: Population Forecast for Rocky Branch Service Area



7.3 TREATMENT PLANT FLOWS AND LOADINGS

This chapter includes a description of the analytical approach used to evaluate operating data and develop current and future wastewater flow and pollutant loading rates. Average day, maximum month, maximum day, and peak flows were developed using available WWTP operating records and flow metering data from 2011 through June 2014. Average day, maximum month, and maximum day pollutant loading rates were developed using available WWTP operating records for the same period. Future forecasts of flow and pollutant loadings for 2025, 2030, and 2035 were developed in consultation with WSD. The information provided within this document was used in the development of capital improvement plan (CIP) documents and financial plans provided in Technical Memorandum No. 18 of the WWMP, unless other parameters are explicitly stated.

7.3.1 Approach to Statistical Analysis

This section establishes the methodology used in the analysis of existing operating data. Wastewater flow and pollutant loading rates were developed using operating data from 2011 through June 2014. Daily flow data were analyzed to develop average day, maximum month, maximum day, and peak-hour flow rates; and pollutant data were analyzed to develop average day, maximum month, and maximum day loading rates. Pollutants of interest included total suspended solids (TSS), five-day biochemical oxygen demand (BOD_5), total ammonia nitrogen (TAN), and total phosphorus (TP). At Rocky Branch WWTP, flow is measured every normal business day, while TSS, BOD_5, TAN, and orthophosphate are measured one to four times weekly.

Average day, maximum month, maximum day, and peak (flow only) values were developed for each parameter using the processes outlined in the following sections. Mass loading rates were determined using the following general equation:

$$\dot{M} = Q * C * F$$

where: $\dot{M}$ = mass loading rate, lbs/day
Q = flow rate, MGD
C = pollutant concentration, mg/L
F = 8.34, conversion factor

For all analyses, the median (50th percentile) of the data set was used to report the average day flow or loading. The maximum month condition was determined by developing a continuous set of data consisting of running 30-day medians, and then identifying the largest value of that group. Maximum day

loading for all analyses were determined using the 99.7 percentile (equivalent to 364/365) of the entire data set. The maximum flow value reported in the data set was used to represent the peak condition. The statistical analyses used for determining flow and loading parameters are summarized in Table 7-2.

Table 7-2: Statistical Analyses Used for Determining Flow and Loading Conditions

Parameter	Flow	Pollutant Loadings[a]
Average Day	Median (50 Percentile)	Median (50 Percentile)
Maximum Month	30-d Running Median	30-d Running Median
Maximum Day	99.7 Percentile	99.7 Percentile
Peak	Maximum Value	-

Notes:
a Pollutant data sets were trimmed to remove outliers (see Section 7.3.3).

7.3.1.1 Influent Flow

Raw influent wastewater flow is recorded daily, and the resulting data set did not appear to have significant outliers (Figure 7-4). Average day, maximum month, maximum day, and peak-hour flow rates were calculated using the entire data set.

7.3.1.2 Raw Influent TSS and BOD_5

Mass loading rates were developed for each day raw influent TSS and BOD_5 were sampled. The resulting data sets for TSS and BOD_5 had high maximum month and maximum day loadings because of the presence of outliers. The outliers could have resulted from a number of sources, including atypical slugs of solids/organic material, the sampling location within the influent pipe, and errors in data collection or transcription. After consultation with WSD, the data were trimmed by removing any daily loading data points that exceeded the average of all loadings plus three standard deviations (Avg + 3SD). The revised data sets were used to develop average day, maximum month, and maximum day loadings for TSS and BOD_5.

7.3.1.3 Influent TAN and TP

Total ammonia nitrogen (TAN) and total phosphorus (TP) are monitored one to four times weekly at Rocky Branch WWTP. Following a similar process as described in Section 7.3.1, the TAN and TP data were trimmed to remove outliers exceeding the average plus three standard deviations.

7.3.2 Treatment Plant Flow Analysis

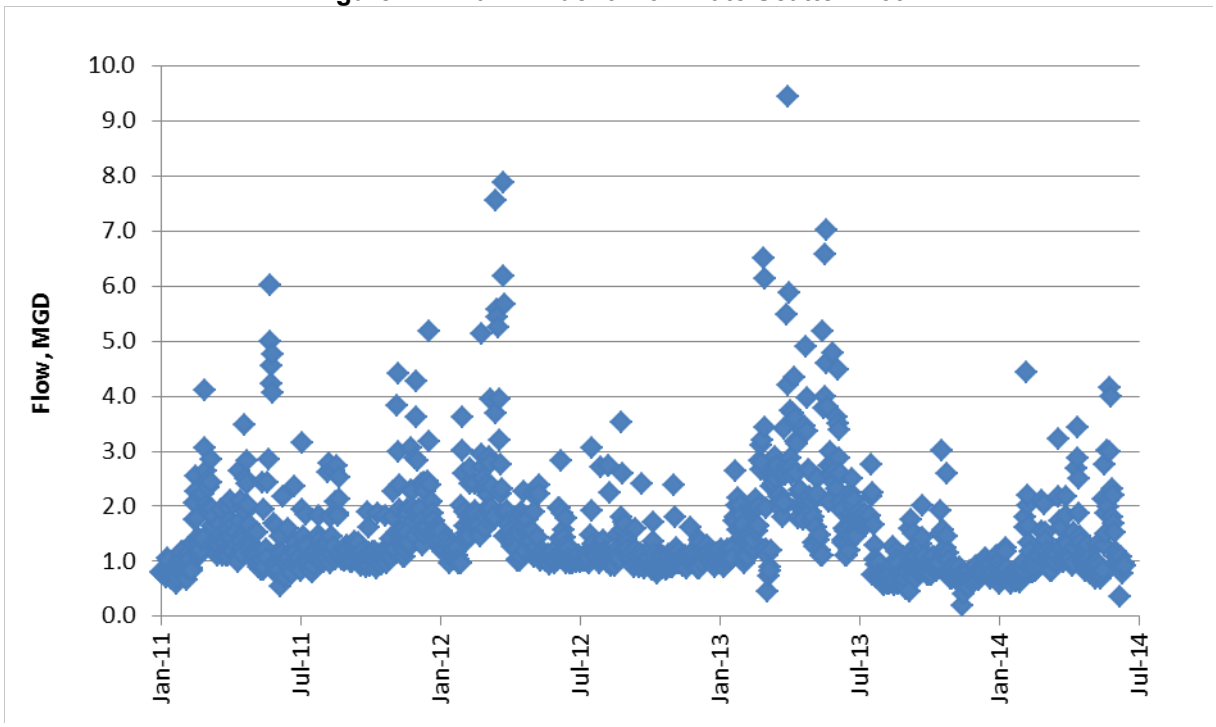
This section provides the results from the analysis of flow data based on the approach described in Section 7.3.1. Rocky Branch WWTP influent wastewater flows from 2011 through June 2014 were

analyzed to determine average day, maximum month, maximum day, and peak flows. Growth forecasts were developed for the Rocky Branch Service Area as described in Section 7.2, and future wastewater flows were forecasted on a per capita basis, based on current per capita flow.

7.3.2.1 Existing Flows

Influent flow metering data for the Rocky Branch WWTP was reviewed from 2011 through May 2014 to determine average, peak, and maximum flow conditions. The data is presented in a scatter plot in Figure 7-4.

Figure 7-4: Raw Influent Flow Rate Scatter Plot



The raw data does not appear to contain outliers and operations staff was confident in the metering devices at the plant. Statistical analyses were performed on the data to determine the following flow parameters: average day, maximum month, maximum day, and peak.

These values are typically used as the basis of design for various solids and liquid processes. Biological processes and tankage are commonly designed for average day or maximum month flow, whereas pumping systems, headworks, and disinfection processes are sized for peak flow to avoid flooding of upstream processes, mechanical issues, and solids breakthrough. Table 7-3 provides a summary of the calculated flow parameters and associated peaking factors. Rocky Branch WWTP does not have provisions for tracking hourly flow rate and the reported peak flow is the maximum daily flow recorded from 2011 through June 2014.

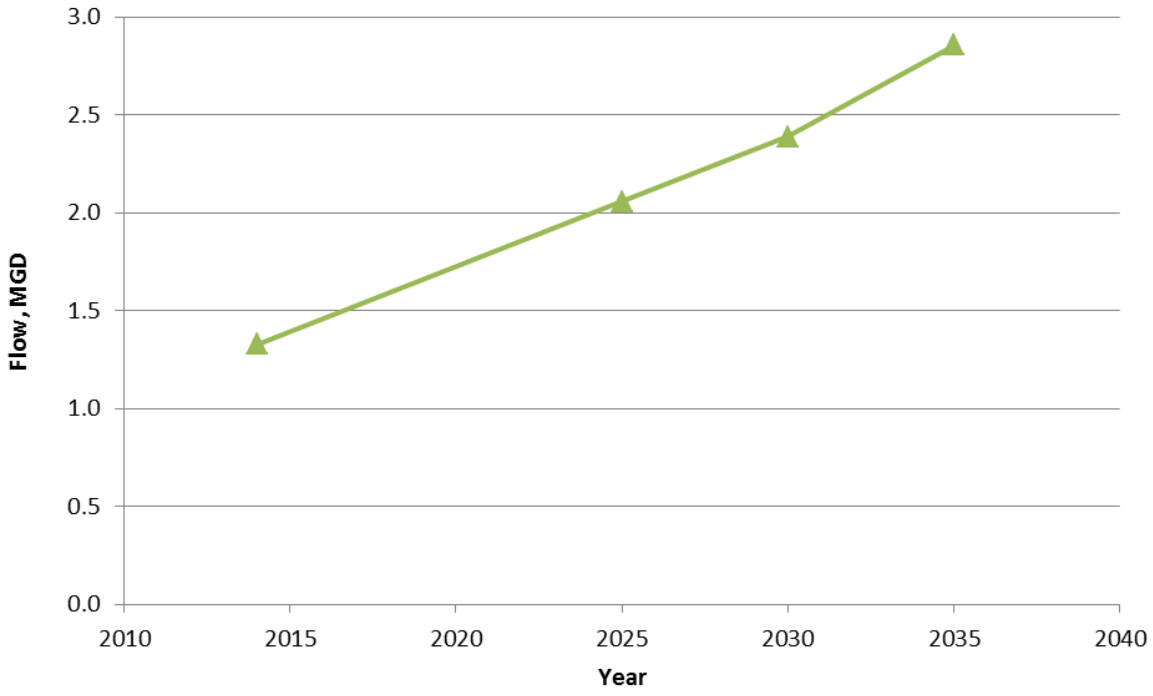
Table 7-3: Current Rocky Branch WWTP Influent Flow

Parameter	Flow (MGD)	Peaking Factor
Average Day (median)	1.3	1.0
Arithmetic Mean	1.5	-
Maximum Month	3.3	2.5
Maximum Day	6.8	5.2
Peak	9.4	7.2

7.3.2.2 Forecasted Flows

As shown in Figure 7-5, average day forecasted flows were calculated based upon population forecasts (developed in Section 7.2) using the current per capita flow rate. Increases in average daily flow are based on a flow of 145 gallons per capita per day, which was determined using average day flow and the 2010 service population.

Figure 7-5: Average Day Flow Projections for Rocky Branch WWTP



The maximum month and maximum day flows were determined using the same per capita scaling ratio as the average-day flow projections, as shown in Table 7-4. Rocky Branch WWTP receives a large amount of inflow and infiltration (I/I) during dry and wet weather events, which is reflected in the large per capita flow and peaking factor for peak flows. After reviewing influent flow data and rainfall events, WSD

approved the use of a 4 MGD I/I contribution that would stay constant throughout the forecast period. For the peak flow forecast, 4 MGD was removed from the current peak flow and the dry weather peak flow was then forecast based on population growth. After producing the dry weather peak flow forecast, the 4 MGD I/I contribution was added to the dry weather forecast to produce the design peak flow projection.

Table 7-4: Flow Projections for Rocky Branch WWTP

Parameter	Flow, MGD			
	2010	2025	2030	2035
Average Day	1.3	2.1	2.4	2.9
Max Month	3.3	5.4	6.0	7.2
Max Day	6.8	10.9	12.2	14.6
Peak	9.4	12.4	13.8	15.7

7.3.3 Treatment Plant Pollutant Loading Analysis

This section provides the results from the analysis of loading data based on the approach described in Section 7.3.1. Rocky Branch WWTP influent wastewater loadings were analyzed from 2011 through June 2014 to determine average day, maximum month, and maximum day loading. Growth forecasts were developed for the Rocky Branch Service Area as outlined in Section 7.2, and future influent wastewater loadings were forecasted on a per capita basis based on those forecasts.

7.3.3.1 Existing Pollutant Loadings

Wastewater quality data from the Rocky Branch WWTP were reviewed from 2011 through June 2014 to determine average day, maximum month, and maximum day loading conditions for various pollutants, including TSS, BOD_5, TAN, and TP. Daily loadings were calculated by combining daily flow and daily pollutant concentrations to produce a pounds-per-day (lbs/d) value. The wastewater quality data was reviewed for outliers considered to be well above what would be expected under maximum loading conditions, as described in Section 7.3.1. With concurrence from WSD staff, all TSS, BOD_5, TAN, and TP loading data points that exceeded the average plus three standard deviations were trimmed to prevent these values from skewing the analysis. Data trimming resulted in the omission of 1.5% of TSS loading data points, 1.9% of BOD_5 loading data points, 0.4% of TAN loading data points and 1.9% of TP loading data points. Scatter plots for TSS, BOD_5, TAN, and TP are presented in Figure 7-6, Figure 7-7, Figure 7-8, and Figure 7-9 respectively.

Figure 7-6: Influent TSS Loading Scatter Plot with Data Trimming Cutoff

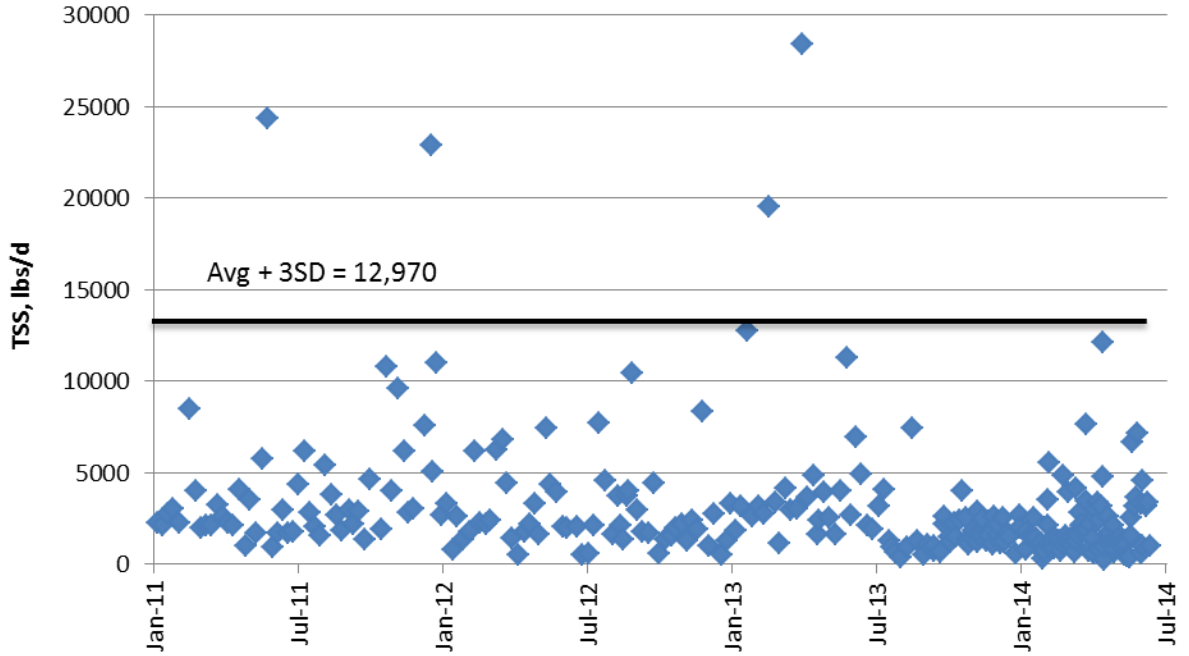


Figure 7-7: Influent BOD_5 Loading Scatter Plot with Data Trimming Cutoff

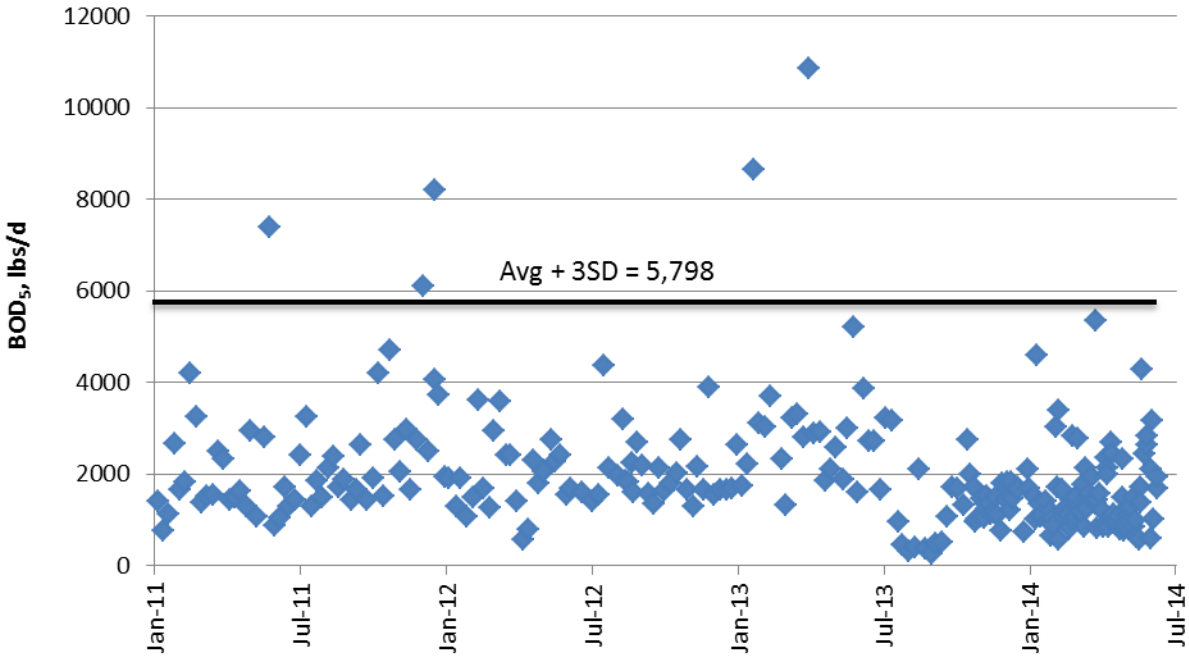


Figure 7-8: Influent TAN Loading Scatter Plot with Data Trimming Cutoff

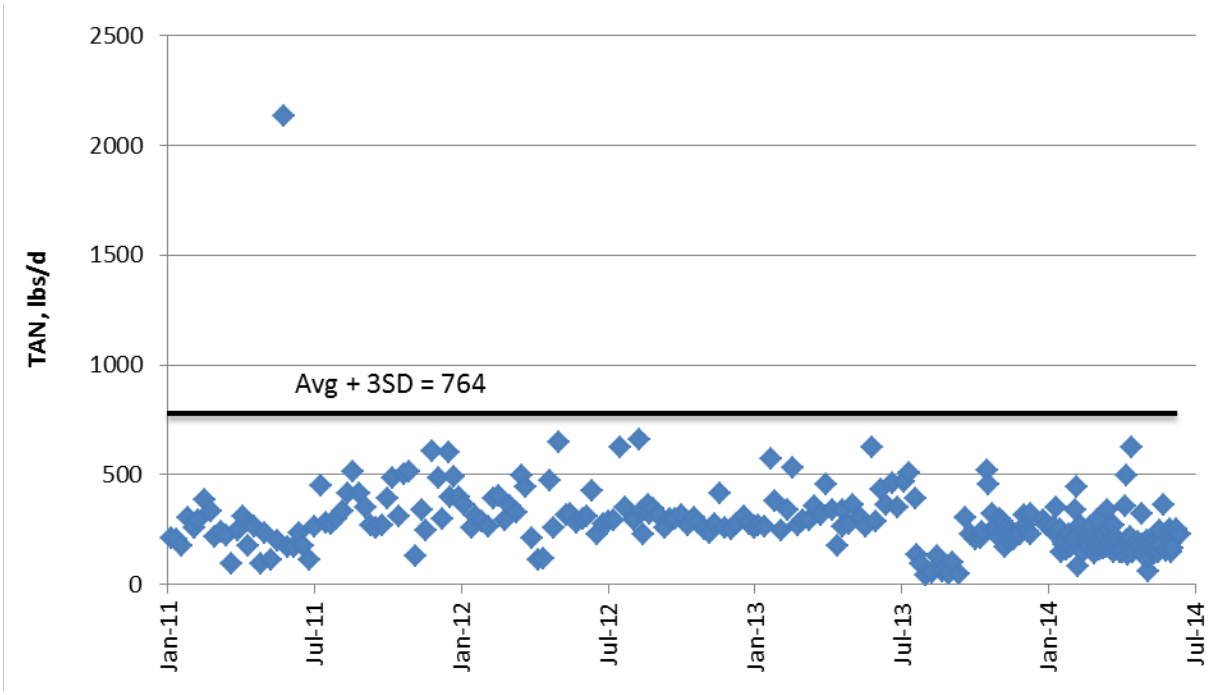
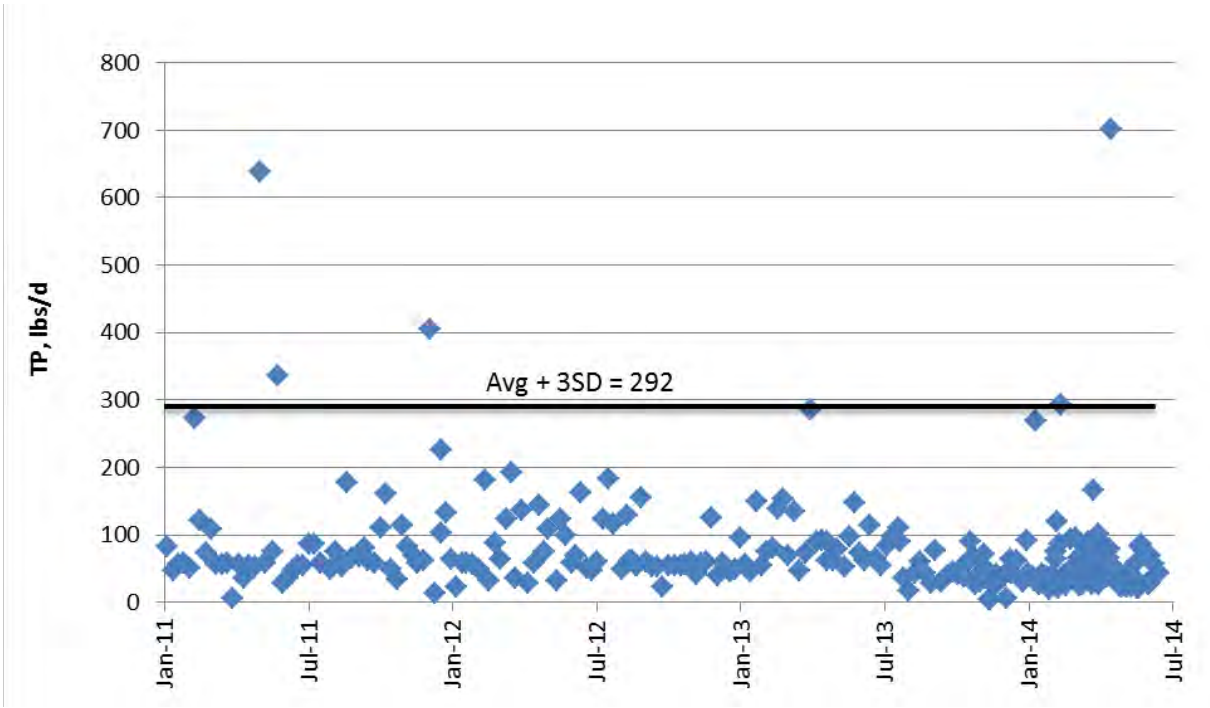


Figure 7-9: Influent TP Loading Scatter Plot with Data Trimming Cutoff



Statistical analyses were performed on the pollutant loading data to produce average day, maximum month, and maximum day values, which are presented in Table 7-5. The peaking factors associated with maximum month and maximum day loadings are higher than typical domestic wastewater treatment facilities, as reported in *WEF Manual of Practice No. 8, Vol. 1* (WEF, 2010, p. 3-25).

Table 7-5: Rocky Branch Current WWTP Influent Loadings

Parameter	Loading, lbs/d	Peaking Factor	Typical Peaking Factor[a]
TSS			
- Average Day	2,020	-	-
- Maximum Month	7,880	3.90	1.37
- Maximum Day	12,260	6.07	1.78
BOD_5			
- Average Day	1,650	-	-
- Maximum Month	3,730	2.26	1.36
- Maximum Day	5,250	3.18	1.60
TAN			
- Average Day	260	-	-
- Maximum Month	540	2.08	1.34
- Maximum Day	650	2.50	1.46
TP			
- Average Day	55	-	-
- Maximum Month	140	2.48	1.14
- Maximum Day	280	5.02	1.26

Notes:
a Reported in WEF Manual of Practice No. 8 (MOP 8) based on influent flow for WWTPs with separate sewer systems.

The reported sampling practices and autosampler locations should be reviewed to assure the operating data are representative of typical wastewater entering the Rocky Branch WWTP. For conceptual sizing and pricing of major process upgrades and improvements, the use of a maximum month pollutant loading peaking factor of 1.5 was approved by WSD, unless the observed peaking factor was less than 1.5. This assumption can be revisited after the sampling practices and autosampler location have been reviewed and an extended period of new data has been collected. This exercise should be completed prior to commencing design phase services (DPS) for any major treatment plant upgrade.

The average day TSS and BOD_5 loadings in Table 7-5 were compared to design standards for WWTP capacity in *Ten States Standards*, which specifies design be based upon at least 0.20 lbs of TSS per capita

per day, and 0.17 lbs of BOD_5 per capita per day (Great Lakes 2004, Section 11.253). Based on a service population of 9,140, the *Ten States Standards* design TSS and BOD_5 loadings for Rocky Branch WWTP are 1,830 lbs/d and 1,550 lbs/d, respectively. The TSS loading determined with actual operating data is approximately 10 percent higher than the *Ten States Standards* guidelines, and the BOD_5 loading based on actual operating data is 6% higher than the *Ten States Standards* guidelines.

7.3.3.2 Forecasted Pollutant Loadings

Forecasted pollutant loadings were developed for the Rocky Branch Service Area by scaling the present pollutant loadings proportionally on a per capita basis, based on the anticipated change in service population. Refer to Section 7.2 for service area growth forecasts. Pollutant loadings and forecasts for TSS, BOD_5, TAN, and TP are summarized in Table 7-6. These forecasts incorporate the 1.5 maximum month peaking factor for TSS, BOD_5, TAN and TP, as agreed upon through discussions with the WSD.

Table 7-6: Rocky Branch Current and Forecasted Pollutant Loadings

Parameter	Pollutant Loading, lbs/d			
	2010	2025	2030	2035
TSS				
- Average Day	2,020	3,230	3,640	4,360
- Maximum Month	3,030	4,850	5,460	6,530
- Maximum Day	12,260	19,600	22,060	26,410
BOD_5				
- Average Day	1,650	2,630	2,960	3,550
- Maximum Month	2,480	3,950	4,440	5,310
- Maximum Day	5,250	8,400	9,450	11,310
TAN				
- Average Day	260	410	460	550
- Maximum Month	390	620	690	830
- Maximum Day	650	1,040	1,170	1,400
TP				
- Average Day	55	90	100	120
- Maximum Month	85	140	150	180
- Maximum Day	280	450	500	600

Notes:

a Total Kjeldahl nitrogen (TKN) loading forecasts are provided in Section 7.6.

7.4 WWTP CAPACITY AND CONDITION ASSESSMENT

This chapter includes an assessment of the existing Rocky Branch WWTP capacity and performance capabilities based on meeting current WWTP operating permit limits. Assessments of the estimated flow and pollutant loading capacities for each WWTP unit process are included. The assessments are based on a comparison of the existing WWTP design with applicable design standards and criteria, and on actual WWTP performance history to the extent permitted by available WWTP operating data. The peak flow hydraulic capacities of the existing WWTP processes and piping systems are also included. The capacity of the WWTP to comply with future permit conditions is addressed in Section 7.6.

This chapter also includes a condition assessment and summary of architectural, structural, process, mechanical and electrical inspections of the existing WWTP facilities, including support systems. The purpose of the inspections was to identify deficiencies, including aged or worn structures or equipment requiring repair to maintain the long-term integrity and reliability of the WWTP, and to determine if facilities conform to current design standards, regulations and codes.

Space needs for WWTP support facilities including office, laboratory, and maintenance functions were also assessed. Facilities and building spaces exposed to corrosive environments that compromise their long-term integrity and reliability were identified.

7.4.1 Rocky Branch WWTP Description and Capacity

The Rocky Branch WWTP is a conventional activated sludge treatment plant located north of the city in Clay County. The original plant was constructed in 1974 and consisted of a steel tank contact stabilization activated sludge package plant, including chlorination of effluent and aerobic digestion of sludge. Two earthen lagoons were constructed for effluent polishing prior to discharge. In 2006-2007, the treatment plant underwent a capacity upgrade, including new headworks facilities and conversion of the secondary treatment process to extended aeration. The headworks upgrades consist of a new influent pump station, influent screens, and grit removal facilities. Secondary treatment upgrades included new aeration basins and secondary clarifiers. A portion of the primary lagoon was filled for construction of the new aeration basins and clarifiers and the remaining lagoon volume was converted to peak flow storage basins. Ultraviolet (UV) disinfection was added in 2010. Plant design flow was re-rated from 2 MGD to 2.8 MGD average in spring 2011 as indicated in the Missouri State Operating Permit (Appendix A). The Missouri Operating Permit (effective March 5, 2012) reported actual flow of 1.57 MGD. The Rocky Branch WWTP receives domestic wastewater from Rocky Branch and First Creek Watersheds on the northern side of the city.

The 30-inch plant influent discharges to a trash basket for collection of large solids at the Influent Pump Station. Peak flow is diverted by gravity to the primary and secondary lagoons during high wet well levels. Stored wastewater at and above the low water level of the Primary Lagoon can flow by gravity to the Influent Pump Station wet well for treatment. Four submersible pumps in a deep wet well pump the raw sewage to the Headworks Building for processing through a mechanical step screen, or manually cleaned bar screen during maintenance outages. A vortex grit collector and classifier remove inorganic solids. The effluent flows by gravity to the Aeration Basin Splitter Box to the two aeration basins, then the Secondary Clarifier Splitter Box to two secondary clarifiers. Effluent from the secondary treatment process flows by gravity to the UV Disinfection Building, then to a Parshall flume for flow measurement. Final effluent is re-aerated by a cascade aeration structure prior to discharge through the Plant Outfall to Rocky Branch Creek. The plant outfall consists of a 42-inch gravity flow ductile iron pipe that terminates at an outfall structure at the Rocky Branch Creek. Plant effluent flow is measured by an ultrasonic flow transmitter located in the parshall flume.

Solids processing facilities consist of an aerobic sludge digestion basin (converted steel tank), which receives waste activated sludge (WAS) from two constant-speed submersible WAS pumps. Flow is monitored by one magnetic in-line WAS flow meter. There are two sludge holding basin blowers located in the Sludge Process Building. Air is collected from the headspace of the sludge holding basin, influent pump station, and headworks, and treated using a wood-chip biofilter. One sludge-loading pump conveys solids from the sludge-holding basin to the sludge-loading pad, which is transported by truck to Birmingham Land Farm Lagoons for disposal by land application.

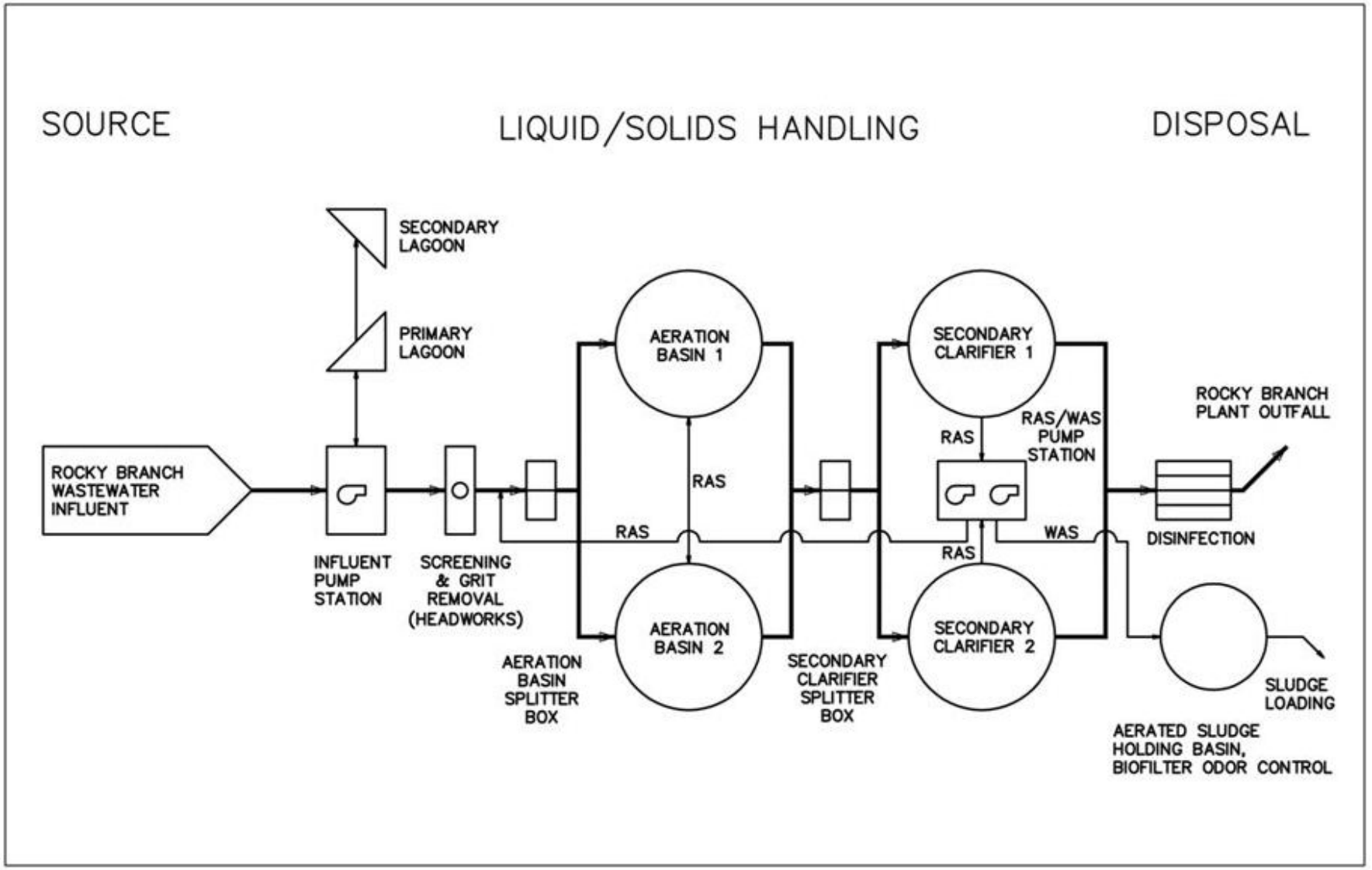
For an aerial view of the entire plant and process flow diagram, see Figure 7-10 and Figure 7-11, respectively.

Assessments of the Rocky Branch WWTP process unit capacities were performed by comparing existing WWTP configuration with design standards and criteria, and on actual WWTP performance history where operating data was available. Each process unit was analyzed on an individual basis, using primarily *Ten States Standards* (Great Lakes, 2004), Missouri Department of Natural Resources Design Standards (MDNR. 2012), and Metcalf & Eddy *Wastewater Engineering* (Metcalf & Eddy, 2014).

Figure 7-10: Rocky Branch WWTP Aerial Photograph

Image Courtesy of Google

Figure 7-11: Rocky Branch WWTP Process Flow Diagram



7.4.1.1 Influent Pumps

From the influent channel of the Influent Pump Station, wastewater is pumped to the Headworks Building with four submersible pumps controlled by variable frequency drives (VFDs). The pumps operate based on wet well liquid level which is measured by an ultrasonic control transducer. Each pump is rated at 2,130 gpm. Four pumps (three duty, one standby) provide a firm capacity of 9.2 MGD. The level in the wet well is measured by two (one primary and one backup) ultrasonic pump level control transducers. High and low float instruments are also included in the wet well. The flow leaving the influent pump station is measured by an in-line magnetic flow transmitter located in a manhole downstream of the influent valve vault.

7.4.1.2 Screens

Screening of the wastewater is achieved with one step screen and one manually cleaned bypass bar rack located in the Headworks Building. Slide gates provide isolation of the channels of each screen. The manually cleaned bar rack bars are 2.25-inch wide with 1.75-inch spacing on centers. The step screen has 0.5-inch openings and discharges to a washer/compactor. The step screen is planned to be replaced in 2017.

Each channel has a pair of upstream and downstream isolation gates. A single ultrasonic sensor measures high water level upstream of the isolation gates. An ultrasonic instrument measures the water level on the upstream side of the manual screen, and an ultrasonic instrument measures the water level on the upstream side of the step screen. An ultrasonic monitoring instrument is also located on the downstream side of the step screen to control screen operation.

The peak flow capacity of the fine screens is 9.2 MGD. Based on a recommended channel velocity of 2 feet per second (fps), the capacity of the manually cleaned bypass bar rack is approximately 10 MGD.

7.4.1.3 Grit Removal

Grit Removal at the Rocky Branch WWTP is achieved through one 360-degree circular vortex grit basin. The concrete basin is 11 feet in diameter and has an operating water level of 9 feet-10 inches. Design peak flow provided from the manufacturer (Kusters Water/Waste Tech) is 10 MGD. One vertical, end suction centrifugal grit pump draws suction from the bottom of the grit chamber and discharges to a conical grit concentrator. One inclined dewatering screw grit classifier was installed.

Design peak flow of the grit chamber is 10 MGD. *Ten States Standards* does not have design criteria for Vortex type grit chambers, which are typically designed based on the grit particle size to be removed (0.5 mm = 100 mesh) at maximum specific gravity of 2.5. The range of flow to achieve grit removal is

based on a minimum inlet velocity of 0.5 feet per second (fps), an ideal maximum inlet velocity of 3 fps, and absolute maximum inlet velocity of 3.5 fps. Table 7-7 displays the values.

Table 7-7: Grit Removal Design Criteria

Parameter	Value
Minimum Flow Based on Minimum Inlet Velocity of 0.5 fps, MGD	1.7
Ideal Maximum Flow Based on Maximum Inlet Velocity of 3 fps, MGD	10.0
Absolute Maximum Flow Based on Maximum Inlet Velocity of 3.5 fps, MGD	11.7

The grit pump is rated at 350 gpm. The inclined dewatering screw grit classifier provided is rated at a grit slurry capacity of 200 to 500 gpm and a peak of 600 gpm.

7.4.1.4 Aeration Basins

Grit Chamber effluent flows by gravity to the Aeration Basin Splitter Box and is split evenly to two identical aeration basins. The aeration basins function as a complete nitrification secondary treatment system. The basin dimensions are 100 feet diameter and 17.2 feet side water depth. Each basin has a volume of 134,700 cubic feet, or 1.0 million gallons. Aeration is achieved with five positive displacement blowers (four duty, one standby) located in the Blower Building, each rated to supply 835 scfm. The blower are manifolded to allow two blowers to be dedicated to each basin, with a redundant blower that can be used to supply air to either basin. Each aeration basin contains a set of five fine bubble diffusers positioned radially. The diffuser assemblies do not extend to the center of the basins and floating mixers are located in the center of each basin to ensure good mixing. Airflow is measured by an in-line air flow meter at each basin. Dissolved oxygen levels are monitored by two dissolved oxygen sensors located within each basin. Effluent from the aeration basins is discharged over an effluent weir to the Secondary Clarifiers Splitter Box for distribution to two secondary clarifiers. A summary of biological treatment system information is provided in Table 7-8.

Table 7-8: Aeration Basin Information

Parameter	Value
Number of Basins	2
Diameter, ft	100
Normal Water Depth, ft	17.2
Total Volume, MG	2.0
Diffuser Type	Fine-Bubble EPDM, Tube Type
Firm Blower Capacity, scfm	3,340

The design standards for complete nitrification activated sludge systems listed in Table 7-9 were used to evaluate the capacity of the existing aeration basins. The most critical design criterion for biological treatment basin sizing is design solids retention time (SRT).

Table 7-9: Activated Sludge Design Criteria

Parameter	Value		Basis
	Minimum	Maximum	
SRT for Complete Nitrification, d	3	15	*Metcalf & Eddy*[a]
MLSS, mg/L	1,500	4,000	*Metcalf & Eddy*[a]
BOD_5 Removal Oxygen Requirement (lbs O_2/lb peak BOD_5)	1.1		*Ten States Standards*[b]
Nitrification Removal Oxygen Requirement (lbs O_2/lb peak TKN)	4.6		*Ten States Standards*[b]
RAS Recycle Rate (percent of Average Day Flow)	50	150	*Ten States Standards*[b] and *MDNR 10 CSR 20-8.180*[c]
F/M Ratio, lbs BOD_5/lb MLVSS-d	0.05	0.10	*Ten States Standards*[b]

Notes:
a Metcalf & Eddy 2014, p. 793, Table 8-19 for Complete Mix activated sludge processes.
b Great Lakes 2004, Chapter 90
c MDNR 2012, p. 59

An analysis of maximum month aeration basin capacity (Table 7-10) considered two scenarios: flow capacity based on operating the aeration basins with a maximum recommended mixed liquor suspended solids (MLSS) of 4,000 mg/L, and flow capacity based on required conditions to meet the design capacity as stated in the National Pollutant Discharge Elimination System (NPDES) permit (2.8 MGD). Based on minimum wastewater temperature and permit requirements for effluent TAN (1.4 mg/L), a design SRT of 8 days was selected for the analysis, which includes a 1.5 safety factor. An MLSS of 4,000 mg/L is typically the upper limit for complete-mix activated sludge systems, unless field conditions have shown the ability to maintain a higher concentration at design flow and loading capacity. The design conditions consider a maximum month loading and average day flow condition. The existing 2.0 MG of aeration basin volume are sufficient for treating approximately 4.0 MGD of average day flow, assuming an 8-day SRT and 4,000 mg/L MLSS. The plant currently operates with an average day flow of 1.3 MGD, but is permitted for 2.8 MGD of influent wastewater flow, and appears to be sized for sustaining adequate performance during a maximum month loading condition at the permitted influent flow condition based on the assumptions provided in this analysis.

Table 7-10: Maximum Month Aeration Basin Capacity Evaluation

Parameter	Maximum MLSS	Permitted Capacity
SRT, d	8	8
Design MLSS, mg/L	4,000	2,800
Maximum Month BOD_5 Loading, lbs/d	7,330	5,130
Maximum Month TKN Loading, lbs/d	1,820	1,270
F/M Ratio, lbs BOD_5/lb MLVSS-d	0.16	0.16
Aeration Basin Design Capacity, MGD	4.0	2.8

Notes:
a Organic loading rate as measured at average day BOD_5 loading

MDNR recommends a return activated sludge (RAS) pump capacity between 50% and 150% of the average WWTP flow. Rocky Branch WWTP uses three RAS pumps (two duty, one standby) with a rated capacity of 1,040 gpm (1.5 MGD) each. The RAS pumps are operated with VFDs. The firm RAS pumping capacity of 3.0 MGD is sufficient for maintaining a 100% RAS recycle rate at the plant design flow of 2.8 MGD.

Aeration is achieved with five (four duty, one standby) positive displacement blowers rated at 835 standard cubic feet per minute (scfm) each. Air distribution is accomplished with retrievable rack–mounted, fine, bubble tube diffusers with EPDM membranes. The firm blower capacity is 3,350 scfm, which corresponds to an oxygen transfer rate of 11,700 lbs/d and peak BOD_5 and total Kjeldahl nitrogen (TKN) loadings of 5,850 lbs/d and 1,160 lbs/d, respectively. Based on the oxygen transfer efficiency estimated in this report, the maximum treatment capacity of the aeration equipment is summarized in Table 7-11. For this analysis, the ratio of flow and loadings were held constant and the flow rate was adjusted until the peak load matched the peak oxygen transfer capacity. Thus, the 1.5 MGD average day condition corresponds with the expected peak loading that can be handled with the installed mechanical aeration capacity.

Table 7-11: Peak Oxygen Transfer Capacity Evaluation

Parameter	Aeration Limited
Installed Peak Aeration Rate, scfm	3,350
Installed Oxygen Transfer Rate, lbs/d	11,700
Peak BOD_5 Loading, lbs/d	5,850
Peak TKN Loading, lbs/d	1,160
Equivalent Average Day Flow, MGD	1.5

7.4.1.5 Secondary Clarifiers

Rocky Branch WWTP has two 100-foot circular secondary clarifiers with weir inboard launders and side water depth of 13.4 feet (from bottom of V-notch weir to inside bottom of wall). *Ten States Standards* and MDNR design standards for the secondary clarifiers are shown in Table 7-12.

Table 7-12: Secondary Clarifier Design Standards

Parameter	Value		Basis
	Minimum	Maximum	
Side Water Depth, ft	12		*Ten States Standards*[a] and *MDNR 10 CSR 20-8.160*[b]
Surface Overflow Rate, gpd/sf		1,000	*Ten States Standards*[a] and *MDNR 10 CSR 20-8.160*[b]
Peak Weir Loading Rate, gpd/lf		30,000	*Ten States Standards*[a]
		15,000	*MDNR 10 CSR 20-8.160*[b]
Peak Solids Loading Rate, lbs/d-sf		35	*Ten States Standards*[a]
		50	*MDNR 10 CSR 20-8.160*[b]

Notes:
a Great Lakes 2004, Chapter 70
b MDNR 2012, p. 50-52

Rocky Branch secondary clarifier capacity based on surface overflow rate (SOR) and weir loading rate (WLR) is shown in Table 7-13. SOR and WLR are calculated using the influent wastewater flow rate and does not include the RAS recycle rate.

Table 7-13: Total Secondary Clarifier Capacity

Parameter	Value
Maximum Day Flow Capacity Based on SOR, MGD total	15.7
Maximum Day Flow Capacity Based on WLR, MGD total	9.0

Based on maximum MDNR standard WLR limit, the two final clarifiers have a capacity of 9.0 MGD, which is more restrictive than the SOR. However, it is generally accepted that WLR can be a very conservative measure of performance and is not as critical to final clarifier performance as SOR. The recommended SOR of 1,000 gpd/sf from *Ten States Standards* limits the Rocky Branch final clarifiers to 15.7 MGD.

Solids loading rate (SLR) typically becomes a more critical design consideration with elevated RAS recycle rates, higher design MLSS concentration, and higher anticipated peak flows. The determination of peak SLR considers the design RAS recycle rate (typically 0.5-1.5 times the average day influent flow

rate), the evaluated MLSS concentration (for average day flow and maximum month loading condition), and the maximum day influent flow anticipated at the secondary treatment system. The final clarification peak-flow capacity has been determined for anticipated operating conditions at the permitted capacity of 2.8 MGD. Table 7-14 provides a summary of final clarifier capacity.

Table 7-14: Final Clarifier Capacity

Parameter	Maximum MLSS	Permitted Capacity
Average Day Flow, MGD	4.0	2.8
Design MLSS, mg/L	4,000	2,800
RAS Recycle Rate, MGD	4.0	2.8
Surface Overflow Rate, gpd/sf	790	1,000
Solids Loading Rate, lbs/d-sf	35.0	27.5
Allowable Peak Influent Flow, MGD	12.4	15.7

7.4.1.6 Average Day Secondary Treatment Capacity

The effective capacity of a secondary treatment system is contingent upon the peak flow rate that can be delivered to the secondary clarifiers, and the design conditions that can be met in the aeration basin that allow effective operation of the secondary clarifiers at the peak flow. The previous analyses considered the aeration basins and secondary clarifiers as separate systems, whereas this analysis considers both system in conjunction to establish the operating conditions adequate to treat anticipated sustained loadings to the treatment plant. The effective capacity of the secondary treatment system is 4.0 MGD average day flow with a peak of 12.4 MGD (Table 7-15). The aeration basin analysis assumes an 8-day SRT and RAS flow rate equal to the average day flow.

Table 7-15: Rocky Branch WWTP Secondary Treatment Capacity

Parameter	Value
Average Day Flow, MGD	4.0
Design MLSS, mg/L	4,000
RAS Recycle Rate, MGD	4.0
Peak Flow, MGD	12.4
Clarifier SOR, gpd/sf	790
Clarifier SLR, lbs/d-sf	35

7.4.1.7 UV Disinfection System

In 2010, a UV disinfection system was installed consisting of two channels, each provided with a manually cleaned bar screen, and three UV lamp modules in series. The channels were designed to accommodate one additional future module. Each lamp module contains 40 lamps, with the entire system containing a total of 240 lamps. Level indicators are located in each UV channel.

The UV modules installed at Rocky Branch WWTP (OZONIA Aquaray 40 HO) have a treatment capacity of 2 MGD per module. Therefore, each channel is able to disinfect up to a peak flow of 6 MGD. The firm capacity of the UV system is 10 MGD, assuming one module is out of service.

Effluent flow from the disinfection system is measured by a parshall flume utilizing an ultrasonic level instrument. Non-potable water (NPW) is pulled from this water just upstream of the flume, and the flowrate from each of the two NPW pumps is measured by a pair of in-line magnetic flow meters. Pressure indicators in the discharge line of each of the process pumps are used to control pump operation.

7.4.1.8 RAS/WAS Pump Station

The RAS/WAS Pump Station serves the secondary clarifiers and consists of three RAS, two WAS and two scum pumps. The RAS pumps are submersible solids handling pumps rated at 1,042 gpm each with a firm capacity (two operating) at 2,084 gpm. The RAS pumps are operated with VFDs and so possess turn-down in the range of 40-60 percent.. The WAS pumps are submersible type (one operating, one standby) rated at 300 gpm. The sludge level in the wet well is measured by an ultrasonic level instrument, backed up with a high- and low-level flow switch. The RAS flow and the WAS flow are each monitored by a separate magnetic flow transmitter located in a manhole downstream of the RAS pumps and the WAS pumps (respectively). A scum pit, located in the RAS/WAS Pump Station, is operated based on an ultrasonic level instrument.

7.4.1.9 Peak Flow Storage

The original effluent polishing lagoons were converted to peak flow storage basins with the 2006-2007 improvements. The storage volumes of the primary and secondary lagoons were calculated from the 2006 as-built drawings of the Rocky Branch WWTP improvements. The approximate total storage volume of the primary lagoon was calculated to be 4.5 million gallons and the secondary lagoon was calculated to be 1.6 million gallons. Therefore, the total available storage volume available at the plant is approximately 6.1 million gallons.

The primary lagoon has one foot of freeboard at the overflow to the secondary lagoon, which has two feet of freeboard.

7.4.1.10 Summary of Plant Capacity

The hydraulic limitations of interconnecting pipe segments were analyzed between all processes at Rocky Branch WWTP. The analysis was conducted by selecting limiting upstream and downstream water surface elevations for each piping or conduit segment and determining the maximum flow (by gravity). The summary of plant capacity presents the hydraulic capacity of piping segments, and the capacity of major unit processes based on either hydraulic or process limits, as applicable (Table 7-16).

Table 7-16: Rocky Branch WWTP Summary of Plant Capacity

Process/Piping System	Capacity, MGD	Basis
Influent Pumps (3 Duty, 1 Standby)	9.2	Pump Capacity
Fine Screen	9.2[a]	Channel Velocity
Grit Basins	11.7	Inlet Velocity
Piping System: Grit Basins to Aeration Basins	13.9	Hydraulic
Aeration Basins	4.0[b]	SRT and Maximum MLSS
Aeration Blowers	1.5[c]	Oxygen Transfer @ Peak Organic Loading
Piping System: Aeration Basins to Final Clarification	35.1	Hydraulic
Final Clarification	15.7[d]	Solids Loading Rate
Piping System: Final Clarification to UV Disinfection	125	Hydraulic
UV Disinfection	10.0	Manufacturer Rating
Piping System: UV Disinfection to Rocky Branch Creek	55.6	Hydraulic

Notes:

a Headworks capacity based on fine screen in service. Temporary capacity with fine screen out of service and manual bar screen in service is approximately 10 MGD.

b Aeration basin capacity based on 8-day SRT and maximum MLSS of 4,000 mg/L during a maximum month pollutant loading condition.

c Aeration blower capacity based on peak day pollutant loading condition. See Section 7.4.1.4 for details.

d Final basin capacity based on required design conditions at permitted capacity, maximum month pollutant loadings, and RAS recycle rate to maintain design MLSS (see Section 7.4.1.5).

7.4.2 Rocky Branch Equipment Condition Assessment Rating System

A condition assessment and summary of architectural, structural, process, mechanical, and electrical inspections of the existing WWTP facilities, including support systems was performed. The purpose of the inspections was to identify deficiencies, including aged or worn structures or equipment requiring repair to maintain the long-term integrity and reliability of the WWTP, and to determine if facilities conform to current design standards, regulations and codes. For the purposes of consistency and based on discussions with WSD operations management, the assessment protocol for rotating assets, as well as other infrastructure located at the treatment plant and pump station is based on a 1-4 rating scale as shown in Table 7-17.

Table 7-17: Equipment Condition Rating System

Rating Number	Rating Term	Rating Description
1	Very Good Condition	Virtually no defects; appears well maintained
2	Moderate Deterioration	Some defects in equipment; some maintenance performed
3	Significant Deterioration	Numerous defects in equipment; little maintenance performed
4	Virtually Unserviceable	Beyond repair; remove or replace as applicable

The use of a 1 to 4 scale provides better separation between ranked values when compared to a 1 to 10 scale, and therefore facilitates a more straightforward prioritization of future improvements. In addition, this scale matches the approach used for the recent WSD Water Master Plan as applied to the water treatment plant. Using the same type of scale will facilitate clear communication within the operations group when discussing facility condition.

Corrosion observed at various locations throughout the plant is a result of moisture, chemical exposure (hydrogen sulfide or other), age of equipment, or a combination.

7.4.3 Rocky Branch Liquids Process Equipment Condition Assessment

7.4.3.1 Influent Pump Station

The Influent Pump Station includes four submersible pumps, which pump to the Headworks Building for screening and grit removal. Due to confined space entry restrictions, these pumps were not inspected. A ventilation exhaust fan and influent wet well hoist are provided for venting of gases to the odor control system and pump maintenance. A trash basket/rock box is located in the wet well. All metallic

components show signs of corrosion, likely due to the presence of hydrogen sulfide (H_2S) and the humid environment.

Work orders indicate preventative maintenance has been performed on the screens and pumps. The hoist has had unscheduled maintenance for the mount, controls, cord, travel, and left/right movement. A summary of equipment condition rating for the Influent Pump Station is provided in Table 7-18.

Table 7-18: Influent Pump Station Process Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Influent Pump 1	Flygt	2	Yes
Influent Pump 2	Flygt	2	Yes
Influent Pump 3	Flygt	2	Yes
Influent Pump 4	Flygt	2	Yes
Influent Flow Meter	Rosemount	2	Yes
Hoist	Gorbel	2	Yes
Ventilation Exhaust Fan	MK Plastics	2	Yes

7.4.3.2 Screening and Grit Removal

Equipment for screening and grit removal are located in the Headworks Building. Work orders indicate preventative maintenance performed on the grit removal equipment. The facility is moderately clean, with moderate noise and moderate presence of odor, as shown in Figure 7-12. The step screen was subsequently discovered to be in very poor condition due to mechanical wear under the water line. The step screen is planned to be replaced in 2017. A summary of equipment condition for the Headworks Building is provided in Table 7-19.

Table 7-19: Headworks Building Process Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Manual Screen	Waste Tech	2	Yes
Step Screen	Waste Tech	3	Yes
Washer/Compactor	Waste Tech	2	Yes
Grit Paddle Drive	Waste Tech	2	Yes
Grit Pump	Wemco	2	Yes
Grit Classifier	Waste Tech	2	Yes

Figure 7-12: Screening and Grit Removal Process Equipment

7.4.3.3 Secondary Treatment

Aeration Basin 1 and Secondary Clarifier 1 were out of service at the time of the inspection. The WAS pumping flow meters were not accessible. Work orders indicate preventative maintenance performed on mixers, final clarifier drives, and pumps. The facilities and operation is clean with low noise and a weak presence of odor, as shown in Figure 7-13 and Figure 7-14. A summary of equipment condition rating for the secondary treatment system is provided in Table 7-20.

Table 7-20: Secondary Treatment Process Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Floating Mixer 1	Aqua	2	Yes
Floating Mixer 2	Aqua	2	Yes
Final Clarifier Drive 1	Walker	2	Yes
Final Clarifier Drive 2	Walker	2	Yes
WAS Pump 1	Flygt	2	Yes
WAS Pump 2	Flygt	2	Yes
RAS Pump 1	Flygt	2	Yes
RAS Pump 2	Flygt	2	Yes
RAS Pump 3	Flygt	2	Yes
Scum Chopper Pump 1	Vaughan	2	Yes
Scum Chopper Pump 2	Vaughan	2	Yes
WAS Flow Meter	Rosemount	2	Yes
RAS Flow Meter	Rosemount	2	Yes

7.4.3.4 UV Disinfection

Work orders indicate preventative maintenance performed on UV equipment and flow meter. The interior UV equipment, which includes two UV channels (CHNLs) with two modules (MODs) each, exterior and interior building facilities are clean with no noise or odor, as shown in Figure 7-15. A summary of equipment condition rating for the UV disinfection system is provided in Table 7-21.

Table 7-21: UV Disinfection Process Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
UV-CHNL1-MOD1	Ozonia	1	Yes
UV-CHNL1-MOD2	Ozonia	1	Yes
UV-CHNL2-MOD1	Ozonia	1	Yes
UV-CHNL2-MOD2	Ozonia	1	Yes
Effluent Flow Meter	---	1	Yes

Figure 7-13: Aeration Basins and Secondary Clarifier 1

Figure 7-14: Secondary Clarifier 2 and RAS/WAS Pump Station

Figure 7-15: UV Disinfection System

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7.4.4 Rocky Branch Mechanical Equipment Condition Assessment

Below is a summary of the heating, ventilation, and air conditioning (HVAC) and general mechanical items at the Rocky Branch WWTP. Review of the maintenance records indicates that the backflow preventers, filters, fans, heaters, boilers, emergency showers/eyewashes, and air conditioners have regularly scheduled inspections and maintenance performed on them. The frequency of inspections ranges from monthly to yearly depending on the equipment. Per WSD staff, the maintenance records do not document if a piece of equipment is inoperable and needs to be replaced. It was also unclear if all repair requests were entered into the database. A list of acronyms used throughout the mechanical equipment condition assessment is shown in Table 7-22.

Table 7-22: Common Mechanical Acronyms

Acronym	Equipment
BFP	Backflow Preventer
EF	Exhaust Fan
EUH	Electric Unit Heater
HWH	Hot Water Heater
SSH	Safety Shower
WAC	Wall-mounted Air Conditioner

7.4.4.1 Influent Pump Station and Headworks Building

The Headworks Building is heated and continuously ventilated. Filtered, tempered air from a grade-mounted make-up air unit is ducted throughout the space. A grade-mounted exhaust fan draws in air from the space and sends it to the odor control fan at the Biofilter Building. The make-up air unit is the building's source of heat. The Headworks Building is continuously ventilated at a rate above 12 air changes per hour (AC/HR) and is, therefore, a Class I, Division 2 space. The mechanical systems are in compliance with the requirements of NFPA 820.

The Influent Pump Station, an in-ground structure, is ventilated. A grade-mounted fan draws air into the space through a gooseneck located on the top surface of the pump station and sends the air to the odor control fan at the biofilter.

The Influent Pump Station is ventilated at six AC/HR and, therefore, is a Class I, Division 1 space. The ventilation fan for the space is in accordance with the requirements for this classification.

The exhaust fan for the Influent Pump Station shows a small amount of corrosion as shown in Figure 7-16. The equipment for the Headworks Building appears to be in good condition. For equipment condition rating, see Table 7-23.

Table 7-23: Influent Pump Station and Headworks Building Mechanical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Fan (Headworks)	MK Plastic	1	Yes
Make-up Air Unit (Headworks)	Greenheck	1	Yes
Fan (Influent Pump Station)	MK Plastic	2	Yes

7.4.4.2 MCC Buildings

Each of the three motor control center (MCC) buildings is air conditioned and heated by a separate wall-mounted, direct expansion (DX) air conditioning unit with electric heat. Each of the units is controlled by a wall-mounted thermostat in the space. NFPA 820 does not apply to these structures. Corrosion was not visible on the mechanical systems in these buildings. For equipment condition rating, see Table 7-24.

Table 7-24: MCC Buildings HVAC Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
WAC-1 (MCC Bldg 1)	Eubank	1	Yes
WAC-1 (MCC Bldg 2)	Eubank	1	Yes
WAC-1 (MCC Bldg 3)	Eubank	1	Yes

Figure 7-16: Influent Pump Station and Headworks Building HVAC Equipment

Headworks Building

Influent Pump Station

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7.4.4.3 Blower Building

The Blower Building is a heated and ventilated space. When called for by the ventilation thermostat, air is supplied to the space via two roof-mounted supply air (intake) fans. The air is then exhausted from the space by two roof-mounted exhaust fans. One ceiling mounted electric unit heater provides heat to the space, as required, by a wall-mounted thermostat. NFPA 820 does not apply to this building. The mechanical equipment in this structure show small amounts of corrosion, as shown in Figure 7-17. For equipment condition rating, see Table 7-25.

Table 7-25: Blower Building HVAC Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Blower 1	Roots	2	Yes
Blower 2	Roots	2	Yes
Blower 3	Roots	2	Yes
Blower 4	Roots	2	Yes
Blower 5	Roots	2	Yes
Fan 1 (Intake)	Not Available	1	Yes
Fan 2 (Intake)	Not Available	1	Yes
Fan 3 (Exhaust)	Not Available	1	Yes
Fan 4 (Exhaust)	Not Available	1	Yes
Heater	Not Available	2	Yes

Figure 7-17: Blower Building Mechanical Equipment

7.4.4.4 UV Disinfection Building

The equipment room in the UV Disinfection Building is heated and ventilated. A wall-mounted exhaust fan draws in air through a wall-mounted louver when the space temperature rises above the wall-mounted thermostat setpoint. The space is heated by two unit heaters. This space also contains the backflow preventers for the potable and nonpotable water systems and an instantaneous water heater for the emergency shower/eye wash system (located on the exterior of the building near the clean-in-place tank).

The electrical room is ventilated and heated. A wall-mounted fan draws air in through a louver/damper located above the door when the space thermostat calls for ventilation. A unit heater provides heat to the space, as required.

This building is unclassified per NFPA 820. The mechanical systems in these spaces do not display any signs of corrosion, as shown in Figure 7-18. For equipment condition rating, see Table 7-26.

Table 7-26: UV Disinfection Building Mechanical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
EUH-1	TPI	1	Yes
EUH-2	TPI	1	Yes
EUH-3	TPI	1	Yes
EF-1	Greenheck	1	Yes
EF-2	Greenheck	1	Yes
HWH-1	Eemax	1	Yes
BFP	Watts	1	Yes
SSH-2	Haws	1	Yes

Figure 7-18: UV Disinfection Building Mechanical Equipment-

7.4.4.5 Biofilter Building

The Biofilter Building is a heated and ventilated space. A wall-mounted fan exhausts air drawn in through the roof gooseneck, as required, to ventilate the space. The exhaust fan is controlled by a wall-mounted thermostat. A ceiling-mounted heater provides heat to the space, as required.

The Biofilter Building also houses the biofilter control system and the boiler system used to maintain the moisture of the odorous air prior to it entering the biofilter. Combustion air is drawn in through the roof gooseneck and is ducted high and low into the space.

A pad-mounted, outdoor odor-control fan is used to push air though the humidification chamber and through the wood-chip biofilter bed. Fans at each of the respective odorous air sources are used to extract the odorous air from the structures and send it to the biofilter fan.

This room is unclassified per NFPA 820. A 3-foot space around the odor control fan, dampers, and flanged duct joints, located just outside this structure, is rated Class I, Division 2. The equipment is rated accordingly.

Small amounts of corrosion were observed on the mechanical equipment for the Biofilter Building. The panel face was also removed from one of the control panels during the inspection, as shown in Figure 7-19. For equipment condition rating, see Table 7-27.

Table 7-27: Biofilter Building HVAC Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Fan (Odor Control)	Hartzell	2	Yes
Fan	Greenheck	2	Yes
Heater	Not Available	2	Yes
Boiler	Lochinvar	2	Yes

Figure 7-19: Biofilter Building HVAC Equipment

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7.4.4.6 Aerated Sludge Holding Basin

The aerated sludge-holding basin is a ventilated space. Air is drawn into the tank, through a gooseneck located on the top of the tank, and then exhausted to the odor control building via a grade-mounted fan. A 3-foot envelope around the odor control fan, dampers, and flanged duct joints is a Class I, Division 2 space. The fan installed is rated accordingly, per NFPA 820. Some corrosion was observed on the fan.

For equipment condition rating, see Table 7-28.

Table 7-28: Aerated Sludge Holding Basin HVAC Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Fan	MK Plastic	2	Yes

7.4.4.7 Sludge Process Building

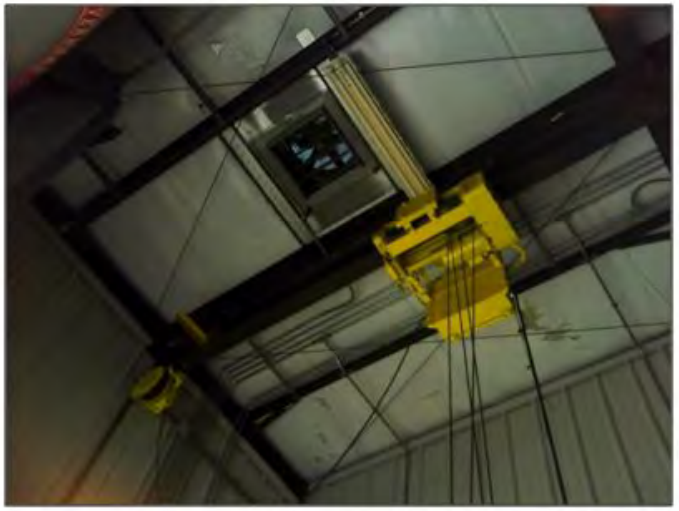
The Sludge Process Building is a heated and ventilated space that contains the digester blowers and the sludge pump. Ventilation air is supplied to the space by a roof-mounted intake fan. The air is exhausted from the space by a roof-mounted exhaust fan. The fans are controlled by a wall-mounted thermostat. A ceiling-mounted electric unit heater provides heat to the space, as required, by a second wall-mounted thermostat. As this space in intermittently ventilated, per NFPA 820 it is a Class I, Division 2 space. The equipment in this space is not rated for a classified area.

Corrosion was observed on the heater and blowers in this space, likely due to H_2S exposure. Per the staff at the plant, the ventilation and heat in this building are both undersized as they struggle to maintain the space thermostat setpoints for summer and winter. See Figure 7-20 for an example of equipment located in this space. For equipment condition rating, see Table 7-29.

Table 7-29: Sludge Process Building Mechanical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Fan (Intake)	Not Available	1	Yes
Fan (Exhaust)	Not Available	1	Yes
Heater	Not Available	2	Yes
Blower 1	Roots	2	Yes
Blower 2	Roots	2	Yes

Figure 7-20: Sludge Process Building Mechanical Equipment



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7.4.4.8 Control/Laboratory Building

The office area and laboratory of the Control/Laboratory Building is conditioned by a split system. The DX, packaged air handler is located in the furnace room. Ductwork is used to supply air to and return air from the various spaces and to bring exterior air to the unit. The condensing unit is located on the west side of the building at grade. The air-handling unit also provides heat to the space. A wall-mounted exhaust fan is used to ventilate the restroom. The furnace room also contains the water heater.

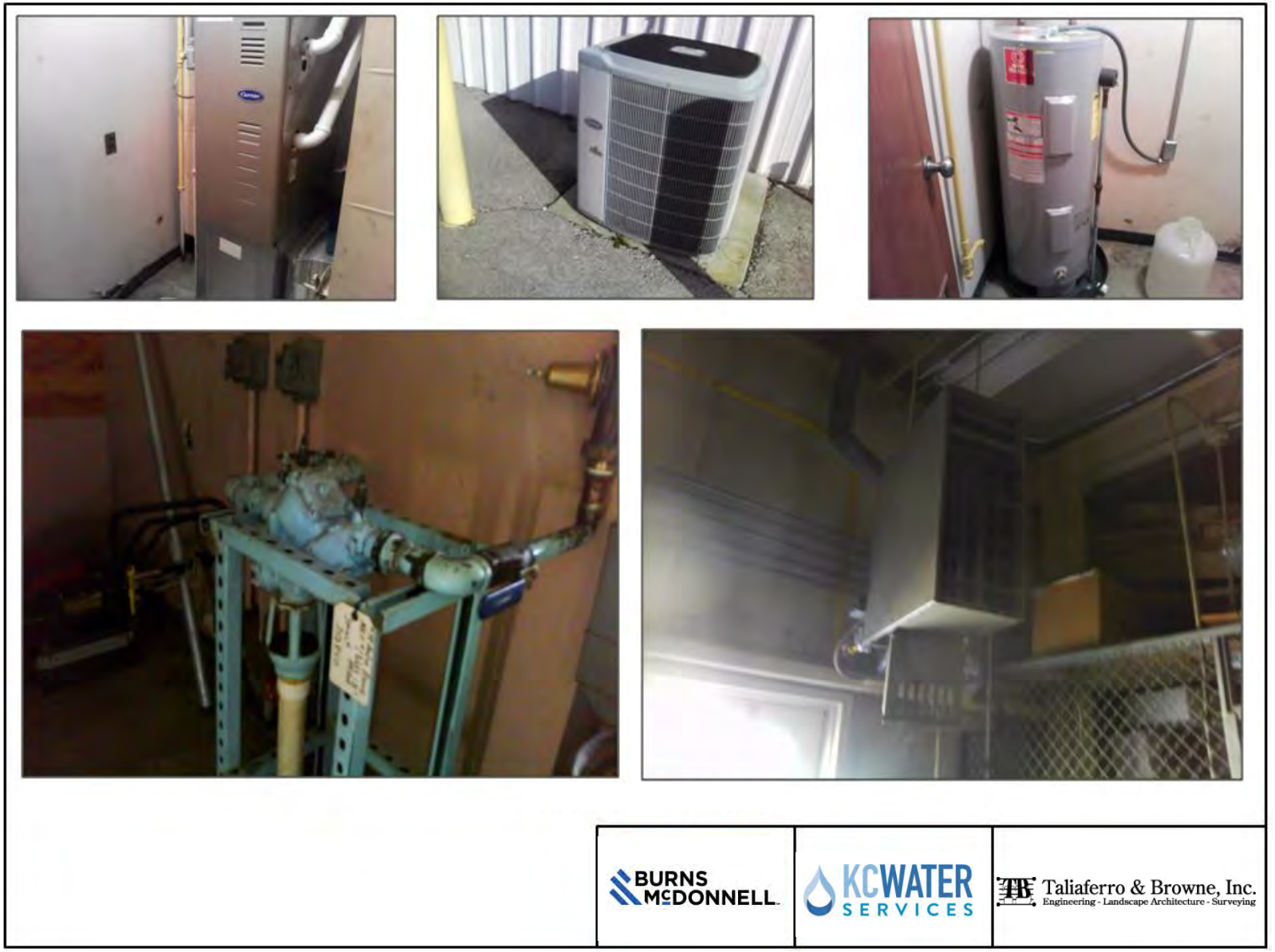
The garage area is heated by a wall-mounted unit heater. It also contains the backflow preventer for the building water service. The storage room is heated and ventilated. A roof-mounted fan draws air in through two wall-mounted louvers when ventilation is required by the space thermostat. A ceiling-suspended unit heater provides heat to the space. NFPA 820 does not apply to this space.

The water heater, some of the unit heaters, and the split system air conditioning system appear to have been replaced recently and are in good condition. The restroom fan, backflow preventer, and garage heater displayed some corrosion and wear, as shown in Figure 7-21. For equipment condition rating, see Table 7-30.

Table 7-30: Control/Laboratory Building Mechanical Equipment

Equipment	Manufacturer	Condition Rating	Operational
Restroom Exhaust Fan	Not Available	2	Yes
Furnace	Carrier	1	Yes
Water Heater	State Select	1	Yes
Condensing Unit	Carrier	1	Yes
Unit Heater (Garage)	Trane	2	Yes
Unit Heater (Storage)	Reznor	1	Yes
Exhaust Fan (Storage)	Greenheck	2	Yes
Backflow Preventer	Not Available	2	Yes

Figure 7-21: Control/Laboratory Building Mechanical Equipment



7.4.5 Rocky Branch Electrical Equipment Condition Assessment

The following paragraphs include a condition assessment and summary of electrical observations of the Rocky Branch WWTP. The purpose of the inspections was to identify deficiencies and corrosion, including aged equipment requiring repair to maintain the long-term integrity and reliability of the Rocky Branch WWTP.

7.4.5.1 Power Distribution

Power is supplied to the Rocky Branch WWTP by two KCP&L overhead lines. The incoming power is 13.2-kV, which is the primary source voltage at this site. The feeder lines are routed underground from utility poles to utility-owned pad-mounted transformers and underground from the transformers secondary to MCCs. A 300-kVA transformer, TP-1, is located next to the MCC-1 Facility. A 750-kVA transformer, TP-2, is located next to the Blowers Building. These transformers step down the 13.2-kV incoming service to 480V to power MCC-1 and MCC-2. Both transformers are relatively free of corrosion and appear to be in good condition. The condition ratings of electrical equipment are discussed in the following paragraphs.

Various WSD facilities have experienced issues with power quality and availability. In some cases, this has been due to power supplies originally dedicated to the facility eventually being tapped for multiple other utility customers. For future improvement and expansion projects, it is recommended the City obtain an agreement with the utility provider that prohibits additional service connections from being tied to transmission infrastructure funded by the City. The agreement should also provide that the utility will agree to provide ongoing maintenance to the transmission equipment, and that the utility will guarantee that they can provide the maximum required power demand.

7.4.5.2 MCC-1 Building

The existing MCC-1 is manufactured by Allen-Bradley and is a Centerline model. MCC-1 supplies power to process equipment in the Biofilter and Sludge Process buildings. MCC-1 also provides power, via low-voltage transformers, to Lab Building panelboard LP-10-01-02 and MCC-1 Building panelboard LP-01-01-01. MCC-1 has eight sections and appears to be in good condition.

A 25-kVA, 480V to 240/120V, single-phase GE transformer (T1) provides secondary power within MCC-1 Building and the Biofilter Building. Secondary power is distributed through a 100A, 240/120V, 20-pole lighting panel, LP-01-01-01 to small loads, as well as the aerobic digester process control panel LCP-08-05-02 and biofilter control panel CP-09-01-02. The transformer and lighting panel are in good condition, as shown in Figure 7-22.

The programmable logic controller PLC-1 panel is manufactured by A.W.Schultz and contains an Allen-Bradley PLC with input/output modules and an Allen-Bradley PanelView 300 human machine interface (HMI). The PLC-1 equipment, biofilter control panel CP-09-01-02, and aerobic digester control panel LCP-08-05-02 are all in good condition, as shown in Figure 7-22.

Table 7-31: MCC-1 Building Electrical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
MCC-1	A-B	1	Yes
Transformer T1	GE	1	Yes
Panel LP-01-01-01	Square D	1	Yes
PLC-1	A.W. Schultz/A-B	1	Yes
Control Panel LCP-08-05-02	Aqua-Aerobic Systems	1	Yes
Control Panel CP-09-01-02	---	1	Yes

7.4.5.3 MCC-2 Building

The existing MCC-2 is manufactured by Allen Bradley and it is a Centerline model. MCC-2 supplies power to process equipment at the RAS/WAS/Scum Pump Station and Process Water Pump Station. MCC-2 also provides power to MCC-3 and to MCC-2 building panelboard LP-07-01-01 via a 25-kVA low-voltage transformer. MCC-2 has five sections and appears to be in good condition, as shown in Figure 7-23.

A 25-kVA, 480V to 240/120V, single-phase GE transformer (T2) provides secondary power within the MCC-2 Building. Secondary power is distributed through a 100A, 240/120V, 20-pole lighting panel LP-07-01-01. The transformer and lighting panel are in good condition.

The PLC-2 panel is manufactured by A.W. Schultz and contains an Allen-Bradley controller with input/output modules. The PLC-2 equipment is in good condition.

Table 7-32: MCC-2 Building Electrical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
MCC-2	A-B	1	Yes
Transformer T2	GE	1	Yes
Panel LP-07-01-01	Square D	1	Yes
PLC-2	A.W. Schultz/A-B	1	Yes

Figure 7-22: MCC-1 Building Electrical - Panels LCP-08-05-02, CP-09-01-02

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Figure 7-23: MCC-2 Building Electrical - MCC-2, PLC-2 - MCC-2

7.4.5.4 MCC-3 Building

The existing MCC-3 is manufactured by Allen-Bradley and it is a Centerline model. The permanent power to MCC-3 is provided by MCC-2. A 500-kW, 480V, three-phase Kohler emergency generator, via an 800A, three-phase automatic transfer switch (ATS), provides emergency power to MCC-3 in the event of a failure in the permanent feeder. The Kohler emergency generator is located outside between the Blower and the MCC-3 buildings. Slight corrosion is evident on the emergency generator enclosure. The equipment appears to be in overall good working order as a result of the regular monthly maintenance indicated in the Hansen database (Figure 7-17). MCC-3 supplies power to process equipment in the Boiler Building, Influent Pump Station, aeration basin, clarifiers, RAS/WAS/Scum Pump Station, Headworks Building, and UV Disinfection Facility distribution panel PDP-UV. MCC-3 also provides power to the Lab Building panelboard LP-10-01-01, via low-voltage transformers, the Aeration Basin blower mini-power center, and MCC-3 Building panelboard LP-03-01-02. MCC-3 appears to be in good condition.

A 25-kVA, 480V to 240/120V, single-phase GE transformer (T4) provides secondary power within the MCC-3 Building. Secondary power is distributed through a 100A, 240/120V, 20-pole lighting panel LP-03-01-02 to small loads and aeration basin blower control panel CP-03-03-02. The transformer and lighting panel are in good condition.

An aeration basin blower mini power center (MPC) consists of a 15-kVA, 480V to 208Y/120V, three-phase GE transformer (T3) and lighting panel LP-01-01-01. The mini power center provides secondary power within the Blower Building. Secondary power is distributed through a 100A, 240/120V, 20-pole lighting panel LP-01-01-01 to small loads and aeration basin blower local control panel LCP-03-03-01. The transformer and lighting panel are in good condition.

The PLC-3 panel contains an Allen-Bradley CompactLogix 1769- L35E controller with input/output modules. The PLC-3 equipment, aeration basin blower control panel LCP-03-03-01 and aeration basin blower control panel CP-03-03-02 are in good condition, as shown in Figure 7-24. Table 7-33 provides a summary of the condition ratings in the MCC-3 building.

Table 7-33: MCC-3 Building Electrical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
MCC-3	A-B	1	Yes
MPC Transformer T3	GE	1	Yes
MPC Panel LP-03-01-01	Square D	1	Yes
Transformer T4	GE	1	Yes
Panel LP-03-01-02	Square D	1	Yes
PLC-3	A-B	1	Yes
Control Panel LCP-03-03-01	---	1	Yes
Control Panel CP-03-03-02	---	2	Yes
Emergency Generator	Kohler	2	Yes

7.4.5.5 Headworks Building

MCC-3 provides power to the Headworks Building. The feeder from MCC-3 is routed through an underground ductbank to a dry type, outdoor rated transformer. Transformer T-1 and a 100A secondary disconnect switch are located outside on the northeast side of the building. The 45-kVA, 480V to 208Y/120V, three-phase GE transformer (T-1) provides secondary power within the Headworks Building. Secondary power is distributed through a 100A, 208Y/120V, 20-pole lighting panel LP-02-01-01. Slight corrosion is evident on the transformer enclosure; however, the equipment appears to be in good condition. The 120V secondary power is distributed to small loads, the screen, and compactor local control panel LCP-02-01-01 and the grit removal control panel LCP-02-01-02. The Headworks Building is a wet, corrosive area. Slight corrosion is evident on pipes, hardware, and conduit fittings, as shown in Figure 7-26, and is likely due to H_2S exposure. A summary of the equipment condition ratings is provided in Table 7-34.

Table 7-34: Headworks Building Electrical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Transformer T-1	GE	2	Yes
Disconnect Switch	GE	2	Yes
Panel LP-02-01-01	Square D	2	Yes
Panel LCP-02-01-01	Waste-Tech	2	Yes
Panel LCP-02-01-02	---	2	Yes

Figure 7-24: MCC-3 Building Electrical - Transformer T4, Emergency Generator

Figure 7-25: Blower Building and MCC-3 Building Electrical - Panels LCP-03-03-01, CP-03-03-02

Figure 7-26: Headworks Building Electrical - Transformer T-1, Panels LCP-02-01-01 and LCP-02-01-02

7.4.5.6 UV Disinfection Building

MCC-3 provides power to UV Building power panel PDP-UV. A 480V/277Y, 225A panel, PDP-UV is located in the UV Building electrical room. PDP-UV is manufactured by Eaton and is in good condition.

A 75-kVA, 480V to 230/133V Rex Power Magnetics isolation transformer (UV-XFMR) provides secondary power to the power and data distribution center panelboard, UV-PDDC. The data distribution center controls the Ozonia UV process equipment. The transformer and panel are in good condition as shown in Figure 7-27.

A mini load center consists of a 30-kVA, 480V to 208Y/120V, three-phase transformer (LP-UV-XFMR) and lighting panel LP-UV. The mini load center provides secondary power within the UV Building. The transformer and lighting panel are in good condition.

A 75-kVA, 480/277V Eaton transformer (HWH-1 XFMR) provides power to the water heater HWH-1 via a standalone local safety switch. The electrical equipment is in good condition.

The interior lighting is in good condition with sufficient illuminations for maintenance and operation.

Table 7-35: UV Disinfection Building Conditions

Equipment	Manufacturer	Condition Rating	Operational
Panel PDP-UV	Eaton	1	Yes
Transformer LP-UV-XFMR	Eaton	1	Yes
Panel LP-UV	Eaton	1	Yes
Transformer UV-XFMR	Rex Power Magnetics	1	Yes
250A Circuit Breaker	Eaton	1	Yes
Panel UV-PDDC	ABB	1	Yes
HWH-1 XFMR	Eaton	1	Yes
HWH-1 SS	Eaton	1	Yes

Figure 7-27: UV Disinfection Building Electrical - Panels PDP-UV and UV-PDDC

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7.4.5.7 Control/Laboratory Building

Power is supplied to the Control/Laboratory Building from existing motor control centers MCC-1 and MCC-3. The feeders from both MCCs are routed in an underground duct bank to a dry-type transformer located in the storage room.

A 37.5-kVA, 480V to 240/120V, single-phase GE transformer (T-1) provides secondary power within the Control/Laboratory Building. Secondary power is distributed through a 100A, 240/120V original plant lighting panel LP-10-01-02. There have not been any significant problems reported, but the age of the panel indicates that it may be difficult to find replacement breakers if needed. The transformer and lighting panel are dated, but in good condition, as shown in Figure 7-28.

A new transformer and panelboards were installed during a 2003 improvement project to Rocky Branch WWTP. A 45-kVA, 480V to 208Y/120V, three-phase GE transformer provides secondary power within the Control/Laboratory Building. Secondary power is distributed through a 100A, 208Y/120V, 18-pole lighting panel (LP-10-01-01) to small loads, HVAC equipment and the Altronix Series 1000 security panels. The transformer and lighting panel are in good condition. A summary of the equipment condition ratings is provided in Table 7-36. The interior lighting is in good condition with sufficient illumination for maintenance and operation.

Table 7-36: Control/Laboratory Building Electrical Equipment Conditions

Equipment	Manufacturer	Condition Rating	Operational
Transformer T1	GE	2	Yes
Panel LP-10-01-02	GE	2	Yes
Transformer T2	GE	1	Yes
Panel LP-10-01-01	GE	1	Yes
Security & Alarm Panel	Altronix	1	Yes

7.4.5.8 Supervisory Control and Data Acquisition (SCADA)

The existing instruments measuring flow, pressure, position, level, and temperature are wired as digital/analog inputs to each building's PLC. Fiber optic cables link the PLCs over Ethernet and via a network equipment rack located in Control/Laboratory Building. An operator workstation provides the HMI for operators to monitor the treatment process systems in real time.

The control system also incorporates data logging functions, an alarm/event printer, an intrusion alarm, and CCTV cameras. The system can detect and report preprogrammed alarm conditions, such as system or equipment failure, out-of-range performance levels, or security breaches. In the event that the site PLC determines an alarm condition exists, it dials the pager system to alert personnel.

Figure 7-28: Control/Laboratory Building Electrical - Transformer T1, Security and Alarm Panel

7.4.6 Rocky Branch Buildings and Structures Condition Assessment

This section includes structural and architectural condition and corrosion assessments of the Rocky Branch WWTP. During the visual inspection, major structural and architectural features were examined for functionality, deterioration, and corrosion. In general, Rocky Branch WWTP is in good working condition and requires minimal structural repair and rehabilitation. Table 7-37 provides the condition rating for each of the structures reviewed at the Rocky Branch WWTP.

Table 7-37: Buildings and Structures Conditions

Building or Structure Name	Condition Rating
Influent Pump Station	2
Headworks Building	2
Aeration Basins	1
Blower Building	1
Secondary Clarifier	2
RAS/WAS Pump Station	1
UV Disinfection Building	1
Effluent Structure	1
Biofilter Building	1
Control/Laboratory Building	2

Condition assessment and ratings presented hereby do not withdraw or dismiss any of the existing regular maintenance plans. In addition to the repair of the identified defects, all applicable maintenance plans should be performed to prevent future deterioration and damage. If such plans and schedules do not exist, a comprehensive maintenance plan should be developed to avoid further structural damage to the existing buildings and structures.

All structural inspections are limited to visible features and elements. Jib crane conditions explained in this report do not include the operation and performance of cranes.

7.4.6.1 Influent Pump Station

The above-grade concrete structure and exterior features at the Influent Pump Station are in good working condition. The two-ton crane has moderate rust. Gratings are in good condition.

7.4.6.2 Headworks Building

The Headworks Building is a concrete masonry unit building with a concrete roof structure. The building houses screens and a grit classifier. The building construction was completed in 2006 and is in good condition. In general, the building is in good structural condition. The exterior concrete wall in the north side shows signs of chemical degradation, as shown in Figure 7-29.

Figure 7-29: Headworks Building Structural - Chemical Degradation of the Concrete Wall -

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7.4.6.3 Aeration Basins

Visible structural components at the aeration basins - including concrete walls, galvanized metal post and pipe supports, and the surrounding grade - are in good shape and show minimal to no structural corrosion or damage. The aeration basin splitter is also in good condition with no signs of degradation or corrosion.

7.4.6.4 Aeration Basins Blower Building and MCC Buildings

The Blower Building is a pre-engineered metal building. It is in very good condition inside and out and does not require any repair or upgrades at this time.

Structural components at the Aeration Basins Blower Building - including exterior walls, interior walls, roof, floor, and surrounding grade - are in good condition and show minimal to no structural corrosion or damage, as shown in Figure 7-30 and Figure 7-31.

7.4.6.5 Secondary Clarifiers

The secondary clarifiers are in good structural condition. Moderate rust was observed on handrails in several places.

7.4.6.6 RAS/WAS Pump Station

The RAS/WAS Pump Station, located between Clarifiers 1 and 2, is in good structural condition with minimal to no repairs needed. Inspected elements include concrete, jib crane, handrails, and stairs.

7.4.6.7 UV Disinfection Building

The UV Disinfection Building is a pre-engineered. It contains UV equipment and an electrical room for the disinfection system. There is a canopy attached to the building exterior over the UV channels. The construction of the building was completed in 2013. The building is in very good condition inside and out.

The UV Building and channels are structurally in good condition with no observed deterioration or corrosion. Inspected structural components include above grade exterior/interior walls, roof structure, floor, jib crane, and surrounding grade. Additionally, the concrete channels (visible parts) and gratings at the UV channels are in good condition, as shown in Figure 7-32.

Figure 7-30: MCC Buildings Structural

MCC Building 1

MCC Building 2

MCC Building 3

Figure 7-31: Blower Building Structural

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Figure 7-32: UV Disinfection Building Structural

7.4.6.8 Effluent Structure

Effluent structural components including a concrete box, grating/walkway surface, handrails, and surrounding grade are in good working condition with no observed structural damage or corrosion.

7.4.6.9 Biofilter

The Biofilter Building is a pre-engineered metal building. The exterior walls and roof are in good condition, as shown in Figure 7-33.

The building, attached concrete box, stairs and handrails are in good condition with no observed corrosion. The media may be excessively compacted, which would affect the odor removal efficiency of the system.

7.4.6.10 Control/Laboratory Building

The Control/Laboratory Building houses the control room, laboratory, toilets and lockers, electrical room, and a storage area. The building is a pre-engineered metal building that was partially renovated in 2006. New windows and doors were installed and the existing metal wall painted on the exterior. The suspended-ceiling tiles are in poor condition because of roof leaks. The metal roof panels are rusting and it appears that the roof is leaking at the gutters. As the gutters fill up with water, the water is running in under the metal roof panels. The interior metal wall panels in the storage area show some corrosion at the bottom of the panels where they contact the concrete floor.

The Control Building is structurally in moderate to good condition with some corrosion, as shown in Figure 7-35. Above-grade exterior walls, roof structure, and surrounding grade are in good condition. Metal panels on interior walls have some rust.

7.4.6.11 Cranes and Hoists

Two 1-ton jib cranes with motor-actuated hoists are located at the RAS/WAS pump station and the UV Disinfection Building, respectively. Both hoists appear to be in good operating condition.

Figure 7-33: Biofilter Building Structural -

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Figure 7-34: Sludge Process Building Structural

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Figure 7-35: Control/Laboratory Building Structural

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7.4.7 Non-Destructive Testing Results

Non-destructive testing in the form of multispectrum vibration analysis was performed at the Rocky Branch WWTP in April 2015 by Advanced Technology Solutions Inc. (ATS). WSD staff identified the following critical liquid stream plant assets for testing:

1. Aeration Blowers (1-5).
2. Digester Blowers (1-2).
3. Grit Pump (1).

The condition ratings for these pieces of equipment were compared to the rating developed by the site inspection team and, where the vibration testing suggested a lesser condition, the rating was modified accordingly. A full report of the testing results for Rocky Branch WWTP is provided in Appendix B of this memorandum. WSD staff have also been provided access to the ATS client website, where the testing results are held by ATS.

7.4.8 Rocky Branch WWTP Condition Rating Summary

Table 7-37 represents an overall condition rating that combines process, mechanical, electrical, structural, and architectural disciplines. It is a subjective rating looking at all of the rating values assigned by all the disciplines for the various assets within each given area for Rocky Branch WWTP. The scale is based on the condition rating scale in Table 7-38, and is presented by major process area.

Table 7-38: Rocky Branch Overall Condition Rating

Description	Rating Number
Influent Pump Station	2
Screening & Grit Removal (Headworks)	2
Blower Building	2
Aeration Basins	1
Secondary Clarifiers	1
UV Disinfection	1
RAS/WAS/Scum Pump Station	2
Control/Laboratory Building	2

7.4.9 Assessment of Space Needs

Based on the current staff and laboratory and management operations at the Rocky Branch WWTP, the laboratory and office space appear acceptable for the current water quality needs. Maintenance space is currently minimal and staff did not comment on any additional needs.

7.5 OPERATIONS OPTIMIZATION

The following sections include a review of the Rocky Branch WWTP's current plant operations. The existing facility's operations were reviewed, including standard operating procedure reviews, multiple site visits, coordination with plant staff, and operational data analyses. Using the information collected from these tasks, potential plant performance improvements were identified. These potential plant performance improvements were categorized as treatment process improvements (e.g., improved process monitoring) or operations/maintenance improvements (e.g., updated standard operating procedures) and are discussed the sections below.

7.5.1 Treatment Process Improvements

This section describes treatment plant process performance improvements. The process performance improvements listed are intended to improve effluent quality, reduce operations costs, and improve process control. Table 7-39 lists a summary of the improvements, including potential benefits, risks, and cost implications associated with each proposed improvement. Table 7-39 also includes operational improvements, described further in the last sections of this chapter.

7.5.1.1 Odor Control Equipment

The Rocky Branch WWTP was originally designed in 2006 with an odor control system to treat odorous gases from the influent pump station, the headworks building, and the aerobic digester. The odor control system was out of service at the time of inspection. The headworks building was noticeably odorous. The non-functioning odor control equipment should be further investigated and requisite equipment repaired or replaced as soon as possible to mitigate odor issues. Prolonged lack of odor control may also be the cause of observed corrosion of critical equipment.

7.5.1.2 Aeration Basin Influent Gates

The aeration basin influent gates were not fully open during the site visit. The aeration basin influent gates should be fully open when not used to isolate an aeration basin. Maintaining fully open gates promotes equal flow distribution to the in-service basins and mitigates short-circuiting.

Table 7-39: Treatment Plant Process and Operations Optimization Summary

	Plant Process	Improvement	Benefits	Concerns	Cost Implications
Process	Odor Control Equipment	Bring odor control system back into service	Reduce odors from influent pump station, headworks building and aerobic digester	The functional condition of the odor control system is unknown	Dependent on state of existing system
	Influent Gates	Open fully when not using gate to isolate aeration basin	Provide equal flow distribution and mitigate short-circuiting	None	None
	DO Control System	Utilize existing automated DO control system	Reduce electricity consumption of aeration system	None	Dependent on state of existing system
Operations	Staff Technical Training	Encourage staff to review O&M manual for Rocky Branch WWTP	Staff become more familiar with on-site equipment and improve understanding of WWTP processes	None	None
	DO Control System	Routinely verify calibration of in-basin DO meters with calibrated field instrument	Improve efficiency and compliance	N/A	Negligible
	Data Management	Utilize commercially-available or client-developed data management software	Centralized database of laboratory and field data, as well as better and faster data auditing; automated report generation; and centralized, secure, auditable, historical data archiving	N/A	Cost of software package
		Provide operational data to on-site staff from central laboratory. Provide internet connectivity.	Provide staff with additional information to promote more informed process control decisions.	N/A	Negligible
	Process Control	Develop and implement a process management plan	Improves on-site process control and technical oversight	N/A	$100,000-$150,000

7.5.1.3 DO Control System

The Rock Branch WWTP is designed with an automated DO controlled and/or timed aeration system. A preliminary review of operational data and the SCADA system indicates that the DO instrumentation is not currently being utilized. Automatic operation and control of the aeration system should be employed to reduce energy consumption and optimize the treatment system. A review of the instrumentation and controls associated with DO control should be completed to determine what work is required to bring the system back into operation. D.O. setpoints should not normally exceed 1.5 – 2.0 mg/L.

7.5.2 Operations/Management Improvements

This section describes improvements to the plant operations and management procedures. The improvements listed are intended to streamline management activities, simplify data collection and storage, and improve resources (e.g., updated SOPs, process control lab, etc.) available to operators.

7.5.2.1 Technical Training of Staff

The staff and on-site operators are encouraged to review the facility Operation and Maintenance manual to increase familiarity with on-site equipment and improve technical understanding of the WWTP processes.

7.5.2.2 DO Control System

Staff indicated aeration basin DO concentrations are occasionally collected with a calibrated handheld meter. In the absence of automated control, aeration basin DO concentrations should be routinely collected using a calibrated field instrument to promote efficient and compliant operation. D.O. should not normally exceed 1.5 – 2.0 mg/L. The automated DO control system should be brought back into service, after which hand measurements may only be needed to ensure uniform aeration within the basins and confirm calibration of the in-tank probes.

7.5.2.3 Data Management

The current data management system, mostly spreadsheet-based, is fragmented and prevents centralized, streamlined data acquisition and dissemination. Furthermore, routine report generation (e.g. discharge monitoring reports) is currently a tedious and time-consuming process, and the existing system has limited data auditing and data approval functionality. The provision of a commercially-available or a customized data management software would be of great benefit to Rocky Branch WWTP operations. Such software would allow all laboratory and field generated data to be entered into a centralized database, and the database tool is equipped with extensive data auditing functions, automated report generation, and centralized, secure, auditable, historical data archiving.

Furthermore, on-site staff have limited exposure to operational data generated at the central laboratory. The facility and staff could benefit from the provision of additional on-site process control facilities to facilitate rapid generation of analytical data to promote more robust operational process control and troubleshooting.

7.5.2.4 Process Control

A preliminary review of effluent water quality data suggests occasional effluent ammonia and BOD_5 upsets. These process upsets are likely the result of poor process control and process management. A process control management plan similar to what was developed for Fishing River and Blue River WWTP is recommended to assist with improving on-site process control technical oversight. This would include establishment of SOPs, on-site testing capabilities, and new reporting and analysis tools. Use of the existing team and tools from the Fishing River project will help to reduce costs and accelerate implementation.

7.5.2.5 Operations Hub

Blue River WWTP currently serves as the operational hub of the KCMO wastewater operations. The Northland treatment facilities' (Fishing River, Rocky Branch, and Todd Creek) managers maintain their offices at the Blue River WWTP. Additionally, operational staff for the Northland treatment facilities typically start and end their shifts at the Blue River WWTP. Rocky Branch, Todd Creek, and Fishing River are at distances of 27 miles, 28 miles, and 19 miles from the Blue River WWTP, respectively. These distances result in increased daily travel time for the facility operators. Distance and estimated travel times between the various treatment facilities are displayed in Table 7-40. Figure 7-36 displays an aerial photo of the various WWTPs operated by KCMO.

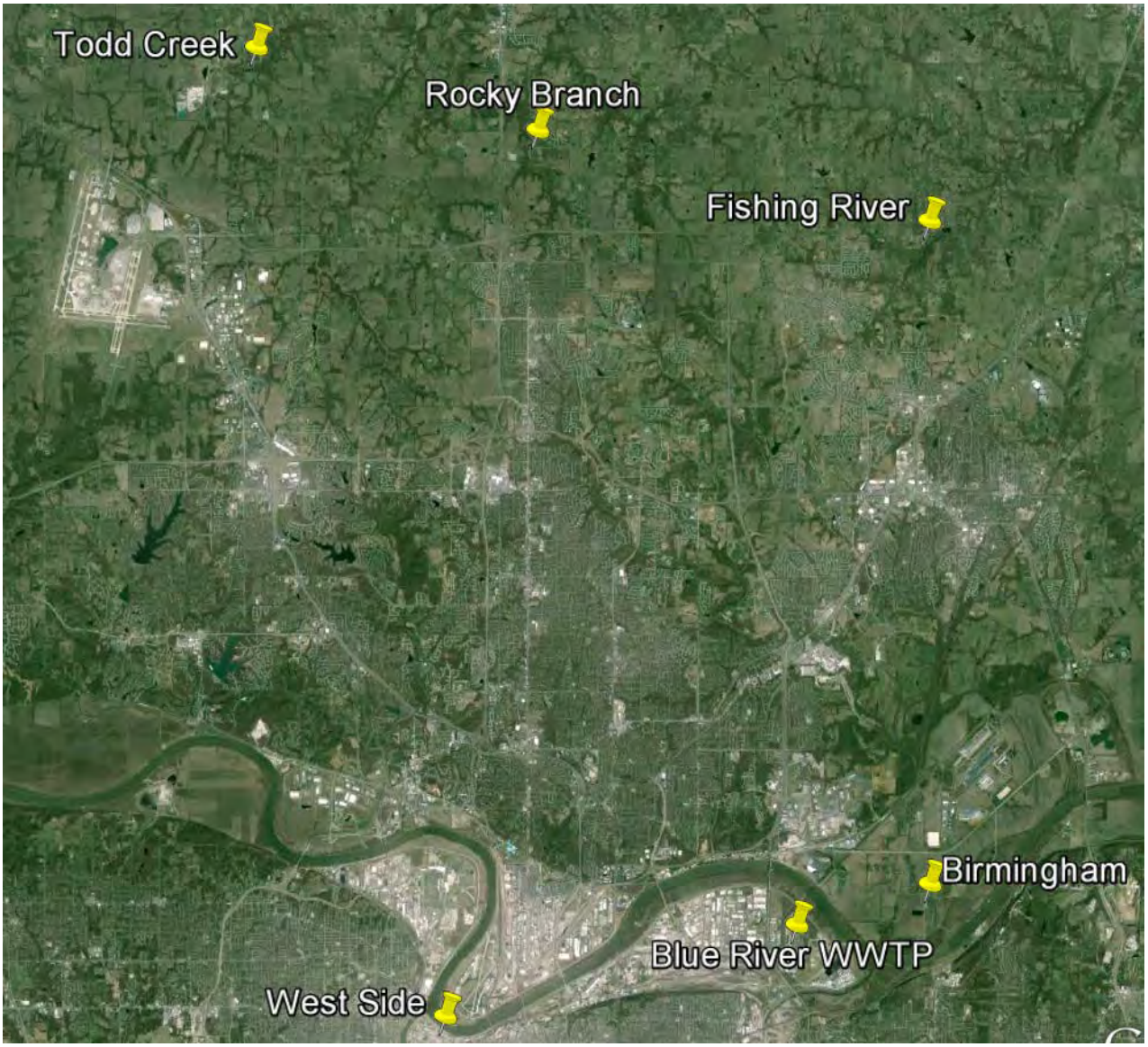
Table 7-40: Driving Distances and Travel Times Between Treatment Facilities.

Hub	Satellite	Distance (miles)	Driving Time (mins)
Blue River	Rocky Branch	27	32
Blue River	Todd Creek	28	31
Blue River	Fishing River	19	25
Rocky Branch	Todd Creek	10	20
Rocky Branch	Fishing River	9	20

Relocating the northland operational hub from the Blue River WWTP to the Rocky Branch WWTP would reduce driving mileage from hub-to-satellite facilities by 60% and reduce estimated driving time by 30%. The Rocky Branch WWTP is relatively centrally located between the three Northland treatment facilities. Additionally, the Rocky Branch WWTP has available space in the Control/Laboratory Building. The

facility currently lacks adequate information technology (IT) infrastructure to support the functions of an operational hub, therefore, network infrastructure improvements would be required for this improvement. It is recommended that the Rocky Branch WWTP be utilized as the Northland operational hub in place of the Blue River WWTP to reduce driving distances and times between the operational hub and satellite facilities.

Figure 7-36: Satellite image displaying the locations of the WWTPs operated by WSD.



7.6 TREATMENT PLANT NEEDS IDENTIFICATION

The Rocky Branch WWTP current and future needs, as well as site considerations for potential upgrades, are summarized in this section. The evaluation is primarily focused on treatment needs based on permitted capacities, anticipated loadings, and projected future regulatory requirements.

7.6.1 Design Flow Rates and Loadings

Influent wastewater flows and pollutant loadings were developed in Section 7.3 and forecasted through 2035 based on population growth. At the direction of WSD in order to provide a more conservative analysis, the design influent flows and loadings have been developed based on the permitted flow capacity as stated in the current NPDES permit. The forecasted pollutant loadings have therefore been adjusted based on the ratio of projected 2035 flow developed earlier in this memorandum to the permitted flow capacity. The 2035 forecasted average day flow is 3.1 MGD and the NPDES permitted flow capacity is 3.4 MGD, resulting in a scaling factor of 1.1. The design influent flows and loadings are presented in Table 7-41. Recording and reviewing hourly flow data is recommended to confirm peaking factors, and total influent flow to the plant (including to the holding ponds), as these data were not available during this master plan's development. Since influent TKN is not currently monitored, TKN loading was estimated based on a TKN:TAN ratio of 1.6 (typical for municipal wastewater).

Table 7-41: Design Influent Flows and Pollutant Loadings

Parameter	Average Day	Maximum Month	Peak
Flow, MGD	2.9	7.2	20.3
TSS, lbs/d	4,360	6,530	26,400
BOD_5, lbs/d	3,550	5,310	11,300
TAN, lbs/d	550	830	1,400
TKN, lbs/d	880	1,320	2,240
TP, lbs/d	120	180	600

7.6.2 Anticipated Regulatory Requirements

Through conversations with MDNR, more stringent nutrient removal requirements are anticipated beginning around the year 2025. The extent of nutrient removal requirements are difficult to predict because updated MDNR regulations have not been finalized. Potential future permit limits through 2035 were developed that pertain to TAN, TN, and TP (Table 7-42). Further discussion of discharge permit limits is available in Technical Memorandum 3.

Table 7-42: Rocky Branch WWTP Anticipated Future Average Monthly Permit Limits

Parameter	Current	2025	2030	2035
TSS, mg/L	15	15	10	10
BOD_5, mg/L	10	10	10	10
TAN, mg/La	2.9/1.4	2.8/1.0	2.8/1.0	2.8/1.0
Total Nitrogen, mg/L	-	-	-	8.0
Total Phosphorus, mg/L	-	0.5	0.5	0.5

Notes:
a TAN permit limits vary depending on season.

7.6.3 Current Secondary Treatment Performance

Rocky Branch WWTP currently utilizes aeration basins for secondary treatment, including BOD_5 removal and nitrification. The ultimate performance of the secondary treatment system is dependent on final clarifier TSS and BOD_5 removal efficiency, as inadequate removal of activated sludge TSS may result in permit exceedance due to particulate BOD_5. The 30-day running average for TSS, BOD_5, and TAN are shown in Figure 7-37, Figure 7-38, and Figure 7-39.

Figure 7-37: 30-Day Running Average of Effluent TSS (Monthly Average Limit Shown)

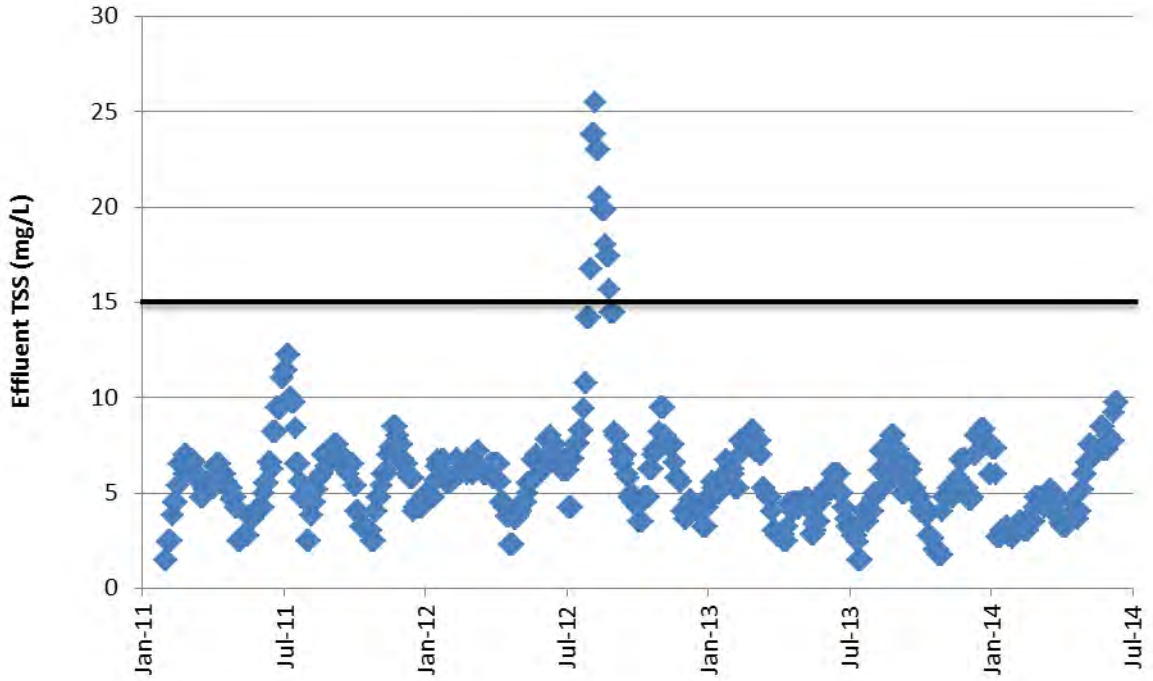


Figure 7-38: 30-Day Running Average of Effluent BOD_5 (Monthly Average Limit Shown)

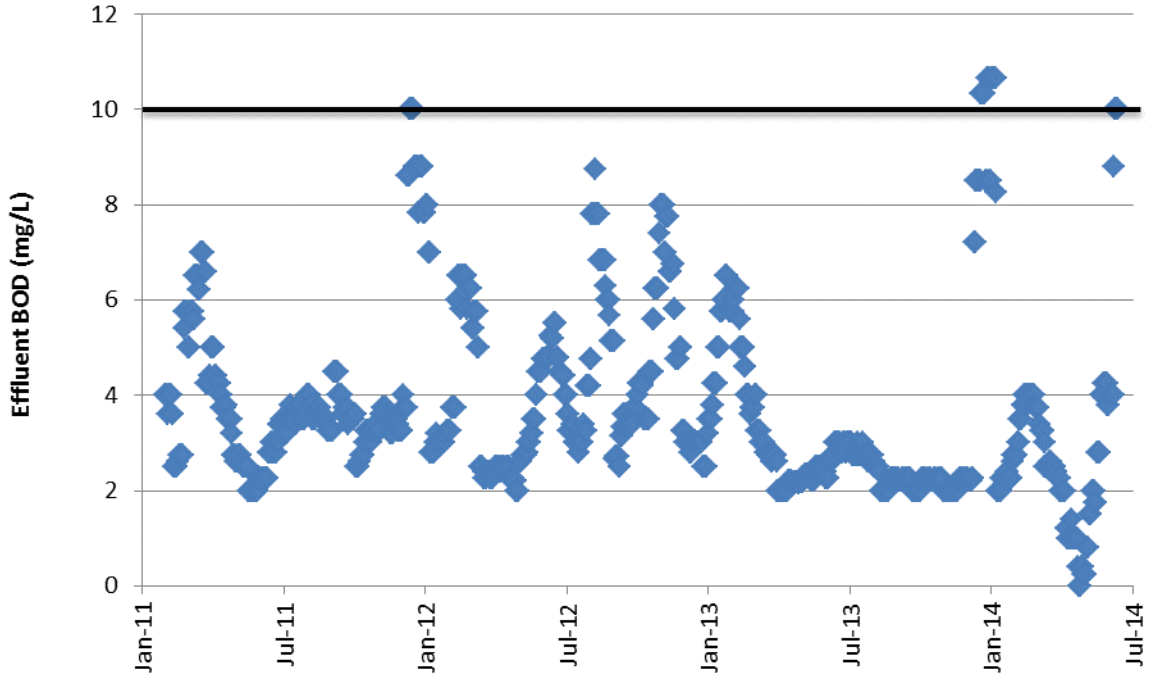
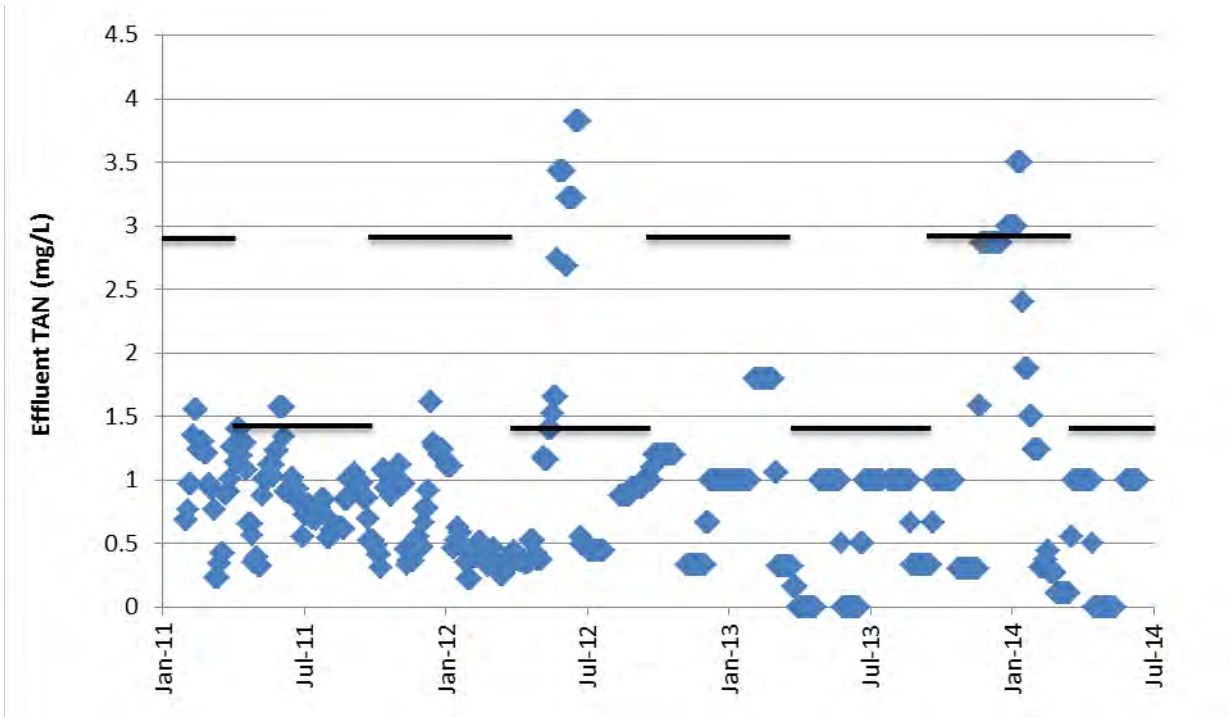


Figure 7-39: 30-Day Running Average of Effluent TAN (Monthly Average Limit Shown)



Aside from an apparent process upset during the summer of 2012, effluent TSS has met monthly average permit limits. Effluent BOD_5 exceeded the monthly average permit limits in December 2013, but the

WWTP has performed satisfactorily for most of 2011 through mid-2014. Effluent TAN exceeded permit limits briefly around June 2012 and December 2013.

7.6.3.1 Considerations for Future Permit Limits

Based on operating data from 2011-2014 and analysis of aeration basin capacity, the current processes at Rocky Branch WWTP will likely be adequate to achieve anticipated 2025 effluent TAN limits of 1.0 mg/L during the warmer months of the year (April-September), and 2.8 mg/L during the colder months of the year (October-March).

By 2025, Rocky Branch WWTP will likely need to comply with an effluent total phosphorus limit of 0.5 mg/L. The current secondary treatment system is not capable of reducing total phosphorus. Total phosphorus removal can be achieved through biological or chemical means, although TP limits less than 1 mg/L may require chemical polishing and tertiary filtration to provide reliable performance. Advanced activated sludge processes are commonly used to achieve both biological denitrification and phosphorus removal, with supplemental chemical addition (polishing) to ensure the total phosphorus discharge limits are met consistently. The existing final clarifiers appear to be adequate for effective settling of precipitate and for achieving effluent TSS below 10 mg/L, including consideration for additional inert solids and reduced VSS content. Meeting stringent effluent phosphorus limits typically requires effluent TSS below 10 mg/L to ensure adequate removal of particulate phosphorus. Solids from biological phosphorus removal processes typically contain between 3-6% phosphorus by weight, and a target of 10 mg/L or less is ideal for consistently meeting a 1.0 mg/L effluent total phosphorus.

By 2035, Rocky Branch WWTP will likely need to comply with an effluent total nitrogen limit of 8.0 mg/L. Under this scenario, the final effluent will need to regularly achieve TSS and BOD_5 removal to 10 mg/L, whether or not it is actually included as a permit limit. As mentioned above, a more robust biological system is required for total nitrogen removal.

7.6.4 Basis of Evaluation

Existing major unit process deficiencies are evaluated using various design flow and loading conditions based upon performance requirements. For example, the headworks facility must be sized to accommodate peak flow to prevent rapid screen blinding and significant grit accumulation in downstream treatment processes during storm events. However, biological treatment processes must be size for a maximum month condition based on average day flow and maximum month BOD_5, TKN, and TP loading. Aeration demand for biological treatment was calculated using maximum day loadings. Table 7-43 provides a summary of design loading conditions that will be used during the alternatives analysis (Section 7.7).

Table 7-43: Rocky Branch WWTP Design Conditions for Unit Processes

Unit Process	Flow, MGD	BOD_5, lbs/d	TSS, lbs/d	TKN[a], lbs/d	TP, lbs/d
Headworks	9.6	-	-	-	-
Biological Treatment	2.9	5,310	6,530	1,320	180
Aeration Demand	-	11,300	-	2,240	-
Final Clarification (Hydraulic Loading)	9.6	-	-	-	-
Final Clarification (Solids Loading)	23.2[b]	-	4,600[c]	-	-

Notes:
a TKN has been estimated based on a TKN:TAN ratio of 1.6
b Final clarifier flow shown includes 100% RAS recycle rate during peak flow event
c Value reported in mg/L. Solids concentration includes estimated solids contribution related to chemical phosphorus removal.

7.6.5 Capacity Needs

The existing treatment plant unit process capacities and anticipated future capacity requirements are presented in Table 7-44. The peak flow to the WWTP is forecast to be approximately 15.7 MGD. However, the lagoons can hold approximately 6.1 MG and the resulting peak flow to the facility is estimated to be 9.6 MGD. Note that the reduced capacities for the activated sludge and final clarifiers are based on operating conditions needed to treat to a total nitrogen value of 8 mg/L. . Alternatives to meet the identified needs are presented in Section 7.7.

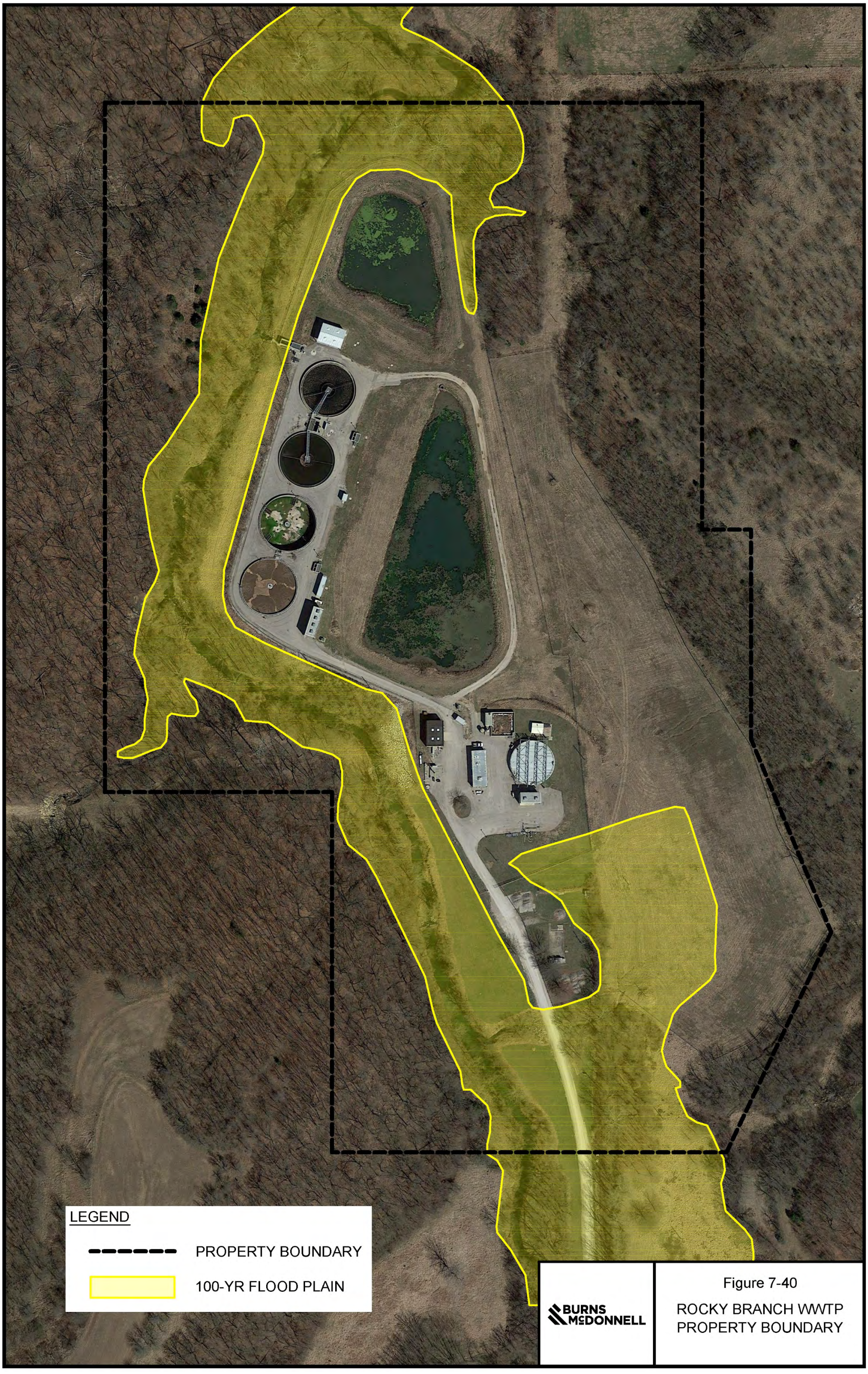
Table 7-44: Rocky Branch WWTP Existing Capacity and Anticipated Design Needs

Unit Process	Existing Capacity	Future Capacity Required	Additional Capacity Needed
Influent Pump Station	9.2 MGD	9.6 MGD	0.4 MGD
Mechanical Screens	9.2 MGD	9.6 MGD	0.4 MGD
Grit Removal	11.7 MGD	9.6 MGD	-
Biological Treatment Basins[a]	2.1 MGD	2.9 MGD	0.8 MGD
Final Clarification			
- Hydraulic Loading	15.7 MGD	9.6 MGD	-
- Solids Loading[b]	11.3 MGD	9.6 MGD	-
Disinfection	10.0 MGD	9.6 MGD	-

Notes:
a Existing and required capacities are based on anaerobic, anoxic, and aerobic zones required to meet future permit limits. Previous capacities were based on existing permit conditions.
b Solids loading assumes MLSS of 4,600 mg/L (includes MLSS contribution from chemical phosphorus removal) and RAS recycle rate of 1Q

7.6.6 WWTP Site Considerations for Future Conditions

The boundaries of all KCMO-owned property at or adjacent to the Rocky Branch WWTP site are shown in Figure 7-40. Areas that appear to be open space are assumed to be available for future development. Construction may be restricted in areas located in a Federal Emergency Management Agency (FEMA)-identified flood plain. If necessary, the requisition of additional property to allow treatment plant expansion in the future will be addressed in Section 7.7.


LEGEND
PROPERTY BOUNDARY
100-YR FLOOD PLAIN
BURNS McDONNELL
Figure 7-40
ROCKY BRANCH WWTP
PROPERTY BOUNDARY

7.7 ALTERNATIVES ANALYSIS

7.7.1 Alternatives Analysis Approach

This section describes the alternatives analysis for secondary treatment processes to meet the projected permit limits. Two (2) secondary treatment alternatives were evaluated in detail, both of which were identified during a planning workshop conducted with WSD. Although the majority of the alternatives analysis largely focuses on the secondary process, capital costs were also developed for various other facility components identified as limiting plant capacity or processes requested by WSD. These costs will be incorporated into the final CIP, along with major equipment replacement identified in the condition assessment. The detailed analyses consisted of process basin and equipment sizing, conceptual cost opinion development, net present value analyses, and quadruple bottom line (QBL) analysis.

7.7.2 Alternatives Development and Workshop

Burns & McDonnell and WSD conducted a service area needs and treatment alternatives workshop on October 13, 2015 to discuss improvement needs at each of the six WWTPs. The drivers for those needs were physical condition, capacity deficiency and regulatory requirements. Condition and capacity needs at the WWTPs were reviewed with WSD during the workshop, along with a "long list" of potential treatment alternatives, which could potentially meet anticipated regulatory requirements. During the workshop, the long list of treatment alternatives was reduced according to WSD stated objectives:

1. Incorporate reliable and time-tested processes.
2. Incorporate solutions that are relatively simple to operate and capable of standardization.
3. Represent the best value over the project life cycle with respect to impacts on the environment, community, economy, and operations.
4. Optimize existing operations and infrastructure.
5. Consider site limitations and account for planned infrastructure like wet weather treatment facilities.

For potential treatment alternatives at the Rocky Branch WWTP, WSD selected conventional biological nutrient removal (BNR) and membrane bioreactor (MBR) processes for the detailed evaluation. A four-stage Bardenpho configuration was evaluated for the conventional BNR alternative. The following sections summarize the alternatives developed as part of this project.

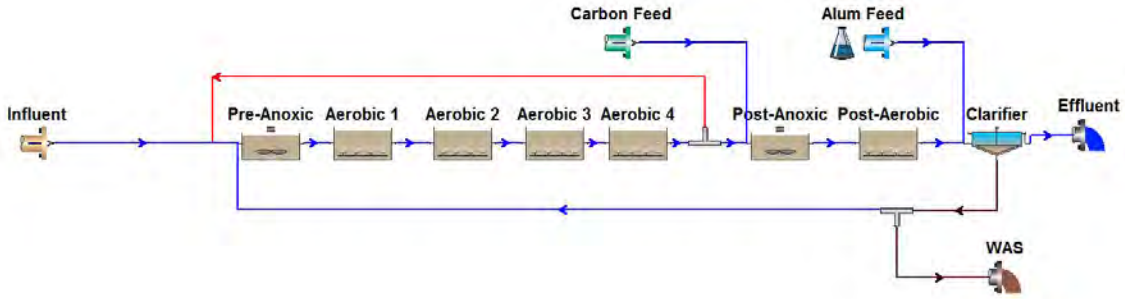
7.7.3 Secondary Process Improvements

Alternatives analyses were performed for conventional BNR and MBR systems. The conventional BNR process improvements were developed using a spreadsheet kinetic model utilizing the biological treatment design flow and maximum month loadings listed in Table 7-43. For the MBR alternative, the process basin sizing and MBR concept was developed by manufacturers specializing in the design of MBR systems. Because of the relatively similar nature of the technologies, the alternatives were modeled using BioWin to refine basin volumes and chemical feed rates.

7.7.3.1 Upgrade Existing Facility to Four-Stage Bardenpho

The four-stage Bardenpho process is a conventional secondary treatment process designed for removal of total nitrogen from the influent wastewater. The basin configuration includes four stages: pre-anoxic, aerobic, post-anoxic, and post-aerobic, as shown in Figure 7-41. Note that carbon supplementation capacity has been provided, but that carbon feed is not anticipated to be required under normal operating conditions.

Figure 7-41: Process Flow Diagram for Four-Stage Bardenpho Activated Sludge Process



Though this configuration requires a number of process basins, it also provides excellent operational flexibility to help optimize effluent quality. The post-anoxic zone allows the system to achieve reduced effluent total nitrogen compared to systems with only pre-anoxic basins and internal recycle (such as an A2O process – anaerobic-anoxic-oxic). The post-anoxic zone also reduces the likelihood that carbon feed is necessary, compared to an A2O process. This alternative assumes phosphorus is removed via chemical precipitation, but an additional anaerobic basin could be installed in the future for a limited cost to allow enhanced biological phosphorus removal and a reduction in chemical use.

The primary disadvantage of the four-stage Bardenpho process is the upfront capital costs for the additional process basins and annual maintenance associated with the post-anoxic mixers and post-aerobic diffusers.

Figure 7-42 shows a potential four-stage Bardenpho process layout on the Rocky Branch WWTP site. Flow splits into two parallel process trains, and continues through the pre-anoxic zone, aerobic zone, post-anoxic zone, and post-aerobic zone. Submersible propeller pumps are installed in each aerobic zone, which convey the internal recycle (IR) stream to the pre-anoxic zone. From the post-aerobic zone, flow is equally divided by the clarifier splitter structure, and continues to the secondary clarifiers. Overflow from the clarifiers continues to disinfection, and the RAS pumps station conveys clarifier underflow back to the pre-anoxic zone. Chemical feed points include supplemental carbon in the post-anoxic zone and coagulant upstream of the clarifiers. Table 7-45 lists major process basin volumes, and Table 7-46 lists major process equipment.

Table 7-45: Four-Stage Bardenpho Basin Sizes

Basin Type	Number of Units (Total)	Approximate Size (Each)
Pre-Anoxic[a]	2	0.3 MG
Aerobic[b]	2	0.8 MG
Post-Anoxic[b]	2	0.2 MG
Post-Aerobic[a]	1	0.06 MG
Secondary Clarifiers[c]	2	100 ft Diameter

Notes:
a Requires new basin construction.
b Utilizes existing basins with internal baffling.
c Utilizes existing secondary clarifiers.

Table 7-46: Four-Stage Bardenpho Process Equipment

Equipment	Location	Number of Units	Capacity (Each)
Basin Mixers	Anoxic Basins	8	-
Aeration Blowers	Blower Building	3	1,500 scfm
Diffused Air Grids	Aerobic Basins	13,400 ft^2	-
IR Pumps	Aerobic Basins	6[a]	2,000 gpm
Carbon Storage Tanks	Process Building	1	3,000 Gallons
Carbon Feed System	Process Building	1[a]	8 gph
Coagulant Storage Tanks	Process Building	1	30,000 Gallons
Coagulant Feed System	Process Building	1[a]	40 gph

Notes:
a Quantity indicated includes N-1 duty units and one redundant unit.

LEGEND

1 PRE-ANOXIC
2 AEROBIC
3 AEROBIC
4 AEROBIC
5 AEROBIC
6 POST-ANOXIC
7 POST-AEROBIC
8 PROCESS BUILDING
PROPERTY BOUNDARY
FEMA FLOOD ZONE

BURNS McDONNELL

Figure 7-42

ROCKY BRANCH WWTP
FOUR-STAGE BARDENPHO
SITE PLAN

The four-stage Bardenpho alternatives utilizes the existing process basins and requires construction of additional process volume. The existing process basins must be taken of out service to install partition walls, which will allow a single tank to contain multiple segregated zones. This phase of construction should be undertaken in the warmer months when a smaller basin volume is required to meet the required SRT for nitrification. One basin operated at an elevated MLSS (up to 5,000 mg/L) should be adequate to meet the current permit requirements during the summertime. The first basin should be partitioned and retrofitted with new aeration and mixing equipment in early summer. Once complete, the new basin should be placed into service and the second basin should be partitioned and retrofitted the following late spring or early summer.

7.7.3.2 Retrofit Existing Facility into MBR Plant

Membrane bioreactor processes consist of a biological reactor with biomass in suspension, similar to conventional activated sludge. The difference in principle of operation between an MBR and conventional activated sludge is the solids separation process. Rather than using gravity clarification for solids separation, membranes are immersed in basins and a vacuum draws treated wastewater through the membrane fibers. Periodically, air introduced at the base of the membranes scours solids off the membrane fibers. Chemical cleaning is required occasionally to remove fouling from the membrane surface.

An MBR can operate at much higher MLSS concentrations (7,500 to 10,000 mg/L) than traditional secondary process (conventional activated sludge processes typically operate between 2,000 and 4,000 mg/L MLSS) because it is not limited by gravity clarification (high MLSS concentrations lead to poor settling). MBR technologies allow for a much smaller plant footprint than conventional activated sludge plants for two reasons: 1) elimination of the need for secondary clarification, and 2) higher MLSS allows similar solids retention times in smaller process basins. MBR plants can be costly to operate when compared to traditional activated sludge plants due to high-energy pumping and chemical cleaning requirements. MBR plants also tend to have higher upfront capital costs and equipment replacement costs compared to conventional treatment plants. MBRs require fine screening (1-2 mm openings) upstream of the secondary process to protect the membranes from damage.

An additional benefit of the MBR process is that downstream tertiary filtration processes are not required for plants requiring strict effluent phosphorus requirements. Coagulant, such as alum, can be added to the process basins upstream of the membranes to precipitate phosphorus not taken up by the biological process. Note that ferric salts are not appropriate because they can cause iron ore deposits (termed “clinkers”) to form in the incinerator, which cause operational and maintenance issues. Phosphorus that is excluded by the membranes is ultimately removed from the process train through the waste activated

sludge stream. Figure 7-43 shows a process flow diagram for the MBR alternative proposed for Rocky Branch WWTP.

Figure 7-43: Rocky Branch WWTP MBR Process

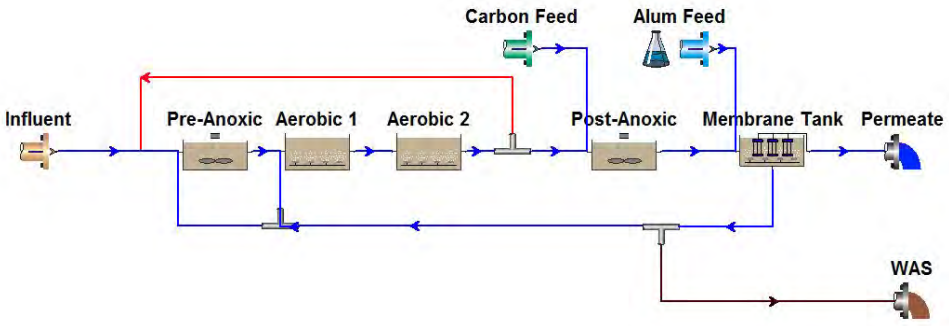


Figure 7-44 shows a potential MBR process layout on the Rocky Branch site. Fine screens (2 mm or finer) located in the headworks building remove debris from the wastewater prior to entering the secondary process. Flow splits into two parallel process trains, and continues through a pre-anoxic zone (denitrification), two aerobic zones, a post-anoxic zone, and the MBR system. MLSS is re-aerated in the membrane tank, which strips residual nitrogen gas from the wastewater and scours the membranes. Return streams from the MBR tank include a 2.4Q recycle loop to the pre-anoxic (combined RAS/IR) zones and 1.6Q recycle loop to the aerobic zones. The return stream to the aerobic zone minimizes MLSS buildup in the membrane tanks, while the return to the pre-anoxic zone maintains adequate MLSS and introduces nitrate, enhancing nitrogen removal. Permeate pumps draw wastewater through the membranes to the disinfection process. Chemical feeds include carbon feed in the post-anoxic zone, coagulant (for chemical phosphorus removal) at the membrane tank, as well as sodium hypochlorite and citric acid systems for cleaning the membranes. Table 7-47 lists major process basin volumes, and Table 7-48 lists major process equipment. Note that carbon supplementation capacity has been provided, but that carbon feed is not anticipated to be required under normal operating conditions.

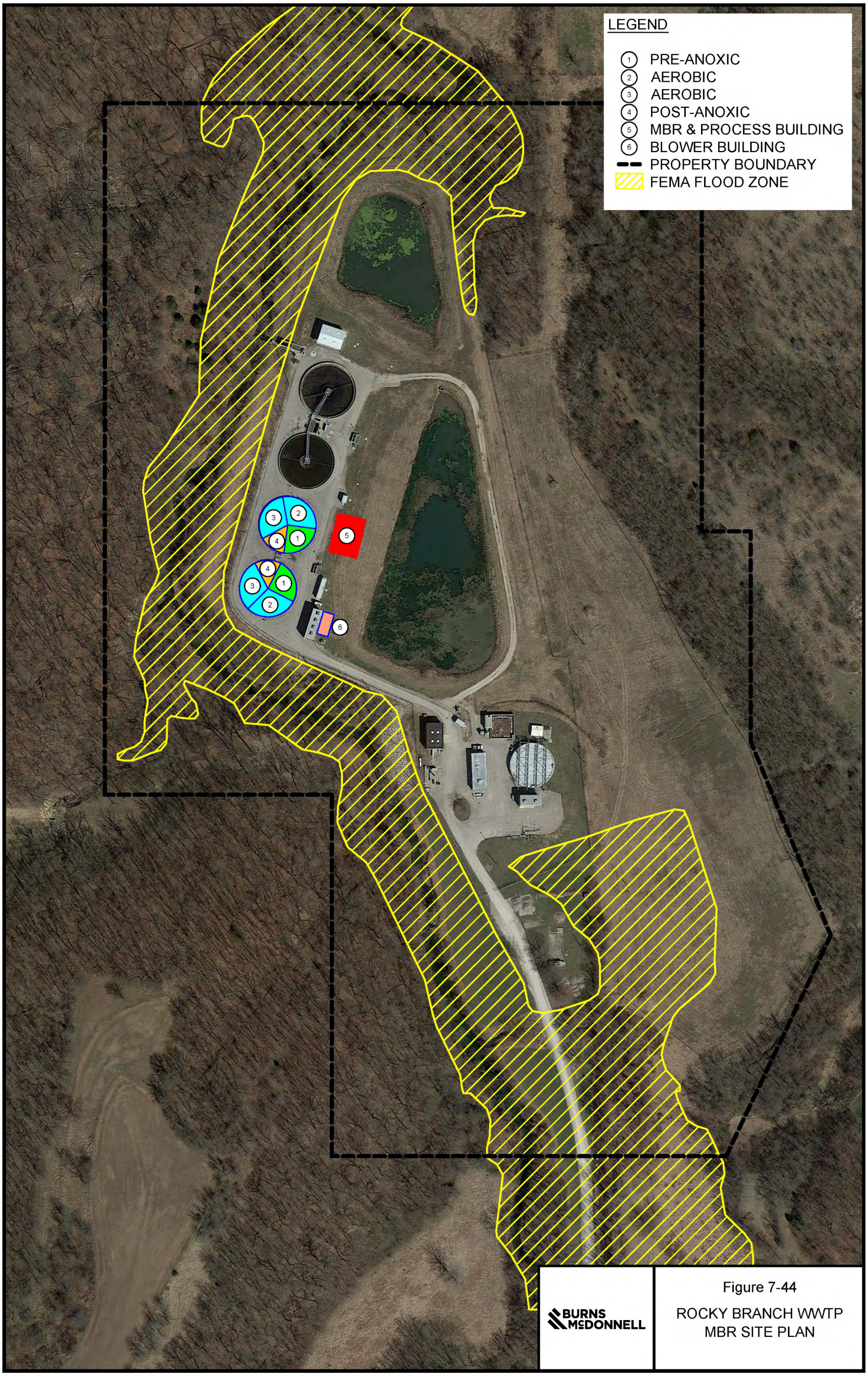

LEGEND
1 PRE-ANOXIC
2 AEROBIC
3 AEROBIC
4 POST-ANOXIC
5 MBR & PROCESS BUILDING
6 BLOWER BUILDING
PROPERTY BOUNDARY
FEMA FLOOD ZONE
BURNS McDONNELL
Figure 7-44
ROCKY BRANCH WWTP
MBR SITE PLAN

Table 7-47: MBR Basin Sizes

	Number of Units (Total)	Approximate Size (Each)
Pre-Anoxic[a]	2	200,000 Gallons
Aerobic[a]	2	450,000 Gallons
Post-Anoxic[a]	2	150,000 Gallons
MBR[b]	1	50,000 Gallons

Notes:
a Utilizes existing basins with internal baffling.
b Requires new basin construction.

Table 7-48: MBR Process Equipment

Equipment	Location	Number of Units	Capacity (Each)
Influent Fine Screens	Headworks	2[a]	9.6 MGD
Basin Mixers	Anoxic Basins	8	-
Aeration Blowers	Blower Building	3	1,500 scfm
Diffused Air Grids	Aerobic Basins	10,400 ft^2	-
IR Pumps	Process Building	5[a]	2,000 gpm
WAS Pumps	Process Building	3[a]	250 gpm
Carbon Storage Tanks	Process Building	1	3,000 Gallons
Carbon Feed System	Process Building	1[a]	8 gph
Coagulant Storage Tanks	Process Building	1	30,000 Gallons
Coagulant Feed System	Process Building	1[a]	40 gph
MBR Equipment	MBR Basin	1[b]	9.6 MGD

Notes:
a Quantity indicated includes N-1 duty units and one redundant unit.
b MBR equipment includes membranes and associated equipment, permeate pumping system, air scour blowers, backpulse system, chemical cleaning systems, electrical and control equipment, and air compressors.

The MBR alternative utilizes the existing process basins and requires construction of additional process volume. The MBR tank would be installed first to allow the final clarifiers to be taken offline and allow the plant to operate with less focus on MLSS during the remaining phases of construction. The existing process basins must be taken of out service to install partition walls, which will allow a single tank to contain multiple segregated zones. This phase of construction should be undertaken in the warmer months when a smaller basin volume is required to meet the required SRT for nitrification. One basin operated at an elevated MLSS (5,000 – 8,000 mg/L) should be adequate to meet the current permit requirements during the summertime. The first basin should be partitioned and retrofitted with new aeration and mixing equipment in early summer. Once complete, the new basin should be placed into service and the second basin should be partitioned and retrofitted the following late spring or early summer.

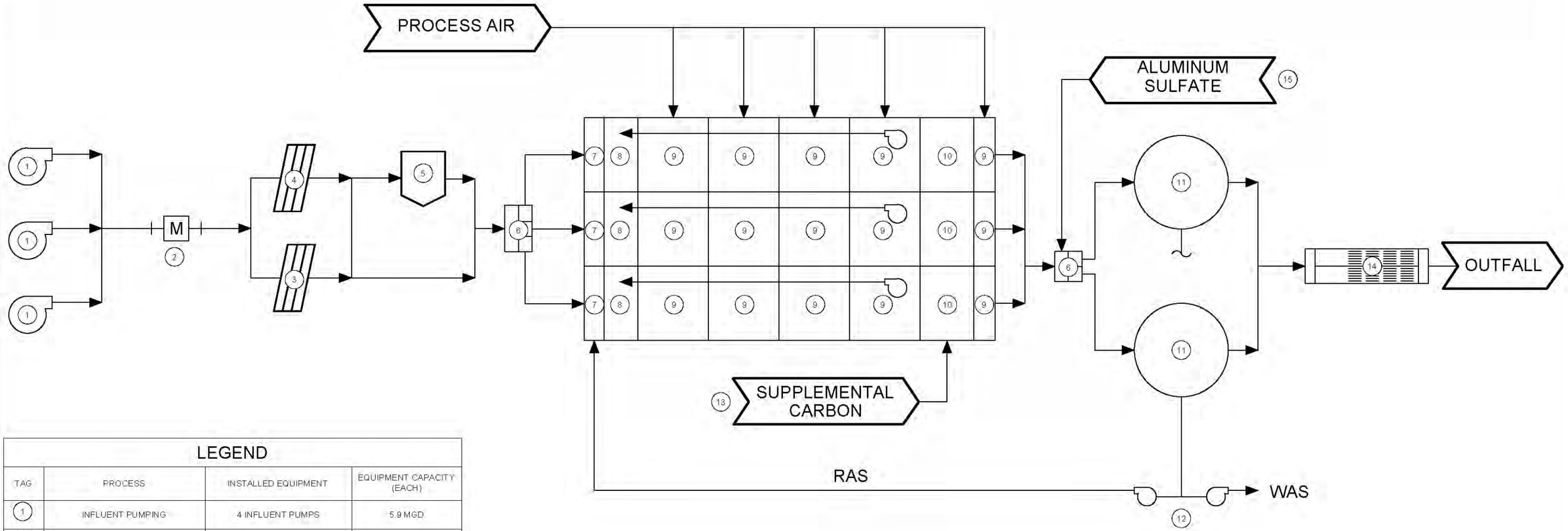
7.7.3.3 New Regional WWTP for Rocky Branch and Todd Creek Service Areas

This alternative constructs a new treatment facility for both the Rocky Branch and Todd Creek service areas, approximately one (1) mile north of the existing Todd Creek facility. A high-level conceptual design was developed for the regional facility to develop order of magnitude costs for the regional facility alternative. It should be noted that the cost for a greenfield facility can vary significantly depending on the level of redundancy, control, and amount of ancillary facilities constructed. The costs should continue to be updated throughout the design process.

Figure 7-45 shows a process flow diagram for the conceptual facility and Figure 7-46 shows a site plan for the collection system expansion and new treatment plant. The 30-inch influent interceptor sewer from the existing Todd Creek plant would extend approximately one (1) mile north to the new plant, and a new 24-inch force main extends approximately six (6) miles northwest from the existing Rocky Branch WWTP. The existing Rocky Branch influent lift station would be retrofitted to pump to the new facility by replacing the pumps with higher head capacity pumps. Alternatively, a new pump station could be constructed on the Rocky Branch site, depending on WSD's preferences. The remaining treatment processes at both Rocky Branch and Todd Creek would be removed from normal service, with the exception of the lagoons at Rocky Branch (upgraded for additional peak flow storage), and the lagoons at Todd Creek (waste solids storage).

The regional facility site includes a headworks building, secondary process basins, process building (housing blowers and chemical feeds), secondary process trains, clarifiers, RAS pump station, UV facilities, and an administration/lab building. Flow from the interceptor extension and new force main discharge into a new influent wet well, where the new influent lift station pumps flow to two parallel mechanical screens. A bypass channel is also provided with a manual bar rack. From the screens, flow enters two parallel grit removal units (or bypass channel) and continues to the secondary process.

The secondary process used in this evaluation is in a five-stage Bardenpho configuration, as shown in Figure 7-47. Note that carbon supplementation capacity has been provided, but that carbon feed is not anticipated to be required under normal operating conditions.



LEGEND			
TAG	PROCESS	INSTALLED EQUIPMENT	EQUIPMENT CAPACITY (EACH)
1	INFLUENT PUMPING	4 INFLUENT PUMPS	5.9 MGD
2	INFLUENT FLOW METER	MAGNETIC FLOW METER	24"
3	INFLUENT SCREENING	2 MECHANICAL SCREENS 4 ISOLATION GATES	9.0 MGD
4	INFLUENT SCREENING	MANUAL BAR RACK 2 ISOLATION GATES	18.0 MGD
5	GRIT REMOVAL	2 GRIT UNITS 4 GATES 2 GRIT PUMPS 2 GRIT CLASSIFIERS	9.0 MGD
6	SPLITTER STRUCTURE	3 GATES (PROCESS BASINS) 4 GATES (CLARIFIERS)	-
7	ANAEROBIC BASINS	2MIXERS/BASIN	-
8	ANOXIC BASINS	4 MIXERS/BASIN	-
9	AEROBIC BASINS	5 AERATION BLOWERS 2 IR PUMPS/LAST BASIN	3,700 SCFM 3.0 MGD PUMPS
10	ANOXIC BASINS	4 MIXERS/BASIN	-
11	SECONDARY CLARIFIERS	CLARIFIER MECHANISMS	100 FT DIAMETER
12	RAS/WAS PUMP STATION	3 RAS PUMPS 2 WAS PUMPS	RAS: 2.0 MGD
13	CARBON FEED SYSTEM	2 TANKS 2 FEED PUMPS	5,000 GAL TANKS 6 GPH PUMPS
14	DISINFECTION	3 CHANNELS 6 ISOLATION GATES	9.0 MGD/CHANNEL
15	ALUMINUM SULFATE FEED	4 TANKS 2 FEED PUMPS	10,000 GALLON TANKS 50 GPH PUMPS

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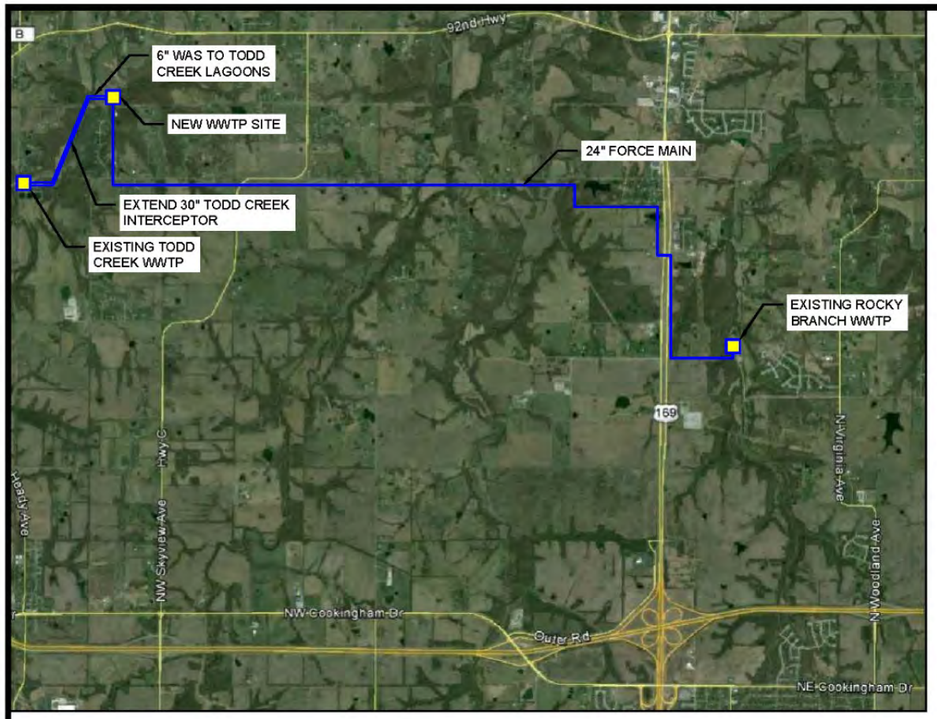
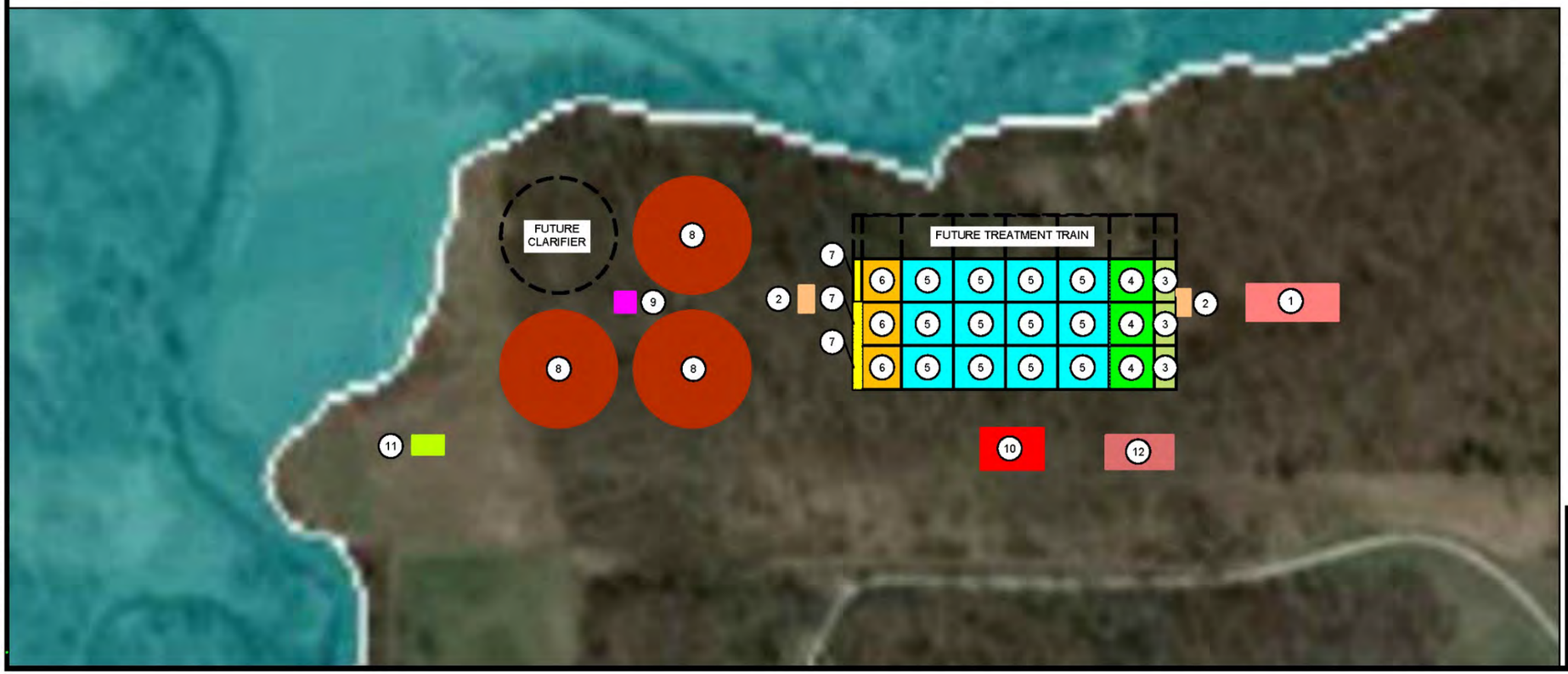
Figure 7-45

ROCKY BRANCH WWTP
REGIONAL FACILITY
PROCESS FLOW DIAGRAM





LEGEND

1. HEADWORKS
2. SPLITTER STRUCTURE
3. ANAEROBIC
4. ANOXIC
5. AEROBIC
6. POST-ANOXIC
7. RE-AERATION
8. SECONDARY CLARIFIER
9. RAS PUMP STATION
10. PROCESS BUILDING
11. UV BUILDING
12. ADMINISTRATION BUILDING

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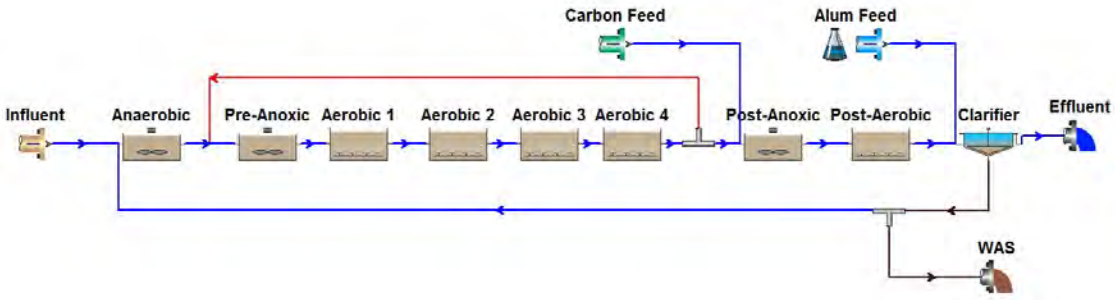
Figure 7-46

ROCKY BRANCH WWTP
REGIONAL FACILITY
WITH TODD CREEK

Figure 7-47: Process Flow Diagram for Five-Stage Bardenpho Activated Sludge Process



Though this configuration requires a number of process basins, it also provides excellent operational flexibility to help optimize effluent quality and provides a reliable effluent quality. Flow splits into three parallel process trains (with space allocated on the site for a 4th), and continues north through the anaerobic zone, pre-anoxic zone, aerobic zone, post-anoxic zone, and post-aerobic zone. Each aerobic zone houses two (2) submersible propeller pumps, which conveys the IR stream to the pre-anoxic zone.

From the post-aerobic zone, flow splits in the clarifier splitter structures, and continues to the secondary clarifiers. Overflow from the clarifiers continues to a new 2-channel UV facility, and the RAS pump station conveys underflow back to the anaerobic zone. Chemical feed points include supplemental carbon in the post-anoxic zone and coagulant system for phosphorus removal. Table 7-49 shows estimated process basin volumes for this alternative. Note that carbon supplementation capacity has been provided, but that carbon feed is not anticipated to be required under normal operating conditions.

Table 7-49: Rocky Branch and Todd Creek Regional Treatment Facility Basin Sizes

	Number of Units (Total)	Approximate Size (Each)
Anaerobic	3	0.16 MG
Pre-Anoxic	3	0.35 MG
Aerobic	3	1.6 MG
Post-Anoxic	3	0.3 MG
Post-Aerobic	3	0.06 MG
Secondary Clarifiers	3	135 ft Diameter

Table 7-50: Rocky Branch and Todd Creek Regional Treatment Facility Process Equipment

Equipment	Location	Number of Units	Capacity (Each)
Basin Mixers	Anaerobic/Anoxic Basins	30	-
Aeration Blowers	Blower Building	5	3,700 scfm
Diffused Air Grids	Aerobic Basins	37,000 ft^2	-
IR Pumps	Aerobic Basins	6[a]	3,000 gpm
Carbon Storage Tanks	Process Building	1	5,000 Gallons
Carbon Feed System	Process Building	1[a]	8 gph

Notes:
a Quantity indicated includes N-1 duty units and one redundant unit.

New WAS pumps transfer waste solids from the system to the existing Todd Creek lagoons for final disposal in accordance with the recommendations described in TM-10.

Constructability of this alternative is less complicated than retrofitting the existing plant. This alternative could be constructed with little to no interruption to the existing plant's operation, as construction of a new facility is required.

7.7.3.4 New Regional WWTP for Rocky Branch, Todd Creek, and Smithville Service Areas

During the wastewater regionalization discussion that occurred during Workshop W16-19-Service Area Plans, Kansas City, Missouri Water Services requested that the feasibility of regionalizing with the City of Smithville, Missouri be evaluated. This additional evaluation was to be performed at a high level, without a full QBL, but was to provide planning-level capital costs for the alternative so that WSD could determine if it was financially viable. The City of Smithville was contacted to discuss this alternative and to gauge their willingness to participate in this type of regionalization effort. Discussions with Steve Garrett, Smithville, Missouri City Administrator, indicated that they were open to discussions on the topic of regionalization, however, regionalization must be financially feasible for both parties.

7.7.3.4.1 The Existing Smithville WWTP

The existing Smithville Wastewater Treatment Plant (WWTP) is located west of Smithville at approximately 100 NW 164th Street, Smithville, Missouri. Per their Missouri State Operating Permit dated February 1, 2016, the Smithville WWTP has a design flow of 1.125 MGD, an actual flow of 0.746 MGD, and a design sludge production of 350 dry tons per year. The current plant consists of a headworks facility with mechanical bar screen, three sequencing batch reactors, UV disinfection, effluent pumping, and two sludge storage basins. Future plant improvements include construction of holding basins to store excess

flow. Table 7-51 below includes a summary of the effluent permit requirements listed in Smithville WWTP's current operating permit.

Table 7-51: Smithville WWTP Current Effluent Limits

	Weekly Average	Monthly Average
BOD_5 (mg/L)	45	30
Total Suspended Solids (mg/L)	45	30
E. coli (#/100 mL)	1030	206
Ammonia as N (mg/L)	Daily Max: 11.5 (April 1- Sept 30) 12.4 (Oct 1 – March 31)	 3.2 (April 1- Sept 30) 5.6 (Oct 1 – March 31)
Oil & Grease (mg/L)	15 (Daily Max)	10

The current plant is located within the 100-year floodplain, which makes expansion of the current plant at its current location an unattractive option. A potential location for a new regional plant was selected approximately 0.75 miles northwest of the existing plant. This site was selected because it is out of the floodplain, it is near the existing Smithville WWTP, it is near the downstream convergence of the Smithville, Todd Creek, and Rocky Branch service areas, and it is secluded from major developments.

7.7.3.4.2 New Regional Facilities for Rocky Branch, Todd Creek, and Smithville Service Areas

Regionalization requires construction of a new 7 MGD average daily flow (19.9 MGD peak flow) treatment facility and additional conveyance systems for the Rocky Branch, Todd Creek, and Smithville service areas. Development of the new facilities would involve land acquisition, permitting, and easements for interceptor sewers.

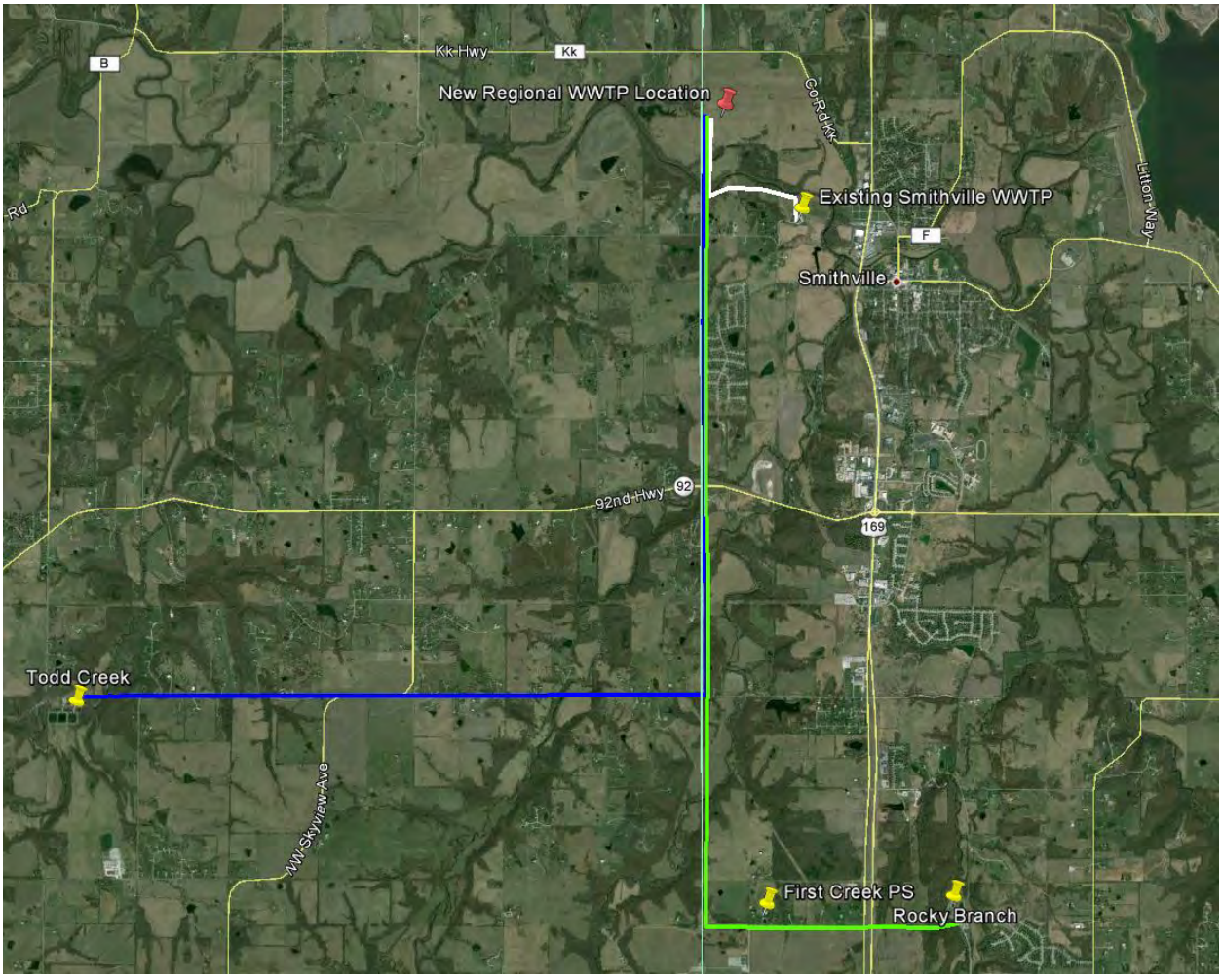
The regional plant size was developed by estimating the 2035 population for Smithville, Missouri and multiplying by the current average daily flow per person. This resulted in a 2035 average daily flow for Smithville. The Smithville average daily flow value was added to the values previously forecasted for Rocky Branch and Todd Creek resulting in the average daily flow required for the regional plant. The projected 2035 population values were also used to calculate the peaking factor, which was used to size facilities such as the headworks, screens, and grit.

7.7.3.4.3 Pump Station and Force Main Requirements

New pump stations at the Rocky Branch WWTP and the Todd Creek WWTP would be required to pump flow from the service areas to the new facility. Extending the interceptors from the First Creek pump station and the Second Creek pump station was evaluated in order to reduce pumping costs and to provide

sanitary sewer service to more downstream areas. However, there are low points along the proposed sewer alignments, which would drive the pipelines very deep and would necessitate either intermediate pump stations or the use of force mains from the existing infrastructure to the new treatment facility. For the purposes of this evaluation, First Creek and Second Creek will continue to pump to Todd Creek and Rocky Branch WWTPs, respectively, and the new pump stations at Todd Creek and Rocky Branch WWTPs will pump all of the flow from those service areas to the new regional WWTP for treatment. A new pump station will be required at the existing Smithville WWTP to pump all influent flow to the new regional WWTP for treatment; gravity flow is not possible due to low points along the proposed alignment. Refer to Figure 7-48 for the proposed force main alignments.

Figure 7-48: Force Main Alignments to the Regional WWTP



New force mains routed from the new pump stations at the Rocky Branch, Todd Creek, and Smithville WWTPs will be added. The proposed force main alignment from Rocky Branch to the new facility is approximately 5.8 miles, the force main from Todd Creek to the new facility is approximately 6.6 miles, and the force main from the Smithville WWTP to the new facility is approximately 1.1 miles.

The force mains were sized to maintain a velocity of at least 2 feet per second at the permitted capacities of each of the treatment plants. Preliminary sizes are included in Table 7-49 below; however, further hydraulic evaluations would need to be conducted if this alternative is pursued further.

Table 7-52: Summary of Force Main Requirements

	Force Main Length	Force Main Size
Rocky Branch	5.8 miles	16-inch
Todd Creek	6.6 miles	18-inch
Smithville	1.1 miles	10-inch

The regional plant modeled in this effort is a BNR system. It was assumed that the nitrogen and phosphorous goals for Smithville will be similar to those for Rocky Branch and Todd Creek. The regional facility includes a headworks building, secondary process basins, a process building (housing blowers and chemical feeds), secondary process trains, clarifiers, a RAS pump station, UV facilities, and an administration/lab building. Flow from the new force mains discharges into a new influent wet well, where the new influent lift station pumps flow to two parallel mechanical screens. A bypass channel is also provided with a manual bar rack. From the screens, flow enters two parallel grit removal units (or bypass channel) and continues to the secondary process. The secondary process used in this evaluation is a five (5)-stage Bardenpho configuration.

Rocky Branch WWTP, Todd Creek WWTP and Smithville WWTP currently land apply their solids. It is assumed that the new regional plant would continue to land apply solids, however, a decision to land apply using WSD's land farm or by a third party would be required.

7.7.3.4.4 Smithville Regionalization Capital Cost

A high-level capital cost was developed for this alternative, including the cost of land acquisition, pump stations, collection system, and the WWTP. The estimated capital cost was approximately $163,800,000.

On an average daily basis, the Rocky Branch Service Area accounts for 40.3% of the total flow at the regional facility, the Todd Creek Service Area accounts for 45.8% of the total for at the regional facility, and Smithville accounts for 13.9% of the total flow at the regional facility. In order to develop a high-level cost for both KCMO WSD and the City of Smithville, these percentages were used to divide the shared cost of the land acquisition and regional treatment facility between the two municipalities. The cost of the pump station and force main from Smithville WWTP to the new facility will be the responsibility of the City of Smithville, and the cost of the pump stations and force mains from Rocky Branch and Todd Creek WWTPs to the new regional facility will be the responsibility of KCMO WSD.

Table 7-53 includes a summary of the cost of this alternative for both municipalities. A more detailed facilities development and cost estimate will need to be developed if this alternative moves forward for further analysis.

Table 7-53: Regionalization Cost Summary

Cost Allocation	Capital $
KCMO WSD	$141M
City of Smithville	$22.8M
Total Cost	**$163.8M**

7.7.3.5 Chemical Feed Considerations

The rate of denitrification in anoxic zones is dependent upon the quantity of organic carbon (food) available to the microorganisms responsible for nutrient removal. After the pre-anoxic and aeration zones, there is very little organic carbon available in the post-anoxic zone, and denitrification proceeds at a lower rate. Supplemental carbon can be added to the post-anoxic basin to accelerate the denitrification rate in the same reactor volume. Common supplemental carbon chemicals include methanol and MicroC-Glycerin.

All treatment alternatives include installation of a carbon supplementation chemical feed system. However, since the facility does not have primary clarification, carbon supplementation is not anticipated to be required under normal operation conditions. The carbon feed system would be utilized in the event of a process upset or if the facility experiences long-term difficulty maintaining effluent TN below 8 mg/L. The MBR Alternative also requires additional chemicals associated with membrane cleaning.

For the four-stage Bardenpho and MBR alternatives, alum addition is planned for chemical phosphorus removal to achieve an effluent TP concentration of 0.5 mg/L. The addition of metal salts causes the precipitation of metallic hydroxides and phosphate complexes, which settle readily in downstream clarification processes or are removed via filtration through membranes or tertiary filtration. Achieving effluent TP concentrations of 0.5 mg/L or less with chemical addition typically requires between 1-3 moles of aluminum or iron per mole of phosphorus in the wastewater at the time of chemical addition. The MBR option will result in the removal of virtually all particulate phosphorus and achieving a 0.5 mg/L effluent TP should only require proper chemical dosing. The four-stage Bardenpho system will require tighter control over the settling characteristics of the sludge to ensure effective removal of particulate phosphorus. Both alternatives are anticipated to require the same amount of metal salt addition

to achieve 0.5 mg/L effluent TP (Table 7-54). The regional facility does not require alum feed because anaerobic zones are included in the plant design.

Table 7-54: Metal Salt Feed Requirements

Alternative	Feed Rate (gpd)
Four-Stage Bardenpho	360
MBR	360
Regional Facility	-

For the four-stage Bardenpho and MBR alternatives, alum usage could be reduced in the future with the incorporation of a small, mixed anaerobic zone upstream of the pre-anoxic basin to encourage biological phosphorus removal. Biological phosphorus removal requires a slightly more complex control scheme and is more prone to sensitivity than chemical phosphorus removal, but may yield a lower lifecycle cost due to significant reductions in daily chemical consumption.

7.7.4 Additional Facility Improvements

This section describes improvements that are independent of the secondary process improvements. These improvements address the capacity limitations identified in Section 7.6.5, as well as major equipment replacements described in Section 7.4.

7.7.4.1 Influent Pump Station

The existing Influent Pump Station does not have adequate firm capacity for the projected peak facility flow. The proposed solution is to replace two of the four existing pumps (3.1 MGD) with units of a slightly higher capacity (3.5 MGD), bringing the firm capacity to 9.6 MGD. Due to the relatively low cost of the influent pumps, these costs have been included in the individual alternatives analyses rather than a separate additional facility improvements analysis.

7.7.4.2 Influent Screening

The existing mechanical screen is rated for 9.2 MGD peak flow, which is below the forecasted wet weather flow of 9.6 MGD. The four-stage Bardenpho alternative requires conventional mechanical screening (6 mm openings), while the MBR system requires fine screening (1-2 mm openings). Since both alternatives require unique influent screening improvements, the screening systems have been included in the individual alternative analyses rather than a separate additional facility improvements analysis.

7.7.4.3 Major Equipment Replacement

Existing major equipment timeline for replacement is based on process and equipment condition ratings in Section 7.4. The equipment replacement timeline as shown in Table 7-55 is an approximation of remaining equipment life. Equipment with a rating of one (1) is expected to realize the full equipment life while equipment with a rating of three (3) or four (4) is near or at the end of equipment life. The equipment with condition ratings of three (3) or four (4) should be considered for replacement within the next five (5) years. No equipment at Rocky Branch WWTP was given a condition rating of 3 or 4 during the condition assessment.

Table 7-55: Estimated Remaining Service Life for Major Equipment Based on Condition Rating

Rating Number	Rating Term	Estimated Service Life
1	Very Good Condition	15 years
2	Moderate Deterioration	10 years
3	Significant Deterioration	5 years
4	Virtually Unserviceable	0 years

7.7.4.4 Process Instrumentation and Controls

WSD desires a high level of automation for their new or upgraded facilities. For Rocky Branch WWTP, the final plant design can provide instrumentation and controls for most major process systems. Equipment instrumentation typically includes failure alarms, high temperature alarms, pressure switch interlocks, among many other manufacturer or system-specific components. This section describes major process instrumentation and control systems that the future liquid-stream design can consider; solids instrumentation and controls are described in TM-11:

- **Secondary Clarifiers (where applicable):** Installing sludge blanket level sensors would provide valuable information on the clarifier operation, with less involvement required from operators. Operators can fine-tune sludge pump run intervals and times using the information gathered from these monitors.

- **Secondary Process Controls:** Control and monitoring systems for the secondary process greatly improves operator's ability to diagnose problems, and can significantly reduce power costs and chemical usage. Instruments for these control systems can consist of: influent online ammonia analyzers, oxidation-reduction-potential (ORP) and/or nitrate sensors, DO probes in both aerated and unaerated basins, TSS monitors, chemical oxygen demand (COD) analyzers, and recycle flow meters. These sensors provide feedback to the control systems and allow operators to fine-

tune the system to meet treatment requirements while lowering operations and maintenance (O&M) costs. The control system can take the level of control a step further and automatically turn equipment on or off, adjust pump speeds and chemical dosages, and actuate valves as required to treat the wastewater based on influent flow and water quality.

- **Chemical Feed Dosages:** Chemical feed systems at the new facility may require supplemental carbon and alum. The chemical dosages can be controlled using the plant influent flow and real-time phosphorus monitoring, minimizing over- or under-dosing chemicals during the plant's diurnal flow pattern.

- **Pump Automation and Remote Control:** Remote control and automation of pump stations at the plant greatly improves operators' ability to diagnose and resolve problems remotely. This would reduce travel time of night shift plant operators from Blue River WWTP. Remote control is recommended for the Influent Pump Station, RAS pumps and WAS pumps.

Note that most process instrumentation requires periodic cleaning and calibration, and that staff must conduct routine inspection to ensure that process equipment is performing properly. Without proper care, many process instruments lose their value to the treatment system because they no longer provide an accurate representation of plant operating conditions. All instrumentation should be cleaned, calibrated, and serviced as recommended per the manufacturer.

7.7.5 Alternative Net Present Value Comparisons

Based on the equipment requirements and conceptual site plans, opinions of probable construction costs were developed for each alternative. The cost opinions show a relative comparison between the two alternatives. Cost opinions are based upon conceptual information, raw water quality, and anticipated regulatory requirements. These cost opinions rely primarily on Burns & McDonnell's experience and judgments as professional consultants combined with information from past experience, vendors, and published sources.

Numerous assumptions were required to develop opinions of probable costs. WSD provided direction on discount rate, inflation rate, utility costs, and labor costs. For developing high-level cost opinions for each alternative, the project team made assumptions regarding ancillary project costs, general conditions, fee and contingency based on Burns & McDonnell's experience developing municipal wastewater projects. Costs for process equipment used vendor quotes and past project bid tabs.

Table 7-56: Assumptions Used for the Development of Probable Cost Opinions[a]

Parameter	Assumed Value	Basis
Discount Rate	4.0%	KCMO/WSD
Inflation Rate	1.9%	KCMO/WSD
Electricity Cost	$0.05 per kWh	Billings
Annual Maintenance Cost	5% of IC	KCMO/WSD
Excavation & Backfill	$10 per cubic yard	BMcD
Installed Equipment Cost (IE – Equipment Only)	Alternative specific	Various
Installed Cost (IC – IE+Buildings, Major Piping, etc)	Alternative specific	Various
A - Piping Cost[b]	10-15% of IE	BMcD
A – Mobilization	1% of above	BMcD
A - Civil Site Work	5% of above	BMcD
A – Miscellaneous Structural	5% of above	BMcD
A – Miscellaneous Mechanical	2% of above	BMcD
A – Electrical	15-20% of above	BMcD
A – Instrumentation	5-10% of IE	BMcD
Total Unmarked Up Cost (TUC)	IC + A Items	
B - Sales Tax	n/a	WSD
B - Field Overhead	5% of above	BMcD
B - Home Office (G&A)	2% of above	BMcD
B - Subcontractor Overhead and Profit (O&P)	7% of above	BMcD
B - Prime O&P	7% of above	BMcD
B – Bonds	1% of above	KCMO/WSD
B – Inflation (to year of construction)	4-12% of above	KCMO/WSD
Total Construction Cost (TCC)	TUC + B Items	
C – Engineering	20% of TCC	BMcD
C – Contingency	30% of above	KCMO/WSD
C - Owner's Contingency (allowance for out-of-scope work during execution)	5% of TCC + Engineering	KCMO/WSD
Probable Cost Opinion	TCC + C Items	

Notes:

a For B and C items, percentages are taken cumulatively as traveled downwards in the table. Values indicating "% of above take percentage of sum of all above values before closest double line. For example, Home Office (G&A) is equivalent to 2% of the sum of TUC + TUC·7% + TUC·7%·5%.

b Piping cost percentage includes smaller diameter ancillary facility piping. Quantity takeoffs for major process piping, such as piping between unit processes, recycle piping, air supply piping, etc., were estimated using preliminary site layouts.

The conceptual opinion of probable cost also includes mechanical, electrical, and civil work required for implementation of the treatment technologies. Annual operation and maintenance costs were developed for comparison purposes only, based on the design flow of 2.9 MGD. Operation, maintenance, equipment replacement, and capital costs were used to develop a 20-year net present value (NPV) for each of the alternatives. The 20-year NPV assumes the upgrades would occur in 2025, with the remaining 15 years of operation corresponding to the planning period through 2040. Equipment replacement timeframes are based on Burns & McDonnell's experience with similar systems, as listed in Table 7-57.

Table 7-57: Typical Equipment Useful Lives

Component	Useful Life (Years)
Pumps (unsubmerged)	20
Intake Filters	10
Aeration Blowers	20
Chemical Storage Tanks	15
Chemical Feed Systems	15
Mixers & Submerged Pumps	10
Aeration Diffusers	10
Clarifier Mechanisms	20
Fine Screens & Conveyors	20
Membrane Modules	12
Ancillary Membrane Equipment	20

The net present value compares all future cash flows (capital and O&M costs) in present dollar equivalents. Table 7-58 shows the conceptual opinion of probable capital cost, and 20-year net present worth for each option. Spreadsheets detailing the calculation of these costs can be found in Appendix C.

Table 7-58: Summary of Costs for Rocky Branch WWTP Alternatives

Alternative	NPV ($M 2015)	Capital Cost ($M 2015)
Rocky Branch Four-Stage Bardenpho	$17.8M	$11.6M
Rocky Branch MBR Retrofit	$35.7M	$25.9M
Regionalization (RB + TC)[a]	$46.6M	$38.1M
Smithville Regionalization (RB + TC + Smithville)[b]	-	$66.0M

Notes:

a Cost represents fraction of total Regional WWTP based on ratio of flow from Rocky Branch Service to total regional flow for Rocky Branch and Todd Creek Service Areas (2.9/6.2 ratio). Total NPV and Capital Cost for Regional WWTP is approximately $99.4M and $81.3M, respectively.

b Cost represents fraction of total Smithville Regional WWTP based on ratio of flow from Rocky Branch Service to total regional flow for Rocky Branch, Todd Creek, and Smithville Service Areas (2.9/7.2 ratio). Total Capital Cost for Regional WWTP is approximately $163.8M.

7.7.6 Rocky Branch Treatment Alternatives QBL Scoring

The methodology used for the QBL analysis was developed in Technical Memorandum No. 4, and a larger QBL score indicates a more preferred alternative. The QBL analysis scoring is most heavily influenced by financial considerations, representing 40% of the score, but also includes factors relating to operational complexity and impact on the environment and community. A summary of the scoring for each QBL analysis is provided in Figure 7-49 and Table 7-59. The Smithville Regionalization scenario was not included in the QBL analysis, as only a high-level capital cost was developed.

Figure 7-49: QBL Scoring for Rocky Branch Treatment Alternatives

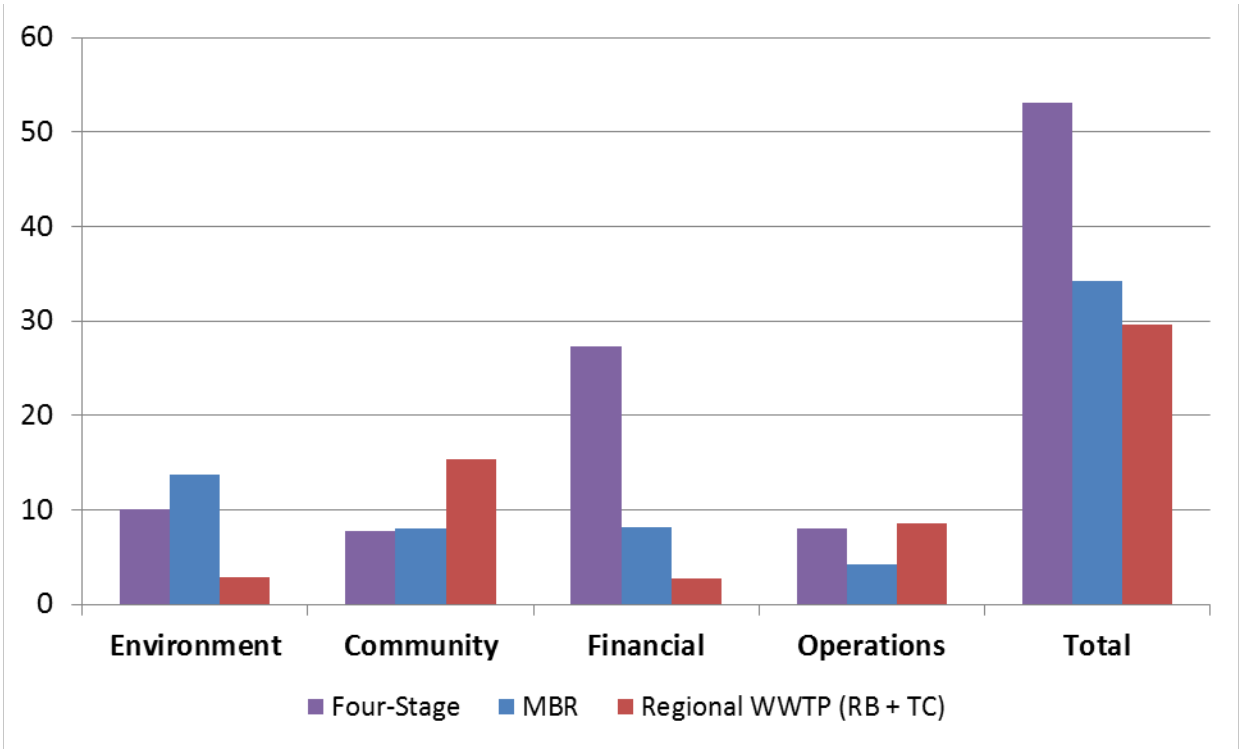


Table 7-59: QBL Scoring for Rocky Branch Treatment Alternatives

Scenario	Environment	Community	Financial	Operations	Total	NPV
Four-Stage Bardenpho	10.0	7.7	27.3	8.1	53.0	$17.8M
MBR Retrofit	13.8	8.1	8.2	4.2	34.2	$35.7M
Regional WWTP (RB & TC)	2.9	15.4	2.7	8.6	29.6	$46.6M[a]

Notes:
a Cost represents fraction of total Regional WWTP based on ratio of flow from Rocky Branch Service to total regional flow for Rocky Branch and Todd Creek Service Areas (2.7/6.0 ratio). Total NPV for Regional WWTP is approximately $81.4M.

The QBL scoring results were reviewed with WSD on 02/02/2015. The QBL assessment indicated that the four-stage Bardenpho alternative was preferable largely due to cost and operational complexity. The

MBR alternative scored lower than the conventional option due to significant capital and operations costs associated with the membrane system and the ability for the conventional alternative to utilize the existing secondary clarifiers.

7.7.7 Results and Discussion

The Rocky Branch WWTP has insufficient process capacity to meet future TN and TP removal requirements. A different biological treatment system configuration and/or chemical precipitation process will be required to meet future nutrient removal requirements. Two options for capacity upgrade of the existing facility were assessed: a four-stage Bardenpho process and an MBR process. In the QBL analysis, two main differences emerged between the two alternatives: the four-stage Bardenpho process is significantly more affordable than an MBR, and the MBR is more difficult to operate than the Bardenpho process. Implementation of the four-stage Bardenpho process is recommended.

The evaluation performed in Section 7.7 did not include all major equipment replacement anticipated through the planning horizon. Expected replacement schedules, costs, and phasing will be addressed in Section 7.11. Based on the regulatory schedule developed in Technical Memorandum 3, improved biological facilities should be in service by 2025, with engineering design suggested to begin by 2020. The condition assessment indicated that the influent pump station and screens in the headworks do not currently have firm capacity for the plant design flow. As a result, additional recommended facility improvements include installation of new screens in the facility headworks and replacement of two influent pumps to increase influent pumping capacity. The screens have already been purchased by WSD and should be installed in the near future. The replacement pumps have been included in the recommended alternative for biological treatment improvements. Table 7-60 provides a summary of the recommended implementation schedule. Technical Memorandum 18 will provide more details on project scheduling, capital and O&M expense integration into the budget, and incorporation of other needs not addressed in this section.

Table 7-60: Alternative and Schedule

Recommended Alternative	Project Initiation	Startup	NPV
Four-Stage Bardenpho Process	2020	2025	$17.8M

7.8 PUMP STATION CONDITION ASSESSMENT

There were no pump stations identified by WSD for condition assessment within the Rocky Branch Service Area as the First Creek Pump Station was recently constructed and the Rocky Branch Influent Pump Station was evaluated as part of the WWTP condition assessment in Section 7.4. The First Creek Pump Station is a submersible station that was completed in January 2015 and replaces the North Bristol and South Bristol Pump Stations. It has three pumps on variable speed drives and space for a fourth pump in the future. Two pumps have a rated flow of 2,260 gpm at 240 feet of head and one pump has a rated flow 3,600 gpm at 180 feet of total dynamic head resulting in a firm capacity of 6.5 MGD. The pump station is equipped with automatic bar screens, a backup generator, an odor control chemical feed system, and flow monitoring with radio antenna and SCADA equipment.

7.9 COLLECTION SYSTEM CAPACITY EVALUATION

The Rocky Branch Service Area serves the Rocky Branch watershed which consists of a separate sanitary sewer collection system and no combined sewers. The Rocky Branch watershed is further divided into Rocky Branch and First Creek basin. The collection system conveys flow through the basins to the WWTP. Its ability to convey flow efficiently is determined by stress testing the system using standardized criteria. Separate sanitary sewer systems are sized to convey sanitary sewer flows and incidental inflow and infiltration (I/I). Storm water for a sanitary sewer area is conveyed via a separate storm water system of pipes and/or ditches and creeks.

WSD is currently implementing the Overflow Control Plan to reduce the occurrence of wet-weather sewer overflows in the combined sewer and separate sanitary sewer systems. In 2016, a hydrologic and hydraulic (H&H) model was developed as part of the Overflow Control Plan. Flow metering was not able to be completed in the Rocky Branch service area; therefore, the model has not been calibrated. The WWMP recommends flow metering and calibration of the model and reevaluation of system performance, stress test, and review of capital improvement projects.

7.9.1 Hydrologic and Hydraulic Models

A hydrologic and hydraulic model was developed to evaluate sewer system capacity, collection system response, expected conveyance, and potential sewer system improvements. A design storm is run in the model in order to anticipate system performance. The Rocky Branch model is less complex than other service area models due to the absence of constructed overflows and flow metering data. The lack of flow metering data prevents the model from being calibrated and inhibits the development of a design storm specific to this system. The analysis conducted to determine flows to be used in the WWMP model is described further in Section 7.9.2.

Model development in the Rocky Branch WWTP service area included pipes 10 inches and greater. Invert elevations, diameters, length, and manhole rim data was collected from the OCP InfoNet database, WSD GIS, and record drawings. Contour data provided by WSD was utilized to populate missing manhole rim elevations. Remaining missing data was populated with interpolation between known data points, minimum slope, or minimum depth below grade, as deemed appropriate.

The model components are detailed in Table 7-61 and illustrated in Figure 7-50. The Rocky Branch watershed is shown in purple. The pump stations' firm capacity, wet well storage and force mains are included in the hydraulic model.

Table 7-61: Rocky Branch Model Components

Description	Quantity
Gravity Mains	94,000 LF
Manholes	332
Pump Station	2
Force Main	19,000 LF

Figure 7-50: Rocky Branch Watershed

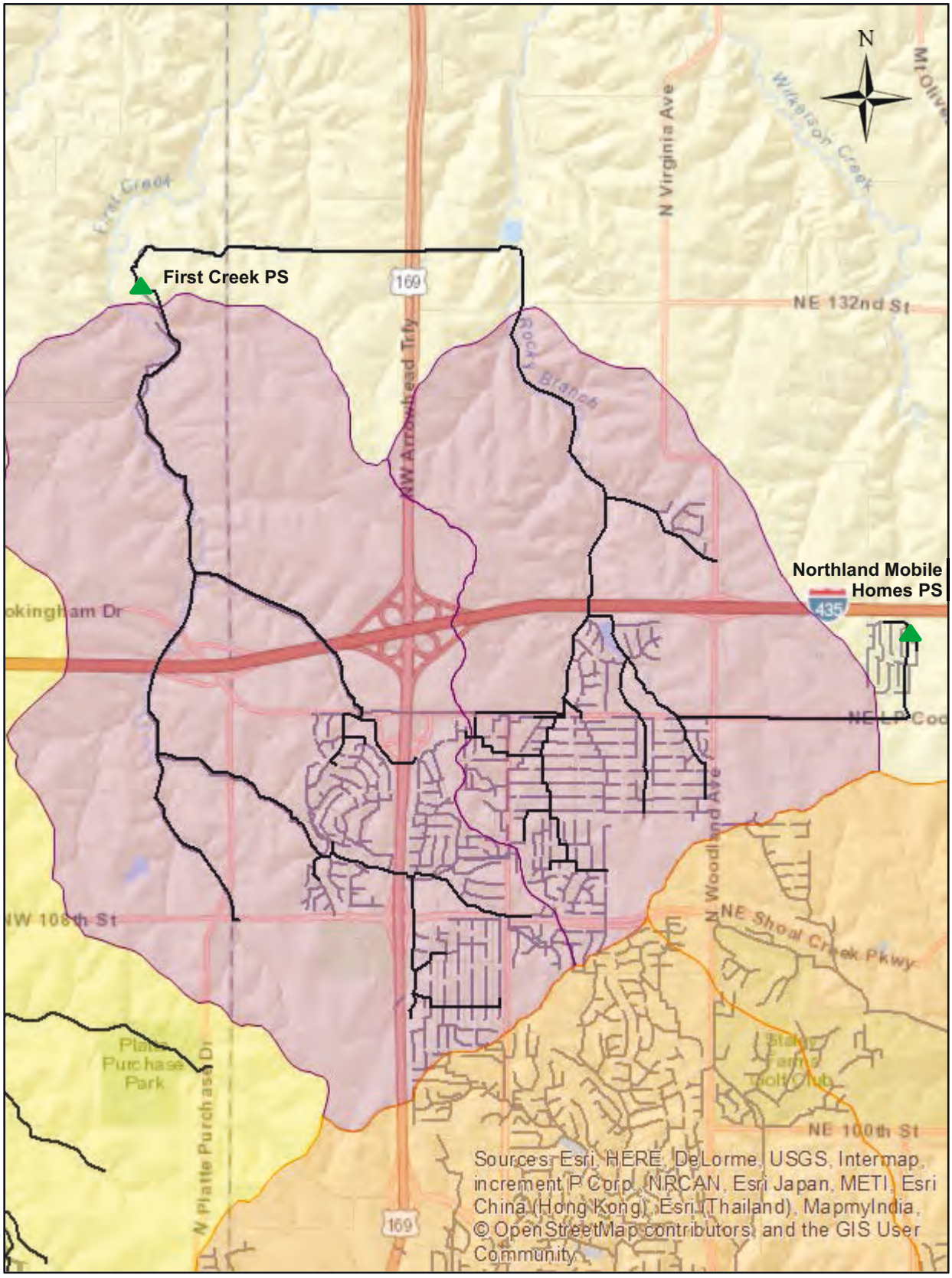
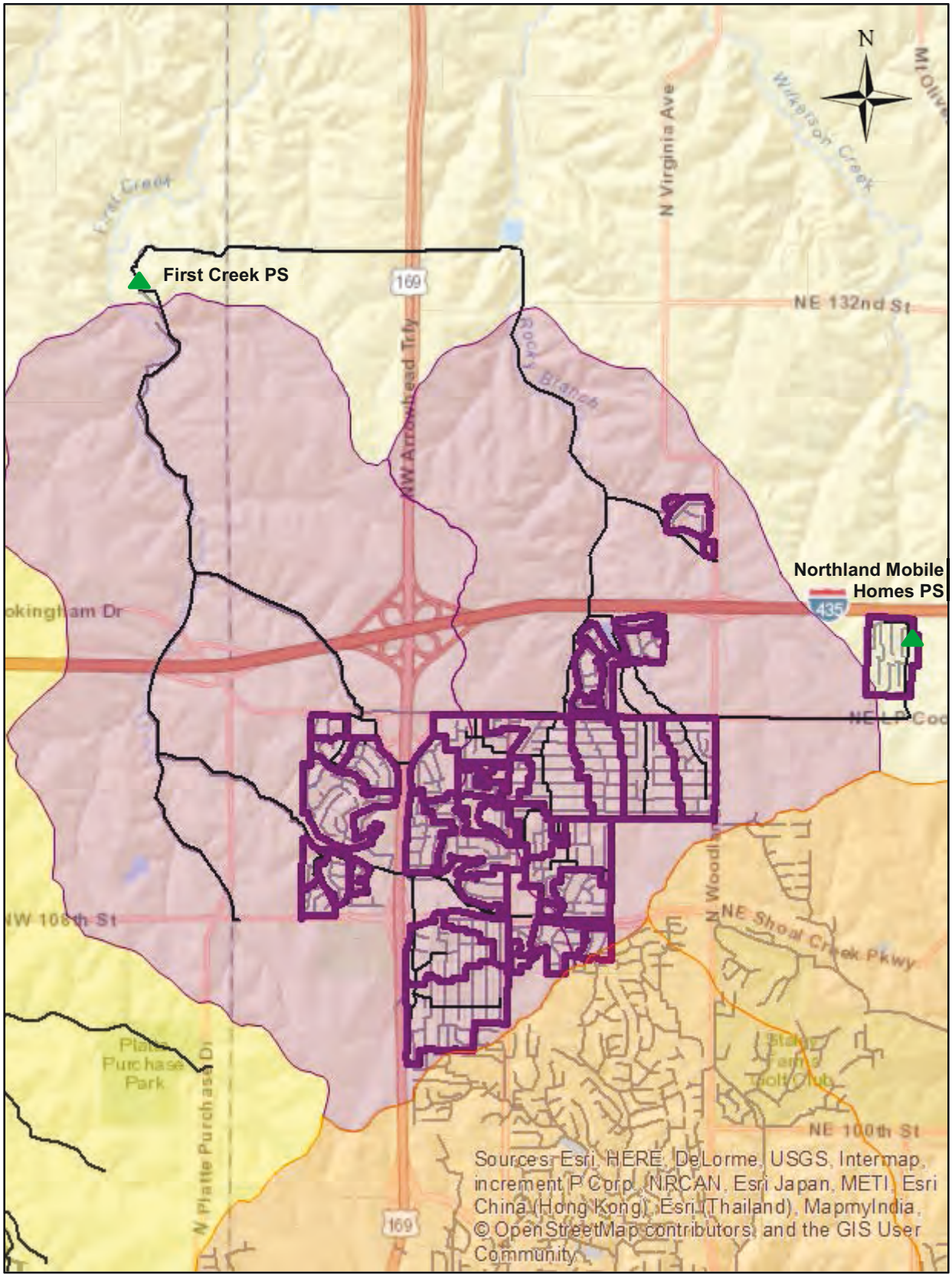


Figure 7-51 illustrates the Rocky Branch watershed in light purple and the delineated sanitary sewer service area subcatchments are outlined in bold purple. Sanitary sewer subcatchments route in the model flow to main sewer lines. The delineated subcatchments include acreage that is already developed or soon to be developed. The watershed acreage is notably larger than the delineated acreage due to the amount of undeveloped area in Rocky Branch. Approximately 1,200 acres of developed sanitary sewer area was delineated, while the watershed encompasses approximately 7,200 acres.

Figure 7-51: Rocky Branch Service Area Subcatchment Delineation



7.9.2 Description of Design Storm

Due to lack of flow metering data, the Rocky Branch service area model has not been calibrated. Therefore, the WWMP reviewed existing data available for Rocky Branch, the documents included OCP desktop analysis and previous Master Plans. The wastewater masterplan analyzed recent plant flow volume data and compared that data to previous documentation. Where appropriate, the recent dry weather data and previous 5-year return period and 24-hour duration storm volumes were utilized for analysis.

The OCP documented average dry weather flow and peak flow rates for the 5-year, 24-hour, design storm in the *Remainder of the SSS Basins Project, 2007*. The OCP analyzed the existing average daily dry weather flow and anticipated population growth for Rocky Branch service area, as well as the *Wastewater Master Plan North of the Missouri River, (2000)* and *Rocky Branch Sanitary Sewer System Evaluation and Infiltration & Inflow Study (1997)* to develop wet weather flow rates for the Rocky Branch service area. No additional flow metering has been completed in the Rocky Branch service area. The daily volume to the wastewater treatment plant was analyzed and projected to 2035 based on updated population growth projections, as discussed in Section 7.3. Table 7-62 compares the data available from previous studies to daily flows recorded at the WWTP.

Table 7-62: Rocky Branch Service Area 5-year Peak Flow Rates

Data Source	2010	2025	2030	2035
OCP – Population Projection[a]	7,738	8,210	8,305	N/A
OCP – Average Dry Weather Flow (mgd)	1.31	1.39	1.40	N/A
OCP – 5-Year 24 hr Volume (MG)	2.32	2.45	2.46	N/A
WWMP – Population Projection	9,140	14,610	17,140	19,670
WWMP – Average Dry Weather Flow (mgd)	1.3[b]	2.1	2.4	2.9

Note:

a) OCP reference the population projections developed in the Wastewater Master Plan, 2005.
b) WWMP data reflects existing conditions through June 2014.

The WWMP existing conditions and projection for average dry weather flow is less than the flows projected by the OCP. Population projections have increased for the Rocky Branch service area, however the average dry weather flow has not increased proportionally. Improvements in water conservation since 2005 and conservation measures and lower I/I flow rates typical of new developments may have contributed to the difference. Flow quantities anticipated to be observed at the Rock Branch WWTP are

expected to increase considerably in the future. It is recommended to perform flow analysis and calibration of the model when flow data becomes available.

The capacity analysis was completed with the average daily dry weather flow projections developed in the WWMP, as well as the 5-year 24-hr volume analyzed by OCP in 2007.

7.9.3 Collection System Model Results

The WWMP evaluated the performance and capacity of the Rocky Branch WWTP collection system with respect to the following:

- Sewer capacity,
- Potential for overflow at manholes, and
- Potential for water-in-basements.

The OCP completed a desk top analysis of the Rocky Branch service area, utilizing static peaks, based on the volumes described above. A static peak is a set flow for the simulation duration as opposed to a hydrograph. The original analysis indicated several pump stations were under capacity however, since then those pump stations have been abandoned and a new pump station has been constructed.

The hydraulic and hydrologic model developed for the WWMP could not be calibrated due to a lack of flow monitoring data. Hence, the level of service analysis utilized static peaks, based on the average dry weather flow and 5-year 24-hr volume. The static peaks were applied uniformly at the subcatchment loading locations.

7.9.4 Identification of Pipes with Reduced Level of Service

An adequate level of service is considered to have been achieved when the hydraulic grade line (HGL) does not exceed the crown (top) of the pipe for a given gravity pipeline. When the HGL exceeds the crown of the pipe, the pipe no longer meets level of service criteria and is performing at a reduced level of service.

Sections of gravity pipe laid at minimum slopes can cause flow restrictions resulting in a reduced level of service. Additional causes of restrictions include debris or root build up. Flow restrictions can also be caused by an undersized pump station. Upstream conduits may adequately convey flow to the pump station. However, if the pump station does not meet capacity requirements, surcharging will occur within the upstream sewer reaches.

The model indicates the system has sufficient capacity to provide a 5-year level of service, for the following planning years 2015, 2025, and 2035. This analysis should be updated when flow monitoring and model calibration has been performed.

7.9.5 Identification of Manholes with Reduced Level of Service

A manhole would be considered a reduced level of service structure if an overflow occurs. Manhole overflows are caused by deteriorated or broken pipes, downstream equipment failure, or system overload. A reduced level of service largely occurs at manholes that backup due to downstream pipe reaches that are also at a reduced level of service.

The model indicates the system has sufficient capacity to provide a 5-year level of service, for the following planning years 2015, 2025, and 2035. This analysis should be updated when flow monitoring has been completed.

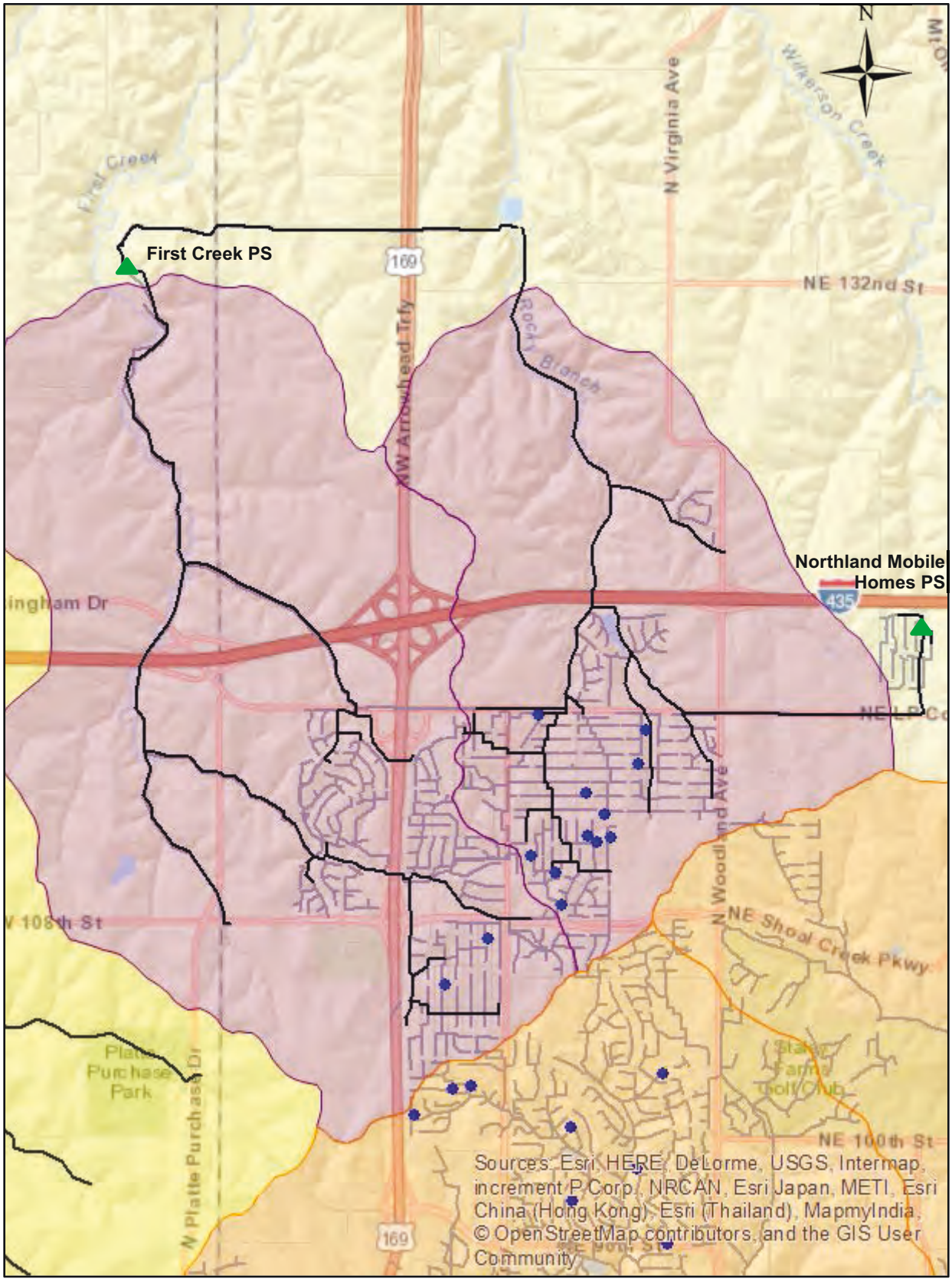
7.9.6 Identification of Manholes with Potential Basement Flooding

The potential for basement flooding at the 5-year level of service was evaluated by comparing the maximum elevation of the 5-year hydraulic grade line to the ground surface.

The average depth of basement floors was assumed to be eight feet below grade. For areas where the collection system depth is equal to or greater than than eight feet, manholes that indicated a modeled 5-year HGL at or less than eight feet below the ground elevation were identified as likely areas for water-in-basement (WIB) locations. For areas where the collection system depth is less than eight feet below grade, only manholes where the 5-year HGL is above the crown of the pipe were identified as potential WIB locations. It should be noted that this analysis is for the 5-year level of service and the associated WIB may or may or not be corroborated by field observations. Field observations of WIB episodes may result from storms larger than the 5-year level of service.

Based on the static model, the hydraulic grade line does not exceed the crown of the pipe. Therefore, the model does not indicate WIB for existing conditions and planning years 2025 and 2035. Figure 7-52 illustrates the historical records of basement backup complaints in blue. Based on the historical data, basement flooding complaints appear across the system. However, due to storms larger than the model flows, there are a few locations with complaints.

Figure 7-52: Rocky Branch Service Area Historical Water in Basement Complaints



7.10 COLLECTION SYSTEM ALTERNATIVES ANALYSIS

The Rocky Branch WWTP service area is not fully developed, however WSD has indicated the collection system has been sized for future developed conditions. The future developed conditions include buildout of areas served by existing interceptors. Currently, WSD builds the interceptor sewers sized 24 inches and larger, while the collector sewers are constructed by the developer or through other mechanisms. These new interceptors are sized to provide adequate capacity for existing and future developed conditions.

The American Public Works Association (APWA) offers minimum hourly peak design flow rates for different land uses. APWA identifies residential housing, commercial, or industrial use as shown in Table 7-63. An infiltration and inflow allowance is included in the development of the flow rate per land area.

Table 7-63: American Public Works Association Design Flow Rates

Land Use	Minimum Hourly Peak Design Flow Rate (cfs/acre)
Residential Housing: one- and two-family dwellings, one through three stories	0.020
Commercial: strip shopping centers or regional shopping centers	0.015

Notes:
a *Adapted from APWA Sanitary Sewers and Appurtenances, 1996*

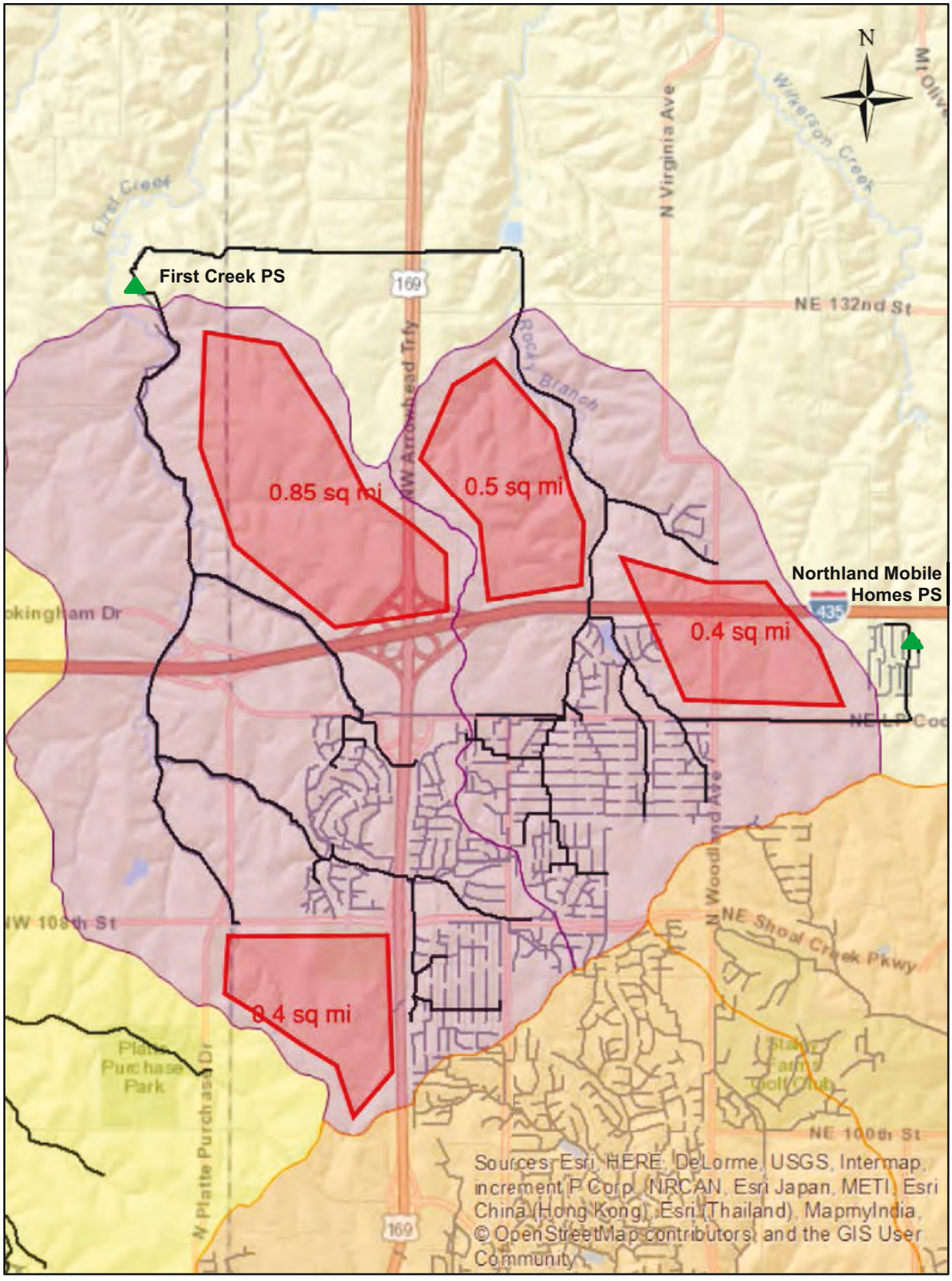
Based on discussions with WSD, future development in the Rocky Branch service area was assumed to be two-thirds residential and one-third commercial. New interceptor sewer were assumed to be 24-inch and laid at minimum allowable slope. The minimum area of development required to justify a new 24-inch sewer was calculated at 610 acres (0.95 square miles). If the expected flow at build-out from identified undeveloped areas approached the capacity of a 24-inch interceptor, a capital improvement project would be developed to provide an interceptor sewer to serve the undeveloped area.

In order to determine potential locations for new interceptor sewers, undeveloped areas without existing interceptor sewers were identified throughout the Rocky Branch service area. Most of these areas were determined to be adjacent to existing interceptors and therefore not included in this analysis. Input from WSD identified four undeveloped location within the service area that could potentially require new collection system infrastructure within the WWMP planning period.

The first location is in the northeast section of the service area, north of I-435, west of NW Arrowhead Trafficway and is approximately 0.85 square miles. The second location is in the northeast section of the service area, north of I-435, east of NW Arrowhead Trafficway just south of the Rocky Branch WWTP, and approximately 0.5 square miles. The third area on the eastern side of the service area along I-435 and

only 0.4 square miles. The final area is in the southern section of the service area, south of NW 108th St, west of MO Hwy 169, and approximately 0.4 square miles. All four areas are shown in Figure 7-54. These areas are all less than the 0.95 square miles established for a 24-inch sewer. Based on this, there are no CIP project needs identified for the collection systems in the Rocky Branch service area.

Figure 7-53: Rocky Branch Projected Development Areas



7.11 EMERGENCY DIVERSIONS

In addition to identifying WWTP needs for additional capacity, improvements, or treatment process upgrades, options were also evaluated for regionalization and enhanced reliability for each service area. Alternatives were evaluated to determine whether a temporary emergency diversion of flow to a neighboring utility or service area was feasible through existing or possible new connections. These options were evaluated and given a feasibility assessment score of low, moderate or high. For example, if a temporary emergency diversion requires installation of a new pump station and several miles of new force main, its feasibility assessment would be low as the construction cost of such infrastructure would be prohibitive. If a temporary diversion can be accommodated through an existing connection, its feasibility assessment would be high.

Due to Rocky Branch's location at the northern edge of the service area, emergency diversions will not be possible without additional infrastructure. A new force main could be installed to divert flow from the First Creek Pump Station to a nearby waste water treatment facility such as the Platte City Waste Water Treatment Plant (WWTP) or the Platte County Regional Sewer District's Brush Creek WWTP. Flow could also be diverted to the New Second Creek Pump Station, which would then be routed to either the Platte City or Brush Creek WWTP.

Generally, pipes at the outskirts of Platte City or the Platte County Regional Sewer District would not be large enough to accommodate a substantial amount of flow; however, it is assumed these smaller sewers will eventually join a main interceptor that continues to increase in size until it reaches the waste water treatment facility. To estimate the amount of new force main that would be required, it is assumed the new force main would join the interceptor approximately halfway between the First Creek Pump Station and the Platte City WWTP.

Another option as mentioned above would be to pump flow from the First Creek Pump Station to the Second Creek Pump Station. From there, a new force main would be required to direct flow to either the Platte City WWTP or the Brush Creek WWTP. The estimated distance below includes the distance of force main from the First Creek Pump Station to the Second Creek Pump Station and from the Second Creek Pump Station to the Platte City WWTP or Brush Creek WWTP. A summary of the capacity and infrastructure requirements is provided in Table 7-64.

Table 7-64: Rocky Branch Temporary Emergency Diversions

Description	Capacity	Infrastructure Required	Est. Distance (miles)	Feasibility Assessment
Platte City WWTF	0.84 MGD*	Force Main	6.5	Low
Second Creek Pump Station to Platte City WWTP	0.84 MGD*	Force Main	6.7	Low
Second Creek Pump Station to Brush Creek WWTP	0.84 MGD*	Force Main	8.7	Low

Notes:
*Capacity limited to First Creek Pump Station capacity.

There are two possible methods to temporarily divert flow from the Blue River Service Area; however, the feasibility of these two methods is low due to the significant length of force main and pump station modifications associated with each option. In addition, the sizing, operation, and maintenance of such infrastructure and amount of temporary flows would need to be negotiated with the neighboring utilities.

7.12 SERVICE AREA PLAN

Table 7-95 shows all CIP projects planned for the Rocky Branch Service Area through 2035 (in chronological order). Refer to Technical Memorandum No. 18 for detailed project descriptions for each project. The WWMP recommends flow monitoring for the development of a full hydraulic model in preparation of a future master plan update around 2025.

Table 7-65: Rocky Branch Service Area Capital Improvement Projects

Project Name	Project Category	Project Drivers	Project Initiation	Costs
Rocky Branch Force Main Inspection	Collection Systems	Condition	2018 (Inspection)	DPS: $8k CPS: $4k Const: $83k **Total: $95k**
Rocky Branch Control Building and Laboratory Roof Repairs	WWTP	Condition	2018 (DPS) 2019 (CPS)	DPS: $3k CPS: $2k Const: $30k **Total: $35k**
Aerobic Digester Addition and Sludge Pump Replacement	Solids (WWTP)	Capacity/ Condition	2020 (DPS) 2021 (Const)	DPS: $250k CPS: $90k Const: $1.39M **Total: $1.73M**
I/I Reduction: Northern Basins Project 2	OCP/ Collection System	Regulatory	2021 (DPS) 2022 (Const)	DPS: $240k CPS: $220k Const: $4.45M **Total: $4.91M**
Rocky Branch WWTP Upgrade (Headworks Upgrade and Alum Feed)	Liquid (WWTP)	Regulatory/ Capacity	2023 (DPS) 2024 (Const)	DPS: $300k CPS: $100k Const: $2.93M **Total: $3.33M**
Rocky Branch Phase I Mechanical Improvements	WWTP	Condition	2024 (DPS) 2025 (Const)	DPS: $60k CPS: $30k Const: $600k **Total: $690k**

Project Name	Project Category	Project Drivers	Project Initiation	Costs
Rocky Branch Electrical Improvements	WWTP	Condition	2025 (DPS) 2026-2030 (Const)	DPS: $25k CPS: $10k Const: $235k **Total: $270k**
Solids Processing Improvements and Sludge Pump Replacement	Solids (WWTP)	Condition	2026-2030	DPS: $180k CPS: $90k Const: $1.55M **Total: $1.82M**
Rocky Branch WWTP Secondary Treatment Expansion (4-Stage Bardenpho)	Liquid (WWTP)	Regulatory/ Capacity	2031-2035	DPS: $1.7M CPS: $0.5M Const: $15.9M **Total: $18.1M**
Secondary Clarifier Mechanisms Replacement	Liquid (WWTP)	Condition	2031-2035	DPS: $130k CPS: $70k Const: $1.14M **Total: $1.34M**
First Creek Pump Station Rehabilitation	Pump Stations	Condition	2031-2035	DPS: $560k CPS: $280k Const: $4.75M **Total: $5.59M**

APPENDIX A – STATE OPERATING PERMIT

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0048305
Owner:	City of Kansas City – Water Services Department
Address:	4800 East 63rd Street, Kansas City, MO 64130
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	KC, Rocky Branch Sewage Treatment Plant
Address:	500 NE 132nd Street, Kansas City, MO 64165
Legal Description:	SW ¼, NE ¼, Sec. 11, T52N, R33W, Clay County
UTM Coordinates:	X=364257, Y=4355337
Receiving Stream:	Rocky Branch Creek (C)
First Classified Stream and ID:	Rocky Branch Creek (C)(03326) 303(d)
USGS Basin & Sub-watershed No.:	(10240012-0708)

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

See Page Two (2). The use or operation of this facility shall be by or under the supervision of a **Certified C Operator.**

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

March 5, 2012
Effective Date

Sara Parker Pauley
Sara Parker Pauley, Director, Department of Natural Resources

March 4, 2017
Expiration Date

John Madras
John Madras, Director, Water Protection Program

FACILITY DESCRIPTION (continued):

Outfall #002 – POTW – SIC #4952
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).

Outfall #003 – POTW - SIC #4952
Extended aeration/ultraviolet disinfection/ sedimentation/sludge may be hauled to another permitted facility, land applied, landfilled or incinerated.
Design population equivalent is 20,000.
Design flow is 2.8 MGD, Actual flow is 1.57 MGD.
Design sludge production is 426 dry tons/year.

Outfall #S1 Instream Monitoring Eliminated

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Outfall #003						
Flow (Note 1)	MGD	*		*	once/weekday	24 hr. total
Biochemical Oxygen Demand$_5$	mg/L		20	10	once/week	24 hr. composite**
Total Suspended Solids	mg/L		25	15	once/week	24 hr. composite**
E. coli (Note 2)	#/100 mL		1030	206	once/week	grab
Ammonia as N (April 1 – Sept 30) (Oct 1 – March 31)	mg/L	3.7 7.5		1.4 2.9	once/month	grab
Oil & Grease	mg/L	15		10	once/month	grab
Dissolved Oxygen	mg/L	*		*	once/month	grab

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE April 28, 2012. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

Whole Effluent Toxicity (WET) test	% Survival	See Special Conditions	once/year	24 hr. composite**

MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE September 28, 2012.

B. STANDARD CONDITIONS

IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED Parts I, II, & III STANDARD CONDITIONS DATED October 1, 1980 and August 15, 1994, AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The interim effluent limitations shall become effective upon issuance and remain in effect until **364 days** after the effective date of this permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units	SU	***		***	once/week	grab

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE April 28, 2012.

FINAL EFFLUENT LIMITS BELOW

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective **one (1) year** from the effective date of this permit and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units	SU	****		****	once/week	grab

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE April 28, 2013.

B. STANDARD CONDITIONS

IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED PARTS I, II & III STANDARD CONDITIONS DATED OCTOBER 1, 1980 and AUGUST 15, 1994, AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.

C. INFLUENT MONITORING REQUIREMENTS

The facility is required to meet a removal efficiency of 85% or more as a monthly average. The monitoring requirements shall become effective upon issuance and remain in effect until expiration of the permit. To determine removal efficiencies, the influent wastewater shall be monitored by the permittee as specified below:

SAMPLING LOCATION AND PARAMETER(S)	UNITS	MONITORING REQUIREMENTS	
		MEASUREMENT FREQUENCY	SAMPLE TYPE
Influent			
Biochemical Oxygen Demand$_5$	mg/L	once/month	24 hr. composite**
Total Suspended Solids	mg/L	once/month	24 hr. composite**

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE April 28, 2012.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

* Monitoring requirement only.

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

*** pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.0-9.0 pH units.

**** pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.5-9.0 pH units.

Note 1 - Once each weekday means: Monday, Tuesday, Wednesday, Thursday & Friday except nine Federal legal holidays (New Years, Martin Luther King Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving, and Christmas).

Note 2 - Final 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).

D. SPECIAL CONDITIONS

1. This permit may be reopened and modified, or alternatively revoked and reissued, to:
   (a) 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 Clean Water Act, 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) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
   (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

   The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

2. All outfalls must be clearly marked in the field.

3. Changes in Discharges of Toxic Substances

   The permittee shall notify the Director as soon as it knows or has reason to believe:
   (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
      (1) One hundred micrograms per liter (100 µg/L);
      (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,5 dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
      (3) Five (5) times the maximum concentration value reported for the pollutant in the permit application;
      (4) The level established in Part A of the permit by the Director.
   (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant, which was not reported in the permit application.

4. Report as no-discharge when a discharge does not occur during the report period.

5. Water Quality Standards
   (a) Discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.
   (b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
      (1) 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;
      (2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
      (3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
      (4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
      (5) There shall be no significant human health hazard from incidental contact with the water;
      (6) There shall be no acute toxicity to livestock or wildlife watering;
      (7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
      (8) 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.

6. The permittee shall comply with any applicable requirements listed in 10 CSR 20-8 and 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. If a modification of the monitoring frequencies listed in 10 CSR 20-9 is needed, the permittee shall submit a written request to the department for review and, if deemed necessary, approval.

D. SPECIAL CONDITIONS (continued)

7. The permittee shall develop and implement a program for maintenance and repair of the collection system. The permittee shall submit a report annually by March 31st per the requirements of the Administrative Order of Consent (Civil Action No. 4:10-cv-0497-GAF).

8. Bypasses are not authorized at this facility and are subject to 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3)(i), and with Standard Condition Part I, Section B, subsection 2.b. Bypasses are to be reported to the Kansas City Regional Office.

9. Whole Effluent Toxicity (WET) Test shall be conducted as follows:

SUMMARY OF ACUTE WET TESTING FOR THIS PERMIT				
OUTFALL	AEC	FREQUENCY	SAMPLE TYPE	MONTH
003	100%	once/year	24 hr. composite**	August

Dilution Series							
AEC%	100% effluent	50% effluent	25% effluent	12.5% effluent	6.25% effluent	(Control) 100% upstream, if available	(Control) 100% Lab Water, also called synthetic water

(a) Test Schedule and Follow-Up Requirements

(1) Perform a MULTIPLE-dilution acute WET test in the months and at the frequency specified above. For tests which are successfully passed, submit test results using the Department's WET test report form #MO-780-1899 along with complete copies of the test reports as received from the laboratory, including copies of chain-of-custody forms within 30 calendar days of availability to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102. If the effluent passes the test, do not repeat the test until the next test period.

(a) Chemical and physical analysis of the upstream control 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.

(b) Any and all chemical or physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% Effluent concentration in addition to analysis performed upon any other effluent concentration.

(c) All chemical analyses included in the Missouri Department of Natural Resources WET test report form #MO-780-1899 shall be performed and results shall be recorded in the appropriate field of the report form.

(2) The WET test will be considered a failure if mortality observed in effluent concentrations for either specie, equal to or less than the AEC, is significantly different (at the 95% confidence level; $p = 0.05$) than that observed in the upstream receiving-water control sample. Where upstream receiving water is not available, synthetic laboratory control water may be used.

(3) All failing test results along with complete copies of the test reports as received from the laboratory, INCLUDING THOSE TESTS CONDUCTED UNDER CONDITION (3) BELOW, shall be reported to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the availability of the results.

(4) If the effluent fails the test for BOTH test species, a multiple dilution test shall be performed for BOTH test species within 30 calendar days and biweekly thereafter (for storm water, tests shall be performed on the next and subsequent storm water discharges as they occur, but not less than 7 days apart) until one of the following conditions are met: Note: Written request regarding single species multiple dilution accelerated testing will be address by THE WATER PROTECTION PROGRAM on a case by case basis.

(i) THREE CONSECUTIVE MULTIPLE-DILUTION TESTS PASS. No further tests need to be performed until next regularly scheduled test period.

(ii) A TOTAL OF THREE MULTIPLE-DILUTION TESTS FAIL.

(5) Follow-up tests do not negate an initial failed test.

(6) The permittee shall submit a summary of all test results for the test series along with complete copies of the test reports as received from the laboratory to the WATER PROTECTION PROGRAM, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the third failed test.

D. SPECIAL CONDITIONS (continued)
9. Wet Test (continued)

(7) Additionally, the following shall apply upon failure of the third follow up MULTIPLE DILUTION test The permittee should contact THE WATER PROTECTION PROGRAM 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 WATER PROTECTION PROGRAM upon the third follow up test failure, 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 to the WATER PROTECTION PROGRAM within 60 calendar days of the date of the automatic trigger or DNR's direction to perform either a TIE or TRE. This plan must be approved by DNR before the TIE or TRE is begun. A schedule for completing the TIE or TRE shall be established in the plan approval.
(8) Upon DNR's approval, the TIE/TRE schedule may be modified if toxicity is intermittent during the TIE/TRE investigations. A revised WET test schedule may be established by DNR for this period.
(9) If a previously completed TIE has clearly identified the cause of toxicity, additional TIEs will not be required as long as effluent characteristics remain essentially unchanged and the permittee is proceeding according to a DNR approved schedule to complete a TRE and reduce toxicity. Regularly scheduled WET testing as required in the permit, without the follow-up requirements, will be required during this period.
(10) When WET test sampling is required to run over one DMR period, each DMR report shall contain a copy of the Department's WET test report form that was generated during the reporting period.
(11) Submit a concise summary in tabular format of all WET test results with the annual report.

(b) Test Conditions
(1) Test Type: Acute Static non-renewal
(2) All tests, including repeat tests for previous failures, shall include both test species listed below unless approved by the department on a case by case basis.
(3) Test species: Ceriodaphnia dubia and Pimephales promelas (fathead minnow). Organisms used in WET testing shall come from cultures reared for the purpose of conducting toxicity tests and cultured in a manner consistent with the most current USEPA guidelines. All test animals shall be cultured as described in the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.
(4) Test period: 48 hours at the "Allowable Effluent Concentration" (AEC) specified above.
(5) Upstream receiving stream water shall be used as dilution water. If upstream water is unavailable or if mortality in the upstream water exceeds 10%, "reconstituted" water will be used as dilution water. Procedures for generating reconstituted water will be supplied by the MDNR upon request.
(6) Tests will be run with 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent, and reconstituted water.
(7) If reconstituted-water control mortality for a test species exceeds 10%, the entire test will be rerun.
(8) If upstream control mortality exceeds 10%, the entire test will be rerun using reconstituted water as the dilutant.
(9) Whole-effluent-toxicity test shall be consistent with the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms

10. Sewer Extension Authority
(a) The Department has approved the Sewer Extension Program for Kansas City to regulate and approve construction of sanitary sewers which are owned and/or operated by Kansas City.
(b) The approval of the Sewer Extension Program may be modified or revoked by the Department if the sewage collection, transportation, and receiving treatment facility reach their respective design capacity, or if the Department determines that this program is causing or contributing to chronic non-compliance of the receiving treatment facility, or if the permittee fails to follow the terms and conditions of the submitted and approved program.
(c) The Sewer Extension Program Special Condition may be reopened and modified and reissued, or alternatively revoked to incorporate new or modified conditions to the sewer construction permit authority, if information or regulation or statute indicates changes are necessary to assure compliance with Missouri's Clean Water Law and associated regulations.
(d) If items b or c of the Sewer Extension Program occur, the permittee will be notified to any modification to this operating permit.

D. SPECIAL CONDITIONS (continued)
10. Sewer Extension Authority (continued)

(e) The Permittee, as part of their Sewer Extension Program, shall submit an annual report by March 31st of each year, to the Missouri Department of Natural Resources' Kansas City Regional Office. The report shall include, but is not limited to, the following:
- (1) A list of the name of each individual project and their respective:
- (2) Length of sewer and force main
- (3) Capacity of the lift stations constructed under the sewer extension (if applicable);
- (4) Inspections made of the construction and the findings of each;
- (5) Results of leakage and deflection test;
- (6) Population or number of lots to be served by this extension; and
- (7) Type of wastewater (i.e., domestic or industrial);
- (8) An annual summary of
  - (a) Number of construction permits issued
  - (b) Number of inspections completed
  - (c) Number of sewer lines tested and/or inspected with Closed Circuit Television
  - (d) Number of warnings, violations, or notices given
  - (e) Capacity remaining at the treatment plant

(f) The Sewer Extension Authority is valid the length of this operating permit. Upon renewal of the permit, the Sewer Extension Authority for Kansas City will be reevaluated.

11. The permittee shall implement and enforce its approved pretreatment program in accordance with the requirements of 40 CFR Part 403. The approved pretreatment program is hereby incorporated by reference.

Missouri Department of Natural Resources
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-048305
KANSAS CITY, ROCKY BRANCH

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution 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 storm water 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)2.] a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

A Factsheet is not an enforceable part of an operating permit. This Factsheet is for a Major ☒.

Part I – Facility Information

Facility Type: POTW
Facility SIC Code(s): 4952

Facility Description:
Kansas City Rocky Branch STP is a 2.8 MGD extended aeration facility with ultraviolet disinfection. The facility was built in 2005, in part due to the TMDL for Rocky Branch. The facility was rerated from 2.0 MGD to 2.8 MGD in the spring 2011.

Have any changes occurred at this facility or in the receiving water body that effects effluent limit derivation?

☒ Yes: Ammonia effluent limits were recalculated based on the department's Ammonia Policy. The monthly average Ammonia effluent limits were lowered slightly from 1.9 mg/L to 1.4 mg/L for summer and from 3.7 mg/L to 2.9 mg/L for winter, per the department's August 2007 Ammonia Implementation Guidance. From discharge monitoring reports, it appears the facility can meet the more protective effluent limits without a schedule of compliance. Facility has a year to come into compliance with the new pH requirements. pH effluent limits have changed from a minimum of 6.0 to a minimum of 6.5 standard units. No receiving water monitoring requirements required at this time. Previous permit limited downstream monitoring to that permit cycle if the receiving stream data achieved water quality standards for ammonia and dissolved oxygen. The required sampling showed that the stream was achieving water quality standards over the previous permit cycle.

Application Date: 04/18/2011
Expiration Date: 10/12/2011
Last Inspection: 05/18/2010 In Compliance ☒

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE	DISTANCE TO CLASSIFIED SEGMENT (MI)
003	4.34	secondary	municipal	0.0

Outfall #001 – Eliminated with the construction of the new treatment facility in 2005.

Outfall #002- Eliminated- Discharges from this outfall is no longer authorized.
Legal Description: SW ¼ , NE ¼ , Sec. 11, T52N, R33W
UTM Coordinates: x= 364285; y= 4355635
Receiving Stream: Rocky Branch (C)
First Classified Stream and ID: Rocky Branch (C) (3326)
USGS Basin & Sub-watershed No.:(10240012-0708)

Outfall #003
Legal Description: SW ¼, NE ¼, Sec. 11, T52N, R33W, Clay County
UTM Coordinates: X=364257, Y=4355337
Receiving Stream: Rocky Branch Creek (C)
First Classified Stream and ID: Rocky Branch Creek (C)(03326) 303(d)
USGS Basin & Sub-watershed No.: (10240012-0708)

Receiving Water Body's Water Quality & Facility Performance History:
In review of the facility's discharge monitoring reports, discharges through the emergency bypass (Outfall 002) occurred in 10/2009. From the treatment plant, the facility had a BOD_5 and Ammonia exceedance in 01/2008, an Ammonia exceedance 03/2010 and a TSS exceedance in 06/2010.

Comments:
For information on the Administrative Order of Consent (Civil Action No. 4:10-cv-0497-GAF) and the actions to be taken in the Northern Watersheds of Kansas City under the Overflow Control Plan, please visit Kansas City's website for a copy of the plan, Consent Decree, and proposed schedule. Treatment plants in the Northern Watersheds include Rocky Branch, Fishing River, Todd Creek, and Northland Mobile Home Park: http://www.kcmo.org/CKCMO/Depts/WaterServices/index.htm.

Part II – Operator Certification Requirements

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], permittees shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators or supervisors of operations 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 20-9.010(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

- Owned or operated by or for:
  - Municipalities ☒

Each of the above entities are only applicable if they have a Population Equivalent greater than two hundred (200) and/or fifty (50) or more service connections.

This facility currently requires an operator with a C Certification Level. Please see **Appendix A: Classification Worksheet.** Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator's Name: Randy Williams
Certification Number: 8660
Certification Level: A

The listing of the operator above only signifies that staff drafting this operating permit have reviewed appropriate Department records and determined that the name listed on the operating permit application has the correct and applicable Certification Level.

Part III – Receiving Stream Information

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
As per Missouri's Effluent Regulations [10 CSR 20-7.015], the waters of the state are divided into seven (7) categories. Each category lists effluent limitations for specific parameters, which are presented in each outfall's Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

All Other Waters [10 CSR 20-7.015(8)]: ☒

10 CSR 20-7.031 Missouri Water Quality Standards, the Department defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's beneficial water uses to be maintained are located in the Receiving Stream Table located below in accordance with [10 CSR 20-7.031(3)].

RECEIVING STREAM(S) TABLE:

WATERBODY NAME	CLASS	WBID	DESIGNATED USES*	8-DIGIT HUC	EDU**
Rocky Creek	C	3326	AQL, LWW, WBC (B)***	10240012	Central Plains/ Nishnabotna/Platte

* - Protection of Warm Water Aquatic Life and Human Health-Fish Consumption (AQL), Cold Water Fishery (CDF), Cool Water Fishery(CLF), Drinking Water Supply (DWS), Groundwater (GRW), Industrial (IND), Irrigation (IRR), Livestock & Wildlife Watering (LWW), Secondary Contact Recreation (SCR), Whole Body Contact Recreation (WBC).
** - Ecological Drainage Unit
*** - UAA conducted in March 2005 and October 2008 to retain WBC and add SCR.

RECEIVING STREAM(S) LOW-FLOW VALUES TABLE:

RECEIVING STREAM (U, C, P)	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Rocky Creek	0.0	0.0	0.0

MIXING CONSIDERATIONS TABLE:
Mixing Zone: Not Allowed [10 CSR 20-7.031(4)(A)4.B.(I)(a)].
Zone of Initial Dilution: Not Allowed [10 CSR 20-7.031(4)(A)4.B.(I)(b)].

RECEIVING STREAM MONITORING REQUIREMENTS:

No receiving water monitoring requirements required at this time. Previous permit limited downstream monitoring to that permit cycle if the receiving stream data achieved water quality standards for ammonia and dissolved oxygen. The required sampling showed that the stream was achieving water quality standards over the previous permit cycle.

Part IV – 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.

Not Applicable ☒: The facility does not discharge to a Losing Stream as defined by [10 CSR 20-2.010(36)] & [10 CSR 20-7.031(1)(N)], or is an existing facility.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

☒ - All limits in this operating permit are at least as protective as those previously established; therefore, backsliding does not apply.

ANTIDEGRADATION:
In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(2)], the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. Degradation is justified by documenting the socio-economic importance of a discharging activity after determining the necessity of the discharge.

☒ - Renewal no degradation proposed and no further review necessary.

AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:
As per [10 CSR 20-6.010(3)(B)], ...An applicant may utilize a lower preference continuing authority by submitting, as part of the application, a statement waiving preferential status from each existing higher preference authority, providing the waiver 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. Additional information regarding biosolids and sludge is located at the following web address: http://dnr.mo.gov/env/wpp/pub/index.html, items WQ422 through WQ449.

Applicable ☒: Permittee land applies biosolids in accordance with Standard Conditions III and a Department approved biosolids management plan. The facility takes the sludge to the Blue River WWTP (MO-0024911) for incineration or land application.

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.

Not Applicable ☒: The permittee/facility is not currently under Water Protection Program enforcement action.

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

Applicable ☒: Kansas City has an approved pretreatment program in accordance with the requirements of [40 CSR Part 403] and [10 CSR 20-6.100] and is expected to implement and enforce its approved program. Rocky Branch does not currently receive flows from an industrial user.

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with [40 CFR Part 122.44(d)(iii)] if the permit writer determines that any give 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.

Not Applicable ☒: A RPA was not conducted for this facility. Independent application was used for determining there was reasonable potential to exceed Water Quality Standards for ammonia. When reviewing DMR data from the previous permit cycle, there was a large variability in effluent values, from 0.1 mg/L to over 9 mg/L.

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.

Applicable ☒: 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 an untreated or partially treated sewage release are considered bypassing under state regulation [10 CSR 20-2.010(11)] and should not be confused with the federal definition of bypass. SSO's have a variety of causes including blockages, line breaks, and sewer defects that allow excess storm water and ground water to (1) enter and overload the collection system, and (2) overload the treatment facility. Additionally, SSO's can be also be caused by lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. SSOs also include overflows out of manholes and onto city streets, sidewalks, and other terrestrial locations. Additionally, Missouri RSMo §644.026.1 mandates that the Department require proper maintenance and operation of treatment facilities and sewer systems and proper disposal of residual waste from all such facilities.

☒ - In accordance with Missouri RSMo §644.026.1.(15) and 40 CFR Part 122.41(e), the permittee is required to develop and/or implement a program for maintenance and repair of the collection system and shall be required in this operating permit by either means of a Special Condition or Schedule of Compliance. In addition, the Department considers the development of this program as an implementation of this condition. Additionally, 40 CFR Part 403.3(o) defines a POTW to include any device and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW Treatment Plant.

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). The CMOM identifies some of the criteria used by the EPA 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.

City of Kansas City has developed maintenance and repair plan to address SSO which is documented in the Kansas City, Missouri Overflow Control Plan dated January 30, 2009. On April 14, 2010 the Missouri Department of Natural Resources approved the Overflow Control Plan and the Western District Court of Missouri approved the OCP as memorialized in a US EPA/DOJ Consent Decree on September 27, 2010. The CMOM plan is Appendix C of the Consent Decree. A copy of the requirements of the CMOM report and the overall OCP is available on Kansas City's webpage: http://www.kcmo.org/CKCMO/Depts/WaterServices/index.htm.

SCHEDULE OF COMPLIANCE (SOC):
A schedule of remedial measures included in a permit, including 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.

Applicable ☒: 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(10)]. The facility has a schedule of compliance to meet the more stringent pH requirements.

STORM WATER 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 storm water discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure. Additionally in accordance with the Storm Water 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 storm water discharges.

Not Applicable ☒: At this time, the permittee is not required to develop and implement a SWPPP.

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.

Not Applicable ☒: 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(78)], 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.

Applicable ☒: Wasteload allocations were calculated where applicable using water quality criteria or water quality model results and the dilution equation below:

$$C = \frac{(C_s \times Q_s) + (C_e \times Q_e)}{(Q_e + Q_s)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
C_s = upstream concentration
Q_s = upstream flow
C_e = effluent concentration
Q_e = effluent 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.

Not Applicable ☒: A WLA study was either not submitted or determined not applicable by Department staff.

WATER QUALITY STANDARDS:
Per [10 CSR 20-7.031(3)], General Criteria shall be applicable to all waters of the state at all times including mixing zones. Additionally, [40 CFR 122.44(d)(1)] directs the Department to establish in each NPDES permit to include conditions to achieve water quality established under Section 303 of the Clean Water Act, including State narrative criteria for water quality.

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.

Applicable ☒: 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)7. and the Water Quality Standards 10 CSR 20-7.031(3)(D),(F),(G),(I)2.A & B are being met. Under [10 CSR 20-6.010(8)(A)4], 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 **all** facilities meeting the following criteria:

☒ Facility is a designated Major.
☒ Facility is a municipality or domestic discharger with a Design Flow ≥ 22,500 gpd.

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, which includes blending, 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 20-2.010(11) defines a bypass as the diversion of wastewater from any portion of wastewater treatment facility or sewer system 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.

☒ - The permittee has meet the criteria as established in 40 CFR 122.41(m)(4)(i)(A), (B), and (C). Outfall 002 is no longer authorized to discharge as it is a Bypass. For more information on how Kansas City plans to address peak flows at the treatment plants along with sanitary sewer overflows prior to the facility headworks, please visit the Kansas City's website for the Overflow Control Plan, its schedule, and the Consent Decree. http://www.kcmo.org/CKCMO/Depts/WaterServices/index.htm.

303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

Applicable ☒ Rocky Branch is listed on the 2002 Missouri 303(d) List for biochemical oxygen demand.
☒ – This facility is considered to be a source of or has the potential to contribute to the above listed pollutant(s). In 2005, Kansas City constructed a new wastewater treatment plant and received stringent permit limits in lieu of a TMDL. The approval letter for the permit-in-lieu of a TMDL was issued on July 20, 2006.
(http://dnr.mo.gov/env/wpp/tmdl/3326-rocky-br-record.htm)

Part V – Effluent Limits Determination

Outfall #003 – Main Facility Outfall
Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

EFFLUENT LIMITATIONS TABLE:

PARAMETER	UNIT	BASIS FOR LIMITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MODIFIED	PREVIOUS PERMIT LIMITATIONS
FLOW	GPD	1	*		*	N	
BOD_5	MG/L	10		20	10	N	
TSS	MG/L	10		25	15	N	
PH	SU	2,3	**		**	Y	6.0-9.0
AMMONIA AS N (APRIL 1 – SEPT 30)	MG/L	3	3.7		1.4	Y	3.7/1.9
AMMONIA AS N (OCT 1 – MARCH 31)	MG/L	3	7.5		2.9	Y	7.5/3.7
DISSOLVED OXYGEN (DO)	MG/L	10	*		*	N	
ESCHERICHIA COLI	***	1,2		1030	260	Y	FECAL
OIL & GREASE (MG/L)	MG/L	1,2	15		10	Y	
WHOLE EFFLUENT TOXICITY (WET) TEST	% Survival	11	Please see WET Test in the Derivation and Discussion Section below.				

* - Monitoring requirement only.
** - pH shall be maintained between 6.5-9.0 SU. pH shall not be averaged.
*** - # of colonies/100mL; the Monthly Average for *E. coli* is a geometric mean.
**** - 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. Lagoon Policy
5. Ammonia Policy
6. Antidegradation Review
7. Antidegradation Policy
8. Water Quality Model
9. Best Professional Judgment
10. TMDL or Permit in lieu of TMDL
11. WET Test Policy

OUTFALL #003 – 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)**. Effluent limitations from the previous state operating permit have been reassessed and verified that they are still protective of the receiving stream's Water Quality. Therefore, effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.** Weekly average= 20 mg/L; Monthly average =10 mg/L,

- **Total Suspended Solids (TSS)**. Effluent limitations from the previous state operating permit have been reassessed and verified that they are still protective of the receiving stream's Water Quality. Therefore, effluent limitations have been retained from previous state operating permit, please see the **APPLICABLE DESIGNATION OF WATERS OF THE STATE** sub-section of the **Receiving Stream Information.** Weekly average= 25 mg/L; Monthly average =15 mg/L,

- **pH**. Facility has a year to come into compliance with the new pH effluent limits. pH shall be maintained between 6.5-9.0 standard units after the first year. [10 CSR 20-7.015(8)(A)3A.].

- **Total Ammonia Nitrogen**. Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(4)(B)7.C. & Table B3] default pH 7.8 SU Background total ammonia nitrogen = 0.01 mg/L .

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

Summer: April 1 – September 30
Chronic WLA: $C_e = ((4.33 + 0.0)1.5 - (0.0 * 0.01))/4.33$
$C_e = 1.5$ mg/L

Acute WLA: $C_e = ((4.33 + 0.0)12.1 - (0.0 * 0.01))/4.33$
$C_e = 12.1$ mg/L

$LTA_c = 1.5$ mg/L (0.780) = **1.2 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
$LTA_a = 12.1$ mg/L (0.321) = 3.9 mg/L [CV = 0.6, 99th Percentile]
MDL = 1.2 mg/L (3.11) = 3.7 mg/L [CV = 0.6, 99th Percentile]
AML = 1.2 mg/L (1.19) = 1.4 mg/L [CV = 0.6, 95th Percentile, n =30]

Winter: October 1 – March 31
Chronic WLA: $C_e = ((4.33 + 0.0)3.1 - (0.0 * 0.01))/4.33$
$C_e = 3.1$ mg/L

Acute WLA: $C_e = ((4.33 + 0.0)12.1 - (0.0 * 0.01))/4.33$
$C_e = 12.1$ mg/L

$LTA_c = 3.1$ mg/L (0.780) = **2.4 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
$LTA_a = 12.1$ mg/L (0.321) = 3.9 mg/L [CV = 0.6, 99th Percentile]
MDL = 2.4 mg/L (3.11) = 7.5 mg/L [CV = 0.6, 99th Percentile]
AML = 2.4 mg/L (1.19) = 2.9 mg/L [CV = 0.6, 95th Percentile, n =30]

Season	MDL (mg N/L)	AML (mg N/L)
Summer	3.7	1.4
Winter	7.5	2.9

- **Dissolved Oxygen**. Monitoring requirements from the previous state operating permit have been reassessed and verified that they are still protective of the receiving stream's Water Quality. Therefore, monitoring requirements have been retained from previous state operating permit, please see the APPLICABLE DESIGNATION OF WATERS OF THE STATE sub-section of the **Receiving Stream Information.**

- ***Escherichia coli (E. coli)***. Monthly average of 206 per 100 ml as a geometric mean and Weekly Average of 1030 during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation ((B) designated use of the receiving stream, as per 10 CSR 20-7.031(4)(C). Weekly Average effluent variability will be evaluated in development of a future effluent limit. An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). Kansas City is using ultraviolet disinfection to meet *E. Coli* effluent limits during the recreational season.

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

- **WET Test**. 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
    - ☒ No less than **ONCE/YEAR:**
      - ☒ Facility is designated as a Major facility or has a design flow ≥ 1.0 MGD.

Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Class C streams are 100%, 50%, 25%, 12.5%, & 6.25%.

PART VI: Finding of Affordability

Pursuant to Section 644.145, RSMo., the Department is required to determine whether a permit or decision is affordable and makes a finding of affordability for certain permitting and enforcement decisions. This requirement applies to discharges from combined or separate sanitary sewer systems or publically-owned treatment works.

Applicable☒ : The Department is required to determine findings of affordability because the permit applies to a **combined or separate sanitary sewer system for a publically-owned treatment works.**

Finding of affordability - 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 department is hereby making a finding based from the following facts:

- ☐ 1) The applicant states that the terms and conditions are affordable for the community. OR; This permit action was taken at the discretion of the facility, therefore the department assumes the applicant already determined it is affordable;
- ☐ 2) The permit action is taken at the discretion of the system itself (e.g., sewer extension construction permits, or the relocation of an outfall in lieu of otherwise upgrading a system in order to comply with a permit issued prior to July 11, 2011);
- ☐ 3) This permit contains no new or expanded terms and conditions;
- ☐ 4) The department is not aware of any significant economic impacts this permit would cause on distressed populations;
- ☐ 5) No comments indicating such impact were received during the public comment period on the draft permit;
- ☒ 6) The department is not aware of any other more cost effective wastewater treatment options that would achieve the required effluent quality;
- ☐ 7) The Facility Plan on the construction permit contained an affordability finding;
- ☐ 8) The applicant provided increased effluent discharge monitoring costs due to expanded monitoring frequency for certain permit parameters;
- ☒ 9) An affordability analysis was performed as part of the Long Term Control Plan on Combined Sewer Overflows. The LTCP provided a comprehensive review of necessary upgrades and the affordability for all Kansas City wastewater treatment plants. The LTCP was approved by the department and was entered into by consent judgment, Administrative Order of Consent (Civil Action No. 4:10-cv-0497-GAF)
- ☐ 10) An affordability analysis was performed as part of an Antidegradation Review Determination;
- ☐ 11) The applicant has entered into a Voluntary Compliance Agreement (VCA) for the purpose of eliminating inflow and infiltration into the plant. The applicant entered into the VCA after due consideration, therefore the department assumes that the applicant has determined it is affordable.
- ☐ 12) Others: explain.

Part VI – 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.

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 December 09, 2011 to January 09, 2012. No responses received or responses to the Public Notice of this operating permit do not warrant the modification of effluent limits and/or the terms and conditions of this permit.

DATE OF FACT SHEET: OCTOBER 06, 2011; JANUARY 25, 2012

COMPLETED BY:

LEASUE MEYERS, ENVIRONMENTAL ENGINEER II
PERMITTING AND ENGINEERING SECTION
WATER PROTECTION PROGRAM
LEASUE.MEYERS@DNR.MO.GOV

Part VII – Appendices

APPENDIX A: CLASSIFICATION WORKSHEET

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Maximum Population Equivalent (P.E.) served (Max 10 pts.)	1 pt./10,000 PE or major fraction thereof.	2
Maximum: 10 pt Design Flow (avg. day) or peak month; use greater (Max 10 pts.)	1 pt. / MGD or major fraction thereof.	3
EFFLUENT DISCHARGE RECEIVING WATER SENSITIVITY:		
Missouri or Mississippi River	0	
All other stream discharges except to losing streams and stream reaches supporting whole body contact	1	1
Discharge to lake or reservoir outside of designated whole body contact recreational area	2	
Discharge to losing stream, or stream, lake or reservoir area supporting whole body contact recreation	3	
PRELIMINARY TREATMENT - Headworks		
Screening and/or comminution	3	
Grit removal	3	3
Plant pumping of main flow (lift station at the headworks)	3	
PRIMARY TREATMENT		
Primary clarifiers	5	5
Combined sedimentation/digestion	5	
Chemical addition (except chlorine, enzymes)	4	
REQUIRED LABORATORY CONTROL – performed by plant personnel (highest level only)		
Push – button or visual methods for simple test such as pH, Settleable solids	3	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	
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	
ALTERNATIVE FATE OF EFFLUENT		
Direct reuse or recycle of effluent	6	
Land Disposal – low rate	3	
High rate	5	
Overland flow	4	
Total from page **ONE (1)**	----	17

APPENDIX A: CLASSIFICATION WORKSHEET (CONTINUED)

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
VARIATION IN RAW WASTE (highest level only) (DMR exceedances and Design Flow exceedances)		
Variation do not exceed those normally or typically expected	0	
Recurring deviations or excessive variations of 100 to 200 % in strength and/or flow	2	
Recurring deviations or excessive variations of more than 200 % in strength and/or flow	4	4
Raw wastes subject to toxic waste discharge	6	
SECONDARY TREATMENT		
Trickling filter and other fixed film media with secondary clarifiers	10	
Activated sludge with secondary clarifiers (including extended aeration and oxidation ditches)	15	15
Stabilization ponds without aeration	5	
Aerated lagoon	8	
Advanced Waste Treatment Polishing Pond	2	
Chemical/physical – without secondary	15	
Chemical/physical – following secondary	10	
Biological or chemical/biological	12	
Carbon regeneration	4	
DISINFECTION		
Chlorination or comparable	5	
Dechlorination	2	
On-site generation of disinfectant (except UV light)	5	
UV light	4	4
SOLIDS HANDLING - SLUDGE		
Solids Handling Thickening	5	
Anaerobic digestion	10	
Aerobic digestion	6	
Evaporative sludge drying	2	
Mechanical dewatering	8	
Solids reduction (incineration, wet oxidation)	12	
Land application	6	
Total from page **TWO (2)**	----	17
Total from page **ONE (1)**	---	23
Grand Total	---	40

☐ - A: 71 points and greater
☐ - B: 51 points – 70 points
☒ - C: 26 points – 50 points
☐ - D: 0 points – 25 points

APPENDIX B – VIBRATION ANALYSIS REPORT

Vibration Analysis Summary Report

Priority 1 Needs Immediate Action
Priority 2 Repair at Earliest Opportunity
Priority 3 Abnormality Detected-Continue to Monitor
Priority 4 Needs No Immediate Attention
Priority 5 Machine Not Running-No Data
Priority 6 Not Scheduled

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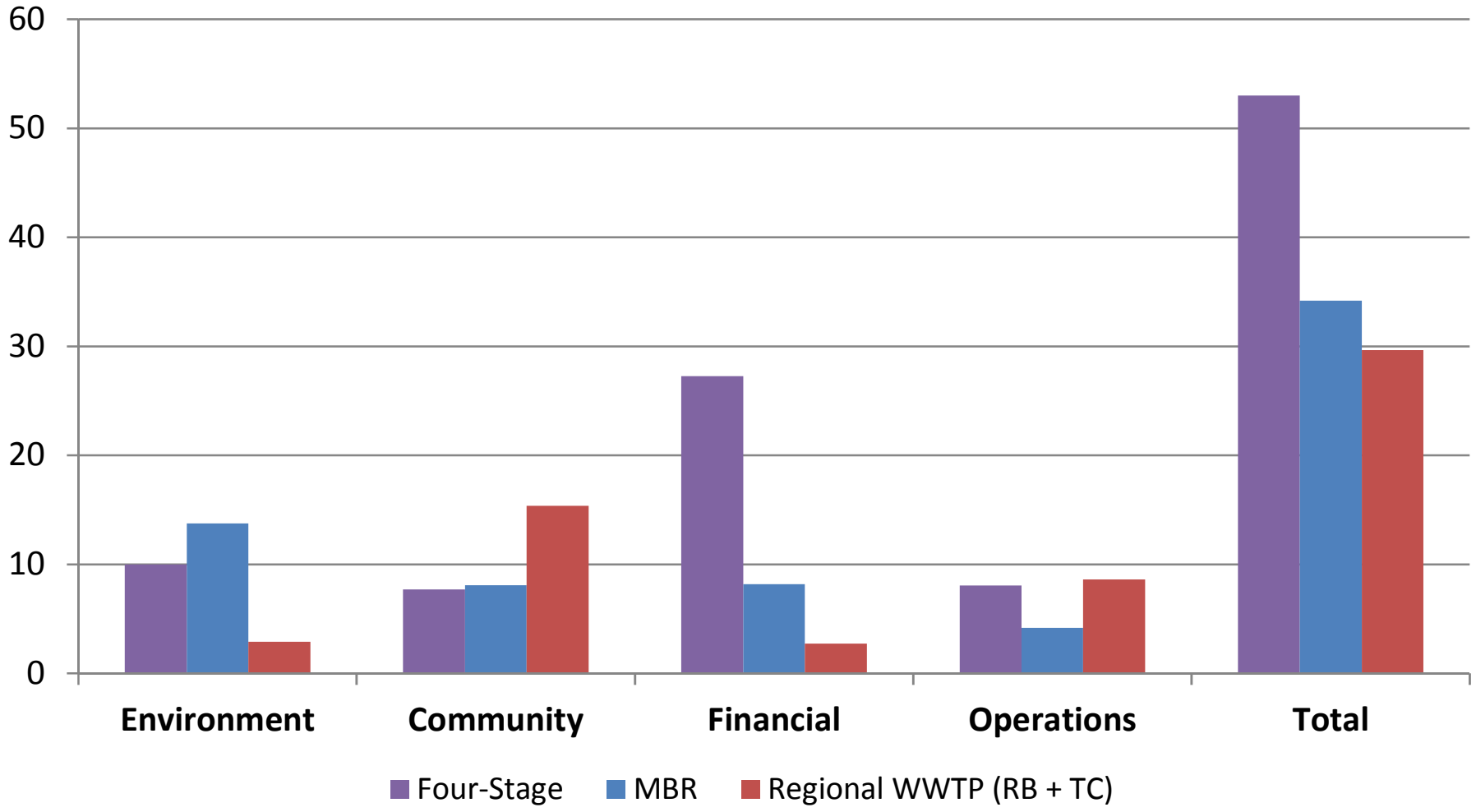
Summary Breakdown					
Total Equipment Monitored	26	Total Equipment NOT Monitored	13	% of Equipment in Failure Mode	30.77 %
Total Equipment on Route	39	Requires Sensors or Access	0	% of Equipment in Risk Mode	33.33 %
Total # Priority 1	0	Total # Priority 2	1	Total # Priority 3	11
Total # Priority 4	14	Total # Priority 5	13	Total # Priority 6	0

Asset #	Equipment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ROCKY BRANCH													
	Digestor Blower 1			3			3			3			
	Digestor Blower 2			3			3			3			
	Aeration Blower 1			5			5			5			
	Aeration Blower 2			4			5			4			
	Aeration Blower 3			4			5			5			
	Aeration Blower 4			4			3			2			
	Aeration Blower 5			4			3			3			
	Grit Pump			4			4			5			
	Non-Potable Pump 1			4			4			5			
	Non-Potable Pump 2			3			4			5			
	Final Clarifier 1			4			5			5			
	Final Clarifier 2			5			4			4			
	Digester Sludge Pump			4			3			5			

APPENDIX C – ALTERNATIVES OPINIONS OF PROBABLE COST

KC Water Services
Wastewater Master Plan & OCP Services
Task 4: Decision Making Framework
Rocky Branch WWTP Process Improvements
Quadruple Bottom Line Summary

Dimension	Weighting	Max Score	Four-Stage	MBR	Regional WWTP (RB + TC)
EN-1: Resource recovery/reuse		6.7	1.7	6.7	1.7
EN-2: Land Use		1.7	1.3	1.7	0.0
EN-3: Reduce resource consumption		6.7	5.0	1.7	0.0
EN-4: Greenhouse Gas Footprint		1.7	1.3	0.4	0.4
EN-5: Improve water quality		3.3	0.8	3.3	0.8
Environment	20%	20.0	10.0	13.8	2.9
CO-1: Odor Emissions		6.2	3.1	3.1	6.2
CO-2: Public Safety		6.2	3.1	3.1	6.2
CO-3: Construction & Operating Impacts		3.1	0.8	0.8	2.3
CO-4: Green/Innovative Solutions		1.5	0.0	0.4	0.0
CO-5: Workforce Development		3.1	0.8	0.8	0.8
Community	20%	20.0	7.7	8.1	15.4
EC-1: Total Capital and Operating Cost		14.5	10.9	0.0	0.0
EC-2: Financial and Schedule Risk		7.3	5.5	7.3	0.0
EC-3: Cost Effectiveness		14.5	10.9	0.0	0.0
EC-4: Enabling Additional Revenue Streams		3.6	0.0	0.9	2.7
Financial	40%	40.0	27.3	8.2	2.7
OT-1: Equipment Requirements (including spare parts)		4.4	3.3	0.0	3.3
OT-2: Skill Level of Operator Required		4.4	2.2	1.1	3.3
OT-3: Safety of Operation		4.4	1.1	0.0	1.1
OT-4: Sophistication of O&M/SOP/SMP		2.2	0.0	1.7	0.0
OT-5: Ease of System Integration		2.2	1.1	0.6	0.0
OT-6: Sophistication of Controls		1.1	0.3	0.8	0.3
OT-7: Manpower Requirements (Contract vs internal)		1.1	0.0	0.0	0.6
Operations	20%	20.0	8.1	4.2	8.6
Total	100.0%	100.0	53.0	34.2	29.6


60
50
40
30
20
10
0
Environment
Community
Financial
Operations
Total
Four-Stage
MBR
Regional WWTP (RB + TC)

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
Rocky Branch Conventional Activated Sludge

Date - **23-Nov-15**
Made By - **PEW**
Checked By - **JJK**
Preliminary

Rocky Branch Conventional Activated Sludge

ASSUMPTIONS:

Annual Inflation Rate	**1.90%**
Construction Midpoint Month-Year	**Jun-23**
Construction Contingency	**30%**

Line Item Description	Equip Cat.	No.	Size ea	Units	Unit Purchased Cost.$	Purchased Cost, $	Installation Factor	Installed Cost
Major Equipment								
Headworks								
Influent Pumps		**2**	**3.5 MGD**	**EA**	**$35,000**	$70,000	1.25	$87,500
Mechanical Screen		**2**	**9.6 MGD**	**EA**	**$170,000**	$340,000	1.25	$425,000
Screenings Conveying System		**2**		**EA**	**$82,000**	$164,000	1.25	$205,000
Blower Building								
Intake Filters		**3**	**2000 scfm**	**EA**	**$4,000**	$12,000	1.25	$15,000
Aeration Blowers		**3**	**2000 scfm**	**EA**	**$84,000**	$252,000	1.25	$315,000
Blower CVs		**3**	**12"**	**EA**	**$1,000**	$3,000	1.25	$3,750
Blower BFVs		**5**	**12"**	**EA**	**$1,000**	$5,000	1.25	$6,250
Process Basins								
Anaerobic Mixers		**2**		**EA**	**$25,000**	$50,000	1.25	$62,500
Anoxic Mixers		**2**		**EA**	**$25,000**	$50,000	1.25	$62,500
Aeration BFV Dropleg BFVs		**8**	**12"**	**EA**	**$1,000**	$8,000	1.25	$10,000
Aeration Diffusers		**13400**		**SF**	**$8**	$107,200	1.25	$134,000
Chem Feed							1.25	
Coagulant Storage Tanks		**1**	**30,000 gal**	**EA**	**$60,000**	$60,000	1.25	$75,000
Carbon Storage Tanks		**1**	**3,000 gal**	**EA**	**$9,000**	$9,000	1.25	$11,250
Coagulant Feed System		**3**	**40 gph**	**EA**	**$10,000**	$30,000	1.25	$37,500
Carbon Feed System		**3**	**8 gph**	**EA**	**$8,000**	$24,000	1.25	$30,000
Recirculation Pumps		**6**	**2,000 gpm**	**EA**	**$50,000**	$300,000	1.25	$375,000
TOTAL EQUIPMENT						$1,484,200	IE=	$1,855,250
Piping and Valves Summary		LF	Diameter		Installed Cost		Complexity	
Screened Influent		200	**30"**	inch	$300	$60,000	**1.25**	$75,000
Post-Anoxic to Aeration		80	**30"**	inch	$300	$24,000	**1.50**	$36,000
RAS		150	**12"**	inch	$150	$22,500	**1.25**	$28,125
Secondary Effluent		50	**30"**	inch	$350	$17,500	**1.50**	$26,250
Aeration Piping		205	**12"**	inch	$115	$23,500	**1.25**	$29,375
Miscellaneous Piping					% of IE		**10%**	$185,525

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
Rocky Branch Conventional Activated Sludge

Date - **23-Nov-15**
Made By - **PEW**
Checked By - **JJK**
Preliminary

MISC. SUB-CONTRACTORS		No.	Size, ea	Units	Unit Cost	Total Cost	Complexity or Installation Factor	Installed Cost
Splitter Structure		**1**		**EA**	$74,940	$74,940	**1**	$74,940
Pre-Anoxic Basins		**1**		**EA**	$698,100	$698,100	**1**	$698,100
Post-Aerobic Basin		**1**		**sqft**	$137,880	$137,880	**1.25**	$172,350
Building Drilled Piers		**6760**		**sqft**	$22	$148,720	**1**	$148,720
Blower Bldg Basement & Top Slab		**1**		**EA**	$443,440	$443,440	**1**	$443,440
Blower Bldg Upper Level		**2200**		**sqft**	$300	$660,000	**1**	$660,000
Process Basins Partitions		**1**		**EA**	$222,000	$222,000	**1.5**	$333,000
Mobilization					% of IC		**1%**	$47,661
Miscellaneous Civil					% of IC		**5%**	$238,304
Miscellaneous Structural					% of IC		**5%**	$238,304
Miscellandous Mechanical					% of IC		**4%**	$190,643
Electrical					% of IC		**20%**	$953,215
Instrumentation					% of IE		**10%**	$185,525
TOTAL UNMARKED UP COST								$6,619,726
SALES TAX					% of Above		**0%**	$0
FIELD OVERHEAD					% of Above		**5%**	$330,986
HOME OFFICE (G&A)					% of Above		**2%**	$139,014
SUBCONTRACTOR O&P					% of Above		**7%**	$496,281
PRIME OVERHEAD AND PROFIT					% of Above		**7%**	$531,021
BONDS					% of Above		**1%**	$81,170
INFLATION					% of Above		15.22%	$1,247,766
TOTAL CONSTRUCTION COST								$9,445,964
ENGINEERING					% of Above		**20%**	$1,889,193
CONTINGENCY					% of Above		30%	$3,400,547
OWNER'S CONTINGENCY					% of Above		**5%**	$736,785
TOTAL WITH CONTINGENCY								**$15,472,490**

Client -	Kansas City Water Services	Date -	23-Nov-15
Project Number -	85608	Made By -	PEW
Description -	Construction Cost Opinion Breakdown	Checked By -	JJK
	Rocky Branch Conventional Activated Sludge	Preliminary	

Inflation Rate	1.9%	
Discount Rate	4.0%	
Annual O&M Cost		
Equipment Replacement Cost		$101,420
Operating Power Cost		$120,522
Chemical Cost		$341,275
Calculated Total O&M Cost		$563,217
Annual O&M Cost to use in analysis		$563,217
Present Worth of Life Cycle O&M Costs		$6,200,000
Construction Cost Estimate		
Calculated Construction Cost Estimate		$15,472,490
Construction Cost to use in Analysis		$11,600,000
Present Worth of Life Cycle Cost		$17,800,000

Year	Present Worth of Annual O&M Cost, $
6/1/2024	$473,280
6/1/2025	$463,723
6/1/2026	$454,359
6/1/2027	$445,185
6/1/2028	$436,171
6/1/2029	$427,364
6/1/2030	$418,734
6/1/2031	$410,279
6/1/2032	$401,972
6/1/2033	$393,855
6/1/2034	$385,903
6/1/2035	$378,110
6/1/2036	$370,455
6/1/2037	$362,974
6/1/2038	$355,645
Total O&M Cost NPV	$6,200,000
Total Construction Cost NPV	$11,600,000
Total Present Worth	**$17,800,000**

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
Rocky Branch MBR

Date - **23-Nov-15**
Made By - **PEW**
Checked By - **JJK**
Preliminary

Rocky Branch MBR

ASSUMPTIONS:

Annual Inflation Rate	**1.90%**
Construction Midpoint Month-Year	**Jun-23**
Construction Contingency	**30%**

Line Item Description	Equip Cat.	No.	Size ea	Units	Unit Purchased Cost.$	Purchased Cost, $	Installation Factor	Installed Cost
Major Equipment								
Headworks								
Influent Pumps	1	**2**	**3.5 MGD**	**EA**	**$35,000**	$70,000	1.25	$87,500
Fine Screen (1-2 mm)	1	**2**	**9.6 MGD**	**EA**	**$210,000**	$420,000	1.25	$525,000
Screenings Conveying System	1	**2**		**EA**	**$82,000**	$164,000	1.25	$205,000
Blower Building								
Intake Filters	2	**3**	**2000 scfm**	**EA**	**$4,000**	$12,000	1.25	$15,000
Aeration Blowers	2	**3**	**2000 scfm**	**EA**	**$84,000**	$252,000	1.25	$315,000
Blower CVs	2	**3**	**12"**	**EA**	**$1,000**	$3,000	1.25	$3,750
Blower BFVs	2	**5**	**12"**	**EA**	**$1,000**	$5,000	1.25	$6,250
Process Basins								
Anaerobic Mixers	3	**2**		**EA**	**$25,000**	$50,000	1.25	$62,500
Anoxic Mixers	3	**2**		**EA**	**$25,000**	$50,000	1.25	$62,500
Aeration BFV Dropleg BFVs	3	**8**	**12"**	**EA**	**$1,000**	$8,000	1.25	$10,000
Aeration Diffusers	3	**10000**		**SF**	**$8**	$80,000	1.25	$100,000
MBR/Process Bldg								
Membrane System	4	**1**	**9.6 MGD**	**EA**	**$4,200,000**	$4,200,000	1.25	$5,250,000
Coagulant Storage Tanks	4	**1**	**30,000 gal**	**EA**	**$60,000**	$60,000	1.25	$75,000
Carbon Storage Tanks	4	**1**	**3,000 gal**	**EA**	**$9,000**	$9,000	1.25	$11,250
Coagulant Feed System	4	**3**	**40 gph**	**EA**	**$10,000**	$30,000	1.25	$37,500
Carbon Feed System	4	**3**	**8 gph**	**EA**	**$8,000**	$24,000	1.25	$30,000
Recirculation Pumps	4	**5**	**2,000 gpm**	**EA**	**$50,000**	$250,000	1.25	$312,500
WAS Pumps	4	**3**	**250 gpm**	**EA**	**$15,000**	$45,000	1.25	$56,250
TOTAL EQUIPMENT						$5,732,000	IE=	$7,165,000
Piping and Valves Summary		LF	Diameter		Installed Cost		Complexity	
RAS Aerobic		345	**12"**	inch	$110	$38,000	**1.50**	$57,000
RAS Anoxic		260	**24"**	inch	$138	$36,000	**1.50**	$54,000
WAS		125	**6"**	inch	$72	$9,000	**1.25**	$11,250
Secondary Effluent		50	**36"**	inch	$350	$17,500	**1.50**	$26,250
Final Effluent		450	**36"**	inch	$350	$157,500	**1.25**	$196,875
Aeration Piping		205	**12"**	inch	$115	$23,500	**1.25**	$29,375
Miscellaneous Piping					% of IE		**10%**	$716,500

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
Rocky Branch MBR

Date - **23-Nov-15**
Made By - **PEW**
Checked By - **JJK**
Preliminary

MISC. SUB-CONTRACTORS		No.	Size, ea	Units	Unit Cost	Total Cost	Complexity or Installation Factor	Installed Cost
MBR Tank		**1**		**EA**	$319,600	$319,600	**1**	$319,600
Process Building Basement & Top Slab		**1**		**EA**	$549,820	$549,820	**1**	$549,820
Process Building Upper Level		**2100**		**sqft**	$300	$630,000	**1**	$630,000
Drilled Piers		**4375**		**LS**	$22	$96,250	**1**	$96,250
Blower Bldg Basement & Top Slab		**1**		**EA**	$246,090	$246,090	**1**	$246,090
Blower Bldg Upper Level		**800**		**sqft**	$200	$160,000	**1**	$160,000
Process Basins Partitions		**1**		**EA**	$133,200	$133,200	**1.5**	$199,800
Mobilization					% of IC		**1%**	$104,578
Miscellaneous Civil					% of IC		**5%**	$522,891
Miscellaneous Structural					% of IC		**5%**	$522,891
Miscellandous Mechanical					% of IC		**4%**	$418,312
Electrical					% of IC		**20%**	$2,091,562
Instrumentation					% of IE		**10%**	$716,500
TOTAL UNMARKED UP COST								$14,834,544
SALES TAX					% of Above		**0%**	$0
FIELD OVERHEAD					% of Above		**5%**	$741,727
HOME OFFICE (G&A)					% of Above		**2%**	$311,525
SUBCONTRACTOR O&P					% of Above		**7%**	$1,112,146
PRIME OVERHEAD AND PROFIT					% of Above		**7%**	$1,189,996
BONDS					% of Above		**1%**	$181,899
INFLATION					% of Above		15.22%	$2,796,194
TOTAL CONSTRUCTION COST								$21,168,031
ENGINEERING					% of Above		**20%**	$4,233,606
CONTINGENCY					% of Above		30%	$7,620,491
OWNER'S CONTINGENCY					% of Above		**5%**	$1,651,106
TOTAL WITH CONTINGENCY								**$34,673,234**

Client -	Kansas City Water Services	Date -	23-Nov-15
Project Number -	85608	Made By -	PEW
Description -	Construction Cost Opinion Breakdown Rocky Branch MBR	Checked By -	JJK
		Preliminary	

Inflation Rate	1.9%	
Discount Rate	4.0%	
Annual O&M Cost		
Equipment Replacement Cost		$310,700
Operating Power Cost		$181,597
Chemical Cost		$396,843
Calculated Total O&M Cost		$889,140
Annual O&M Cost to use in analysis		$889,140
Present Worth of Life Cycle O&M Costs		$9,800,000
Construction Cost Estimate		
Calculated Construction Cost Estimate		$34,673,234
Construction Cost to use in Analysis		$25,900,000
Present Worth of Life Cycle Cost		$35,700,000

Year	Present Worth of Annual O&M Cost, $
6/1/2024	$747,158
6/1/2025	$732,071
6/1/2026	$717,289
6/1/2027	$702,805
6/1/2028	$688,576
6/1/2029	$674,672
6/1/2030	$661,048
6/1/2031	$647,700
6/1/2032	$634,586
6/1/2033	$621,773
6/1/2034	$609,218
6/1/2035	$596,916
6/1/2036	$584,830
6/1/2037	$573,021
6/1/2038	$561,451
Total O&M Cost NPV	$9,800,000
Total Construction Cost NPV	$25,900,000
Total Present Worth	**$35,700,000**

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
TC + RB Regional WWTP

Date - **23-Nov-15**
Made By - **CTO**
Checked By - **JJK**
Preliminary

TC + RB Regional WWTP

Annual Inflation Rate	**1.90%**
Construction Midpoint Month-Year	**Jun-23**
Construction Contingency	**30%**

Line Item Description	Equip Cat.	No.	Size ea	Units	Unit Purchased Cost.$	Purchased Cost, $	Installation Factor	Installed Cost
Major Equipment								
Rocky Branch LS								
Replace influent pumps	0	**4**	**3.2 MGD**		**$30,000**	$120,000	1.25	$150,000
Headworks								
Influent Pumps	1	**4**	**5.9 MGD**		**$50,000**	$200,000	1.25	$250,000
Influent PVs	1	**8**	**16"**		**$4,500**	$36,000	1.25	$45,000
Influent CVs	1	**4**	**16"**		**$6,500**	$26,000	1.25	$32,500
Influent flow meter	1	**1**	**24"**		**$24,000**	$24,000	1.25	$30,000
Mechanical Screens	1	**2**	**9 MGD**		**$60,000**	$120,000	1.25	$150,000
Bar Rack	1	**1**	**18 MGD**		**$5,000**	$5,000	1.25	$6,250
Grit Removal Units	1	**2**	**9 MGD**		**$70,000**	$140,000	1.25	$175,000
Grit Pumps	1	**2**			**$20,000**	$40,000	1.25	$50,000
Grit Classifiers	1	**2**			**$70,000**	$140,000	1.25	$175,000
Misc Gates	1	**11**			**$6,000**	$66,000	1.25	$82,500
Process Building								
Intake Filters	1	**5**	**3700 scfm**		**$4,000**	$20,000	1.25	$25,000
Aeration Blowers	1	**5**	**3700 scfm**		**$130,000**	$650,000	1.25	$812,500
Blower BFVs	1	**10**	**12"**		**$1,000**	$10,000	1.25	$12,500
Blower CVs	1	**5**	**12"**		**$1,000**	$5,000	1.25	$6,250
Carbon Feed Tanks	1	**2**	**5000 gallons**		**$15,000**	$30,000	1.25	$37,500
Carbon Feed System	1	**2**	**6 gph**		**$10,000**	$20,000	1.25	$25,000
Process Basins								
Mixers	1	**30**			**$15,000**	$450,000	1.25	$562,500
Diffused Air Grids	1	**37000**			**$8**	$296,000	1.25	$370,000
IR Pumps	1	**6**			**$20,000**	$120,000	1.25	$150,000
Splitter Gates	1	**4**			**$6,000**	$24,000	1.25	$30,000
Clarifiers								
Mechanisms	1	**3**	**137'**		**$310,000**	$930,000	1.25	$1,162,500
Splitter Gates	1	4			**$6,000**	$24,000	1.25	$30,000
RAS Pump Station	1							
RAS Pumps	1	**3**	**2 MGD**		**$25,000**	$75,000	1.25	$93,750
WAS Pumps	1	**2**			**$15,000**	$30,000	1.25	$37,500
UV Building								
UV Equipment	1	**1**			**$450,000**	$450,000	1.25	$562,500
Gates	1	**6**			**$6,000**	$36,000	1.25	$45,000
TOTAL EQUIPMENT						$4,087,000	IE=	$5,108,750
Piping and Valves Summary		LF	Diameter		Installed Cost		Complexity	
Plant Yard Piping	**0**	2,750	**18 - 48**	inch	$315	$865,000	**1.25**	$1,081,250
Rocky Branch Force Main	**0**	32,000	**24**	inch	$250	$8,000,000	**1.00**	$8,000,000
Todd Creek Interceptor Extension	**0**	4,900	**36**	inch	$350	$1,715,000	**1.00**	$1,715,000
WAS Piping to Todd Creek Lagoons	**0**	4,900	**6**	inch	$80	$392,000	**1.00**	$392,000
Miscellaneous Piping					% of IE		**15%**	$766,313

Client - **Kansas City Water Services**
Project Number - **85608**
Description - Construction Cost Opinion Breakdown
TC + RB Regional WWTP

Date - **23-Nov-15**
Made By - **CTO**
Checked By - **JJK**
Preliminary

MISC. SUB-CONTRACTORS		No.	Size, ea	Units	Unit Cost	Total Cost	Complexity or Installation Factor	Installed Cost
Headworks Facility Concrete & Exc.	**1**	**1**		**LS**	$960,720	$960,720	**1**	$960,720
Headworks Facility Drilled Piers	**1**	**4650**		**SF**	$22	$102,300	**1**	$102,300
Headworks Facility Building	**1**	**4650**		**SF**	$200	$930,000	**1**	$930,000
Process Building Drilled Piers	**1**	**3700**		**SF**	$22	$81,400	**1**	$81,400
Process Building	**1**	**3700**		**SF**	$200	$740,000	**1**	$740,000
Process Basins Drilled Piers	**1**	**59826**		**SF**	$22	$1,316,172	**1**	$1,316,172
Process Basins	**1**	**1**		**LS**	$7,813,240	$7,813,240	**1**	$7,813,240
Clarifier Splitter Piers	**1**	**576**		**SF**	$22	$12,672	**1**	$12,672
Clarifier Splitter	**1**	**1**		**LS**	$118,170	$118,170	**1**	$118,170
Clarifier Piers	**1**	**57226.5**		**SF**	$22	$1,258,983	**1**	$1,258,983
Clarifiers	**1**	**3**		**EA**	$860,060	$2,580,180	**1**	$2,580,180
RAS PS Piers	**1**	**576**		**SF**	$22	$12,672	**1**	$12,672
RAS PS Basement	**1**	**1**		**LS**	$118,170	$118,170	**1**	$118,170
RAS PS Building	**1**	**576**		**SF**	$22	$12,672	**1**	$12,672
UV Building Piers	**1**	**850**		**SF**	$22	$18,700	**1**	$18,700
UV Building Basement	**1**	**1**		**LS**	$83,810	$83,810	**1**	$83,810
UV Building	**1**	**850**		**SF**	$200	$170,000	**1**	$170,000
Admin Building	**1**	**3200**		**SF**	$250	$800,000	**1**	$800,000
Land Acquisition	**0**	**1**		**LS**	$10,000	$10,000	**1**	$10,000
Mobilization					% of IC		**1%**	$342,032
Miscellaneous Civil					% of IC		**5%**	$1,710,159
Miscellaneous Structural					% of IC		**5%**	$1,710,159
Miscellandous Mechanical					% of IC		**4%**	$1,368,127
Electrical					% of IC		**20%**	$6,840,635
Instrumentation					% of IE		**10%**	$510,875
TOTAL UNMARKED UP COST								$46,685,159
SALES TAX					% of Above		**0%**	$0
FIELD OVERHEAD					% of Above		**5%**	$2,334,258
HOME OFFICE (G&A)					% of Above		**2%**	$980,388
SUBCONTRACTOR O&P					% of Above		**7%**	$3,499,986
PRIME OVERHEAD AND PROFIT					% of Above		**7%**	$3,744,985
BONDS					% of Above		**1%**	$572,448
INFLATION					% of Above		15.22%	$8,799,782
TOTAL CONSTRUCTION COST								$66,617,007
ENGINEERING					% of Above		**20%**	$13,323,401
CONTINGENCY					% of Above		30%	$23,982,122
OWNER'S CONTINGENCY					% of Above		**5%**	$5,196,127
TOTAL WITH CONTINGENCY								**$109,118,657**

Client -	Kansas City Water Services	Date -	23-Nov-15
Project Number -	85608	Made By -	CTO
Description -	Construction Cost Opinion Breakdown TC + RB Regional WWTP	Checked By -	JJK Preliminary

Inflation Rate	1.9%	
Discount Rate	4.0%	
Annual O&M Cost		
Equipment Replacement Cost		$244,183
Operating Power Cost		$375,911
Chemical Cost		$1,028,260
Calculated Total O&M Cost		$1,648,354
Annual O&M Cost to use in analysis		$1,648,354
Present Worth of Life Cycle O&M Costs		$18,100,000
Construction Cost Estimate		
Calculated Construction Cost Estimate		$109,118,657
Construction Cost to use in Analysis		$81,300,000
Present Worth of Life Cycle Cost		$99,400,000

Year	Present Worth of Annual O&M Cost, $
6/1/2024	$1,385,138
6/1/2025	$1,357,168
6/1/2026	$1,329,764
6/1/2027	$1,302,913
6/1/2028	$1,276,533
6/1/2029	$1,250,757
6/1/2030	$1,225,501
6/1/2031	$1,200,755
6/1/2032	$1,176,444
6/1/2033	$1,152,689
6/1/2034	$1,129,413
6/1/2035	$1,106,608
6/1/2036	$1,084,202
6/1/2037	$1,062,310
6/1/2038	$1,040,859

		Rocky Branch Equivalent	**Todd Creek Equivalent**
Total O&M Cost NPV	$18,100,000	$8,500,000	$9,600,000
Total Construction Cost NPV	$81,300,000	$38,100,000	$43,200,000
Total Present Worth	**$99,400,000**	**$46,600,000**	**$52,800,000**

KANSAS CITY
MISSOURI

KCMO.GOV/SMARTSEWER

C311

C312

C313

C314

SUBSTATION

EXISTING CEMETERY
(TO REMAIN)

124TH STREET

OFFSITE CONNECTION FOR FIBER;
LOCATION TO BE DETERMINED

MO STATE HIGHWAY 169

NEW WATER LINE TO BE PLACED
WITHIN THE NORTH MAIN STREET
EXISTING R.O.W.

N MAIN STREET

ALTERNATE CONNECTION TO
EXISTING WATER MAIN TO THE
EAST AT EXISTING SUBDIVISION

INTERSTATE-435

CONNECTION TO EXISTING WATER
MAIN VIA EXISTING 24" SLEEVE
PIPE UNDER INTERSTATE-435

NOTES

LEGEND

- PROJECT BOUNDARY LINES
- F — EXISTING UNDERGROUND FIBER
- W — EXISTING UNDERGROUND WATER LINE
- OE — OE — EXISTING OVERHEAD ELECTRICAL LINES
- SAN — EXISTING SANITARY SEWER
- G — G — PROPOSED GAS LINE
- SAN — PROPOSED SANITARY SEWER
- E — E — PROPOSED UNDERGROUND ELECTRICAL
- FP — PROPOSED FIRE PROTECTION WATER LINE
- SD — SD — PROPOSED STORM WATER
- W — W — PROPOSED WATER MAIN
- F/E — PROPOSED FIBER OPTIC & ELECTRICAL
- PARCEL LINE
- ROAD CENTERLINE
- STREAM CL (SEE NOTE #3, SHEET C400)
- STREAMSIDE ZONE
- MATURE RIPARIAN VEGETATION
- MIDDLE ZONE (FEMA 100 YEAR FLOOD ZONE)
- STREAM BUFFER OUTER ZONE
- WETLANDS
- WETLANDS (ISOLATED)
- POND
- POND (ISOLATED)
- REINFORCED SLOPES

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200' 100' 0 200' 400'
1"=200'

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ROCKY BRANCH CREEK

PROJECT	DRAWING NUMBER	REV
406347	C300	A

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OVERALL UTILITY PLAN LAYOUT
NE CORNER OF I-435 & 169 HWY

CODE -
AREA -

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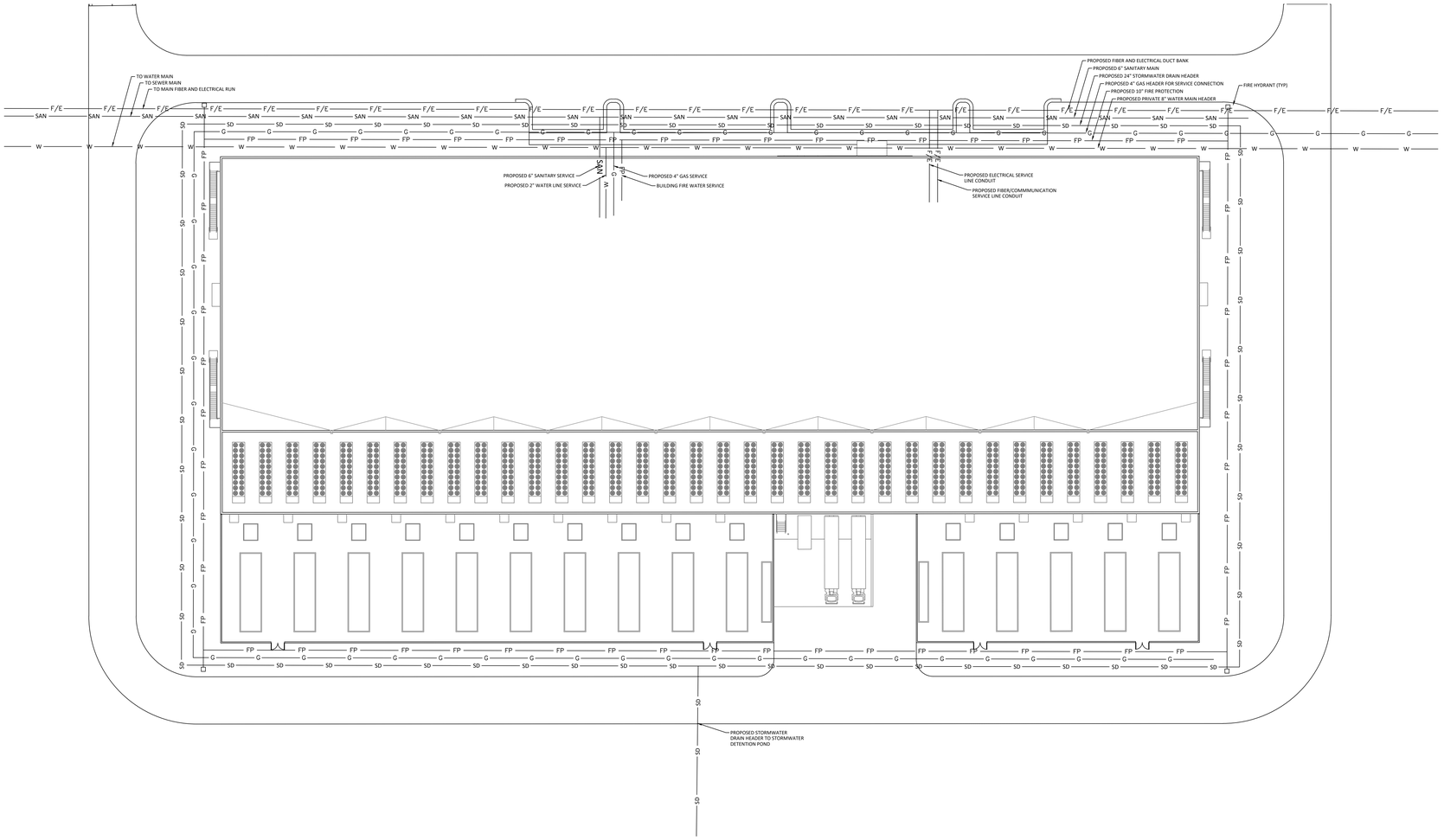

NOTES

1. ALL LINE SIZES ARE PRELIMINARY.

LEGEND

- G — G — PROPOSED GAS LINE
- SAN — SAN — PROPOSED SANITARY SEWER
- E — E — PROPOSED UNDERGROUND ELECTRICAL
- FP — FP — PROPOSED FIRE PROTECTION WATER LINE
- SD — SD — PROPOSED STORM WATER
- W — W — PROPOSED WATER MAIN
- F/E — F/E — PROPOSED FIBER OPTIC & ELECTRICAL

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UTILITY PLAN - TYPICAL UTILITY DATA CENTER LAYOUT
NE CORNER OF I-435 & 169 HWY

PROJECT	DRAWING NUMBER	REV
406347	C310	A

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AREA -

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MO STATE HIGHWAY 169

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ASPHALT

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124TH STREET

EXISTING 8" GAS MAIN

MATCHLINE C312

MATCHLINE C313

NOTES

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- PROJECT BOUNDARY LINES
- EXISTING UNDERGROUND FIBER
- EXISTING UNDERGROUND WATER LINE
- EXISTING OVERHEAD ELECTRICAL LINES
- EXISTING SANITARY SEWER
- PROPOSED GAS LINE
- PROPOSED SANITARY SEWER
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED FIRE PROTECTION WATER LINE
- PROPOSED STORM WATER
- PROPOSED WATER MAIN
- PROPOSED FIBER OPTIC & ELECTRICAL
- PARCEL LINE
- ROAD CENTERLINE
- STREAM CL (SEE NOTE #3, SHEET C400)
- STREAMSIDE ZONE
- MATURE RIPARIAN VEGETATION
- MIDDLE ZONE (FEMA 100 YEAR FLOOD ZONE)
- STREAM BUFFER OUTER ZONE
- WETLANDS
- WETLANDS (ISOLATED)
- POND
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UTILITY PLAN - AREA 1
NE CORNER OF I-435 & 169 HWY

PROJECT	DRAWING NUMBER	REV
406347	C311	A

CODE -
AREA -

USERNAME E1
ACAD VERSION
DATE/TIME

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- EXISTING UNDERGROUND WATER LINE
- EXISTING OVERHEAD ELECTRICAL LINES
- EXISTING SANITARY SEWER
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UTILITY PLAN - AREA 2
NE CORNER OF I-435 & 169 HWY

PROJECT	DRAWING NUMBER	REV
406347	C312	A
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AREA -		

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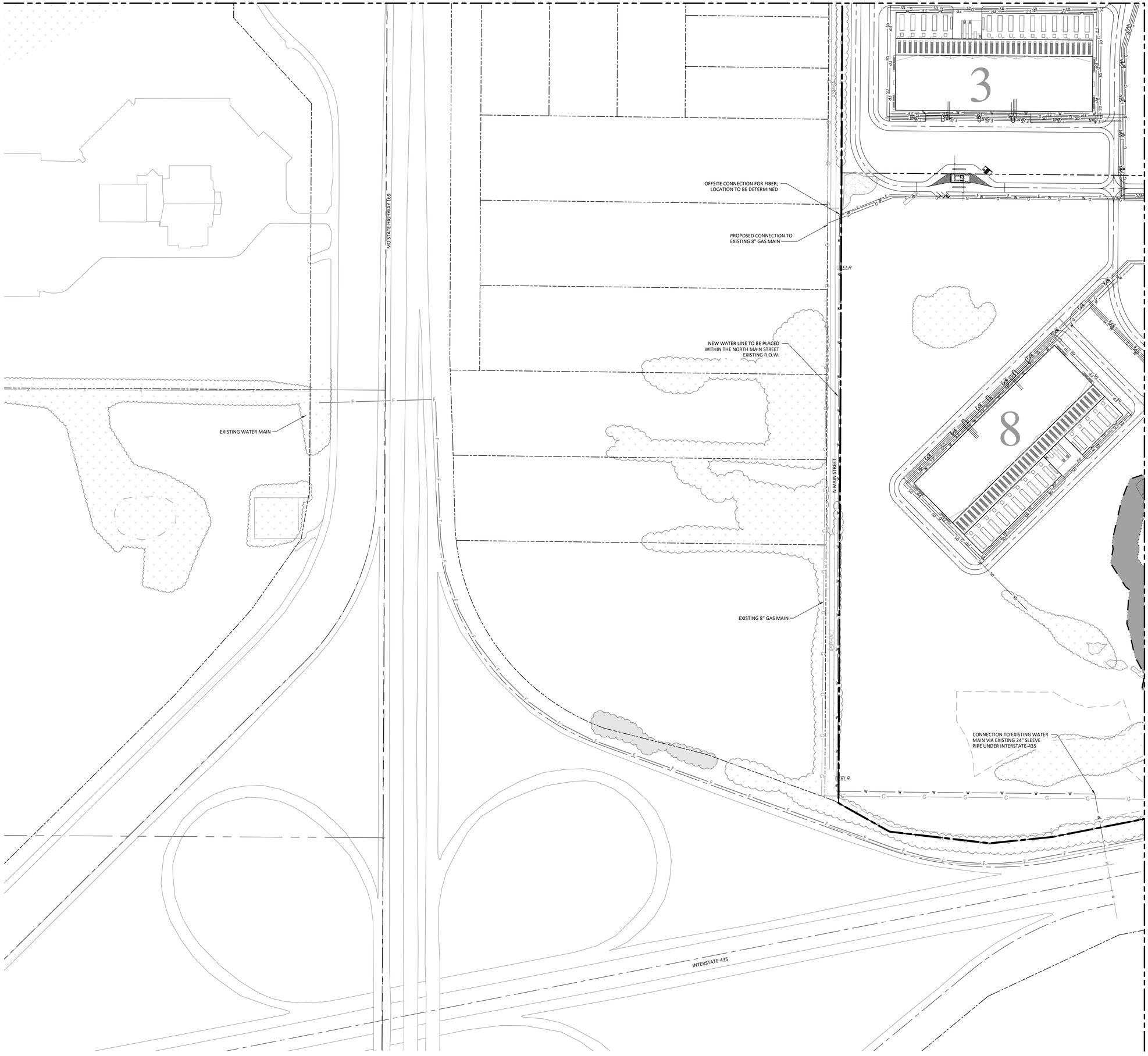

MATCHLINE C314

NOTES

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- EXISTING UNDERGROUND WATER LINE
- EXISTING OVERHEAD ELECTRICAL LINES
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- PROPOSED SANITARY SEWER
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UTILITY PLAN - AREA 3
NE CORNER OF I-435 & 169 HWY

PROJECT	DRAWING NUMBER	REV
406347	C313	A

CODE -
AREA -

USERNAME E1
LAYOUT
DATE TIME
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MATCHLINE C312

MATCHLINE C313

7

9

PROPOSED CONNECTION TO SANITARY MAIN

EXISTING OVERHEAD UTILITY

ALTERNATE CONNECTION TO EXISTING WATER MAIN TO THE EAST AT EXISTING SUBDIVISION

INTERSTATE-435

NOTES

LEGEND

- PROJECT BOUNDARY LINES
- EXISTING UNDERGROUND FIBER
- EXISTING UNDERGROUND WATER LINE
- EXISTING OVERHEAD ELECTRICAL LINES
- EXISTING SANITARY SEWER
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ENGINEER JJD | DRAWN CLC | CHECKED SMR | DATE -

UTILITY PLAN - AREA 4
NE CORNER OF I-435 & 169 HWY

PROJECT 406347 | DRAWING NUMBER C314 | REV A
CODE - | AREA -

USERNAME
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Master Planned Development (MPD) Statement of Intent

Rocky Branch Creek Technology Park (RBC)

This MPD Plan provides for the preparation and approval of a unified development of approximately 360 acres located in the northeast corner of Interstate 435 and Highway 169 within the 2nd council district. The site is currently zoned for a mix of potential uses, but limited by overlay zoning classifications; it is currently used for agriculture and is otherwise undeveloped. The proposed MPD rezoning and planning would allow for nearly 2,000,000 square feet of commercial data center use with smaller (<20,000 square feet) additional office use opportunity, all spread across 9 separate data center buildings. Data centers fall under Communications Service Establishments in the City Code, and would ordinarily be developed under B2-3 or similar zoning; as such, much of our proposed guidelines were pulled from existing zoning code.

MPD zoning grants the project and the city several benefits. While B2-3 zoning was used as a guideline, several variances would have been requested for the project site: requirements for automobile and bicycle parking; public access and uses; and building height are chief among them. Although RBC is smaller in size than the similar development, Golden Plains Technology Park, its substantial size can contribute to overly burdensome requirements for both the developer and for City staff review. The MPD Plan provides greater community benefits through more assured uses, more substantial protection of the city's natural resources (including streams, buffers, and existing trees), and maintains the City's green/vegetated gateway into the Northland.

Application Description:

Application to rezone property at the northeast corner of Interstate 435 and Highway 169 from a mix of uses including R-6, R-2.5, R-1.5, B3-2, and R-7.5 to MPD for data center development.

DRAFT

ROCKY BRANCH WWTP CAPACITY REVIEW

B&V PROJECT NO. 412157

PREPARED FOR

Kansas City Water Services Department

10 JUNE 2022

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

1.0 Study Objectives

The Rocky Branch Wastewater Treatment Plant (WWTP) treats domestic wastewater from Rocky Branch and First Creek Sewersheds in northern Kansas City prior to discharge to the Rocky Branch Creek. The treatment process is comprised of screening and grit removal, an extended aeration activated sludge process, and UV disinfection. The overall objective of this study is to review and/or update the Rocky Branch WWTP process unit capacities and compare them to current and future needs. To this end, this study completed the following:

1) trended historical flows and loads and compared them to future projections,

2) analyzed historical aeration basin dissolved oxygen concentrations as they pertain to blower capacity,

3) estimated the capacity of the secondary system based on recent influent quality and sludge settleability, and

4) compared process unit capacity to historical operation .

2.0 Rocky Branch Process Overview

The Rocky Branch WWTP process is depicted in the flow schematic in Figure 2-1. Raw influent flows to the influent pump station, which operates by level. During wet weather, the influent pump station fills, and the excess flow overflows into the lagoons. Once the level drops in the influent pump station, the stored flow in the lagoons flows by gravity back to the influent pump station. The headworks at Rocky Branch consists of step-screens and vortex grit removal. Secondary treatment consists of two extended aeration basins and two clarifiers that operate with a shared sludge. The secondary effluent is disinfected via ultraviolet (UV) disinfection and reaerated by a cascade aeration structure prior to discharge to the Rocky Branch Creek.

Wasted sludge from the aeration basins is aerated in the aerobic digester. Solids from the aerobic digesters is transported by truck to the Buckeye Pump Station to receive treatment at the Blue River Wastewater Treatment Plant.

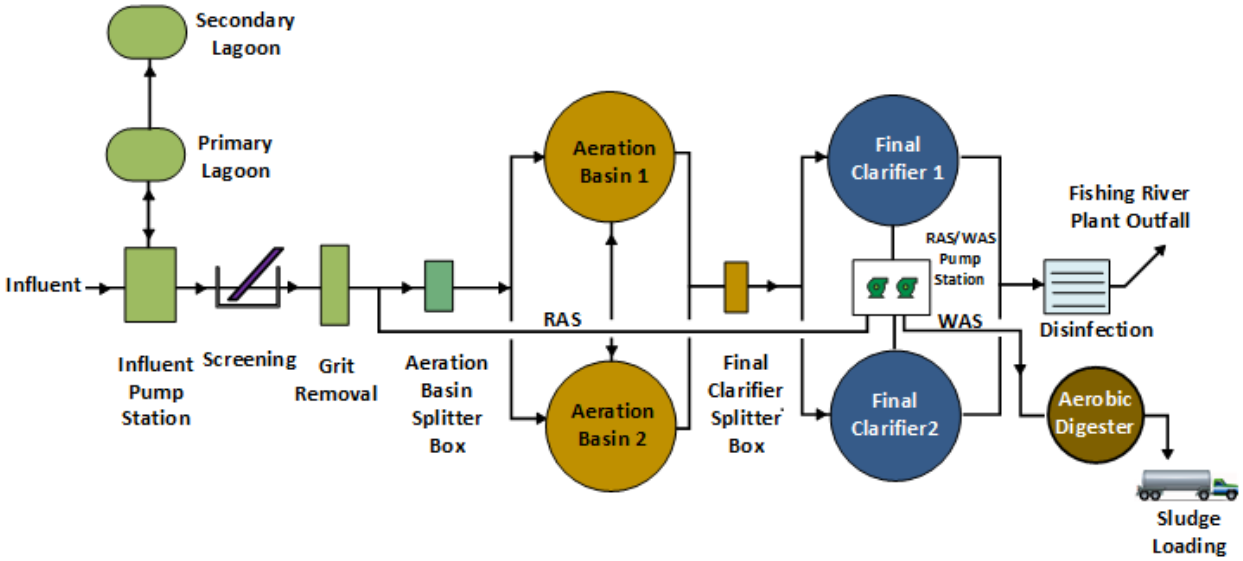

Figure 2-1. Rocky Branch WWTP Process Flow Schematic

3.0 Influent Flow and Load Analysis

The first step in evaluating the capacity demands of the Rocky Branch WWTP is to understand the historical flows and loading trends. To this end, the Rocky Branch Monthly Operating Report data was evaluated from 2018-2021.

3.1.1 Influent Flow

As shown in Figure 3-1, the annual average (AA) influent flow from 2018 to 2020 remained at or very near 2.0 mgd. In 2021, a series of wet weather events drove the AA up to 2.6 mgd.

Figure 3-2 compares the measured AA, maximum month (MM), and peak day (PD) influent flow averages to those projected in the 2017 Rocky Branch Master Plan. The 2018-2020 measured AA flows closely matched the projected values, while the 2021 AA flow exceeded the projected value by 12%. The greatest MM flow occurred in 2019 during an exceptionally wet weather month. With the exception of the 2019 values, the MM and PD flows fell well under the predicted values.

KC Water is considering the addition of developer flows of 1.43 mgd cumulative daily peak flow. These flows were added onto the projected PD flows for comparison in Figure 3-3. The impact of the developer flow on AA and MM are under investigation.

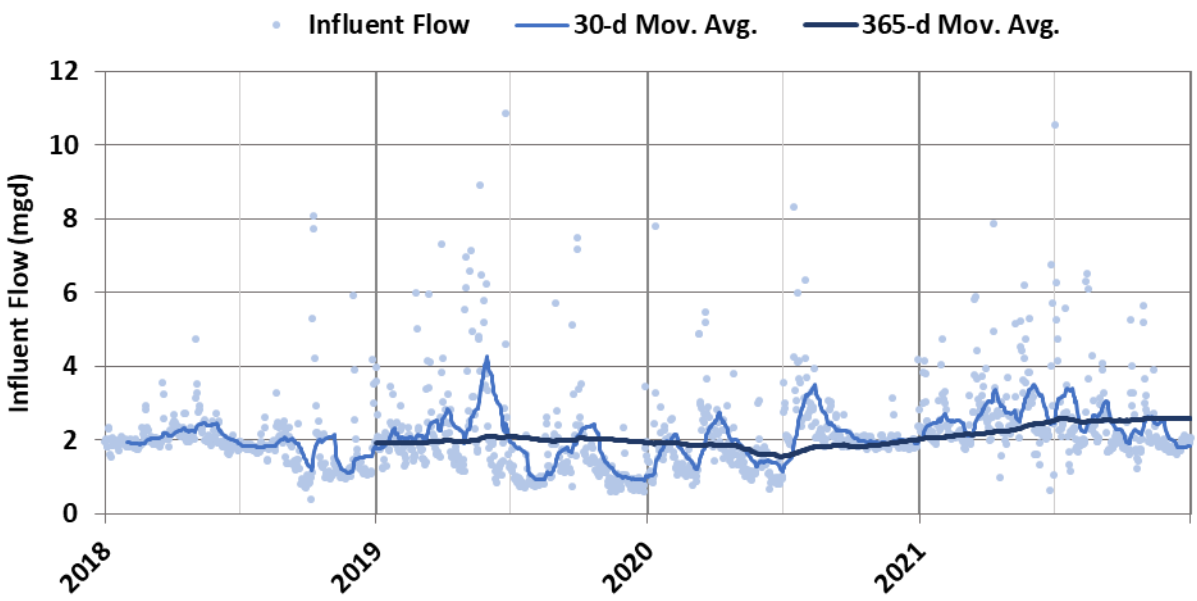

Figure 3-1. 2018-2021 Rocky Branch WWTP Influent Flow vs. Time

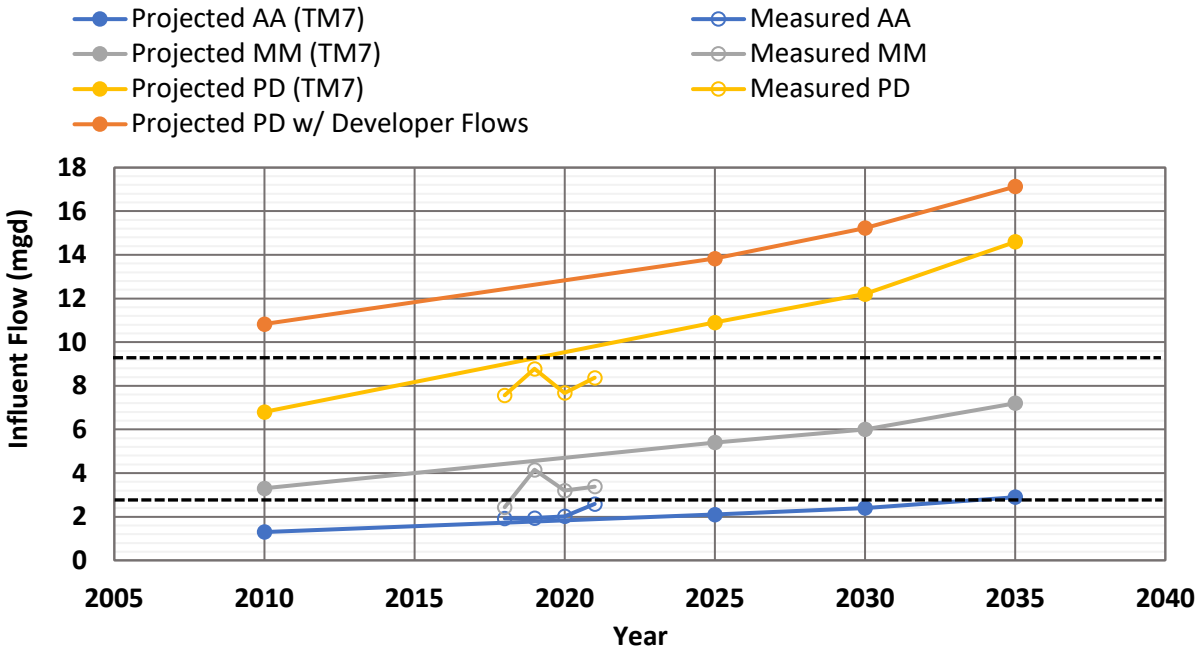

Figure 3-2. 2018-2021 Rocky Branch WWTP Influent Flow vs. Projected Averages

3.1.2 Influent Loads

The historical trends in total suspended solids (TSS) and biological oxygen demand (BOD) load are shown in Figure 3-7Figure 3-3 through Figure 3-6. Note that the box and whiskers plots have the statistical outliers removed. For both TSS and BOD, relatively high loads were observed in the first half of 2018, which resulted in 2018 experiencing the highest AA loads. Overall, there are no discernable trends in the 2019-2021 TSS or BOD load.

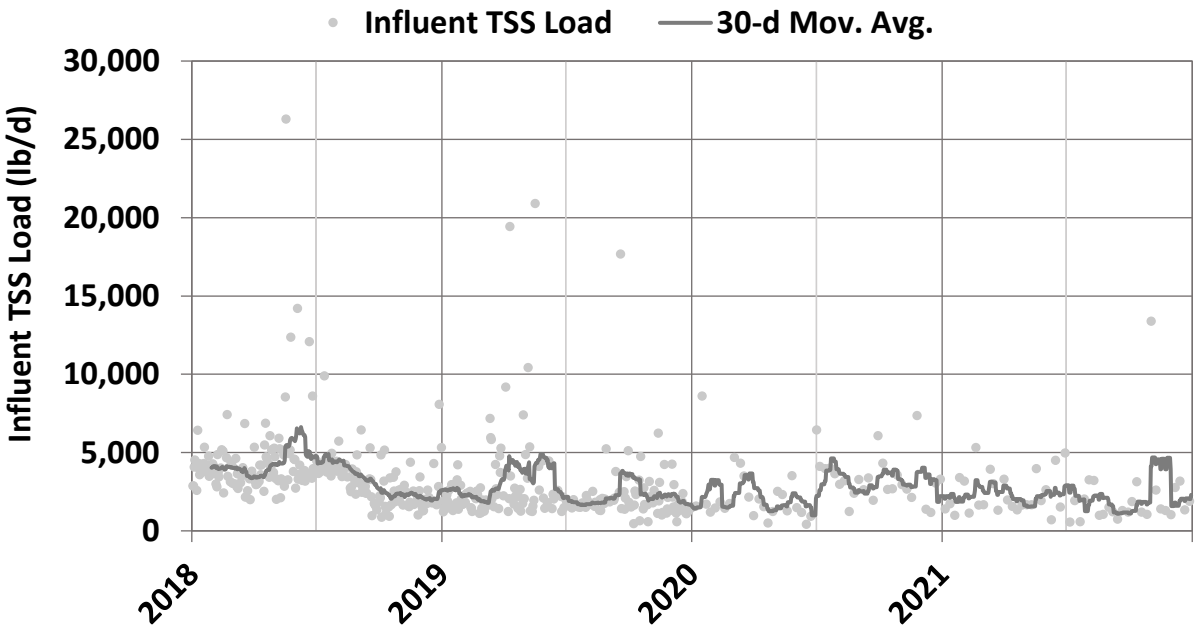

Figure 3-3. 2018-2021 Rocky Branch WWTP Influent TSS Load vs. Time

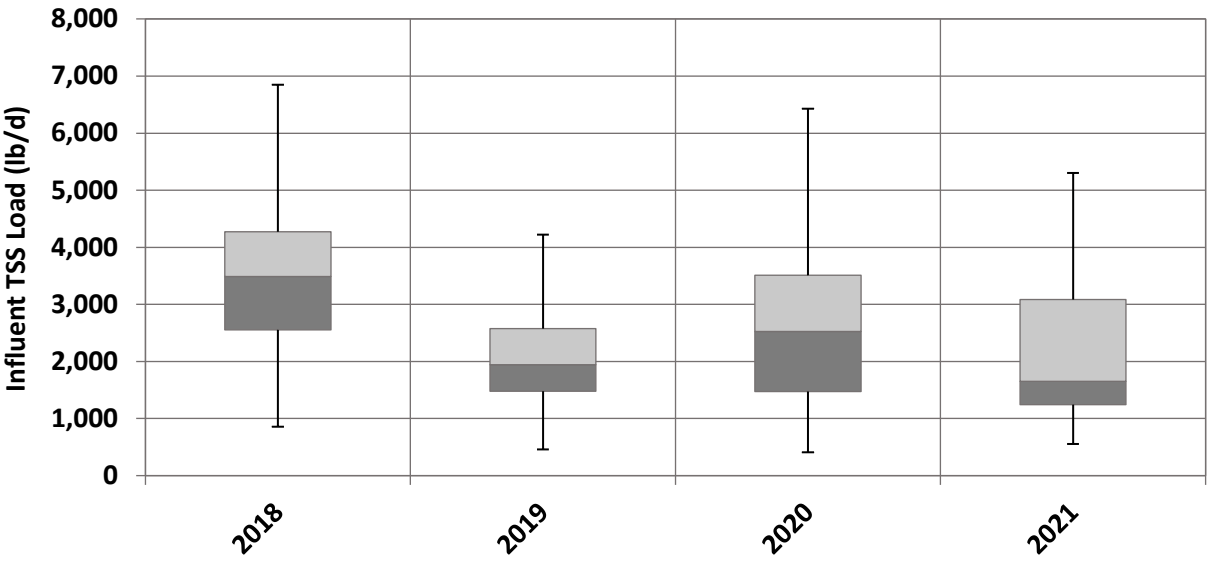

Figure 3-4. 2018-2021 Rocky Branch WWTP Influent TSS Load Box and Whisker Plot

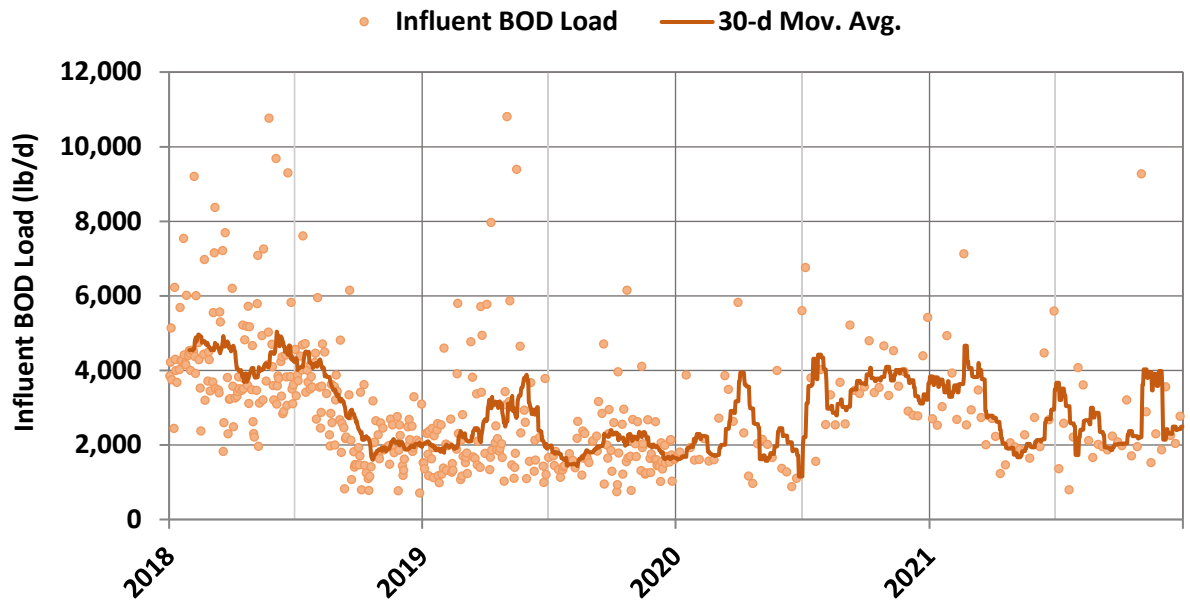

Figure 3-5. 2018-2021 Rocky Branch WWTP Influent BOD Load vs. Time

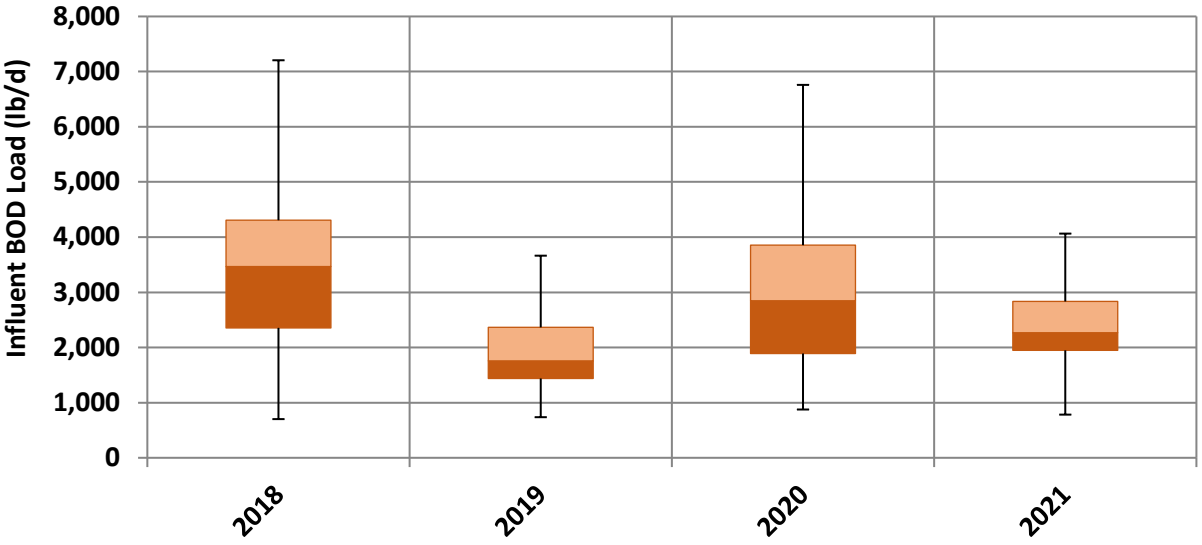

Figure 3-6. 2018-2021 Rocky Branch WWTP Influent BOD Load Box and Whisker Plot

Weekly nitrogen (N) measurements were taken for ammonia (NH_x-N) prior to 2020 and Total Kjeldahl Nitrogen (TKN) from Jan 2020 onward. Both NH_x-N and TKN data are shown in Figure 3-7 and Figure 3-8, with calculated TKN also plotted in Figure 3-7 assuming an NH_x-N:TKN ratio of 0.6. Note that the aerobic digester is slowly decanted back to the head of the plant, prior to the influent sampler, so flow and load contributions from the decant are captured in the sampling.

Similar to BOD and TSS, 2018 N loads were higher than the rest, especially in the first three quarters of the year. N loads were depressed in 2019, and increased in 2020 and 2021, but not to the levels experienced in 2018.

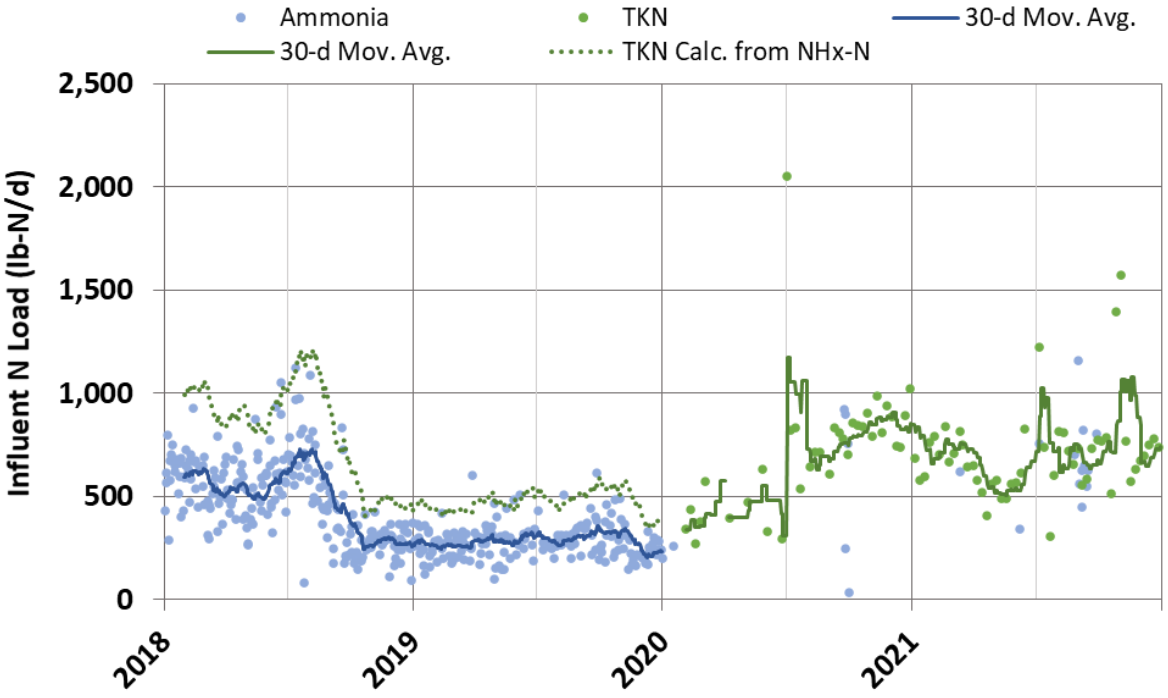

Figure 3-7. 2018-2021 Rocky Branch WWTP Influent TKN and NH_x-N Load vs. Time

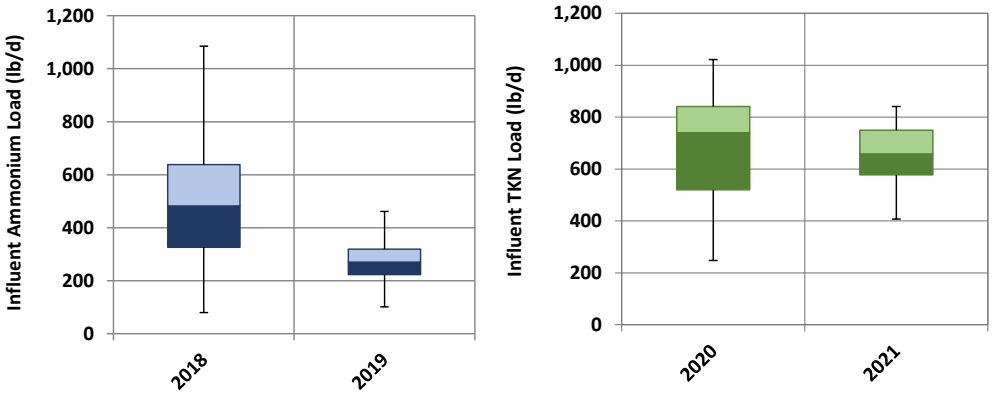

Figure 3-8. 2018-2021 Rocky Branch WWTP Influent TKN and NH_x-N Load Box and Whisker Plot

Figure 3-9 compares the measured influent loads to the projected influent loads developed as part of the 2017 Master Plan. For TSS, BOD, and N, 2018 loads significantly exceeded the projected AA and MM values. For TSS, the 2019-2021 data generally aligned well with the projected values, with a 20% deviation from the projected AA value in 2021. For BOD, the 2019-2021 data exceeded the projected values by 20% on average. Finally, for N, the 2019 data fell well under the projected values. The 2020 and 2021 NH_x-N data was calculated from the direct TKN measurement using an NH_x-N:TKN ratio of 0.6. Based on the calculated NH_x-N averages, the influent NH_x-N load exceeded the projected AA values by 20% on average. Overall, the data suggests that Rocky Branch is receiving higher loads than expected, therefore KC Water should continue to track the loads and readjust the projections if the measured data continue to deviate.

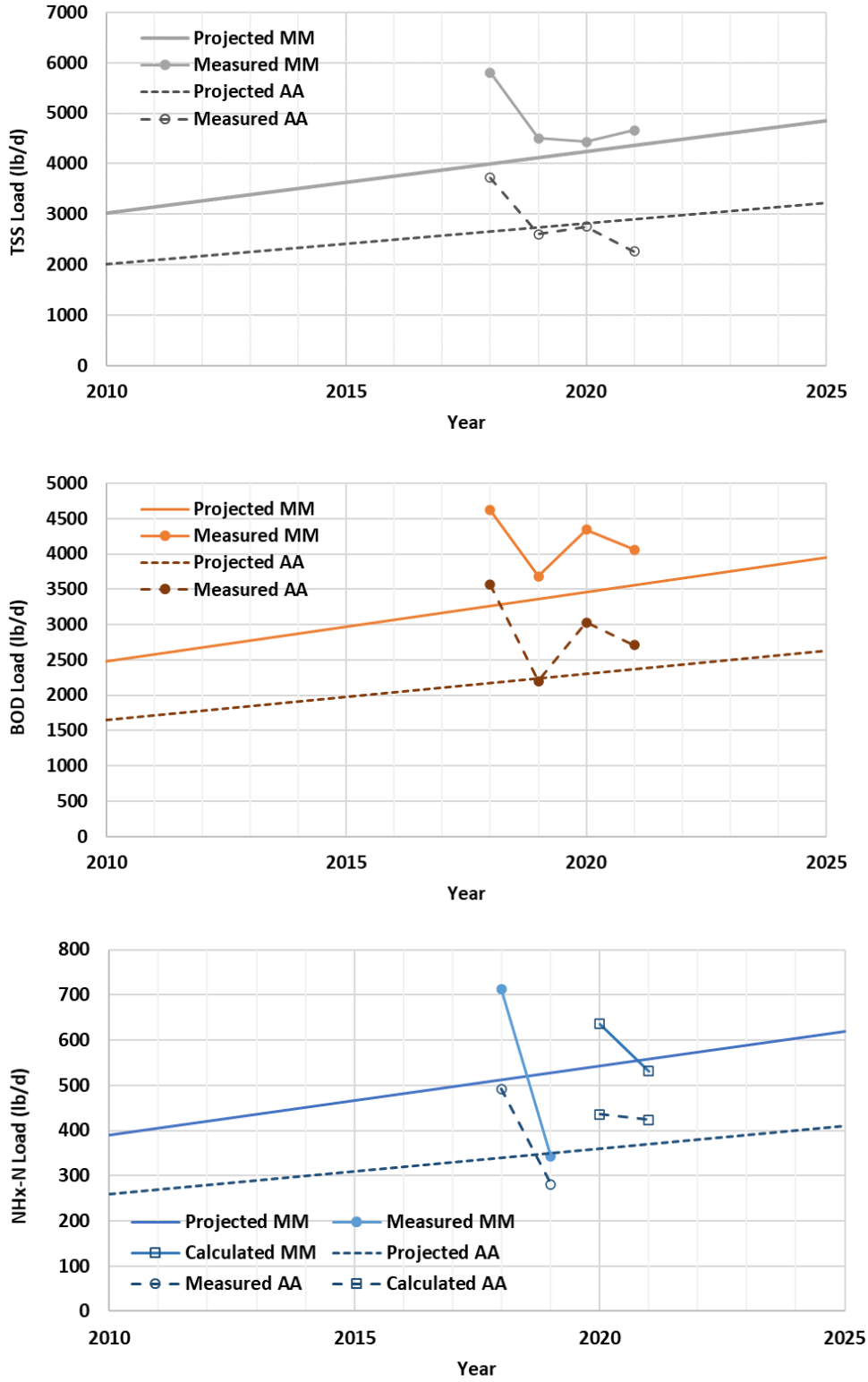

Figure 3-9. 2018-2021 Projected and Measured Influent TSS, BOD, and NHx-N Load Comparison

4.0 Historical Dissolved Oxygen Concentrations

This capacity study was partially motivated by observation of low dissolved oxygen (DO) concentrations (<0.5 mg/L) in the aeration basins at Rocky Branch. Low DO could indicate exceedance of blower capacity.

The DO concentrations measured in the aeration basins are plotted against time in Figure 4-1. Correlations between the DO concentration and theoretical influent oxygen demand (BOD+4.57*NH_4-N), mixed liquor suspended solids (MLSS) temperature, and MLSS concentration are explored in Figure 4-2. There was no clear correlation between DO and the influent oxygen demand load or temperature. A correlation was observed between MLSS and DO, with higher DOs observed at lower MLSS concentrations. High MLSS values correspond with long SRTs, which increases the overall oxygen demand for the oxidation of MLSS. The MLSS time series data in Figure 4-3 reveal a general increase in DO in June 2020 aligning with stricter MLSS control implemented at the same time.

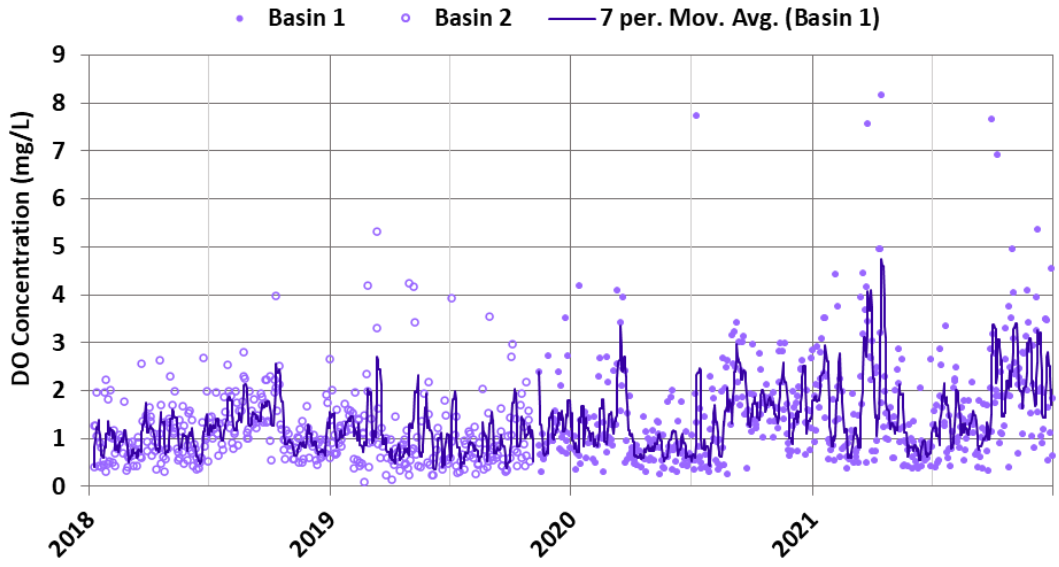

Figure 4-1. 2018- 2021 Rocky Branch WWTP Historical Aeration Basin DO Concentrations

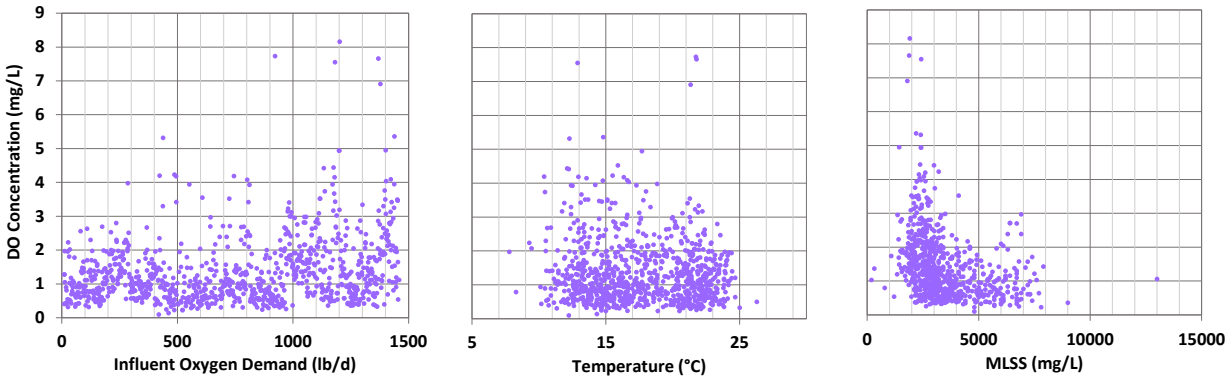

Figure 4-2. Correlation between Aeration Basin DO Concentration and Influent Oxygen Demand, Temperature, and MLSS Concentration

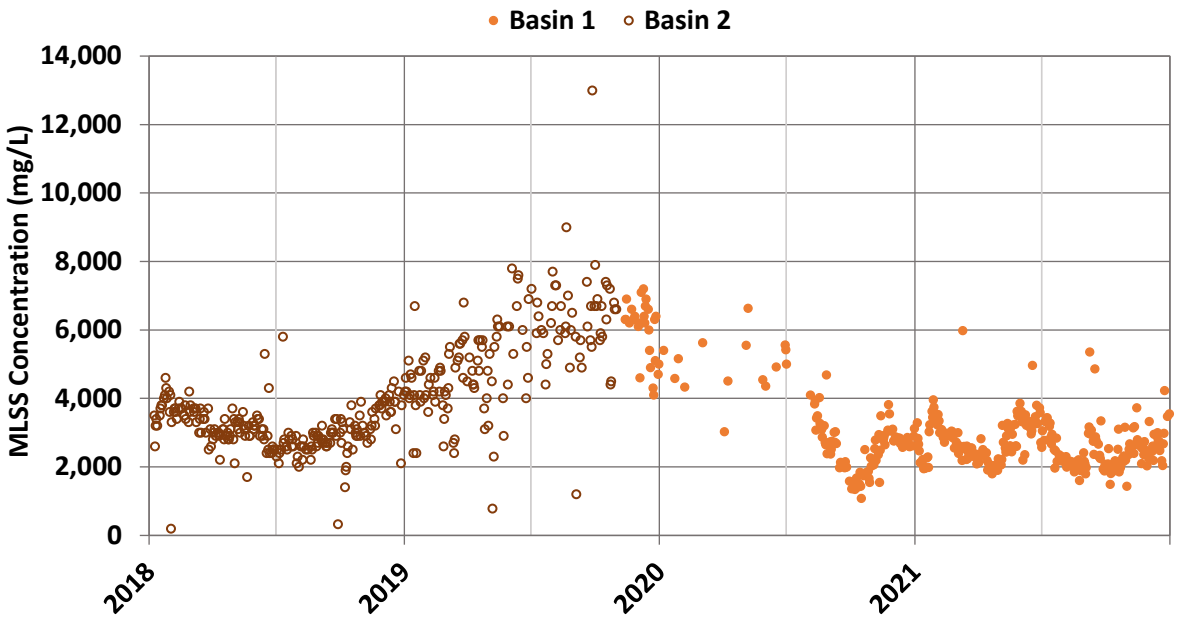

Figure 4-3. 2018- 2021 Rocky Branch WWTP Historical MLSS Concentrations

From 2018-2021, Rocky Branch operated 1 aeration basin and 1 secondary clarifier, which limited the duty airflow capacity to 1,670 scfm (3,340 scfm with redundant blower). To further understand the airflow needs of Rocky Branch during this time period, the airflow requirements for 2020-2021 were estimated using the theoretical oxygen demand and assumptions of the DO setpoint = 1.0 mg/L, alpha = 0.65, beta = 0.95, and oxygen transfer efficiency = 24%, taken from the original Aqua Aerobics design.

The results of this calculation (Figure 4-4) show that 2 basins (4 blowers) were needed to meet the full aeration demand for 27% of the data. With only one basin in service, low DOs are expected as the available airflows cannot meet the full demand. However, there were many assumptions that went into this calculation. The airflow could be better predicted with a calibrated and validated model that estimates the alpha value and considers denitrification during the low DO periods.

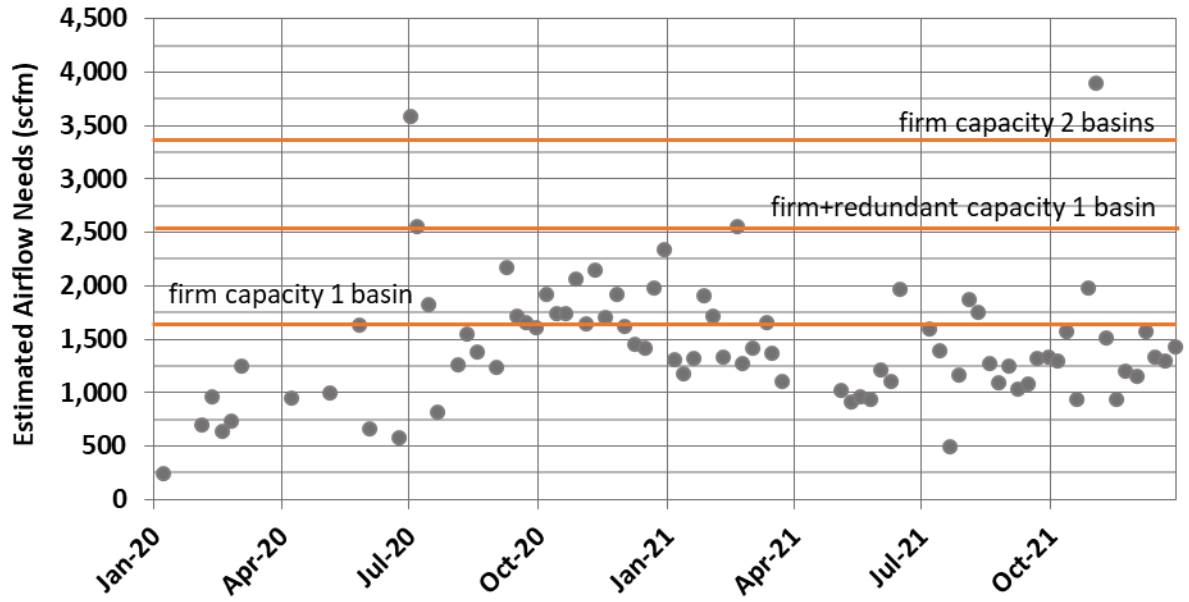

Figure 4-4. 2020-2021 Estimated Airflow Needs

Despite the possible DO limitations, the effluent ammonia concentrations were low, with all values falling under 2.0 mg/L, and 90% of the values falling under 1 mg/L (Figure 4-5). Excellent ammonia removal was achieved at both high and low DO alike, and effluent concentrations above 1 mg/L were achieved at both DO concentrations of 0.6 mg/L and 2.0 mg/L. Low DO can result in excellent nitrification, considering there is adequate sludge retention time (SRT) and hydraulic retention time (HRT). Low DO can be beneficial for energy efficiency and alkalinity control. That said, rather than allowing the blower capacity to limit DO, a more stable and resilient process approach would be to intentionally operate at a low DO (i.e. DO control) with excess blower capacity available as flows and loads increase.

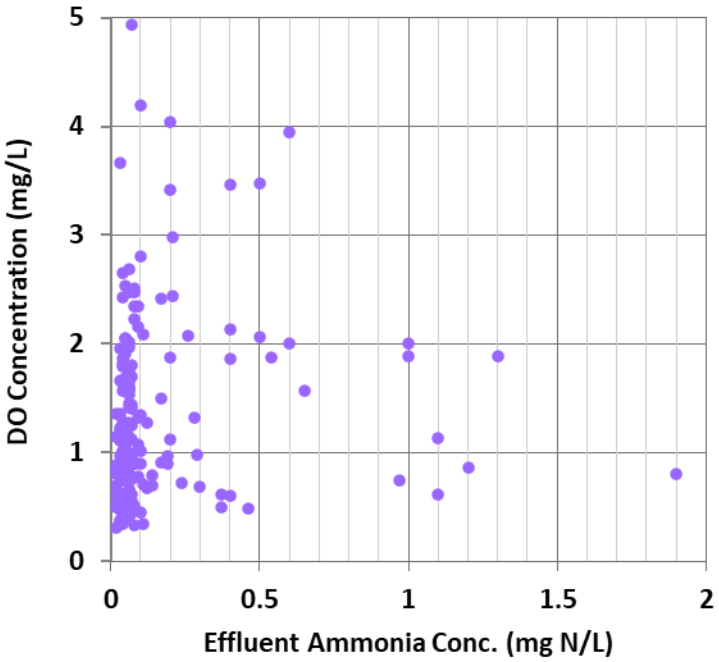

Figure 4-5. Basin DO vs. Effluent Ammonia Concentration

The sampling methodology may have influenced the DO readings and poor correlation with oxygen demand or temperature. Upon discussion with the Rocky Branch operator, the DO samples were generally pulled in the morning between 8:30 and 10:00 am when the basin was under aeration. The sample was grabbed and taken immediately to the lab for measurement. While good effort was made to immediately take the sample to the lab, DO was consumed between the field and the lab. It is recommended the DO measurement is taken in the field with calibrated handheld or installed probes, which were unavailable during the evaluation period.

5.0 Capacity Analysis

The capacity of each process unit was determined in the 2017 Master Plan (Burns and McDonnell). The results from this effort are summarized in Table 5-1.

The Rocky Branch WWTP influent pump station lifts the wastewater received at the plant to the screens. The pump station operates with four submersible pumps on VFDs. Four pumps (three duty, one standby) provide a firm capacity of 9.2 mgd. Therefore, the influent pump station limits the flow entering the plant to 9.2 mgd, which is equal to the capacity of the influent screens. Flows above 9.2 mgd are diverted to the lagoon and flow back by gravity when the influent pump station empties.

Table 5-1. Rocky Branch Capacity as Determined by 2017 Master Plan

Process Unit	Capacity, MGD	Basis
Influent Pump Station	9.2	Hydraulic
Influent Screens	9.2	Channel Velocity
Grit Basins	11.7	Inlet Velocity
Piping System: Grit Basins to Aeration Basins	13.9	Hydraulic
Aeration Basins	4.0	SRT and Maximum MLSS
Aeration Blowers	1.5	Oxygen Transfer
Piping System: Aeration Basins to Final Clarification	35.1	Hydraulic
Final Clarification	13.6	Solids Loading Rate
Piping System: Final Clarification to UV Disinfection	125	Hydraulic
UV Disinfection	10.0	Manufacturer Rating
Piping System: UV Disinfection to Rocky Branch Creek	55.6	Hydraulic

The process units whose capacity is determined by hydraulics or the manufacturer rating were not reevaluated in this study as the design has not changed from 2017. The aeration basin, aeration basin blowers, and final clarifier capacities were reevaluated given more recent influent concentration data and operational data, such as the sludge volume index (SVI).

5.1 Aeration Basin Capacity

Rocky Branch WWTP operates 2-100 foot diameter aeration basins, each with a volume of 1.0 million gallons. Aeration and mixing are accomplished by the AquaMix-Air® system (Aqua Aerobic Systems, Inc), which provides the capability to cyclically operate aeration and mixing to promote anoxic/aerobic environments. The plant currently operates the air 55 minutes on and 5 minutes off.

5.1.1 Approach

The treatment capacity of the secondary system is based on meeting the current discharge permit requirements during a maximum month pollutant loading. For the aeration basin, the HRT, SRT, MLSS concentration, blower capacity, and mixing power are considered in the design. The aeration basin

capacity analysis solved for the loading condition that meets a minimum SRT of 10 days, assuming a winter temperature of 12°C. The maximum MLSS concentration was set at 3,000 mg/L. The allowable MLSS concentration is tied to the performance of the final clarifiers, which is dependent on the solids loading and sludge settleability (See Section 5.3). From the final clarifier capacity analysis in Section 5.3, an MLSS concentration of 3,000 mg/L is supported with 2 clarifiers in service and an SVI less than 200 g/mL, assuming the redundant RAS pump may run during peak flows. For reference, the 2018-2021 SVIs at Rocky Branch ranged from 90-220 (10^{th}-90^{th} percentile). The blower capacity is evaluated separately in Section 5.2 and the existing mixer size is assumed to be adequate.

The TSS, BOD, and TKN influent concentrations used in the analysis were taken from July 2020 (Table 5-2). July 2020 experienced the maximum monthly average loadings for TSS, BOD, and TKN in 2020, which were the the 90^{th}, 90^{th}, and 96^{th} percentile of all monthly average data evaluated, respetively. While July 2020 was a wet month with a strong wet weather event, the influent TSS:BOD and BOD:TKN ratios were representative of the averages observed for the entire data set. The TSS:BOD ratio provides insight into the proportion of suspended solids that is inert, and the BOD:TKN ratio plays a role in the oxygen demand (See Section 5.2)

Table 5-2. July 2020 Flow, Concentations, and Loads

Parameter	Unit	Value
Flow	mgd	3.2
TSS	mg/L	166
	ppd	4,432
BOD	mg/L	163
	ppd	4,342
TKN	mg/L	40
	ppd	1,060
TSS:BOD[1]	--	1.0
BOD:TKN[2]	--	4.1

[1] 2018-2021 avearge of 1.1, 2018-2021 Maximum Month Average of 1.2
[2] 2018-2021 avearge of 4.1, 2018-2021 Maximum Month Average of 4.3

Given the design constraints and influent concentrations listed above, the maximum allowable TSS and BOD loads were estimated using a process model developed in Biowin 6.0. The Biowin model layout is depicted in Figure 5-1. The solids holding tank (i.e., aerobic digester) is not simulated as the decant is returned to the head of the plant and captured in the influent sample. The model assumed the aeration basin volume was 2.0 million gallons (i.e., 2 aeration basins in service) with a DO setpoint of 2.0 mg/L. The influent fractions, kinetic parameters, and stoichiometric parameters remained at default. To complete the influent characterization, a VSS:TSS ratio of 0.9 was assumed.

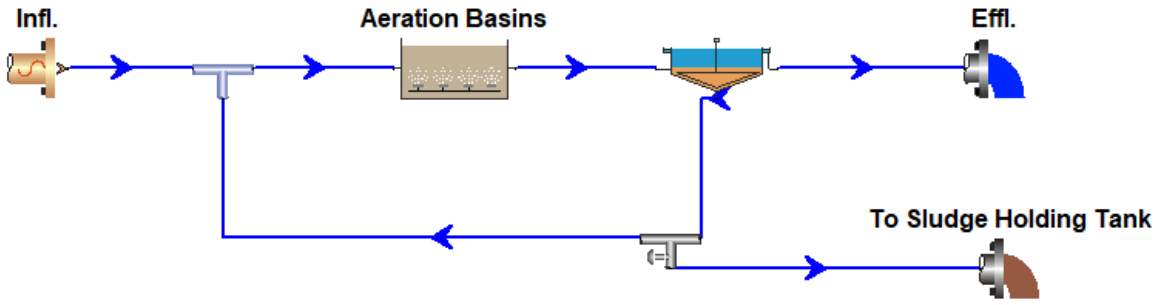

Figure 5-1. Biowin Layout

5.1.2 Results and Discussion

The capacity analysis results are summarized in Table 7-10. The maximum acceptable loads are nearly equal to the 2017 TM7 Master Plan loads, with only 0.2% and 1% differeince in the BOD and TKN loads respectively.

For the new capacity results, the influent flow was 5.4 mgd, which results in an adequate HRT of 9 hours. However, the flows and concentrations are not listed in Table 5-3 as the loads should be the focus for capacity monitoring. The capacity analysis was based on influent flows and concentrations from a wet weather month. Similar loads could be achieved during a dry weather month with higher influent concentrations.

The TSS:BOD ratio should also be monitored as the ratio suggests a given influent quality. For example, if the TSS:BOD ratio is 1.3, there is likely more inert solids in the influent and the model should be rerun with the assumed values.

Table 5-3. Aeration Basin Capacity Analysis Results

Parameter	Unit	2017 Wastewater Master Plan	This Study
Temperature	°C	--	12
No. Aeration Basins in Service		2	2
SRT	d	8	10
MLSS	mg/L	4,000	3,000
TSS	lb/d	NA	7,475
BOD	lb/d	7,330	7,340
TKN	lb/d	1,820	1,800

5.2 Aeration Basin Blower Capacity

Aeration for the Rocky Branch WWTP is achieved with 5 positive displacement (PD) blowers, each rated at 835 scfm. The blowers are manifolded such that two blowers are dedicated to each basin with a redundant blower shared between the two basins.

5.2.1 Approach

To determine the blower capacity in terms of influent loads, the maximum month concentrations from July 2020 were simulated in the Biowin model with a DO setpoint of 2.0 mg/L. The Biowin model outputted the oxygen uptake rate for the scenario, which was then entered into the Black & Veatch aeration model to estimate the blower demand. The model was run to steady state to simulate a monthly average.

A peak day scenario was also modeled with a dynamic simulation. The peak day concentrations of October 27, 2020 were selected for this scenario (Table 5-4). On this day, the theoretical oxygen demand (BOD +4.57*TKN) was the 90th percentile of the 2018-2021 dataset. The peak day TKN:BOD ratio exceeeded that of the maximum month, but aligned with values observed in the days with the highest aeration demand. For the peak day scenario, the DO was allowed to sag to 1 mg/L.

The aeration calculation assumed an alpha of 0.6 and a beta of 0.95, as stated in the AquaAerobics design.

Table 5-4. October 27, 2020 Flow, Concentations, and Loads

Parameter	Unit	Value
Flow	mgd	2.09
TSS	mg/L	204
	ppd	3,556
BOD	mg/L	267
	ppd	4,654
TKN	mg/L	52
	ppd	906
TSS:BOD	--	0.8
BOD:TKN	--	5.1

5.2.2 Results and Discussion

Table 5-5 compares the load capacity of the blowers for both maximu month and peak day conditions at summer and winter temperatures. The monthly average theoretical oxygen demand capacity from this study falls between the original AquaAerobics design and the 2017 Wastewater Master Plan values, assuming summer temperatures. For winter temperatures, the monthly average oxygen demand capacity aligned well with the 2017 Master Plan values.

For the peak day, the DO was allowed to sag, which allowed for a greater theoretical oxygen demand loading compared to the maximum montn. Slightly higher loads (~10%) may be accommodated at cooler wastewater temperatures.

For tracking the demand of current flows and loads, it is recommended the theoretical oxygen demand is calculated and used as the parameter for comparison to this analysis, rather than the BOD and TKN loads individually. The oxygen demand accounts for variation in the BOD:TKN ratio.

Table 5-5. Blower Capacity Analysis Results

Parameter	Unit	Original AquaAerobics Blower Basis of Design	2017 Wastewater Master Plan	This Study			
				Monthly Average Summer	Monthly Average Winter	Peak Day Summer	Peak Day Winter
Temperature	°C	--	--	22	12	22	12
DO Setpoint	mg/L	--	--	2.0	2.0	1.0	1.0
SRT	d	--	--	10	10	10	10
BOD	lb/d	--	5,850	4,760	5,300	6,905	7,570
TKN	lb/d	--	1,160	1,170	1,300	1,345	1,475
Theoretical O_2 Demand	lb/d	9,155	11,150	10,095	11,245	13,050	14,310

5.3 Final Clarifier Capacity

The Rocky Branch WWTP operates 2-100 ft diameter final clarifiers. Effluent from the aeration basins combines in a splitter box to feed the final clarifiers. RAS/WAS from both clarifiers is directed to a common wet well from which the RAS is pumped by 3 pumps (2 duty, 1 standby). The RAS firm pump capacity is 3.0 mgd.

The 2017 Master Plan determined the final clarifier peak flow capacity under two scenarios presented in Table 5-6. In the “Maximum MLSS” scenario, a maximum MLSS concentration of 4,000 mg/L was assumed. Under these conditions, the allowable peak influent flow was 12.4 mgd based on a maximum solids loading rate of 35 lb/d-sf. In the “Permitted Capacity” scenario, the average day flow was limited to the permitted capacity of 2.8 mgd, which lowered the MLSS concentration to 2,800 mg/L. The allowable peak influent flow equaled 15.7 mgd based on a maximum surface overflow rate of 1,000 gpd/sf. For both of these scenarios, the RAS rate was set at 100% of the average day flow.

Table 5-6. Total Final Clarifier Capacity Determined in the 2017 Master Plan

Parameter	Maximum MLSS	Permitted Capacity
Average Day Flow, MGD	4.0	2.8
Design MLSS, mg/L	4,000	2,800
RAS Recycle Rate, MGD	4.0	2.8
Surface Overflow Rate, gpd/sf[1]	790	1,000
Solids Loading Rate, lbs/d-sf[2]	35.0	27.5
Allowable Peak Influent Flow, MGD	12.4	15.7

[1]Maximum Surface Overflow Rate = 1000 gpd/sf (Ten State Standards and MDNR 10 CSR 20-8.160)
[2]Peak Solids loading Rate = 35 lb/d-sf (Ten State Standards) and 50 lb/d-sf (MDNR 10 CSR 20-8.160)

5.3.1 Approach

As an alternative approach to the 2017 Master Plan analysis, the peak flow capacity of the final clarifiers was determined by state point analysis. State point analysis predicts clarifier performance as a function of the influent and RAS flowrates, the MLSS concentration, and the sludge settleability measured by the SVI. For this analysis, the RAS flowrate was set at 3.0 mgd, the maximum RAS pump capacity currently installed. Capacities were determined for SVIs between 100-250 g/mL, as the historical SVI at Rocky Branch fell between 90-220 g/mL (10th to 90th percentile) (Figure 5-2). The state point analysis used the Daigger correlation (Diagger, 1995) to correlate the Vesilind settling parameters to the SVI and a safety factor (i.e., Ekama Factor) of 80%.

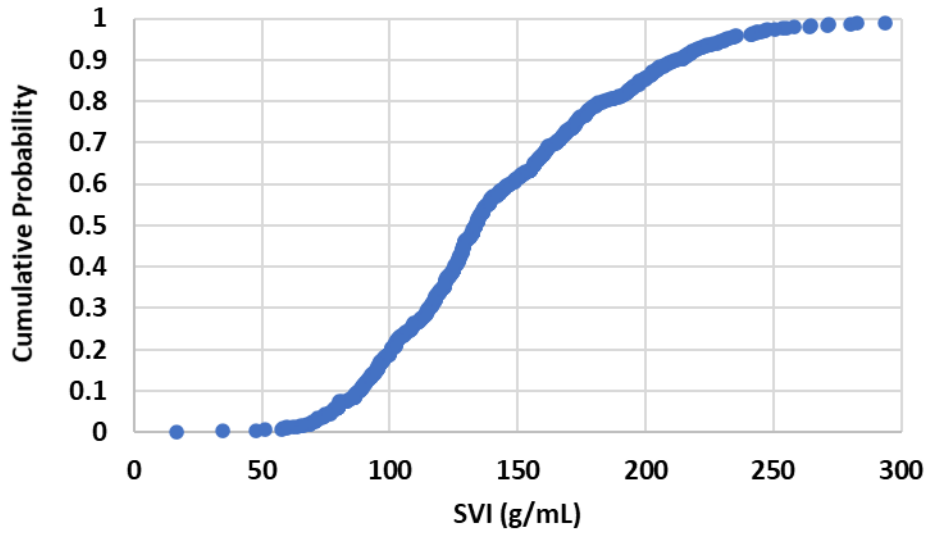

Figure 5-2. 2018-2021 Rocky Branch WWTP SVI Cumulative Probability

5.3.2 Results and Discussion

Figure 5-3 and Figure 5-4 plot the allowable peak flow capacity as a function of the MLSS and SVI for 1 and 2 clarifiers in service.

Based on the results, the MLSS should be maintained below 2,000 mg/L to support a peak flow of 9.2 mgd with one clarifier in service. With 2 clarifiers in service, the MLSS may be maintained at 3,000 mg/L if the SVI is below 160 g/mL. For reference, daily average flows above 10 mgd have been observed at Rocky Branch, so a peak flow of 9.2 mgd is possible for over a 24-hour period.

In the state point analysis, the RAS pump capacity limited the peak capacity of the clarifiers. If the redundant RAS pump may operate during peak flow or an additional RAS pump is installed, the MLSS may be maintained at 3,000 mg/L at SVIs up to 200 g/mL with two clarifiers in service (Figure 5-5).

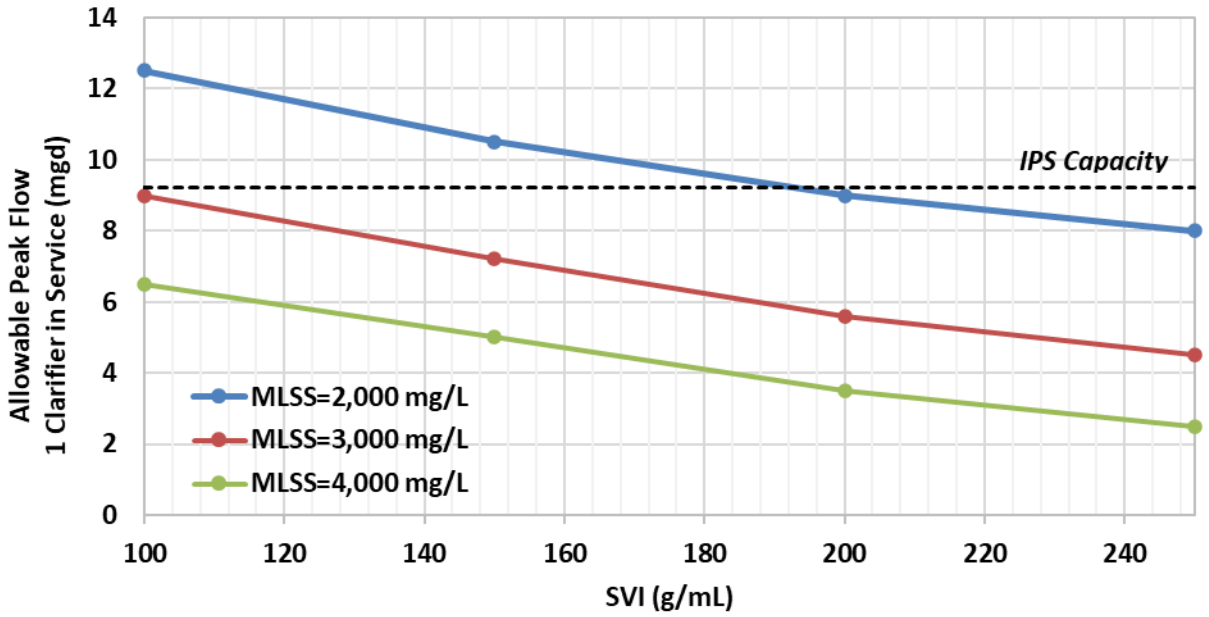

Figure 5-3. Final Clarifier Peak Flow Capacity based on State Point Analysis with 1 Clarifier in Service

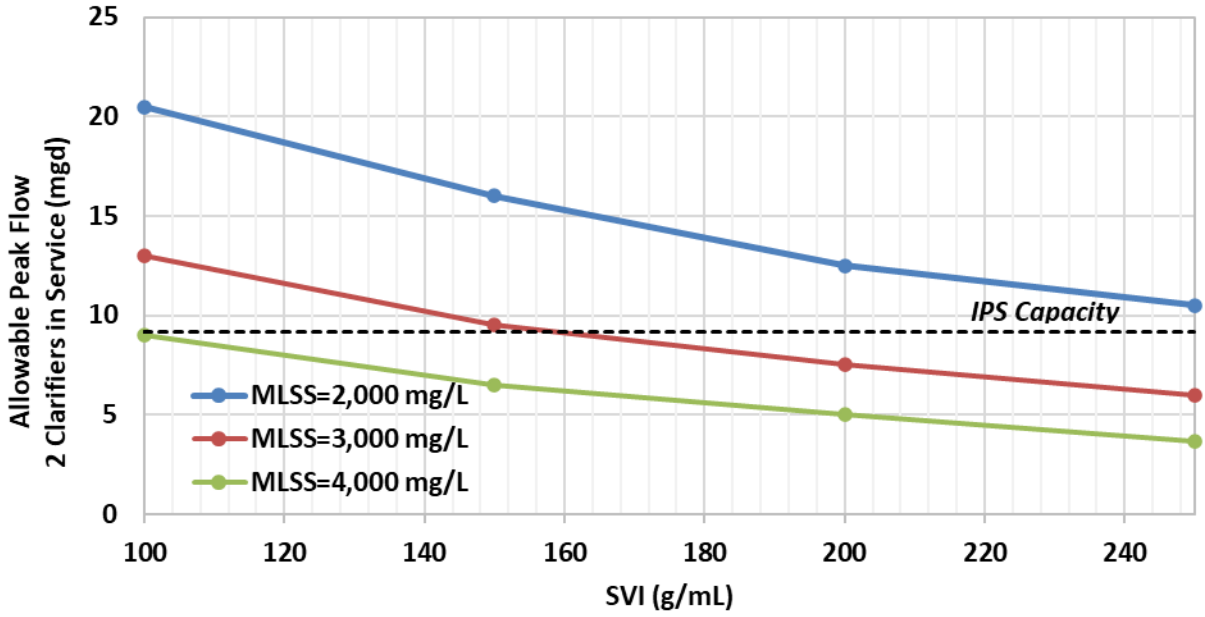

Figure 5-4. Final Clarifier Peak Flow Capacity based on State Point Analysis with 2 Clarifiers in Service

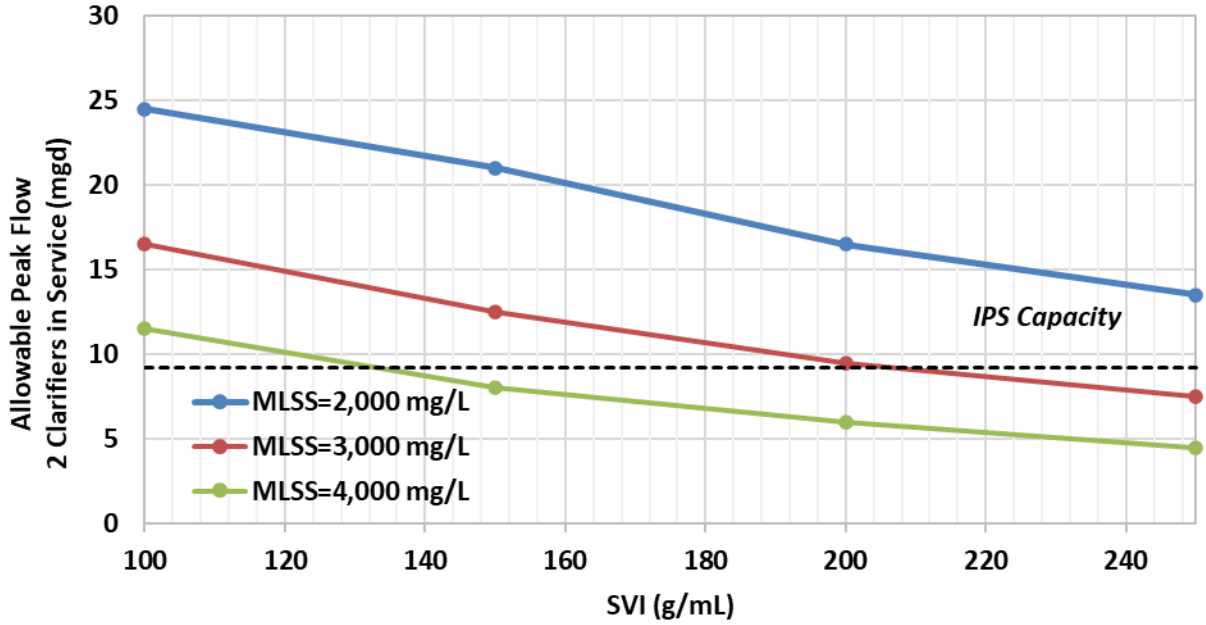

Figure 5-5. Final Clarifier Peak Flow Capacity with Higher RAS Capacity

6.0 Capacity Utilization

Table 6-1 summarizes the capacity utilization at the Rocky Branch WWTP.

Table 6-1. Rocky Branch Capacity as Determined by 2017 Master Plan

Process Unit	Capacity, MGD	Basis	Observed	Utilization
Influent Screens	9.2	Peak	9.2	100%
Grit Basins	11.7	Peak	9.2	79%
Piping System: Grit Basins to Aeration Basins	13.9	Peak	9.2	66%
Aeration Basins[1]	TSS = 7475 lb/d BOD = 7340 lb/d	Monthly Average	TSS=4,665 lb/d (Nov. 2021) BOD=4,340 lb/d (July 2020)	TSS = 62% BOD = 59%
Aeration Blowers[2]	BOD = 4,760 lb/d TKN = 1,170 lb/d Oxygen Demand = 10,095 lb/d	Monthly Average Summer	OD=9,265 lb/d (July 2020)	OD = 92%
	BOD = 6,905 lb/d TKN = 1,345 lb/d Oxygen Demand = 13,050 lb/d	Peak Day Summer	10,275 lb/d (July 6, 2020)	OD = 79%
	BOD = 5,300 lb/d TKN = 1,300 lb/d Oxygen Demand = 11,245 lb/d	Monthly Average Winter	8,040 lb/d (November 2021)	OD = 71%
	BOD = 7,570 lb/d TKN = 1,475 lb/d Oxygen Demand = 14,310 lb/d	Peak Day Winter	10,725 lb/d (Feb 19, 2021)	OD = 75%
Piping System: Aeration Basins to Final Clarification	35.1	Peak	12.2	35%
Final Clarification[3]	9.2	Peak	9.2	100%
Piping System: Final Clarification to UV Disinfection	125	Peak	9.2	7%
UV Disinfection	10.0	Peak	9.2	92%
Piping System: UV Disinfection to Rocky Branch Creek	55.6	Peak	9.2	17%

[1] Assumed 2 basins and 2 clarifiers online
[2] Assumed 2 basins online
[3] The final clarifier peak capacity is set in order to determine the aeration basin capacity.

Daily average flows above 9.2 mgd have been measured at the plant, therefore it is assumed the pump capacity of 9.2 mgd is the existing peak flow. Flows above 9.2 mgd are diverted to the lagoon, which has a total available storage volume of approximately 6.1 million gallons (2017 Master Plan). For the load-based capacities, the 2019-2021 data set was considered.

The capacity analysis suggests the blowers are the limiting unit. July 2020 utilized 92% of the summer oxygen demand capacity. As discussed in Section 4, the effluent ammonia concentrations were satisfactory operating with 1 aeration basin and 1 final clarifier, but bringing a second aeration basin online would increase the stability and resiliency of the process. When selecting the peak day utilization, the magnitude and frequency of the peak oxygen demand should be considered. Figure 6-1 plots the cumulative probability of the 2018-2021 influent theoretical oxygen demand. The two greatest values were not selected to represent the peak day blower utilization due to their high value (i.e., 50% greater than the 95th precentile) and rare occurrence.

The final clarifier capacity utilization is listed at 100%, but peak flow to the finals is set in order to determine the aeration basin capacity, which is not yet fully utilized.

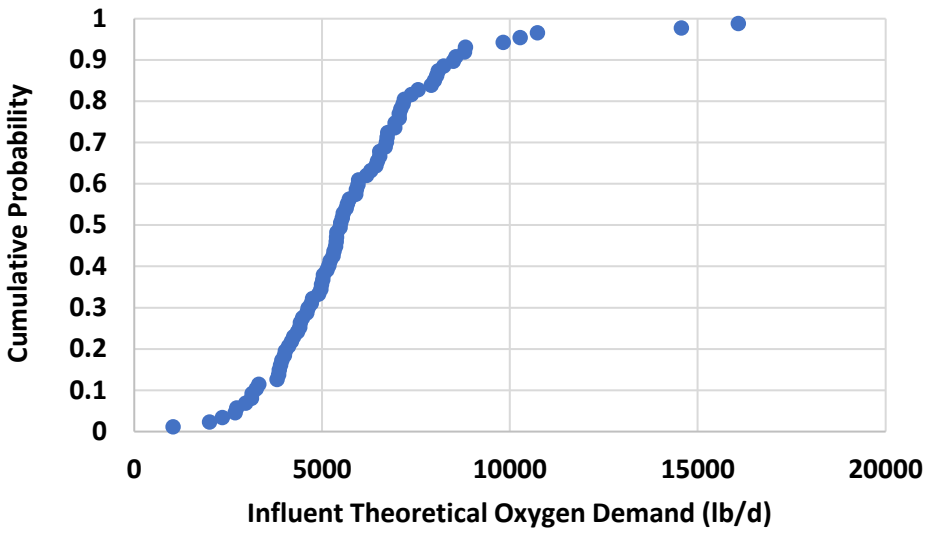

Figure 6-1. 2018-2021 Rocky Branch WWTP Influent Theoretical Oxygen Demand Cumulative Probability

7.0 Operational Recommendations

- Low DO concentrations in the basin may indicate an overloaded basin. For accurate data, the measurement should be made with a handheld probe or installed basin probe.
- This analysis suggests a second aeration basin should be brought online to provide adequate blower capacity. The plant may benefit from operating a low DO strategy, but for improved process stability and sludge stability, there should be adequate blower capacity to meet peak events. A model calibrated and validated to airflow and DO concentrations would provide an improved estimation of blower demand.
- This analysis suggests a second clarifier should be brought online to meet capacity during peak flows based on historical SVI. If the sludge settleability is improved, the need for a second clarifier may be reevaluated using Figure 5-3, Figure 5-4, and Figure 5-5.
- Rocky Branch WWTP should consider operating the redundant RAS pump during peak flow events to increase the capacity of the clarifiers.

8.0 References

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