RFQ NO.21-TA003564SAM
PROFESSIONAL ENGINEERING SERVICES
SOUTHEAST WATER RECLAMATION FACILITY CAPACITY IMPROVEMENTS
PROJECT NUMBER 6106080
(NIGP CODE 925-96)
DECEMBER 9, 2020

Manatee County BCC
Procurement Division
1112 Manatee Avenue West Ste 803
Bradenton, FL 34205
purchasing@mymanatee.org

ADVERTISEMENT

REQUEST FOR QUALIFICATIONS NO. 21-TA003564SAM

PROFESSIONAL ENGINEERING SERVICES SOUTHEAST WATER RECLAMATION FACILITY CAPACITY IMPROVEMENTS

Manatee County, a political subdivision of the State of Florida (hereinafter referred to as County) will receive qualification proposal responses (Proposals) from individuals, corporations, partnerships, and other legal entities authorized to do business in the State of Florida (Proposers), to provide professional engineering services for capacity imprvements at a water treatment facility as specified in this Request for Qualifications.

DATE, TIME AND PLACE DUE:
The Due Date and Time for submission of Proposals in response to this RFQ **is January 15, 2021 by 2:00 P.M. ET.** Proposals must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Ave. W., Suite 803, Bradenton, FL 34205 and time stamped by a Procurement representative by the Due Date and Time. Proposals will be opened immediately following the Due Date and Time at the Manatee County Administration Building, Suite 803.

SOLICITATION INFORMATION CONFERENCE:
A non-mandatory Information Conference will be held at 10:30 A.M. ET, December 18, 2020 at the Southeast Water Reclamation Facility, 3331 Lena Road, Bradenton, FL 34211. A mandatory site tour will be conducted immediately following the Information Conference.

DEADLINE FOR QUESTIONS AND CLARIFICATION REQUESTS:
The deadline to submit all questions, inquiries, or requests concerning interpretation, clarification or additional information pertaining to this Request for Qualifications to the Manatee County Procurement Division is January 4, 2020. Questions and inquiries should be submitted via email to the Designated Procurement Contact shown below.

Important: A prohibition of lobbying is in place. Review Section A.13 carefully to avoid violation and possible sanctions.

DESIGNATED PROCUREMENT CONTACT: Sherri Meier, Procurement Team Leader
(941) 749-3042, Fax (941) 749-3034
Email: sherri.adamsmeier@mymanatee.org
Manatee County Financial Management Department
Procurement Division

AUTHORIZED FOR RELEASE: Chris Daley, CPPO, CPPB

Digitally signed by Chris Daley, CPPO, CPPB
Date: 2020.12.08 08:27:42 -05'00'

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SECTION A, INSTRUCTIONS TO PROPOSERS

In order to receive consideration, Proposers must meet the minimum qualification requirements, submit the required forms and information, and comply with the instructions as follows. Proposals will be accepted from a single business entity, joint venture, partnership or corporation. The County intends to award an agreement(s) for the provision of professional engineering services for capacity improvements at a water treatment facility services as identified in this RFQ.

A.01 INFORMATION CONFERENCE AND SITE VISIT

A non-mandatory Information Conference will be held at 10:30 A.M. ET on December 18, 2020 at the Southeast Water Reclamation Facility, 3331 Lena Road, Bradenton, FL 34211. A mandatory site tour will be conducted immediately following the Information Conference. Attendance to the information conference is not mandatory, but is strongly encouraged.

A.02 DUE DATE AND TIME

The Due Date and Time for submission of Proposals in response to this Request for Qualifications (RFQ) **is January 15, 2021 by 2:00 P.M. ET.** Proposals must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Ave. W., Suite 803, Bradenton, FL 34205 prior to the Due Date and Time.

Proposal(s) received after the Due Date and Time will not be considered. It will be the sole responsibility of the Proposer to deliver its Proposal to the Manatee County Procurement Division for receipt on or before the Due Date and Time. If a Proposal is sent by U.S. Mail, courier or other delivery services, the Proposer will be responsible for its timely delivery to the Procurement Division. Proposals delayed in delivery will not be considered, will not be opened at the public opening, and arrangements will be made for their return at the Proposer's request and expense.

A.03 PUBLIC OPENING OF RESPONSES

Sealed Proposals will be publicly opened at Manatee County Administration Procurement Division, 1112 Manatee Avenue West, 8th Floor, Suite 803, Bradenton, Florida 34205, in the presence of County officials immediately upon expiration of the Due Date and Time. Proposers or their representatives may attend the Proposal opening.

Manatee County will make public at the opening the names of the business entities which submitted a Proposal and city and state in which they reside. No review or analysis of the Proposals will be conducted at the Proposal opening.

A.04 SUBMISSION OF RESPONSES

The contents of the Proposal sealed package must include:

- One (1) bound original clearly identifying Proposer and marked “ORIGINAL”.
- Three (3) bound copy(s) clearly identifying Proposer and marked “COPY” with all required information and identical to the original.
- One (1) electronic format copy(s) clearly identifying Proposer.

Electronic format copies should be submitted on separate Universal Serial Bus (USB) portable flash memory drives or compact disc (CD) in MicroSoft Office® or Adobe Acrobat® portable

document format (PDF) in one continuous file. Do not password protect or otherwise encrypt electronic Proposal copies. Electronic copies must contain an identical Proposal to the original.

Upon submission, all Proposals become the property of Manatee County which has the right to use any or all ideas presented in any Proposal submitted in response to this Request for Qualifications whether, or not, the Proposal is accepted.

Submit the Proposal package in a sealed container with the following information clearly marked on the outside of the package: RFQ No. 21-TA003564SAM, Professional Engineering Services Southeast Water Reclamation Facility Capacity Improvements, Proposer's name, and Proposer's address. Proposals must be received by the Manatee County Procurement Division prior to the Due Date and Time at the following address:

Manatee County
Procurement Division
1112 Manatee Avenue West, Suite 803
Bradenton, FL 34205

A.05 ORGANIZATION OF RESPONSES

Proposals must be organized and arranged with tabs in the same order as listed in the subsections within Attachment B, Proposal Response, identifying the response to each specific item.

Proposals must clearly indicate the legal name, address and telephone number of the Proposer. Proposal Signature Form must be signed by an official or other individual authorized to make representations for the Proposer.

A.06 DISTRIBUTION OF SOLICITATION DOCUMENTS

All documents issued pursuant to this RFQ are distributed electronically and available for download at no charge at www.mymanatee.org > *Business* > *Bids and Proposals.* Documents may be viewed and downloaded for printing using Adobe Reader® or Microsoft software, as applilcable.

At its sole discretion, the County may utilize a third-party provider to distribute Proposals. For more information regarding this service visit the Procurement webpage of the County website. Utilization of this third-party service is not a requirement for doing business with Manatee County.

Additionally, the RFQ and all related documents are available for public inspection at the Manatee County Procurement Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205. Call (941) 749-3014 to schedule an appointment. Documents are available between the hours of 8:00 A.M. and 5:00 P.M., Monday through Friday, with the exception of County holidays.

As a courtesy, Manatee County notifies the Manatee County Chamber of Commerce and the Manasota Black Chamber of Commerce of all active solicitations, who then distributes the information to its members.

A.07 ADDENDA

Any interpretations, corrections or changes to this RFQ will be made by addendum. Addenda will be posted on the Procurement Division's web page of the County website at http://www.mymanatee.org/> *Business* > *Bids and Proposals*. For those solicitations that are advertised on a third-party website, addenda will likewise be posted on the third-party website.

All addenda are a part of the RFQ and each Proposer will be bound by such addenda. It is the responsibility of each Proposer to obtain, read and comprehend all addenda issued. Failure of any Proposer to acknowledge an issued addendum in its Proposal will not relieve the Proposer from any obligation contained therein.

A.08 RESPONSE EXPENSES

All costs incurred by Proposer in responding to this RFQ and to participate in any interviews/presentations/demonstrations, including travel, will be the sole responsibility of the Proposer.

A.09 QUESTION AND CLARIFICATION PERIOD

Each Proposer shall examine all RFQ documents and will judge all matters relating to the adequacy and accuracy of such documents. Any questions or requests concerning interpretation, clarification or additional information pertaining to this RFQ shall be made in writing via email to the Manatee County Procurement Division to the Designated Procurement Contact or to purchasing@mymanatee.org. All questions received and responses given will be provided to potential Proposers via an addendum to this RFQ

Manatee County will not be responsible for oral interpretations given by other sources including County staff, representative, or others. The issuance of a written addendum by the Procurement Division is the only official method whereby interpretation, clarification or additional information will be given.

A.10 FALSE OR MISLEADING STATEMENTS

Proposals which contain false or misleading statements, or which provide references which do not support an attribute or condition claimed by the Proposer, may be rejected. If, in the opinion of the County, such information was intended to mislead the County in its evaluation of the Proposal, and the attribute, condition or capability is a requirement of this RFQ. Such Proposer will be disqualified from consideration for this RFQ and may be disqualified from submitting a response on future solicitation opportunities with the County.

A.11 WITHDRAWAL OR REVISION OF RESPONSES

Proposers may withdraw Proposals under the following circumstances:

a. If Proposer discovers a mistake(s) prior to the Due Date and Time. Proposer may withdraw its Proposal by submitting a written notice to the Procurement Division. The notice must be received in the Procurement Division prior to the Due Date and Time for receiving Proposals. A copy of the request shall be retained, and the unopened Proposal returned to the Proposer; or

b. After the Proposals are opened but before a contract is signed, Proposer alleges a material mistake of fact if:

   1. The mistake is clearly evident in the solicitation document; or
   2. Proposer submits evidence which clearly and convincingly demonstrates that a mistake was made in the Proposal. Request to withdraw a Proposal must be in writing and approved by the Procurement Official.

A.12 JOINT VENTURES

Proposers intending to submit a Proposal as a joint venture with another entity are required to have filed proper documents with the Florida Department of Business and Professional Regulation and all other State or local licensing agencies as required by Florida Statute Section 489.119, prior to the Due Date and Time.

A.13 LOBBYING

After the issuance of any solicitation, no prospective Proposer, or their agents, representatives or persons acting at the request of such Proposer, shall contact, communicate with or discuss any matter relating in any way to the solicitation with any County officers, agents or employees, other than the Procurement Official or designee, unless otherwise directed by the Procurement Official or designee. This prohibition includes copying such persons on written communications (including email correspondence) but does not apply to presentations made to evaluation committees or at a County Commission meeting where the Commission is considering approval of a proposed contract/purchase order. This requirement ends upon final execution of the contract/purchase order or at the time the solicitation is cancelled. Violators of this prohibition will be subject to sanctions as provided in the Manatee County Code of Ordinances Section 2-26-31 and 2-26-32. Sanctions may include (a) written warning; (b) termination of contracts; and (c) debarment or suspension.

A.14 EXAMINATION OF RESPONSES

The examination and evaluation of the Proposals submitted in response to this solicitation generally requires a period of not less than ninety (90) calendar days from the Due Date and Time.

A.15 ERRORS OR OMISSIONS

Once a Proposal is opened, the County will not accept any request by Proposer to correct errors or omissions in the Proposal other than as identified in paragraph A.11.

A.16 DETERMINATION OF RESPONSIBLENESS AND RESPONSIVENESS

The County will conduct a due diligence review of all Proposals received to determine if the Proposer is responsible and responsive.

To be responsive a Proposer must submit a Proposal that conforms in all material respects to the requirements of this RFQ and contains all the information, fully completed attachments and forms, and other documentation required. Proposals that are deemed non-responsive will not be considered or evaluated.

To be responsible, a Proposer must meet the minimum qualification requirements and have the capability to perform the Scope of Services contained in this RFQ. Proposals submitted by Proposers that are deemed non-responsible will not be considered or evaluated.

A.17 RESERVED RIGHTS

The County reserves the right to accept or reject any and all Proposals, to waive irregularities and technicalities, to request additional information and documentation, and to cancel this solicitation at any time prior to execution of the contract. In the event only one Proposal is received, the County reserves the right to negotiate with the Proposer. The County reserves the right to award the contract to a responsive and responsible Proposer which in its sole determination is the best value and in the best interests of the County.

The County reserves the right to conduct an investigation as it deems necessary to determine the ability of any Proposer to perform the work or service requested. Upon request by the County, Proposer shall provide all such information to the County. Additional information may include, but will not be limited to, current financial statements prepared in accordance with generally accepted accounting practices and certified by an independent CPA or official of Proposer; verification of availability of equipment and personnel; and past performance records.

A.18 APPLICABLE LAWS

Proposer must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting contract. This solicitation process will be conducted in accordance with Manatee County Code of Ordinances, Chapter 2-26.

A.19 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Cert. No. 59-78-0089K; Florida Sales Tax Exempt Cert. No. 85-8012622206C-6). Therefore, the Proposer is prohibited from delineating a separate line item in its Proposal for any sales or service taxes.

The Successful Proposer will be responsible for the payment of taxes of any kind, including but not limited to sales, consumer, use, and other similar taxes payable on account of the work performed and/or materials furnished under the award in accordance with all applicable laws and regulations.

A.20 SCRUTINIZED COMPANIES

Pursuant to Florida Statute Section 287.135, as of July 1, 2012, a company that, at the time of submitting a response for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Florida Statute Section 215.473, is ineligible for, and may not submit a response for or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more.

A.21 COLLUSION

Proposer certifies that its Proposal is made without prior understanding, agreement, or connection with any other corporation, firm or person submitting a Proposal for the same

materials, services, supplies, or equipment and is in all respects fair and without collusion or fraud.

Any such violation may result in contract cancellation, return of materials or discontinuation of services and the possible removal of Proposer from participation in future County solicitations for a specified period.

The County reserves the right to disqualify a Proposer during any phase of the solicitation process and terminate for cause any resulting contract upon evidence of collusion with intent to defraud on the part of the Proposer.

A.22 CODE OF ETHICS

With respect to this Request for Qualifications, if any Proposer violates, directly or indirectly, the ethics provisions of the Manatee County Procurement Code and/or Florida criminal or civil laws related to public procurement, including but not limited to Florida Statutes Chapter 112, Part II, Code of Ethics for Public Officers and Employees, such Proposer will be disqualified from eligibility to perform the work described in this RFQ, and may also be disqualified from submitting any future bids or proposals to supply goods or services to Manatee County.

A.23 PUBLIC ENTITY CRIMES

In accordance with Section 287.133, Florida Statutes, a person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a proposal on a contract to provide any goods or services to a public entity, may not submit a proposal on a contract with a public entity for the construction or repair of a public building or public work, may not submit proposals on leases or real property to a public entity, may not be awarded or perform work as a contractor, Successful Proposer, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017 for Category Two for a period of 36 months from the date of being placed on the convicted vendor list.

In addition, Manatee County Code of Laws Chapter 2-26 Article V prohibits the award of County contracts to any person or entity who/which has, within the past 5 years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the Purchasing Official, establishes reasonable grounds to believe the person or business entity will not conduct business in a reasonable manner.

To ensure compliance with the foregoing, Manatee County Code of Laws requires all persons or entities desiring to contract with Manatee County to execute and file with the Purchasing Official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity, and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with Manatee County. Proposer is to complete Form 3 and submit with your Proposal.

A.24 AMERICANS WITH DISABILITIES

Manatee County does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of County's functions including one's access to participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation for an information conference or Proposal opening should contact the person named on the cover page of this document at least twenty-four (24) hours in advance of either activity.

A.25 EQUAL EMPLOYMENT OPPORTUNITY

In accordance with Title VI of the Civil Rights Act of 1964, Title 15, Part 8 of the Code of Federal Regulations and the Civil Rights Act of 1992, Manatee County hereby notifies all Proposers that it will affirmatively ensure minority business enterprises are afforded full opportunity to participate in response to this Request for Qualifications and will not be discriminated against on the grounds of race, color, national origin, religion, sex, age, handicap, or marital status in consideration of award.

A.26 MINORITY AND/OR DISADVANTAGED BUSINESS ENTERPRISE

The State of Florida Office of Successful Proposer Diversity provides the certification process and maintains the database of certified MBE/DBE firms. Additional information may be obtained at http://www.osd.dms.state.fl.us/iframe.htm or by calling (850) 487-0915.

A.27 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this Request for Proposal become “Public Records”, and shall be subject to public disclosure consistent with Florida Statute, Chapter 119.

Proposals become subject to disclosure thirty (30) days after the opening or if a notice of intent to award decision is made earlier than this time as provided by Florida Statutes § 119.071(1)(b). No announcement or review of the Proposals shall be conducted at the public opening.

If County rejects all Proposals and concurrently notices its intent to reissue the solicitation, the rejected Proposals are exempt from public disclosure until such time the County provides notice of an intended decision concerning the reissued solicitation or until County withdraws the reissued solicitation. A Proposal is not exempt for longer than twelve (12) months after the initial notice of rejection of all Proposals.

Pursuant to Florida Statute 119.0701, to the extent Successful Proposer is performing services on behalf of County, Successful Proposer must:

a. Keep and maintain public records required by public agency to perform the service. That information and data it manages as part of the services may be public record in accordance with Chapter 119, Florida Statutes and Manatee County public record policies. Proposer agrees, prior to providing goods/services, it will implement policies and procedures, which are subject to approval by County, to maintain, produce, secure, and retain public records in accordance with applicable laws, regulations, and County policies including but not limited to Section 119.0701, Florida Statutes.

b. Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Florida Statutes, Chapter 119, or as otherwise provided by law.

c. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the Successful Proposer does not transfer the records to the public agency.

d. Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of contractor or keep and maintain public records required by the public agency to perform the service. If the Successful Proposer transfers all public records to County upon completion of the contract, the Successful Proposer shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Successful Proposer keeps and maintains public records upon completion of the contract, the Successful Proposer shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to County, upon request from County's custodian of public records, in a format that is compatible with the information technology systems of County.

IF THE SUCCESSFUL PROPOSER HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO ITS DUTY TO PROVIDE PUBLIC RECORDS RELATING TO ANY RESULTING CONTRACT, CONTACT COUNTY'S CUSTODIAN OF PUBLIC RECORDS AT:

PHONE: (941) 742-5845
EMAIL: DEBBIE.SCACCIANOCE@MYMANATEE.ORG
ATTN: RECORDS MANAGER
1112 MANATEE AVENUE WEST
BRADENTON, FL 34205

A.28 TRADE SECRETS

Manatee County is subject to Chapter 119, Florida Statutes. Therefore, all documents, materials, and data submitted as part of a Proposal in response to a Request for Proposal are governed by the disclosure, exemption and confidentiality provisions relating to public records in Florida Statutes.

Notwithstanding any other provision in this solicitation, designation of the entire proposal as 'trade secret', 'proprietary', or 'confidential' is not permitted and may result in a determination that the Proposal is non-responsive and therefore the proposal will not be evaluated or considered.

Except for materials that are 'trade secrets' as defined by Chapter 812, Florida Statutes, ownership of all documents, materials and data submitted as part of a Proposal in response to the Request for Proposal shall belong exclusively to County.
To the extent that Proposer desires to maintain the confidentiality of materials that constitute trade secrets pursuant to Florida law, trade secret material submitted must be segregated from the portions of the Proposal that are not declared as trade secret. In addition, Proposer shall cite, for each trade secret claimed, the Florida Statute number which supports the designation. Further, Proposer shall offer a brief written explanation as to why the cited Statute is applicable to the information claimed as trade secret. Additionally, Proposer shall provide a hard copy of its Proposal that redacts all information designated as trade secret.

In conjunction with trade secret designation, Proposer acknowledges and agrees that:

a. Trade secret requests made after the opening will not be considered. However, County reserves the right to clarify the Proposers request for trade secret at any time; and
b. County and its officials, employees, agents, and representatives are hereby granted full rights to access, view, consider, and discuss the information designated as trade secret throughout the evaluation process and until final execution of any awarded purchase order or contract; and
c. That after notice from County that a public records request has been made pursuant to Proposer's proposal, the Proposer at its sole expense, shall be responsible for defending its determination that submitted material is a trade secret and is not subject to disclosure. Action by Proposer in response to notice from the County shall be taken immediately, but no later than 10 calendar days from the date of notification or Proposer will be deemed to have waived the trade secret designation of the materials.

Offeror shall indemnify and hold County, and its officials, employees, agents and representatives harmless from any actions, damages (including attorney's fees and costs), or claims arising from or related to the designation of trade secrets by the Proposer, including actions or claims arising from County's non-disclosure of the trade secret materials.

A.29 CONFIDENTIALITY OF SECURITY RELATED RECORDS

a. Pursuant to Florida Statutes § 119.071(3), the following records (hereinafter referred to collectively as "the Confidential Security Records") are confidential and exempt from the disclosure requirements of Florida Statutes § 119.07(1):

    i. A Security System Plan or portion thereof for any property owned by or leased to County or any privately owned or leased property held by County.

    ii. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, arena, stadium, water treatment facility, or other structure owned or operated by County.
    iii. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout or structural elements of an attractions and recreation facility, entertainment or resort complex, industrial complex, retail and service development, office development, or hotel or motel development in the possession of, submitted to County.

b. Successful Proposer agrees that, as provided by Florida Statute, it shall not, as a result of a public records request, or for other reason disclose the contents of, or release or provide copies of the Confidential Security Records to any other party absent the express written authorization of County's Property Management Director or to comply with a court order requiring such release or disclosure. To the extent Successful Proposer receives a request for such records, it shall immediately contact the County's designated Contract administrator who shall coordinate County's response to the request.

A.30 E-VERIFY

Prior to the employment of any person under this contract, the Successful Proposer shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of (a) all persons employed during the contract term by the Successful Proposer to perform employment duties within Florida and (b) all persons, including subcontractors, assigned by the Successful Proposer to perform work pursuant to the contract with Manatee County. For more information on this process, please refer to United States Citizenship and Immigration Service site at: http://www.uscis.gov/.

Only those individuals determined eligible to work in the United States shall be employed under this contract.

By submission of a Proposal in response to this RFQ, the successful Proposer commits that all employees and subcontractors will undergo e-verification before placement on this contract.

The successful Proposer shall maintain sole responsibility for the actions of its employees and subcontractors. For the life of the contract, all employees and new employees brought in after contract award shall be verified under the same requirement stated above.

A.31 LICENSES AND PERMITS

The successful Proposer shall be solely responsible for obtaining all necessary license and permit fees, including, but not limited to, all license fees, permit fees, impact fees, or inspection fees, and responsible for the costs of such fees. Successful Proposer is solely responsible for ensuring all work complies with all Federal, State, local, and Manatee County ordinances, orders, codes, laws, rules, regulations, directives, and guidelines.

A.32 MINIMUM WAGE REQUIREMENTS

The successful Proposer shall comply with all minimum wage requirements, such as Living Wage requirements, minimum wages based on Federal Law, minimum wages based on the Davis-Bacon Act, and the provisions of any other employment laws, as may be applicable to the Agreement.

A.33 PROTEST

Any actual bidder, Proposer, or contractor who is aggrieved in connection with the notice of intent to award of a contract with a value greater than $250,000 where such grievance is asserted to be the result of a violation of the requirements of the Manatee County Procurement Code or any applicable provision of law by the officers, agents, or employees of the County, may file a protest to the Procurement Official.

Protest must be in writing and delivered via email at purchasing@mymanatee.org or by hand delivery to the Procurement Division at 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205 by 5:00 p.m. on the fifth business day following the date of posting of the Notice of Intent to Award on the County website. There is no stay of the procurement process during a protest. The Procurement Official shall have the authority to settle and resolve a protest concerning the intended award of a contract.

For additional information regarding the County protest process, visit the Procurement Division webpage on the County website.

A.34 BINDING OFFER

Proposals will remain valid for a period of 120 days following the Due Date and Time and will be considered a binding offer to perform the required services and/or provide the required goods. The submission of a Proposal will be taken as prima facie evidence that the Proposer has familiarized itself with the contents of this Solicitation

A.35 ACCESSIBILITY

The County is committed to making its documents and information technologies accessible to individuals with disabilities by meeting the requirements of Section 508 of the Rehabilitation Act and best practices (W3C WCAG 2). **For assistance with accessibility regarding this solicitation, contact the Manatee County Procurement Division via email at purchasing@mymanatee.org or by phone at 941-748-4501, X3014.**

Successful Bidder shall ensure all its electronic information, documents, applications, reports, and deliverables required under the Agreement are in a format that meets the requirements of Section 508 of the Rehabilitation Act and best practices (W3C WCAG 2).

Where not fully compliant with these requirements and best practices, Successful Bidder shall provide clear points of contact for each document and information technology to direct users in how to obtain alternate formats. Further, successful Bidder shall develop accommodation strategies for those non-compliant resources and implement strategies to resolve the discrepancies.

A.36 SOLICITATION SCHEDULE

The following schedule has been established for this Solicitation process. Refer to the County's website (www.mymanatee.org *> Business > Bids & Proposals*) for meeting locations and updated information pertaining to any revisions to this schedule.

Scheduled Item	Scheduled Date
Non-Mandatory Solicitation Information Conference with mandatory site vitis immediately following at the Southeast Water Reclamation Facility, 3331 Lena Road, Bradenton, FL 34211	December 18, 2020 10:30 AM ET

Question and Clarification Deadline	January 4, 2021
Final Addendum Posted	January 7, 2021
Proposal Due Date and Time	January 15, 2021, by 2:00 P.M. ET
Technical Evaluation Meeting	January 26, 2021
Technical Evaluation Meeting	January 27, 2021
Interviews/Presentations (if conducted)	February 17, 2021
Final Evaluation Meeting (if required)	February 18, 2021
Projected Award	April 2021

END SECTION A

SECTION B, EVALUATION OF RESPONSES

B.01 EVALUATION

A due diligence review will be conducted to determine if the Proposal is responsive to the submission requirements outlined in this Solicitation and to determine if the Proposer is a responsible Proposer.

A responsive Proposal is one that follows the requirements of this Solicitation, includes all documentation, is submitted in the format outlined in this Solicitation, is of timely submission, and has the appropriate signatures as required on each document. Failure to comply with these requirements may result in the Proposal being deemed non-responsive. A responsible Proposer is a Proposer which the County affirmatively determines has the ability, capability and skill to perform under the terms of the agreement; can provide the materials and/or service promptly within the time specified, without delay or interference; has a satisfactory record of integrity and business ethics; and meets the minimum qualification requirements in this RFQ.

Evaluation of Proposals will be conducted by an evaluation committee. Each evaluation committee member will evaluate and rank the Proposals for each of the evaluation criteria. The committee will consider all information submitted by each responsible and responsive Proposer; clarification information provided by Proposer; information obtained during the interviews, presentations, or demonstrations; feedback received from Proposer's references; and any other relevant information received during any investigation of Proposer to ascertain the ability of the Proposer to perform the Scope of Services as stated in this RFQ.

B.02 EVALUATION CRITERIA

The following evaluation criteria have been established for this RFQ.

Criteria	Weight
Proposer & Team's Experience	30%
Approach to Engineering	20%
Organizational Structure and Capacity	20%
Similar Completed Projects	30%

B.03 CLARIFICATIONS, INTERVIEWS, PRESENTATIONS, DEMONSTRATIONS

As part of the evaluation process, the evaluation committee will determine a list of those responsive and responsible Proposals that are deemed by the committee as having a reasonable probability of being selected for award (Short List). At a minimum, the evaluation committee shall conduct discussions with the Short List Proposers and may request additional information or clarification from Proposers for the purpose of further evaluation of (a) conformance to the solicitation requirements, (b) the abilities of the Proposer, and (c) understanding of the Proposal submitted. Additional information and clarification must be submitted by Proposer within the requested time-period.

Additionally, interviews, presentations or demonstrations may be conducted with Proposers as part of the evaluation process. If conducted, the Short List Proposers will be invited to meet with the committee. The information gained from these interviews, presentations, or demonstrations will be part of the committee's consideration in making a recommendation for award. Therefore, Proposers should make arrangements to attend, if invited.

The interviews, presentations and demonstrations are closed to the public to the extent permitted by law.

In the final evaluations, each evaluator will consider the information obtained from the proposals as well as the discussions and clarifications presented during the presentations. As part of the final evaluations, the initial technical evaluation scores and ranking for each short-listed firm, in each of the evaluation criterion, will be discussed by the evaluation committee and are subject to change.

B.04 RECOMMENDATION FOR NEGOTIATION

The evaluation committee will determine from the responses to this RFQ and subsequent investigations, the Proposer(s) who best meets the County's requirements. Upon completion of the technical evaluations, the evaluation committee will make a recommendation as to the Proposer(s) which the County should enter into negotiations, if any. The County will notice the Intent to Negotiate, in the same manner the original Request for Qualifications document was noticed prior to commencing negotiations.

Upon approval to commence negotiations, the recommended Proposer(s) shall submit one original hard copy and one electronic copy on a CD or USB flash drive of its pricing proposal. The pricing information should show a categorical breakout of the pricing, with any alternates or options clearly identified. The pricing information shall be clear and unambiguous to facilitate evaluation of the prices submitted.

The County will conduct negotiations with the highest ranked Proposer. If the County and the highest-ranked Proposer cannot reach agreement on a contract, the County reserves the right to terminate negotiations and may, at its sole discretion, begin negotiations with the next highest-ranked Proposer(s). This process may continue until a contract acceptable to the County has been negotiated or all Proposals are rejected.

B.05 RECOMMENDATION FOR AWARD

Upon successful completion of negotiations, a recommendation for award to the successful Proposer(s) will be presented for approval per County ordinances, policies and procedures.

END SECTION B

SECTION C, AWARD OF THE AGREEMENT

C.01 GENERAL

By submitting a Proposal, Proposer understands and agrees:

a. The Proposal and all subsequent information requested by the County during the procurement process will serve as a basis for the Agreement.
b. All products and papers produced during the Agreement period become the property of Manatee County upon termination or completion of the engagement.

C.02 AGREEMENT

The successful Proposer(s) will be required to execute the Agreement in a form and with provisions acceptable to the County (See Attachment D, Sample Agreement). The County (as Owner) will execute this Agreement with the successful Proposer (as Contractor).

The negotiated Agreement may or may not include all elements of this RFQ or the Proposal submitted by the successful Proposer(s) where alternatives provide best value, are desirable to the County, and the parties agree to such terms. Negotiations of the terms of the Agreement, may include specifications, scope of project, price, the Agreement period, renewal, or any other relevant provisions.

C.03 AWARD

County does not make award to a Proposer who is delinquent in payment of any taxes, fees, fines, contractual debts, judgments, or any other debts due and owed to County, or is in default on any contractual or regulatory obligation to County. By submitting this solicitation response, Proposer attests that it is not delinquent in payment of any such debts due and owed to County, nor is it in default on any contractual or regulatory obligation to County. In the event the Proposer's statement is discovered to be false, Proposer will be subject to suspension and debarment and County may terminate any contract it has with Proposer.

Award of the Agreement is subject to approval as provided for in the Manatee County Procurement Code.

END SECTION C

SECTION D, FORMS

FORM 1 - ACKNOWLEDGMENT OF ADDENDA

The undersigned acknowledges receipt of the following addenda:

Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:
Addendum No. _____	Date Received:

Print or type Proposer's information below:

Name of Proposer	Telephone Number
Street Address	City/State/Zip
Email Address	Website Address
Print Name & Title of Authorized Officer	Signature of Authorized Official Date

FORM 2 - PROPOSAL SIGNATURE FORM

The undersigned represents that by signing this Proposal Signature Form that:

(1) He/she has the authority and approval of the legal entity purporting to submit the Proposal and any additional documentation which may be required such as the Joint Venture Agreement or Joint Venture Affidavit, if applicable; and

(2) All facts and responses set forth in the Proposal are true and correct; and

(3) If the Proposer is selected by County to negotiate an agreement, that Proposer's negotiators will negotiate in good faith to establish an agreement to provide the services described in this RFQ; and

(4) By submitting a Proposal and signing below, the Proposer agrees to the terms and conditions in this RFQ, which incorporates all addenda, appendices, exhibits, and attachments, in its entirety, and is prepared to sign the Agreement, of which a sample is incorporated into this RFQ as Attachment D. The Proposer understands that if it submits exceptions to the Sample Agreement in its Proposal, the Proposer may be determined non-responsive.

Print or type Proposer's information below:

Name of Proposer	Telephone Number
Street Address	City/State/Zip
Email Address	Web Address
Print Name & Title of Authorized Officer	Signature of Authorized Officer Date

FORM 3- PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION
SWORN STATEMENT PURSUANT TO MANATEE COUNTY PROCUREMENT CODE SECTION 2-26 ARTICLE V,

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

This sworn statement is submitted to Manatee County by _____

[print individual's name and title]

for _____

[name of entity submitting sworn statement]

whose business address is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is _____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement:

I, the undersigned, understand that no person or entity shall be awarded or receive a County contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of County monies unless such person or entity has submitted a written certification to County that it has not:

(1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or

(2) been convicted of an agreement or collusion among Proposers or prospective Proposers in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or

(3) been convicted of a violation of an environmental law that, as determined by the County, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or

(4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of, or has admitted guilt to, any of the crimes set forth above on behalf of such and entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he/she is an official of the business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common board of directors.

For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests amount family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

Any person or entity who claims that this Article is inapplicable to him/her/it because a conviction or judgment has been reversed by a court of competent jurisdiction, shall prove the same with documentation satisfactory to Manatee County's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with Manatee County.

I UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE PROCUREMENT DIVISION OR THE COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

_____
Signature of Contractor Representative

STATE OF _____

COUNTY OF_____

Sworn to and subscribed before me this _____ day of _____, 20____ by _____

_____. ☐ Personally known OR ☐ Produced the following identification

_____

[Type of identification]

_____
Notary Public Signature

My commission expires_____

_____
[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

FORM 4 - CONFLICT OF INTEREST DISCLOSURE FORM

The award of an agreement resulting from this RFQ is subject to the provisions of Manatee County Code of Laws. Proposer must disclose within its Proposal: the name of any officer, director, or agent who is also an employee of Manatee County. Furthermore, Proposer must disclose the name of any County employee who owns, directly or indirectly, an interest of more than five percent (5%) in the Proposer's firm or any of its branches, divisions, or affiliates.

By signing below, Proposer confirms that it is not currently engaged or will not become engaged in any obligations, undertakings or contracts that will require the firm to maintain an adversarial role against the County or that will impair or influence the advice or recommendations it provides to the County.

Please check one of the following statements and attach additional documentation if necessary:

_____ To the best of my knowledge, the undersigned firm has no potential conflict of interest for this RFQ.

_____ The undersigned firm, by execution of this form, submits information which may be a potential conflict of interest for this RFQ.

Acknowledged and attested to by:

_____

Firm Name

_____

Signature

_____

Name and Title (Print or Type)

_____

Date

Return this fully executed form with your Proposal.

FORM 5 - NON-COLLUSION AFFIDAVIT

STATE OF _____

COUNTY OF _____

Before me, the undersigned authority, personally appeared _____, who, after being by me first duly sworn, deposes and says of his/her personal knowledge that:

a. He/She is _____ of _____, the Proposer that has submitted a Proposal to perform work for the following:

RFQ No.: _____ Title: _____

b. He/She is fully informed respecting the preparation and contents of the attached Request for Qualifications, and of all pertinent circumstances respecting such Solicitation.

Such Proposal is genuine and is not a collusive or sham Proposal.

c. Neither the said Proposer nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Proposer, firm, or person to submit a collusive or sham Proposal in connection with the Solicitation and contract for which the attached Proposal has been submitted or to refrain from proposing in connection with such Solicitation and contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Proposer, firm, or person to fix the price or prices in the attached Proposal or any other Proposer, or to fix any overhead, profit, or cost element of the Proposal price or the Proposal price of any other Proposer, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against the City or any person interested in the proposed contract.

d. The price or prices to be submitted shall be fair and proper and shall not be tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Proposer or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Signature: _____

Subscribed and sworn to (or affirmed) before me this _____ day of _____ 20__, by _____, who is personally known to me OR has produced _____ as identification.

Notary Signature_____
Notary Name: _____
Notary Public (State): _____
My Commission No: _____
Expires on: _____
SEAL

FORM 6 - TRUTH – IN – NEGOTIATION CERTIFICATE

The undersigned warrants (i) that it has not employed or retained any company or person, other than bona fide employees working solely for the undersigned, to solicit or secure the Agreement and (ii) that it has not paid or agreed to pay any person, company, corporation, individual, or firm other than its bona fide employees working solely for the undersigned or agreed to pay any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of the Agreement.

The undersigned certifies that the wage rates and other factual unit costs used to determine the compensation provided for in the Agreement are accurate, complete, and current as of the date of the Agreement.

(This document must be executed by an authorized official of Proposer (e.g., President, CEO, Partner, Managing Partner)

Name: _____

Title: _____

Date: _____

Signature:_____

FORM 7 – SCRUTINIZED COMPANY CERTIFICATION

This certification is required pursuant to Florida State Statute Section 287.135 and must be executed and returned with Proposer's Proposal.

As of July 1, 2011, a company that, at the time of bidding or submitting a Proposal for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List is ineligible for, and may not bid on, submit a Proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more.

Companies must complete and return this form with its response.

Company: _____

FEIN: _____

Address. _____

City/State/Zip. _____

I, _____, as a representative of _____

certify and affirm that this entity is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List.

Signature	Title
Printed Name	Date

FORM 8, INSURANCE REQUIREMENTS

The Successful Proposer will not commence work under the resulting Agreement until all insurance coverages indicated by an "X" herein have been obtained. The Successful Proposer shall obtain and submit to the Procurement Division within ten (10) calendar days from the date of notice of intent to award, at its expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy): Work under this Agreement cannot commence until all insurance coverages indicated herein have been obtained on a standard ACORD form (inclusive of any amounts provided by an umbrella or excess policy):

☒ **Automobile Liability Insurance Required Limits**
Coverage must be afforded under a per occurrence policy form including coverage for all owned, hired and non-owned vehicles for bodily injury and property damage of not less than:

- $2,000,000 Combined Single Limit; OR
- $ 1,000,000 Bodily Injury and $1,00,000 Property Damage
- $10,000 Personal Injury Protection (No Fault)
- $500,000 Hired, Non-Owned Liability
- $10,000 Medical Payments

This policy shall contain severability of interests' provisions.

☒ **Commercial General Liability Insurance Required Limits (per Occurrence form only; claims-made form is not acceptable)**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $1,000,000 Single Limit Per Occurrence
- $2,000,000 Aggregate
- $1,000,000 Products/Completed Operations Aggregate
- $1,000,000 Personal and Advertising Injury Liability
- $100,000 Fire Damage Liability
- $10,000 Medical Expense, and
- $1,000,000, Third Party Property Damage
- $ Project Specific Aggregate (Required on projects valued at over $10,000,000)

This policy shall contain severability of interests' provisions.

☒ **Employer's Liability Insurance**
Coverage limits of not less than:

- $100,000 Each Accident
- $500,000 Disease Each Employee
- $500,000 Disease Policy Limit

☒ Worker's Compensation Insurance
☐ **US Longshoremen & Harbor Workers Act**
☐ **Jones Act Coverage**

Coverage limits of not less than:

- Statutory workers' compensation coverage shall apply for all employees in compliance with the laws and statutes of the State of Florida and the federal government.
- If any operations are to be undertaken on or about navigable waters, coverage must be included for the US Longshoremen & Harbor Workers Act and Jones Act.

Should 'leased employees' be retained for any part of the project or service, the employee leasing agency shall provide evidence of Workers' Compensation coverage and Employer's Liability coverage for all personnel on the worksite and in compliance with the above Workers' Compensation requirements. NOTE: Workers' Compensation coverage is a firm requirement. Elective exemptions are considered on a case-by-case basis and are approved in a very limited number of instances.

☐ **Aircraft Liability Insurance Required Limits**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $ Each Occurrence Property and Bodily Injury with no less than $100,000 per passenger each occurrence or a 'smooth' limit.
- $ General Aggregate.

☐ **Un-Manned Aircraft Liability Insurance (Drone)**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $ Each Occurrence Property and Bodily Injury; Coverage shall specifically include operation of Unmanned Aircraft Systems (UAS), including liability and property damage.
- $ General Aggregate

☐ **Installation Floater Insurance**
When the contract or agreement **does not** include construction of, or additions to, above ground building or structures, but does involve the installation of machinery or equipment, Installation Floater Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- 100% of the completed value of such addition(s), building(s), or structure(s)

☒ **Professional Liability and/or Errors and Omissions (E&O) Liability Insurances**
Coverage shall be afforded under either an occurrence policy form or a claims-made policy form. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- $ 3,000,000 Bodily Injury and Property Damage Each Occurrence
- $ 3,000,000 General Aggregate

☐ **Builder's Risk Insurance**
When the contract or agreement includes the construction of roadways and/or the addition of a permanent structure or building, including the installation of machinery and/or equipment, Builder's Risk Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- An amount equal to 100% of the completed value of the project, or the value of the equipment to be installed
- The policy shall not carry a self-insured retention/deductible greater than $10,000

Coverage shall be for all risks and include, but not be limited to, storage and transport of materials, equipment, supplies of any kind whatsoever to be used on or incidental to the project, theft coverage, and Waiver of Occupancy Clause Endorsement, where applicable.

☐ **Cyber Liability Insurance**
Coverage shall comply with Florida Statute 501.171, shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $ Security Breach Liability
- $ Security Breach Expense Each Occurrence
- $ Security Breach Expense Aggregate
- $ Replacement or Restoration of Electronic Data
- $ Extortion Threats
- $ Business Income and Extra Expense
- $ Public Relations Expense

NOTE: Policy must not carry a self-insured retention/deductible greater than $25,000.

☐ **Hazardous Materials Insurance (As Noted Below)**
Hazardous materials include all materials and substances that are currently designated or defined as hazardous by the law or rules of regulation by the State of Florida or federal government.
All coverage shall be afforded under either an occurrence policy form or a claims-made policy form, and the policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

☐ ***Pollution Liability***
Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

☐ ***Asbestos Liability (If handling within scope of Contract)***
Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

☐ ***Disposal***
When applicable, Successful Proposer shall designate the disposal site and furnish a Certificate of Insurance from the disposal facility for Environmental Impairment Liability Insurance covering liability.

- Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Liability for Sudden and Accidental Occurrences, each claim and an aggregate.
- Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Liability for Non-Sudden and Accidental Occurrences, each claim and an aggregate.

☐ **Hazardous Waste Transportation Insurance**
Successful Proposer shall designate the hauler and have the hauler furnish a Certificate of Insurance for Automobile Liability insurance with Endorsement MCS-90 for liability arising out of the transportation of hazardous materials. EPA identification number shall be provided.

All coverage shall be afforded under either an occurrence policy form or a claims-made policy form and the policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- Amount equal to the value of the contract, subject to a $1,000,000 minimum, per accident.

☐ **Liquor Liability Insurance**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- $1,000,000 Each Occurrence and Aggregate

☐ **Garage Keeper’s Liability Insurance**
Coverage shall be required if the maintenance, servicing, cleaning or repairing of any County motor vehicles is inherent or implied within the provision of the contract.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the lot or garage.

☐ **Bailee's Customer Liability Insurance**
Coverage shall be required for damage and/or destruction when County property is temporarily under the care or custody of a person or organization, including property that is on, or in transit to and from the person or organization's premises. Perils covered should include fire, lightning, theft, burglary, robbery, explosion, collision, flood, earthquake and damage or destruction during transportation by a carrier.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the County asset(s) in the Successful Proposer'S care, custody and control.

☐ **Hull and Watercraft Liability Insurance**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- $ Each Occurrence
- $ General Aggregate
- $ Fire Damage Liability
- $10,000 Medical Expense, and
- $ Third Party Property Damage
- $ Project Specific Aggregate (Required on projects valued at over $10,000,000)

☐ **Other [Specify]**

BOND REQUIREMENTS
☐ **Bid Bond**
A Bid Bond in the amount of $_____ or ____% of the total offer. Bid bond shall be submitted with the sealed response and shall include project name, location, and / or address and project number. In lieu of the bond, the bidder may file an alternative form of security in the amount of $_____ or ____% of the total offer. in the form of a money order, a certified check, a cashier's check, or an irrevocable letter of credit issued to Manatee County. NOTE: A construction project over $200,000 requires a Bid Bond in the amount of 5% of the total bid offer.

☐ **Payment and Performance Bond**
A Payment and Performance Bond shall be submitted by Successful Bidder for 100% of the award amount and shall be presented to Manatee County within ten (10) calendar days of issuance of the notice of intent to award. NOTE: A construction project over $200,000 requires a Payment and Performance Bond.

INSURANCE REQUIREMENTS

I. THE POLICIES ARE TO CONTAIN, OR BE ENDORSED TO CONTAIN, THE FOLLOWING PROVISIONS:

Commercial General Liability and Automobile Liability Coverages

a. **"Manatee County, a Political Subdivision of the State of Florida," is to be named as an Additional Insured in respect to:** Liability arising out of activities performed by or on behalf of the Successful Proposer, his agents, representatives, and employees; products and completed operations of the Successful Proposer; or automobiles owned, leased, hired or borrowed by the Successful Proposer. The coverage shall contain no special limitation(s) on the scope of protection afforded to the COUNTY, its officials, employees or volunteers.
In addition to furnishing a Certificate of Insurance, the Successful Proposer shall provide the endorsement that evidences Manatee COUNTY being listed as an Additional Insured. This can be done in one of two ways: (1) an endorsement can be issued that specifically lists "Manatee County, a Political Subdivision of the State of Florida," as Additional Insured; or, (2) an endorsement can be issued that states that all Certificate Holders are Additional Insured with respect to the policy.
b. The Successful Proposer'S insurance coverage shall be primary insurance with respect to the COUNTY, its officials, employees and volunteers. Any insurance or self-insurance maintained by the COUNTY, its officials, employees or volunteers shall be excess of Successful Proposer's insurance and shall be non-contributory.
c. The insurance policies must be on an occurrence form.

Workers' Compensation and Employers' Liability Coverages
The insurer shall agree to waive all rights of subrogation against the COUNTY, its officials, employees and volunteers for losses arising from work performed by the Successful Proposer for the COUNTY.

II. General Insurance Provisions Applicable to All Policies

1. Prior to the execution of contract, or issuance of a Purchase Order, and then annually upon the anniversary date(s) of the insurance policy's renewal date(s) for as long as this contract remains in effect, Successful Proposer shall furnish the COUNTY with a Certificate(s) of Insurance (using an industry accepted certificate form, signed by the Issuer, with applicable endorsements, and containing the solicitation or contract number, and title or description) evidencing the coverage set forth above and naming "Manatee County, a Political Subdivision of the State of Florida" as an Additional Insured on the applicable coverage(s) set forth above.

2. If the policy contains an aggregate limit, confirmation is needed in writing (letter, email, etc.) that the aggregate limit has not been eroded to procurement representative when supplying Certificate of Insurance. In addition, when requested in writing from the COUNTY, Successful Proposer will provide the COUNTY with a certified copy of all applicable policies. The address where such certificates and certified policies shall be sent or delivered is as follows:

Manatee County, a Political Subdivision of the State of Florida
Attn: Risk Management Division
1112 Manatee Avenue West, Suite 969

Bradenton, FL 34205

3. The project's solicitation number and title shall be listed on each certificate.
4. Successful Proposer shall provide thirty (30) days written notice to the Risk Manager of any cancellation, non-renewal, termination, material change, or reduction in coverage of any insurance policies to procurement representative including solicitation number and title with all notices.
5. Successful Proposer agrees that should at any time Successful Proposer fail to meet or maintain the required insurance coverage(s) as set forth herein, the COUNTY may terminate this contract.
6. The Successful Proposer waives all subrogation rights against COUNTY, a Political Subdivision of the State of Florida, for all losses or damages which occur during the contract and for any events occurring during the contract period, whether the suit is brought during the contract period or not.
7. The Successful Proposer has sole responsibility for all insurance premiums and policy deductibles.
8. It is the Successful Proposer'S responsibility to ensure that his agents, representatives and subcontractors comply with the insurance requirements set forth herein. Successful Proposer shall include his agents, representatives, and subcontractors working on the project or at the worksite as insured under its policies, or Successful Proposer shall furnish separate certificates and endorsements for each agent, representative, and subcontractor working on the project or at the worksite. All coverages for agents, representatives, and subcontractors shall be subject to all of the requirements set forth to the procurement representative.
9. All required insurance policies must be written with a carrier having a minimum A.M. Best rating of A- FSC VII or better. In addition, the COUNTY has the right to review the Successful Proposer's deductible or self-insured retention and to require that it be reduced or eliminated.
10. Successful Proposer understands and agrees that the stipulated limits of coverage listed herein in this insurance section shall not be construed as a limitation of any potential liability to the COUNTY, or to others, and the COUNTY'S failure to request evidence of this insurance coverage shall not be construed as a waiver of Successful Proposer'S obligation to provide and maintain the insurance coverage specified.
11. Successful Proposer understands and agrees that the COUNTY does not waive its immunity and nothing herein shall be interpreted as a waiver of the COUNTY'S rights, including the limitation of waiver of immunity, as set forth in Florida Statutes 768.28, or any other statutes, and the COUNTY expressly reserves these rights to the full extent allowed by law.
12. No award shall be made until the Procurement Division has received the Certificate of Insurance in accordance with this section.

BONDING REQUIREMENTS

Bid Bond/Certified Check. By submitting a proposal, the Successful Proposer agrees should its proposal be accepted, **to execute the form of Agreement and present the same to COUNTY for approval within ten (10) calendar days after notice of intent to award**. The Successful Proposer further agrees that failure to execute and deliver said form of Agreement **within ten (10) calendar days** will result in damages to COUNTY and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed proposal in the amount of five (5%) percent of the total amount of the proposal. The Successful Proposer further agrees that in case the Successful

Proposer fails to enter into an Agreement, as prescribed by COUNTY, the bid bond/certified check accompanying the proposal shall be forfeited to COUNTY as agreed liquidated damages. If COUNTY enters into an agreement with a Successful Proposer, or if COUNTY rejects any and/or all proposals, accompanying bond will be promptly returned.

Payment and Performance Bonds. Prior to commencing work, the Successful Proposer shall obtain, for the benefit of and directed to COUNTY, a Payment and Performance Bond satisfying the requirements of Florida Statutes § 255.05, covering the faithful performance by the Successful Proposer of its obligation under the Contract Documents, including but not limited to the construction of the project on the project site and the payment and obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the Successful Proposer to provide the Payment and Performance Bond shall be approved by COUNTY prior to issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that surety is rated A- or better by Best's Key Guide, latest edition.

Failure to provide the required bonds on the prescribed form may result in Successful Proposer being deemed nonresponsive. Bonds must be in the form prescribed in Florida Statutes § 255.05, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Florida Statutes § 255.05.

Bonds shall be in an amount equal to 100% of the contract price issued by a duly authorized and nationally recognized surety company, authorized to do business in the State of Florida, satisfactory to COUNTY. Surety shall be rated as "A-" or better by Best's Key Guide, latest edition. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Payment and Performance Bonds shall be issued to "Manatee County, a political subdivision of the State of Florida", **within ten (10) calendar days after issuance of notice of intent to award**.

In addition, pursuant to Florida Statutes § 255.05(1)(b), Florida Statutes, prior to commencing work, the Successful Proposer shall be responsible and bear all costs associated to record the Payment and Performance Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Procurement Division upon filing. Pursuant to Florida Statutes § 255.05(1)(b), Florida Statutes, COUNTY will make no payment to the Successful Proposer until the Successful Proposer has complied with this paragraph.

Furnishing Payment and Performance Bonds shall be requisite to execution of an Agreement with COUNTY. Said Payment and Performance Bonds will remain in force for the duration of this Agreement with the premiums paid by the Successful Proposer. Failure of the Successful Proposer to execute such Agreement and to supply the required bonds shall be just cause for cancellation of the award. COUNTY may then contract with the next lowest, responsive and responsible Successful Proposer or re-advertise this RFP.

Failure of COUNTY at any time to require performance by the Successful Proposer of any provisions set out in the resulting Agreement will in no way affect the right of COUNTY, thereafter, to enforce those provisions.

FORM 8, INSURANCE STATEMENT
RFQ NO. 21-TA003564SAM

THE UNDERSIGNED has read and understands the insurance requirements applicable to any Agreement resulting from this solicitation and shall provide the insurances required in this RFQ within ten (10) days from the date of Notice of Intent to Award.

Proposer Name: _____ Date: _____

Signature
(Authorized Official): _____

Printed Name/Title: _____

Insurance Agency: _____

Agent Name: _____ Agent Phone: _____

Return this signed statement with your proposal.

FORM 9, INDEMNITY AND HOLD HARMLESS

MANATEE COUNTY, A POLITICAL SUBDIVISION OF THE STATE OF FLORIDA

The Successful Proposer shall indemnify and hold harmless County, its officers, and employees from liabilities, damages, losses, and costs, including but not limited to reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentionally wrongful conduct of the Successful Proposer, its personnel, design professionals and other persons employed or utilized by the Successful Proposer in the performance of the Agreement, including without limitation, defects in design, or errors or omissions that result in material cost increases to County. Such indemnification shall include the payment of all valid claims, losses, and judgments of any nature whatsoever in connection therewith and the payment of all related fees and costs. County reserves the right to defend itself with its own counsel or retained counsel at Successful Proposer's expense.

Signature of Authorized Official of Proposer: _____

Title: Date: _____

Project Number and /or Name:_____

Insurance Agent: _____

Acknowledgement:

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____,
20____ by _____ [FULL LEGAL NAME], who is

☐ Personally known to me
OR
☐ has produced _____ as identification.

Notary Signature _____
Print Name _____
Seal

SECTION E ATTACHMENTS

Attachment A, Scope of Services

Attachment B, Proposal Response

Attachment C, Technical Memorandum - Southwest Water Reclamation Facility Biological Treatment Cpacity Analysis

Attachment D, Sample Agreement

ATTACHMENT A
SCOPE OF SERVICES

1.01 BACKGROUND INFORMATION

Manatee County, a political subdivision of the State of Florida (hereinafter in this Scope referred to as County), is seeking proposals from qualified firms for the provision of Professional Engineering Services and other professional services for the Southeast Water Reclamation Facility Capacity Improvements Project located at 3331 Lena Road, Bradenton, FL 34211.

1.02 PROJECT DESCRIPTION

The project will include replacement of anoxic mixers and aerators in Basins 1, 2 and 3. Perform a structural inspection of Basin 3. Replace the fiberglass cover and repair/replace existing return mixed liquor gate on Basin 3. Consider improved mixed liquor recycle transport. Install new oxidation ditch, headworks and repair/replace the existing splitter box. Make electrical upgrades to support new equipment. And new aeration controls with DO probes long with SCADA programming. Install new anoxic basins upstream of oxidation ditches to increase anoxic volume (zone 1). Install new anoxic basins downstream of oxidation ditches (zone 2) and new reaeration zones downstream of anoxic zone 2.

A Request for Qualifications (RFQ) for Construction Manager at Risk (CMAR) services will be advertised to coincide with the selected Consultants 30% design milestone.

1.03 SCOPE

The successful Proposer (hereinafter in this scope referred to as Consultant) shall furnish all equipment, labor, materials, supplies, licensing, transportation and other components necessary to perform Professional Engineering Services and other professional services for the Project to include, but not limited to the following disciplines and sub-disciplines:

1. Data Collection, Basis of Design, and Preliminary design
2. Wastewater Treatment – Process Engineering / Modeling
3. Geotechnical Engineering and Materials Testing
4. Land Surveying, Mapping and Subsurface Utility Engineering (SUE)
5. Design Phase Services – Engineering (Civil, Structural, Mechanical, Electrical, Instrumentation and Controls); working with a CMAR at 30% design
6. Permitting Phase Services
7. Environmental and Ecological Services
8. Construction Phase Services

1.04 SERVICE REQUIREMENTS

The Consultant's services shall include, but not limited to, the following:

1. Mitigation Plan

2. Utilities Design and Specification (Wastewater Plant modeling)
3. Landscape Architecture
4. Permitting (Meetings, Applications and Certifications)
5. Utility Coordination
6. Perform Field Reviews
7. Attend Project Meetings, Prepare Meeting Agendas and Meeting Minutes
8. Attend Design Review Meetings
9. Project Scheduling
10. Construction Phasing
11. Engineering Contract Administration and Management
12. Contract File (Setup and Maintenance)
13. Topographic Survey
14. Boundary Survey
15. Subsurface Utility Engineering (SUE) Locates
16. Legal Sketch and Descriptions
17. Bidding and Construction Phase Services
18. Prepare Record Drawings
19. All Other Services Necessary for Project Completion

Attachment B, Technical Memorandum: Southeast Water Reclamation Facility Biological Treatment Capacity Analysis (February 2020) is attached to use as a reference during project design.

1.05 DELIVERABLES

The Consultant shall provide the following deliverables to the County:

1. Project Management, Coordination, Field Review, Data Collection
    a. Project Schedule
    b. Survey CAD file in “DWG” format
    c. Final CAD base files in “DWG” format
    d. Records of correspondence with permitting agencies and utilities
    e. Provide monthly progress reports for the duration of the project
    f. Attend bi-weekly project meetings and provide meeting minutes to the County
    g. Perform survey, and SUE as necessary of the project site within the project limits
    h. Conduct a field review of the project to take photos, note field conditions, and verify survey information within the project limits
    i. Obtain any existing site surveys, existing geotechnical reports, and any existing as-builts from the County to incorporate County and franchise utilities info and update the project documents

2. Design and Permitting

a. Preliminary Design (30%)
    i. Two (2) 24”x36” sets of plans.
    ii. One (1) electronic set of plans in “pdf” format.
    iii. One (1) electronic copy of the 30% opinion of probable construction cost with bid quantities in “pdf” format.
    iv. One (1) electronic copy of the Geotechnical Report in “pdf” format.
    v. All electronic copies of the items listed above are to be submitted via the Design Review (DESR) process in e-Builder.
b. Intermediate Design (60%)
    i. Two (2) 24”x36” sets of plans.
    ii. One (1) electronic set of plans in "pdf' format.
    iii. One (1) electronic set of technical specifications in "pdf' format.
    iv. One (1) electronic set of the Special Provisions in “pdf” format.
    v. One (1) electronic copy of the updated opinion of probable construction cost with bid quantities in “pdf” format.
    vi. All electronic copies of the items listed above are to be submitted via the Design Review (DESR) process in e-Builder
c. Intermediate Design (90%)
    i. Two (2) 24”x36” sets of plans.
    ii. One (1) electronic set of plans in "pdf' format.
    iii. One (1) electronic set of technical specifications in "pdf' format.
    iv. One (1) electronic set of the Special Provisions in “pdf” format.
    v. One (1) electronic copy of the updated opinion of probable construction cost with bid quantities in “pdf” format.
    vi. All electronic copies of the items listed above are to be submitted via the Design Review (DESR) process in e-Builder.
d. Final Design (100%)
    i. Two (2) sets of Signed and Sealed 24”x36” plans, Technical Specifications and Special Provisions.
    ii. One (1) electronic set of digitally signed and sealed plans, Technical Specifications and Special Provisions in “pdf” format.
    iii. One (1) copy of all base files in AutoCAD "dwg" format and text fonts used.
    iv. One (1) final opinion of probable construction cost with bid quantities in “pdf” format.
    v. One (1) copy of all permits in “pdf” format.
    vi. SWFWMD permit design calculations
    vii. One (1) electronic copy of the final Geotechnical Report in “pdf” format.
    viii. All electronic copies of the items listed above are to be submitted via the Design Review (DESR) process in e-Builder.
e. Permitting: submit permit applications for the construction of the project to the authority having jurisdiction.

3. Construction Phase Services
    a. Construction Phase
        i. Attend one (1) pre-construction meeting, prepare and provide agenda and minutes of the meeting.
        ii. Attend monthly progress meetings during the construction phase.
        iii. Notify permitting agencies of the start of construction, as necessary and in accordance with permit conditions.
        iv. Review monthly pay applications submitted by the Contractor for completeness and make recommendations for payments.
        v. Review and provide responses/approvals for submittals, RFIs, and shop drawings.
        vi. Provide recommendations of changes, as necessary, which may be required within the scope of the project during construction.
        vii. Conduct a limited number of site visits during construction to observe general construction activities and prepare a one-page narrative on the progress of the work.
        viii. Prepare the punch list items to be corrected or completed at the substantial and final completion stages of the work.
        ix. Prepare Right-of-Way maps of the constructed project limits.
        x. Prepare and furnish a final set of reproducible record drawings from the construction contractor's as-built documents and submit to County and to permitting agency for final permit clearance. Record drawing deliverable to County will include:
            (1) One (1) transmittal letter
            (2) One (1) electronic set of record drawings in "pdf' format.
            (3) One (1) set of certified 24"x36"" record drawings.
            (4) One (1) CD (or flash drive) with record drawing base files, including text fonts, in AutoCAD "dwg".

1.06 GENERAL DUTIES OF THE CONSULTANT

The relationship of the Consultant to the County will be that of a professional consultant, and the Consultant will provide the professional and technical services required under the resulting Agreement in accordance with professional practices and ethical standards. No employer/employee relationships shall be deemed to be established and the consultant, its agents, subcontractors, and employees shall be independent contractors at all times.

It shall be the responsibility of the Consultant to work with the County and apprise it of solutions to problems and the approach or technique to be used towards accomplishment of the County objectives as set forth in this RFQ, which will be made a part of the Agreement upon execution by both parties.

The Consultant shall be responsible for the professional quality, technical accuracy, timely completion, compliance with laws, regulations and rules, and the coordination with all appropriate agencies of all designs, drawings, specifications, reports and other Professional Services provided by the Consultant. If the County, in its sole discretion, determines there are errors, omissions or other deficiencies in the Consultant's designs, drawings, specifications, reports and other services, the Consultant shall, without additional compensation, correct or revise said errors or omissions to the satisfaction of the County.

The Consultant shall be familiar with Manatee County Standards, templates and processes.

The Consultant shall be required to use the Internet web-based project management tool, e-Builder Enterprise™ (e-Builder), and protocols included in that software during this project; and shall take any training courses required by the Owner, at no additional cost to the Owner. The use of this project management system does not replace or change any contractual responsibilities of the participants.

User registration, electronic and computer equipment, and Internet connections required for e-Builder are the responsibility of the Consultant. The sharing of user accounts is prohibited. Individuals who are granted log-in access to the County e-Builder platform shall be responsible for the proper use of their passwords and access to data as agents of the Consultant. For documents requiring original signature such as Contracts, Change Orders, Application and Certification for Payment, and Field Directives, paper documents may be required in addition to submittal via e-Builder.

User licenses for e-Builder Enterprise™ will be provided and paid for by the Owner based on assigned roles for the project including Project Manager, Project Fiscal, Project Superintendent, and others as may be required.

1.07 ESTIMATED PROJECT COMPLETION DATE

The estimated project completion time for the 100% design submittal for this RFQ is 24 months from the project design kick-off meeting.

1.08 ESTIMATED PROJECT COST

The County has estimated the project design and construction cost at approximately $57,340,000.00.

END OF ATTACHMENT A

ATTACHMENT B, PROPOSAL RESPONSE

This section identifies specific information which must be contained within the Proposal response and the order in which such information should be organized. The information each Proposer provides will be used to determine those Proposers with the background, experience and capacity to perform the scope of services as stated in this RFQ and which Proposer(s) best meets the overall needs of the County. For more information on the evaluation process, refer to Section C, Evaluation of Responses.

B.01 INFORMATION TO BE SUBMITTED

The contents of each Response will be organized and arranged with tabs in the same order as listed below and with the same TAB numbers. The Response should contain sufficient detail to permit the County to conduct a meaningful evaluation. However, overly elaborate responses are not requested or desired.

B.02 RESPONSE FORMAT

A. TAB 1 - INTRODUCTION

Include the following in Tab 1 of the Response.

1. A cover page that identifies Proposer, the RFQ by title and the RFQ number.
2. An introductory letter/statement that describe your Response in summary form (limit 2 pages).
3. A table of contents.

B. TAB 2 – MINIMUM QUALIFICATION REQUIREMENTS

In Tab 2 submit the information and documentation requested that confirms Proposers meets the following minimum qualification requirement(s):

1. Must be registered with the State of Florida, Division of Corporations to do business in Florida.

   No documentation is required. The County will verify registration.

2. Proposer and its subconsultant(s) must possess current, valid licenses and certifications required under Florida Statute to perform professional engineering services.

   Submit information and documentation from the issuing agency that confirms Proposer and/or its subcontractor(s) meet the following:

   a. Certified under Section 471.023, Florida Statutes, to practice or to offer to practice engineering; or
   b. Certified under Section 481.219, Florida Statutes, to practice or to offer to practice architecture; or
   c. Certified under Section 481.319, Florida Statutes, to practice or to offer to practice landscape architecture.

3. Proposer must have been in business proving consulting services in the area of professional engineering services for a minimum of ten (10) years since December 1, 2010.

   Provide a copy of Proposer's, or the managing partners, business license issued by the state, county or local government indicating it has been in business in the area of professional engineering services since December 1, 2010.

4. Proposer Is NOT listed on the Florida State Board of Administration, Scrutinized List of Prohibited Companies.

   No documentation is required. The County will verify

5. Proposer is not on the Florida Suspended or Debarred Vendor List

   No documentation is required. The County will verify

6. Proposer is not on the Federal Convicted Vendor or Excluded Parties list (SAM/EPLS)

   No documentation is required. The County will verify

7. Proposer is not on the Florida Department of Transportation Contractor Suspended List

   No documentation is required. The County will verify

8. If Proposer is submitting as a joint venture, it must have filed the required documents with the Florida Department of Business and Professional Regulation as required by Florida Statute Section 489.119, prior to the Due Date and Time.

   If Proposer is not a joint venture, provide a statement to that effect. If Proposer is a joint venture, provide a copy of Proposer's approved filing with the Florida Department of Business and Professional Regulation.

9. Proposer has no reported conflict of interests in relation to this RFQ.

   Disclose the name of any officer, director or agent who is also an employee of the County. Disclose the name of any County employee who owns, directly or indirectly, any interest in the Proposer's firm or any of its branches. If no conflicts of interests are present, Proposer must submit a statement to that affect.

C. TAB 3 – FORMS

Provide the completed and executed Forms listed below in Tab 3.
Form 1, Acknowledgement of Addenda
Form 2, Response Signature Form
Form 3, Public Contracting and Environmental Crimes Certification
Form 4, Conflict of Interest Disclosure
Form 5, Non-Collusion Affidavit
Form 6, Truth in Negotiation Certification
Form 7, Scrutinized Company Certification

Form 8, Insurance Statement
Form 9, Indemnity and Hold Harmless

D. TAB 4 - TRADE SECRETS

Pursuant to Section A.24, Trade Secrets, in Tab 4 identify any trade secret being claimed. Proposer must submit purported trade secret as follows:

1. Trade secret material must be segregated, within the applicable TAB, from the portions of the Response that are not being declared as trade secret. NOTE: Responses cannot be designated as 'Proprietary' or 'Confidential' in their entirety.
2. Proposer shall cite, for each trade secret being claimed, the Florida Statute number which supports the designation.
3. Proposer shall offer a brief written explanation as to why information claimed as trade secret fits the cited Statute.
4. Proposer shall provide an additional electronic copy of its Response that redacts all designated trade secrets.

E. TAB 5 - PROPOSER STATEMENT OF ORGANIZATION (Limit 5 pages)

In Tab 5, provide information and documentation on Proposer as follows:

1. Legal contracting name including any dba.
2. State of organization or incorporation.
3. Ownership structure of Proposer's company.
   (e.g., Sole Proprietorship, Partnership, Limited Liability Corporation, Corporation)
4. Federal Identification Number.
5. A fully completed (signed and dated) copy of Proposer's W-9.
6. Contact information for Proposer's corporate headquarters and local office (if different) NOTE: local is defined as Manatee, DeSoto, Hardee, Hillsborough, Pinellas or Sarasota counties.
   i. Address
   ii. County, State, Zip
   iii. Phone
   iv. Number of years at this location
7. List of officers, owners and/or partners, or managers of the firm. Include names, addresses, email addresses, and phone numbers.
8. Provide supporting documentation from the certifying agent indicating Proposer is a certified Minority-owned Business Enterprise, if applicable.
9. Contact information for Proposer's primary and secondary representatives during this RFQ process to include the following information:
   i. Name
   ii. Phone
   iii. E-mail
   iv. Mailing Address
   v. County, State, Zip
10. Provide a brief summary regarding any prior or pending litigation, either civil or criminal, involving a governmental agency or which may affect the performance of the services to be rendered herein, in which the Proposer, any of its partners, employees or subcontractors is or has been involved within the last three years.
11. Provide details of any ownership changes to Proposer's organization in the past three

(3) years or changes anticipated within six (6) months of the Due Date and Time (e.g., mergers, acquisitions, changes in executive leadership).

F. TAB 6 – PROPOSER AND TEAM'S EXPERIENCE (Limit 20 pages)

In Tab 6, provide details of Proposer and its team's experience to include the following:

1. Provide a summary of Proposer's background, size and years in business.
2. Describe Proposer's experience in professional engineering services for capacity improvements in a water reclamation or potable water treatment facility for other government agencies, particularly those within Florida.
3. Identify and include information regarding experience and qualifications of Proposer's key staff to be assigned to the services. Include a resume for each with the name of the firm(s) for their current and previous employers, their full names, professional credentials (e.g., certifications and/or licenses), and roles and duties which the individuals will provide to the County relevant to the project. Include the address of their current primary office location, email address and phone number.
4. Identify any proposed sub-consultant(s) to accomplish the work for each discipline. Include the company name, the name of the individual(s) to be assigned, and an overview of their experience and qualifications applicable to their role in the provision of engineering services for the County. If more than one firm is listed for a discipline, then label which firm is the primary firm for that discipline. Firms may perform more than one (1) discipline.
5. Describe any significant or unique accomplishments, recognition, or awards received by Proposer, its key personnel, or its subcontractors for previous similar services.
6. Provide a minimum of five (5) client references for professional engineering services for a water reclamation or potable water treatment facility performed by Proposer, who are agreeable to responding to an inquiry by the County. At least one (1) project reference designed and constructed using the CMAR project delivery method. References should include the following information:
    a. Client name
    b. Client address
    c. Client contact name
    d. Client contact phone and fax numbers
    e. Client contact email address
    f. Brief description of work (1-2 sentences)
    g. Performance period (start/end dates)
    h. Total dollar value of contract

G. TAB 7 - APPROACH TO ENGINEERING (Limit 14 pages)

In Tab 7, provide Proposer's project approach to include the following:

1. The overall approach to delivering the Scope of Services and any strategies, best practices or innovations Proposer proposes to implement/utilize.
2. An explanation of Proposer's technical ability to perform all facets of the scope of services defined in Attachment A. If more than one Proposer is jointly filing a Response, details must be provided to clearly demonstrate individual roles and responsibility for all components of the project.

3. Details of implementation plan and schedule. Provide an implementation schedule for each component of services. NOTE: Proposer must commit to a timetable of no more than 24 months for substantial completion of the project.
4. Provide a narrative of the methodology for engaging with County representatives in-the-course of performing the duties.
5. Proposer shall thoroughly explain:
    a. Its accessibility in the areas of availability for meetings, general communications, coordination, and supervision
    b. How Proposer physically plans on attending pre-scheduled meetings
    c. How Proposer plans on ensuring accessibility and availability during the term of the Agreement
6. Proposer's Risk Management and Safety Plan that includes a list of risks related to the provision of services and Proposer's proposed mitigation procedures for each item.
7. Provide a statement on company letterhead and signed by an authorized official of Proposer attesting to its commitment to meet the County's time and budget requirements for all assigned work.
8. Provide your team's approach to coordinating efforts with a construction manager at risk project delivery method.
9. Submit any additional information not previously requested which Proposer believes would assist County in the evaluation of Proposer's approach to provide the required services.

H. TAB 8 - ORGANIZATIONAL STRUCTURE AND CAPACITY (Limit 12 pages)

1. Identify whether or not the Proposer is a certified minority business enterprise and include as copy of the applicable document from the certifying agency.
2. Submit details of Proposer's staffing resources, at the location that will provide services to the County as well as corporately, by discipline and the number of personnel within each discipline.
3. Detail the location of the managing office and what plans will be adopted to ensure County citizens receive consideration for employment; and suppliers located within the County will be used for the acquisition of goods and services needed to perform the scope of services.
4. Submit an organizational diagram clearly identifying key personnel as well as other staffing resources who are designated to provide services to the County. For each individual in the organization diagram, include each individual's name, title, firm and indicate their functional relationship to each other.
5. If Proposer is teaming with other entities to provide the required goods and services, detail any prior similar work any two or more team members have jointly performed.
6. If a joint venture is proposed, provide an affidavit attesting to the formulation of the joint venture and provide proof of incorporation as a joint venture or a copy of the formal joint venture agreement between all joint venture parties, indicating their respective roles, responsibilities, and levels of participation in the project.
7. An explanation, in general terms, of Proposers' financial capacity to perform the scope of services. If Proposer is jointly filing a Response with other entities, details must be provided to demonstrate financial capacity of each entity.
8. Provide a statement on company letterhead and signed by a company official authorizing a County auditor and/or financial analysts access to your financial records,

including all records prepared by an independent firm, or the financial records of other entities for which you have ownership interest. Such access will occur at the primary location of the Proposer, or such other location as may be agreed, for the purposes of verifying financial representations, and/or to review and assess the historical and current financial capacity of Proposer's business entity and its expected ability to meet ongoing financial obligations related to the required services, if awarded a contract. If an audit is conducted, the County's audit and/or financial analysts will report their findings in a summary report to the Procurement Official, which will be placed in the Response files for subsequent use, review, and discussions during evaluations.

9. Disclose any ownership interest in other entities proposed for services. This ownership disclosure includes ownership by the Proposer through a parent, subsidiary or holding company or any other form of business entity. Submit entity names and the percent of ownership for each.
10. Detail Proposer and any subcontractor's current workloads and any projected changes to the workload within the next six (6) months.
11. Provide a list of engineering projects that have been awarded to the Proposer and their sub-consultant by Manatee County in the past two (2) years since December 1, 2018. Include the following information for each:
    i. Name of the project
    ii. Date of award
    iii. Dollar value of the design work
12. Submit any additional information not previously requested which Proposer believes would assist County in the evaluation of Proposer's capacity to provide the required services.

I. TAB 9 - SIMILAR COMPLETED PROJECTS (Limit 1 page per project)

Provide a list of up to fifteen projects, particularly those in which Proposer has provided professional engineering services, to include projects designed and constructed using the CMAR project delivery method, since December 1, 2010. Include the following information:

a. Organization/Owner name
b. Address (County/State)
c. Project date (Start/End)
d. Proposer's role in the project (e.g., prime/lead, sub)
e. Scope of work (Brief description 1-2 sentences)
f. Total project costs

NOTE: Representative photographs and exhibits supporting the above projects are permitted as an attachment to this section.

END OF ATTACHMENT B

ATTACHMENT C
RFQ 21-TA003564SAM

Manatee County

Technical Memorandum
SOUTHEAST WATER RECLAMATION FACILITY BIOLOGICAL TREATMENT CAPACITY ANALYSIS

FINAL | February 2020

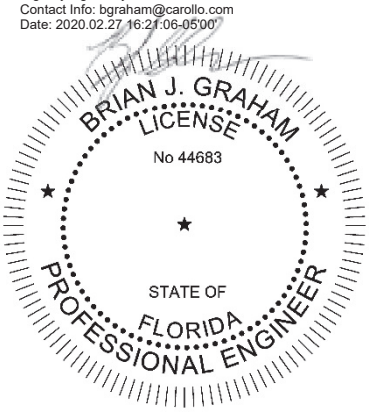
carollo®
CA 8571

Manatee County

Technical Memorandum
SOUTHEAST WATER RECLAMATION FACILITY BIOLOGICAL TREATMENT CAPACITY ANALYSIS

FINAL | February 2020

Digitally signed by Brian J. Graham
Contact Info: bgraham@carollo.com
Date: 2020.02.27 16:21:06-05'00'



Brian J. Graham
FL PE 44683

Carollo Engineers, Inc.
CA 8571
200 East Robinson Street, Suite 1400
Orlando, FL 32801
P: 407-478-4642
F: 407-478-4643

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Contents

Appendices

Tables

Figures

Abbreviations

ADD	average day demand
AOR	actual oxygen requirement
Carollo	Carollo Engineers, Inc.
cf	cubic feet
cfs	cubic feet per second
F	Fahrenheit
ft	feet
gpcd	gallons per capita day
gpd/ac	gallons per day per acre
MDD	maximum day demand
MLR	mixed liquor recycle
µg/L	micrograms per liter
Mgal	million gallons
mgd	million gallons per day
mg/L	milligrams per liter
msl	mean sea level
PHD	peak hour demand
PS	pump station
psi	pounds per square inch
RAS	return activated sludge
SCADA	supervisory control and data acquisition
SHT	sludge holding tank
SOR	standard oxygen requirement
SRT	solids retention time
TMRADF	Three Month Rolling Average Daily Flow
WAS	waste activated sludge
WRF	water reclamation facility
WWTP	wastewater treatment plant
WTP	water treatment plant

EXECUTIVE SUMMARY

As a result of operating problems in 2016 and 2017, Carollo Engineers, Inc. (Carollo) performed an evaluation of the treatment capacity of the mainstream treatment process at the Manatee County (County) Southeast Water Reclamation Facility (SEWRF). As a part of this evaluation (Manatee County Southeast Water Reclamation Facility - Review of Master Plan Capacity Estimate, 2018), the study recommended that the impact of additional loads on the biological process from sidestreams such as leachate, hauled septage, sludge dryer scrubber water, filter backwash, filtrate from the dewatering system, and other contributions to the plant drain station flows be evaluated for their effect on the plant biological treatment capacity.

Sampling data collected by the County showed that the plant drain stations at the SEWRF constitute a significant (40-50 percent) additional contribution to the total pollutant load at the facility, and consequently a limitation on available capacity. Process modeling of the biological treatment system at the SEWRF incorporating this additional load showed that these loads in conjunction with historical operating procedures targeting long solids retention times (SRT) of 30-40 days have significantly limited the capacity of the plant. This limitation of capacity, due to the additional load of the drain station flows, is likely the cause of some of the operational problems reported by plant staff.

The operating staff at the SEWRF have, at Carollo's recommendation, begun reducing the SRT at the plant from historical values to values in the range of 20-30 days aerobic SRT. However, due to the magnitude of the impact of the sidestream loads, these SRT will not be sufficient for the plant to meet the permitted capacity of 11 mgd Three Month Rolling Average Daily Flow (TMRADF). If the County wishes to maintain operations with the existing biological treatment volume, an aerobic SRT of 10 days would be required. At this aerobic SRT, the plant will meet secondary treatment standards and nitrification requirements at design flows, but will have limited denitrification performance, likely requiring operational adjustments such as the addition of supplemental carbon to the anoxic zones to achieve the permitted total nitrate limit of 12 mg N/L. This configuration would not be able to achieve the County's desired effluent total nitrogen concentration of 10 mg N/L and would also limit redundancy and operational flexibility, and significantly increase the load to the existing solids handling system.

The County has expressed a desire to target an effluent total nitrogen (TN) limit of 10 mg N/L, and to operate at an aerobic SRT in the range of 20-30 days to provide reduced sludge production and volatile organic content, increased process stability, and better nitrogen removal. To achieve these goals, Carollo recommends the addition of a fourth biological treatment train and expansion of the existing anoxic basin volumes to achieve design capacity at longer SRT and with better denitrification performance, as well as to provide more redundancy and flexibility to remove a treatment train for maintenance in the future. While the existing treatment trains are sized similarly to each other, based on the capacity analysis in this study, this fourth train should be sized to ensure that desired performance is met at design influent flows despite the additional load of the sidestream flows. While the predicted sludge production from these changes to the biological processes is expected to be within the capacity of the existing sludge handling system, depending on the desired operating practices, an expansion of the sludge handling system may also be required.

In addition to the concluding that the existing biological treatment volume is insufficient to meet capacity at longer operating SRT due to the impact of the sidestream loads, the study also identified deficiencies in the capacity of the aeration system. While the system is sufficient for current maximum day demands, the study found that it would be insufficient to meet the predicted maximum day oxygen demand at design capacity, based on the updated combined load on the plant. Consequently, Carollo recommends that the County investigate either an expansion of the existing mechanical aerator capacity during the upcoming Capital Improvements Plan project in 2020, or the addition of supplemental fine bubble aeration. A conceptual cost estimate predicts a supplemental fine-bubble aeration system to cover the predicted oxygen supply shortfall to cost approximately $2,300,000. Additional details for the capacity analysis and recommendations for operational and capital improvements are provided in this report.

Section 1

INTRODUCTION

This report was prepared by Carollo Engineers, Inc. (Carollo) to document an evaluation of the biological treatment capacity of Manatee County (County) Southeast Water Reclamation Facility (SEWRF). Prior reports and information from plant operations staff indicates that under current operating conditions the plant's biological treatment capacity may be insufficient to meet the permitted capacity of 11.0 million gallons per day (mgd) Three Month Rolling Average Daily Flow (TMRADF).

Carollo conducted a study of the biological treatment system at the SEWRF in 2018 (Manatee County Southeast Water Reclamation Facility - Review of Master Plan Capacity Estimate, 2018), and provided a number of recommendations for improvements to operations, including lowering the plant SRT, sampling the plant sidestreams to determine their impact on performance, and conducting a revised biological treatment capacity analysis to account for these impacts. The County conducted the recommended sampling and authorized Carollo to perform a revised evaluation of the current biological conditions at SEWRF using historical influent data and recent sampling of the plant sidestream loads. This report will summarize the findings of the biological treatment capacity study, identify deficiencies, and provide recommendations for capital and operational improvements to meet future demands.

The following is a list of related studies, reports, and documents previously developed for Manatee County that were used or referenced in the preparation of this report:

- Water Reclamation Facilities Master Plan Development Technical Memorandum No. 2: Design/Standby Criteria and Capacity Rating, Carollo, March 2016.
- Manatee County Southeast Water Reclamation Facility - Review of Master Plan Capacity Estimate, Carollo, January 2018.
- Manatee County Southeast Water Reclamation Facility - Sludge Holding Capacity Analysis, Carollo, October 2018.

Section 2

EXISTING CONDITIONS

2.1 Facilities Description

The SEWRF is located in southeastern Manatee County at 3331 Lena Road in Bradenton, Florida, and has a permitted capacity of 11.0 mgd TMRADF under Florida Department of Environmental Protection (FDEP) Wastewater Permit No. FLA012618. The treatment process at the SEWRF consists of preliminary screening and grit removal, secondary biological nutrient removal (BNR) activated sludge, and tertiary filtration and high-level disinfection.

The influent flow to the SEWRF is received through two raw influent streams, the Main Raw Influent and the Lakewood Ranch Raw Influent. The Main Raw Influent includes leachate flow from the Lena Road Solid Waste Landfill. The total combined influent to the SEWRF is approximately 6.5 mgd Annual Average Daily Flow (AADF). Both the Main Raw Influent and Lakewood Ranch Influent lines flow to the plant headworks facility, where they combine with the flows from the two on-site plant drain stations. Preliminary treatment consists of a headworks facility with two influent transit time flow meters, three mechanically cleaned bar screens, and two forced flow vortex de-gritting units. Following preliminary treatment, wastewater flows to a Flow Splitter Box, which splits flows among the three secondary treatment basins and directs peak flows to the two on-site equalization basins.

Secondary treatment is achieved in three oxidation ditch-style BNR activated sludge processes, each operating in a Modified Ludzack-Ettinger (MLE) configuration, for a total biological treatment volume of 10.4 million gallons (Mgal). Secondary clarification is provided by four circular draft tube clarifiers, each with a diameter of 110 ft. Clarified effluent flows to flash mix basins, flocculation tanks, and granular media traveling bridge automatic backwash filters for tertiary treatment. The filtered effluent is then disinfected with sodium hypochlorite in four chlorine contact chambers and discharged either to the slow-rate Public Access Reuse (PAR) system or on-site reject ponds. Figure 1 shows a process flow diagram of the existing SEWRF liquid treatment stream.

Waste activated sludge (WAS) pumps remove WAS from the secondary clarifiers and pumps it to the on-site gravity belt thickeners (GBT). Thickened sludge is transferred to aerobic sludge holding tanks (SHT) for further stabilization. Downstream of the SHT, sludge is dewatered with three belt filter presses and then transferred to the biosolids treatment facility located onsite. There, the biosolids are either dried with a direct heat dryer to produce a Class A product or disposed of in a Class I solid waste landfill adjacent to the SEWRF (Lena Road Landfill). The dryer processes biosolids from all three County water reclamation facilities (WRFs). Any solids cake exceeding the capacity of the dryer is hauled to the Lena Road Landfill at an additional cost to the facility.

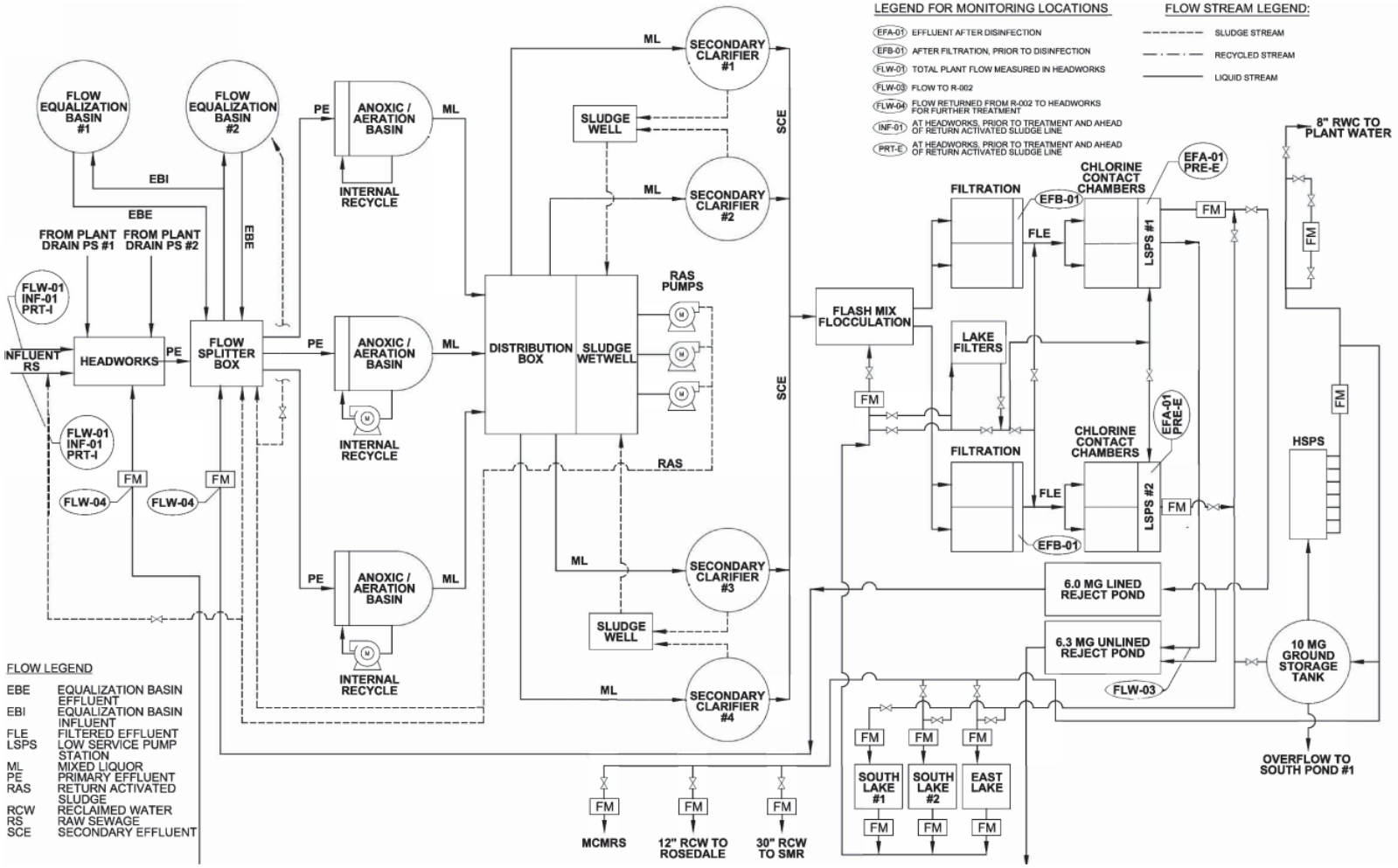


Figure 1 Manatee SEWRF Liquid Stream Process Schematic

Details of tankage and equipment in place for each component of the existing secondary treatment facilities at the SEWRF are provided in Table 1.

Table 1 Existing Secondary Treatment Facilities

Process	Criteria	Description
Anoxic basins	Number	3
	Length, each (Nos. 1 & 2)	47 ft
	Width, each (Nos. 1 & 2)	107 ft
	Radius (No. 3)	53.5 ft
	SWD (Nos. 1 & 2)	13.5 ft
	SWD (No. 3)	14 ft
	Volume, each (Nos. 1 & 2)	0.51 Mgal
	Volume (No. 3)	0.54 Mgal
	Volume, total	1.56 Mgal
	Number of mixers, each	2
	Mixer type	Mechanical
	Motor power, each	15 hp
Aeration basins	Number	3
	Length, each (Nos. 1 &2)	289 ft
	Length (No. 3)	294 ft
	Width, each	107 ft
	SWD, each (Nos. 1 & 2)	13.5 ft
	SWD (No. 3)	14 ft
	Volume, each (Nos. 1 & 2)	2.89 Mgal
	Volume (No. 3)	3.06 Mgal
	Volume, total	8.84 Mgal
Aeration system	Number	9
	Type	Mechanical surface aerators
	Motor power, each	125 hp
Secondary clarifiers	Number	4
	Type	Center feed, peripheral weir
	Sludge withdrawal	Draft tube
	Diameter	110 ft
	SWD	14 ft
	Surface area, each	9,500 ft2
	Surface area, total	38,010 ft2
	Scum handling	Full radius scum trough

Table 2 includes the influent design criteria that are the basis for the existing treatment processes at the SEWRF.

Table 2 Existing Influent Design Criteria

Parameter	Units	Value
Flow, TMRADF	mgd	11.0
Flow, MDF	mgd	12.65
Flow, PHF	mgd	27.5
$cBOD_5$	mg/L	250
$cBOD_5$ (at TMRADF)	lb/d	22,940
TSS	mg/L	250
TSS (at TMRADF)	lb/d	22,940
TKN	mg N/L	40
TKN (at TMRADF)	lb/d	3,670

2.2 Permitted Capacities

SEWRF is permitted to handle 11.0 mgd TMRADF. Treated effluent is pumped either to a slow-rate PAR system (R-001), or onsite reject pond storage (R-002). The onsite reject pond storage is rarely used, it was reported that the last time the reject pond storage was used was for reclaimed water during the shutdown for the 10 Mgal Storage Tank Project. Each of these discharge points has their own permitted limits, shown in Tables 3 and 4. These requirements have been defined according to Permit Number FLA012618, issued to Manatee County for operation of SEWRF under Chapter 403, Florida Statutes.

Table 3 Master Reuse Distribution System Permit Limits (R-001)

Parameter	Units	Max/Min	Annual Average	Monthly Average	Weekly Average	Single Sample
Flow	mgd	Maximum	11.0	-	-	-
$cBOD_5$	mg/L	Maximum	20.0	30.0	45.0	60.0
TSS	mg/L	Maximum	-	-	-	5.0
pH	std. units	Range	-	-	-	6.0-8.5
Fecal coliform	% < detection	Minimum	-	75	-	-
Fecal coliform	#/ 100 mL	Maximum	-	-	-	25
Total Residual Chlorine	mg/L	Minimum	-	-	-	1.0
Total Nitrogen (as N)	mg N/L	Maximum	-	-	-	Report

Table 4 Reject Pond Storage Permit Limits (R-002)

Parameter	Units	Max/Min	Annual Average	Monthly Average	Weekly Average	Single Sample
Flow	mgd	Maximum	Report	Report	-	-
$cBOD_5$	mg/L	Maximum	20.0	30.0	45.0	60.0
TSS	mg/L	Maximum	20.0	30.0	45.0	60.0
pH	std. units	Range	-	-	-	6.0-8.5
Fecal coliform	#/ 100 mL	Maximum	200	-	-	800
Total Residual Chlorine	mg/L	Minimum	-	-	-	0.5
Total Nitrate (as N)	mg N/L	Maximum	-	-	-	12.0

Based on these specified permit limits, this study examines the operational capacity of the plant's biological treatment system to produce effluent that can meet the most stringent specified limit for Carbonaceous 5-day Biochemical Oxygen Demand ($cBOD_5$) and Total Nitrate. Predicted effluent total suspended solids (TSS) was not considered, as the study does not include modeling of the plant's tertiary filtration system.

2.3 Flow and Load Conditions

The study developed evaluations and biological modeling of the secondary treatment processes at Manatee SEWRF based on historical data provided by the County. This data included influent flow and loading data for April 2016 through January 2019. The County also provided operational data for this time period, and the results from the plant sidestream sampling effort, which monitored various sidestreams, such as the sludge dryer scrubber water, hauled septage, filter backwash, and combined drain station flows, and the loads they exert on the plant's biological treatment processes. These sidestreams are collected at two on-site drain stations and pumped to the headworks, where they are mixed with the combined plant influent. The sidestream sampling effort monitored the influent loads exerted by the plant drain station flows from May 2018 through January 2019. Table 5 details the historical influent flows, concentrations, and loads for SEWRF between 2016 and 2018, as well as the observed flows and loads from the plant drain stations for May 2018 through January 2019.

Table 5 Manatee SEWRF Historical Influent Flows and Loads, 2016-2018

Parameter	Annual Daily Average	Maximum Monthly Average (92nd Percentile)
Flows		
Main Influent, 2016 (mgd)	6.3	6.8
Main Influent, 2017 (mgd)	6.3	6.6
Main Influent, 2018 (mgd)	6.5	7.1
Plant Drain Stations (mgd)(1)	3.2	4.4
Main Influent Loads(3)		
Main Influent $cBOD_5$ (lb/day)	8,640	12,380
Main Influent TSS (lb/day)(2)	8,180	17,810
Main Influent TKN (lb/day)	2,600	3,050
Drain Station Loads(1)		
Drain Station $cBOD_5$ (lb/day)	3,400	4,840
Drain Station TSS (lb/day)	4,770	8,730
Drain Station VSS (lb/day)	4,700	8,320
Drain Station TKN (lb/day)	1,070	1,450

Notes:
(1) Based on sampling data, May 2018 - January 2019.
(2) Influent monitoring did not include VSS. VSS assumed as 80% of TSS for modeling.
(3) Based on historical sampling of raw influent, not including drain stations.

As can be seen from the table, the plant drain stations exert a significant load on the total influent treated by the biological treatment processes, adding an additional 39 percent $cBOD_5$ load and an additional 41-47 percent TKN load. The plant drain stations also pump significant flow to the headworks, 49-62 percent of the influent flow. These additional flows and loads, which are not accounted for in the influent design criteria described in Table 2, have a significant effect on the overall capacity of the plant.

In the Master Plan effort conducted for the County in 2016, Carollo predicted the future annual average daily flows for the Southeast service area of Manatee County, based on anticipated level of service. Table 6 contains the annual average daily wastewater flows through the year 2035, as predicted by the 2016 Water Reclamation Facility Master Plan.

Table 6 Projected Wastewater Flows - 2016 Water Reclamation Facility Master Plan

Year	Annual Average Wastewater Flow (mgd)(1)
2014	6.68
2015	8.24
2020	9.09
2025	9.95
2030	10.80
2035	11.66

Notes:
(1) Annual average flows were developed using 85 gpcd wastewater flow Level of Service (LOS) values revised in May 2015.

Based on the values outlined in Table 6, SEWRF is expected to approach an annual average daily flow of 11.0 mgd by 2030, and exceed by 2035. Per Florida Administrative Code (FAC) Rule 62-600.405, planning and preliminary design of necessary plant expansions should begin five years before the anticipated exceedance of the plant's 11.0 mgd TMRADF capacity. A permit application for the necessary expansion should be submitted to FDEP three years before the anticipated exceedance of capacity.

Section 3

BIOLOGICAL MODELING

To evaluate the biological treatment capacity Manatee SEWRF, Carollo conducted process modeling of the system using both spreadsheet-based modeling and the commercial process simulation program BioWin® Version 6.0, from EnviroSim Associates Ltd. Based on the combined results of these modeling approaches, the study concluded an estimated capacity of the existing biological treatment process based on process volume, configuration, operation, and aeration capacity.

3.1 Modeling Data and Assumptions

The process modeling was conducted using existing data on plant secondary treatment processes, historical data, and prior studies conducted on the SEWRF biological treatment system. For the process modeling, a number of simplifying assumptions were made, including the following:

- Modeling would be conducted on the basis of total influent load, combining loadings from main influent flows and drain station flows.
- The impact of the drain station would be accounted for using the maximum monthly average flow and load. This provides a conservative estimate of sidestream impacts.
- Plant mechanical aerators assumed to meet the standard oxygen transfer rate (OTR) of 2.2 lb O_2/hp-hr specified in prior studies at SEWRF, and an alpha value of 0.85.
- Influent concentrations assumed to remain constant in the future.
- Biological capacity analysis assumes all trains and aerators in service, unless otherwise specified.
- All biological modeling conducted at steady state.
- RAS/WAS/IMLR pumping capacity assumed to be sufficient for future demands.
- Flow assumed to split evenly among three treatment trains.
- Clarifier capacity analysis assumes all clarifiers in service.
- For clarifier capacity, a 92nd percentile SVI of 150 mL/g was used, for conservatism.
- All SRT calculations based on aerobic SRT.

3.2 BioWin® Model

A BioWin® model was developed based on the existing secondary treatment basin volumes and operational configurations. Figure 2 shows the layout of the BioWin® model. Given that the two northern oxidation ditches are geometrically identical, their volumes were combined and modeled as a single train (Train A). The southern oxidation ditch (Train B) is configured in a Carrousel® format, and operates slightly differently from the two northern trains.

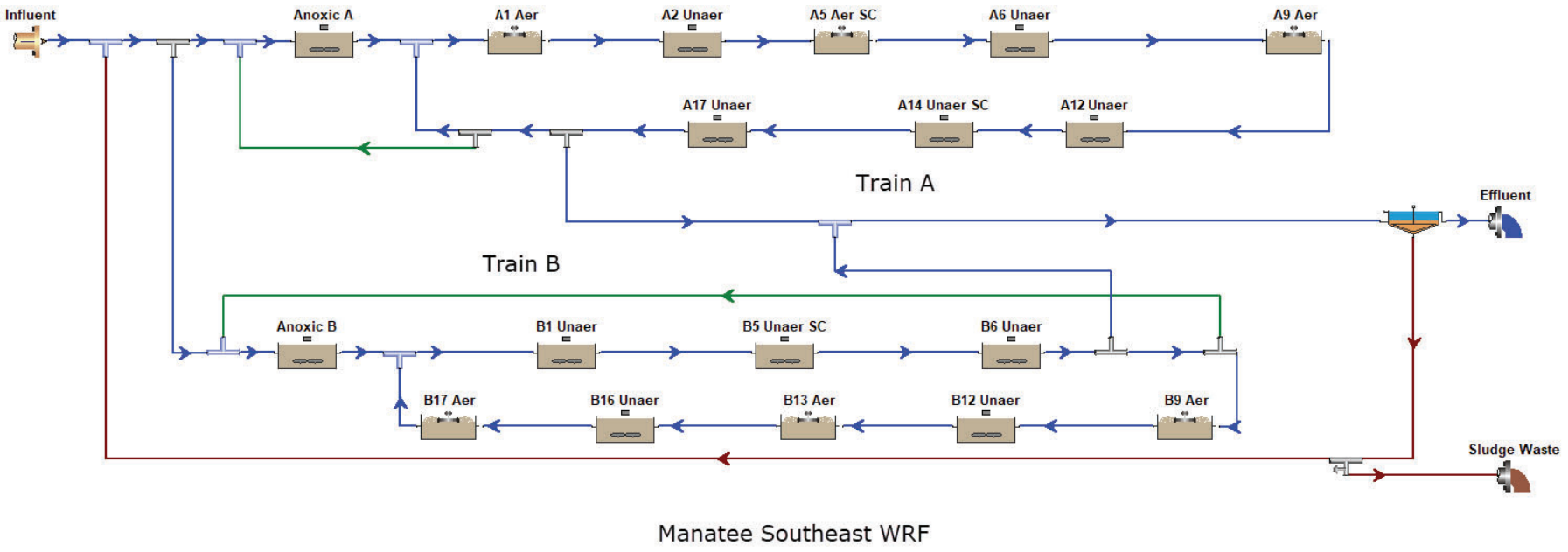


Figure 2 Manatee SEWRF BioWin® Model

To account for the influence of the plant sidestreams, a set of combined influent conditions for the simulation was generated from the data based on maximum three month rolling average conditions (75th percentile) for the main influent data and maximum monthly average data for the plant drain station flows. This corresponds with the existing permit requirements to meet a Three Month Rolling Average Daily Flow (TMRADF) limit. Operational conditions were selected based on average historical operations data and feedback from plant staff. The simulation influent and operational conditions are detailed in Table 7.

Table 7 BioWin® Simulation Conditions

Parameter(1)	Unit	Value
Influent Flow	mgd	6.6
Sidestream Flow	mgd	4.15
Total Modeled Flow	mgd	10.75
BOD_5(2)	mg/L	191
TSS	mg/L	211
VSS	mg/L	179
TKN	mg N/L	46
TP	mg P/L	8
Alkalinity	mg/L as $CaCO_3$	330
Temperature	°C	25
RAS Ratio	%	120%
Train A IMLR	%	250%
Train B IMLR	%	350%

Notes:
(1) Composite concentrations for BOD_5, TSS, VSS, and TKN, based on combined influent and sidestream flows and loads.
(2) BOD estimated as 120% $cBOD_5$.

The BioWin® model was calibrated based on historical data to predict observed yield, mixed liquor concentration, and nitrogen removal performance in the historical loading and operations data from SEWRF. The model was then run at the specified conditions across a variety of SRT conditions to predict plant nitrogen removal performance and yield at various SRT and mixed liquor values.

From this modeling effort, an expression for Specific Denitrification Rate (SDNR), i.e. the mass of nitrate removed per unit mass of active biomass, was developed based on the food-to-mass ratio (F/M) of the plant. Figure 3 shows SDNR values calculated from the BioWin® modeling effort, and the estimated SDNR expressions for the assumed operating temperature (25°C) and standard temperature (20°C). For conservatism, the SDNR expression for standard temperature is used in this study.

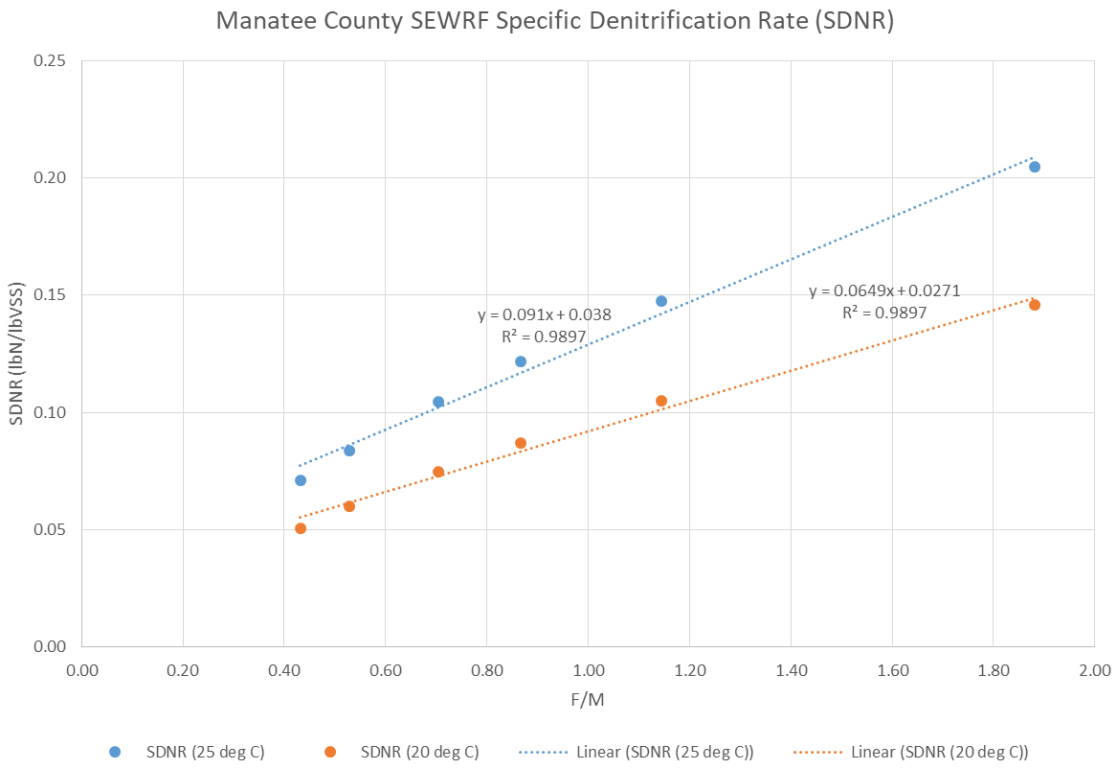


Figure 3 Manatee SEWRF Specific Denitrification Rate (SDNR)

The SDNR expressions shown in Figure 3 may be used to estimate the rate of denitrification at a given F/M and active anoxic biomass. Because the aerobic reactors at the SEWRF are configured as oxidation ditches, simultaneous nitrification-denitrification (SNDN) likely occurs in the "aerobic" volume of the process as well, which is not accounted for in the SDNR calculation. As a result, the denitrification performance calculated using the SDNR expression is a conservative estimate. In the following sections, this calculation is used to estimate the denitrification performance of the SEWRF over a range of operating conditions.

While the SEWRF currently operates under a permit limit of 12 mg N/L total nitrate, the County prefers to maintain performance below 10 mg N/L total nitrogen (TN). In a typical domestic wastewater treatment plant effluent, TN includes any nitrate that is not removed in the denitrification step(s) of the process, as well as the effluent TKN, which consists of unoxidized ammonia, refractory nitrogen that is not removed in the biological treatment process, and the nitrogen content of the effluent TSS. Based on historical data and typical values for refractory nitrogen and unoxidized ammonia, the total effluent TKN of 1.7 mg N/L was assumed. Thus, to meet the desired effluent quality of 10 mg N/L TN, the SEWRF will have to achieve 8.3 mg N/L effluent nitrate.

Because alkalinity data was not available for the sidestream flows, the model assumed an alkalinity concentration in the sidestream equal to that of the main influent. The model showed that this alkalinity was sufficient to provide nitrogen removal to match historical plant performance. The County has expressed concern that influent alkalinity may decline in the future, although this may be offset by the addition of magnesium hydroxide for odor control in the collection system. It is recommended that the alkalinity of both the sidestreams and the

main influent be measured regularly, to ensure that the total alkalinity input to the process remains sufficient for nitrogen removal. The simulation used an influent alkalinity of 330 mg/L as $CaCO_3$ based on the limited alkalinity data available. Nitrification consumes 7.14 mg of alkalinity as $CaCO_3$ per mg NH_3-N nitrified and denitrification produces 3.57 mg alkalinity as $CaCO_3$ per mg of NO3-N denitrified. It is desirable to maintain a minimum alkalinity of 50 mg/L as $CaCO_3$ in the final effluent to buffer the water. The simulation used 46 mg/L as the influent TKN concentration. Using a conservative assumption that 100 percent of the ammonia is nitrified and an effluent nitrate concentration of 10 mg/L (a high value is used to be conservative) an alkalinity concentration in the influent flow equal to 250 mg/L as $CaCO_3$ is required.

3.3 Existing Biological Treatment Capacity

Based on the yield values calculated at various SRT values using the BioWin® modeling efforts, a biological treatment capacity curve was developed to show the effect of various target SRT on plant capacity for the existing aerobic process volume of 8.84 Mgal. This capacity curve, shown in Figure 4, plots mixed liquor curves at various SRT, based on a specified net yield and BOD_5 removal, as well as clarifier capacity, assuming the historical 92nd percentile SVI of 150 mL/g. The intersection of these curves represents the maximum AADF capacity of the plant's secondary treatment system at various SRT. Historically, Manatee SEWRF has operated at aerobic SRT of 25-70 days.

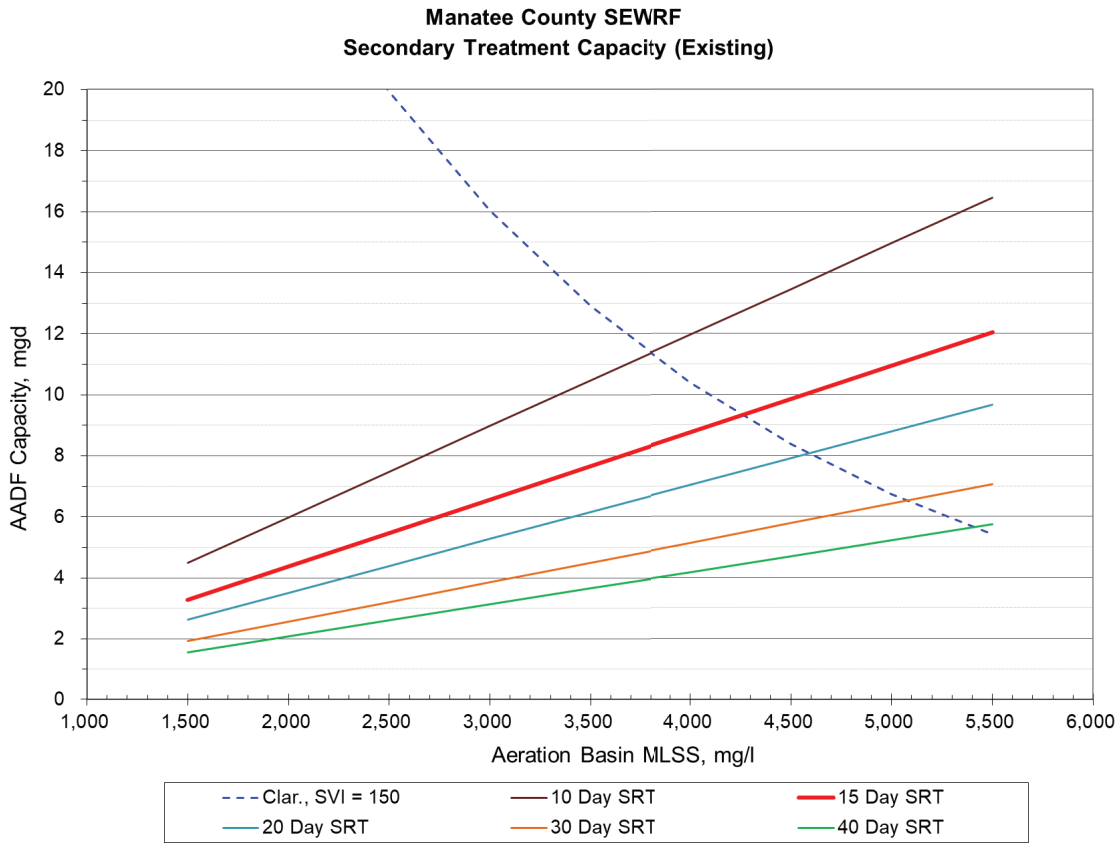


Figure 4 Manatee SEWRF Secondary Capacity and SRT - Existing Biological Volume (3 Trains)

As can be seen from Figure 4, with the existing aerobic volume, an SRT of 10 days and a mixed liquor of 3,800 mg/L MLSS is required for the SEWRF to meet an AADF capacity of approximately 11.4 mgd for BOD_5 removal and nitrification. In the 2018 biological capacity analysis, Carollo recommended that an SRT in the range of 15 days would be sufficient to meet permit limits and design treatment capacity, but this analysis had very little available historical data on the loads exerted by the plant drain station flows. As discussed in section 2.3, these flows exert significant load on the biological process, which in turn reduce the overall capacity. At SRT higher than 10 days, the plant will likely not be able to meet permitted capacity without the construction of additional biological treatment volume.

Because the capacity curves in Figure 4 only consider BOD_5 removal, nitrification and clarifier capacity for the biological process, a separate calculation is required to determine the denitrification performance of the plant at a given SRT and mixed liquor condition, using the SDNR expression developed in section 3.2. Table 8 shows the capacities calculated for the existing biological system across a range of SRT, as shown in Figure 4, and their corresponding denitrification performances. The influent loadings for Table 8 include both domestic influent and sidestreams.

Table 8 Manatee SEWRF Biological Treatment Capacity - Existing Biological Volume (3 Trains)

Aerobic Volume (Mgal)	Aerobic SRT (days)	Capacity (mgd)	MLSS Required (mg/L)	Capacity, One Basin Down (mgd)	MLSS Required, One Basin Down (mg/L)	Class I Reliability (1)	Effluent TN, (mg N/L) (2)
8.84	10	11.4	3,796	8.7	4,417	Y	17.0
8.84	15	9.3	4,252	7.0	4,897	N	14.4
8.84	20	8.1	4,585	6.1	5,246	N	11.6
8.84	30	6.5	5,074	4.9	5,755	N	5.6

Notes:
(1) Class I Reliability is defined as the capacity to meet 75% of permitted AADF with one train out of service.
(2) Assumes effluent TKN of 1.7 mg/L, including refractory nitrogen and unoxidized ammonia.

As can be seen from Table 8, while an SRT of 10 days with the existing biological treatment volume is sufficient to meet secondary treatment capacity for the permitted flow of 11 mgd TMRADF, it is not sufficient to meet the desired 10 mg N/L TN, although with some operational adjustments to target SNDN in the aerobic basins, the permitted 12 mg N/L total nitrate effluent quality may be achieved. In order to achieve the desired denitrification performance, an SRT over 20 days is required, which limits the secondary treatment capacity of the plant to less than 8 mgd AADF. Operation of the plant at very low SRT also poses operational challenges and exerts higher loads on the plant solids handling system, as will be discussed in section 3.6.

The limitation of plant capacity for the existing biological system is due primarily to the significant additional loadings imposed by the plant drain station flows. These additional loads are equivalent to 2.5-3 mgd of additional influent domestic wastewater to the plant. Additionally, because influent TKN concentrations have been increasing gradually in recent years, beyond the original design concentration of 40 mg N/L, it is likely that the existing anoxic basins are undersized for the current nitrogen load, limiting denitrification at higher flows.

Further evaluation of the plant drain station flows and loads is required to refine the evaluation of the impacts to the biological process. For this analysis, the BOD_5 removal required in the biological process was calculated based on an effective load exerted by the combination of the maximum month influent BOD_5 load and the average drain station BOD_5 load. This combination of loads was chosen assuming that the maximum month conditions for the influent and drain station loads do not occur simultaneously. Some uncertainty exists on this point due to the varied sidestream sources and the limited historical data available. If the maximum month BOD_5 conditions for both the influent and the drain station coincide, the result will be a higher load and further reduced capacity. Appendix B contains capacity curves calculated assuming this condition.

3.4 Potential Expansion of Biological Treatment Capacity

Based on the results from sections 3.3, it is apparent that the existing biological treatment facilities at the SEWRF face potential limitations in treatment volume, particularly at the longer SRT required to achieve the desired denitrification performance. Additionally, even at shorter SRT, when flows approach capacity the existing facilities may encounter operational difficulties or insufficient capacity if one train is taken offline. To mitigate these concerns and to allow for operation at longer SRT, the County requested that the biological capacity analysis be conducted with an expanded biological treatment volume, specifically by the addition of a fourth oxidation ditch of similar design to the existing basins. Figure 5 shows the resulting capacity curves.

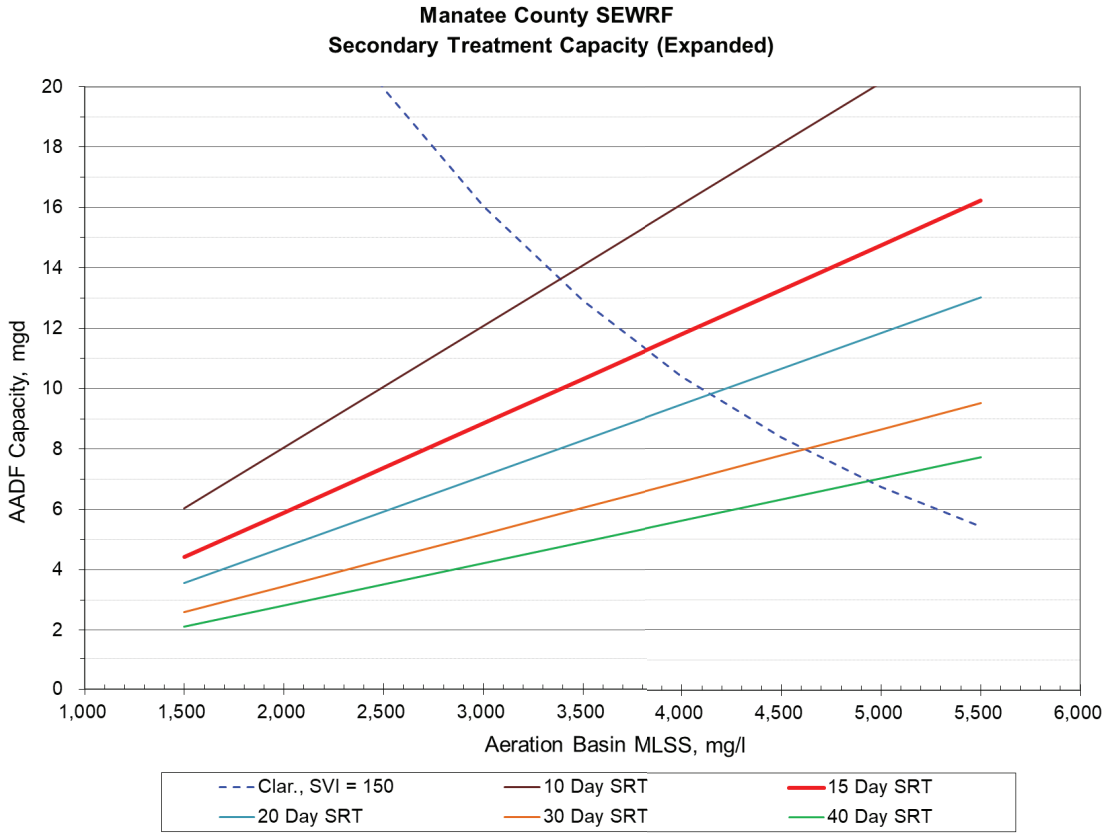


Figure 5 Manatee SEWRF Secondary Capacity and SRT - Expanded Biological Volume (4 Trains)

Table 9 shows the predicted treatment capacity of the SEWRF with expanded biological treatment, as well as the estimated effluent TN. For the expansion, an additional ditch of identical size to the southernmost train was assumed. The influent loadings for Table 9 include both domestic influent and sidestreams.

Table 9 Manatee SEWRF Biological Treatment Capacity - Expanded Biological Volume (4 Trains)

Aerobic Volume (Mgal)	Aerobic SRT (days)	Capacity (mgd)	MLSS Required (mg/L)	Capacity, One Basin Down (mgd)	MLSS Required, One Basin Down (mg/L)	Class I Reliability(1)	Effluent TN, (mg N/L)(2)
11.9	10	13.6	3,379	11.4	3,796	Y	17.0
11.9	15	11.3	3,817	9.3	4,252	Y	14.4
11.9	20	9.8	4,137	8.1	4,585	N	11.6
11.9	30	8.0	4,610	6.5	5,074	N	5.5

Notes:
(1) Class I Reliability is defined as the capacity to meet 75% of permitted AADF with one train out of service.
(2) Assumes effluent TKN of 1.7 mg/L, including refractory nitrogen and unoxidized ammonia.

As can be seen from the table, the addition of a fourth biological treatment train of equal size allows operation at up to 15 days SRT while maintaining secondary treatment at 11 mgd AADF. However, this SRT is still not sufficient to achieve the desired denitrification performance to maintain 10 mg N/L TN. At a 15 day SRT, however, the plant can likely meet design flows while maintaining the permitted effluent total nitrate of 12 mg N/L. Alternatively, operation of an expanded system at an SRT of 10 days will expand capacity such that the desired denitrification to an effluent TN of 10 mg N/L may be achieved at 11 mgd AADF. As discussed in section 3.6, however, operation at such a short SRT will result in potential loading problems to the solids handling system.

Because of the significant sidestream loads and limited anoxic volume, a longer SRT is required to achieve the County's desired denitrification performance. This may be mitigated in a number of ways, including the addition of supplemental carbon to the anoxic zones or operation of the aerobic zones to encourage SNDN. Alternatively, the anoxic volume may be expanded.

Given that an expansion of biological treatment volume is likely necessary to meet design capacity and given the County's desire to achieve denitrification to 10 mg N/L TN at an SRT similar to historical operations, it is recommended that the biological process be expanded with the addition of a fourth treatment train. Additionally, it is recommended that expansion of the total anoxic volume be evaluated to increase the denitrification capacity, and that operational options like the addition of supplemental carbon (to increase the specific denitrification rate in the anoxic basins) and targeting of SNDN in the aerobic zones be considered to further encourage nitrogen removal. Appendix C shows the results of a high-level analysis of some of these options, but a detailed analysis and modeling effort is recommended for final configuration selection and sizing.

As in section 3.3, the capacity curves for the expanded biological process were also calculated assuming the maximum month BOD_5 conditions for both the influent and the drain station coincide, resulting in a higher load. Appendix B contains capacity curves calculated assuming this condition.

3.5 Aeration Capacity

The capacity analysis also considered the available aeration system capacity to determine if the SEWRF would have sufficient aeration capacity to meet demands with the existing 125 hp mechanical surface aerators. Aeration capacity was calculated for spatial average dissolved oxygen (DO) saturation concentrations of both 2 mg/L DO and 1 mg/L DO, as would be maintained for average and peak flow conditions, respectively. The aeration capacity was also calculated with one aerator and one train out of service. Historic maximum day demands were calculated based on the calculated daily influent oxygen demands plus the maximum monthly average oxygen demands from the drain station flows. Table 10 details the results of the aeration system capacity analysis, while Table 11 shows the estimated existing and design demands.

Table 10 Manatee SEWRF Aeration System Capacity, Actual Oxygen Requirement (AOR)

Parameter	Unit	Value
Total Oxygen Supply (1 mg/L DO):	lb O_2/day	44,800
Total Oxygen Supply (2 mg/L DO):	lb O_2/day	38,500
Supply with 1 Aerator Out of Service (1 mg/L DO):	lb O_2/day	39,800
Supply with 1 Aerator Out of Service (2 mg/L DO):	lb O_2/day	34,300
Supply with 1 Train Out of Service (1 mg/L DO):	lb O_2/day	29,900
Supply with 1 Train Out of Service (2 mg/L DO):	lb O_2/day	25,700

Table 11 Manatee SEWRF Estimated Oxygen Demands, Actual Oxygen Requirement (AOR)

Parameter	Unit	Value
Historic Maximum Day Total Demand:	lb O_2/day	36,900
Design Average Day Total Demand (11 mgd):	lb O_2/day	39,100
Design Maximum Day Total Demand (11 mgd):	lb O_2/day	63,100

Note that in Table 10 a lower DO concertation results in a greater available AOR. This is because as the DO concentration is reduced, more oxygen is available for biochemical oxidation and less is "wasted". As can be seen from Tables 10 and 11, while the existing aerator capacity is sufficient for current maximum day demands and design capacity average day total demands, at design capacity max day, the plant will experience a deficiency of approximately 18,300 lb O_2/day with all aerators in service, 23,300 lb O_2/day with one aerator out of service, and 33,200 lb O_2/day with one train out of service. This deficiency will have a number of consequences as flows increase, including potential restriction of $cBOD_5$ removal and the production of nitrite due to incomplete nitrification. Nitrite accumulation is a concern because while the effluent limit of 12 mg N/L nitrate (and the lower concentrations required to achieve 10 mg N/L TN) is unlikely to impact plant performance, significant nitrite production significantly increase downstream chlorine demands. Consequently, the aeration system will require expansion in the future, possibly in conjunction with the expansion of the biological treatment volume, as discussed earlier. Section 5.3 will address this need.

3.6 Sludge Handling Capacity

At Manatee SEWRF, WAS is pumped to two gravity belt thickeners for thickening and transferred to two aerated sludge holding tanks operated in series. The County noted that under normal operations it is preferred that the SHT be maintained at approximately 2.5 percent solids and 50 percent capacity, to ensure sufficient aeration of the sludge and provide effective treatment to meet the requirements of the downstream dewatering processes. After holding, the sludge is dewatered using three belt filter presses and then transferred to the biosolids treatment facility located onsite. There, the biosolids are either dried with a direct heat dryer to produce a Class A product or trucked to the County's Class I solid waste landfill (Lena Road Landfill). Table 12 details the existing sludge handling capacities for the SEWRF. All data on the solids handling system capacity was drawn from a study of the system conducted by Carollo in 2018.

Table 12 Manatee SEWRF Sludge Handling Capacity

Element	Value
Gravity Belt Thickeners (GBT)	
Solids Loading Rate (SLR), per GBT(1)	1,000 - 3,000 lb/hr
Hydraulic Loading Rate (HLR), per GBT(2)	500 gpm
Aerated Sludge Holding Tanks (SHT)	
Total Sludge Holding Volume	2,000,000 gallons
Supplied Air	45 scfm/1,000 cu ft of sludge volume(3)
Belt Filter Presses (BFP)	
SLR per BFP(4)	1,200 lb/hr (28,800 lb/day)
HLR per BFP(5)	96 gpm

Notes:
(1) Facility has 2 GBT units, each with an SLR between 1,000 to 3,000 lb/hr. These were based on design criteria at feed of solids of 0.5% and 1.5%, respectively.
(2) Manufacturer data, 250 gpm/m and 2 m belts.
(3) Supplied air exceeds the minimum of 30 cfm/1,000 cu ft of sludge volume recommended in the Ten State Standards (2004).
(4) Facility has 3 BFP units, each with an SLR of 1,200 lb/hr.
(5) Based on a SLR of 1,200 lb/hr and solids content of 2.5%.

Because changing SRT results in a change in the WAS produced by the system and therefore the load on the plant solids handling systems, the expected WAS production, flow to the GBT, flow to the SHT, and the hydraulic retention time (HRT) of the SHT were calculated for each capacity condition discussed in Tables 8 and 9, for three and four trains of biological treatment, respectively. These values, shown in Table 13, were checked against the capacity of the existing solids handling systems at Manatee SEWRF.

Table 13 Manatee SEWRF Biological Treatment Capacity

Basins[1]	Aerobic SRT (days)	Overall Capacity (mgd)	WAS (lb/day)	WAS TSS (mg/L)	Flow to GBT (gpm)[2]	Flow to SHT (gpm)[3]	SHT HRT (days)[4]
4	10	13.6	33,600	6,200	451	95	7.0
4	15	11.3	25,300	7,000	300	71	9.3
4	20	9.8	20,600	7,600	225	58	11.5
4	30	8.0	15,300	8,500	150	43	15.4
3	10	11.4	28,000	7,000	335	79	8.4
3	15	9.3	20,900	7,800	223	59	11.3
3	20	8.1	16,900	8,400	167	48	13.9
3	30	6.5	12,500	9,300	112	35	18.9

Notes:
(1) Additional basin sized at 3.06 Mgal aerobic volume, identical to the existing southern train.
(2) Assumes 24/7 operation of the GBT.
(3) Assumes 85% solids capture for GBT, 2.5% solids to SHT.
(4) Assumes SHT held at 50% capacity.

WAS production in Table 13 was based on the MLSS and SRT determined in the capacity analyses in sections 3.3 and 3.4. WAS concentration was assumed to be equal to RAS concentration and was calculated based on a historical average RAS ratio of 1.2. Based on this calculation, the expected future maximum monthly average WAS production for the existing biological treatment system at 10 day SRT, as would be required to achieve secondary treatment at design capacity, was estimated to be approximately 28,000 lb/day, with a WAS concentration of 7,000 mg/L and a flowrate to the GBT system of 335 gpm. If the biological treatment system is expanded and a longer SRT of 15 days is chosen, a WAS production of 25,300 lb/day at a concentration of 7,000 mg/L and a flow of 300 gpm is expected. While these flows are within the manufacturer's provided hydraulic capacity of 500 gpm per GBT, the County has indicated that they prefer to run their GBT at 200-250 gpm per press. Likewise, while this calculation assumes 24 hours per day, 7 days per week operation, the County has expressed a preference to operate their GBT for 14-16 hours per day, 7 days a week. Under these conditions, the required flows to the GBT would increase to 450-500 gpm per press. Consequently, as flows increase to design capacity, the County should evaluate the operation of the GBT system and possibly consider the addition of another GBT.

The County currently operates their SHT in series, limiting the sludge concentration to 2.5 percent solids and the sludge level in each of the two tanks to 50 percent capacity. Plant staff have noted that operating at higher sludge concentrations and depths restricts the aeration of the holding tanks. Based on these operating conditions, the HRT of the SHT is expected to be 8-10 days at max month WAS production for design flows.

The existing BFP are operated 4-5 days per week, 12-14 hours per day, and have a solids loading capacity of 1,200 lb/hr each, for a total solids loading capacity of 2,400 lb/hr with one BFP out of service. Assuming no solids reduction in the SHT and based on this operating schedule, it is expected that the SEWRF BFP will receive a load of 2,380 lb/hr for the design flows to the existing biological treatment system at a 10 day SRT. With the addition of another biological treatment train and a 15 day SRT, the load to the BFP is expected to be 2,150 lb/hr. These loads are within the current capacity of the existing BFP system, and given that the County is already planning the addition of a fourth BFP to the system, it is unlikely that this step of the solids handling process will limit operations at design flows.

The evaluation of the SEWRF solids handling system has been conducted, in this study, assuming the operating SRT has been significantly shortened in order to meet secondary treatment standards at the design capacity of 11 mgd TMRADF, either with the existing biological treatment volume or with the addition of one additional treatment train of identical size. If, however, the existing biological treatment system is expanded beyond what has been considered in this study, and a longer SRT is selected to provide enhanced nitrogen removal, the resulting solids production and dewatering requirements should be reevaluated.

Section 4

HYDRAULIC PROFILE

The master plan study conducted by Carollo in 2016 included the study of a hydraulic profile for Manatee SEWRF. Water surface elevations were calculated for peak hourly flow (PHF) of 29.87 mgd (29.15 mgd of influent flow in 2035 and 0.72 mgd from future water treatment plant) and RAS flow of 11.7 mgd. This represents a PHF of 2.7. Because the results of this capacity analysis do not recommend any expansion of permitted capacity, this study concludes that the 2016 Master Plan hydraulic analysis results and recommendations are still current, and no additional hydraulic analysis is required until plant expansion is necessary.

Section 5

SUMMARY AND CONCLUSIONS

Manatee SEWRF currently operates at very high SRT and receives a number of significant loadings in addition to raw wastewater from the municipal service area that the facility was originally designed to serve. These loads include:

- Leachate from the Lena Road Solid Waste Landfill.
- Scrubber water from the Manatee County biosolids dryer.
- Trucked wastes, including septage, FOG (fats, oils, and grease), and portable toilet wastes.
- Filtrate from thickening and dewatering of waste sludge.
- Filtrate from on-site tertiary filters.

As a result of these impacts, the plant currently encounters operational issues and is unable to meet permitted capacity. This study conducted a biological treatment capacity evaluation to determine the impacts of the sidestream loads under current operating conditions, and to provide recommendations for operational changes and process expansion to meet future demands.

5.1 Plant Capacity under Current Operations

Based on the capacity analysis under various SRT conditions (Figure 4), the current average targeted aerobic SRT of 20-30 days, combined with the additional loads imposed by the sidestream flows, restricts the biological treatment capacity of the SEWRF to approximately 6-8 mgd AADF. This is due, to a great extent, to the additional BOD and TKN load imposed by the sidestream flows, in addition to the already high mixed liquors generated by operating at long SRT. Assuming that the sidestream loads continue to increase proportionally to the influent, these will be a significant limiting factor on the SEWRF biological treatment capacity. Reducing the SRT to 10 days will allow the SEWRF to meet secondary treatment for the permitted capacity of 11 mgd TMRADF, but under these operating conditions the plant will not be able to meet the desired 10 mg /L effluent TN. Additionally, the existing biological treatment volume does not currently provide operational flexibility for taking one train offline while maintaining performance, a problem which will worsen as flows increase.

The study found that the existing aeration system could provide sufficient aeration capacity to meet maximum day oxygen demands under current load conditions, including the additional loads imposed by the sidestream flows. Thus, for current operations, aeration is not a limiting factor. Aeration will become limiting as flow increases. At maximum day oxygen demands for permitted capacity, the aeration system will not be able to meet the predicted oxygen demands, and supplemental aeration will be required to meet permit limits. Section 5.3 discusses this further.

The plant hydraulics had been evaluated in the 2016 Master Plan that Carollo had conducted for Manatee County. Because this study does not recommend any increased in permitted capacity, the conclusions and recommendations from the 2016 Master Plan hydraulic evaluation remain valid.

5.2 Recommendations for Operational Changes

The Review of Master Plan Capacity Estimate conducted by Carollo in 2018 noted that because SEWRF is a nitrogen removal facility, the activated sludge process must be operated to a certain minimum aerobic SRT, but that the historical targeted SRT of 30-70 days was much greater than this minimum, and was resulting in a limitation on available plant capacity. To recover this lost capacity, the report recommended a 15 day total SRT, but also that an evaluation of the impacts of sidestream loads on the biological treatment process be evaluated, as these may not have been adequately captured in the initial analysis, due to a lack of historical data. This evaluation of sidestream impacts was conducted in this study.

Based on process modeling of the biological treatment system and the evaluation of the additional loads imposed by the existing sidestream flows (see Table 8), the current biological treatment system has an overall capacity of 8 mgd at a 20 day SRT. If the SRT is reduced to 10 days, secondary treatment can be accomplished at design flows, but BNR performance will be limited, presenting difficulties meeting the targeted effluent TN of 10 mg N/L without operational changes to encourage nitrogen removal. This approach also places significantly increased loads on the plant sludge handling system while reducing operational flexibility and redundancy. In the immediate future, Carollo recommends reduction of SRT to provide some additional capacity as flows increase. To meet design flows of 11 mgd TMRADF, expansion of the biological treatment volume or the addition of supplemental carbon is required.

As a result of the increased influent TKN in recent years combined with the additional TKN load imposed by the sidestream flows, the BNR process at the SEWRF is likely limited by the available anoxic volume. Some operational changes may be implemented to encourage better denitrification performance. The addition of supplemental carbon to the anoxic basins will drive the SDNR higher, allowing for more denitrification. A high-level denitrification capacity analysis showed that with the existing biological treatment volume and the addition of supplemental carbon, the SEWRF would have an AADF capacity of 9.3 mgd operating at a 15 day SRT, and 11.4 mgd at 10 day SRT, while meeting the target effluent TN of 10 mg N/L. See Appendix C for more details. The addition of supplemental carbon may also have other process effects, including increased aeration demands, increased solids production, and increased mixed liquor concentration. A more detailed analysis of the plant denitrification capacity and performance is recommended before implementation of supplemental carbon.

As has been discussed, the total volume of the existing anoxic basins limits the denitrification performance of the biological treatment system. Expansion of these basins will increase the total anoxic biomass in the system and therefore increase denitrification. As shown in Appendix C, a 100 percent increase in anoxic volume will provide the same improvement to denitrification performance as the addition of supplemental carbon, allowing for a plant capacity of 9.3 mgd AADF at a 15 day SRT while meeting the target effluent TN of 10 mg N/L, or 11.4 mgd AADF at a 10 day SRT. It should be noted that for either the addition of supplemental carbon or the expansion of the anoxic basins, the internal mixed liquor recycle rate in the plant should be increased to 400 percent raw influent flow, to prevent limitation of denitrification performance.

Denitrification performance may also be enhanced by targeting SNDN in the aerobic basins by adjusting the target DO, although determining the denitrification performance of this measure will require more calibrated modeling efforts than is within the scope of this study.

As has been discussed, the impact of the sidestream flows represents a significant additional load on the biological treatment process, equivalent to an additional 2.5 to 3 mgd of domestic wastewater flow. Further monitoring and validation of these flows and loads is recommended, given the restriction they place on plant capacity. It is recommended that future operations continue to monitor and evaluate these sidestream flows to validate the current historical data and determine the relative contributions of each of the sidestream flows to the overall load. This monitoring and evaluation should be carried out prior to the expansion of the biological treatment volume to ensure that the expansion is sized correctly. If applicable, capital and operational solutions to mitigate the impacts of the sidestream loads on the main process should be considered.

5.3 Recommendations for Expansion

Because of inability of the existing biological treatment volume to meet permit limits at the design flow of 11 mgd TMRADF, the study conducted an evaluation of the potential for expanding the biological treatment volume (see Table 9). Based on this evaluation, the addition of a fourth biological treatment basin, equal in size to the existing southern basin, would likely be able to treat the permitted capacity of 11 mgd TMRADF and meet the permitted effluent nitrate limit of 12 mg N/L assuming a 15-day SRT. At this SRT the plant will likely not be able to achieve the County's desired denitrification performance or achieve an effluent TN of 10 mg N/L. A number of options exist to increase denitrification performance, as discussed in section 5.2. Some of these options were also evaluated for the addition of a fourth treatment train (see Appendix C).

If the biological treatment process is to be expanded with the addition of a fourth treatment train, Carollo recommends that this train be sized appropriately for the desired capacity at the desired operating SRT. Additionally, it is recommended that expansion of the total anoxic volume be evaluated to increase the denitrification capacity. A high-level denitrification capacity analysis indicates that a 100 percent increase in total anoxic volume (including that of the fourth treatment train) provides 11.3 mgd AADF capacity at a 15 day SRT and 13.6 mgd AADF capacity at a 10 day SRT, while meeting the target effluent TN of 10 mg N/L. If the expansion includes the addition of another clarifier, a capacity of 14.9 mgd AADF may be achieved at a 10 day SRT. This capacity and denitrification performance may also be achieved with the addition of supplemental carbon while maintaining the existing anoxic/aerobic ratio in all four treatment trains. See Appendix C for more details. As in section 5.2, increasing the internal mixed liquor recycle rate to 400 percent raw influent flow is recommended in all cases to improve denitrification performance.

Because a number of design parameters for this expansion will have an effect on the overall plant capacity, the relative sizes of the aerobic and anoxic volume, and ensuring reliability and redundancy in the system, it is recommended that a more detailed analysis be conducted for the expansion of the biological system to ensure that an effective configuration is selected and that the new components are sized correctly. As discussed in section 5.2, a detailed evaluation of the impacts and variations in the sidestream loads is critical to correctly sizing any expansions in the future.

The study also conducted an evaluation of the existing aeration system and found that while the existing aerators could provide sufficient capacity, with one aerator out of service, to meet oxygen demands at historical maximum day flows, it did not have enough capacity to meet the predicted maximum day demands at design capacity (see Table 11). At maximum day design conditions, with one aerator out of service, the SEWRF will require an additional 23,300 lb O_2/day. To meet this demand, Carollo recommends either expansion of the existing mechanical aeration capacity, or the addition of fine bubble diffused aeration to supplement the existing mechanical aerators. Carollo has provided a conceptual capacity and cost for a diffused aeration system expansion for the County's planning purposes. The selection of supplemental aeration versus new, larger mechanical aerators will require a detailed evaluation.

The addition of fine bubble diffused aeration to the existing biological treatment systems, should the County choose this method of supplemental aeration, will require the installation of diffuser grids on the floor of the existing oxidation ditches, and either a central blower system or individual blowers installed at each oxidation ditch. Table 14 shows the conditions used to estimate the approximate supplementary air demand, based on typical values for fine-bubble membrane disk diffusers and positive displacement (PD) blowers.

Table 14 Manatee SEWRF Supplementary Aeration Requirements

Parameter	Unit	Value
Actual Oxygen Requirement (AOR)	lb/day	23,300
AOR/SOR(1)		0.357
Standard Oxygen Requirement (SOR)	lb/day	65,200
Standard Oxygen Transfer Efficiency (SOTE)(2)	%	22.5
Airflow Required	SCFM	12,000
Discharge Pressure	psig	6.9
Total Blower Horsepower Required(3)	hp	550

Notes:
(1) Assumes alpha of 0.45.
(2) Assumes diffuser submergence of 12.5 ft, SOTE of 1.8% per foot submergence.
(3) Assumes blower efficiency of 60%.

Based on these conceptual demand estimates, the SEWRF will require approximately 550 hp of blower capacity, using PD blowers and fine-bubble membrane disk diffusers. Table 15 develops a conceptual cost estimate for this system. The costs in this table are developed based on capital equipment costs from similar Carollo projects, with multipliers used to estimate site work, piping, electrical, and engineering costs.

Table 15 Manatee SEWRF Supplementary Aeration Conceptual Cost Estimate

Item	Quantity	Value
PD Blowers and Controls	550 hp	$1,427,000
Fine Bubble Diffusers	3600	$126,000
Site Work (5%)	-	$78,000
Yard Piping (15%)	-	$233,000
Electrical (20%)	-	$311,000
Contingency (30%)	-	$466,000
Engineering (12%)	-	$187,000
TOTAL COSTS		**$2,282,000**

As an alternative to purchasing supplemental fine-bubble aeration to cover the aeration deficiency at design maximum day demands, the County could choose to upgrade the existing mechanical surface aeration system. A capital improvements plan (CIP) is scheduled in 2020 to replace the anoxic mixers and aerators for the SEWRF. At this time, the existing aerators may be replaced with higher capacity units with new style impellers that provide more efficient oxygen transfer and are less prone to becoming clogged with rags. Additional horsepower may also be provided if needed to cover the predicted aeration demand, as well as VFD control for more precise process control. If the County chooses to expand the existing biological treatment system by adding a fourth basin, the aeration capacity of the new basin will also contribute to the overall expansion of aeration capacity. Carollo recommends further study into supplying additional aeration capacity to the SEWRF to determine the most cost-effective method for covering the identified deficiency and ensure performance at design capacity, as well as the best timing for this expansion.

5.4 Summary of Recommendations

Based on the analysis of this study and prior studies conducted at the Manatee County SEWRF, Carollo recommends the following actions:

1. The existing biological treatment basins at the SEWRF are unable to meet the permitted 11 mgd TMRADF with the targeted effluent TN of 10 mg N/L, due to restrictions in the existing anoxic volume and denitrification capacity. If the County wishes to maintain the existing biological treatment basins and meet permitted capacity and the desired denitrification performance, the plant aerobic SRT should be decreased to 10 days, and changes should be made to the biological system to enhance denitrification performance, such as the addition of supplemental carbon or the expansion of the existing anoxic volume. Detailed analysis of denitrification enhancement options at the SEWRF is recommended, but a high-level capacity analysis indicates that a 100 percent increase in anoxic volume and increased internal mixed liquor recycle will be sufficient to meet the necessary denitrification performance for 11.4 mgd AADF of capacity at 10 days SRT. Supplemental carbon may be used instead of expanding the anoxic basins to achieve the same performance. If the anoxic basins are expanded, however, supplemental carbon may still be added in the future if nitrogen loads increase, or in the short term to boost performance during construction of the anoxic expansion. See Appendix C for more details.

2. If the County wishes to maintain an SRT longer than 10 days and increase the operational flexibility at the plant, the existing biological treatment system should be expanded by adding a fourth biological treatment train. This expansion should be sized to be sufficient to allow the plant to meet both permit limits and denitrification to 10 mg N/L TN, at a long enough aerobic SRT to allow for ease of operation and prevent overloading of the existing solids handling system. This expansion should also allow for increased operational flexibility and redundancy. If a fourth treatment train is sized identically to the existing trains, modifications should be made to both the new and existing trains to enhance denitrification performance. A 100 percent increase in overall anoxic volume and an increase of the internal mixed liquor recycle rate to 400 percent raw influent flow will provide a capacity of 11.3 mgd AADF at a 15 day SRT and 13.6 mgd AADF at a 10 day SRT, thus providing an overall increase over existing capacity. If a new clarifier is added in addition to these improvements and a 10 day SRT is selected, the overall capacity of the SEWRF may be expanded further to 14.9 mgd AADF, while meeting the targeted effluent TN of 10 mg N/L. Supplemental carbon may also be used to enhance denitrification instead of expanding the anoxic volume. See Appendix C for more details. Detailed analysis of the options for the expansion of the biological treatment system at the SEWRF is recommended.
3. It is recommended that the County continue to monitor the contribution of sidestreams to the total facility pollutant load, and investigate why these sidestream loads constitute such a high percentage of the total load on the biological process. The results of this monitoring should be incorporated in future process analysis and design.
4. A capital improvements plan (CIP) project is scheduled in 2020 to replace the anoxic mixers and aerators. At that time, the County should evaluate replacement of the aerators with higher capacity units with new style impellers that provide more efficient oxygen transfer and are less prone to ragging. Additionally, installing VFDs for these aerators will provide more precise process control. At this time the County should evaluate options for expanding aeration capacity to cover the predicted shortfall as flows approach design capacity, and determine if this shortfall should be remedied by expanding the existing mechanical surface aerator capacity or adding supplemental fine-bubble aeration at a later date. If a fourth biological treatment train is added, the aeration capacity of this train should be included in the overall plant aeration capacity evaluation.

5. A plan to remove accumulated grit and rags from the oxidation ditches on a regular basis should be developed and implemented. Regular cleaning of the anoxic reactors and oxidation ditches is recommended to maintain the capacity of treatment processes. While the capacity analyses in this study assumed that the full constructed volume of biological treatment was available, significant grit accumulation can reduce this operating volume and therefore reduce biological capacity. Carollo recommends one ditch be cleaned per year until experience dictates otherwise. To avoid the operational and capacity limitations posed by taking one full train out of service for cleaning, many utilities have used in-situ grit removal using vacuum cleaning technology, as offered by U.S. Submergent Technologies and other similar companies. This method of basin cleaning would allow for removal of accumulated grit and rags while maintaining full operation of the basin. Manatee County has evaluated this technology and is convinced that it would be ineffective and impractical for the SEWRF. Therefore, improving the headworks grit removal capacity and efficiency should be considered to prevent accumulation of grit in the process basins which reduces the overall plant capacity.

Appendix A

BIOWIN® RUNS

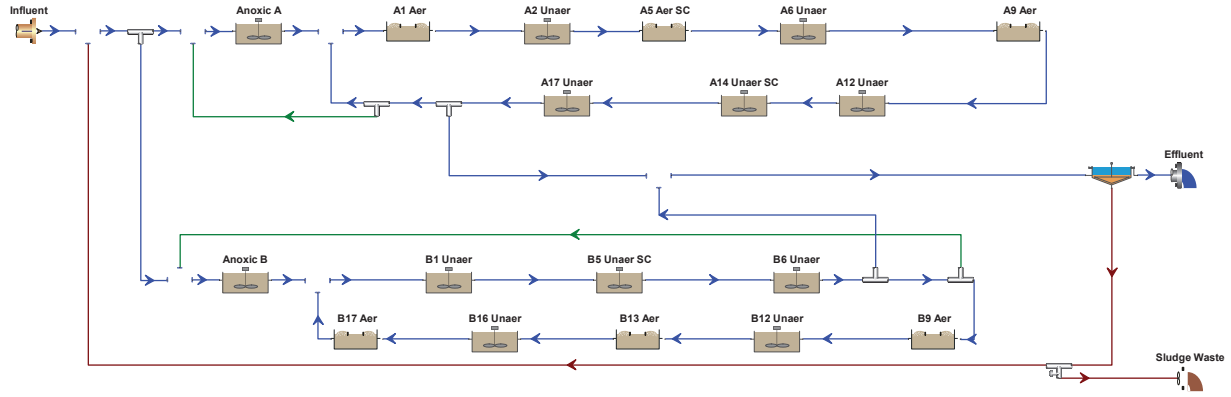
BioWin user and configuration data

Project details
Project name: Manatee County SEWRF Biological Capacity Evaluation
Project ref.: BW1
Plant name: Manatee County SEWRF
User name: ADeVries

Created: 6/21/2019
Saved: 8/8/2019

Steady state solution
Target SRT: 15.00 days
SRT #0: 15.00 days
Temperature: 25.0°C

Flowsheet



Configuration information for all Bioreactor units

Physical data

Element name	Volume [Mil. Gal]	Area [ft2]	Depth [ft]	# of diffusers
Anoxic A	1.0200	1.010E+4	13.500	Un-aerated
Anoxic B	0.5400	5,156.2503	14.000	Un-aerated
A2 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A14 Unaer SC	0.7000	6,931.5848	13.500	Un-aerated
A6 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A12 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A17 Unaer	1.0000	9,902.2639	13.500	Un-aerated
B1 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B5 Unaer SC	0.3600	3,437.5002	14.000	Un-aerated
B6 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B12 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B16 Unaer	0.6000	5,729.1670	14.000	Un-aerated

Operating data Average (flow/time weighted as required)

Element name	Average DO Setpoint [mg/L]
Anoxic A	0
Anoxic B	0
A2 Unaer	0
A14 Unaer SC	0
A6 Unaer	0
A12 Unaer	0
A17 Unaer	0
B1 Unaer	0
B5 Unaer SC	0
B6 Unaer	0
B12 Unaer	0
B16 Unaer	0

Aeration equipment parameters

Element name	k1 in C = k1(PC)^ 0.25 + k2	k2 in C = k1(PC)^ 0.25 + k2	Y in Kla = C Usg ^ Y - Usg in [m3/(m2 d)]	Area of one diffuser	Diffuser mounting height	Min. air flow rate per diffuser ft3/min (20C, 1 atm)	Max. air flow rate per diffuser ft3/min (20C, 1 atm)	'A' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2	'B' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2	'C' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2
Anoxic A	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
Anoxic B	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A2 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A14 Unaer SC	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A6 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A12 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A17 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B1 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B5 Unaer SC	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B6 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B12 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B16 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0

Configuration information for all Influent - BOD units

Operating data Average (flow/time weighted as required)

Element name	Influent
Flow	10.75

BOD - Total Carbonaceous mgBOD/L	191.00
Volatile suspended solids mg/L	179.00
Total suspended solids mg/L	211.00
N - Total Kjeldahl Nitrogen mgN/L	46.00
P - Total P mgP/L	8.00
N - Nitrate mgN/L	0
pH	7.30
Alkalinity mmol/L	6.64
Metal soluble - Calcium mg/L	80.00
Metal soluble - Magnesium mg/L	15.00
Gas - Dissolved oxygen mg/L	0

Element name	Influent
Fbs - Readily biodegradable (including Acetate) [gCOD/g of total COD]	0.1600
Fac - Acetate [gCOD/g of readily biodegradable COD]	0.1500
Fxsp - Non-colloidal slowly biodegradable [gCOD/g of slowly degradable COD]	0.9140
Fus - Unbiodegradable soluble [gCOD/g of total COD]	0.0500
Fup - Unbiodegradable particulate [gCOD/g of total COD]	0.1300
Fcel - Cellulose fraction of unbiodegradable particulate [gCOD/gCOD]	0.5000
Fna - Ammonia [gNH3-N/gTKN]	0.6600
Fnox - Particulate organic nitrogen [gN/g Organic N]	0.5000
Fnus - Soluble unbiodegradable TKN [gN/gTKN]	0.0200
FupN - N:COD ratio for unbiodegradable part. COD [gN/gCOD]	0.0350
Fpo4 - Phosphate [gPO4-P/gTP]	0.5000
FupP - P:COD ratio for unbiodegradable part. COD [gP/gCOD]	0.0110
Fsr - Reduced sulfur [H2S] [gS/gS]	0.1500
FZbh - Ordinary heterotrophic COD fraction [gCOD/g of total COD]	0.0200
FZbm - Methylotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZao - Ammonia oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZno - Nitrite oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZaao - Anaerobic ammonia oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZppa - Phosphorus accumulating COD fraction [gCOD/g of total COD]	1.000E-4
FZpa - Propionic acetogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZam - Acetoclastic methanogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZhm - Hydrogenotrophic methanogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZso - Sulfur oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZsrpa - Sulfur reducing propionic acetogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZsra - Sulfur reducing acetotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZsrh - Sulfur reducing hydrogenotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZe - Endogenous products COD fraction [gCOD/g of total COD]	0

Configuration information for all Effluent units

Configuration information for all Clarifier - Ideal units

Physical data

Element name	Volume[Mil. Gal]	Area[ft2]	Depth[ft]
Clarifier - Ideal109	3.9807	3.801E+4	14.000

Operating data Average (flow/time weighted as required)

Element name	Split method	Average Split specification
Clarifier - Ideal109	Ratio	1.21

Element name	Average Temperature	Reactive	Percent removal	Blanket fraction

Clarifier - Ideal109	Uses global setting	No	99.80	0.05

Configuration information for all Sludge units

Configuration information for all Splitter units

Operating data Average (flow/time weighted as required)

Element name	Split method	Average Split specification
Main Flow Split	Fraction	0.33
IMLR Splitter A	Flowrate [Side]	17.92
Effluent A Splitter	Flowrate [Main]	295
Effluent B Splitter	Flowrate [Main]	155
IMLR Splitter B	Flowrate [Side]	12.54
RAS/WAS Splitter	Flowrate [Side]	0.325220910643597

Configuration information for all Bioreactor - Surface aeration units

Physical data

Element name	Volume[Mil. Gal]	Area[ft2]	Depth[ft]
A1 Aer	0.4600	4,555.0414	13.500
A5 Aer SC	0.2100	2,079.4754	13.500
A9 Aer	0.4600	4,555.0414	13.500
B9 Aer	0.1000	954.8612	14.000
B13 Aer	0.1000	954.8612	14.000
B17 Aer	0.1000	954.8612	14.000

Operating data Average (flow/time weighted as required)

Element name	Average Power supply rate [hp]
A1 Aer	250.0
A5 Aer SC	250.0
A9 Aer	250.0
B9 Aer	125.0
B13 Aer	125.0
B17 Aer	125.0

Aeration equipment parameters

Element name	Surface aerator Std. oxygen transfer rate [lb O /(hp hr)]
A1 Aer	2.2000
A5 Aer SC	2.2000
A9 Aer	2.2000
B9 Aer	2.2000
B13 Aer	2.2000
B17 Aer	2.2000

BioWin Album

Album page - Influent vs Effluent

Influent			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	6.64	270.20	mmol/L and kmol/d
BOD - Filtered Carbonaceous	56.50	5,069.10	
BOD - Total Carbonaceous	191.00	17,135.20	
COD - Filtered	103.18	9,256.47	
COD - Particulate	286.29	25,684.08	
COD - Total	389.47	34,940.55	
COD - Volatile fatty acids	9.35	838.57	
Influent inorganic suspended solids	30.33	2,720.83	
ISS cellular	0.70	62.63	
ISS precipitate	0	0	
ISS Total	32.00	2,870.82	
N - Ammonia	30.36	2,723.69	
N - Filtered TKN	37.91	3,400.84	
N - Nitrate	0	0	
N - Nitrite + Nitrate	0	0	
N - Particulate TKN	8.09	725.96	
N - Total inorganic N	30.36	2,723.69	
N - Total Kjeldahl Nitrogen	46.00	4,126.80	
N - Total N	46.00	4,126.80	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	4.00	358.85	
P - Total P	8.00	717.70	
pH	7.30		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	211.00	18,929.46	
Volatile suspended solids	179.00	16,058.64	

Parameter	Value	Units

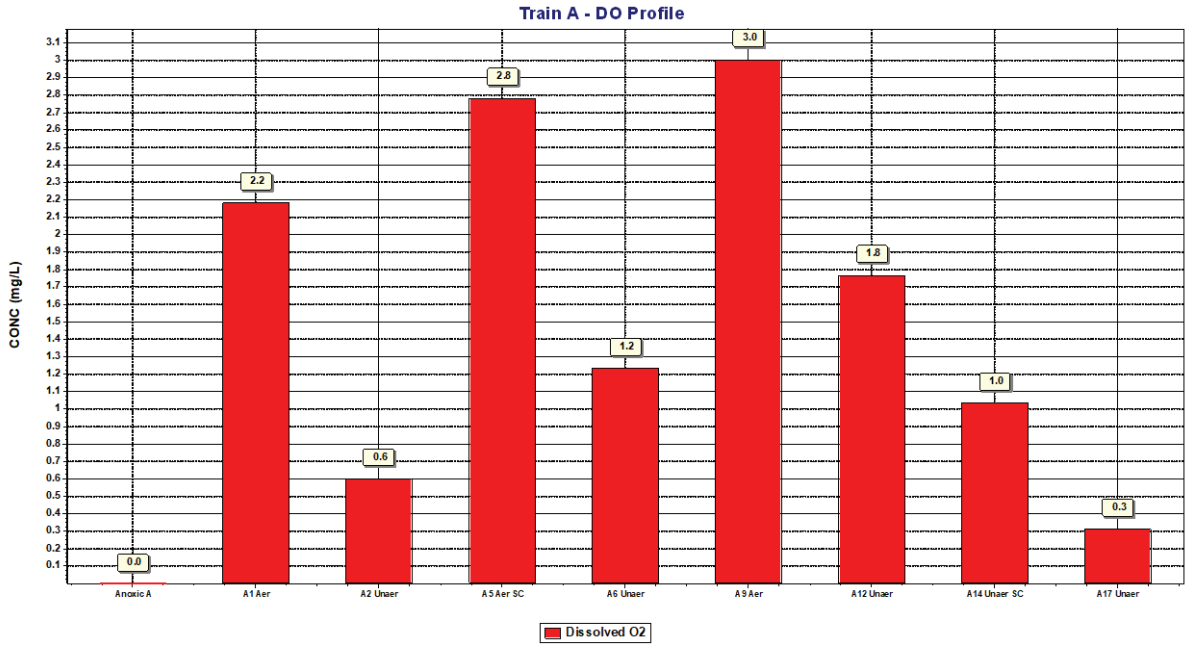
Album page - Influent vs Effluent

Effluent			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	3.66	144.37	mmol/L and kmol/d
BOD - Filtered Carbonaceous	0.82	71.29	
BOD - Total Carbonaceous	2.74	238.15	
COD - Filtered	20.67	1,798.01	
COD - Particulate	9.63	837.87	
COD - Total	30.30	2,635.88	
COD - Volatile fatty acids	0.00	0.30	
Influent inorganic suspended solids	2.26	196.23	
ISS cellular	0.48	41.35	
ISS precipitate	0	0	
ISS Total	2.73	237.64	
N - Ammonia	0.23	19.92	
N - Filtered TKN	1.71	149.02	
N - Nitrate	11.12	967.05	
N - Nitrite + Nitrate	11.19	973.65	
N - Particulate TKN	0.47	41.23	
N - Total inorganic N	11.42	993.57	
N - Total Kjeldahl Nitrogen	2.19	190.25	
N - Total N	13.38	1,163.90	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	5.99	521.20	
P - Total P	6.14	534.20	
pH	7.41		
S - Total S	0	0	

Total aluminium (all forms)	0	0
Total iron (all forms)	0	0
Total suspended solids	9.37	815.09
Volatile suspended solids	6.64	577.45

Parameter	Value	Units
Cost (Chemicals)	0	$/hour
Power	0	kW
Power cost (Excl. heating)	0	$/hour

Album page - Train A DO



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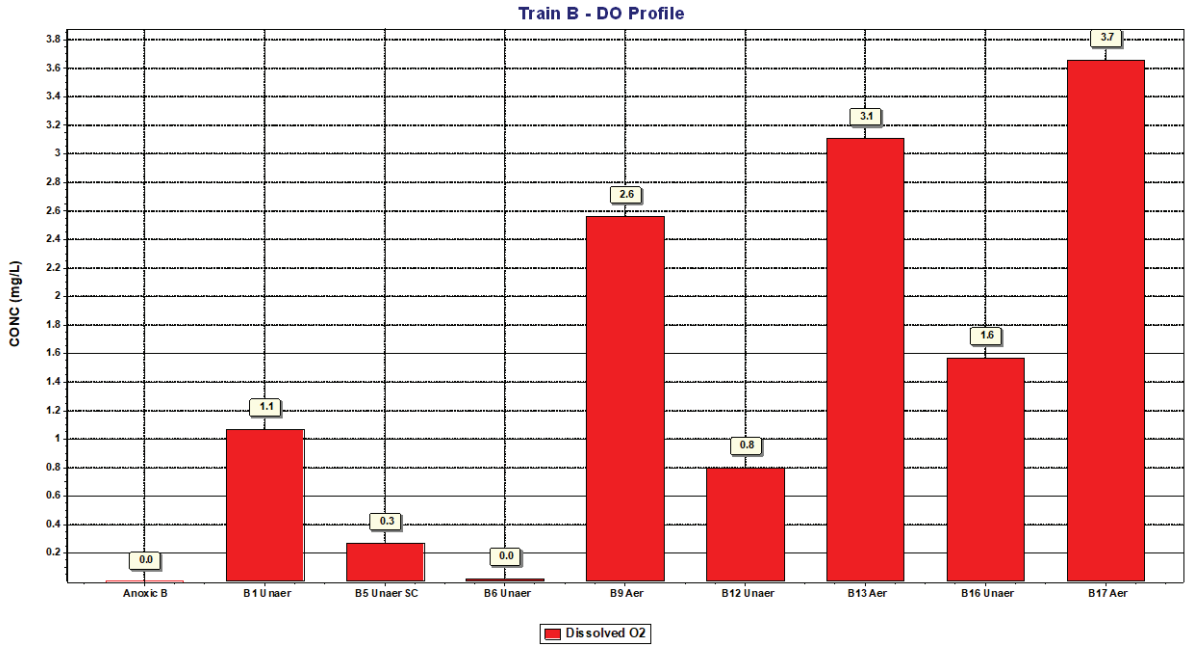
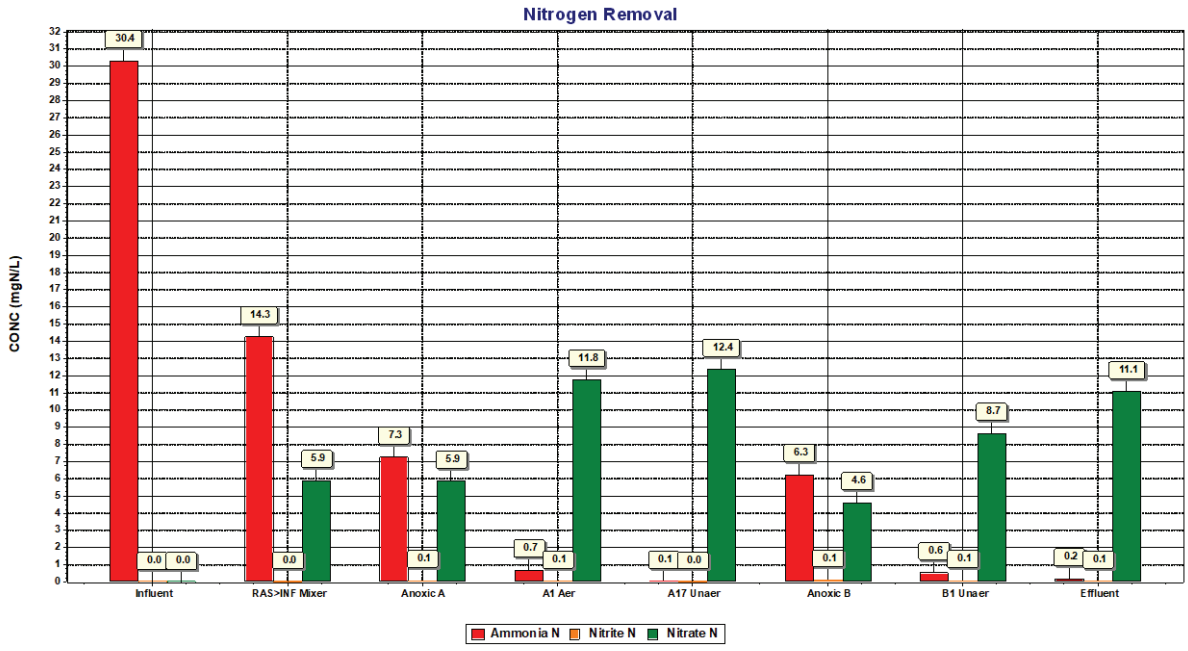
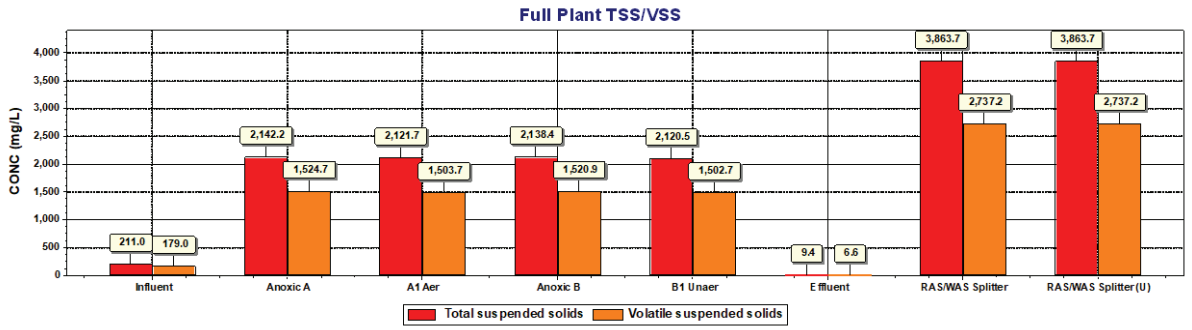


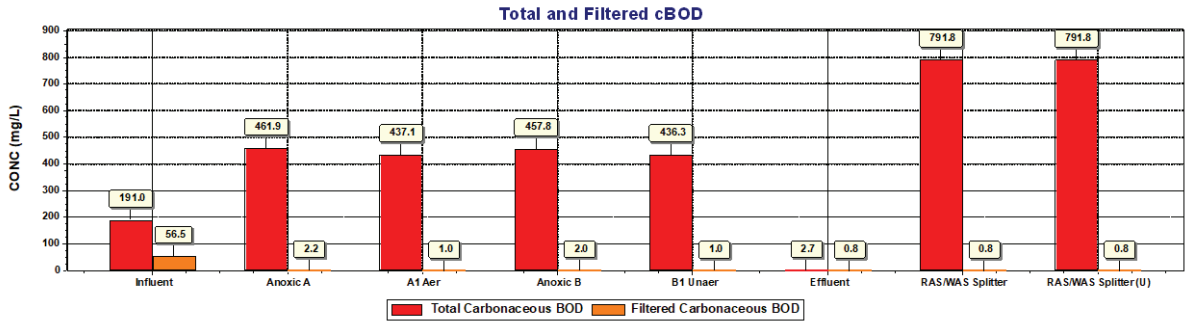
Album page - Nitrogen Removal



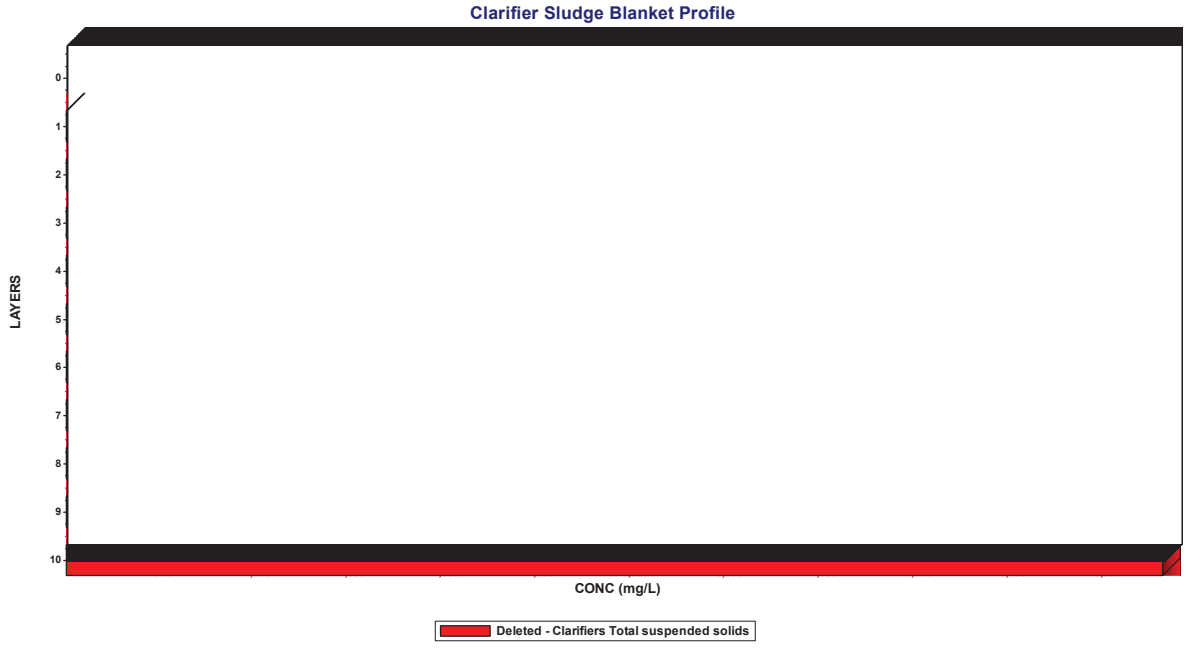
Album page - TSS/VSS and BOD



Album page - TSS/VSS and BOD



Album page - Page 6



Album page - Page 7

IMLR Mixer A			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	4.25	534.80	mmol/L and kmol/d
BOD - Filtered Carbonaceous	12.84	3,566.53	
BOD - Total Carbonaceous	469.93	130,515.05	
COD - Filtered	38.47	10,684.90	
COD - Particulate	2,212.34	614,442.18	
COD - Total	2,250.81	625,127.08	
COD - Volatile fatty acids	2.01	559.56	
Influent inorganic suspended solids	510.30	141,728.99	
ISS cellular	106.36	29,539.02	
ISS precipitate	0	0	
ISS Total	617.02	171,367.62	
N - Ammonia	6.64	1,845.24	
N - Filtered TKN	9.45	2,623.71	
N - Nitrate	9.42	2,616.13	
N - Nitrite + Nitrate	9.46	2,626.24	
N - Particulate TKN	107.59	29,882.72	
N - Total inorganic N	16.10	4,471.48	
N - Total Kjeldahl Nitrogen	117.04	32,506.43	
N - Total N	126.50	35,132.67	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	5.56	1,545.45	
P - Total P	39.80	11,053.19	
pH	7.36		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	2,137.86	593,756.75	
Volatile suspended solids	1,520.84	422,389.13	

Parameter	Value	Units

Album page - Page 7

IMLR Mixer 2			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	4.31	329.86	mmol/L and kmol/d
BOD - Filtered Carbonaceous	10.62	1,791.58	
BOD - Total Carbonaceous	464.35	78,351.12	
COD - Filtered	35.21	5,940.75	
COD - Particulate	2,207.47	372,474.93	
COD - Total	2,242.67	378,415.67	
COD - Volatile fatty acids	1.66	280.33	
Influent inorganic suspended solids	510.30	86,105.70	
ISS cellular	106.44	17,960.13	
ISS precipitate	0	0	
ISS Total	617.08	104,122.09	
N - Ammonia	5.74	968.37	
N - Filtered TKN	8.27	1,394.98	
N - Nitrate	7.54	1,271.97	
N - Nitrite + Nitrate	7.65	1,291.48	
N - Particulate TKN	107.51	18,141.15	
N - Total inorganic N	13.39	2,259.85	
N - Total Kjeldahl Nitrogen	115.78	19,536.14	
N - Total N	123.43	20,827.62	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	5.63	950.43	
P - Total P	39.80	6,715.23	
pH	7.38		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	2,135.02	360,251.62	
Volatile suspended solids	1,517.95	256,129.52	

Parameter	Value	Units

Global Parameters

Common

Name	Default	Value	
Hydrolysis rate [1/d]	2.1000	2.1000	1.0290
Hydrolysis half sat. [-]	0.0600	0.0600	1.0000
Anoxic hydrolysis factor [-]	0.2800	0.2800	1.0000
Anaerobic hydrolysis factor (AS) [-]	0.0400	0.0400	1.0000
Anaerobic hydrolysis factor (AD) [-]	0.5000	0.5000	1.0000
Adsorption rate of colloids [L/(mgCOD d)]	0.1500	0.1500	1.0290
Ammonification rate [L/(mgCOD d)]	0.0800	0.0800	1.0290
Assimilative nitrate/nitrite reduction rate [1/d]	0.5000	0.5000	1.0000
Endogenous products decay rate [1/d]	0	0	1.0000

Ammonia oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.9000	0.9000	1.0720
Substrate (NH4) half sat. [mgN/L]	0.7000	0.7000	1.0000
Byproduct NH4 logistic slope [-]	50.0000	50.0000	1.0000
Byproduct NH4 inflection point [mgN/L]	1.4000	1.4000	1.0000
Denite DO half sat. [mg/L]	0.1000	0.1000	1.0000
Denite HNO2 half sat. [mgN/L]	5.000E-6	5.000E-6	1.0000
Aerobic decay rate [1/d]	0.1700	0.1700	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0800	0.0800	1.0290
KiHNO2 [mmol/L]	5.000E-3	5.000E-3	1.0000

Nitrite oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.7000	0.7000	1.0600
Substrate (NO2) half sat. [mgN/L]	0.1000	0.1000	1.0000
Aerobic decay rate [1/d]	0.1700	0.1700	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0800	0.0800	1.0290
KiNH3 [mmol/L]	0.0750	0.0750	1.0000

Anaerobic ammonia oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.2000	0.2000	1.1000
Substrate (NH4) half sat. [mgN/L]	2.0000	2.0000	1.0000
Substrate (NO2) half sat. [mgN/L]	1.0000	1.0000	1.0000
Aerobic decay rate [1/d]	0.0190	0.0190	1.0290
Anoxic/anaerobic decay rate [1/d]	9.500E-3	9.500E-3	1.0290
Ki Nitrite [mgN/L]	1,000.0000	1,000.0000	1.0000
Nitrite sensitivity constant [L / (d mgN)]	0.0160	0.0160	1.0000

Ordinary heterotrophic

Name	Default	Value	
Max. spec. growth rate [1/d]	3.2000	3.2000	1.0290
Substrate half sat. [mgCOD/L]	5.0000	5.0000	1.0000
Anoxic growth factor [-]	0.5000	0.5000	1.0000
Denite N2 producers (NO3 or NO2) [-]	0.5000	0.5000	1.0000
Aerobic decay rate [1/d]	0.6200	0.6200	1.0290
Anoxic decay rate [1/d]	0.2330	0.2330	1.0290
Anaerobic decay rate [1/d]	0.1310	0.1310	1.0290
Fermentation rate [1/d]	1.6000	1.6000	1.0290
Fermentation half sat. [mgCOD/L]	5.0000	5.0000	1.0000
Fermentation growth factor (AS) [-]	0.2500	0.2500	1.0000
Free nitrous acid inhibition [mol/L]	1.000E-7	1.000E-7	1.0000

Heterotrophic on industrial COD

Name	Default	Value	
Maximum specific growth rate on Ind #1 COD [1/d]	4.3000	4.3000	1.0290
Substrate (Ind #1) half sat. [mgCOD/L]	1.0000	1.0000	1.0000
Inhibition coefficient for Ind #1 [mgCOD/L]	60.0000	60.0000	1.0000
Anaerobic growth factor for Ind #1 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on Ind #2 COD [1/d]	1.5000	1.5000	1.0290
Substrate (Ind #2) half sat. [mgCOD/L]	30.0000	30.0000	1.0000
Inhibition coefficient for Ind #2 [mgCOD/L]	3,000.0000	3,000.0000	1.0000
Anaerobic growth factor for Ind #2 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on Ind #3 COD [1/d]	4.3000	4.3000	1.0290
Substrate (Ind #3) half sat. [mgCOD/L]	1.0000	1.0000	1.0000
Inhibition coefficient for Ind #3 COD [mgCOD/L]	60.0000	60.0000	1.0000
Anaerobic growth factor for Ind #3 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on adsorbed hydrocarbon COD [1/d]	2.0000	2.0000	1.0290
Substrate (adsorbed hydrocarbon) half sat. [-]	0.1500	0.1500	1.0000
Anaerobic growth factor for adsorbed hydrocarbons [mgCOD/L]	0.0100	0.0100	1.0000
Adsorption rate of soluble hydrocarbons [l/(mgCOD d)]	0.2000	0.2000	1.0000

Methylotrophic

Name	Default	Value	
Max. spec. growth rate [1/d]	1.3000	1.3000	1.0720
Methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
Denite N2 producers (NO3 or NO2) [-]	0.5000	0.5000	1.0000
Aerobic decay rate [1/d]	0.0400	0.0400	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0300	0.0300	1.0290
Free nitrous acid inhibition [mmol/L]	1.000E-7	1.000E-7	1.0000

Phosphorus accumulating

Name	Default	Value	
Max. spec. growth rate [1/d]	0.9500	0.9500	1.0000
Max. spec. growth rate, P-limited [1/d]	0.4200	0.4200	1.0000
Substrate half sat. [mgCOD(PHB)/mgCOD(Zbp)]	0.1000	0.1000	1.0000
Substrate half sat., P-limited [mgCOD(PHB)/mgCOD(Zbp)]	0.0500	0.0500	1.0000
Magnesium half sat. [mgMg/L]	0.1000	0.1000	1.0000
Cation half sat. [mmol/L]	0.1000	0.1000	1.0000
Calcium half sat. [mgCa/L]	0.1000	0.1000	1.0000
Aerobic/anoxic decay rate [1/d]	0.1000	0.1000	1.0000
Aerobic/anoxic maintenance rate [1/d]	0	0	1.0000
Anaerobic decay rate [1/d]	0.0400	0.0400	1.0000
Anaerobic maintenance rate [1/d]	0	0	1.0000
Sequestration rate [1/d]	4.5000	4.5000	1.0000
Anoxic growth factor [-]	0.3300	0.3300	1.0000

Propionic acetogenic

Name	Default	Value	
Max. spec. growth rate [1/d]	0.2500	0.2500	1.0290
Substrate half sat. [mgCOD/L]	10.0000	10.0000	1.0000
Acetate inhibition [mgCOD/L]	10,000.0000	10,000.0000	1.0000
Anaerobic decay rate [1/d]	0.0500	0.0500	1.0290
Aerobic/anoxic decay rate [1/d]	0.5200	0.5200	1.0290

Methanogenic

Name	Default	Value	
Acetoclastic max. spec. growth rate [1/d]	0.3000	0.3000	1.0290
H2-utilizing max. spec. growth rate [1/d]	1.4000	1.4000	1.0290
Acetoclastic substrate half sat. [mgCOD/L]	100.0000	100.0000	1.0000
Acetoclastic methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
H2-utilizing CO2 half sat. [mmol/L]	0.1000	0.1000	1.0000
H2-utilizing substrate half sat. [mgCOD/L]	1.0000	1.0000	1.0000
H2-utilizing methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
Acetoclastic propionic inhibition [mgCOD/L]	10,000.0000	10,000.0000	1.0000
Acetoclastic anaerobic decay rate [1/d]	0.1300	0.1300	1.0290
Acetoclastic aerobic/anoxic decay rate [1/d]	0.6000	0.6000	1.0290
H2-utilizing anaerobic decay rate [1/d]	0.1300	0.1300	1.0290
H2-utilizing aerobic/anoxic decay rate [1/d]	2.8000	2.8000	1.0290

Sulfur oxidizing

Name	Default	Value	
Maximum specific growth rate (sulfide) [1/d]	0.7500	0.7500	1.0290
Maximum specific growth rate (sulfur) [1/d]	0.1000	0.1000	1.0290
Substrate (H2S) half sat. [mgS/L]	1.0000	1.0000	1.0000
Substrate (sulfur) half sat. [mgS/L]	1.0000	1.0000	1.0000
Anoxic growth factor [-]	0.5000	0.5000	1.0000
Decay rate [1/d]	0.0400	0.0400	1.0290

Sulfur reducing

Name	Default	Value	
Propionic max. spec. growth rate [1/d]	0.5830	0.5830	1.0350
Propionic acid half sat. [mgCOD/L]	295.0000	295.0000	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	185.0000	185.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	2.4700	2.4700	1.0000
Decay rate [1/d]	0.0185	0.0185	1.0350
Acetotrophic max. spec. growth rate [1/d]	0.6120	0.6120	1.0350
Acetic acid half sat. [mgCOD/L]	24.0000	24.0000	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	164.0000	164.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	6.4100	6.4100	1.0000
Decay rate [1/d]	0.0275	0.0275	1.0350
Hydrogenotrophic max. spec. growth rate with SO4= [1/d]	2.8000	2.8000	1.0350
Hydrogenotrophic max. spec. growth rate with S [1/d]	0.1000	0.1000	1.0350
Hydrogen half sat. [mgCOD/L]	0.0700	0.0700	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	550.0000	550.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	6.4100	6.4100	1.0000
Sulfur (S) half sat. [mgS/L]	50.0000	50.0000	1.0000
Decay rate [1/d]	0.0600	0.0600	1.0350

pH

Name	Default	Value
Ordinary heterotrophic low pH limit [-]	4.0000	4.0000
Ordinary heterotrophic high pH limit [-]	10.0000	10.0000
Methylotrophic low pH limit [-]	4.0000	4.0000
Methylotrophic high pH limit [-]	10.0000	10.0000
Autotrophic low pH limit [-]	5.5000	5.5000
Autotrophic high pH limit [-]	9.5000	9.5000
Phosphorus accumulating low pH limit [-]	4.0000	4.0000
Phosphorus accumulating high pH limit [-]	10.0000	10.0000
Ordinary heterotrophic low pH limit (anaerobic) [-]	5.5000	5.5000
Ordinary heterotrophic high pH limit (anaerobic) [-]	8.5000	8.5000
Propionic acetogenic low pH limit [-]	4.0000	4.0000
Propionic acetogenic high pH limit [-]	10.0000	10.0000
Acetoclastic methanogenic low pH limit [-]	5.0000	5.0000
Acetoclastic methanogenic high pH limit [-]	9.0000	9.0000
H2-utilizing methanogenic low pH limit [-]	5.0000	5.0000
H2-utilizing methanogenic high pH limit [-]	9.0000	9.0000

Switches

Name	Default	Value
Ordinary heterotrophic DO half sat. [mgO2/L]	0.1500	0.1500
Phosphorus accumulating DO half sat. [mgO2/L]	0.0500	0.0500
Anoxic/anaerobic NOx half sat. [mgN/L]	0.1500	0.1500
Ammonia oxidizing DO half sat. [mgO2/L]	0.2500	0.2500
Nitrite oxidizing DO half sat. [mgO2/L]	0.5000	0.5000
Anaerobic ammonia oxidizing DO half sat. [mgO2/L]	0.0100	0.0100
Sulfur oxidizing sulfate pathway DO half sat. [mgO2/L]	0.2500	0.2500
Sulfur oxidizing sulfur pathway DO half sat. [mgO2/L]	0.0500	0.0500
Anoxic NO3(->NO2) half sat. [mgN/L]	0.1000	0.1000
Anoxic NO3(->N2) half sat. [mgN/L]	0.0500	0.0500
Anoxic NO2(->N2) half sat. (mgN/L)	0.0100	0.0100
NH3 nutrient half sat. [mgN/L]	5.000E-3	5.000E-3
PolyP half sat. [mgP/mgCOD]	0.0100	0.0100
VFA sequestration half sat. [mgCOD/L]	5.0000	5.0000
P uptake half sat. [mgP/L]	0.1500	0.1500
P nutrient half sat. [mgP/L]	1.000E-3	1.000E-3
Autotrophic CO2 half sat. [mmol/L]	0.1000	0.1000
H2 low/high half sat. [mgCOD/L]	1.0000	1.0000
Propionic acetogenic H2 inhibition [mgCOD/L]	5.0000	5.0000
Synthesis anion/cation half sat. [meq/L]	0.0100	0.0100

Common

Name	Default	Value
Biomass/Endog Ca content (gCa/gCOD)	3.912E-3	3.912E-3
Biomass/Endog Mg content (gMg/gCOD)	3.912E-3	3.912E-3
Biomass/Endog other cations content (mol/gCOD)	5.115E-4	5.115E-4
Biomass/Endog other Anions content (mol/gCOD)	1.410E-4	1.410E-4
N in endogenous residue [mgN/mgCOD]	0.0700	0.0700
P in endogenous residue [mgP/mgCOD]	0.0220	0.0220
Ca content of slowly biodegradabe (gCa/gCOD)	3.912E-3	3.912E-3
Mg content of slowly biodegradabe (gMg/gCOD)	3.700E-4	3.700E-4
Endogenous residue COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Particulate substrate COD:VSS ratio [mgCOD/mgVSS]	1.6327	1.6327
Particulate inert COD:VSS ratio [mgCOD/mgVSS]	1.6000	1.6000
Cellulose COD:VSS ratio [mgCOD/mgVSS]	1.4000	1.4000
External organic COD:VSS ratio [mgCOD/mgVSS]	1.6000	1.6000
Molecular weight of other anions [mg/mmol]	35.5000	35.5000
Molecular weight of other cations [mg/mmol]	39.0983	39.0983

Ammonia oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.1500	0.1500
Denite NO2 fraction as TEA [-]	0.5000	0.5000
Byproduct NH4 fraction to N2O [-]	2.500E-3	2.500E-3
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Nitrite oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.0900	0.0900
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Anaerobic ammonia oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.1140	0.1140
Nitrate production [mgN/mgBiomassCOD]	2.2800	2.2800
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Ordinary heterotrophic

Name	Default	Value
Yield (aerobic) [-]	0.6660	0.6660
Yield (fermentation, low H2) [-]	0.1000	0.1000
Yield (fermentation, high H2) [-]	0.1000	0.1000
H2 yield (fermentation low H2) [-]	0.3500	0.3500
H2 yield (fermentation high H2) [-]	0	0
Propionate yield (fermentation, low H2) [-]	0	0
Propionate yield (fermentation, high H2) [-]	0.7000	0.7000
CO2 yield (fermentation, low H2) [-]	0.7000	0.7000
CO2 yield (fermentation, high H2) [-]	0	0
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Endogenous fraction - aerobic [-]	0.0800	0.0800
Endogenous fraction - anoxic [-]	0.1030	0.1030
Endogenous fraction - anaerobic [-]	0.1840	0.1840
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Yield (anoxic) [-]	0.5400	0.5400
Yield propionic (aerobic) [-]	0.6400	0.6400
Yield propionic (anoxic) [-]	0.4600	0.4600
Yield acetic (aerobic) [-]	0.6000	0.6000
Yield acetic (anoxic) [-]	0.4300	0.4300
Yield methanol (aerobic) [-]	0.5000	0.5000
Adsorp. max. [-]	1.0000	1.0000
Max fraction to N2O at high FNA over nitrate [-]	0.0500	0.0500
Max fraction to N2O at high FNA over nitrite [-]	0.1000	0.1000

Ordinary heterotrophic on industrial COD

Name	Default	Value
Yield Ind #1 COD (Aerobic) [-]	0.5000	0.5000
Yield Ind #1 COD (Anoxic) [-]	0.4000	0.4000
Yield Ind #1 COD (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Ind #1 COD [gCOD/Mol]	224.0000	224.0000
Yield Ind #2 COD (Aerobic) [-]	0.5000	0.5000
Yield Ind #2 COD (Anoxic) [-]	0.4000	0.4000
Yield Ind #2 COD (Anaerobic) [-]	0.0500	0.0500
COD:Mole ratio - Ind #2 COD [gCOD/Mol]	240.0000	240.0000
Yield on Ind #3 COD (Aerobic) [-]	0.5000	0.5000
Yield on Ind #3 COD (Anoxic) [-]	0.4000	0.4000
Yield on Ind #3 COD (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Ind #3 COD [gCOD/Mol]	288.0000	288.0000
Yield enmeshed hydrocarbons (Aerobic) [-]	0.5000	0.5000
Yield enmeshed hydrocarbons (Anoxic) [-]	0.4000	0.4000
Yield enmeshed hydrocarbons (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Hydrocarbon COD [gCOD/Mol]	336.0000	336.0000
Hydrocarbon COD:VSS ratio [mgCOD/mgVSS]	3.2000	3.2000
Max. hydrocarbon adsorp. ratio [-]	1.0000	1.0000
Yield of Ind #1 on Ind #3 COD (Aerobic) [-]	0	0
Yield of Ind #1 on Ind #3 COD (Anoxic) [-]	0	0
Hydrocarbon Yield on Ind #3 COD (Aerobic) [-]	0	0
Hydrocarbon Yield on Ind #3 COD (Anoxic) [-]	0	0

Methylotrophic

Name	Default	Value
Yield (anoxic) [-]	0.4000	0.4000
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Max fraction to N2O at high FNA over nitrate [-]	0.1000	0.1000
Max fraction to N2O at high FNA over nitrite [-]	0.1500	0.1500

Phosphorus accumulating

Name	Default	Value
Yield (aerobic) [-]	0.6390	0.6390
Yield (anoxic) [-]	0.5200	0.5200
Aerobic P/PHA uptake [mgP/mgCOD]	0.9300	0.9300
Anoxic P/PHA uptake [mgP/mgCOD]	0.3500	0.3500
Yield of PHA on sequestration [-]	0.8890	0.8890
N in biomass [mgN/mgCOD]	0.0700	0.0700
N in sol. inert [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous part. [-]	0.2500	0.2500
Inert fraction of endogenous sol. [-]	0.2000	0.2000
P/Ac release ratio [mgP/mgCOD]	0.5100	0.5100
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Yield of low PP [-]	0.9400	0.9400
Mg to P mole ratio in polyphosphate [mmolMg/mmolP]	0.3000	0.3000
Cation to P mole ratio in polyphosphate [meq/mmolP]	0.1500	0.1500
Ca to P mole ratio in polyphosphate [mmolCa/mmolP]	0.0500	0.0500

Propionic acetogenic

Name	Default	Value
Yield [-]	0.1000	0.1000
H2 yield [-]	0.4000	0.4000
CO2 yield [-]	1.0000	1.0000
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Methanogenic

Name	Default	Value
Acetoclastic yield [-]	0.1000	0.1000
Acetoclastic yield on methanol[-]	0.1000	0.1000
H2-utilizing yield [-]	0.1000	0.1000
H2-utilizing yield on methanol [-]	0.1000	0.1000
N in acetoclastic biomass [mgN/mgCOD]	0.0700	0.0700
N in H2-utilizing biomass [mgN/mgCOD]	0.0700	0.0700
P in acetoclastic biomass [mgP/mgCOD]	0.0220	0.0220
P in H2-utilizing biomass [mgP/mgCOD]	0.0220	0.0220
Acetoclastic fraction to endog. residue [-]	0.0800	0.0800
H2-utilizing fraction to endog. residue [-]	0.0800	0.0800
Acetoclastic COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
H2-utilizing COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Sulfur oxidizing

Name	Default	Value
Yield (aerobic) [mgCOD/mgS]	0.5000	0.5000
Yield (Anoxic) [mgCOD/mgS]	0.3500	0.3500
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Sulfur reducing

Name	Default	Value
Yield [mgCOD/mg H2 COD]	0.0712	0.0712
Yield [mgCOD/mg Ac COD]	0.0470	0.0470
Yield [mgCOD/mg Pr COD]	0.0384	0.0384
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

General

Name	Default	Value
Tank head loss per metre of length (from flow) [m/m]	2.500E-3	2.500E-3
BOD calculation rate constant for Xsc degradation [/d]	0.5000	0.5000
BOD calculation rate constant for Xsp (and hydrocarbon) degradation [/d]	0.5000	0.5000
BOD calculation rate constant for Xeo degradation [/d]	0.5000	0.5000

Heating fuel/Chemical Costs

Name	Default	Value
Methanol [$/gal]	1.6656	1.6656
Ferric [$/gal]	0.3785	0.3785
Ferrous [$/gal]	0.3785	0.3785
Aluminium [$/gal]	0.3028	0.3028
Natural gas [$/MMBTU]	3.1652	3.1652
Heating oil [$/gal]	1.8927	1.8927
Diesel [$/gal]	2.6498	2.6498
Custom fuel [$/gal]	3.7854	3.7854
Biogas sale price [$/MMBTU]	2.1101	2.1101

Anaerobic digester

Name	Default	Value
Bubble rise velocity (anaerobic digester) [cm/s]	23.9000	23.9000
Bubble Sauter mean diameter (anaerobic digester) [cm]	0.3500	0.3500
Anaerobic digester gas hold-up factor []	1.0000	1.0000

Combined Heat and Power (CHP) engine

Name	Default	Value
Methane heat of combustion [kJ/mole]	800.0000	800.0000
Hydrogen heat of combustion [kJ/mole]	240.0000	240.0000
CHP engine heat price [$/kWh]	0	0
CHP engine power price [$/kWh]	0.1500	0.1500

Calorific values of heating fuels

Name	Default	Value
Calorific value of natural gas [BTU/lb]	20,636	20,636
Calorific value of heating fuel oil [BTU/lb]	18,057	18,057
Calorific value of diesel [BTU/lb]	19,776	19,776
Calorific value of custom fuel [BTU/lb]	13,758	13,758

Density of liquid heating fuels

Name	Default	Value
Density of heating fuel oil [lb/ft3]	56	56
Density of diesel [lb/ft3]	55	55
Density of custom fuel [lb/ft3]	49	49

Mass transfer

Name	Default	Value	
Kl for H2 [m/d]	17.0000	17.0000	1.0240
Kl for CO2 [m/d]	10.0000	10.0000	1.0240
Kl for NH3 [m/d]	1.0000	1.0000	1.0240
Kl for CH4 [m/d]	8.0000	8.0000	1.0240
Kl for N2 [m/d]	15.0000	15.0000	1.0240
Kl for N2O [m/d]	8.0000	8.0000	1.0240
Kl for H2S [m/d]	1.0000	1.0000	1.0240

KI for Ind #1 COD [m/d]	0	0	1.0240
KI for Ind #2 COD [m/d]	0.5000	0.5000	1.0240
KI for Ind #3 COD [m/d]	0	0	1.0240
KI for O2 [m/d]	13.0000	13.0000	1.0240

Henry's law constants

Name	Default	Value	
CO2 [M/atm]	3.4000E-2	3.4000E-2	2,400.0000
O2 [M/atm]	1.3000E-3	1.3000E-3	1,500.0000
N2 [M/atm]	6.5000E-4	6.5000E-4	1,300.0000
N2O [M/atm]	2.5000E-2	2.5000E-2	2,600.0000
NH3 [M/atm]	5.8000E+1	5.8000E+1	4,100.0000
CH4 [M/atm]	1.4000E-3	1.4000E-3	1,600.0000
H2 [M/atm]	7.8000E-4	7.8000E-4	500.0000
H2S [M/Atm]	1.0000E-1	1.0000E-1	2,200.0000
Ind 1 [M/Atm]	1.9000E+3	1.9000E+3	7,300.0000
Ind 2 [M/Atm]	1.8000E-1	1.8000E-1	2,200.0000
Ind 3 [M/Atm]	1.5000E-1	1.5000E-1	1,900.0000

Properties constants

Name	Default	Value
K in Viscosity = K e ^(Ea/RT) [Pa s]	6.849E-7	6.849E-7
Ea in Viscosity = K e ^(Ea/RT) [j/mol]	1.780E+4	1.780E+4
Y in ML Viscosity = H2O viscosity * (1+A*MLSS^Y) [-]	1.0000	1.0000
A in ML Viscosity = H2O viscosity * (1+A*MLSS^Y) [m3/g]	1.000E-7	1.000E-7
A in ML Density = H2O density + A*MLSS [(kg/m3)/(g/m3)]	3.248E-4	3.248E-4
A in Antoine equn. [T in K, P in Bar {NIST}]	5.2000	5.2039
B in Antoine equn. [T in K, P in Bar {NIST}]	1,734.0000	1,733.9260
C in Antoine equn. [T in K, P in Bar {NIST}]	-39.5000	-39.4800

Metal salt solution densities

Name	Default	Value
Ferric chloride solution density [kg/m3]	3,820.0000	3,820.0000
Ferrous chloride solution density [kg/m3]	3,160.0000	3,160.0000
Aluminium sulfate solution density [kg/m3]	1,950.0000	1,950.0000

Mineral precipitation rates

Name	Default	Value	
Vivianite precipitation rate [L/(mol d)]	1.000E+5	1.000E+5	1.0240
Vivianite redissolution rate [L/(mol d)]	1.000E+5	1.000E+5	1.0240
Vivianite half sat. [mgTSS/L]	0.0100	0.0100	1.0000
FeS precipitation rate [L/(mol d)]	1,000.0000	1,000.0000	1.0240
FeS redissolution rate [L/(mol d)]	10.0000	10.0000	1.0240
FeS half sat. [mgTSS/L]	0.1000	0.1000	1.0000
Struvite precipitation rate [L^2/(mol^2 d)]	3.000E+10	3.000E+10	1.0240
Struvite redissolution rate [L^2/(mol^2 d)]	3.000E+11	3.000E+11	1.0240
Struvite half sat. [mgTSS/L]	1.0000	1.0000	1.0000
Brushite precipitation rate [L/(mol d)]	1.000E+6	1.000E+6	1.0000
Brushite redissolution rate [L/(mol d)]	10,000.0000	10,000.0000	1.0000
Brushite half sat. [mgTSS/L]	1.0000	1.0000	1.0000
HAP precipitation rate [g/d]	5.000E-4	5.000E-4	1.0000

Mineral precipitation constants

Name	Default	Value
Vivianite solubility product [mol/L]^5	1.710E-36	1.710E-36
FeS solubility product [mol/L]^2	4.258E-4	4.258E-4
Struvite solubility product [mol/L]^3	6.918E-14	6.918E-14
Brushite solubility product [mol/L]^2	2.490E-7	2.490E-7

Fe rates

Name	Default	Value	
A in aging rate = A * exp(G/B) [1/d)]	16.1550	16.1550	1.0000
B in aging rate = A * exp(G/B) [1/s)]	57.3000	57.3000	1.0000
HFO(L) aging rate factor	2.500E-4	2.500E-4	1.0000
HFO(H) with H2PO4- bound aging factor []	1.000E-5	1.000E-5	1.0000
HFO(L) with H2PO4- bound aging factor []	0.4000	0.4000	1.0000
H2PO4- coprecipitation rate [mol/(L d)]	1.500E-9	1.500E-9	1.0000
H2PO4- Adsorption rate [mol /(L d)]	2.000E-11	2.000E-11	1.0000
H+ competition for HFO(H) protonation sites [L/(mmol . d)]	1,000.0000	1,000.0000	1.0000
H+ competition for HFO(L) protonation sites [L/(mmol . d)]	100.0000	100.0000	1.0000

Fe constants

Name	Default	Value
Ferric active site factor(high) [{mol Sites}/{mol HFO(H)}]	2.0000	2.0000
Ferric active site factor(low) [{mol Sites}/{mol HFO(L)}]	1.2000	1.2000
H+ competition level for Fe(OH)3 [mol/L]	7.000E-7	7.000E-7
Equilibrium constant for FeOH3-H2PO4- [{mf HFO(H).H2PO4}/({mol H2PO4-}{mf HFO(H)}^2)]	2.000E-9	2.000E-9
Colloidal COD removed with Ferric [gCOD/Fe active site]	130.0000	130.0000
Minimum residual P level with iron addition	0.0150	0.0150
HFO(H) with H2PO4- P release factor	10,000.0000	10,000.0000
HFO(L) with H2PO4- P release factor	10,000.0000	10,000.0000

Fe RedOx rates

Name	Default	Value	
Iron reduction using acetic acid	1.000E-7	1.000E-7	1.0000
Half Sat. acetic acid	0.5000	0.5000	1.0000
Iron reduction using propionic acid	1.000E-7	1.000E-7	1.0000
Half Sat. propionic acid	0.5000	0.5000	1.0000
Iron reduction using dissolved hydrogen gas	1.000E-7	1.000E-7	1.0000
Half Sat. dissolved hydrogen gas	0.5000	0.5000	1.0000
Iron reduction using hydrogen sulfide	5.000E-5	5.000E-5	1.0000
Half Sat. hydrogen sulfide	0.5000	0.5000	1.0000
Iron oxidation rate (aerobic)	1.000E-3	1.000E-3	1.0000
Abiotic iron reduction using acetic acid	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using propionic acid	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using dissolved hydrogen gas	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using hydrogen sulfide	2.000E-5	2.000E-5	1.0000
Abiotic iron oxidation rate (aerobic)	1.0000	1.0000	1.0000

CEPT rates

Name	Default	Value	
HFO colloidal adsorption rate	1.0000	1.0000	1.0000
Residual Xsc for adsorption to HFO	5.0000	5.0000	1.0000
Slope for Xsc residual	1.0000	1.0000	1.0000

HAO colloidal adsorption rate	1.0000	1.0000	1.0000
Residual Xsc for adsorption to HAO	5.0000	5.0000	1.0000
Slope for Xsc residual	1.0000	1.0000	1.0000

Al rates

Name	Default	Value	
A in aging rate = A * exp(G/B) [1/d)]	16.1550	16.1550	1.0000
B in aging rate = A * exp(G/B) [1/s)]	57.3000	57.3000	1.0000
HAO(L) aging rate factor	2.500E-4	2.500E-4	1.0000
HAO(H) with H2PO4- bound aging factor []	1.000E-5	1.000E-5	1.0000
HAO(L) with H2PO4- bound aging factor []	0.4000	0.4000	1.0000
H2PO4- coprecipitation rate [mol/(L d)]	1.500E-9	1.500E-9	1.0000
H2PO4- Adsorption rate [mol /(L d)]	1.000E-9	1.000E-9	1.0000

Al constants

Name	Default	Value
Al active site factor(high) [{mol Sites}/{mol HAO(H)}]	3.0000	3.0000
Al active site factor(low) [{mol Sites}/{mol HAO(L)}]	1.5000	1.5000
Equilibrium constant for AlOH3-H2PO4- [{mf HAO(H).H2PO4}/({mol H2PO4-}{mf HAO(H)}^2)]	8.000E-10	8.000E-10
Colloidal COD removed with Al [gCOD/Al active site]	30.0000	30.0000
Minimum residual P level with Al addition	0.0150	0.0150
HAO(H) with H2PO4- P release factor	10,000.0000	10,000.0000
HAO(L) with H2PO4- P release factor	10,000.0000	10,000.0000

Pipe and pump parameters

Name	Default	Value
Static head [ft]	0.8202	0.8202
Pipe length (headloss calc.s) [ft]	164.0420	164.0420
Pipe inside diameter [in]	19.68504	19.68504
K(fittings) - Total minor losses K	5.0000	5.0000
Pipe roughness [in]	0.00787	0.00787
'A' in overall pump efficiency = A + B*Q + C*(Q^2)[-]	0.8500	0.8500
'B' in overall pump efficiency = A + B*Q + C*(Q^2)[-]/(mgd)]	0	0
'C' in overall pump efficiency = A + B*Q + C*(Q^2)[-]/(mgd)^2]	0	0

Fittings and loss coefficients ('K' values)

Name	Default	Value
Pipe entrance (bellmouth)	0.0500	1.0000
90° bend	0.7500	5.0000
45° bend	0.3000	2.0000
Butterfly value (open)	0.3000	1.0000
Non-return value	1.0000	0
Outlet (bellmouth)	0.2000	1.0000

Aeration

Name	Default	Value
Surface pressure [kPa]	101.3250	101.3250
Fractional effective saturation depth (Fed) [-]	0.3250	0.3250
Supply gas CO2 content [vol. %]	0.0400	0.0400

Supply gas O2 [vol. %]	20.9500	20.9500
Off-gas CO2 [vol. %]	2.0000	2.0000
Off-gas O2 [vol. %]	18.8000	18.8000
Off-gas H2 [vol. %]	0	0
Off-gas NH3 [vol. %]	0	0
Off-gas CH4 [vol. %]	0	0
Off-gas N2O [vol. %]	0	0
Surface turbulence factor [-]	2.0000	2.0000
Set point controller gain []	1.0000	1.0000

Blower

Name	Default	Value
Intake filter pressure drop [psi]	0.5076	0.5076
Pressure drop through distribution system (piping/valves) [psi]	0.4351	0.4351
Adiabatic/polytropic compression exponent (1.4 for adiabatic)	1.4000	1.4000
'A' in blower efficiency = A + B*Qa + C*(Qa^2)[-]	0.7500	0.7500
'B' in blower efficiency = A + B*Qa + C*(Qa^2)[[-]/(ft3/min (20C, 1 atm))]	0	0
'C' in blower efficiency = A + B*Qa + C*(Qa^2)[[-]/(ft3/min (20C, 1 atm))^2]	0	0

Diffuser

Name	Default	Value
k1 in C = k1(PC)^0.25 + k2	1.2400	1.2400
k2 in C = k1(PC)^0.25 + k2	0.8960	0.8960
Y in Kla = C Usg ^ Y - Usg in [m3/(m2 d)]	0.8880	0.8880
Area of one diffuser [ft2]	0.4413	0.4413
Diffuser mounting height [ft]	0.8202	0.8202
Min. air flow rate per diffuser ft3/min (20C, 1 atm)	0.2943	0.2943
Max. air flow rate per diffuser ft3/min (20C, 1 atm)	5.8858	5.8858
'A' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2 [psi]	0.4351	0.4351
'B' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2[psi/(ft3/min (20C, 1 atm))]	0	0
'C' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2[psi/(ft3/min (20C, 1 atm))^2]	0	0

Surface aerators

Name	Default	Value
Surface aerator Std. oxygen transfer rate [lb O /(hp hr)]	2.46697	2.20000

Modified Vesilind

Name	Default	Value
Maximum Vesilind settling velocity (Vo) [ft/min]	0.387	0.387
Vesilind hindered zone settling parameter (K) [L/g]	0.370	0.370
Clarification switching function [mg/L]	100.000	100.000
Specified TSS conc.for height calc. [mg/L]	2,500.000	2,500.000
Maximum compactability constant [mg/L]	15,000.000	15,000.000
Maximum compactability slope [L/mg]	0.010	0.010

Double exponential

Name	Default	Value
Maximum Vesilind settling velocity (Vo) [ft/min]	0.934	0.934
Maximum (practical) settling velocity (Vo') [ft/min]	0.615	0.615

Hindered zone settling parameter (Kh) [L/g]	0.400	0.400
Flocculent zone settling parameter (Kf) [L/g]	2.500	2.500
Maximum non-settleable TSS [mg/L]	20.0000	20.0000
Non-settleable fraction [-]	1.000E-3	1.000E-3
Specified TSS conc. for height calc. [mg/L]	2,500.0000	2,500.0000

Emission factors

Name	Default	Value
Carbon dioxide equivalence of nitrous oxide	296.0000	296.0000
Carbon dioxide equivalence of methane	23.0000	23.0000

Biofilm general

Name	Default	Value	
Attachment rate [g / (m2 d)]	8.0000	8.0000	1.0000
Attachment TSS half sat. [mg/L]	100.0000	100.0000	1.0000
Detachment rate [g/(m3 d)]	8,000.0000	8,000.0000	1.0000
Solids movement factor []	10.0000	10.0000	1.0000
Diffusion neta []	0.8000	0.8000	1.0000
Thin film limit [mm]	0.5000	0.5000	1.0000
Thick film limit [mm]	3.0000	3.0000	1.0000
Assumed Film thickness for tank volume correction (temp independent) [mm]	1.2500	1.2500	1.0000
Film surface area to media area ratio - Max.[ ]	1.0000	1.0000	1.0000
Minimum biofilm conc. for streamer formation [gTSS/m2]	4.0000	4.0000	1.0000

Maximum biofilm concentrations [mg/L]

Name	Default	Value	
Biomass - Ordinary heterotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Methylotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Ammonia oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Nitrite oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Anaerobic ammonia oxidizing	5.000E+4	5.000E+4	1.0000
Biomass - Phosphorus accumulating	5.000E+4	5.000E+4	1.0000
Biomass - Propionic acetogenic	5.000E+4	5.000E+4	1.0000
Biomass - Acetoclastic methanogenic	5.000E+4	5.000E+4	1.0000
Biomass - Hydrogenotrophic methanogenic	5.000E+4	5.000E+4	1.0000
Biomass - Endogenous products	3.000E+4	3.000E+4	1.0000
CODp - Slowly degradable particulate	5,000.0000	5,000.0000	1.0000
CODp - Slowly degradable colloidal	4,000.0000	4,000.0000	1.0000
CODp - Degradable external organics	5,000.0000	5,000.0000	1.0000
CODp - Undegradable non-cellulose	5,000.0000	5,000.0000	1.0000
CODp - Undegradable cellulose	5,000.0000	5,000.0000	1.0000
N - Particulate degradable organic	0	0	1.0000
P - Particulate degradable organic	0	0	1.0000
N - Particulate degradable external organics	0	0	1.0000
P - Particulate degradable external organics	0	0	1.0000
N - Particulate undegradable	0	0	1.0000
P - Particulate undegradable	0	0	1.0000
CODp - Stored PHA	5,000.0000	5,000.0000	1.0000
P - Releasable stored polyP	1.150E+6	1.150E+6	1.0000
P - Unreleasable stored polyP	1.150E+6	1.150E+6	1.0000
CODs - Complex readily degradable	0	0	1.0000
CODs - Acetate	0	0	1.0000
CODs - Propionate	0	0	1.0000
CODs - Methanol	0	0	1.0000
Gas - Dissolved hydrogen	0	0	1.0000
Gas - Dissolved methane	0	0	1.0000
N - Ammonia	0	0	1.0000
N - Soluble degradable organic	0	0	1.0000

Gas - Dissolved nitrous oxide	0	0	1.0000
N - Nitrite	0	0	1.0000
N - Nitrate	0	0	1.0000
Gas - Dissolved nitrogen	0	0	1.0000
P - Soluble phosphate	0	0	1.0000
CODs - Undegradable	0	0	1.0000
N - Soluble undegradable organic	0	0	1.0000
Influent inorganic suspended solids	1.300E+6	1.300E+6	1.0000
Precipitate - Struvite	8.500E+5	8.500E+5	1.0000
Precipitate - Brushite	1.165E+6	1.165E+6	1.0000
Precipitate - Hydroxy - apatite	1.600E+6	1.600E+6	1.0000
Precipitate - Vivianite	1.340E+6	1.340E+6	1.0000
HFO - High surface	5.000E+4	5.000E+4	1.0000
HFO - Low surface	5.000E+4	5.000E+4	1.0000
HFO - High with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HFO - Low with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HFO - Aged	5.000E+4	5.000E+4	1.0000
HFO - Low with H+ adsorbed	5.000E+4	5.000E+4	1.0000
HFO - High with H+ adsorbed	5.000E+4	5.000E+4	1.0000
HAO - High surface	5.000E+4	5.000E+4	1.0000
HAO - Low surface	5.000E+4	5.000E+4	1.0000
HAO - High with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HAO - Low with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HAO - Aged	5.000E+4	5.000E+4	1.0000
P - Bound on aged HMO	5.000E+4	5.000E+4	1.0000
Metal soluble - Magnesium	0	0	1.0000
Metal soluble - Calcium	0	0	1.0000
Metal soluble - Ferric	0	0	1.0000
Metal soluble - Ferrous	0	0	1.0000
Metal soluble - Aluminum	0	0	1.0000
Other Cations (strong bases)	0	0	1.0000
Other Anions (strong acids)	0	0	1.0000
Gas - Dissolved total CO2	0	0	1.0000
User defined - UD1	0	0	1.0000
User defined - UD2	0	0	1.0000
User defined - UD3	5.000E+4	5.000E+4	1.0000
User defined - UD4	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Sulfur reducing propionic acetogenic	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur reducing acetotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur reducing hydrogenotrophic	1.000E+5	1.000E+5	1.0000
Gas - Dissolved total sulfides	0	0	1.0000
S - Soluble sulfate	0	0	1.0000
S - Particulate elemental sulfur	5.000E+4	5.000E+4	1.0000
Precipitate - Ferrous sulfide	5.000E+4	5.000E+4	1.0000
CODp - Adsorbed hydrocarbon	5.000E+4	5.000E+4	1.0000
CODs - Degradable volatile ind. #1	0	0	1.0000
CODs - Degradable volatile ind. #2	0	0	1.0000
CODs - Degradable volatile ind. #3	0	0	1.0000
CODs - Soluble hydrocarbon	0	0	1.0000
Gas - Dissolved oxygen	0	0	1.0000

Effective diffusivities [m2/s]

Name	Default	Value	
Biomass - Ordinary heterotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Methylotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Ammonia oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Nitrite oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Anaerobic ammonia oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Phosphorus accumulating	5.000E-14	5.000E-14	1.0290
Biomass - Propionic acetogenic	5.000E-14	5.000E-14	1.0290
Biomass - Acetoclastic methanogenic	5.000E-14	5.000E-14	1.0290
Biomass - Hydrogenotrophic methanogenic	5.000E-14	5.000E-14	1.0290
Biomass - Endogenous products	5.000E-14	5.000E-14	1.0290
CODp - Slowly degradable particulate	5.000E-14	5.000E-14	1.0290
CODp - Slowly degradable colloidal	5.000E-10	5.000E-10	1.0290

CODp - Degradable external organics	5.000E-14	5.000E-14	1.0290
CODp - Undegradable non-cellulose	5.000E-14	5.000E-14	1.0290
CODp - Undegradable cellulose	5.000E-14	5.000E-14	1.0290
N - Particulate degradable organic	5.000E-14	5.000E-14	1.0290
P - Particulate degradable organic	5.000E-14	5.000E-14	1.0290
N - Particulate degradable external organics	5.000E-14	5.000E-14	1.0290
P - Particulate degradable external organics	5.000E-14	5.000E-14	1.0290
N - Particulate undegradable	5.000E-14	5.000E-14	1.0290
P - Particulate undegradable	5.000E-14	5.000E-14	1.0290
CODp - Stored PHA	5.000E-14	5.000E-14	1.0290
P - Releasable stored polyP	5.000E-14	5.000E-14	1.0290
P - Unreleasable stored polyP	5.000E-14	5.000E-14	1.0290
CODs - Complex readily degradable	6.900E-10	6.900E-10	1.0290
CODs - Acetate	1.240E-9	1.240E-9	1.0290
CODs - Propionate	8.300E-10	8.300E-10	1.0290
CODs - Methanol	1.600E-9	1.600E-9	1.0290
Gas - Dissolved hydrogen	5.850E-9	5.850E-9	1.0290
Gas - Dissolved methane	1.963E-9	1.963E-9	1.0290
N - Ammonia	2.000E-9	2.000E-9	1.0290
N - Soluble degradable organic	1.370E-9	1.370E-9	1.0290
Gas - Dissolved nitrous oxide	1.607E-9	1.607E-9	1.0290
N - Nitrite	2.980E-9	2.980E-9	1.0290
N - Nitrate	2.980E-9	2.980E-9	1.0290
Gas - Dissolved nitrogen	1.900E-9	1.900E-9	1.0290
P - Soluble phosphate	2.000E-9	2.000E-9	1.0290
CODs - Undegradable	6.900E-10	6.900E-10	1.0290
N - Soluble undegradable organic	6.850E-10	6.850E-10	1.0290
Influent inorganic suspended solids	5.000E-14	5.000E-14	1.0290
Precipitate - Struvite	5.000E-14	5.000E-14	1.0290
Precipitate - Brushite	5.000E-14	5.000E-14	1.0290
Precipitate - Hydroxy - apatite	5.000E-14	5.000E-14	1.0290
Precipitate - Vivianite	5.000E-14	5.000E-14	1.0290
HFO - High surface	5.000E-14	5.000E-14	1.0290
HFO - Low surface	5.000E-14	5.000E-14	1.0290
HFO - High with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HFO - Low with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HFO - Aged	5.000E-14	5.000E-14	1.0290
HFO - Low with H+ adsorbed	5.000E-14	5.000E-14	1.0290
HFO - High with H+ adsorbed	5.000E-14	5.000E-14	1.0290
HAO - High surface	5.000E-14	5.000E-14	1.0290
HAO - Low surface	5.000E-14	5.000E-14	1.0290
HAO - High with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HAO - Low with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HAO - Aged	5.000E-14	5.000E-14	1.0290
P - Bound on aged HMO	5.000E-14	5.000E-14	1.0290
Metal soluble - Magnesium	7.200E-10	7.200E-10	1.0290
Metal soluble - Calcium	7.200E-10	7.200E-10	1.0290
Metal soluble - Ferric	4.800E-10	4.800E-10	1.0290
Metal soluble - Ferrous	4.800E-10	4.800E-10	1.0290
Metal soluble - Aluminum	4.800E-10	4.800E-10	1.0290
Other Cations (strong bases)	1.440E-9	1.440E-9	1.0290
Other Anions (strong acids)	1.440E-9	1.440E-9	1.0290
Gas - Dissolved total CO2	1.960E-9	1.960E-9	1.0290
User defined - UD1	6.900E-10	6.900E-10	1.0290
User defined - UD2	6.900E-10	6.900E-10	1.0290
User defined - UD3	5.000E-14	5.000E-14	1.0290
User defined - UD4	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing propionic acetogenic	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing acetotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing hydrogenotrophic	5.000E-14	5.000E-14	1.0290
Gas - Dissolved total sulfides	1.530E-9	1.530E-9	1.0290
S - Soluble sulfate	2.130E-10	2.130E-10	1.0290
S - Particulate elemental sulfur	5.000E-14	5.000E-14	1.0290
Precipitate - Ferrous sulfide	5.000E-14	5.000E-14	1.0290
CODp - Adsorbed hydrocarbon	5.000E-14	5.000E-14	1.0290
CODs - Degradable volatile ind. #1	7.240E-10	7.240E-10	1.0290
CODs - Degradable volatile ind. #2	8.900E-10	8.900E-10	1.0290
CODs - Degradable volatile ind. #3	7.960E-10	7.960E-10	1.0290
CODs - Soluble hydrocarbon	7.120E-10	7.120E-10	1.0290

Gas - Dissolved oxygen	2.500E-9	2.500E-9	1.0290

EPS Strength coefficients [ ]

Name	Default	Value	
Biomass - Ordinary heterotrophic	1.0000	1.0000	1.0000
Biomass - Methylotrophic	1.0000	1.0000	1.0000
Biomass - Ammonia oxidizing	5.0000	5.0000	1.0000
Biomass - Nitrite oxidizing	25.0000	25.0000	1.0000
Biomass - Anaerobic ammonia oxidizing	10.0000	10.0000	1.0000
Biomass - Phosphorus accumulating	1.0000	1.0000	1.0000
Biomass - Propionic acetogenic	1.0000	1.0000	1.0000
Biomass - Acetoclastic methanogenic	1.0000	1.0000	1.0000
Biomass - Hydrogenotrophic methanogenic	1.0000	1.0000	1.0000
Biomass - Endogenous products	1.0000	1.0000	1.0000
CODp - Slowly degradable particulate	1.0000	1.0000	1.0000
CODp - Slowly degradable colloidal	1.0000	1.0000	1.0000
CODp - Degradable external organics	1.0000	1.0000	1.0000
CODp - Undegradable non-cellulose	1.0000	1.0000	1.0000
CODp - Undegradable cellulose	1.0000	1.0000	1.0000
N - Particulate degradable organic	1.0000	1.0000	1.0000
P - Particulate degradable organic	1.0000	1.0000	1.0000
N - Particulate degradable external organics	1.0000	1.0000	1.0000
P - Particulate degradable external organics	1.0000	1.0000	1.0000
N - Particulate undegradable	1.0000	1.0000	1.0000
P - Particulate undegradable	1.0000	1.0000	1.0000
CODp - Stored PHA	1.0000	1.0000	1.0000
P - Releasable stored polyP	1.0000	1.0000	1.0000
P - Unreleasable stored polyP	1.0000	1.0000	1.0000
CODs - Complex readily degradable	0	0	1.0000
CODs - Acetate	0	0	1.0000
CODs - Propionate	0	0	1.0000
CODs - Methanol	0	0	1.0000
Gas - Dissolved hydrogen	0	0	1.0000
Gas - Dissolved methane	0	0	1.0000
N - Ammonia	0	0	1.0000
N - Soluble degradable organic	0	0	1.0000
Gas - Dissolved nitrous oxide	0	0	1.0000
N - Nitrite	0	0	1.0000
N - Nitrate	0	0	1.0000
Gas - Dissolved nitrogen	0	0	1.0000
P - Soluble phosphate	0	0	1.0000
CODs - Undegradable	0	0	1.0000
N - Soluble undegradable organic	0	0	1.0000
Influent inorganic suspended solids	0.3300	0.3300	1.0000
Precipitate - Struvite	1.0000	1.0000	1.0000
Precipitate - Brushite	1.0000	1.0000	1.0000
Precipitate - Hydroxy - apatite	1.0000	1.0000	1.0000
Precipitate - Vivianite	1.0000	1.0000	1.0000
HFO - High surface	1.0000	1.0000	1.0000
HFO - Low surface	1.0000	1.0000	1.0000
HFO - High with H2PO4- adsorbed	1.0000	1.0000	1.0000
HFO - Low with H2PO4- adsorbed	1.0000	1.0000	1.0000
HFO - Aged	1.0000	1.0000	1.0000
HFO - Low with H+ adsorbed	1.0000	1.0000	1.0000
HFO - High with H+ adsorbed	1.0000	1.0000	1.0000
HAO - High surface	1.0000	1.0000	1.0000
HAO - Low surface	1.0000	1.0000	1.0000
HAO - High with H2PO4- adsorbed	1.0000	1.0000	1.0000
HAO - Low with H2PO4- adsorbed	1.0000	1.0000	1.0000
HAO - Aged	1.0000	1.0000	1.0000
P - Bound on aged HMO	1.0000	1.0000	1.0000
Metal soluble - Magnesium	0	0	1.0000
Metal soluble - Calcium	0	0	1.0000
Metal soluble - Ferric	0	0	1.0000
Metal soluble - Ferrous	0	0	1.0000
Metal soluble - Aluminum	0	0	1.0000

Other Cations (strong bases)	0	0	1.0000
Other Anions (strong acids)	0	0	1.0000
Gas - Dissolved total CO2	0	0	1.0000
User defined - UD1	0	0	1.0000
User defined - UD2	0	0	1.0000
User defined - UD3	1.0000	1.0000	1.0000
User defined - UD4	1.0000	1.0000	1.0000
Biomass - Sulfur oxidizing	1.0000	1.0000	1.0000
Biomass - Sulfur reducing propionic acetogenic	1.0000	1.0000	1.0000
Biomass - Sulfur reducing acetotrophic	1.0000	1.0000	1.0000
Biomass - Sulfur reducing hydrogenotrophic	1.0000	1.0000	1.0000
Gas - Dissolved total sulfides	0	0	1.0000
S - Soluble sulfate	0	0	1.0000
S - Particulate elemental sulfur	1.0000	1.0000	1.0000
Precipitate - Ferrous sulfide	1.0000	1.0000	1.0000
CODp - Adsorbed hydrocarbon	1.0000	1.0000	1.0000
CODs - Degradable volatile ind. #1	0	0	1.0000
CODs - Degradable volatile ind. #2	0	0	1.0000
CODs - Degradable volatile ind. #3	0	0	1.0000
CODs - Soluble hydrocarbon	0	0	1.0000
Gas - Dissolved oxygen	0	0	1.0000

Simulation Notes

- Influent values are based on 75th Percentile Loading in main influent and *max month* loadings from drain stations.
- Running at 15 Day Aerobic SRT
- Using 25 C plant temperature. This is a conservative estimate based on winter and spring temperature data at Manatee SWWRF that varied between 23 and 30 C.
- Linear velocity in oxidation ditches set to approximately 0.75 ft/s.
- IMLR set to 250% *influent* flow (not including RAS) for Train A and 350% for Train B.
- Yield of 0.61 should be compared to overall average yield of 0.55 from the data.

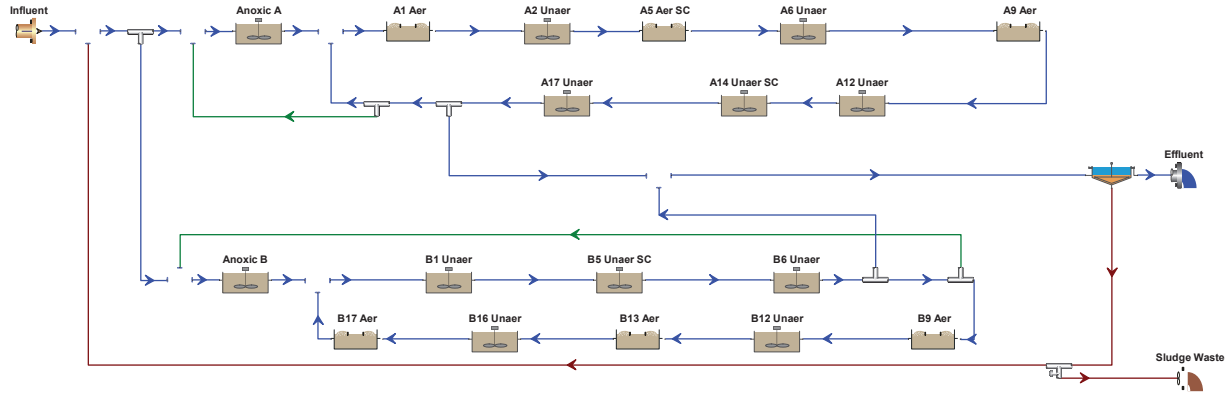
BioWin user and configuration data

Project details
Project name: Manatee County SEWRF Biological Capacity Evaluation
Project ref.: BW1
Plant name: Manatee County SEWRF
User name: ADeVries

Created: 6/21/2019
Saved: 8/8/2019

Steady state solution
Target SRT: 20.00 days
SRT #0: 20.00 days
Temperature: 25.0°C

Flowsheet



Configuration information for all Bioreactor units

Physical data

Element name	Volume [Mil. Gal]	Area [ft2]	Depth [ft]	# of diffusers
Anoxic A	1.0200	1.010E+4	13.500	Un-aerated
Anoxic B	0.5400	5,156.2503	14.000	Un-aerated
A2 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A14 Unaer SC	0.7000	6,931.5848	13.500	Un-aerated
A6 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A12 Unaer	1.0000	9,902.2639	13.500	Un-aerated
A17 Unaer	1.0000	9,902.2639	13.500	Un-aerated
B1 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B5 Unaer SC	0.3600	3,437.5002	14.000	Un-aerated
B6 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B12 Unaer	0.6000	5,729.1670	14.000	Un-aerated
B16 Unaer	0.6000	5,729.1670	14.000	Un-aerated

Operating data Average (flow/time weighted as required)

Element name	Average DO Setpoint [mg/L]
Anoxic A	0
Anoxic B	0
A2 Unaer	0
A14 Unaer SC	0
A6 Unaer	0
A12 Unaer	0
A17 Unaer	0
B1 Unaer	0
B5 Unaer SC	0
B6 Unaer	0
B12 Unaer	0
B16 Unaer	0

Aeration equipment parameters

Element name	k1 in C = k1(PC)^ 0.25 + k2	k2 in C = k1(PC)^ 0.25 + k2	Y in Kla = C Usg ^ Y - Usg in [m3/(m2 d)]	Area of one diffuser	Diffuser mounting height	Min. air flow rate per diffuser ft3/min (20C, 1 atm)	Max. air flow rate per diffuser ft3/min (20C, 1 atm)	'A' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2	'B' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2	'C' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2
Anoxic A	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
Anoxic B	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A2 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A14 Unaer SC	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A6 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A12 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
A17 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B1 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B5 Unaer SC	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B6 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B12 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0
B16 Unaer	1.2400	0.8960	0.8880	0.4413	0.2500	0.2943	5.8858	2.9999	0	0

Configuration information for all Influent - BOD units

Operating data Average (flow/time weighted as required)

Element name	Influent
Flow	10.75

BOD - Total Carbonaceous mgBOD/L	191.00
Volatile suspended solids mg/L	179.00
Total suspended solids mg/L	211.00
N - Total Kjeldahl Nitrogen mgN/L	46.00
P - Total P mgP/L	8.00
N - Nitrate mgN/L	0
pH	7.30
Alkalinity mmol/L	6.64
Metal soluble - Calcium mg/L	80.00
Metal soluble - Magnesium mg/L	15.00
Gas - Dissolved oxygen mg/L	0

Element name	Influent
Fbs - Readily biodegradable (including Acetate) [gCOD/g of total COD]	0.1600
Fac - Acetate [gCOD/g of readily biodegradable COD]	0.1500
Fxsp - Non-colloidal slowly biodegradable [gCOD/g of slowly degradable COD]	0.9140
Fus - Unbiodegradable soluble [gCOD/g of total COD]	0.0500
Fup - Unbiodegradable particulate [gCOD/g of total COD]	0.1300
Fcel - Cellulose fraction of unbiodegradable particulate [gCOD/gCOD]	0.5000
Fna - Ammonia [gNH3-N/gTKN]	0.6600
Fnox - Particulate organic nitrogen [gN/g Organic N]	0.5000
Fnus - Soluble unbiodegradable TKN [gN/gTKN]	0.0200
FupN - N:COD ratio for unbiodegradable part. COD [gN/gCOD]	0.0350
Fpo4 - Phosphate [gPO4-P/gTP]	0.5000
FupP - P:COD ratio for unbiodegradable part. COD [gP/gCOD]	0.0110
Fsr - Reduced sulfur [H2S] [gS/gS]	0.1500
FZbh - Ordinary heterotrophic COD fraction [gCOD/g of total COD]	0.0200
FZbm - Methylotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZao - Ammonia oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZno - Nitrite oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZaao - Anaerobic ammonia oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZppa - Phosphorus accumulating COD fraction [gCOD/g of total COD]	1.000E-4
FZpa - Propionic acetogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZam - Acetoclastic methanogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZhm - Hydrogenotrophic methanogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZso - Sulfur oxidizing COD fraction [gCOD/g of total COD]	1.000E-4
FZsrpa - Sulfur reducing propionic acetogenic COD fraction [gCOD/g of total COD]	1.000E-4
FZsra - Sulfur reducing acetotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZsrh - Sulfur reducing hydrogenotrophic COD fraction [gCOD/g of total COD]	1.000E-4
FZe - Endogenous products COD fraction [gCOD/g of total COD]	0

Configuration information for all Effluent units

Configuration information for all Clarifier - Ideal units

Physical data

Element name	Volume[Mil. Gal]	Area[ft2]	Depth[ft]
Clarifier - Ideal109	3.9807	3.801E+4	14.000

Operating data Average (flow/time weighted as required)

Element name	Split method	Average Split specification
Clarifier - Ideal109	Ratio	1.21

Element name	Average Temperature	Reactive	Percent removal	Blanket fraction

Clarifier - Ideal109	Uses global setting	No	99.80	0.05

Configuration information for all Sludge units

Configuration information for all Splitter units

Operating data Average (flow/time weighted as required)

Element name	Split method	Average Split specification
Main Flow Split	Fraction	0.33
IMLR Splitter A	Flowrate [Side]	17.92
Effluent A Splitter	Flowrate [Main]	295
Effluent B Splitter	Flowrate [Main]	155
IMLR Splitter B	Flowrate [Side]	12.54
RAS/WAS Splitter	Flowrate [Side]	0.243905957050157

Configuration information for all Bioreactor - Surface aeration units

Physical data

Element name	Volume[Mil. Gal]	Area[ft2]	Depth[ft]
A1 Aer	0.4600	4,555.0414	13.500
A5 Aer SC	0.2100	2,079.4754	13.500
A9 Aer	0.4600	4,555.0414	13.500
B9 Aer	0.1000	954.8612	14.000
B13 Aer	0.1000	954.8612	14.000
B17 Aer	0.1000	954.8612	14.000

Operating data Average (flow/time weighted as required)

Element name	Average Power supply rate [hp]
A1 Aer	250.0
A5 Aer SC	250.0
A9 Aer	250.0
B9 Aer	125.0
B13 Aer	125.0
B17 Aer	125.0

Aeration equipment parameters

Element name	Surface aerator Std. oxygen transfer rate [lb O /(hp hr)]
A1 Aer	2.2000
A5 Aer SC	2.2000
A9 Aer	2.2000
B9 Aer	2.2000
B13 Aer	2.2000
B17 Aer	2.2000

BioWin Album

Album page - Influent vs Effluent

Influent			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	6.64	270.20	mmol/L and kmol/d
BOD - Filtered Carbonaceous	56.50	5,069.10	
BOD - Total Carbonaceous	191.00	17,135.20	
COD - Filtered	103.18	9,256.47	
COD - Particulate	286.29	25,684.08	
COD - Total	389.47	34,940.55	
COD - Volatile fatty acids	9.35	838.57	
Influent inorganic suspended solids	30.33	2,720.83	
ISS cellular	0.70	62.63	
ISS precipitate	0	0	
ISS Total	32.00	2,870.82	
N - Ammonia	30.36	2,723.69	
N - Filtered TKN	37.91	3,400.84	
N - Nitrate	0	0	
N - Nitrite + Nitrate	0	0	
N - Particulate TKN	8.09	725.96	
N - Total inorganic N	30.36	2,723.69	
N - Total Kjeldahl Nitrogen	46.00	4,126.80	
N - Total N	46.00	4,126.80	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	4.00	358.85	
P - Total P	8.00	717.70	
pH	7.30		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	211.00	18,929.46	
Volatile suspended solids	179.00	16,058.64	

Parameter	Value	Units

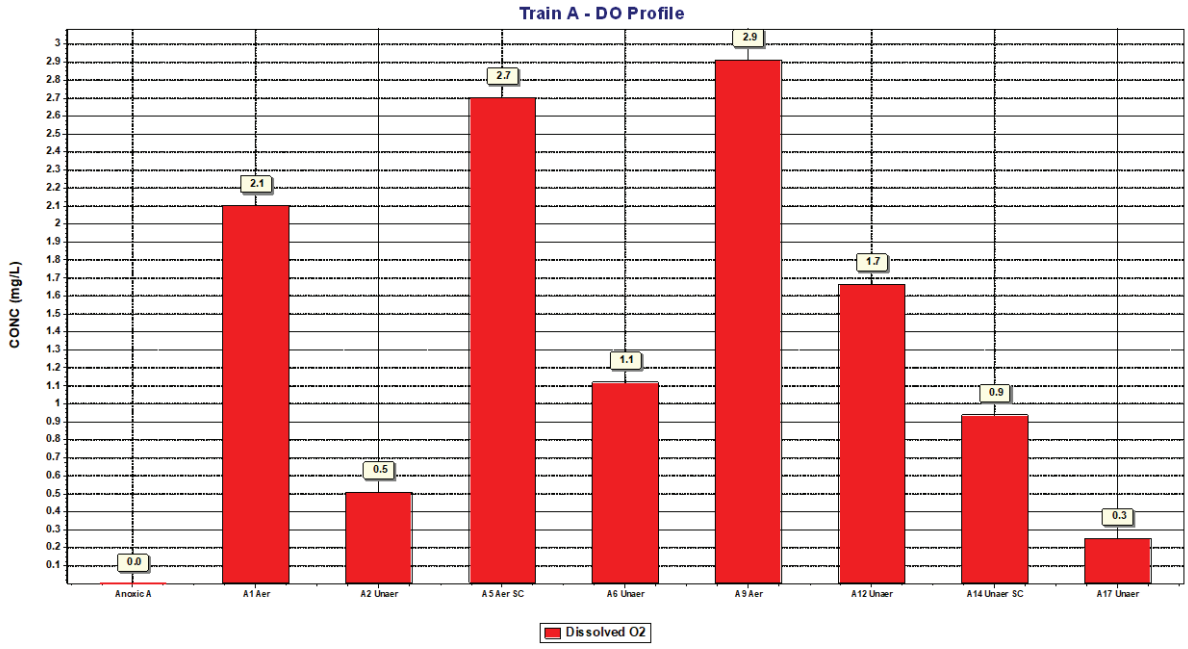
Album page - Influent vs Effluent

Effluent			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	3.74	148.68	mmol/L and kmol/d
BOD - Filtered Carbonaceous	0.79	68.98	
BOD - Total Carbonaceous	2.82	246.89	
COD - Filtered	20.63	1,808.39	
COD - Particulate	11.85	1,038.55	
COD - Total	32.47	2,846.94	
COD - Volatile fatty acids	0.00	0.35	
Influent inorganic suspended solids	2.93	257.31	
ISS cellular	0.56	49.53	
ISS precipitate	0	0	
ISS Total	3.50	306.90	
N - Ammonia	0.23	19.85	
N - Filtered TKN	1.69	148.57	
N - Nitrate	10.01	877.67	
N - Nitrite + Nitrate	10.08	884.07	
N - Particulate TKN	0.57	49.92	
N - Total inorganic N	10.31	903.92	
N - Total Kjeldahl Nitrogen	2.26	198.49	
N - Total N	12.35	1,082.56	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	6.15	538.83	
P - Total P	6.33	554.57	
pH	7.41		
S - Total S	0	0	

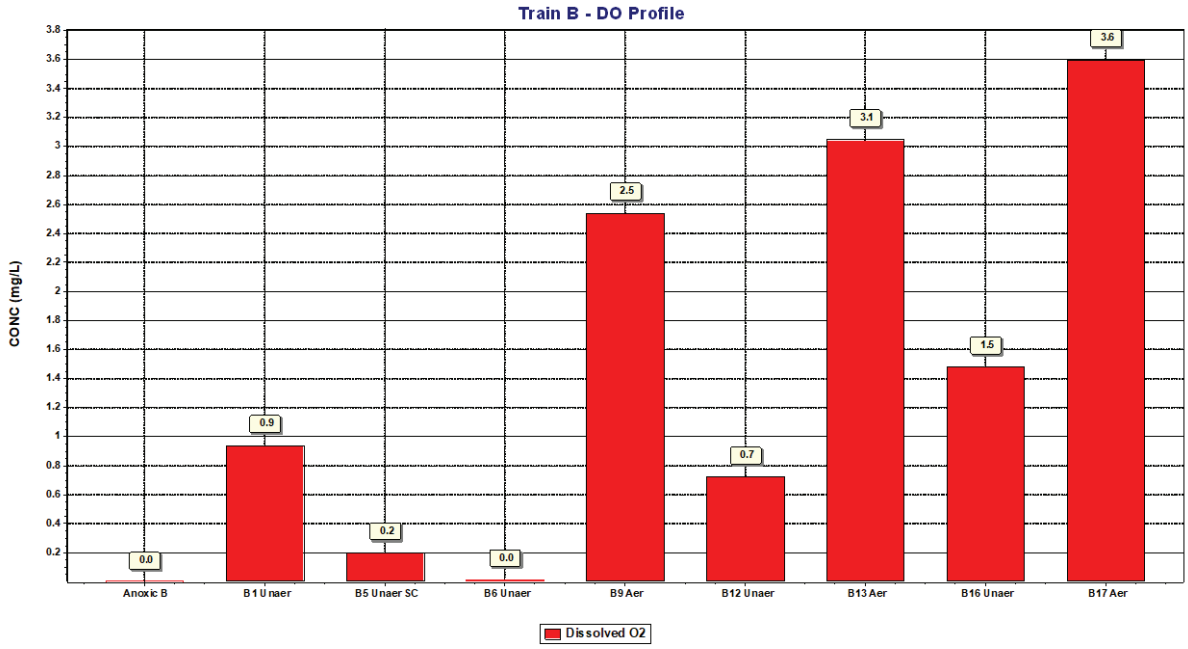
Total aluminium (all forms)	0	0
Total iron (all forms)	0	0
Total suspended solids	11.66	1,022.10
Volatile suspended solids	8.16	715.20

Parameter	Value	Units
Cost (Chemicals)	0	$/hour
Power	0	kW
Power cost (Excl. heating)	0	$/hour

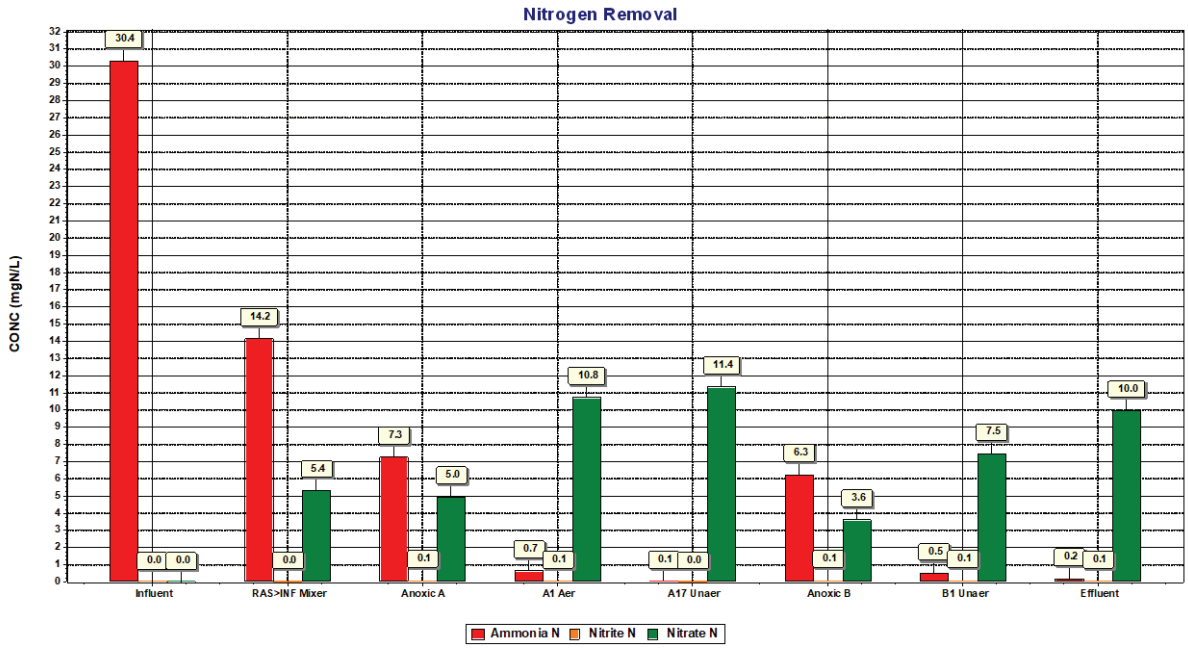
Album page - Train A DO



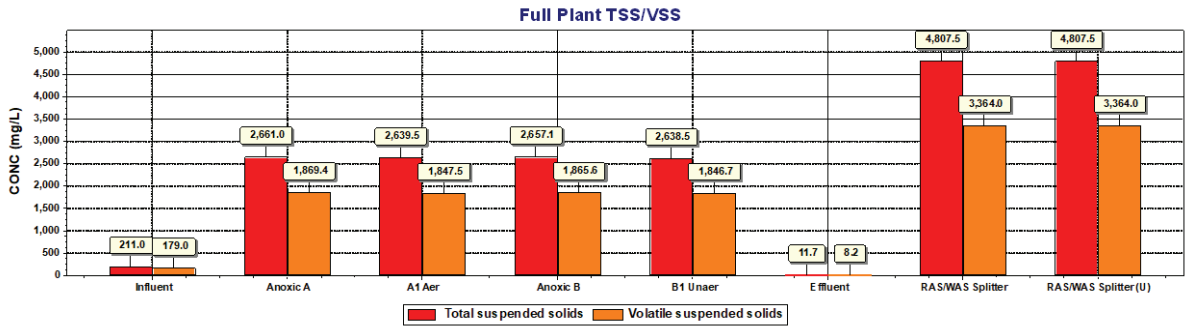
Album page - Train B DO



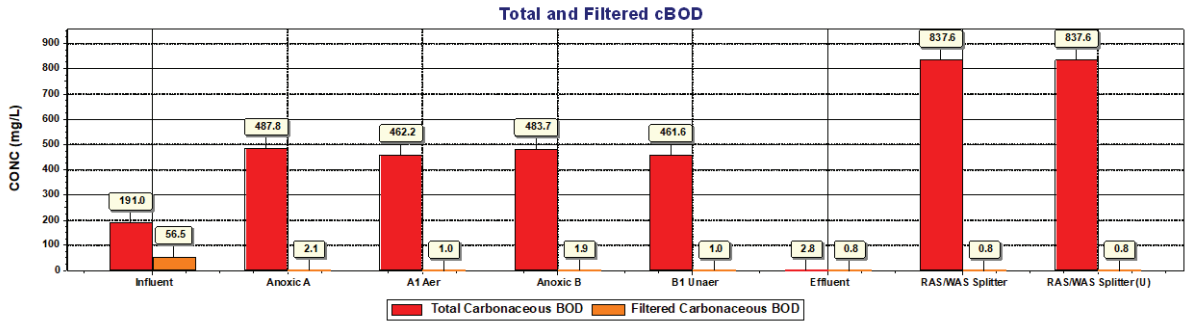
Album page - Nitrogen Removal



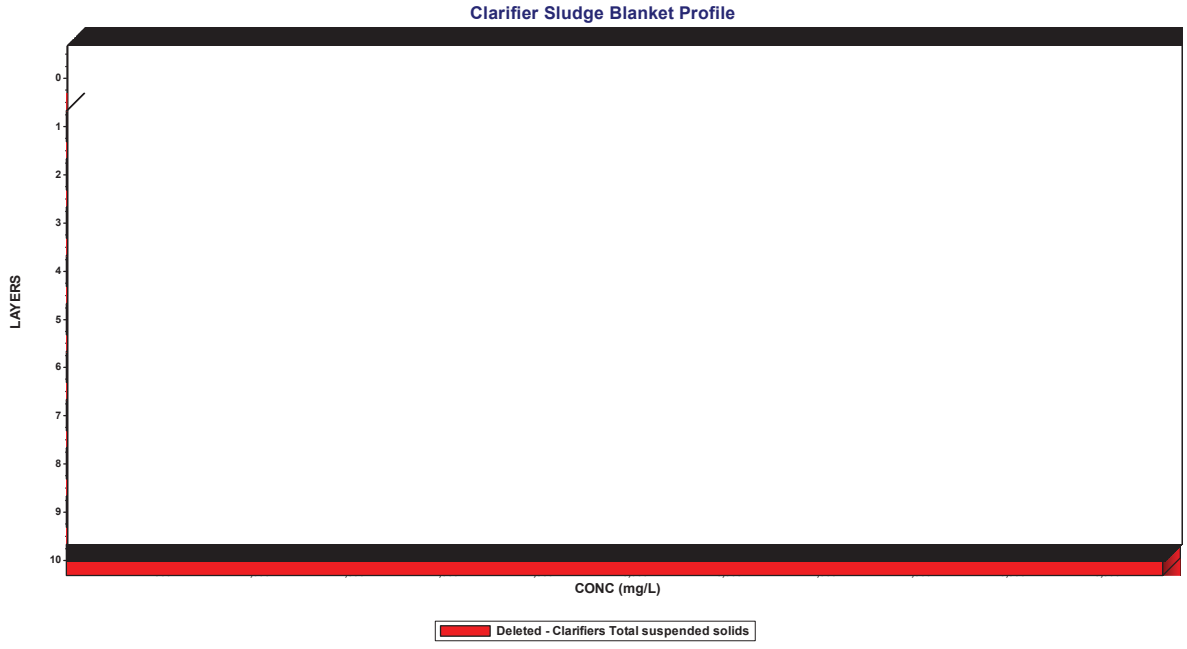
Album page - TSS/VSS and BOD



Album page - TSS/VSS and BOD



Album page - Page 6



Album page - Page 7

IMLR Mixer A			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	4.30	544.14	mmol/L and kmol/d
BOD - Filtered Carbonaceous	12.78	3,561.12	
BOD - Total Carbonaceous	495.92	138,230.51	
COD - Filtered	38.38	10,697.38	
COD - Particulate	2,714.65	756,667.61	
COD - Total	2,753.03	767,364.99	
COD - Volatile fatty acids	2.01	559.66	
Influent inorganic suspended solids	663.97	185,070.76	
ISS cellular	126.74	35,327.07	
ISS precipitate	0	0	
ISS Total	791.07	220,499.04	
N - Ammonia	6.62	1,844.54	
N - Filtered TKN	9.40	2,621.30	
N - Nitrate	8.58	2,392.81	
N - Nitrite + Nitrate	8.62	2,402.51	
N - Particulate TKN	129.29	36,038.57	
N - Total inorganic N	15.24	4,247.05	
N - Total Kjeldahl Nitrogen	138.70	38,659.87	
N - Total N	147.32	41,062.38	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	5.69	1,585.71	
P - Total P	46.74	13,029.41	
pH	7.37		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	2,656.69	740,510.63	
Volatile suspended solids	1,865.62	520,011.59	

Parameter	Value	Units

Album page - Page 7

IMLR Mixer 2			
Parameters	Conc. (mg/L)	Mass rate (lb/d)	Notes
Alkalinity	4.38	336.11	mmol/L and kmol/d
BOD - Filtered Carbonaceous	10.55	1,786.12	
BOD - Total Carbonaceous	490.35	82,983.73	
COD - Filtered	35.12	5,943.99	
COD - Particulate	2,709.80	458,590.46	
COD - Total	2,744.92	464,534.45	
COD - Volatile fatty acids	1.66	280.47	
Influent inorganic suspended solids	663.97	112,366.01	
ISS cellular	126.81	21,460.49	
ISS precipitate	0	0	
ISS Total	791.12	133,883.82	
N - Ammonia	5.72	968.59	
N - Filtered TKN	8.23	1,393.38	
N - Nitrate	6.58	1,112.92	
N - Nitrite + Nitrate	6.69	1,131.89	
N - Particulate TKN	129.21	21,866.35	
N - Total inorganic N	12.41	2,100.48	
N - Total Kjeldahl Nitrogen	137.44	23,259.73	
N - Total N	144.13	24,391.62	
P - Phosphorus in HMO	0	0	
P - Soluble PO4-P	5.76	974.42	
P - Total P	46.74	7,910.83	
pH	7.38		
S - Total S	0	0	
Total aluminium (all forms)	0	0	
Total iron (all forms)	0	0	
Total suspended solids	2,653.84	449,119.43	
Volatile suspended solids	1,862.72	315,235.61	

Parameter	Value	Units

Global Parameters

Common

Name	Default	Value	
Hydrolysis rate [1/d]	2.1000	2.1000	1.0290
Hydrolysis half sat. [-]	0.0600	0.0600	1.0000
Anoxic hydrolysis factor [-]	0.2800	0.2800	1.0000
Anaerobic hydrolysis factor (AS) [-]	0.0400	0.0400	1.0000
Anaerobic hydrolysis factor (AD) [-]	0.5000	0.5000	1.0000
Adsorption rate of colloids [L/(mgCOD d)]	0.1500	0.1500	1.0290
Ammonification rate [L/(mgCOD d)]	0.0800	0.0800	1.0290
Assimilative nitrate/nitrite reduction rate [1/d]	0.5000	0.5000	1.0000
Endogenous products decay rate [1/d]	0	0	1.0000

Ammonia oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.9000	0.9000	1.0720
Substrate (NH4) half sat. [mgN/L]	0.7000	0.7000	1.0000
Byproduct NH4 logistic slope [-]	50.0000	50.0000	1.0000
Byproduct NH4 inflection point [mgN/L]	1.4000	1.4000	1.0000
Denite DO half sat. [mg/L]	0.1000	0.1000	1.0000
Denite HNO2 half sat. [mgN/L]	5.000E-6	5.000E-6	1.0000
Aerobic decay rate [1/d]	0.1700	0.1700	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0800	0.0800	1.0290
KiHNO2 [mmol/L]	5.000E-3	5.000E-3	1.0000

Nitrite oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.7000	0.7000	1.0600
Substrate (NO2) half sat. [mgN/L]	0.1000	0.1000	1.0000
Aerobic decay rate [1/d]	0.1700	0.1700	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0800	0.0800	1.0290
KiNH3 [mmol/L]	0.0750	0.0750	1.0000

Anaerobic ammonia oxidizing

Name	Default	Value	
Max. spec. growth rate [1/d]	0.2000	0.2000	1.1000
Substrate (NH4) half sat. [mgN/L]	2.0000	2.0000	1.0000
Substrate (NO2) half sat. [mgN/L]	1.0000	1.0000	1.0000
Aerobic decay rate [1/d]	0.0190	0.0190	1.0290
Anoxic/anaerobic decay rate [1/d]	9.500E-3	9.500E-3	1.0290
Ki Nitrite [mgN/L]	1,000.0000	1,000.0000	1.0000
Nitrite sensitivity constant [L / (d mgN)]	0.0160	0.0160	1.0000

Ordinary heterotrophic

Name	Default	Value	
Max. spec. growth rate [1/d]	3.2000	3.2000	1.0290
Substrate half sat. [mgCOD/L]	5.0000	5.0000	1.0000
Anoxic growth factor [-]	0.5000	0.5000	1.0000
Denite N2 producers (NO3 or NO2) [-]	0.5000	0.5000	1.0000
Aerobic decay rate [1/d]	0.6200	0.6200	1.0290
Anoxic decay rate [1/d]	0.2330	0.2330	1.0290
Anaerobic decay rate [1/d]	0.1310	0.1310	1.0290
Fermentation rate [1/d]	1.6000	1.6000	1.0290
Fermentation half sat. [mgCOD/L]	5.0000	5.0000	1.0000
Fermentation growth factor (AS) [-]	0.2500	0.2500	1.0000
Free nitrous acid inhibition [mol/L]	1.000E-7	1.000E-7	1.0000

Heterotrophic on industrial COD

Name	Default	Value	
Maximum specific growth rate on Ind #1 COD [1/d]	4.3000	4.3000	1.0290
Substrate (Ind #1) half sat. [mgCOD/L]	1.0000	1.0000	1.0000
Inhibition coefficient for Ind #1 [mgCOD/L]	60.0000	60.0000	1.0000
Anaerobic growth factor for Ind #1 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on Ind #2 COD [1/d]	1.5000	1.5000	1.0290
Substrate (Ind #2) half sat. [mgCOD/L]	30.0000	30.0000	1.0000
Inhibition coefficient for Ind #2 [mgCOD/L]	3,000.0000	3,000.0000	1.0000
Anaerobic growth factor for Ind #2 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on Ind #3 COD [1/d]	4.3000	4.3000	1.0290
Substrate (Ind #3) half sat. [mgCOD/L]	1.0000	1.0000	1.0000
Inhibition coefficient for Ind #3 COD [mgCOD/L]	60.0000	60.0000	1.0000
Anaerobic growth factor for Ind #3 [mgCOD/L]	0.0500	0.0500	1.0000
Maximum specific growth rate on adsorbed hydrocarbon COD [1/d]	2.0000	2.0000	1.0290
Substrate (adsorbed hydrocarbon) half sat. [-]	0.1500	0.1500	1.0000
Anaerobic growth factor for adsorbed hydrocarbons [mgCOD/L]	0.0100	0.0100	1.0000
Adsorption rate of soluble hydrocarbons [l/(mgCOD d)]	0.2000	0.2000	1.0000

Methylotrophic

Name	Default	Value	
Max. spec. growth rate [1/d]	1.3000	1.3000	1.0720
Methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
Denite N2 producers (NO3 or NO2) [-]	0.5000	0.5000	1.0000
Aerobic decay rate [1/d]	0.0400	0.0400	1.0290
Anoxic/anaerobic decay rate [1/d]	0.0300	0.0300	1.0290
Free nitrous acid inhibition [mmol/L]	1.000E-7	1.000E-7	1.0000

Phosphorus accumulating

Name	Default	Value	
Max. spec. growth rate [1/d]	0.9500	0.9500	1.0000
Max. spec. growth rate, P-limited [1/d]	0.4200	0.4200	1.0000
Substrate half sat. [mgCOD(PHB)/mgCOD(Zbp)]	0.1000	0.1000	1.0000
Substrate half sat., P-limited [mgCOD(PHB)/mgCOD(Zbp)]	0.0500	0.0500	1.0000
Magnesium half sat. [mgMg/L]	0.1000	0.1000	1.0000
Cation half sat. [mmol/L]	0.1000	0.1000	1.0000
Calcium half sat. [mgCa/L]	0.1000	0.1000	1.0000
Aerobic/anoxic decay rate [1/d]	0.1000	0.1000	1.0000
Aerobic/anoxic maintenance rate [1/d]	0	0	1.0000
Anaerobic decay rate [1/d]	0.0400	0.0400	1.0000
Anaerobic maintenance rate [1/d]	0	0	1.0000
Sequestration rate [1/d]	4.5000	4.5000	1.0000
Anoxic growth factor [-]	0.3300	0.3300	1.0000

Propionic acetogenic

Name	Default	Value	
Max. spec. growth rate [1/d]	0.2500	0.2500	1.0290
Substrate half sat. [mgCOD/L]	10.0000	10.0000	1.0000
Acetate inhibition [mgCOD/L]	10,000.0000	10,000.0000	1.0000
Anaerobic decay rate [1/d]	0.0500	0.0500	1.0290
Aerobic/anoxic decay rate [1/d]	0.5200	0.5200	1.0290

Methanogenic

Name	Default	Value	
Acetoclastic max. spec. growth rate [1/d]	0.3000	0.3000	1.0290
H2-utilizing max. spec. growth rate [1/d]	1.4000	1.4000	1.0290
Acetoclastic substrate half sat. [mgCOD/L]	100.0000	100.0000	1.0000
Acetoclastic methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
H2-utilizing CO2 half sat. [mmol/L]	0.1000	0.1000	1.0000
H2-utilizing substrate half sat. [mgCOD/L]	1.0000	1.0000	1.0000
H2-utilizing methanol half sat. [mgCOD/L]	0.5000	0.5000	1.0000
Acetoclastic propionic inhibition [mgCOD/L]	10,000.0000	10,000.0000	1.0000
Acetoclastic anaerobic decay rate [1/d]	0.1300	0.1300	1.0290
Acetoclastic aerobic/anoxic decay rate [1/d]	0.6000	0.6000	1.0290
H2-utilizing anaerobic decay rate [1/d]	0.1300	0.1300	1.0290
H2-utilizing aerobic/anoxic decay rate [1/d]	2.8000	2.8000	1.0290

Sulfur oxidizing

Name	Default	Value	
Maximum specific growth rate (sulfide) [1/d]	0.7500	0.7500	1.0290
Maximum specific growth rate (sulfur) [1/d]	0.1000	0.1000	1.0290
Substrate (H2S) half sat. [mgS/L]	1.0000	1.0000	1.0000
Substrate (sulfur) half sat. [mgS/L]	1.0000	1.0000	1.0000
Anoxic growth factor [-]	0.5000	0.5000	1.0000
Decay rate [1/d]	0.0400	0.0400	1.0290

Sulfur reducing

Name	Default	Value	
Propionic max. spec. growth rate [1/d]	0.5830	0.5830	1.0350
Propionic acid half sat. [mgCOD/L]	295.0000	295.0000	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	185.0000	185.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	2.4700	2.4700	1.0000
Decay rate [1/d]	0.0185	0.0185	1.0350
Acetotrophic max. spec. growth rate [1/d]	0.6120	0.6120	1.0350
Acetic acid half sat. [mgCOD/L]	24.0000	24.0000	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	164.0000	164.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	6.4100	6.4100	1.0000
Decay rate [1/d]	0.0275	0.0275	1.0350
Hydrogenotrophic max. spec. growth rate with SO4= [1/d]	2.8000	2.8000	1.0350
Hydrogenotrophic max. spec. growth rate with S [1/d]	0.1000	0.1000	1.0350
Hydrogen half sat. [mgCOD/L]	0.0700	0.0700	1.0000
Hydrogen sulfide inhibition coefficient [mgS/L]	550.0000	550.0000	1.0000
Sulfate (SO4=) half sat. [mgS/L]	6.4100	6.4100	1.0000
Sulfur (S) half sat. [mgS/L]	50.0000	50.0000	1.0000
Decay rate [1/d]	0.0600	0.0600	1.0350

pH

Name	Default	Value
Ordinary heterotrophic low pH limit [-]	4.0000	4.0000
Ordinary heterotrophic high pH limit [-]	10.0000	10.0000
Methylotrophic low pH limit [-]	4.0000	4.0000
Methylotrophic high pH limit [-]	10.0000	10.0000
Autotrophic low pH limit [-]	5.5000	5.5000
Autotrophic high pH limit [-]	9.5000	9.5000
Phosphorus accumulating low pH limit [-]	4.0000	4.0000
Phosphorus accumulating high pH limit [-]	10.0000	10.0000
Ordinary heterotrophic low pH limit (anaerobic) [-]	5.5000	5.5000
Ordinary heterotrophic high pH limit (anaerobic) [-]	8.5000	8.5000
Propionic acetogenic low pH limit [-]	4.0000	4.0000
Propionic acetogenic high pH limit [-]	10.0000	10.0000
Acetoclastic methanogenic low pH limit [-]	5.0000	5.0000
Acetoclastic methanogenic high pH limit [-]	9.0000	9.0000
H2-utilizing methanogenic low pH limit [-]	5.0000	5.0000
H2-utilizing methanogenic high pH limit [-]	9.0000	9.0000

Switches

Name	Default	Value
Ordinary heterotrophic DO half sat. [mgO2/L]	0.1500	0.1500
Phosphorus accumulating DO half sat. [mgO2/L]	0.0500	0.0500
Anoxic/anaerobic NOx half sat. [mgN/L]	0.1500	0.1500
Ammonia oxidizing DO half sat. [mgO2/L]	0.2500	0.2500
Nitrite oxidizing DO half sat. [mgO2/L]	0.5000	0.5000
Anaerobic ammonia oxidizing DO half sat. [mgO2/L]	0.0100	0.0100
Sulfur oxidizing sulfate pathway DO half sat. [mgO2/L]	0.2500	0.2500
Sulfur oxidizing sulfur pathway DO half sat. [mgO2/L]	0.0500	0.0500
Anoxic NO3(->NO2) half sat. [mgN/L]	0.1000	0.1000
Anoxic NO3(->N2) half sat. [mgN/L]	0.0500	0.0500
Anoxic NO2(->N2) half sat. (mgN/L)	0.0100	0.0100
NH3 nutrient half sat. [mgN/L]	5.000E-3	5.000E-3
PolyP half sat. [mgP/mgCOD]	0.0100	0.0100
VFA sequestration half sat. [mgCOD/L]	5.0000	5.0000
P uptake half sat. [mgP/L]	0.1500	0.1500
P nutrient half sat. [mgP/L]	1.000E-3	1.000E-3
Autotrophic CO2 half sat. [mmol/L]	0.1000	0.1000
H2 low/high half sat. [mgCOD/L]	1.0000	1.0000
Propionic acetogenic H2 inhibition [mgCOD/L]	5.0000	5.0000
Synthesis anion/cation half sat. [meq/L]	0.0100	0.0100

Common

Name	Default	Value
Biomass/Endog Ca content (gCa/gCOD)	3.912E-3	3.912E-3
Biomass/Endog Mg content (gMg/gCOD)	3.912E-3	3.912E-3
Biomass/Endog other cations content (mol/gCOD)	5.115E-4	5.115E-4
Biomass/Endog other Anions content (mol/gCOD)	1.410E-4	1.410E-4
N in endogenous residue [mgN/mgCOD]	0.0700	0.0700
P in endogenous residue [mgP/mgCOD]	0.0220	0.0220
Ca content of slowly biodegradabe (gCa/gCOD)	3.912E-3	3.912E-3
Mg content of slowly biodegradabe (gMg/gCOD)	3.700E-4	3.700E-4
Endogenous residue COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Particulate substrate COD:VSS ratio [mgCOD/mgVSS]	1.6327	1.6327
Particulate inert COD:VSS ratio [mgCOD/mgVSS]	1.6000	1.6000
Cellulose COD:VSS ratio [mgCOD/mgVSS]	1.4000	1.4000
External organic COD:VSS ratio [mgCOD/mgVSS]	1.6000	1.6000
Molecular weight of other anions [mg/mmol]	35.5000	35.5000
Molecular weight of other cations [mg/mmol]	39.0983	39.0983

Ammonia oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.1500	0.1500
Denite NO2 fraction as TEA [-]	0.5000	0.5000
Byproduct NH4 fraction to N2O [-]	2.500E-3	2.500E-3
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Nitrite oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.0900	0.0900
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Anaerobic ammonia oxidizing

Name	Default	Value
Yield [mgCOD/mgN]	0.1140	0.1140
Nitrate production [mgN/mgBiomassCOD]	2.2800	2.2800
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Ordinary heterotrophic

Name	Default	Value
Yield (aerobic) [-]	0.6660	0.6660
Yield (fermentation, low H2) [-]	0.1000	0.1000
Yield (fermentation, high H2) [-]	0.1000	0.1000
H2 yield (fermentation low H2) [-]	0.3500	0.3500
H2 yield (fermentation high H2) [-]	0	0
Propionate yield (fermentation, low H2) [-]	0	0
Propionate yield (fermentation, high H2) [-]	0.7000	0.7000
CO2 yield (fermentation, low H2) [-]	0.7000	0.7000
CO2 yield (fermentation, high H2) [-]	0	0
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Endogenous fraction - aerobic [-]	0.0800	0.0800
Endogenous fraction - anoxic [-]	0.1030	0.1030
Endogenous fraction - anaerobic [-]	0.1840	0.1840
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Yield (anoxic) [-]	0.5400	0.5400
Yield propionic (aerobic) [-]	0.6400	0.6400
Yield propionic (anoxic) [-]	0.4600	0.4600
Yield acetic (aerobic) [-]	0.6000	0.6000
Yield acetic (anoxic) [-]	0.4300	0.4300
Yield methanol (aerobic) [-]	0.5000	0.5000
Adsorp. max. [-]	1.0000	1.0000
Max fraction to N2O at high FNA over nitrate [-]	0.0500	0.0500
Max fraction to N2O at high FNA over nitrite [-]	0.1000	0.1000

Ordinary heterotrophic on industrial COD

Name	Default	Value
Yield Ind #1 COD (Aerobic) [-]	0.5000	0.5000
Yield Ind #1 COD (Anoxic) [-]	0.4000	0.4000
Yield Ind #1 COD (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Ind #1 COD [gCOD/Mol]	224.0000	224.0000
Yield Ind #2 COD (Aerobic) [-]	0.5000	0.5000
Yield Ind #2 COD (Anoxic) [-]	0.4000	0.4000
Yield Ind #2 COD (Anaerobic) [-]	0.0500	0.0500
COD:Mole ratio - Ind #2 COD [gCOD/Mol]	240.0000	240.0000
Yield on Ind #3 COD (Aerobic) [-]	0.5000	0.5000
Yield on Ind #3 COD (Anoxic) [-]	0.4000	0.4000
Yield on Ind #3 COD (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Ind #3 COD [gCOD/Mol]	288.0000	288.0000
Yield enmeshed hydrocarbons (Aerobic) [-]	0.5000	0.5000
Yield enmeshed hydrocarbons (Anoxic) [-]	0.4000	0.4000
Yield enmeshed hydrocarbons (Anaerobic) [-]	0.0400	0.0400
COD:Mole ratio - Hydrocarbon COD [gCOD/Mol]	336.0000	336.0000
Hydrocarbon COD:VSS ratio [mgCOD/mgVSS]	3.2000	3.2000
Max. hydrocarbon adsorp. ratio [-]	1.0000	1.0000
Yield of Ind #1 on Ind #3 COD (Aerobic) [-]	0	0
Yield of Ind #1 on Ind #3 COD (Anoxic) [-]	0	0
Hydrocarbon Yield on Ind #3 COD (Aerobic) [-]	0	0
Hydrocarbon Yield on Ind #3 COD (Anoxic) [-]	0	0

Methylotrophic

Name	Default	Value
Yield (anoxic) [-]	0.4000	0.4000
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Max fraction to N2O at high FNA over nitrate [-]	0.1000	0.1000
Max fraction to N2O at high FNA over nitrite [-]	0.1500	0.1500

Phosphorus accumulating

Name	Default	Value
Yield (aerobic) [-]	0.6390	0.6390
Yield (anoxic) [-]	0.5200	0.5200
Aerobic P/PHA uptake [mgP/mgCOD]	0.9300	0.9300
Anoxic P/PHA uptake [mgP/mgCOD]	0.3500	0.3500
Yield of PHA on sequestration [-]	0.8890	0.8890
N in biomass [mgN/mgCOD]	0.0700	0.0700
N in sol. inert [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous part. [-]	0.2500	0.2500
Inert fraction of endogenous sol. [-]	0.2000	0.2000
P/Ac release ratio [mgP/mgCOD]	0.5100	0.5100
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
Yield of low PP [-]	0.9400	0.9400
Mg to P mole ratio in polyphosphate [mmolMg/mmolP]	0.3000	0.3000
Cation to P mole ratio in polyphosphate [meq/mmolP]	0.1500	0.1500
Ca to P mole ratio in polyphosphate [mmolCa/mmolP]	0.0500	0.0500

Propionic acetogenic

Name	Default	Value
Yield [-]	0.1000	0.1000
H2 yield [-]	0.4000	0.4000
CO2 yield [-]	1.0000	1.0000
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Methanogenic

Name	Default	Value
Acetoclastic yield [-]	0.1000	0.1000
Acetoclastic yield on methanol[-]	0.1000	0.1000
H2-utilizing yield [-]	0.1000	0.1000
H2-utilizing yield on methanol [-]	0.1000	0.1000
N in acetoclastic biomass [mgN/mgCOD]	0.0700	0.0700
N in H2-utilizing biomass [mgN/mgCOD]	0.0700	0.0700
P in acetoclastic biomass [mgP/mgCOD]	0.0220	0.0220
P in H2-utilizing biomass [mgP/mgCOD]	0.0220	0.0220
Acetoclastic fraction to endog. residue [-]	0.0800	0.0800
H2-utilizing fraction to endog. residue [-]	0.0800	0.0800
Acetoclastic COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200
H2-utilizing COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Sulfur oxidizing

Name	Default	Value
Yield (aerobic) [mgCOD/mgS]	0.5000	0.5000
Yield (Anoxic) [mgCOD/mgS]	0.3500	0.3500
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

Sulfur reducing

Name	Default	Value
Yield [mgCOD/mg H2 COD]	0.0712	0.0712
Yield [mgCOD/mg Ac COD]	0.0470	0.0470
Yield [mgCOD/mg Pr COD]	0.0384	0.0384
N in biomass [mgN/mgCOD]	0.0700	0.0700
P in biomass [mgP/mgCOD]	0.0220	0.0220
Fraction to endogenous residue [-]	0.0800	0.0800
COD:VSS ratio [mgCOD/mgVSS]	1.4200	1.4200

General

Name	Default	Value
Tank head loss per metre of length (from flow) [m/m]	2.500E-3	2.500E-3
BOD calculation rate constant for Xsc degradation [/d]	0.5000	0.5000
BOD calculation rate constant for Xsp (and hydrocarbon) degradation [/d]	0.5000	0.5000
BOD calculation rate constant for Xeo degradation [/d]	0.5000	0.5000

Heating fuel/Chemical Costs

Name	Default	Value
Methanol [$/gal]	1.6656	1.6656
Ferric [$/gal]	0.3785	0.3785
Ferrous [$/gal]	0.3785	0.3785
Aluminium [$/gal]	0.3028	0.3028
Natural gas [$/MMBTU]	3.1652	3.1652
Heating oil [$/gal]	1.8927	1.8927
Diesel [$/gal]	2.6498	2.6498
Custom fuel [$/gal]	3.7854	3.7854
Biogas sale price [$/MMBTU]	2.1101	2.1101

Anaerobic digester

Name	Default	Value
Bubble rise velocity (anaerobic digester) [cm/s]	23.9000	23.9000
Bubble Sauter mean diameter (anaerobic digester) [cm]	0.3500	0.3500
Anaerobic digester gas hold-up factor []	1.0000	1.0000

Combined Heat and Power (CHP) engine

Name	Default	Value
Methane heat of combustion [kJ/mole]	800.0000	800.0000
Hydrogen heat of combustion [kJ/mole]	240.0000	240.0000
CHP engine heat price [$/kWh]	0	0
CHP engine power price [$/kWh]	0.1500	0.1500

Calorific values of heating fuels

Name	Default	Value
Calorific value of natural gas [BTU/lb]	20,636	20,636
Calorific value of heating fuel oil [BTU/lb]	18,057	18,057
Calorific value of diesel [BTU/lb]	19,776	19,776
Calorific value of custom fuel [BTU/lb]	13,758	13,758

Density of liquid heating fuels

Name	Default	Value
Density of heating fuel oil [lb/ft3]	56	56
Density of diesel [lb/ft3]	55	55
Density of custom fuel [lb/ft3]	49	49

Mass transfer

Name	Default	Value	
Kl for H2 [m/d]	17.0000	17.0000	1.0240
Kl for CO2 [m/d]	10.0000	10.0000	1.0240
Kl for NH3 [m/d]	1.0000	1.0000	1.0240
Kl for CH4 [m/d]	8.0000	8.0000	1.0240
Kl for N2 [m/d]	15.0000	15.0000	1.0240
Kl for N2O [m/d]	8.0000	8.0000	1.0240
Kl for H2S [m/d]	1.0000	1.0000	1.0240

KI for Ind #1 COD [m/d]	0	0	1.0240
KI for Ind #2 COD [m/d]	0.5000	0.5000	1.0240
KI for Ind #3 COD [m/d]	0	0	1.0240
KI for O2 [m/d]	13.0000	13.0000	1.0240

Henry's law constants

Name	Default	Value	
CO2 [M/atm]	3.4000E-2	3.4000E-2	2,400.0000
O2 [M/atm]	1.3000E-3	1.3000E-3	1,500.0000
N2 [M/atm]	6.5000E-4	6.5000E-4	1,300.0000
N2O [M/atm]	2.5000E-2	2.5000E-2	2,600.0000
NH3 [M/atm]	5.8000E+1	5.8000E+1	4,100.0000
CH4 [M/atm]	1.4000E-3	1.4000E-3	1,600.0000
H2 [M/atm]	7.8000E-4	7.8000E-4	500.0000
H2S [M/Atm]	1.0000E-1	1.0000E-1	2,200.0000
Ind 1 [M/Atm]	1.9000E+3	1.9000E+3	7,300.0000
Ind 2 [M/Atm]	1.8000E-1	1.8000E-1	2,200.0000
Ind 3 [M/Atm]	1.5000E-1	1.5000E-1	1,900.0000

Properties constants

Name	Default	Value
K in Viscosity = K e ^(Ea/RT) [Pa s]	6.849E-7	6.849E-7
Ea in Viscosity = K e ^(Ea/RT) [j/mol]	1.780E+4	1.780E+4
Y in ML Viscosity = H2O viscosity * (1+A*MLSS^Y) [-]	1.0000	1.0000
A in ML Viscosity = H2O viscosity * (1+A*MLSS^Y) [m3/g]	1.000E-7	1.000E-7
A in ML Density = H2O density + A*MLSS [(kg/m3)/(g/m3)]	3.248E-4	3.248E-4
A in Antoine equn. [T in K, P in Bar {NIST}]	5.2000	5.2039
B in Antoine equn. [T in K, P in Bar {NIST}]	1,734.0000	1,733.9260
C in Antoine equn. [T in K, P in Bar {NIST}]	-39.5000	-39.4800

Metal salt solution densities

Name	Default	Value
Ferric chloride solution density [kg/m3]	3,820.0000	3,820.0000
Ferrous chloride solution density [kg/m3]	3,160.0000	3,160.0000
Aluminium sulfate solution density [kg/m3]	1,950.0000	1,950.0000

Mineral precipitation rates

Name	Default	Value	
Vivianite precipitation rate [L/(mol d)]	1.000E+5	1.000E+5	1.0240
Vivianite redissolution rate [L/(mol d)]	1.000E+5	1.000E+5	1.0240
Vivianite half sat. [mgTSS/L]	0.0100	0.0100	1.0000
FeS precipitation rate [L/(mol d)]	1,000.0000	1,000.0000	1.0240
FeS redissolution rate [L/(mol d)]	10.0000	10.0000	1.0240
FeS half sat. [mgTSS/L]	0.1000	0.1000	1.0000
Struvite precipitation rate [L^2/(mol^2 d)]	3.000E+10	3.000E+10	1.0240
Struvite redissolution rate [L^2/(mol^2 d)]	3.000E+11	3.000E+11	1.0240
Struvite half sat. [mgTSS/L]	1.0000	1.0000	1.0000
Brushite precipitation rate [L/(mol d)]	1.000E+6	1.000E+6	1.0000
Brushite redissolution rate [L/(mol d)]	10,000.0000	10,000.0000	1.0000
Brushite half sat. [mgTSS/L]	1.0000	1.0000	1.0000
HAP precipitation rate [g/d]	5.000E-4	5.000E-4	1.0000

Mineral precipitation constants

Name	Default	Value
Vivianite solubility product [mol/L]^5	1.710E-36	1.710E-36
FeS solubility product [mol/L]^2	4.258E-4	4.258E-4
Struvite solubility product [mol/L]^3	6.918E-14	6.918E-14
Brushite solubility product [mol/L]^2	2.490E-7	2.490E-7

Fe rates

Name	Default	Value	
A in aging rate = A * exp(G/B) [1/d)]	16.1550	16.1550	1.0000
B in aging rate = A * exp(G/B) [1/s)]	57.3000	57.3000	1.0000
HFO(L) aging rate factor	2.500E-4	2.500E-4	1.0000
HFO(H) with H2PO4- bound aging factor []	1.000E-5	1.000E-5	1.0000
HFO(L) with H2PO4- bound aging factor []	0.4000	0.4000	1.0000
H2PO4- coprecipitation rate [mol/(L d)]	1.500E-9	1.500E-9	1.0000
H2PO4- Adsorption rate [mol /(L d)]	2.000E-11	2.000E-11	1.0000
H+ competition for HFO(H) protonation sites [L/(mmol . d)]	1,000.0000	1,000.0000	1.0000
H+ competition for HFO(L) protonation sites [L/(mmol . d)]	100.0000	100.0000	1.0000

Fe constants

Name	Default	Value
Ferric active site factor(high) [{mol Sites}/{mol HFO(H)}]	2.0000	2.0000
Ferric active site factor(low) [{mol Sites}/{mol HFO(L)}]	1.2000	1.2000
H+ competition level for Fe(OH)3 [mol/L]	7.000E-7	7.000E-7
Equilibrium constant for FeOH3-H2PO4- [{mf HFO(H).H2PO4}/({mol H2PO4-}{mf HFO(H)}^2)]	2.000E-9	2.000E-9
Colloidal COD removed with Ferric [gCOD/Fe active site]	130.0000	130.0000
Minimum residual P level with iron addition	0.0150	0.0150
HFO(H) with H2PO4- P release factor	10,000.0000	10,000.0000
HFO(L) with H2PO4- P release factor	10,000.0000	10,000.0000

Fe RedOx rates

Name	Default	Value	
Iron reduction using acetic acid	1.000E-7	1.000E-7	1.0000
Half Sat. acetic acid	0.5000	0.5000	1.0000
Iron reduction using propionic acid	1.000E-7	1.000E-7	1.0000
Half Sat. propionic acid	0.5000	0.5000	1.0000
Iron reduction using dissolved hydrogen gas	1.000E-7	1.000E-7	1.0000
Half Sat. dissolved hydrogen gas	0.5000	0.5000	1.0000
Iron reduction using hydrogen sulfide	5.000E-5	5.000E-5	1.0000
Half Sat. hydrogen sulfide	0.5000	0.5000	1.0000
Iron oxidation rate (aerobic)	1.000E-3	1.000E-3	1.0000
Abiotic iron reduction using acetic acid	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using propionic acid	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using dissolved hydrogen gas	2.000E-5	2.000E-5	1.0000
Abiotic iron reduction using hydrogen sulfide	2.000E-5	2.000E-5	1.0000
Abiotic iron oxidation rate (aerobic)	1.0000	1.0000	1.0000

CEPT rates

Name	Default	Value	
HFO colloidal adsorption rate	1.0000	1.0000	1.0000
Residual Xsc for adsorption to HFO	5.0000	5.0000	1.0000
Slope for Xsc residual	1.0000	1.0000	1.0000

HAO colloidal adsorption rate	1.0000	1.0000	1.0000
Residual Xsc for adsorption to HAO	5.0000	5.0000	1.0000
Slope for Xsc residual	1.0000	1.0000	1.0000

Al rates

Name	Default	Value	
A in aging rate = A * exp(G/B) [1/d)]	16.1550	16.1550	1.0000
B in aging rate = A * exp(G/B) [1/s)]	57.3000	57.3000	1.0000
HAO(L) aging rate factor	2.500E-4	2.500E-4	1.0000
HAO(H) with H2PO4- bound aging factor []	1.000E-5	1.000E-5	1.0000
HAO(L) with H2PO4- bound aging factor []	0.4000	0.4000	1.0000
H2PO4- coprecipitation rate [mol/(L d)]	1.500E-9	1.500E-9	1.0000
H2PO4- Adsorption rate [mol /(L d)]	1.000E-9	1.000E-9	1.0000

Al constants

Name	Default	Value
Al active site factor(high) [{mol Sites}/{mol HAO(H)}]	3.0000	3.0000
Al active site factor(low) [{mol Sites}/{mol HAO(L)}]	1.5000	1.5000
Equilibrium constant for AlOH3-H2PO4- [{mf HAO(H).H2PO4}/({mol H2PO4-}{mf HAO(H)}^2)]	8.000E-10	8.000E-10
Colloidal COD removed with Al [gCOD/Al active site]	30.0000	30.0000
Minimum residual P level with Al addition	0.0150	0.0150
HAO(H) with H2PO4- P release factor	10,000.0000	10,000.0000
HAO(L) with H2PO4- P release factor	10,000.0000	10,000.0000

Pipe and pump parameters

Name	Default	Value
Static head [ft]	0.8202	0.8202
Pipe length (headloss calc.s) [ft]	164.0420	164.0420
Pipe inside diameter [in]	19.68504	19.68504
K(fittings) - Total minor losses K	5.0000	5.0000
Pipe roughness [in]	0.00787	0.00787
'A' in overall pump efficiency = A + B*Q + C*(Q^2)[-]	0.8500	0.8500
'B' in overall pump efficiency = A + B*Q + C*(Q^2)[-]/(mgd)]	0	0
'C' in overall pump efficiency = A + B*Q + C*(Q^2)[-]/(mgd)^2]	0	0

Fittings and loss coefficients ('K' values)

Name	Default	Value
Pipe entrance (bellmouth)	0.0500	1.0000
90° bend	0.7500	5.0000
45° bend	0.3000	2.0000
Butterfly value (open)	0.3000	1.0000
Non-return value	1.0000	0
Outlet (bellmouth)	0.2000	1.0000

Aeration

Name	Default	Value
Surface pressure [kPa]	101.3250	101.3250
Fractional effective saturation depth (Fed) [-]	0.3250	0.3250
Supply gas CO2 content [vol. %]	0.0400	0.0400

Supply gas O2 [vol. %]	20.9500	20.9500
Off-gas CO2 [vol. %]	2.0000	2.0000
Off-gas O2 [vol. %]	18.8000	18.8000
Off-gas H2 [vol. %]	0	0
Off-gas NH3 [vol. %]	0	0
Off-gas CH4 [vol. %]	0	0
Off-gas N2O [vol. %]	0	0
Surface turbulence factor [-]	2.0000	2.0000
Set point controller gain []	1.0000	1.0000

Blower

Name	Default	Value
Intake filter pressure drop [psi]	0.5076	0.5076
Pressure drop through distribution system (piping/valves) [psi]	0.4351	0.4351
Adiabatic/polytropic compression exponent (1.4 for adiabatic)	1.4000	1.4000
'A' in blower efficiency = A + B*Qa + C*(Qa^2)[-]	0.7500	0.7500
'B' in blower efficiency = A + B*Qa + C*(Qa^2)[[-]/(ft3/min (20C, 1 atm))]	0	0
'C' in blower efficiency = A + B*Qa + C*(Qa^2)[[-]/(ft3/min (20C, 1 atm))^2]	0	0

Diffuser

Name	Default	Value
k1 in C = k1(PC)^0.25 + k2	1.2400	1.2400
k2 in C = k1(PC)^0.25 + k2	0.8960	0.8960
Y in Kla = C Usg ^ Y - Usg in [m3/(m2 d)]	0.8880	0.8880
Area of one diffuser [ft2]	0.4413	0.4413
Diffuser mounting height [ft]	0.8202	0.8202
Min. air flow rate per diffuser ft3/min (20C, 1 atm)	0.2943	0.2943
Max. air flow rate per diffuser ft3/min (20C, 1 atm)	5.8858	5.8858
'A' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2 [psi]	0.4351	0.4351
'B' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2[psi/(ft3/min (20C, 1 atm))]	0	0
'C' in diffuser pressure drop = A + B*(Qa/Diff) + C*(Qa/Diff)^2[psi/(ft3/min (20C, 1 atm))^2]	0	0

Surface aerators

Name	Default	Value
Surface aerator Std. oxygen transfer rate [lb O /(hp hr)]	2.46697	2.20000

Modified Vesilind

Name	Default	Value
Maximum Vesilind settling velocity (Vo) [ft/min]	0.387	0.387
Vesilind hindered zone settling parameter (K) [L/g]	0.370	0.370
Clarification switching function [mg/L]	100.000	100.000
Specified TSS conc.for height calc. [mg/L]	2,500.000	2,500.000
Maximum compactability constant [mg/L]	15,000.000	15,000.000
Maximum compactability slope [L/mg]	0.010	0.010

Double exponential

Name	Default	Value
Maximum Vesilind settling velocity (Vo) [ft/min]	0.934	0.934
Maximum (practical) settling velocity (Vo') [ft/min]	0.615	0.615

Hindered zone settling parameter (Kh) [L/g]	0.400	0.400
Flocculent zone settling parameter (Kf) [L/g]	2.500	2.500
Maximum non-settleable TSS [mg/L]	20.0000	20.0000
Non-settleable fraction [-]	1.000E-3	1.000E-3
Specified TSS conc. for height calc. [mg/L]	2,500.0000	2,500.0000

Emission factors

Name	Default	Value
Carbon dioxide equivalence of nitrous oxide	296.0000	296.0000
Carbon dioxide equivalence of methane	23.0000	23.0000

Biofilm general

Name	Default	Value	
Attachment rate [g / (m2 d)]	8.0000	8.0000	1.0000
Attachment TSS half sat. [mg/L]	100.0000	100.0000	1.0000
Detachment rate [g/(m3 d)]	8,000.0000	8,000.0000	1.0000
Solids movement factor []	10.0000	10.0000	1.0000
Diffusion neta []	0.8000	0.8000	1.0000
Thin film limit [mm]	0.5000	0.5000	1.0000
Thick film limit [mm]	3.0000	3.0000	1.0000
Assumed Film thickness for tank volume correction (temp independent) [mm]	1.2500	1.2500	1.0000
Film surface area to media area ratio - Max.[ ]	1.0000	1.0000	1.0000
Minimum biofilm conc. for streamer formation [gTSS/m2]	4.0000	4.0000	1.0000

Maximum biofilm concentrations [mg/L]

Name	Default	Value	
Biomass - Ordinary heterotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Methylotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Ammonia oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Nitrite oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Anaerobic ammonia oxidizing	5.000E+4	5.000E+4	1.0000
Biomass - Phosphorus accumulating	5.000E+4	5.000E+4	1.0000
Biomass - Propionic acetogenic	5.000E+4	5.000E+4	1.0000
Biomass - Acetoclastic methanogenic	5.000E+4	5.000E+4	1.0000
Biomass - Hydrogenotrophic methanogenic	5.000E+4	5.000E+4	1.0000
Biomass - Endogenous products	3.000E+4	3.000E+4	1.0000
CODp - Slowly degradable particulate	5,000.0000	5,000.0000	1.0000
CODp - Slowly degradable colloidal	4,000.0000	4,000.0000	1.0000
CODp - Degradable external organics	5,000.0000	5,000.0000	1.0000
CODp - Undegradable non-cellulose	5,000.0000	5,000.0000	1.0000
CODp - Undegradable cellulose	5,000.0000	5,000.0000	1.0000
N - Particulate degradable organic	0	0	1.0000
P - Particulate degradable organic	0	0	1.0000
N - Particulate degradable external organics	0	0	1.0000
P - Particulate degradable external organics	0	0	1.0000
N - Particulate undegradable	0	0	1.0000
P - Particulate undegradable	0	0	1.0000
CODp - Stored PHA	5,000.0000	5,000.0000	1.0000
P - Releasable stored polyP	1.150E+6	1.150E+6	1.0000
P - Unreleasable stored polyP	1.150E+6	1.150E+6	1.0000
CODs - Complex readily degradable	0	0	1.0000
CODs - Acetate	0	0	1.0000
CODs - Propionate	0	0	1.0000
CODs - Methanol	0	0	1.0000
Gas - Dissolved hydrogen	0	0	1.0000
Gas - Dissolved methane	0	0	1.0000
N - Ammonia	0	0	1.0000
N - Soluble degradable organic	0	0	1.0000

Gas - Dissolved nitrous oxide	0	0	1.0000
N - Nitrite	0	0	1.0000
N - Nitrate	0	0	1.0000
Gas - Dissolved nitrogen	0	0	1.0000
P - Soluble phosphate	0	0	1.0000
CODs - Undegradable	0	0	1.0000
N - Soluble undegradable organic	0	0	1.0000
Influent inorganic suspended solids	1.300E+6	1.300E+6	1.0000
Precipitate - Struvite	8.500E+5	8.500E+5	1.0000
Precipitate - Brushite	1.165E+6	1.165E+6	1.0000
Precipitate - Hydroxy - apatite	1.600E+6	1.600E+6	1.0000
Precipitate - Vivianite	1.340E+6	1.340E+6	1.0000
HFO - High surface	5.000E+4	5.000E+4	1.0000
HFO - Low surface	5.000E+4	5.000E+4	1.0000
HFO - High with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HFO - Low with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HFO - Aged	5.000E+4	5.000E+4	1.0000
HFO - Low with H+ adsorbed	5.000E+4	5.000E+4	1.0000
HFO - High with H+ adsorbed	5.000E+4	5.000E+4	1.0000
HAO - High surface	5.000E+4	5.000E+4	1.0000
HAO - Low surface	5.000E+4	5.000E+4	1.0000
HAO - High with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HAO - Low with H2PO4- adsorbed	5.000E+4	5.000E+4	1.0000
HAO - Aged	5.000E+4	5.000E+4	1.0000
P - Bound on aged HMO	5.000E+4	5.000E+4	1.0000
Metal soluble - Magnesium	0	0	1.0000
Metal soluble - Calcium	0	0	1.0000
Metal soluble - Ferric	0	0	1.0000
Metal soluble - Ferrous	0	0	1.0000
Metal soluble - Aluminum	0	0	1.0000
Other Cations (strong bases)	0	0	1.0000
Other Anions (strong acids)	0	0	1.0000
Gas - Dissolved total CO2	0	0	1.0000
User defined - UD1	0	0	1.0000
User defined - UD2	0	0	1.0000
User defined - UD3	5.000E+4	5.000E+4	1.0000
User defined - UD4	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur oxidizing	1.000E+5	1.000E+5	1.0000
Biomass - Sulfur reducing propionic acetogenic	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur reducing acetotrophic	5.000E+4	5.000E+4	1.0000
Biomass - Sulfur reducing hydrogenotrophic	1.000E+5	1.000E+5	1.0000
Gas - Dissolved total sulfides	0	0	1.0000
S - Soluble sulfate	0	0	1.0000
S - Particulate elemental sulfur	5.000E+4	5.000E+4	1.0000
Precipitate - Ferrous sulfide	5.000E+4	5.000E+4	1.0000
CODp - Adsorbed hydrocarbon	5.000E+4	5.000E+4	1.0000
CODs - Degradable volatile ind. #1	0	0	1.0000
CODs - Degradable volatile ind. #2	0	0	1.0000
CODs - Degradable volatile ind. #3	0	0	1.0000
CODs - Soluble hydrocarbon	0	0	1.0000
Gas - Dissolved oxygen	0	0	1.0000

Effective diffusivities [m2/s]

Name	Default	Value	
Biomass - Ordinary heterotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Methylotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Ammonia oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Nitrite oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Anaerobic ammonia oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Phosphorus accumulating	5.000E-14	5.000E-14	1.0290
Biomass - Propionic acetogenic	5.000E-14	5.000E-14	1.0290
Biomass - Acetoclastic methanogenic	5.000E-14	5.000E-14	1.0290
Biomass - Hydrogenotrophic methanogenic	5.000E-14	5.000E-14	1.0290
Biomass - Endogenous products	5.000E-14	5.000E-14	1.0290
CODp - Slowly degradable particulate	5.000E-14	5.000E-14	1.0290
CODp - Slowly degradable colloidal	5.000E-10	5.000E-10	1.0290

CODp - Degradable external organics	5.000E-14	5.000E-14	1.0290
CODp - Undegradable non-cellulose	5.000E-14	5.000E-14	1.0290
CODp - Undegradable cellulose	5.000E-14	5.000E-14	1.0290
N - Particulate degradable organic	5.000E-14	5.000E-14	1.0290
P - Particulate degradable organic	5.000E-14	5.000E-14	1.0290
N - Particulate degradable external organics	5.000E-14	5.000E-14	1.0290
P - Particulate degradable external organics	5.000E-14	5.000E-14	1.0290
N - Particulate undegradable	5.000E-14	5.000E-14	1.0290
P - Particulate undegradable	5.000E-14	5.000E-14	1.0290
CODp - Stored PHA	5.000E-14	5.000E-14	1.0290
P - Releasable stored polyP	5.000E-14	5.000E-14	1.0290
P - Unreleasable stored polyP	5.000E-14	5.000E-14	1.0290
CODs - Complex readily degradable	6.900E-10	6.900E-10	1.0290
CODs - Acetate	1.240E-9	1.240E-9	1.0290
CODs - Propionate	8.300E-10	8.300E-10	1.0290
CODs - Methanol	1.600E-9	1.600E-9	1.0290
Gas - Dissolved hydrogen	5.850E-9	5.850E-9	1.0290
Gas - Dissolved methane	1.963E-9	1.963E-9	1.0290
N - Ammonia	2.000E-9	2.000E-9	1.0290
N - Soluble degradable organic	1.370E-9	1.370E-9	1.0290
Gas - Dissolved nitrous oxide	1.607E-9	1.607E-9	1.0290
N - Nitrite	2.980E-9	2.980E-9	1.0290
N - Nitrate	2.980E-9	2.980E-9	1.0290
Gas - Dissolved nitrogen	1.900E-9	1.900E-9	1.0290
P - Soluble phosphate	2.000E-9	2.000E-9	1.0290
CODs - Undegradable	6.900E-10	6.900E-10	1.0290
N - Soluble undegradable organic	6.850E-10	6.850E-10	1.0290
Influent inorganic suspended solids	5.000E-14	5.000E-14	1.0290
Precipitate - Struvite	5.000E-14	5.000E-14	1.0290
Precipitate - Brushite	5.000E-14	5.000E-14	1.0290
Precipitate - Hydroxy - apatite	5.000E-14	5.000E-14	1.0290
Precipitate - Vivianite	5.000E-14	5.000E-14	1.0290
HFO - High surface	5.000E-14	5.000E-14	1.0290
HFO - Low surface	5.000E-14	5.000E-14	1.0290
HFO - High with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HFO - Low with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HFO - Aged	5.000E-14	5.000E-14	1.0290
HFO - Low with H+ adsorbed	5.000E-14	5.000E-14	1.0290
HFO - High with H+ adsorbed	5.000E-14	5.000E-14	1.0290
HAO - High surface	5.000E-14	5.000E-14	1.0290
HAO - Low surface	5.000E-14	5.000E-14	1.0290
HAO - High with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HAO - Low with H2PO4- adsorbed	5.000E-14	5.000E-14	1.0290
HAO - Aged	5.000E-14	5.000E-14	1.0290
P - Bound on aged HMO	5.000E-14	5.000E-14	1.0290
Metal soluble - Magnesium	7.200E-10	7.200E-10	1.0290
Metal soluble - Calcium	7.200E-10	7.200E-10	1.0290
Metal soluble - Ferric	4.800E-10	4.800E-10	1.0290
Metal soluble - Ferrous	4.800E-10	4.800E-10	1.0290
Metal soluble - Aluminum	4.800E-10	4.800E-10	1.0290
Other Cations (strong bases)	1.440E-9	1.440E-9	1.0290
Other Anions (strong acids)	1.440E-9	1.440E-9	1.0290
Gas - Dissolved total CO2	1.960E-9	1.960E-9	1.0290
User defined - UD1	6.900E-10	6.900E-10	1.0290
User defined - UD2	6.900E-10	6.900E-10	1.0290
User defined - UD3	5.000E-14	5.000E-14	1.0290
User defined - UD4	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur oxidizing	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing propionic acetogenic	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing acetotrophic	5.000E-14	5.000E-14	1.0290
Biomass - Sulfur reducing hydrogenotrophic	5.000E-14	5.000E-14	1.0290
Gas - Dissolved total sulfides	1.530E-9	1.530E-9	1.0290
S - Soluble sulfate	2.130E-10	2.130E-10	1.0290
S - Particulate elemental sulfur	5.000E-14	5.000E-14	1.0290
Precipitate - Ferrous sulfide	5.000E-14	5.000E-14	1.0290
CODp - Adsorbed hydrocarbon	5.000E-14	5.000E-14	1.0290
CODs - Degradable volatile ind. #1	7.240E-10	7.240E-10	1.0290
CODs - Degradable volatile ind. #2	8.900E-10	8.900E-10	1.0290
CODs - Degradable volatile ind. #3	7.960E-10	7.960E-10	1.0290
CODs - Soluble hydrocarbon	7.120E-10	7.120E-10	1.0290

Gas - Dissolved oxygen	2.500E-9	2.500E-9	1.0290

EPS Strength coefficients [ ]

Name	Default	Value	
Biomass - Ordinary heterotrophic	1.0000	1.0000	1.0000
Biomass - Methylotrophic	1.0000	1.0000	1.0000
Biomass - Ammonia oxidizing	5.0000	5.0000	1.0000
Biomass - Nitrite oxidizing	25.0000	25.0000	1.0000
Biomass - Anaerobic ammonia oxidizing	10.0000	10.0000	1.0000
Biomass - Phosphorus accumulating	1.0000	1.0000	1.0000
Biomass - Propionic acetogenic	1.0000	1.0000	1.0000
Biomass - Acetoclastic methanogenic	1.0000	1.0000	1.0000
Biomass - Hydrogenotrophic methanogenic	1.0000	1.0000	1.0000
Biomass - Endogenous products	1.0000	1.0000	1.0000
CODp - Slowly degradable particulate	1.0000	1.0000	1.0000
CODp - Slowly degradable colloidal	1.0000	1.0000	1.0000
CODp - Degradable external organics	1.0000	1.0000	1.0000
CODp - Undegradable non-cellulose	1.0000	1.0000	1.0000
CODp - Undegradable cellulose	1.0000	1.0000	1.0000
N - Particulate degradable organic	1.0000	1.0000	1.0000
P - Particulate degradable organic	1.0000	1.0000	1.0000
N - Particulate degradable external organics	1.0000	1.0000	1.0000
P - Particulate degradable external organics	1.0000	1.0000	1.0000
N - Particulate undegradable	1.0000	1.0000	1.0000
P - Particulate undegradable	1.0000	1.0000	1.0000
CODp - Stored PHA	1.0000	1.0000	1.0000
P - Releasable stored polyP	1.0000	1.0000	1.0000
P - Unreleasable stored polyP	1.0000	1.0000	1.0000
CODs - Complex readily degradable	0	0	1.0000
CODs - Acetate	0	0	1.0000
CODs - Propionate	0	0	1.0000
CODs - Methanol	0	0	1.0000
Gas - Dissolved hydrogen	0	0	1.0000
Gas - Dissolved methane	0	0	1.0000
N - Ammonia	0	0	1.0000
N - Soluble degradable organic	0	0	1.0000
Gas - Dissolved nitrous oxide	0	0	1.0000
N - Nitrite	0	0	1.0000
N - Nitrate	0	0	1.0000
Gas - Dissolved nitrogen	0	0	1.0000
P - Soluble phosphate	0	0	1.0000
CODs - Undegradable	0	0	1.0000
N - Soluble undegradable organic	0	0	1.0000
Influent inorganic suspended solids	0.3300	0.3300	1.0000
Precipitate - Struvite	1.0000	1.0000	1.0000
Precipitate - Brushite	1.0000	1.0000	1.0000
Precipitate - Hydroxy - apatite	1.0000	1.0000	1.0000
Precipitate - Vivianite	1.0000	1.0000	1.0000
HFO - High surface	1.0000	1.0000	1.0000
HFO - Low surface	1.0000	1.0000	1.0000
HFO - High with H2PO4- adsorbed	1.0000	1.0000	1.0000
HFO - Low with H2PO4- adsorbed	1.0000	1.0000	1.0000
HFO - Aged	1.0000	1.0000	1.0000
HFO - Low with H+ adsorbed	1.0000	1.0000	1.0000
HFO - High with H+ adsorbed	1.0000	1.0000	1.0000
HAO - High surface	1.0000	1.0000	1.0000
HAO - Low surface	1.0000	1.0000	1.0000
HAO - High with H2PO4- adsorbed	1.0000	1.0000	1.0000
HAO - Low with H2PO4- adsorbed	1.0000	1.0000	1.0000
HAO - Aged	1.0000	1.0000	1.0000
P - Bound on aged HMO	1.0000	1.0000	1.0000
Metal soluble - Magnesium	0	0	1.0000
Metal soluble - Calcium	0	0	1.0000
Metal soluble - Ferric	0	0	1.0000
Metal soluble - Ferrous	0	0	1.0000
Metal soluble - Aluminum	0	0	1.0000

Other Cations (strong bases)	0	0	1.0000
Other Anions (strong acids)	0	0	1.0000
Gas - Dissolved total CO2	0	0	1.0000
User defined - UD1	0	0	1.0000
User defined - UD2	0	0	1.0000
User defined - UD3	1.0000	1.0000	1.0000
User defined - UD4	1.0000	1.0000	1.0000
Biomass - Sulfur oxidizing	1.0000	1.0000	1.0000
Biomass - Sulfur reducing propionic acetogenic	1.0000	1.0000	1.0000
Biomass - Sulfur reducing acetotrophic	1.0000	1.0000	1.0000
Biomass - Sulfur reducing hydrogenotrophic	1.0000	1.0000	1.0000
Gas - Dissolved total sulfides	0	0	1.0000
S - Soluble sulfate	0	0	1.0000
S - Particulate elemental sulfur	1.0000	1.0000	1.0000
Precipitate - Ferrous sulfide	1.0000	1.0000	1.0000
CODp - Adsorbed hydrocarbon	1.0000	1.0000	1.0000
CODs - Degradable volatile ind. #1	0	0	1.0000
CODs - Degradable volatile ind. #2	0	0	1.0000
CODs - Degradable volatile ind. #3	0	0	1.0000
CODs - Soluble hydrocarbon	0	0	1.0000
Gas - Dissolved oxygen	0	0	1.0000

Simulation Notes

- Influent values are based on 75th Percentile Loading in main influent and *max month* loadings from drain stations.
- Running at 10 Day Aerobic SRT
- Using 25 C plant temperature. This is a conservative estimate based on winter and spring temperature data at Manatee SWWRF that varied between 23 and 30 C.
- Linear velocity in oxidation ditches set to approximately 0.65 ft/s.
- IMLR set to 250% *influent* flow (not including RAS) for Train A and 350% for Train B.
- Yield of 0.57 should be compared to overall average yield of 0.55 from the data.

Appendix B

CAPACITY ANALYSIS AT MAX MONTH DRAIN STATION LOADS

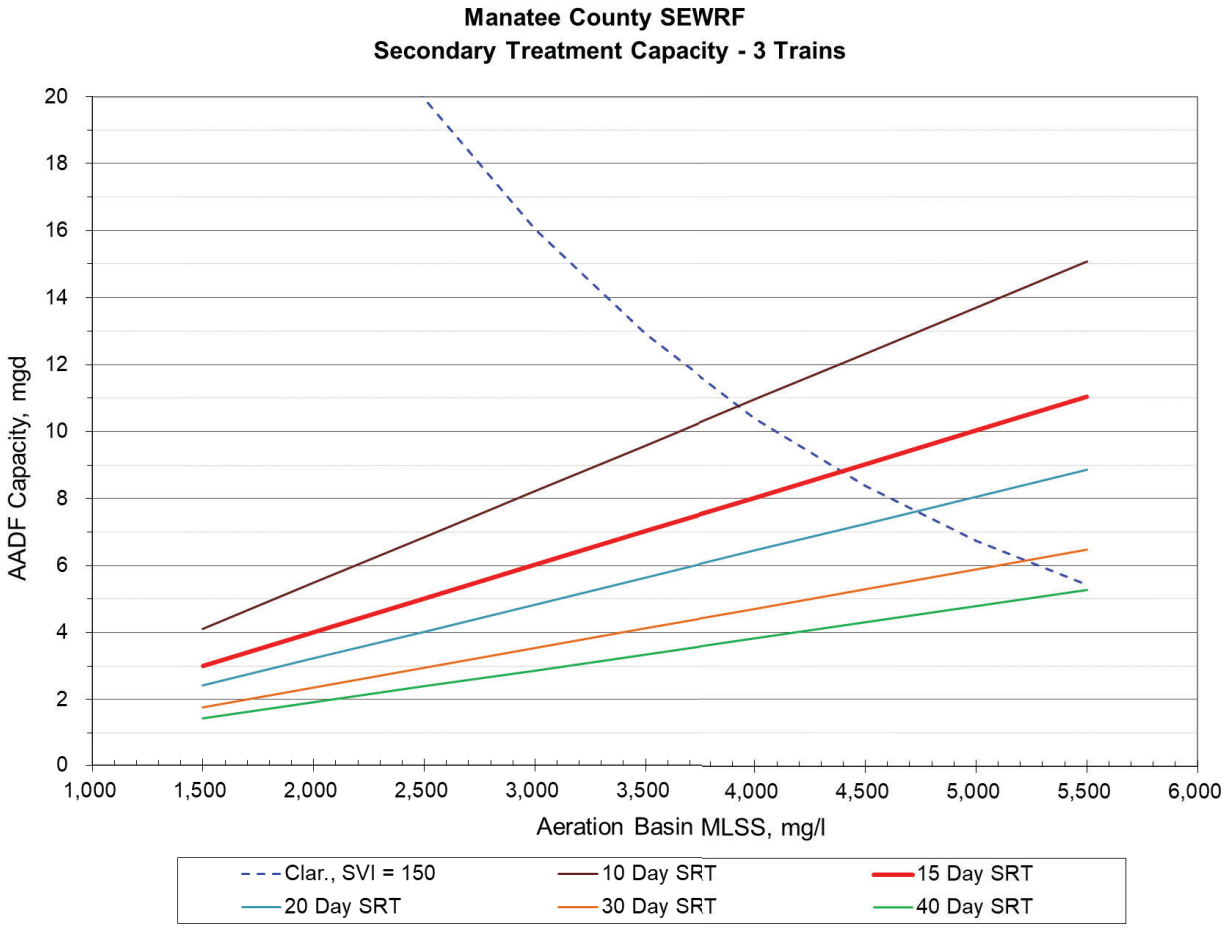


Figure B-1 Manatee SEWRF Secondary Capacity and SRT - Existing Biological Volume (3 Trains)

Table B-1 Manatee SEWRF Biological Treatment Capacity - Existing Biological Volume (3 Trains)

Aerobic Volume (MG)	Aerobic SRT (days)	Capacity (mgd)	MLSS Required (mg/L)	Capacity, One Basin Down (mgd)	MLSS Required, One Basin Down (mg/L)	Class I Reliability (1)	Effluent TN, (mgN/L) (2)
8.84	10	10.8	3,923	8.2	4,551	N	18.5
8.84	15	8.8	4,385	6.6	5,036	N	15.7
8.84	20	7.6	4,721	5.7	5,387	N	12.6
8.84	30	6.1	5,214	4.6	5,900	N	5.7

Notes:
(1) Class I Reliability is defined as the capacity to meet 75% of permitted AADF with one train out of service.
(2) Assumes effluent TKN of 1.7 mg/L, including refractory nitrogen and unoxidized ammonia.

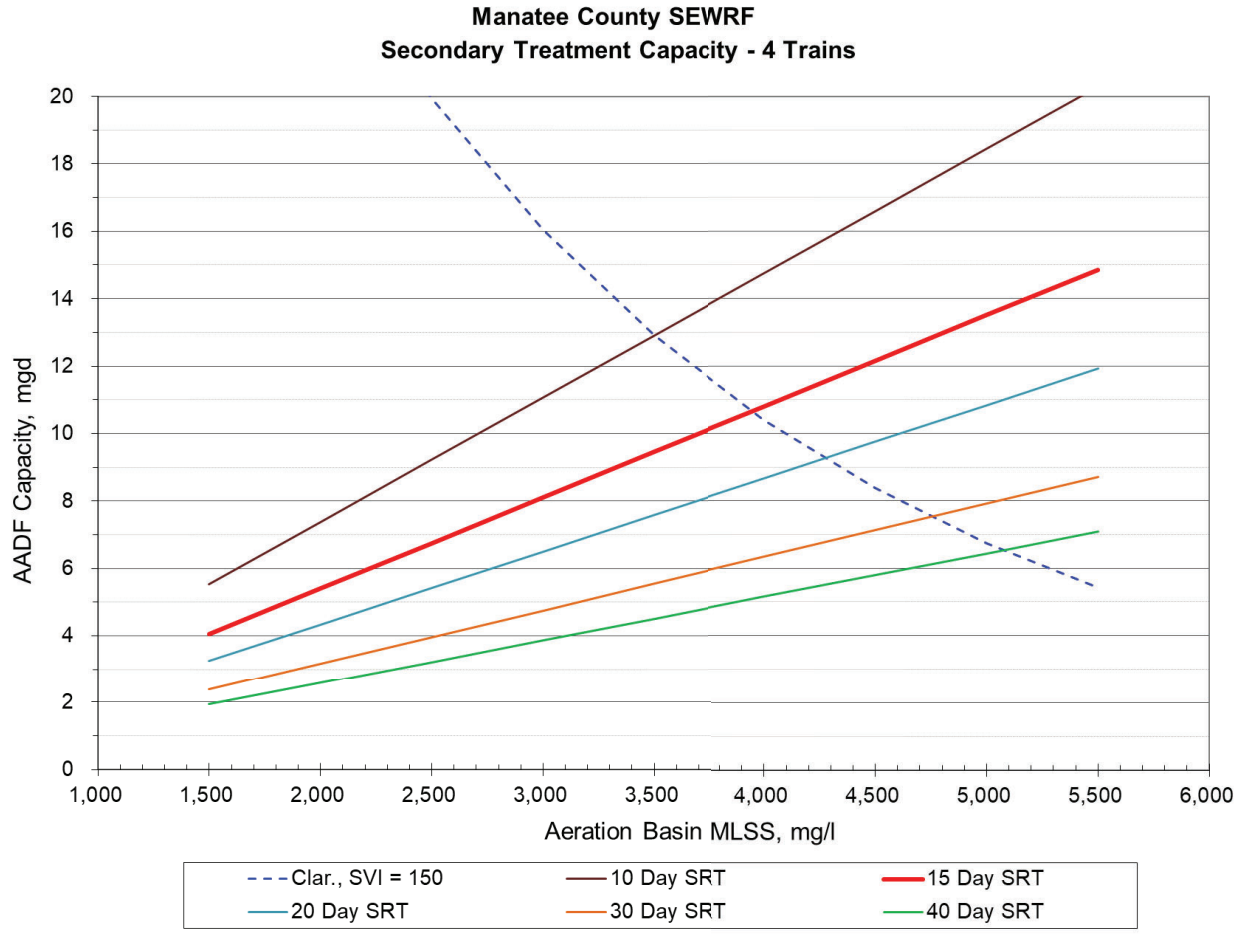


Figure B-2 Manatee SEWRF Secondary Capacity and SRT - Expanded Biological Volume (4 Trains)

Table B-2 Manatee SEWRF Biological Treatment Capacity - Expanded Biological Volume (4 Trains)

Aerobic Volume (MG)	Aerobic SRT (days)	Capacity (mgd)	MLSS Required (mg/L)	Capacity, One Basin Down (mgd)	MLSS Required, One Basin Down (mg/L)	Class I Reliability (1)	Effluent TN, (mgN/L) (2)
8.84	10	12.91	3,501	10.8	3,923	Y	12.4(3)
8.84	15	10.65	3,944	8.8	4,385	Y	15.7
8.84	20	9.25	4,268	7.6	4,721	N	12.6
8.84	30	7.52	4,746	6.1	5,214	N	6.0

Notes:
(1) Class I Reliability is defined as the capacity to meet 75% of permitted AADF with one train out of service.
(2) Assumes effluent TKN of 1.7 mg/L, including refractory nitrogen and unoxidized ammonia.
(3) Effluent TN at 11 mgd AADF.

Appendix C

NITROGEN REMOVAL IMPROVEMENTS ANALYSIS

Table C-1 Manatee SEWRF Biological Treatment Capacity - Nitrogen Removal Improvements Analysis

Configuration[1]	# Ditches	Aerobic Volume (mgal)	Anoxic Vol. Increase	# Clarifiers	Supp. Carbon	aSRT (days)	Capacity (mgd AADF)	MLSS (mg/L)	Effluent TN (mg/L)	Denitrification Limit
3 Basins	3	8.84	0%	4	N	22	7.7	4,700	10	Volume
3 Basins + Carbon[2], Short SRT	3	8.84	0%	4	Y	10	11.4	3,800	9	Recycle
3 Basins + Carbon[2], Long SRT	3	8.84	0%	4	Y	15	9.3	4,300	10	Recycle
3 Basins + Anox	3	8.84	100%	4	N	10	11.4	3,800	9	Recycle
3 Basins + Anox	3	8.84	100%	4	N	15	9.3	4,300	10	Recycle
3 Basins + Anox + Clarifier	3	8.84	100%	5	N	10	12.3	4,100	9	Recycle
3 Basins + Anox + Clarifier	3	8.84	100%	5	N	15	10.1	4,600	10	Recycle
4 Basins	4	11.9	0%	4	N	22	9.3	4,300	10	Volume
4 Basins + Carbon[2], Short SRT	4	11.9	0%	4	Y	10	13.6	3,400	9	Recycle
4 Basins + Carbon[2], Long SRT	4	11.9	0%	4	Y	15	11.3	3,800	10	Recycle
4 Basins + Anox	4	11.9	100%	4	N	10	13.6	3,400	9	Recycle
4 Basins + Anox	4	11.9	100%	4	N	15	11.3	3,800	10	Recycle
4 Basins + Anox + Clarifier	4	11.9	100%	5	N	10	14.9	3,700	9	Recycle
4 Basins + Anox + Clarifier	4	11.9	100%	5	N	15	12.2	4,100	10	Recycle

Notes:
(1) In all cases, an increase in internal recycle rate to 400% raw influent flow is assumed.
(2) Addition of supplemental carbon will have other process effects, including (potentially) increased aeration demands, solids production, and mixed liquor concentration.

CONSULTANT COMPETITIVE NEGOTIATION ACT (CCNA)

AGREEMENT No. [ENTER NUMBER]

PROFESSIONAL SERVICES [ENTER TITLE]

between

MANATEE COUNTY (COUNTY)

and

[ENTER CONSULTANT NAME]

(CONSULTANT)

AGREEMENT FOR [INSERT TYPE OF SERVICE]

THIS AGREEMENT is made and entered into as of this _____ day of _____, 20____, by and between **MANATEE COUNTY**, a political subdivision of the State of Florida, (**"COUNTY")**, with offices located at 1112 Manatee Avenue West, Bradenton, Florida 34205, and **[INSERT COMPANY NAME]**, a [<enter the state of incorproation> and identify if it is a Company, Corporation, Limited Liability Company, etc.], (**"CONSULTANT")** with offices located at [Insert address], and duly authorized to conduct business in the State of Florida. COUNTY and CONSULTANT are collectively referred to as the "Parties" and individually as "Party."

WHEREAS, CONSULTANT engages in the business of providing [INSERT TYPE OF SERVICE]; and

WHEREAS, COUNTY has determined that it is necessary, expedient and in the best interest of COUNTY to retain CONSULTANT to render the professional services described in this Agreement; and

WHEREAS, this Agreement is a result of CONSULTANT'S submission of a proposal in response to Request for Qualifications No. [INSERT RFP NUMBER] and COUNTY thereafter conducted a competitive selection process in accordance with the Manatee County Procurement Code and Florida Statutes § 287.055.

NOW, THEREFORE, the COUNTY and CONSULTANT, in consideration of the mutual covenants, promises, and representations contained herein, the sufficiency of which is hereby acknowledged, the Parties hereto agree as follows:

ARTICLE 1. SCOPE OF SERVICES

CONSULTANT shall provide professional services as described in **Exhibit A**, Scope of Services ("Services"). "Task" as used in this Agreement, refers to particular categories/groupings of services specified in **Exhibit A.**

ARTICLE 2. EXHIBITS INCORPORATED

This Agreement consists of a primary contract and <number> exhibits, which are as follows:

Exhibit A Scope of Services
Exhibit B Fee Rate Schedule
Exhibit C Affidavit of No Conflict
Exhibit D Insurance and Bond Requirements

These Exhibits are attached hereto and are incorporated into this Agreement. In the event of a conflict between the terms and conditions provided in the Articles of this Agreement and any Exhibit, the provisions contained within these Articles shall prevail unless the Exhibit specifically states that it shall prevail.

ARTICLE 3. AGREEMENT TERM

A. This Agreement shall commence on the date of execution by COUNTY ("Effective Date"). This Agreement shall remain in force until all Work issued during the effective period of this Agreement are completed, unless terminated by COUNTY pursuant to Article 10, but not to exceed [Insert number of years] years.

ARTICLE 4. COMPENSATION

A. Compensation payable to CONSULTANT for the Services and expenditures incurred in providing the Services specified in **Exhibit A** shall be as stated in **Exhibit B**.

B. Compensation to CONSULTANT shall be based on actual hours performed times fee rate of the individual performing the work, plus reimbursable expenses up to the maximum compensation authorized in **Exhibit B**

C. The fee rates specified in **Exhibit B** shall be the total compensation for Services and shall contain all costs to include salaries, office operation, transportation, equipment, overhead, general and administrative, incidental expenses, fringe benefits and operating margin.

ARTICLE 5. INVOICES AND TIME OF PAYMENT

A. Subject to the provisions of this Agreement, COUNTY shall pay CONSULTANT for the Services at a rate of compensation according to the deliverable payment schedule stated in **Exhibit B**.

B. COUNTY shall approve of all invoices prior to payment.

C. When CONSULTANT seeks payment for any deliverable or reimbursable expense, it shall provide COUNTY with an invoice that includes a description of authorized Services performed and/or expense incurred, and the total unpaid compensation CONSULTANT represents as being due and owing as of the invoice date. All invoices shall include the number which COUNTY shall assign to this Agreement and will be provided to CONSULTANT in writing, upon execution of this Agreement.

D. If any Task requires units of deliverables, such units must be received and accepted in writing by the COUNTY prior to payment.

E. COUNTY shall have forty-five (45) days from the receipt of an invoice seeking payment of fees or costs to either pay the invoice, or notify CONSULTANT that the deliverable, or any part thereof, is unacceptable, and/or that any asserted expense is not reimbursable.

F. COUNTY shall have the right to retain from any payment due CONSULTANT under this Agreement, an amount sufficient to satisfy any amount of liquidated damages due and owing to COUNTY by CONSULTANT on any other Agreement between CONSULTANT and COUNTY.

G. All costs of providing the Services shall be the responsibility of CONSULTANT, with the exception of reimbursement by COUNTY for costs deemed reimbursable in **Exhibit B**.

H. Any dispute between COUNTY and CONSULTANT with regard to the Services or CONSULTANT'S invoice shall be resolved pursuant to the dispute resolution procedures established by Manatee County Procurement Code and Article 12 of this Agreement.

ARTICLE 6. RESPONSIBILITIES OF CONSULTANT

A. CONSULTANT shall appoint an Agent with respect to the Services. CONSULTANT'S Agent shall have the authority to make representations on behalf of CONSULTANT, receive information, and interpret and define the needs of CONSULTANT and make decisions pertinent to Services covered by this Agreement. CONSULTANT'S Agent shall have the right to designate other employees of CONSULTANT to serve in his or her absence. CONSULTANT reserves the right to designate a different agent, provided that COUNTY is given advance written notice thereof.

B. CONSULTANT shall perform the Services in accordance with the terms and conditions of this Agreement.

C. CONSULTANT shall ensure that all employees assigned to render the Services are duly qualified, registered, licensed or certified to provide the Services required.

D. CONSULTANT shall be responsible for collecting all existing data required for the successful completion of each Task.

F. CONSULTANT shall not engage in any obligations, undertakings, contracts or professional obligations that create a conflict of interest, or even an appearance of a conflict of interest, with respect to the Services. CONSULTANT attests to this via an Affidavit of No Conflict, **Exhibit C**.

G. CONSULTANT shall be entitled to rely upon information provided from COUNTY. Information includes, but is not limited to, additional services, consultations, investigations, and reports necessary for the execution of CONSULTANT'S work under this Agreement. CONSULTANT shall be fully responsible for verifying, to the extent practicable, documents and information provided by COUNTY and identifying any obvious deficiencies concerning the documents and information provided. CONSULTANT shall notify COUNTY of any errors or deficiencies noted in such information provided and assist, to the extent practicable, COUNTY in the identification and resolution of same. CONSULTANT agrees to incorporate the provisions of this paragraph in any subcontract into which it might enter with reference to the Services.

G. CONSULTANT shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other services furnished by CONSULTANT under this Agreement. CONSULTANT shall, without additional compensation, correct or revise any errors or deficiencies in its designs, drawings, specifications, and other services.

H. CONSULTANT shall maintain an adequate and competent staff of professionally qualified persons during the term of this Agreement for the purpose of rendering the required services hereunder. CONSULTANT shall not sublet, assign or transfer any services under this Agreement without prior written consent of COUNTY.

I. COUNTY may require in writing that CONSULTANT remove from the project any of CONSULTANT'S personnel that COUNTY determines to be incompetent, careless or otherwise objectionable. No claims for an increase in compensation or agreement term based on COUNTY'S use of this provision will be valid.

ARTICLE 7. RESPONSIBILITIES OF COUNTY

A. COUNTY shall, through its County Administrator, appoint an individual to serve as County Representative. The County Representative shall have the authority to transmit instructions, receive information, interpret and define the policy of COUNTY and make decisions pertinent to services covered by this Agreement. COUNTY reserves the right to designate a different County Representative, provided that CONSULTANT is given written notice thereof.

B. COUNTY shall make available, at no cost to CONSULTANT, information relative to the project that is useful in the performance of the Services.

C. COUNTY shall provide prompt notice to CONSULTANT whenever COUNTY observes or otherwise becomes aware of any defect in the performance of the Services under this Agreement.

D. COUNTY shall give careful and reasonable consideration to the findings and recommendations of CONSULTANT and shall respond and issue notices to proceed in a timely manner.

E. COUNTY personnel shall be available on a time-permitting basis, where required and necessary to assist CONSULTANT. The availability and necessity of said personnel to assist CONSULTANT shall be at the discretion of COUNTY.

F. COUNTY shall perform the responsibilities enumerated in this Article at no cost to CONSULTANT.

ARTICLE 8. COUNTY'S PROJECT MANAGER

The Project Manager shall be appointed to represent COUNTY in all technical matters pertaining to the Services. The Project Manager shall have the following responsibilities:

A. The examination of all reports, sketches, drawings, estimates, proposals, and any other documents provided by CONSULTANT.

B. Providing CONSULTANT written decisions of COUNTY'S approval or disapproval of these documents within a reasonable time.

C. Transmission of instructions, receipt of information, and interpretation of COUNTY policies and decisions with respect to design, materials and other matters pertinent to the services provided under this Agreement.

D. Provide CONSULTANT with prompt written notice whenever COUNTY observes, or otherwise becomes aware of, any defects or changes necessary in a project.

ARTICLE 9. COUNTY OWNERSHIP OF WORK PRODUCT

The Parties agree that COUNTY shall have exclusive ownership of all reports, documents, designs, ideas, materials, reports, concepts, plans, creative works, and other work product developed for or provided to COUNTY in connection with this Agreement, and all patent rights, copyrights, trade secret rights and other intellectual property rights relating thereto (collectively "the Intellectual Property"). CONSULTANT hereby assigns and transfers all rights in the Intellectual Property to COUNTY. CONSULTANT further agrees to execute and deliver such assignments and other documents as COUNTY may later require to perfect, maintain and enforce COUNTY'S rights as sole owner of the Intellectual property, including all rights under patent and copyright law.

ARTICLE 10. TERMINATION OF AGREEMENT

A. TERMINATION FOR CAUSE:

1. COUNTY shall have the right, by written notice to CONSULTANT, to terminate this Agreement, in whole or in part, for failure to substantially comply with the terms and conditions of this Agreement, to include:

    a. Failure to provide products or Services that comply with the specifications herein or that fail to meet COUNTY'S performance standards;

    b. Failure to deliver the supplies or perform the Services within the time specified; or
    c. Progress that is at a rate that disrupts the overall performance of this Agreement.

2. Prior to termination for default, COUNTY shall provide adequate written notice to CONSULTANT, affording CONSULTANT the opportunity to cure the deficiencies or to submit a specific plan to resolve the deficiencies within ten (10) days (or the period specified in the notice) after receipt of the notice. Failure to adequately cure the deficiency shall result in termination action.

3. Such termination may also result in suspension or debarment of CONSULTANT in

accordance with Manatee County's Procurement Ordinance, Chapter 2-26. CONSULTANT shall be liable for any damage to COUNTY resulting from CONSULTANT'S default of the Agreement.

4. In the event of termination of this Agreement, CONSULTANT shall be liable for any damage to COUNTY resulting from CONSULTANT'S default of this Agreement. This liability includes any increased costs incurred by COUNTY in completing performance under this Agreement.

5. In the event of termination by COUNTY for any cause, CONSULTANT shall not have any right or claim against COUNTY for lost profits or compensation for lost opportunities. After a receipt of COUNTY'S Notice of Termination and except as otherwise directed by COUNTY, CONSULTANT shall:

   a. Stop work on the date and to the extent specified;
   b. Terminate and settle all orders and subcontracts relating to the performance of the terminated work;
   c. Transfer all work in process, completed work, and other materials related to the terminated work as directed by COUNTY; and
   d. Continue and complete all parts of that work that have not been terminated.

B. TERMINATION WITHOUT CAUSE:

COUNTY may terminate this Agreement, in whole or in part, without cause. COUNTY shall provide CONSULTANT a written "Notice of Intent to Terminate" thirty (30) days prior to the date of termination. If this Agreement is terminated by the COUNTY without cause, CONSULTANT shall be entitled to payment for all Services performed to the satisfaction of the COUNTY and all expenses incurred under this Agreement prior to termination, less any costs, expenses or damages due to the failure of the CONSULTANT to properly perform pursuant to this Agreement. CONSULTANT shall not be entitled to any other compensation, including anticipated profits on unperformed Services.

ARTICLE 11. TRANSITION SERVICES UPON TERMINATION

Upon termination or expiration of this Agreement, CONSULTANT shall cooperate with COUNTY to assist with the orderly transfer of the Services to COUNTY. Prior to termination or expiration of this Agreement, COUNTY may require CONSULTANT to perform and, if so required, CONSULTANT shall perform, certain transition services necessary to shift the services of CONSULTANT to another provider or to COUNTY itself as described below (the "Transition Services"). The Transition Services may include but shall not be limited to:

A. Working with COUNTY to jointly develop a mutually agreed upon Transition Services plan to facilitate the termination of the services;

B. Executing the Transition Services plan activities;

C. Answering questions regarding the Services on an as-needed basis; and

D. Providing such other reasonable services needed to effectuate an orderly transition to a new Service provider or to COUNTY.

ARTICLE 12. DISPUTE RESOLUTION

A. Disputes shall be resolved in accordance with the Manatee County Purchasing Code (Chapter 2-26 of the Manatee County Code of Ordinances). Any dispute resolution constituting a material change in this Agreement shall not be final until an amendment to this Agreement has been approved and executed by the COUNTY.

B. CONSULTANT agrees it must exhaust all dispute resolution procedures set forth in Manatee County's Procurement Code prior to instituting any action in state or federal court or before any administrative agency or tribunal.

ARTICLE 13. COMPLIANCE WITH LAWS

All Services rendered or performed by CONSULTANT pursuant to the provisions of this Agreement shall be in compliance with all applicable local, state and federal laws and ordinances. CONSULTANT shall have and keep current at all times during the term of this Agreement all licenses and permits as required by law.

ARTICLE 14. NON-DISCRIMINATION

CONSULTANT shall not discriminate against any employee or applicant for employment because of race, color, sex, creed, national origin, disability or age, and will take affirmative action to ensure that all employees and applicants are afforded equal employment opportunities. Such action will be taken with reference to, but shall not be limited to, recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of training or retraining (including apprenticeship and on-the-job training).

ARTICLE 15. MAINTENANCE OF RECORDS; AUDITS; LICENSES

A. CONSULTANT shall maintain records, accounts, property records, and personnel records in accordance with generally accepted accounting principles, as deemed necessary by COUNTY to assure proper accounting of funds and compliance with the provisions of this Agreement.

CONSULTANT shall provide COUNTY all information, reports, records and documents required by this Agreement or by COUNTY ordinances, rules or procedures, or as needed by COUNTY to monitor and evaluate CONSULTANT'S performance. Such materials shall also be made available to COUNTY upon request for auditing purposes. Inspection or copying will occur during normal business hours, and as often as COUNTY may deem necessary. COUNTY shall have the right to obtain and inspect any audit pertaining to the performance of this Agreement or CONSULTANT made by any local, state or federal agency. To the extent such materials are in the possession of a third party, CONSULTANT must obtain them from

that third party, or certify in writing to COUNTY why it was unable to do so. CONSULTANT shall retain all records and supporting documents related to this Agreement in accordance with all applicable laws, rules and regulations, and, at a minimum, retain all records and supporting documents related to this Agreement, except duplicate copies or drafts, for at least three (3) years after the termination date.

B. CONSULTANT shall obtain any licenses required to provide the Services and maintain full compliance with any licensure requirements. Copies of reports provided to or by any licensing or regulatory agency shall be forwarded to COUNTY within ten (10) days of receipt by CONSULTANT. CONSULTANT shall immediately notify COUNTY if the required licenses of any of its principles or agents working on this Agreement are terminated, suspended, revoked or are otherwise invalid and/or are no longer in good standing.

ARTICLE 16. PUBLIC RECORDS

Pursuant to Florida Statutes §119.0701, to the extent CONSULTANT is performing services on behalf of COUNTY, CONSULTANT shall:

A. Keep and maintain public records that would ordinarily be required by COUNTY to perform the service.

B. Upon request from COUNTY'S custodian of public records, provide COUNTY with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law.

C. Ensure that public records that are exempt or confidential from public records disclosure requirements are not disclosed except as authorized by law for the duration of this Agreement and following completion of this Agreement if CONSULTANT does not transfer the records to COUNTY.

D. Upon completion of this Agreement, transfer, at no cost, to COUNTY all public records in possession of CONSULTANT or keep and maintain public records required by COUNTY to perform the service. If CONSULTANT transfers all public records to COUNTY upon completion of this Agreement, CONSULTANT shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If CONSULTANT keeps and maintains public records upon completion of this Agreement, CONSULTANT shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to COUNTY, upon request from COUNTY'S custodian of public records, in a format that is compatible with the information technology systems of COUNTY.

IF CONSULTANT HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO COUNTY'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT:

Phone: 941.742.5845
Email: Debbie.Scaccianoce@mymanatee.org

Mail or hand delivery:
Attn: Records Manager
1112 Manatee Avenue West
Bradenton, FL 34205

ARTICLE 17. INDEMNIFICATION

A. The CONSULTANT shall indemnify and hold harmless COUNTY, its officers, and employees from liabilities, damages, losses, and costs, including but not limited to reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentionally wrongful conduct of the CONSULTANT, its personnel, design professionals and other persons employed or utilized by the CONSULTANT in the performance of this Agreement, including without limitation, defects in design, or errors or omissions that result in material cost increases to COUNTY. Such indemnification shall include the payment of all valid claims, losses, and judgments of any nature whatsoever in connection therewith and the payment of all related fees and costs. COUNTY reserves the right to defend itself with its own counsel or retained counsel at CONSULTANT'S expense.

B. CONSULTANT shall indemnify, defend, save and hold harmless the COUNTY, its officers, and employees all third-party claims, liabilities, loss, or cause of action that the Services constitutes an infringement of any third-party intellectual property right(s), unless such claim is based on COUNTY'S wrongful or illegitimate use of the Services. The foregoing states the entire liability of CONSULTANT and the sole and exclusive remedy for COUNTY with respect to any third-party claim of infringement or misappropriation of intellectual property rights. Such indemnification shall include, but not be limited to, the payment of all valid claims, losses, and judgments of any nature whatsoever in connection therewith and the payment of all related fees and costs, including attorneys' fees.

ARTICLE 18. NO WAIVER OF SOVEREIGN IMMUNITY

Nothing herein shall be interpreted as a waiver by COUNTY of its rights, including the limitations of the waiver of immunity as set forth in Florida Statutes § 768.28, or any other statutes or immunities. COUNTY expressly reserves these rights to the full extent allowed by law.

ARTICLE 19. INSURANCE

A. CONSULTANT shall, at its own cost and expense, acquire and maintain (and cause any subcontractors, representatives, or agents to acquire and maintain) insurance policies that comply with the Insurance Requirements, attached as **Exhibit D**, during the term of this Agreement, to include any renewal terms.

   Certificates of Insurance and copies of policies evidencing the insurance coverage specified in **Exhibit D** shall be filed with the Purchasing Official before the Effective Date of this Agreement. The required certificates shall identify the type of policy, policy number, date of expiration, amount of coverage, companies affording coverage, shall refer specifically to the title of this Agreement, and shall name Manatee County as an additional insured. No changes shall be made to the insurance coverage without prior written approval by COUNTY'S Risk Management Division.

B. Insurance shall remain in force for at least three (3) years after completion of the Services in the amounts and types of coverage as required by **Exhibit D**, including coverage for all Services completed under this Agreement.

C. If the initial insurance expires prior to the termination of this Agreement, renewal Certificates of Insurance and required copies of policies shall be furnished by CONSULTANT and delivered to the Purchasing Official thirty (30) days prior to the date of their expiration.

ARTICLE 20. SOLICITATION OF AGREEMENT

CONSULTANT warrants that it has not employed or retained any company or person other than a bona fide employee working solely for CONSULTANT to solicit or secure this Agreement, and that it has not paid or agreed to pay any company or person other than an employee working solely for CONSULTANT, any fee, commission, percentage, brokerage fee, gift, contingent fee, or any other consideration contingent upon or resulting from the award or making of this Agreement. For breach or violation of this warranty, COUNTY shall have the right to terminate this Agreement without liability, or at its discretion, to deduct from this Agreement price or consideration or otherwise recover the full amount of such fee, commission, percentage, brokerage fee, gifts, or contingent fee.

ARTICLE 21. ASSIGNMENT AND SUBCONTRACTING

CONSULTANT shall not assign or transfer any right or duty under this Agreement to any other party without the prior written consent of COUNTY. In the event CONSULTANT asserts it is necessary to utilize the services of third parties to perform any Service under this Agreement, CONSULTANT shall first obtain prior written approval of COUNTY.

Approval to utilize any third party shall not relieve CONSULTANT from any direct liability or responsibility to COUNTY pursuant to the provisions of this Agreement, or obligate COUNTY to make any payments other than payments due to CONSULTANT as outlined in this Agreement. All terms and conditions of this Agreement shall extend to and be binding on any approved purchaser, assignee, or other successor in interest.

Assignment, pledging, sale, transfer or encumbering of any interest or rights under this Agreement, to anyone other than the CONSULTANT, without the prior written consent of the COUNTY, shall be grounds for immediate termination of this Agreement.

ARTICLE 22. CERTIFICATION OF NON-PAYMENT OF COMMISSION OR GIFT

CONSULTANT warrants that it has not employed or retained any company or person other than a bona fide employee working solely for CONSULTANT to solicit or secure this Agreement, and that it has not paid or agreed to pay any company or person other than an employee working solely for CONSULTANT, any fee, commission, percentage, brokerage fee, gift, contingent fee, or any other consideration contingent upon or resulting from the award or making of this Agreement. For breach or violation of this warranty, COUNTY shall have the right to annul this Agreement, without liability or at its discretion to deduct from the agreement price consideration or otherwise recover the full amount of such fee, commission, percentage, brokerage fee, gifts, or contingent fee.

ARTICLE 23. KEY PERSONNEL

The following key personnel are hereby assigned to this Agreement by CONSULTANT:

Enter Name, Title

CONSULTANT shall not remove such key personnel from providing the Services; provided, however, that the removal of such personnel due to their incapacity, voluntary termination, or termination due to just cause will not constitute a violation of this Agreement. The COUNTY will require that, at a minimum, any proposed replacement have equal or greater qualifications and experience as the key personnel being replaced. CONSULTANT shall not make any personnel changes of the key personnel until written notice is made to and approved by the COUNTY.

ARTICLE 24. SUB-CONTRACTOR

If CONSULTANT receives written approval from the COUNTY to use the services of a sub-contractor(s), CONSULTANT shall utilize the sub-contractor fees specified in **Exhibit B**. CONSULTANT shall notify COUNTY of any replacements or additions to **Exhibit B** and receive prior written approval of COUNTY for replacements or additions before the use of the sub-contractor.

ARTICLE 25. PROFESSIONAL LIABILITY

To the fullest extent allowed by law, the individuals performing the Services shall be personally liable for negligent acts or omissions. To the fullest extent allowed by law, CONSULTANT shall likewise be liable for negligent acts or omissions in the performance of the Services.

ARTICLE 26. NOTICES

All notices, requests and authorizations provided for herein shall be in writing and shall be delivered by hand or mailed through the U.S. Mail, addressed as follows:

To COUNTY:
Manatee County Government
Department
Attn: Title
Name
Address
City, State, Zip
Phone: (941)
Email:

To CONSULTANT:
Consultant Name
Attn: Representative Name
Address
City, State, Zip
Phone: ( )
Email:

ARTICLE 27. RELATIONSHIP OF PARTIES

The relationship of CONSULTANT to COUNTY shall be that of an independent contractor. Nothing herein contained shall be construed as vesting or delegating to CONSULTANT or any of the officers, employees, personnel, agents, or sub-consultants of CONSULTANT any rights, interest or status as an employee of COUNTY. COUNTY shall not be liable to any person, firm or corporation that is employed by Agreements or provides goods or services to CONSULTANT in connection with this Agreement or for debts or claims accruing to such parties. CONSULTANT shall promptly pay, discharge or take such action as may be necessary and reasonable to settle such debts or claims.

ARTICLE 28. NO CONFLICT

By accepting award of this Agreement, CONSULTANT, its directors, officers and employees, represents that it presently has no interest in and shall acquire no interest in any business or activity which would conflict in any manner with the performance of the Services.

ARTICLE 29. ETHICAL CONSIDERATIONS

CONSULTANT recognizes that in rendering the Services, CONSULTANT is working for the residents of Manatee County, Florida, subject to public observation, scrutiny and inquiry; and based upon said recognition CONSULTANT shall, in all of its relationships with COUNTY pursuant to this Agreement, conduct itself in accordance with all of the recognized applicable ethical standards set by any related national societies, and the reasonable traditions to perform the Services. CONSULTANT shall be truthful in its communications with COUNTY personnel regarding matters pertaining to this Agreement and the Services rendered to COUNTY.

ARTICLE 30. PUBLIC ENTITY CRIMES

CONSULTANT has been made aware of the Florida Public Entity Crimes Act, Florida Statutes § 287.133, specifically section 2(a), and COUNTY'S requirement that CONSULTANT comply with it in all respects prior to and during the term of this Agreement.

ARTICLE 31. TAXES

COUNTY is exempt from Federal Excise and State Sales Taxes (F.E.T. Exemption Certificate No. 59-78-0089K; FL Sales Tax Exemption Certificate No. 51-02-027548-53C). Therefore, CONSULTANT is prohibited from charging or imposing any sales or service taxes. Nothing herein shall affect CONSULTANT'S normal tax liability.

CONSULTANT shall be responsible for payment of federal, state, and local taxes which may be imposed upon CONSULTANT under applicable law to the extent that CONSULTANT is responsible for the payment of same under applicable law.

ARTICLE 32. FORCE MAJEURE

Neither Party shall be considered in default in performance of its obligations hereunder to the extent that performance of such obligations or any of them is delayed or prevented by Force Majeure.

Force Majeure shall include, but not be limited to, hostility, revolution, civil commotion, strike, epidemic, accident, fire, flood, wind, earthquake, hurricane, explosion, lack of or failure of transportation facilities, any law, proclamation, regulation, ordinance or other act of government, or any act of God or any cause whether of the same or different nature, existing or future; provided that the cause, whether or not enumerated in this Article, is beyond the control and without the fault or negligence of the Party seeking relief under this Article.

ARTICLE 33. GOVERNING LAW, JURISDICTION AND VENUE

This Agreement shall be governed by the laws of the State of Florida. Any action filed regarding this Agreement will be filed only in Manatee County, Florida, or if in Federal Court, the Middle District of Florida, Tampa Division.

ARTICLE 34. ATTORNEY FEES

In the event of any litigation arising under the terms of this Agreement, each Party shall be responsible for their own attorney's fees, including appellate fees, regardless of the outcome of the litigation.

ARTICLE 35. PATENT AND COPYRIGHT RESPONSIBILITY

Any material, design or supplied specified by CONSULTANT or supplied by CONSULTANT pursuant to this Agreement shall not knowingly infringe any patent or copyright, and CONSULTANT shall be solely responsible for securing any necessary licenses required for patented or copyrighted material utilized by CONSULTANT in the performance of the Services.

ARTICLE 36. AMENDMENTS

This Agreement and Exhibits referenced herein constitute the entire Agreement between the Parties with respect to subject matter and mutually agree that no verbal agreements, representations, warranties or other understandings affecting the same exist. No amendment hereof shall be effective until and unless reduced to writing and executed by the Parties. The Parties shall execute any additional documents as may be necessary to implement and carry out the intent of this Agreement.

ARTICLE 37. SEVERABILITY

It is understood and agreed by the Parties hereto that if any part, term, or provision of this Agreement is held to be illegal or in conflict with any law, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the Parties shall be construed and enforced as if this Agreement did not contain the particular part, term or provision held to be invalid.

ARTICLE 38. LEGAL REFERENCES

All references to statutory sections or chapters shall be construed to include subsequent amendments to such provisions, and to refer to the successor provision of any such provision. References to “applicable law” and “general law” shall be construed to include provisions of local, state and federal law, whether established by legislative action, administrative rule or regulation, or judicial decision.

ARTICLE 39. HEADINGS, CONSTRUCTION

The Parties agree that they have each participated in the drafting of this Agreement and that the rules with respect to construing ambiguities against the drafter of a contract shall not apply in any action or litigation regarding this Agreement. All articles and descriptive headings of paragraphs of this Agreement are inserted for convenience only and shall not affect the construction or interpretation hereof.

ARTICLE 40. TIME

For purposes of computing any period of number of days hereunder for notices or performance of ten (10) days or less, Saturdays, Sundays and holidays shall be excluded, unless otherwise stated.

ARTICLE 41. AUTHORITY TO EXECUTE

Each of the Parties hereto covenants to the other Party that it has lawful authority to enter into this Agreement.

[Remainder of page intentionally left blank]

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be duly executed effective as of the date set forth above.

CONSULTANT NAME

By: _____

Printed Name: _____

Title: _____

Date: _____

MANATEE COUNTY, a political subdivision of the State of Florida

_____
INSERT PROCUREMENT OFFICIAL
Procurement Official

Date: _____

EXHIBIT A, SCOPE OF SERVICES

EXHIBIT B, FEE RATE SCHEDULE

1. FEES

Fees for the Services detailed in this Agreement shall be as set forth in this **Exhibit B**.

2. REIMBURSEABLE EXPENSES

[Remainder of page intentionally left blank]

EXHIBIT C, AFFIDAVIT OF NO CONFLICT

STATE OF _____
COUNTY OF _____

BEFORE ME, the undersigned authority, this day personally appeared [INSERT NAME] _____, as [INSERT TITLE] _____ of [INSERT CONSULTANT NAME] _____ (hereinafter "CONSULTANT") with full authority to bind, who being first duly sworn, deposes and says that CONSULTANT:

(a) Is not currently engaged and will not become engaged in any obligations, undertakings or contracts that will require CONSULTANT to maintain an adversarial role against the County or that will impair or influence the advice, recommendations or quality of work provided to the County; and

(b) Has provided full disclosure of all potentially conflicting contractual relationships and full disclosure of contractual relationships deemed to raise a question of conflict(s); and

(c) Has provided full disclosure of prior work history and qualifications that may be deemed to raise a possible question of conflict(s).

CONSULTANT makes this Affidavit for the purpose of inducing Manatee County, a political subdivision of the State of Florida, to enter into this Agreement No. _____ for _____

DATED this _____ day of _____, 20_____.

_____
CONSULTANT Signature

The foregoing instrument was sworn to and acknowledged before me this _____ day of _____, 20____, by [NAME]_____, as [TITLE] _____ of [CONSULTANT]_____ _____. He / She is personally known to me or has produced _____ [TYPE OF IDENTIFICATION] as identification.

_____
Notary Signature
Commission No. _____

EXHIBIT D, INSURANCE AND BOND REQUIREMENTS

REQUIRED INSURANCES

The CONSULTANT will not commence work under the resulting Agreement until all insurance coverages indicated by an "X" herein have been obtained. The CONSULTANT shall obtain and submit to the Procurement Division within ten (10) calendar days from the date of notice of intent to award, at its expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy): Work under this Agreement cannot commence until all insurance coverages indicated herein have been obtained on a standard ACORD form (inclusive of any amounts provided by an umbrella or excess policy):

☒ **Automobile Liability Insurance Required Limits**

Coverage must be afforded under a per occurrence policy form including coverage for all owned, hired and non-owned vehicles for bodily injury and property damage of not less than:

- $1,000,000 Combined Single Limit; OR
- $ 500,000 Bodily Injury and $500,000 Property Damage
- $10,000 Personal Injury Protection (No Fault)
- $500,000 Hired, Non-Owned Liability
- $10,000 Medical Payments

This policy shall contain severability of interests' provisions.

☒ **Commercial General Liability Insurance Required Limits (per Occurrence form only; claims-made form is not acceptable)**

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $1,000,000 Single Limit Per Occurrence
- $2,000,000 Aggregate
- $1,000,000 Products/Completed Operations Aggregate
- $1,000,000 Personal and Advertising Injury Liability
- $50,000 Fire Damage Liability
- $10,000 Medical Expense, and
- $1,000,000, Third Party Property Damage
- $ Project Specific Aggregate (Required on projects valued at over $10,000,000)

This policy shall contain severability of interests' provisions.

☒ **Employer's Liability Insurance**

Coverage limits of not less than:

- $100,000 Each Accident
- $500,000 Disease Each Employee
- $500,000 Disease Policy Limit

☒ Worker's Compensation Insurance

☐ **US Longshoremen & Harbor Workers Act**
☐ **Jones Act Coverage**

Coverage limits of not less than:

- Statutory workers' compensation coverage shall apply for all employees in compliance with the laws and statutes of the State of Florida and the federal government.
- If any operations are to be undertaken on or about navigable waters, coverage must be included for the US Longshoremen & Harbor Workers Act and Jones Act.

Should 'leased employees' be retained for any part of the project or service, the employee leasing agency shall provide evidence of Workers' Compensation coverage and Employer's Liability coverage for all personnel on the worksite and in compliance with the above Workers' Compensation requirements. NOTE: Workers' Compensation coverage is a firm requirement. Elective exemptions are considered on a case-by-case basis and are approved in a very limited number of instances.

☐ **Aircraft Liability Insurance Required Limits**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $ Each Occurrence Property and Bodily Injury with no less than $100,000 per passenger each occurrence or a 'smooth' limit.
- $ General Aggregate.

☐ **Un-Manned Aircraft Liability Insurance (Drone)**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- $ Each Occurrence Property and Bodily Injury; Coverage shall specifically include operation of Unmanned Aircraft Systems (UAS), including liability and property damage.
- $ General Aggregate

☐ **Installation Floater Insurance**
When the contract or agreement **does not** include construction of, or additions to, above ground building or structures, but does involve the installation of machinery or equipment,

Installation Floater Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- 100% of the completed value of such addition(s), building(s), or structure(s)

☒ **Professional Liability and/or Errors and Omissions (E&O) Liability Insurances**

Coverage shall be afforded under either an occurrence policy form or a claims-made policy form. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- $ 1,000,000 Bodily Injury and Property Damage Each Occurrence
- $ 2,000,000 General Aggregate

☐ **Builder’s Risk Insurance**

When the contract or agreement includes the construction of roadways and/or the addition of a permanent structure or building, including the installation of machinery and/or equipment, Builder’s Risk Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- An amount equal to 100% of the completed value of the project, or the value of the equipment to be installed
- The policy shall not carry a self-insured retention/deductible greater than $10,000

Coverage shall be for all risks and include, but not be limited to, storage and transport of materials, equipment, supplies of any kind whatsoever to be used on or incidental to the project, theft coverage, and Waiver of Occupancy Clause Endorsement, where applicable.

☐ **Cyber Liability Insurance**

Coverage shall comply with Florida Statute 501.171, shall be afforded under a per occurrence policy form, policy shall be endorsed and name ‘Manatee County, a political subdivision of the State of Florida’ as an Additional Insured, and include limits not less than:

- $ Security Breach Liability
- $ Security Breach Expense Each Occurrence
- $ Security Breach Expense Aggregate
- $ Replacement or Restoration of Electronic Data
- $ Extortion Threats
- $ Business Income and Extra Expense
- $ Public Relations Expense

NOTE: Policy must not carry a self-insured retention/deductible greater than $25,000.

☐ **Hazardous Materials Insurance (As Noted Below)**
Hazardous materials include all materials and substances that are currently designated or defined as hazardous by the law or rules of regulation by the State of Florida or federal government.
All coverage shall be afforded under either an occurrence policy form or a claims-made policy form, and the policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

☐ ***Pollution Liability***
Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

☐ ***Asbestos Liability (If handling within scope of Contract)***
Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

☐ ***Disposal***
When applicable, CONSULTANT shall designate the disposal site and furnish a Certificate of Insurance from the disposal facility for Environmental Impairment Liability Insurance covering liability.

- Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Liability for Sudden and Accidental Occurrences, each claim and an aggregate.
- Amount equal to the value of the contract, subject to a $1,000,000 minimum, for Liability for Non-Sudden and Accidental Occurrences, each claim and an aggregate.

☐ **Hazardous Waste Transportation Insurance**
CONSULTANT shall designate the hauler and have the hauler furnish a Certificate of Insurance for Automobile Liability insurance with Endorsement MCS-90 for liability arising out of the transportation of hazardous materials. EPA identification number shall be provided.

All coverage shall be afforded under either an occurrence policy form or a claims-made policy form and the policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- Amount equal to the value of the contract, subject to a $1,000,000 minimum, per accident.

☐ **Liquor Liability Insurance**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- $1,000,000 Each Occurrence and Aggregate

☐ **Garage Keeper's Liability Insurance**
Coverage shall be required if the maintenance, servicing, cleaning or repairing of any County motor vehicles is inherent or implied within the provision of the contract.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the lot or garage.

☐ **Bailee's Customer Liability Insurance**
Coverage shall be required for damage and/or destruction when County property is temporarily under the care or custody of a person or organization, including property that is on, or in transit to and from the person or organization's premises. Perils covered should include fire, lightning, theft, burglary, robbery, explosion, collision, flood, earthquake and damage or destruction during transportation by a carrier.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the County asset(s) in the CONSULTANT'S care, custody and control.

☐ **Hull and Watercraft Liability Insurance**
Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- $ Each Occurrence
- $ General Aggregate
- $ Fire Damage Liability
- $10,000 Medical Expense, and
- $ Third Party Property Damage
- $ Project Specific Aggregate (Required on projects valued at over $10,000,000)

☐ **Other [Specify]**

REQUIRED BONDS

☐ **Bid Bond**

A Bid Bond in the amount of $_____ or ____% of the total offer. Bid bond shall be submitted with the sealed response and shall include project name, location, and / or address and project number. In lieu of the bond, the bidder may file an alternative form of security in the amount of $_____ or ____% of the total offer. in the form of a money order, a certified check, a cashier's check, or an irrevocable letter of credit issued to Manatee County. NOTE: A construction project over $200,000 requires a Bid Bond in the amount of 5% of the total bid offer.

☐ **Payment and Performance Bond**

A Payment and Performance Bond shall be submitted by Successful Bidder for 100% of the award amount and shall be presented to Manatee County within ten (10) calendar days of issuance of the notice of intent to award. NOTE: A construction project over $200,000 requires a Payment and Performance Bond.

I. INSURANCE REQUIREMENTS

THE POLICIES ARE TO CONTAIN, OR BE ENDORSED TO CONTAIN, THE FOLLOWING PROVISIONS:

Commercial General Liability and Automobile Liability Coverages

a. **"Manatee County, a Political Subdivision of the State of Florida," is to be named as an Additional Insured in respect to:** Liability arising out of activities performed by or on behalf of the CONSULTANT, his agents, representatives, and employees; products and completed operations of the CONSULTANT; or automobiles owned, leased, hired or borrowed by the CONSULTANT. The coverage shall contain no special limitation(s) on the scope of protection afforded to the COUNTY, its officials, employees or volunteers.

In addition to furnishing a Certificate of Insurance, the CONSULTANT shall provide the endorsement that evidences Manatee COUNTY being listed as an Additional Insured. This can be done in one of two ways: (1) an endorsement can be issued that specifically lists "Manatee County, a Political Subdivision of the State of Florida," as Additional Insured; or, (2) an endorsement can be issued that states that all Certificate Holders are Additional Insured with respect to the policy.

b. The CONSULTANT'S insurance coverage shall be primary insurance with respect to the COUNTY, its officials, employees and volunteers. Any insurance

or self-insurance maintained by the COUNTY, its officials, employees or volunteers shall be excess of CONSULTANT's insurance and shall be non-contributory.

c. The insurance policies must be on an occurrence form.

Workers' Compensation and Employers' Liability Coverages

The insurer shall agree to waive all rights of subrogation against the COUNTY, its officials, employees and volunteers for losses arising from work performed by the CONSULTANT for the COUNTY.

II. General Insurance Provisions Applicable To All Policies:

a. Prior to the execution of contract, or issuance of a Purchase Order, and then annually upon the anniversary date(s) of the insurance policy's renewal date(s) for as long as this contract remains in effect, CONSULTANT shall furnish the COUNTY with a Certificate(s) of Insurance (using an industry accepted certificate form, signed by the Issuer, with applicable endorsements, and containing the solicitation or contract number, and title or description) evidencing the coverage set forth above and naming "Manatee County, a Political Subdivision of the State of Florida" as an Additional Insured on the applicable coverage(s) set forth above.

b. If the policy contains an aggregate limit, confirmation is needed in writing (letter, email, etc.) that the aggregate limit has not been eroded to procurement representative when supplying Certificate of Insurance.

In addition, when requested in writing from the COUNTY, CONSULTANT will provide the COUNTY with a certified copy of all applicable policies. The address where such certificates and certified policies shall be sent or delivered is as follows:

Manatee County, a Political Subdivision of the State of Florida
Attn: Risk Management Division
1112 Manatee Avenue West, Suite 969
Bradenton, FL 34205

c. The project's solicitation number and title shall be listed on each certificate.

d. CONSULTANT shall provide thirty (30) days written notice to the Risk Manager of any cancellation, non-renewal, termination, material change, or reduction in coverage of any insurance policies to procurement representative including solicitation number and title with all notices.

e. CONSULTANT agrees that should at any time CONSULTANT fail to meet or maintain the required insurance coverage(s) as set forth herein, the COUNTY may terminate this contract.

f. The CONSULTANT waives all subrogation rights against COUNTY, a Political Subdivision of the State of Florida, for all losses or damages which occur during the contract and for any events occurring during the contract period, whether the suit is brought during the contract period or not.

g. The CONSULTANT has sole responsibility for all insurance premiums and policy deductibles.

h. It is the CONSULTANT'S responsibility to ensure that his agents, representatives and subcontractors comply with the insurance requirements set forth herein. CONSULTANT shall include his agents, representatives, and subcontractors working on the project or at the worksite as insured under its policies, or CONSULTANT shall furnish separate certificates and endorsements for each agent, representative, and subcontractor working on the project or at the worksite. All coverages for agents, representatives, and subcontractors shall be subject to all of the requirements set forth to the procurement representative.

i. All required insurance policies must be written with a carrier having a minimum A.M. Best rating of A- FSC VII or better. In addition, the COUNTY has the right to review the CONSULTANT's deductible or self-insured retention and to require that it be reduced or eliminated.

j. CONSULTANT understands and agrees that the stipulated limits of coverage listed herein in this insurance section shall not be construed as a limitation of any potential liability to the COUNTY, or to others, and the COUNTY'S failure to request evidence of this insurance coverage shall not be construed as a waiver of CONSULTANT'S obligation to provide and maintain the insurance coverage specified.

k. CONSULTANT understands and agrees that the COUNTY does not waive its immunity and nothing herein shall be interpreted as a waiver of the COUNTY'S rights, including the limitation of waiver of immunity, as set forth in Florida Statutes § 768.28, or any other statutes, and the COUNTY expressly reserves these rights to the full extent allowed by law.

l. No award shall be made until the Procurement Division has received the Certificate of Insurance in accordance with this section.

III. BONDING REQUIREMENTS

Bid Bond/Certified Check. By submitting a proposal, the CONSULTANT agrees should its proposal be accepted, **to execute the form of Agreement and present the same to COUNTY for approval within ten (10) calendar days after notice of intent to award**. The CONSULTANT further agrees that failure to execute and deliver said form of Agreement **within ten (10) calendar days** will result in damages to COUNTY and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed proposal in the amount of five (5%) percent of the total amount of the proposal. The CONSULTANT further agrees that in case the CONSULTANT fails to enter into an Agreement, as prescribed by COUNTY, the bid bond/certified check accompanying the proposal shall be forfeited to COUNTY as agreed liquidated damages. If COUNTY enters into an agreement with a CONSULTANT, or if COUNTY rejects any and/or all proposals, accompanying bond will be promptly returned.

Payment and Performance Bonds. Prior to commencing work, the CONSULTANT shall obtain, for the benefit of and directed to COUNTY, a Payment and Performance Bond satisfying the requirements of Florida Statutes § 255.05 covering the faithful performance by the CONSULTANT of its obligation under the Contract Documents, including but not limited to the construction of the project on the project site and the payment and obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the CONSULTANT to provide the Payment and Performance Bond shall be approved by COUNTY prior to issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that surety is rated A- or better by Best's Key Guide, latest edition.

Failure to provide the required bonds on the prescribed form may result in CONSULTANT being deemed nonresponsive. Bonds must be in the form prescribed in Florida Statutes § 255.05 and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Florida Statutes § 255.05.

Bonds shall be in an amount equal to 100% of the contract price issued by a duly authorized and nationally recognized surety company, authorized to do business in the State of Florida, satisfactory to COUNTY. Surety shall be rated as "A-" or better by Best's Key Guide, latest edition. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Payment and Performance Bonds shall be issued to "Manatee County, a political subdivision of the State of Florida", **within ten (10) calendar days after issuance of notice of intent to award**.

In addition, pursuant to Section 255.05(1)(b), Florida Statutes, prior to commencing work, the CONSULTANT shall be responsible and bear all costs associated to record the Payment and Performance Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Procurement Division upon

filing. Pursuant to Florida Statutes § 255.05(1)(b) COUNTY will make no payment to the CONSULTANT until the CONSULTANT has complied with this paragraph.

Furnishing Payment and Performance Bonds shall be requisite to execution of an Agreement with COUNTY. Said Payment and Performance Bonds will remain in force for the duration of this Agreement with the premiums paid by the CONSULTANT. Failure of the CONSULTANT to execute such Agreement and to supply the required bonds shall be just cause for cancellation of the award. COUNTY may then contract with the next lowest, responsive and responsible CONSULTANT or re-advertise the RFP.

Failure of COUNTY at any time to require performance by the CONSULTANT of any provisions set out in the resulting Agreement will in no way affect the right of COUNTY, thereafter, to enforce those provisions.

[Remainder of page intentionally left blank]

CONSULTANT'S INSURANCE STATEMENT

THE UNDERSIGNED has read and understands the aforementioned insurance and bond requirements of this Agreement and shall provide the insurance and bonds required by this section within ten (10) days from the date of notice of intent to award.

Date: _____

Consultant's Name: _____

Authorized Signature: _____

Printed Name/Title: _____

Insurance Agency: _____

Agent Name: _____

Agent Phone: _____

Surety Agency: _____

Surety Name: _____

Surety Phone: _____

Please return this completed and signed statement with your agreement.