TECHNICAL MEMORANDUM

Index Number 150-11 – Southwest WRF Expansion from 14 to 18 MGD Project Definition

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Introduction & Background

This technical memorandum (TM) presents the project definition for the Southwest Water Reclamation Facility (WRF) Expansion to 18 MGD. The information is presented in the following sections:

- Introduction & Background
- Justification
- Scope
- General Requirements
- Maintenance of Plant Operation
- Preliminary Construction Sequence
- Preliminary Design Concept
- Project Deliverables
- Implementation Schedule
- Project Management & Delivery
- Cost Estimate and Expenditure Forecast

Summary of existing facilities

The Southwest WRF is a Biological Nutrient Removal (BNR) facility originally built in 1979. This facility owned and operated by JEA is located at:

5420 118th Street, Jacksonville, Florida 32224
Duval County
Latitude: 30° 13' 57.92" N, Longitude: 81° 43' 20.99" W

The Southwest WRF is an advanced secondary wastewater treatment facility with a permitted capacity of 14.0 million gallon per day (mgd) annual average daily flow (AADF) that discharges to the Lower St. Johns River via outfall. The facility operates under Florida Department of Environmental Protection (FDEP) Permit No. FL0026468. This facility consists of the following components:

- Headworks Structure provided with influent screening and grit removal
- Activated sludge trains in a Modified Ludzak-Ettinger (MLE)/4-stage configuration
- Secondary clarifiers including Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) pumps
- Ultraviolet (UV) disinfection
- Post aeration system
- Effluent pumping station
- Sludge holding tanks
- Sludge transfer pumping station
- Outfall discharging to the St. Johns River

An overview of the facility is presented below; additional information about the existing equipment at the Southwest WRF is presented in Appendix A.

Raw influent enters the site via a 42-inch influent pipe that continues to the headworks. The headworks was originally constructed during the 1986 expansion and the screens were replaced in 2006 and 2014. Additional upgrades are planned for 2018 which include replacing the two grit units and partial rehabilitation of the grit snail and slurry cups. The headworks contains mechanical screens and grit removal. Information about the existing headworks is summarized in Tables A-1 and A-2 of Appendix A.

Screened influent passes through a parshall flume then enters Splitter Box No. 1. As of March 2015, the flow recorded / reported to FDEP comes from the effluent meter instead of the parshall flume. Flow is split between activated sludge train 2 and to Splitter Box No. 2. Once flow enters Splitter Box No. 2 it is distributed between activated sludge trains 1 and 3. The activated sludge trains (1-3) were constructed in 1975, 1986 and 2002, respectively. The existing plant process flow diagram is shown in Figure 1. Each train uses fine bubble aeration to aid in the treatment process. A series of multi-stage centrifugal blowers provides the process air to the basins. Blowers were installed in 1975, 1986 and 2002 to provide process air. In 2007 two blowers were replaced with larger units to increase aeration capacity. Similar upgrades planned for 2018 include replacing two more blowers with larger units. Information about the existing activated sludge infrastructure is summarized in Tables A-3 through A-5 of Appendix A.

Wastewater from the activated sludge trains is directed via Splitter Box Nos. 3 and 4 to the Secondary Clarifiers. The Secondary Clarifiers were constructed in 1975 (1), 1986 (2 and 3) and 2006 (4). Sludge can be returned from Secondary Clarifier Nos. 1-3 via three pumps located at the RAS/WAS Pump Station 1 (south of Secondary Clarifier No. 1). Sludge can be returned from Secondary Clarifier No. 4 via two pumps at RAS Pump Station 2 just south of Secondary Clarifier No. 4. Sludge can be wasted from Secondary Clarifier Nos. 1-3 via two pumps at the RAS/WAS Pump Station 1. Sludge can be wasted from Secondary Clarifier No. 4 via a modulating valve through a 10-inch WAS pipe which tees off the existing RAS header tee at the RAS Pump Station 2. Wasted sludge enters the aerated sludge holding tank. Information about the existing Secondary Clarifier infrastructure is summarized in Tables A-6 through A-8 of Appendix A.

Secondary Clarifier effluent is routed to the UV Splitter Box then to the UV Disinfection / Post Aeration structure. The UV Disinfection / Post Aeration structure was constructed in 1999. The banks of the UV were installed in 1999 (1A and 2A) and 2006 (1B and 2B). Information about the existing

UV Disinfection / Post Aeration infrastructure is summarized in Tables A-9 and A-10 of Appendix A.

Disinfected effluent is directed via the effluent pumping station for disposal via the outfall / diffuser into the St. Johns River. Effluent flow less than approximately 6.5 mgd flows by gravity via a 24-inch diameter bypass around the effluent pump station. When effluent flow exceeds 6.5 mgd, all effluent is pumped to a wetwell which gravity flows to the outfall. Four of the effluent pumps were installed in 1999 and the fifth was installed in 2007. All five pumps are on variable frequency drives. Information about the existing effluent pumps and the outfall are summarized in Tables A-11 and A-12 of Appendix A.

Wasted sludge is transferred from the existing aerated sludge holding tank to the Buckman Residuals Management Facility via two pumps located just north of the aerated sludge holding tank. The sludge holding tank was constructed in 1975 and the sludge transfer pumps were replaced in 2009. Information about the existing sludge infrastructure is summarized in Tables A-13 and A-14 of Appendix A. An emergency sludge holding tank with a capacity of 0.38 million gallons (mg) is located just east of the sludge holding tank.

The plant presently receives utility power at two separate electrical distribution buildings. Each building is served from JEA's primary distribution via outdoor pad mounted transformers at 480 volts. Power Building No. 1 receives primary power from JEA's Firestone Substation and Power Building No. 2 has two primary feeds, one from JEA's Naval Air Station (NAS) Substation and the other from Firestone Substation. Both electrical services provide for Class 1 Reliability per EPA design criteria. The combined service capacity is 5 MVA. Power Building No. 1 utility and standby power configuration includes distribution Switchboard 1 (SWB-1) receiving utility power from a 2500 KVA transformer and 1500 KW diesel engine generator, respectively. SWB-1 serves the north and west portions of the plant. Power Building No. 2 utility and standby power arrangement consists of a main-tie-main distribution Switchboard 2 (SWB-2) receiving utility power via two 2500 KVA transformers and 1500 KW engine generator, respectively. SWB-2 serves south and east portions of the plant. Power is distributed throughout the plant at 480 volts via underground concrete encased ducts to the process associated motor control centers (MCCs). With the exception of MCCs 3 & 4 at the blower building, power is distributed radially throughout the plant. The existing electrical distribution system single line diagram is shown in Figure 2.

The capacity of the existing equipment at the Southwest WRF is summarized in Table 1.

Table 1 Existing Infrastructure Capacity Summary

Component / Unit Process	AADF Capacity	Peak Flow Capacity	Observations/Assumptions
Headworks-Screens	14 mgd	35 mgd	Additional hydraulic limitations due to freeboard at peak flows
Headworks-Grit	14 mgd	20 mgd	Option to bypass during peak events
Activated Sludge Train-BNR Capacity	14 mgd	35 mgd	Based on desired summer aerobic SRT of 4 days (Oxic C unaerated) and winter aerobic SRT (Oxic C aerated) of 5.5 days; target TN of 6 mg/L
Activated Sludge Train-Aeration Capacity	14 mgd	N/A	Assuming blower replacement currently in bidding phase is complete
Secondary Clarifiers	14 mgd	35 mgd	Based on Aerated Effluent Mixed Liquor Suspended Solids (AEMLSS) corresponding to the target SRT; flow split is assumed to be proportional to the clarifier area
UV Disinfection	14 mgd	35 mgd	Based on assumed UVT of 60% (JEA recently began monitoring UVT in laboratory in addition to the in-situ probe for use during detailed design) and equal flow split between channels; water level control gates can pass 54 mgd; adequate hydraulic capacity in secondary effluent piping
Post Aeration	14 mgd	50 mgd	
Effluent Pump Station	N/A	41 mgd	Based on Class 1 Reliability / Firm Capacity; Total Capacity is 57 mgd
Outfall	N/A	42 mgd	Based on high water limitation of effluent pump station wetwell

Design flows, design loads and future limits

Preliminary flows and loading projections for the Southwest WRF are summarized in Tables 2 and 3. The current flows and loads reflect data analysis of three years of record data (2014 to 2016 at the Southwest WRF) with additional flow data dating back to 2007 to verify the design peaking factors. The data was provided by JEA and analyzed by Hazen and Sawyer. The future flows and loading projections represent design criteria used for the Phase 4 Blacks Ford WRF Expansion. The projected flows and loads from the Blacks Ford WRF design represent JEA's most comprehensive analysis to date for new development.

The peaking factors for the current flow (approximately 11 mgd) were determined based on historical data from the Southwest WRF. Since historical flow from 2014 to 2016 was relatively dry, additional flow data dating back to 2007 was reviewed to verify the design peaking factors. The design peaking factors for the Blacks Ford WRF were used for the future flow (approximately 7 mgd) to account for the lower peaking factors expected from new development. Lower peaking factors for new development are assumed because new infrastructure is expected to experience less infiltration and inflow (I&I) than the existing collection infrastructure. The composite peaking factors applied to the

18 mgd expansion design are summarized in Table 2. Based on this analysis, the design peak flow peaking factor was set at 3.0.

The load analysis for the current flow (approximately 11 mgd) were determined based on historical data from 2014 to 2016 at the Southwest WRF. The design influent loads for the Blacks Ford WRF were used for the future flow (approximately 7 mgd) except for carbonaceous biochemical oxygen demand (cBOD) which was much higher historically at the Southwest WRF (220 mg/l vs 175 mg/L). The composite influent loads applied to the 18 mgd expansion design are summarized in Table 3. The projected loads for Southwest WRF represents an increase in influent TKN concentration of 43% and 64% at annual average and maximum month condition, respectively, from the 2004 design loads. The projected influent cBOD concentrations also represent an increase of approximately 10% and 13% at annual average and maximum month condition, respectively, from the 2004 design condition.

The peaking factors, including annual average (AA), maximum month (MM), maximum day (MD) and peak hour (PH), created for conceptual design purposes for the Southwest WRF shall be verified during final design as they have a significant impact on equipment sizing, pipe sizes, hydraulics, etc. The flow and loads analysis conducted for SWWRF does not include impact of I&I and sea level rise.

Table 2 Recommended Influent Design Flows

Condition	**Current Flow ~ 11 mgd**		**Additional Projected Future Flow ~ 7 mgd**		**Combined Flow and Peaking Factor**	
	Flow (mgd)	**Peaking Factor**	**Flow** (mgd)	**Peaking Factor**	**Flow** (mgd)	**Peaking Factor**
Design AA	11.0	1.0	7.0	1.0	18.0	1.0
Design MM	14.3	1.3	8.4	1.2	23.4*	1.3
Design MD	27.5	2.5	11.2	1.6	39.6*	2.2
Design PH	35.2	3.2	17.5	2.5	54.0*	3.0

**Based on selected peaking factors*

Table 3 Recommended Influent Design Loads

Parameter	Current Flow ~11 mgd			Additional Projected Future Flow ~ 7 mgd			Combined Flow and Peaking Factor		
	Conc (mg/L)	Peaking Factor		Conc (mg/L)	Peaking Factor		Conc (mg/L)	Peaking Factor	
	AA	MM	MD	AA	MM	MD	AA	MM	MD
Carbonaceous BOD	220	1.15	1.59	175**	1.35	1.60	220	1.25	1.60
Total Suspended Solids	200	1.16	1.69	200	1.40	1.80	200	1.25	1.73
Total Kjeldahl Nitrogen (TKN)	49	1.17	1.50*	55	1.25	1.50	51	1.20	1.50
Ammonia	37	1.17	1.50*	40	1.25	1.50	38	1.20	1.50
Total Phosphorus	6	1.10	***	7	1.30	1.70	6	1.20	1.65

** Data from Southwest WRF not available; based on Arlington East WRF historical data*
*** Concentration deemed too low; used value from Southwest*
**** Insufficient historical data*

The Southwest WRF has a permitted surface water discharge (D-001) to the St. Johns River. Current effluent limits for the WRF presented in the FDEP Permit FL0026468 are summarized in Table 4 (for cBOD and total suspended solids; refer to current operating permit for other parameters). The proposed flow increase will affect the cBOD and total suspended solids (TSS) effluent limitations. It is expected that a FDEP permit modification will include the discharge limitations summarized in Table 4. The detailed design will need to focus on compliance with current and future operating permits and meeting an annual average total nitrogen (TN) goal of 5 mg/L.

Table 4 Effluent Design Criteria (cBOD and TSS Requirements)

Parameter	Unit	Statistical Basis	Effluent Limitations (Max Limit) at Annual Average Flow	
			Current Condition (14 mgd)	Future Condition (18 mgd)
Carbonaceous BOD	mg/L	Annual Average	14.3	11.1
		Monthly Average	17.9	13.9
		Weekly Average	32.1	25.0
		Single Sample	42.8	33.3
Total Suspended Solids	mg/L	Annual Average	14.3	11.1
		Monthly Average	17.9	13.9
		Weekly Average	32.1	25.0
		Single Sample	42.8	33.3

Justification

JEA currently serves Duval County and portions of Nassau, Clay and St. Johns counties for wastewater service, see Figure 3 for the current JEA wastewater service area map. Wastewater generated west of the St. Johns River and south of Interstate 10 is currently served by the Southwest

WRF. The Southwest service area wastewater growth projections are shown in Table 5. JEA anticipates slow and steady growth within the Southwest service area. For planning purposes, the ultimate build-out capacity of the Southwest WRF is anticipated to be 18 mgd.

Table 5 Flow Projections by JEA, Southwest WRF

Year	Flow (mgd)
2017	10.83
2018	11.11
2019	11.38
2020	11.66
2021	11.91
2022	12.16
2023	12.42
2024	12.67
2025	12.92
2026	13.17
2027	13.41
2028	13.66
2029	13.91
2030	14.15
2031	14.33
2032	14.52
2033	14.70
2034	14.89
2035	15.07
2036	15.19
2037	15.31
2038	15.43
2039	15.55
2040	15.67

The last facility expansion occurred in 2008 with the addition of a third activated sludge train and a fourth secondary clarifier. The expansion increased the treatment capacity from 10 mgd AADF to 14 mgd AADF. After the 2008 expansion was complete Southwest has seen increased flows and loads from both population growth and from flow redirected to Southwest WRF from the phased-out Jax Heights WRF, a 2.5 mgd AADF plant. As a result of the increased flow, the Southwest WRF is gradually approaching its current design capacity of 14 mgd. The current AADF of 11 mgd is approximately 80% of design capacity. Additionally, many of the electrical components of this facility have reached or are reaching the end of their useful life. Under this project, the Southwest WRF would expand its treatment capacity from 14 mgd to 18 mgd AADF (build-out capacity). This document presents a plan for the future expansion to the WRF.

Scope

Based on this analysis, the scope of the Southwest WRF Expansion to 18 mgd project will be as follows:

- Construct a new headworks structure that includes influent screening and grit removal
- Demolish the existing headworks structure
- Construct a new activated sludge train (#4) including instrumentation, nitrified recycle (NRCY) pumps, mixers, diffusers
- Construct a new blower building to serve the new activated sludge train (#4)
- Construct two new secondary clarifiers (#5 and #6) including shared RAS and WAS pumps
- Upgrade / replace the current UV system with a Low Power High Output (LPHO) UV system; upgrades / replacement contingent upon results of a detailed disinfection study; alternative solutions may be required based on results of the study
- Install an additional blower to serve the existing post aeration trains
- Modify the effluent pumping station
- Replace the mixer in the aerated sludge holding tank with a course bubble diffuser system
- Evaluate the required tertiary filter capacity and create a phased approached for construction
- Complete modifications to the existing outfall system, to be completed under a separate project (separate project definition)
- Replace the two odor control bio-filter beds with Bio-Scrubber towers
- Provide an additional primary feed to Switchboard 1, replace MCCs 3, 4, 2, 2A, 2B and 2C, and provide Main-Tie-Main configuration / replace 480V feeders to new MCCs
- Expansion of the ethernet local area network to accommodate the additional instrumentation control panels
- Miscellaneous upgrades throughout the plant including replacement of existing reuse pump #3, installation of additional ammonia and nitrate analyzers in Trains 2 and 3, providing a spare effluent flowmeter, replacing the flowmeters on the activated sludge trains and sludge holding tank, replacing variable frequency drives for RAS Pump Station 2 and required upgrades to the onsite road network, sight lighting, and auxiliary infrastructure (e.g., stormwater, plant drain, plant service water, potable water and sanitary sewer)
- Confirm peaking factors, flows and loads; discuss with JEA during scoping the potential impacts of I&I and sea level rise on the design factors, flows and loads
- Complete a detailed hydraulic and capacity evaluation of the plant to confirm each unit process can handle the proposed flows and loads; confirm the assumed flow splits throughout the plant and propose solutions for hydraulic / flow split issues and any other hydraulic constraints identified during the evaluation

General Requirements

General Engineering requirements include the following:

- Engineer shall obtain as-built facility drawings and existing equipment specifications from JEA.
- Engineer shall perform existing facility inspections, obtain required measurements and observe operation and operational tests.
- Engineer's design shall be in accordance with JEA Water and Sewer Standards Manual as amended by the JEA project team.
- Equipment types, specifications and acceptable suppliers shall be those approved by the JEA Standards Committee where applicable.

Maintenance of Plant Operation

Engineer shall incorporate measures in the drawings and specifications to maintain operation of the existing process units and equipment to the maximum extent feasible. The sequence of construction shall be constrained and temporary construction required as necessary to minimize negative impacts to plant operations. Specific allowable process shut-downs, their duration and coordination with JEA shall be specified.

Preliminary Construction Sequence

Phasing will be a critical component of this design. The detailed design engineer will need to develop a detailed construction sequence to minimize plant process interruptions.

Preliminary Design Concept

The preliminary design concept includes the upgrades required to treat up to 18 mgd of raw sewage. Design criteria for sizing the proposed facilities were developed from the guidelines recommended in *Water Environment Federation Manual of Practice 8, Recommended Standards for Wastewater Facilities* ("Ten State Standards"), United States Environmental Protection Agency (US EPA) design manuals, manufacturer recommended equipment design criteria and engineering experience. Additionally, the Southwest WRF will be designed to meet the US EPA definition of Class 1 reliability standards. A summary of the reliability requirements for vital components of the treatment facility are shown in Appendix B. These requirements are based on the criteria established in *Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability (EPA, 1973).* The design criteria and preliminary equipment selection for each unit process are summarized in the sections that follow. Final equipment design, selection and layout are subject to change. The preliminary design concept is summarized in the site drawing and process flow diagram included as Figures 4 and 5. The base alternative includes the following elements:

- Proposed Influent Structure
- Proposed Activated Sludge Train
- Proposed Secondary Clarifiers
- Proposed Tertiary Filtration
- Proposed UV Disinfection / Post Aeration Structure
- Proposed Effluent Management Infrastructure
- Proposed Sludge Infrastructure
- Proposed Electrical Distribution Improvements

- Proposed Electrical Process Improvements
- Proposed SCADA System PLC Controls
- Proposed Miscellaneous Facility Improvements
- Proposed Flow Splitting
- General Site Development

The proposed base alternative is conservative. JEA may want to consider additional alternatives as part of detailed design. The design engineer shall evaluate alternative technologies and strategies for the expansion after discussion / approval from JEA.

Proposed Influent Structure

A combined headworks will receive wastewater from the collection system pump stations. The influent structure will provide both fine screening and grit removal (concentration and conveyance). The headworks facility will consist of four influent channels with four mechanically cleaned fine screens and four grit removal units. For the base alternative, redundancy at peak flow is provided for the screens but not for the grit removal units. One bypass channel with a manually cleaned bar screen is also proposed. The proposed headworks facility will be sized to provide preliminary treatment for all wastewater flow influent to the WRF at the build-out capacity. This alternative was selected due to the following:

- Concerns about the hydraulic constraints and improper flow split at the existing headworks
- Issues pertaining to unequal solids inventory among the three activated sludge trains
- Inadequate grit removal capacity at the existing headworks
- Common solids inventory between the new and existing trains

Information about the proposed influent infrastructure is summarized in Tables 6 and 7. Additionally, hydraulic improvements should be made between the headworks and the existing activated sludge trains to improve RAS distribution.

Odor control for the headworks will need to be evaluated during detailed design.

Table 6 Proposed Influent Screens

Number of screens	4
Type of Screen	6 mm Perforated Plate
Peak Capacity	18 mgd, each
Firm Capacity	54 mgd, total

Table 7 Proposed Grit Removal System

Number of units	4
Type of Unit	Stacked Tray Grit Separator
Peak Capacity	13.5 mgd, each
Total Capacity	54 mgd, total (with all units in service)

Proposed Activated Sludge Train

A fourth activated sludge train (Train 4) is proposed. The flow split between the activate sludge trains assumes approximately 12 mgd AADF to the existing trains (Trains 1 to 3) and the remaining 6 mgd AADF to proposed Train 4. The flow to the existing trains was limited based on:

- Increase in plant flow peaking factor from 2.5 (during capacity expansion to 14 mgd) to 3.0 based on future projections
- Maintaining a uniform flow peaking factor of 3.0 between the existing and proposed facility, resulting in peak capacities of 35 mgd and 19 mgd, respectively
- Decrease in TN target from 6 mg/L to 5 mg/L based on JEA feedback
- Increase in design TKN and cBOD loads

Limiting the existing activated sludge infrastructure from 14 mgd (see Table 1) to 12 mgd AADF will result in an overall more conservative design, improve operational flexibility (e.g., what trains can be taken offline) and will increase the ability of the SWWRF to meet stringent effluent TN requirements.

The layout for Train 4 will mimic the existing Train 3 for ease of operations. The activated sludge process will consist of the following process components:

- First Anoxic Zone – Denitrification of nitrate from recycled streams
- Aerobic Zone – Oxidation of influent organic compounds and nitrification
- Second Anoxic Zone – Additional denitrification through endogenous respiration
- Second Aerobic Zone/Re-aeration Zone – Release of trapped nitrogen gas bubbles and nitrification of ammonia

Mixed liquor in the anoxic zones will be kept in suspension using submersible mixers. Fine bubble diffusers will be used to provide oxygen to the aerobic zone and to keep the mixed liquor in suspension. MLSS/NRCY pumps with variable frequency drives will provide sufficient recycle of the nitrate-rich MLSS to the first anoxic zone.

A new blower building will be constructed south of Train 3 to house the blowers for Train 3 and Train 4. Four large blowers (250 hp; 4,950 scfm) from the existing blower building will be relocated to the new blower building. In addition to the relocated blowers, one new small (150 hp; 2,800 scfm) and one new large blower (250 hp; 4,950 scfm) will also be provided in the new blower building to meet the aeration demands for Trains 3 and 4. Information about the proposed blowers for the new blower building is summarized in Table 9. The four smaller blowers (150 hp; Hoffman) in the existing blower building will remain in place to serve Trains 1 and 2. Additional electrical and structural improvements are required for the existing blower building. Electrical improvements are summarized in the proposed electrical section.

During detailed design, the following items need to be reviewed/evaluated: alternative technologies and layout options; provisions for dosing glycerin/carbon; the precise flow split between the basins based on the hydraulic assessment of the existing trains; an interconnect between Train 3 and 4 and a common mixed liquor distribution channel between existing and new trains. The design engineer shall also carefully review the flow split downstream of the existing and new aeration basins to the secondary clarifiers hydraulically, mechanically and operationally. Information about the proposed activated sludge infrastructure is summarized in Tables 8-10.

Table 8 Proposed Activated Sludge Train

Number of Basins per Train	2
Dimensions per Basin (approximate)*	72 ft x 167 ft x 18 ft
Peak Capacity per Train	19 mgd
Train Process Volume**	
First Anoxic	0.48 MG
First Oxic/Aerobic	1.82 MG
Second Anoxic	0.18 MG
Second Oxic/ Reaeration	0.005 MG

**Does not include the area required for the Reaeration Zone and influent and effluent distribution channels*
***Does not include freeboard volume*

Table 9 Proposed Blowers for the New Blower Building

Number of Blowers	4 relocated from existing Blower Building, 2 new
Blower Information	4 relocated blowers + 1 new blower at: 4,950 scfm, 8.4 psi, 250 hp motor 1 new blower at: 2,800 scfm, 8.4 psi, 150 hp motor
Firm Capacity	22,600 scfm

Table 10 Proposed NRCY Pumps

Number of units	2 (2 Duty, 0 Standby)
Pump Type	Submersible Pumps; Variable Drive
Pump Information	40 hp, each
Capacity	6.3 to 27.0 mgd, each

Proposed Secondary Clarifiers

Two additional secondary clarifiers are proposed to accommodate the flow from activated sludge Train 4. The new clarifiers would be supported by three RAS pumps and two WAS pumps. Information about the proposed secondary clarifier infrastructure is summarized in Tables 11-13.

Table 11 Proposed Secondary Clarifier

Number of units	2
Clarifier Information	Center Feed-Peripheral Overflow, 110-ft Diameter / 19,000 sf
Peak Capacity	19 mgd, total

Table 12 Proposed RAS Pumps

Number of units	3 (2 Duty, 1 Standby)
Pump Type	Dry Submersible
Pump Information	2,850 gpm
Firm Capacity	5,700 gpm

Table 13 Proposed WAS Pumps

Number of units	2 (1 Duty, 1 Standby)
Pump Type	Dry Pit Centrifugal
Pump Information	500 gpm
Firm Capacity	500 gpm

The flow split and uniform 3.0 peaking factor assumptions for the proposed secondary clarifiers mirror those for the activate sludge trains by assuming approximately 12 mgd AADF / 35 mgd PF to the existing clarifiers (1-4) and the remaining 6 mgd AADF / 19 mgd PF to proposed Secondary Clarifiers 5 and 6. Limiting the existing secondary clarifier infrastructure from 14 mgd (see Table 1) to 12 mgd AADF will result in an overall more conservative design and improve operational flexibility (e.g., which clarifier can be taken offline).

Proposed Tertiary Filtration

The future effluent limitations (Table 4) approach the limits of reduction for secondary clarification. Filtration will be needed in the future at the Southwest WRF due to the proposed flow increase and proposed loading. Filters will also provide additional flexibility within plant. The filtration facility is sized to accommodate partial flow, 9 mgd, from the entire facility with the rest bypassing and blending downstream. A total of six filters (five active, one backwash) are proposed in three phases. Backwash cycles are intermittent, but do result in solids and washwater recycle streams that must be captured. Sufficient filter units will be provided so that acceptable treatment will occur with at least one unit in backwash mode. Information about the proposed Tertiary Filtration is summarized in Table 14.

During detailed design, the tertiary filtration facility/transfer pump station will be designed for build-out capacity and include instructions for phasing. Additionally, the following items need to be reviewed/evaluated during detailed design:

- Confirm timeline for deferred construction of filter facility
- Evaluate need for intermittent polymer system
- Extended historical data TSS data review

It is also recommended that a calibrated CFD model of the secondary clarifiers be used during detailed design to determine the final effluent quality and the subsequent tertiary filter capacity and phasing required.

Note that JEA is currently piloting a water purification facility at the Southwest WRF with potential expansion to 10-mgd in the future. Depending on the results of the pilot, JEA may elect to pursue the 10-mgd water purification facility in lieu of tertiary filtration in the future, however, the design for the tertiary filters will proceed until such time that JEA is ready to make that decision.

Table 14 Proposed Filters

Number of units	6
Filter Type	Deep Bed
Hydraulic Loading Rate (average and peak)	4 gpm/sq ft
Backwash Duration	30 minutes
Backwash Frequency (average)	Once per day
Backwash Volume	6 gpm / sq ft
Firm Capacity	3 mgd per phase; 9 mgd build-out

Proposed UV Disinfection / Post Aeration Structure

Due to the age of the infrastructure, all existing channels (1A, 1B, 2A and 2B; previously termed "banks") will be replaced with the Trojan UVSigna system or equal as detailed in Table 15. Additional channels ("banks") may be needed depending on the UV transmittance at this facility. Detailed design requires evaluation of UV transmittance and secondary coliform concentrations to confirm the design UV dose and equipment options. Additionally, improvements shall be coordinated with any plans to produce high-level-disinfection effluent for reuse.

One new aeration blower will be installed to meet the required post aeration requirements. Information about the proposed UV Disinfection / Post Aeration infrastructure is summarized in Tables 15-16.

Table 15 Proposed UV Disinfection System

UV Type	Trojan UV Signa or equal
Number of Channels	4
Number of Banks	4 per Channel (16 Total)
Number of Lamps	14 per Bank (224 total)
Design UV Transmittance	60 % (minimum)
Firm Capacity	54 mgd (with one channel out of service)
Disinfection Limit	200 Fecal Coliform per 100 ml, 30 day Geometric Mean of consecutive daily grab samples

Table 16 Proposed Post Aeration Improvements

Number of additional units	1
Motor Size	40 hp
Capacity	539 scfm, 6.5 psi

Proposed Effluent Management Infrastructure

At the existing Effluent Pump Station, two of the smaller effluent pumps (75 hp; 6,000 gpm) will be replaced with two of the larger effluent pumps (125 hp; 10,800 gpm). This modification will provide JEA with the peak firm capacity above 54 mgd. Additional upgrades are necessary for the outfall piping and diffuser to achieve 54 mgd. JEA is pursuing outfall modifications via a separate contract / project definition due to the complexity of the installation and the uncertainty of the sizing, route, easements, etc. Information about the proposed effluent pumps is summarized in Table 17.

Table 17 Proposed Effluent Pumps

Number of replaced units	2
Pump Type	Screw Centrifugal Pump/Vertical Motor
Pump Information	125 hp, 10,800 gpm, 33 ft TDH
Firm Capacity	55 mgd, total

Proposed Sludge Infrastructure

Due to operational constraints with the existing sludge holding tank floating mixer, the mixer will be replaced with coarse bubble aeration system. Information about the internal mechanism upgrade is summarized in Table 18.

Table 18 Proposed Sludge Holding Tank Mixing System

Aeration System	Course Bubble Aeration
Number of Blowers	2 (1 Duty, 1 Standby)
Blower Demand	2,200 scfm
Firm Capacity	2,200 scfm
Volume of tank	0.54 MG
Motor Size	125 hp

Proposed Electrical Distribution Improvements

The conceptual design for the electrical distribution system has been developed to meet the design criteria for Class 1 Reliability. The following improvements are recommended to increase reliability and replace obsolete distribution equipment:

- Extend NAS primary service feeder from Electrical Building No. 2 to Electrical Building No. 1 and add second 2500 KVA service transformer at Electrical Building No. 1
- Replace SWB-1 with main-tie-main configuration
- Replace 480-volt feeder cables that have reached their useful life

Proposed Electrical Process Improvements

The proposed plant expansion will result in a net increase in electrical power demand. The net increase by individual process is presented in the Electrical Load Table (Table 19).

Table 19 Electrical Load List

Process	Net Electrical Load Increase (hp)*	Notes
Screens	10	The existing headworks equipment will be abandoned which has an electrical load of approximately 35 hp
Grit Removal	35	
Activated Sludge Train	200	Train 4
Blowers	400	Train 4; 1,000 hp from the existing Power Building No. 1 will be moved to proposed Power Building No. 3
Clarifier Mechanisms	2	For Clarifiers 5&6
RAS Pumps	80	For Clarifiers 5&6
WAS Pumps	15	For Clarifiers 5&6
Post Aeration Blower	40	One additional blower
Filter Transfer Pump Station/Facility	100	For all phases (9 mgd)
Filter Facility Backwash Pumps	30	Assumes one filter in backwash cycle at any given time
Effluent Pump Station	100	Two 75 hp pumps to be replaced with two 125 hp pumps
Sludge Holding Tank Blower	65	One 125 hp blower will replace one 60 hp mixer

* *Excludes stand-by units*

To efficiently distribute power to the proposed plant process facilities at 480 volts, an additional utility electrical service point with standby generator power will be required. Power Building No. 3 will be incorporated and constructed as part of proposed Blower Building. The JEA primary distribution system consisting of two feeders from separate substations will be extended and connected to two stepdown transformers to provide 480 volts secondary power. Switchboard No. 3 (SWB-3) will be configured in a main-tie-main arrangement with connection to generator power. Power Building No. 3 will allow for a simplified sequence of construction and minimize plant power interruptions.

Power will be distributed from Power Building Nos. 1-3 in the most efficient manner dependent upon load location and electrical duct bank routing. The following summarizes the preliminary electrical conceptual design:

- Existing Blower Building: Presently, the building is not air conditioned and houses Motor Control Centers (MCC) Nos. 3, 4, 2, 2A, 2B & 2C. All electrical loads receive power from Power Building No. 1. Blowers will be split and located in two groups to serve Activated Sludge

Trains 1 & 2 and Activated Sludge Trains 3 & 4. The four smaller blowers will remain in the existing building to serve Trains 1 & 2. The four existing larger blowers will be moved to the new blower building along with two additional blowers (one large, one small) to serve Trains 3 & 4. Relocation of the four large blowers to the proposed building to serve Train 3 will free up space at the existing building allowing construction of conditioned room for all proposed MCC replacements. MCC layouts will be optimized to reduce overall footprint. MCCs will be double ended with main-tie-main configuration.

- Proposed Headworks and Screening/Grit Handling Building: Proposed facilities will be serviced from Power Building No. 1 via a new MCCs at existing Blower Building.
- Proposed Blower Building: Power Building No. 3 will be located at the new Blower facility. Switchboard No. 3 will distribute power to the process MCCs. The MCCs will be double ended main-tie-main configured to provide Class 1 reliability. Process electrical loads to be powered from this location are as follows:
    - Activated Sludge Train 4 including miscellaneous equipment
    - Blowers for Train Nos. 3 and 4
    - Secondary Clarifier Nos. 5 and 6
    - RAS/WAS Pump Station for Secondary Clarifier Nos. 5 and 6
- Effluent Pump Station: Proposed 125 hp effluent pumps will replace two existing 75 hp pumps. New pumps will be connected to existing 480v MCC 23 at the pump station.
- Post Aeration: Proposed post aeration loads will be connected to existing 480v MCC 23 located at Effluent Pump Station. Motor feeders will be installed from Effluent Pump Station to the proposed facilities.
- Filter Pump Station: Proposed electrical loads associated with Deep Bed Filters will be powered at 480v from Power Building No. 2 Feeders will be installed from the electrical building 480v MCCs to the proposed facilities.

Proposed SCADA System PLC Controls

The ethernet local area network (LAN) shall be expanded to interconnect each of the PLCs via single mode fiber optic cable. JEA standard Scalence Ethernet switches with fiber ports shall be used for the LAN. Profibus PD and Profinet communications shall be utilized for communications between the PLCs, variable frequency drives and field instrumentation capable of Profibus DP communication.

Instrumentation Control Panels shall be JEA standard Siemens S7 PLCs. New instrumentation control panels shall be located in the climate controlled areas within the Power Building No. 3 / Proposed Blower Building and the Existing Blower Building. Each instrumentation control panel will be equipped with a JEA standard Simatic Human Machine Interface (HMI) touch panel Operator Interface Terminal with a 12-inch display, minimum. Additionally, the HMI to the plant Supervisory Control and Data Acquisition (SCADA) System shall be developed using JEA standard Siemens WinCC (version and service pack will be specified by JEA at the time of the integration).

The required instrumentation will be provided for the unit processes added and modified during the expansion to 18 mgd. Each instrument will be connected to the designated process PLC.

Proposed Miscellaneous Facility Improvements

The Southwest WRF Expansion to 18 mgd project will also include the following miscellaneous facility improvements:

- Replace the two existing odor control bio-filter beds with Bio-Scrubber towers
- Replace the existing reuse pump #3
- Install additional ammonia analyzers in Train 2 and 3; currently Trains 2A/2B and 3A/3B share one analyzer
- Install additional nitrate analyzers in Train 2 and 3; currently Trains 2A/2B and 3A/3B share one analyzer
- Provide a spare effluent flowmeter, spool piece and isolation valves
- Replace flowmeters on the effluent of activated sludge trains and sludge holding tank
- Replace the variable frequency drives for the RAS Pump Station 2
- Replace the existing temperature and pressure sensors in the existing blower building
- Coordinate and provide all facility upgrades with the necessary improvements to the internal road network, stormwater management, plant drain, plant service water, potable water distribution, sanitary sewer, lift station and plant lighting

Proposed Flow Splitting

No preliminary hydraulic evaluations were performed during development of this Project Definition. However; based on field observations and anecdotal evidence, hydraulics at the current facility appear highly constrained. A detail hydraulic model of the existing and future facility shall be developed during design to confirm the hydraulic profile and to confirm adequate flow split among existing and new unit processes. Design of new facilities must consider height limitations and transfer of flow/MLSS between process trains; specifically, between Trains 3 and 4.

General Site Development

The Engineer shall obtain a detailed topographic survey, geotechnical report and site investigation as outlined below. Depending on the findings, additional services / mitigation may be necessary (e.g., a jurisdictional wetland survey in conformance with the US Army Corps of Engineers requirements). A topographical survey for the existing and proposed site will be required. The survey shall include the following at a minimum:

- Wetland identification, flood zone delineation and identification of any waterbodies, water surface elevations, top / bottom of banks, buffers, etc.
- Topographic survey shall be provided on NAVD 88 datum, recommend minimum 1-ft contours based and 50-ft beyond proposed facilities; topographic survey information shall depict the locations of existing features including all visible treatment process yard piping, vaults and structures within the proposed project area including spot elevations
- Location of any above ground natural or manmade features, pavements, fences, signage, etc.
- Location and associated elevations of any storm water retention or conveyance infrastructure
- Location of all trees 6-inch diameter and greater

- As-built survey information to confirm the location and dimensions of existing structures to be upgraded
- Location of standard service utilities, all treatment process yard piping, vaults and structures and weir elevations in areas of proposed construction
- Include the conversion factor between NAVD 88 and NGVD 29

The proposed facilities will also require a geotechnical evaluation to determine structural foundation design requirements. It is anticipated the following information as a minimum will be included in the geotechnical evaluation report:

- Soil boring logs and classifications
- Existing groundwater levels/elevations and estimated seasonal high levels
- Pipe trench preparation and backfill recommendations
- Dewatering discharge recommendations
- Foundation design recommendations for each significant building and process tank

The engineer shall also obtain services for site investigation to identify the potential presence of threatened and endangered species such as the Gopher Tortoise.

Project Deliverables

Project deliverables at design milestones shall include, but are not limited to, the following:

- The 10% Schematic design document shall include the following:
  - Hydraulic Evaluation
  - Flow and Load Analysis
  - Alternatives Analysis
  - Filter Facility Design and Phasing Analysis
  - Class 4 Cost Estimate (+50%/-30%), as defined by AACE International
  - Preliminary Mechanical, Electrical, Structural, Civil and Controls Design
  - Major Equipment Listing
- The 30% Conceptual design document (CDD) shall include the following:
  - Topographic survey
  - Geotechnical Evaluation
  - Class 3 Cost Estimate (+30%/-20%), as defined by AACE International
  - Preliminary Mechanical Plans and Sections
  - Preliminary Process and Instrumentation Drawings
  - Preliminary Power Plans and Single Line Diagrams
  - List of Specifications

- The 60% design documents shall include the following:
  - Class 2 Cost Estimate (+20%/-15%), as defined by AACE International
  - Complete Set of Drawings
  - Complete Set of Specifications
- The 90% design documents shall include the following:
  - Class 1 Cost Estimate (+15%/-10%), as defined by AACE International
  - Complete Set of Drawings
  - Complete Set of Specifications
- The 100% design documents shall include updated version of the 90% documents following review of the 90% documents by JEA.

Implementation Schedule

See Appendix D

Project Management & Delivery

Stage	Project Definition	10% Schematic Design	30% Conceptual Design	90% Detail Design	100% Final Design	Bid	Construction
To Project Delivery	Hazen	PEC	PEC	PEC	PEC	PEC	PEC
		OPB Established		Trend		Trend	Trend

Cost Estimate and Expenditure Forecast (Current $)

ACTIVITY/DESCRIPTION	SUB-TOTAL	TOTAL
Contractor Direct Cost		$ 39,485,000
Contractor Indirect Cost		$ 16,981,000
Contingency – 20%	$ 7,897,000	
General Conditions/Mobilization – 5%	$ 1,975,000	
Overhead & Profit – 12%	$ 4,739,000	
Bonding & Insurance – 3%	$ 1,185,000	
Escalation – 2%	$ 790,000	
Supplemental Work Allowance -10% max (1%)	$ 395,000	
JEA Cost & Engineering		$ 9,035,000
JEA Project Management	$ 1,694,000	
Engineering	$ 5,647,000	
Services During Construction	$ 1,694,000	
TOTAL PROJECT COST		$ 65,501,000

	PROJECTED EXPENDITURE FORECAST BY YEAR (x1,000)										
ACTIVITY	2018	2019				2020				2021	
QUARTER	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Engineering - Design	10	400	995	995	995	995	995	262			
Construction									5,276	4,291	4,291
TOTAL	10	400	995	995	995	995	995	262	5,276	4,291	4,291

	PROJECTED EXPENDITURE FORECAST BY YEAR (x1,000)									
ACTIVITY	**2021**		**2022**				**2023**			**Total**
QUARTER	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	
Engineering - Design										**$5,647**
Construction	4,291	4,291	7,693	7,693	7,693	7,693	2,214	2,214	2,214	**$59,854**
TOTAL	4,291	4,291	7,693	7,693	7,693	7,693	2,214	2,214	2,214	**$65,501**

ITEM #	PROCESS DESCRIPTION	CONTRACTOR DIRECT COST
1	Headworks	$ 7,009,000
2	BNR Train	$ 6,486,000
3	Blower/ Electrical Building	$ 4,302,000
4	Secondary Clarifiers	$ 6,675,000
5	UV Disinfection	$ 4,274,000
6	Effluent Pump Station	$ 452,000
7	Electrical	$ 1,753,000
8	Odor Control	$ 1,189,000*
9	Yard Piping and Miscellaneous Hydraulic Improvements	$ 5,120,000
10	Other Items**	$ 2,225,000
	Total	$ 39,485,000

** Cost provided by JEA*

*** Costs for the other items are primarily comprised of the post aeration system upgrades, sludge storage improvements, modifications / upgrades for the effluent flowmeter and miscellaneous equipment replacement as previously described*

Revision History

Name	Date	Version	Revision Notes
G. Porter	4/23/18	1	Revised project schedule and expenditure forecast to reflect CMAR

Figures

- **Existing Process Flow Diagram**
- **Existing Electrical Distribution System Single Line Diagram**
- **Current JEA Wastewater Service Area Map**
- **Preliminary Site Layout**
- **Proposed Process Flow Diagram**

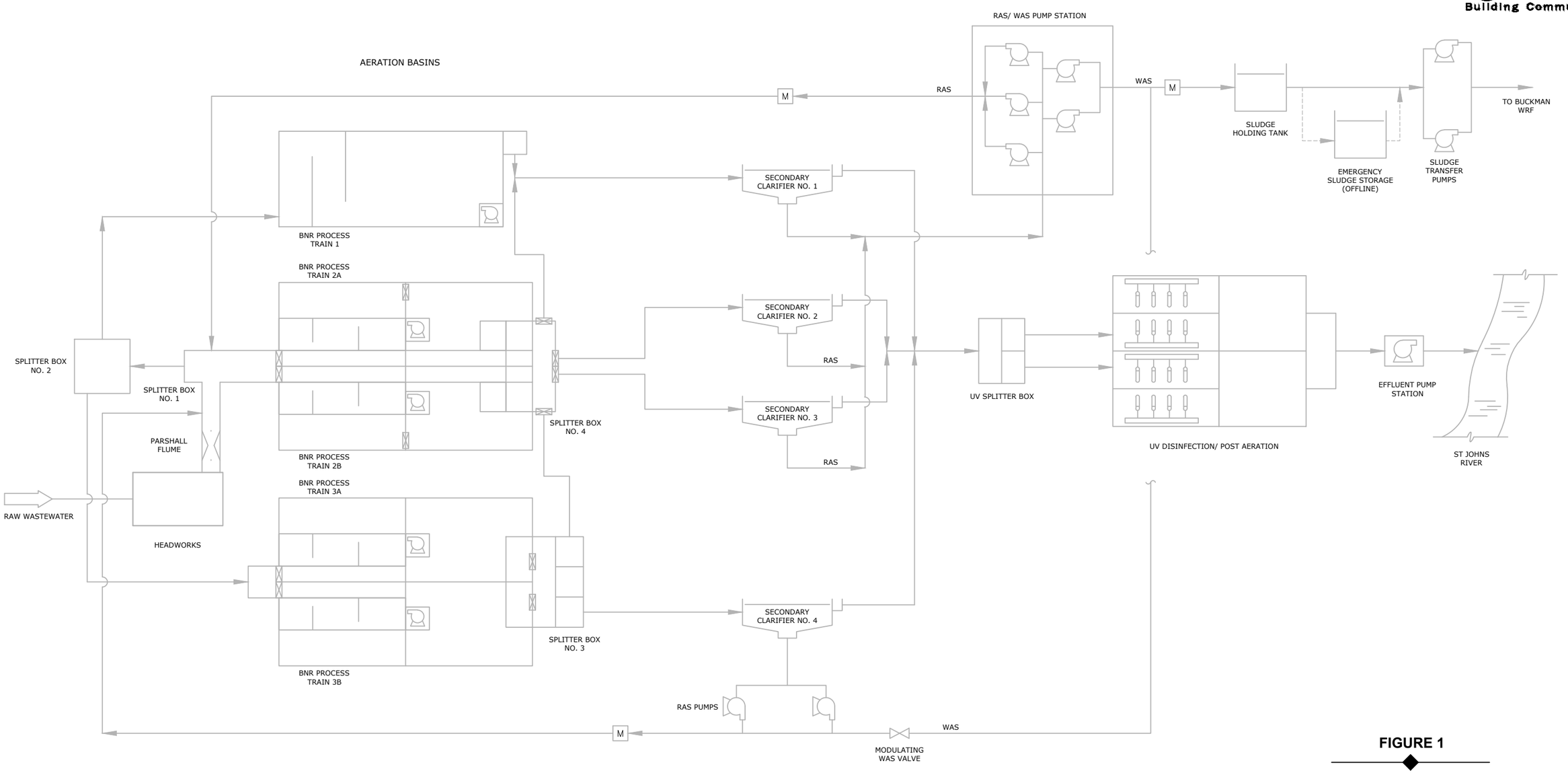


FIGURE 1

EXISTING PROCESS FLOW DIAGRAM

Southwest Water Reclamation Facility

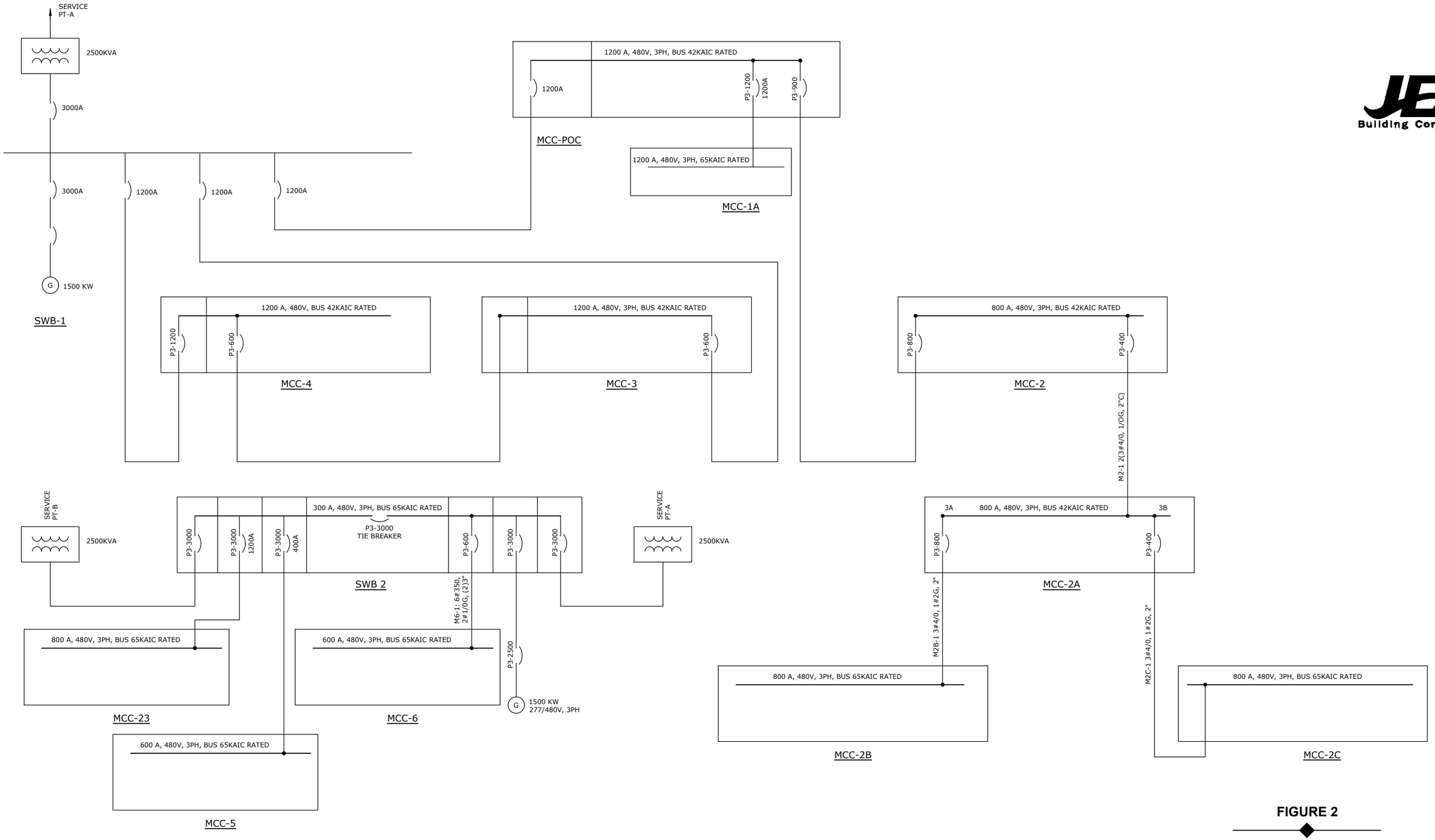
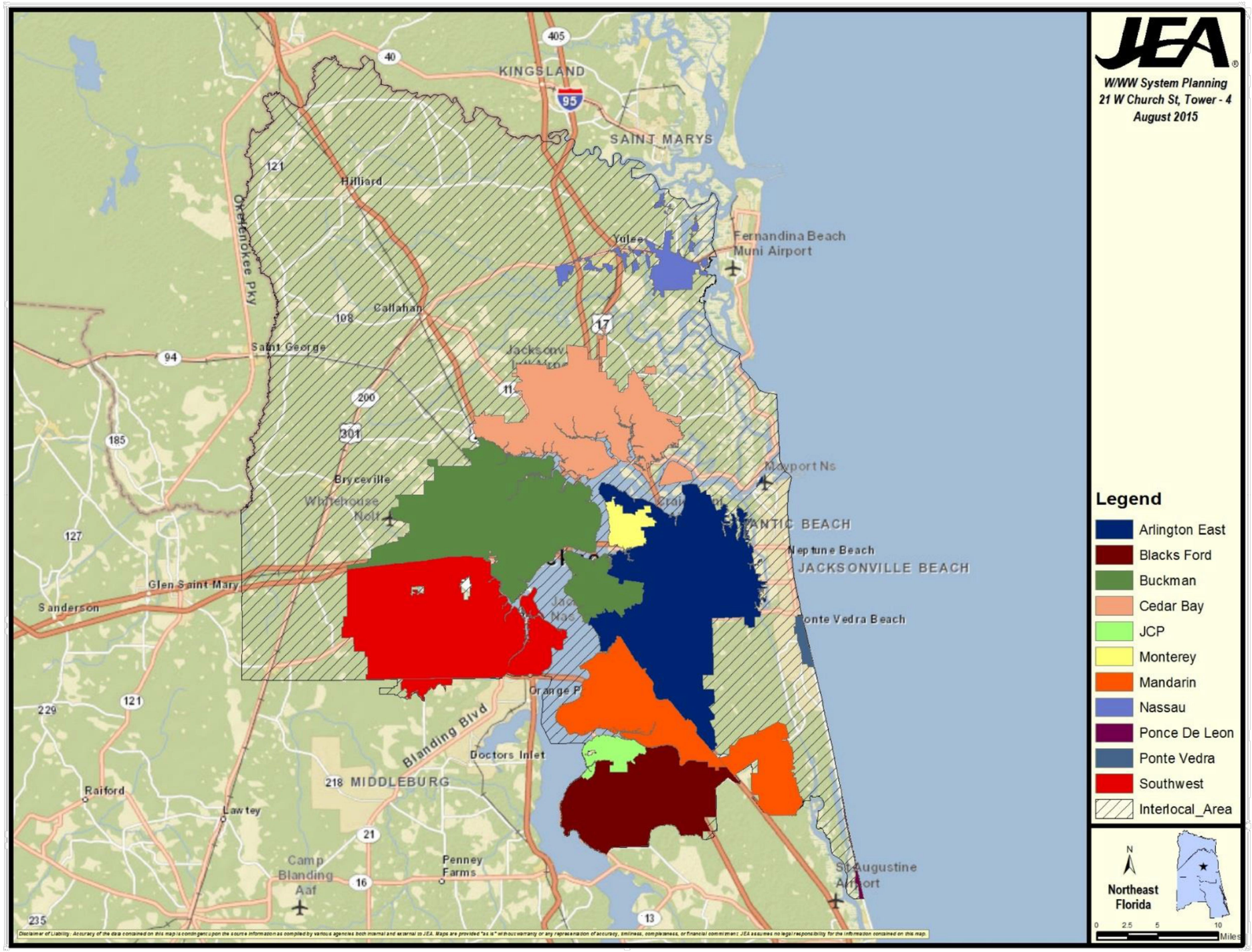


FIGURE 2

EXISTING DISTRIBUTION SYSTEM SINGLE LINE DIAGRAM

Southwest Water Reclamation Facility



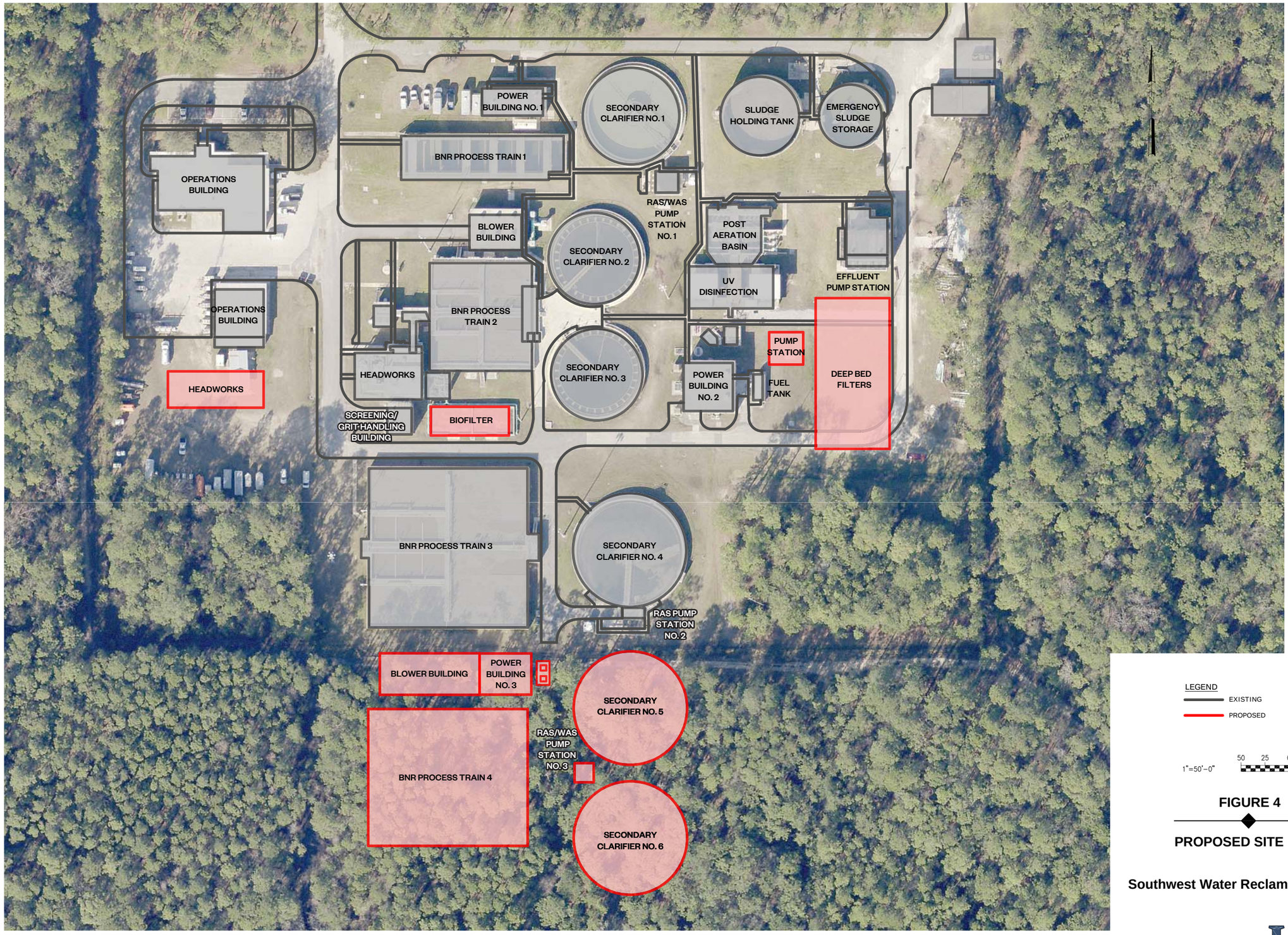
JEA
Building Community

FIGURE 3

WASTEWATER SERVICE AREA

Southwest Water Reclamation Facility

Hazen



LEGEND

EXISTING

PROPOSED

1"=50'-0"

50 25 0 50'

FIGURE 4

PROPOSED SITE PLAN

Southwest Water Reclamation Facility

JEA sm Building Community sm

Hazen

AERATION BASINS

RAW WASTE-WATER

HEADWORKS

SPLITTER BOX

SPLITTER BOX NO. 2

BNR PROCESS TRAIN 1

BNR PROCESS TRAIN 2A

BNR PROCESS TRAIN 2B

BNR PROCESS TRAIN 3A

BNR PROCESS TRAIN 3B

SPLITTER BOX NO. 3

SPLITTER BOX NO. 4

SECONDARY CLARIFIER NO. 1

SECONDARY CLARIFIER NO. 2

SECONDARY CLARIFIER NO. 3

SECONDARY CLARIFIER NO. 4

SECONDARY CLARIFIER NO. 5

SECONDARY CLARIFIER NO. 6

RAS

RAS/ WAS PUMP STATION

RAS PUMPS

WAS

MODULATING WAS VALVE

SPLITTER BOX

BNR PROCESS TRAIN 4A

BNR PROCESS TRAIN 4B

SPLITTER BOX

RAS/ WAS PUMP STATION

WAS

SLUDGE HOLDING TANK

EMERGENCY SLUDGE STORAGE (OFFLINE)

SLUDGE TRANSFER PUMPS

TO BUCKMAN WRF

UV SPLITTER BOX

FILTERS

UV DISINFECTION/ POST AERATION

EFFLUENT PUMP STATION

ST JOHNS RIVER

JEA℠ Building Community℠

FIGURE 5

PROPOSED PROCESS FLOW DIAGRAM

Southwest Water Reclamation Facility

Hazen

Appendix A – Summary of Existing Equipment

Table A-1 Existing Influent Screens

Number of screens	2
Screen Manufacturer	Kusters Filters
Screen Information	6 mm Perforated Plate
Peak Capacity	35 mgd, total
Year of Installation	2011

Table A-2 Existing Grit Removal System

Number of units	2
Grit System Manufacturer	Fluidyne
Screen Information	Hydro-Grit / Grit Snails and Slurry Cups
Peak Capacity	20 mgd, total
Year of Installation	2018

Table A-3 Existing Activated Sludge Trains

Number of units	3
Number of Aerobic Zones per Train	Train 1- One Train 2-Two Train 3-Two
Number of Anoxic Zones per Train	Train 1- Two Train 2-Two Train 3-Two
Volume per train	Train 1- 0.66 MG; ~170 ft x 35 ft x 15 ft Train 2-1.25 MG; ~100 ft x 110 ft x 16.4 ft Train 3-3.14 MG; ~160 ft x 160 ft x 16.4 ft
Peak Capacity	35 mgd, total
Year of Installation	Train 1-1975 Train 2-1986 Train 3-2002

Table A-4 Existing Blowers

Number of units	8
Manufacturer	Two Gardner Denver, Six Hoffman
Blower Information	Two 4,950 scfm, 8.4 PSIG, 250 hp motor Six Hoffman 2,800 scfm, 8.3 PSIG, 150 hp motor In 2018, two 2,800 scfm blowers to be replaced with two 4,950 scfm blowers
Average Capacity	12 mgd (26,050 scfm after replacement of two small blowers with two large blowers)
Year of Installation	Four 150 hp Blowers-1975,1986, 2002 Four 250 hp Blowers-2007, 2018

Table A-5 Existing NRCY Pumps

Number of units	5
Manufacturer	ITT Flygt
Pump Information	Train 1: 15 hp (1 pump) Train 2: 15 hp (2 pumps) Train 3: 40 hp (2 pumps)
Maximum Head	Train 1: 4.3 ft Train 2: 1.4 ft Train 3: 1.9 ft
Capacity	Train 1: 1.3 to 11.8 mgd Train 2: 2.3 to 14.3 mgd Train 3: 6.3 to 27 mgd
Year of Installation	2002

Table A-6 Existing Secondary Clarifiers

Number of units	4
Manufacturers	Various
Clarifier Information	1 - Center Feed-Peripheral Overflow, 100-ft Diameter / 7850 sf, 14-ft SWD 2 - Peripheral Feed-Peripheral Overflow, 95-ft Diameter / 7090 sf, 14-ft SWD 3 - Peripheral Feed-Peripheral Overflow, 95-ft Diameter / 7090 sf, 14-ft SWD 4 - Center Feed-Peripheral Overflow, 110-ft Diameter / 9500 sf, 14.1-ft SWD
Peak Capacity	35 mgd, total
Year of Installation	1-1975 2&3-1986 4-2006

Table A-7 Existing RAS Pumps

Number of units	For Secondary Clarifiers 1-3: 3 For Secondary Clarifier 4: 2
Manufacturer	For Secondary Clarifiers 1-3: Allis-Chalmers For Secondary Clarifier 4: Flygt
Pump Information	For Secondary Clarifiers 1-3: Three 4,300 gpm, 18.5 ft, 25 hp For Secondary Clarifier 4: Two 3,250 gpm, 35 hp
Firm Capacity	16.5 mgd
Year of Installation	For Secondary Clarifiers 1-3: 1975 For Secondary Clarifier 4: 2006

Table A-8 Existing WAS Pumps

Number of units	2 (for Secondary Clarifiers 1-3)
Manufacturer	Gorman-Rupp
Pump Information	500 gpm, 23 TDH, 10 hp
Firm Capacity	500 gpm
Year of Installation	2011

Table A-9 Existing UV Disinfection System

Number of banks	4
Manufacturer	Trojan
UV Information	Banks 1A, 2A: Model UV4000, 56 lamps each Banks 1B, 2B: Model UV4000Plus, 64 lamps each
Peak Capacity	35 mgd (Assuming UVT = 60%; 1 channel out of service)
Year of Installation	Banks 1A, 2A: 1999 Banks 1B, 2B: 2006

Table A-10 Existing Post Aeration System

Number of Diffusers	80
Number/Type of Blowers	Hoffman 3 Hoffman 4207A (7 Stage)
Blower Capacity (each)	538 scfm, 6.5 PSIG, 40 hp motor
Total Capacity	50 mgd
Year of Installation	1999

Table A-11 Existing Effluent Pumps

Number of units	5
Manufacturer	Wemco
Pump Information	Three at 6,000 gpm, 30 ft TDH, 75 hp Two at 10,800 gpm, 33ft TDH, 125 hp
Firm Capacity	41.5 mgd
Year of Installation	Pump Nos. 1-4-1999 Pump No. 5-2007

Table A-12 Existing Outfall Piping

Number of units	1
Materials of Construction	Various including prestressed concrete, ductile iron and steel
Information	Approximately 2.5 miles of 48-inch pipe discharging to the St. Johns River; one horizontal directional drill under the Ortega River; originally installed in 1975
Peak Capacity	40 mgd
Year of Installation	Piping-1975, 2004 Diffuser-1975

Table A-13 Existing Sludge Holding Tank and Mixer

Number of tanks	1
Volume of tank	0.54 mg
Number of mixers	1
Mixer Manufacturer	Aqua-Lator
Mixer Information	Model 6011-SF, 60hp
Firm Capacity	n/a
Year of Installation	2015

Table A-14 Existing Sludge Transfer Pumps

Number of units	2
Manufacturer	Flygt
Pump Information	500 gpm, 150 TDH
Firm Capacity	500 gpm
Year of Installation	2009

Table A-15 Existing Electrical Infrastructure

Number of Service Switchboards	2
Number of MCCs	11
Number of Power Buildings	2
Number of Generators	2
Number of Primary Service Feeders	2
Distribution Voltage	480 V
Year of Installation	Various

Appendix B – Summary of Class 1 Reliability

Unit Process / Operation	Reliability Criteria
Screens	Required; Unit operations with three or more units shall not be required to have provisions for bypassing if the peak wastewater flow can be handled hydraulically with the two largest units out of service.
Provisions for Removal of Settled Solids	Required for all components, channels, pump wells, and piping before degritting
Unit Operation Bypass	Not applicable where two or more units are provided and operating unit can handle peak flow
Pumps	Provide a backup pump that performs the same function for each set of pumps. With the largest pump out of service, remaining pumps must have capacity to handle peak flow.
Aeration Blowers	Multiple units. With largest unit out of service, remaining units able to maintain design oxygen transfer (later defined). Backup unit may be uninstalled.
Air Diffusers	Multiple sections. With largest section out of service, oxygen transfer capability not measurably impaired.
Disinfection Process	Multiple basins. With largest unit out of service, remaining units have capacity for at least 50% of design flow.
Power Source	Provide two separate and independent power sources from either two separate utility substations or from one substation and one standby generator, with the backup power source sufficient to operate all vital components, as well as critical lighting and ventilation, during peak flow conditions. Sludge processing components are optional for backup power.

Appendix C – Alternatives Discussed During Preliminary Design

This technical memorandum (TM) presents a summary of the limited alternatives discussed during development of the Southwest Water Reclamation Facility (WRF) Expansion to 18 mgd Base Alternative. This information was presented over the course of several workshops.

- Proposed Influent Structure Options
- Proposed Activated Sludge Options
- Proposed Secondary Clarifier Options
- Proposed Tertiary Filtration Options
- Proposed Effluent Management Infrastructure Options

Contractor costs are Class 4 and Class 5 (AACE International) Estimate as noted. JEA Project Management, engineering and services during construction are not included. To estimate the Contractor Indirect Cost the following percentages were assumed:

- Contingency 20%
- General Conditions / Mobilization 5%
- Overhead and Profit 12%
- Bonding and Insurance 3%
- Escalation 2%
- Supplemental Work Allowance 1%

Proposed Influent Structure Options

Two alternatives were considered for the influent structure as listed below.

- *Option 1: New combined headworks for the existing trains and the future train(s)*
- *Option 2: Separate headworks for the new train(s)*

JEA opted to pursue one new combined headworks facility (Option 1). Information about the influent infrastructure options is summarized in Tables C-1 through C-3.

Table C-1 Proposed Influent Screen Options

Option	1: New combined headworks	2: Separate headworks
Number of screens	4	2
Type of Screen	6 mm Perforated Plate	6 mm Perforated Plate
Peak Capacity	18 mgd, each	6 mgd, each
Total Capacity	72 mgd	12 mgd

Table C-2 Proposed Grit Removal System Options

Option	1: New combined headworks	2: Separate headworks
Number of units	4	2
Type of Unit	Stacked Tray Grit Separator	Stacked Tray Grit Separator
Peak Capacity	13.5 mgd, each	9.5 mgd, each
Total Capacity	54 mgd	19 mgd

Table C-3 Advantages and Disadvantages of the Influent Structure Options

Option	1: New combined headworks	2: Separate headworks
Advantages	• Eliminate influent flow split issues • Eliminate RAS distribution issues • Combined loads and solids inventory for entire plant • More operator flexibility	• Utilization of the existing infrastructure
Disadvantages	• Reconfiguration of piping to the existing aeration basins • Higher cost	• An additional splitter box • Separate loads and solids inventory in new and existing trains
Contractor Costs*	• Direct $7,009,000 • Indirect $3,014,000 • Total $10,023,000	• Direct $3,117,000 • Indirect $1,341,000 • Total $4,458,000

**Costs based on Class 4 (AACE International) Estimate; does not include yard piping costs*

Proposed Activated Sludge Options

Several alternatives were considered for the activated sludge infrastructure. Initially, JEA was presented with flow splitting options between the existing infrastructure (Trains 1 to 3) and the remainder to proposed Train 4.

- *Option 1: Identical Peaking Factor 2.5 to Existing and Proposed: Consistent Flow Split to Existing and Proposed (78/22); Phase 1 to 45 mgd; Phase 2 to 54 mgd*
- *Option 2: Different Peaking Factor to Existing and Proposed (2.5/4.75); Different Flow Split depending on AADF and PF; one Phase (to 54 mgd)*
- *Option 3: Identical Peaking Factor 3.0 to Existing and Proposed: Consistent Flow Split to Existing and Proposed (65/35); one Phase (to 54 mgd)*
- *Option 4: Identical Peaking Factor 3.0 to Existing and Proposed: Consistent Flow Split to Existing and Proposed (78/22); one Phase (to 54 mgd) includes equalization basin*

As the above alternatives were discussed, JEA provided further background information that the original activated sludge designs were very aggressive and assumed all trains in operation. It was also noted that the plant has consistently seen very high loading in the winter, with MLSS values above 4,000 mg/L, and per the historical data analysis, steady increases in concentration and flow for the last few years. In addition to these factors, Option 3 where the flow split is approximately 12 mgd AADF to the existing trains (Trains 1 to 3) and the remainder (6 mgd AADF) to proposed Train 4 was opted by JEA based on:

- Lower TN target to 5 mg/L from the original TN target of 6 mg/L
- Higher projected TKN and cBOD influent loads
- Increase in plant flow peaking from 2.5 to 3.0
- Using uniform peaking factor across new and existing facility
- Implementation of equalization basin is not preferred

Additional options for the configuration of Activate Sludge Train 4 were presented as follows:

- *Alternative A: One new basin, 6 mgd AADF*
- *Alternative B: One new basin, 7.5 mgd AADF and existing Train 1 abandoned (1.5 mgd AADF)*

JEA recently finished rehabilitation of Train 1 including the addition of baffle walls. With these recent improvements, JEA opted to pursue one 6-mgd basin for activated sludge (Alternative A).

The proposed expansion also requires blower upgrades. Three alternatives were considered for the blower expansion as listed below.

- *Option 1: Reuse the existing blower building to serve all trains*
- *Option 2: Build a new blower building to serve Train 4*
- *Option 3: Build a new blower building to serve Train 3 and Train 4. Relocate 4 large blowers from the existing blower building to the new blower building*

Information about the blower building options is summarized in Table C-4.

Table C-4 Advantages and Disadvantages of the Blower Building Options

Option	1: Reuse Existing Blower Building	2: New Train 4 Blower Building	3: New Blower Building serving Trains 3 and 4; relocate existing blowers
Advantages	• Firm capacity of the existing blower system will allow the Southwest WRF to operate to approximately 2040 • Utilization of the existing infrastructure	• Future flexibility (design to eventually house all blowers OR install air piping modifications to tie into Trains 1-3) • Less above grade, stainless steel air piping crisscrossing the site	• Future flexibility (design to eventually house all blowers or install air piping modifications to tie into Trains 1-2) • Blower load reduced by 400 hp • Avoid expanding the existing blower building to accommodate electrical upgrades
Disadvantages	• Need to expand existing blower building for electrical upgrades • Need for extensive above grade, stainless steel air piping crisscrossing the site	• Blowers in two locations • Need to expand existing blower building for electrical upgrades	• Additional air piping to connect Train 3 from existing blower building • Temporary blowers to Train 3 might be required during construction • Blowers in two locations
Contractor Costs*	• Direct $1,206,000 • Indirect $518,000 • Total $1,724,000	• Direct $4,366,000 • Indirect $1,877,000 • Total $6,243,000	• Direct $4,302,000 • Indirect $1,850,000 • Total $6,152,000

** Costs based on Class 4 (AACE International) Estimate*

Ultimately JEA opted to pursue an option not originally considered. The chosen option includes reusing the existing blower building to feed only Trains 1 and 2 and building a new blower building to serve Trains 3 and 4. Under this option, four of the existing large blowers would be relocated to the new blower building. This option still requires a separate space designated inside the existing blower building for the electrical MCCs, however the space vacated by moving the four large blowers should be adequate such that a new structure is not required.

Proposed Secondary Clarifier Options

Two alternatives were considered for the clarifier infrastructure as listed below.

- *Option 1: One 145 ft Diameter Secondary Clarifier*
- *Option 2: Two 110 ft Diameter Secondary Clarifiers*

Similar to the activated sludge infrastructure, the original secondary clarifier designs were also aggressive assuming all clarifiers in operation and the rating of clarifiers was based on an SVI between 70 mL/g and 90 mL/g. However, based on review of the recent plant data (01/01/2014 to 03/31/2017) it was determined that the average, 50th percentile and 90th percentile SVIs were 100 mL/g, 110 mL/g and 120 mL/g, respectively. Additionally, given that the plant runs at very high loading in the winter, above 4,000 mg/L MLSS, and that wastewater concentrations and flows are increasing, the flexibility for operation has diminished. The decision to pursue Option C, where the flow split is approximately 12 mgd AADF to the existing clarifiers (SC 1 through 4) in lieu of 14 mgd and the remainder (6 mgd AADF approximately) to proposed SC 5 and 6, will benefit the existing secondary clarifier infrastructure as well.

JEA opted to pursue two 110-ft diameter secondary clarifiers (Option 2). Information about the clarification options is summarized in Tables C-5 through C-8.

Table C-5 Proposed Secondary Clarifier Options

Option	**1: One 145-ft SC**	**2: Two 110-ft SCs**
Clarifier Information	Center Feed-Peripheral Overflow	
Square Footage	16,510 sf	19,000 sf
Sidewall Depth	16-ft	16-ft
Peak Capacity	19 mgd	19 mgd

Table C-6 Proposed RAS Pump Options

Option	**1: One 145-ft SC**	**2: Two 110-ft SCs**
Number of units	3 (2 Duty, 1 Standby)	3 (2 Duty, 1 Standby)
Pump Type	Dry Submersible	
Pump Information	2,850 gpm	2,850 gpm
Firm Capacity	5,700 gpm	5,700 gpm

Table C-7 Proposed WAS Pump Options

Option	**1: One 145-ft SC**	**2: Two 110-ft SCs**
Number of units	2 (1 Duty, 1 Standby)	2 (1 Duty, 1 Standby)
Pump Type	Dry Pit Centrifugal	
Pump Information	500 gpm	500 gpm
Firm Capacity	500 gpm	500 gpm

Table C-8 Advantages and Disadvantages of the Clarifier Options

Option	1: One 145-ft SC	2: Two 110-ft SCs
Advantages	• No splitter box required • Lower cost	• Similar size to existing clarifiers • More operational flexibility • Ability to meet Class I reliability if interconnect is provided between trains
Disadvantages	• More challenging to take units offline, especially the 145-ft clarifier • Unable to meet Class I reliability	• An additional splitter box • Higher cost
Contractor Costs*	• Direct $5,310,000 • Indirect $2,283,000 • Total $7,593,000	• Direct $6,675,000 • Indirect $2,870,000 • Total $9,545,000

** Costs based on Class 4 (AACE International) Estimate*

Proposed Tertiary Filtration Options

Comparing the historical TSS data from the plant with the future effluent limitations presented in Table 4 (repeated in Table C-9), the future effluent limitations approach the limits of reduction for secondary clarification. Considering the proposed flow increases and the proposed loading to the secondary clarifiers, tertiary filtration will be needed in the future at this plant. Filters will also provide operators with additional flexibility within plant.

Design limits for typical and worst case secondary effluent quality were selected based on historical plant data from 10/1/2013 to 4/28/2016 (Table C-9).

A preliminary trigger point was defined at which filtration would be necessary at the plant. This analysis included comparing the Surface Overflow Rate (SOR) under current conditions with the proposed design assuming two new 110-ft secondary clarifiers (Table C-10) and comparing final effluent TSS (ESS) of various filtered / bypassed blends at AA, MM, MW and PD (Table C-11).

Table C-9 Historical ESS Data, Proposed ESS Permit Limitations and Filter Design ESS Values

Condition	Historical Data (mg/L)	Future Permit Limit (mg/L)	Design Limit (mg/L)	
			Typical	Worst Case
AA	8.6	11.1	10	15
MM	13.4	13.9	15	20
MW	16.4	25.0	20	25
PD	24.0	33.3	25	35

Table C-10 Historical SOR Compared to Proposed SOR

Condition	Current Condition		Original Design		Future Design	
	Flow (mgd)	Average SOR (gpd/sf)	Flow (mgd)	Average SOR (gpd/sf)	Flow (mgd)	Average SOR (gpd/sf)
AA	11	330	14	440	18	360
MM	14	430	18	550	23	460
MD	23	740	27	860	40	780
PH	32	1,000	35	1,110	54	1,070

Table C-11 Blending Options - Worst Case Secondary Effluent Quality

Condition	Design Conditions		Flow Filtered versus Flow Bypassed		Final Effluent ESS, Required / Blended Value
	Flow (mgd)	ESS (mg/L)	(mgd / mgd)	(% / %)	(mg/L)
AA	18	15	9 / 9	50 / 50	11.1 / 10.0
MM	23	20	9 / 14	39 / 61	13.9 / 14.1
MD	34	25	9 / 25	26 / 74	25.0 / 19.7
PH	54	35	9 / 45	17 / 83	33.3 / 30.0

The analysis revealed that a 9-mgd filter facility with a bypass sized for more than 45 mgd would meet the required final effluent TSS under all typical design conditions (not shown) and for all but maximum month for the worst case secondary effluent quality design condition (Table C-11). Additionally, Hazen concluded based on the current flow projections (Table 5) that the filters could be phased with approximately 6 mgd capacity required by 2029 and the full 9 mgd facility online by approximately 2035. Allowing deferment of this critical infrastructure benefits JEA and its customers by spreading capital expenditures over time but still moving the Southwest WRF to its ultimate build-out capacity of 18 mgd. Additionally, deferment of this infrastructure will give JEA the necessary time to evaluate the onsite water purification pilot, which if pursued, may negate the need for filters in the future. JEA opted to defer filter construction but keep filter design as part of the Expansion to 18 mgd.

Proposed Effluent Management Infrastructure Options

Both the existing effluent pump station and the outfall piping were deficient by approximately 12 mgd for the proposed peak flow of 54 mgd. Three alternatives were originally considered for the proposed Effluent Management Infrastructure as listed below with several other effluent management options discussed during the workshops.

- *Option 1: Replace Two Small Effluent Pumps and New Parallel Outfall Pipe*
- *Option 2: Replace All Existing Effluent Pumps and Modify Wet Well*
- *Option 3: Replace Two Small Effluent Pumps and New Booster Pump Station*

JEA opted to pursue the effluent pump modifications under Option 1 (and 3), however, no decision was made to date regarding the outfall portion except that the existing, permitted 14.0-mgd outfall will not be modified at this time. Information about the alternatives evaluated for the effluent pumps and the outfall are summarized in Tables C-12 and C-13.

Table C-12 Advantages and Disadvantages of the Effluent Management Options

Option	1 – PS Mods and Parallel Outfall Pipe	2 – New Pumps and Wet Well Mods	3 – PS Mods and Booster PS
Proposed Pump Station Capacity, mgd	Firm 55 Total 71	Firm 54 Total 72	Firm 55 Total 71
Proposed Outfall Capacity, mgd	Firm 42 Total 96	Firm n/a Total 54	Firm n/a Total 54
Advantages	• Reusing some existing pumps • Adding redundancy for outfall	• Proposed improvements are on site	• Reusing some existing pumps
Disadvantages	• Losing redundancy of small pump • Cost	• Structural concerns (Table C-13) • No redundancy for outfall	• No redundancy for outfall • Increasing pressure on existing outfall
Contractor Costs*	• Direct $25,874,000 • Indirect $11,126,000 • Total $37,000,000	• Not considered due to structural concerns	• Direct $11,888,000 • Indirect $5,112,000 • Total $17,000,000

**Costs based on Class 5 (AACE International) Estimate*

Table C-13 Effluent Management Option 2 Structural Concerns

Topic	Concern(s)
Applied Soil Pressure	• Differential settlement between the wet well and other parts of structure can cause cracks, leaks, overstress in pipes, overstress in pipe joints, and misalignment of equipment • Applied bearing pressure is increased by ~70% (not considering weight of concrete) • Current allowable bearing pressure is unknown therefore resulting bearing pressure cannot be verified
Fluid Loads	• Will cause increase in tension on the wall struts, increase in bending stresses in walls, increase in shear stresses in walls • May require reinforcement which would be difficult given that wet well shares a common wall with remaining area of structure • Fluid load at bottom of wet well is increased by ~70% • Current condition of wet well is unknown; repairs may be required
Wind Loads	• May need to update structure to current building code in terms of wind resistance
Seismic Loads	• Will need to verify structure can withstand seismic loads (current building code now includes seismic loads for Florida)

Ultimately, the effluent management strategy for the Southwest WRF is still under review. Given that a large reuse customer base is not expected to develop in this service area, supplementing effluent disposal with the water purification pilot (with potential build-out to 10 mgd in the future) will be evaluated in a separate project definition.

Appendix D - Project Schedule

FP 1815011 Southwest WWTF Expansion from 14 to 18 MGD

Run Date: 09-Apr-18
Data Date: 06-Apr-18

Activity ID	Activity Name	Original Duration	Actual Duration	Start	Finish	Start Variance	Finish Variance
FP 1815011 Southwest WWTF Expansion from 14 to 18 MGD							
Milestones							
M1	M1 - Project Controls Accepts PRF	0	0	03-Jan-17 A		458	458
M2	M2 - Project Scope Signoff Complete	0	0		06-Apr-18	0	0
M3	M3 - Start Design	0	0	30-Nov-18		0	0
MR	MR - Real Estate Aquisition Complete	0	0		21-Dec-18	0	0
M4	M4 - Design Complete	0	0		01-Jun-20	0	0
M6	M6 - Commence Construction	0	0	02-Jun-20		0	0
M7	M7 - Construction Substantially Complete	0	0		19-Oct-22	0	0
M8	M8 - Construction Complete	0	0		26-Nov-22	0	0
M9	M9 - Project Closure Complete	0	0		10-Apr-23	0	0
Scope Definition							
S1000	Setup Footprint	2	0	06-Apr-18	09-Apr-18	0	0
Designer Procurement							
RFP Development							
DP1005	S/A of Phase I for RFP	5	0	10-Apr-18	16-Apr-18	0	0
DP1190	PM P/S Required RFP Items for Buyer	5	0	10-Apr-18	16-Apr-18	0	0
DP1120	Procurement Prepare, Approve and Advertise RFP Package	15	0	17-Apr-18	07-May-18	0	0
Advertise and Bid							
MB1	MB1 - Advertise RFP for Design	0	0	08-May-18		0	0
DP1020	Procurement Advertise RFP for Design	30	0	08-May-18	06-Jun-18	0	0
MB5	MB5 - Open Design Bids (Tuesday Only)	0	0	12-Jun-18		0	0
DP1040	Designated Graders Review/Score Design Proposals	15	0	13-Jun-18	03-Jul-18	0	0
DP1045	Selected Firms Prepare Presentations	10	0	05-Jul-18	18-Jul-18	0	0
DP1220	Conduct Presentations	5	0	19-Jul-18	25-Jul-18	0	0
DP1230	Evaluators Score Presentations and Submit to Procurement	10	0	26-Jul-18	08-Aug-18	0	0
DP1240	Procurement Prepare Final Scores	5	0	09-Aug-18	15-Aug-18	0	0
DP1050	Procurement Conduct Public Evaluation Meeting to Announce Selected Firm	0	0	20-Aug-18		0	0
DP1070	PM Request Cost Proposal and Negotiate with Designer	25	0	21-Aug-18	25-Sep-18	0	0
SD1120	PM Develop CMAR Bid Package for Preconstruction Scope	30	0	21-Aug-18	02-Oct-18	0	0
DP1150	PM Request and Receive Post Design Bid Estimate	5	0	26-Sep-18	02-Oct-18	0	0
DP1170	S/A of Phase II for RFP	5	0	03-Oct-18	09-Oct-18	0	0
DP1160	PM Update PUF and Trend to Post Design Bid Estimate	10	0	03-Oct-18	16-Oct-18	0	0
DP1210	Procurement Request Inclusion on Awards Agenda (Friday by Noon)	1	0	12-Oct-18	12-Oct-18	0	0
Award Design							
DP1080	Conduct Awards Committee Meeting for Design (Thursday Only)	0	0	18-Oct-18		0	0
DP1090	Execute Design Contract	20	0	19-Oct-18	16-Nov-18	0	0
DP1100	PM Submit Design Requisition	2	0	19-Nov-18	20-Nov-18	0	0
DP1110	Procurement Issue Design PO	5	0	21-Nov-18	29-Nov-18	0	0
Design and Engineering							
Schematic Design							
10% Schematic Design							
SD1010	Conduct Schematic Design Kick-Off Meeting	1	0	30-Nov-18	30-Nov-18	0	0
SD1020	Perform 10% Design	60	0	30-Nov-18	21-Feb-19	0	0
SD1030	10% Design Submittal	0	0		21-Feb-19	0	0
10% Design Review							
SD1050	Designer Submit Scope and Estimate for 30-100% Design	15	0	22-Feb-19	14-Mar-19	0	0
SD1040	JEA Review 10% Design	20	0	22-Feb-19	21-Mar-19	0	0
SD1060	Conduct 10% Design Review Meeting	1	0	22-Mar-19	22-Mar-19	0	0
10% Checkpoint							
SD1070	PM Negotiate Scope and Fee for 30%-100% Design	25	0	25-Mar-19	26-Apr-19	0	0
M10	M10 - 10% Design Checkpoint and Trend Submitted	0	0	29-Apr-19		0	0
SD1090	Submittal and Approval 10% Checkpoint and Trend	10	0	29-Apr-19	10-May-19	0	0
SD1100	PM Submit Requisition for Design Change Order	2	0	13-May-19	14-May-19	0	0
SD1110	Procurement Issue PO for Design Change Order	5	0	15-May-19	21-May-19	0	0
30% Conceptual Design							
CD1000	Designer Perform 30% Design	60	0	22-May-19	15-Aug-19	0	0

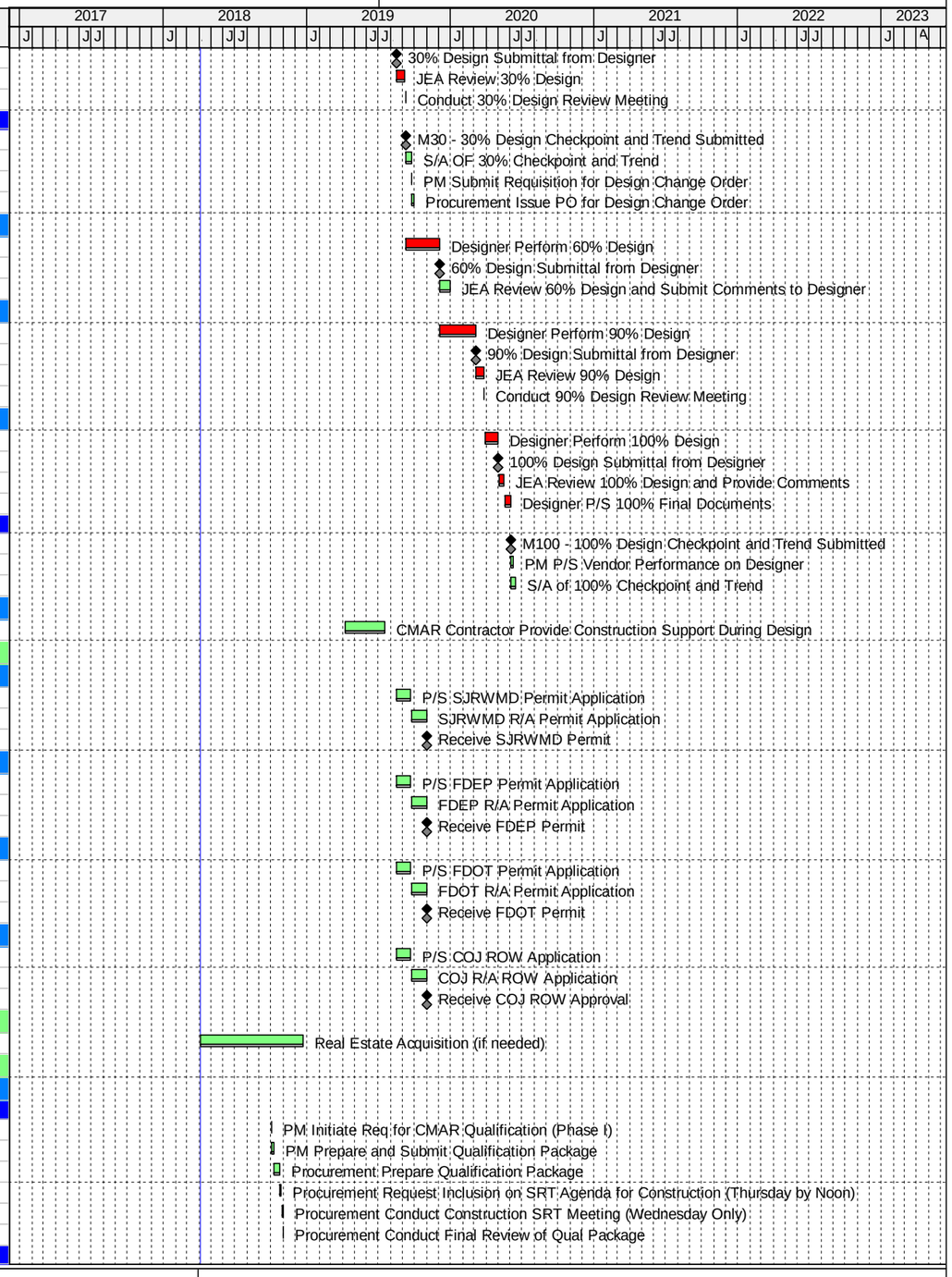
Remaining Level of Effort | Remaining Work | Project Baseline Bar
Actual Level of Effort | Critical Remaining Work | Milestone
Actual Work | Time Delay | Baseline Milestone

TASK filters: Do Not Show LOE, Do Not Show WBS Summaries.

FP 1815011 Southwest WWTF Expansion from 14 to 18 MGD

Run Date: 09-Apr-18
Data Date: 06-Apr-18

Activity ID	Activity Name	Original Duration	Actual Duration	Start	Finish	Start Variance	Finish Variance
CD1010	30% Design Submittal from Designer	0	0		15-Aug-19	0	0
CD1020	JEA Review 30% Design	15	0	16-Aug-19	06-Sep-19	0	0
CD1030	Conduct 30% Design Review Meeting	1	0	09-Sep-19	09-Sep-19	0	0
30% Checkpoint							
M30	M30 - 30% Design Checkpoint and Trend Submitted	0	0	10-Sep-19		0	0
CD1040	S/A OF 30% Checkpoint and Trend	10	0	10-Sep-19	23-Sep-19	0	0
CD1060	PM Submit Requisition for Design Change Order	1	0	24-Sep-19	24-Sep-19	0	0
CD1080	Procurement Issue PO for Design Change Order	5	0	25-Sep-19	01-Oct-19	0	0
60% Design							
D6010	Designer Perform 60% Design	60	0	10-Sep-19	05-Dec-19	0	0
D6020	60% Design Submittal from Designer	0	0		05-Dec-19	0	0
D6030	JEA Review 60% Design and Submit Comments to Designer	15	0	06-Dec-19	30-Dec-19	0	0
90% Design							
D9010	Designer Perform 90% Design	60	0	06-Dec-19	05-Mar-20	0	0
D9020	90% Design Submittal from Designer	0	0		05-Mar-20	0	0
D9030	JEA Review 90% Design	15	0	06-Mar-20	26-Mar-20	0	0
D9050	Conduct 90% Design Review Meeting	1	0	27-Mar-20	27-Mar-20	0	0
100% Design							
D1000	Designer Perform 100% Design	25	0	30-Mar-20	01-May-20	0	0
D1010	100% Design Submittal from Designer	0	0		01-May-20	0	0
D1020	JEA Review 100% Design and Provide Comments	10	0	04-May-20	15-May-20	0	0
D1040	Designer P/S 100% Final Documents	10	0	18-May-20	01-Jun-20	0	0
100% Checkpoint							
M100	M100 - 100% Design Checkpoint and Trend Submitted	0	0	02-Jun-20		0	0
VP10	PM P/S Vendor Performance on Designer	5	0	02-Jun-20	08-Jun-20	0	0
D1050	S/A of 100% Checkpoint and Trend	10	0	02-Jun-20	15-Jun-20	0	0
Construction Support During Design							
CR1000	CMAR Contractor Provide Construction Support During Design	70	0	09-Apr-19	17-Jul-19	0	0
Permitting							
SJRWMD							
P1005	P/S SJRWMD Permit Application	25	0	16-Aug-19	20-Sep-19	0	0
P1015	SJRWMD R/A Permit Application	30	0	23-Sep-19	01-Nov-19	0	0
P1035	Receive SJRWMD Permit	0	0		01-Nov-19	0	0
DEP and Environmental							
P1110	P/S FDEP Permit Application	25	0	16-Aug-19	20-Sep-19	0	0
P1180	FDEP R/A Permit Application	30	0	23-Sep-19	01-Nov-19	0	0
P1100	Receive FDEP Permit	0	0		01-Nov-19	0	0
FDOT							
P1170	P/S FDOT Permit Application	25	0	16-Aug-19	20-Sep-19	0	0
P1020	FDOT R/A Permit Application	30	0	23-Sep-19	01-Nov-19	0	0
P1150	Receive FDOT Permit	0	0		01-Nov-19	0	0
COJ							
P1160	P/S COJ ROW Application	25	0	16-Aug-19	20-Sep-19	0	0
P1120	COJ R/A ROW Application	30	0	23-Sep-19	01-Nov-19	0	0
P1130	Receive COJ ROW Approval	0	0		01-Nov-19	0	0
Real Estate							
R1010	Real Estate Acquisition (if needed)	180	0	06-Apr-18	21-Dec-18	0	0
Construction Procurement (CMAR)							
Phase 1 - Qualification							
RFQ Development							
BID1000	PM Initiate Req for CMAR Qualification (Phase I)	2	0	03-Oct-18	04-Oct-18	0	0
BID1010	PM Prepare and Submit Qualification Package	5	0	03-Oct-18	09-Oct-18	0	0
BID1020	Procurement Prepare Qualification Package	10	0	10-Oct-18	23-Oct-18	0	0
BID1030	Procurement Request Inclusion on SRT Agenda for Construction (Thursday I	1	0	25-Oct-18	25-Oct-18	0	0
BID1040	Procurement Conduct Construction SRT Meeting (Wednesday Only)	1	0	31-Oct-18	31-Oct-18	0	0
BID1050	Procurement Conduct Final Review of Qual Package	1	0	01-Nov-18	01-Nov-18	0	0
Advertisement							



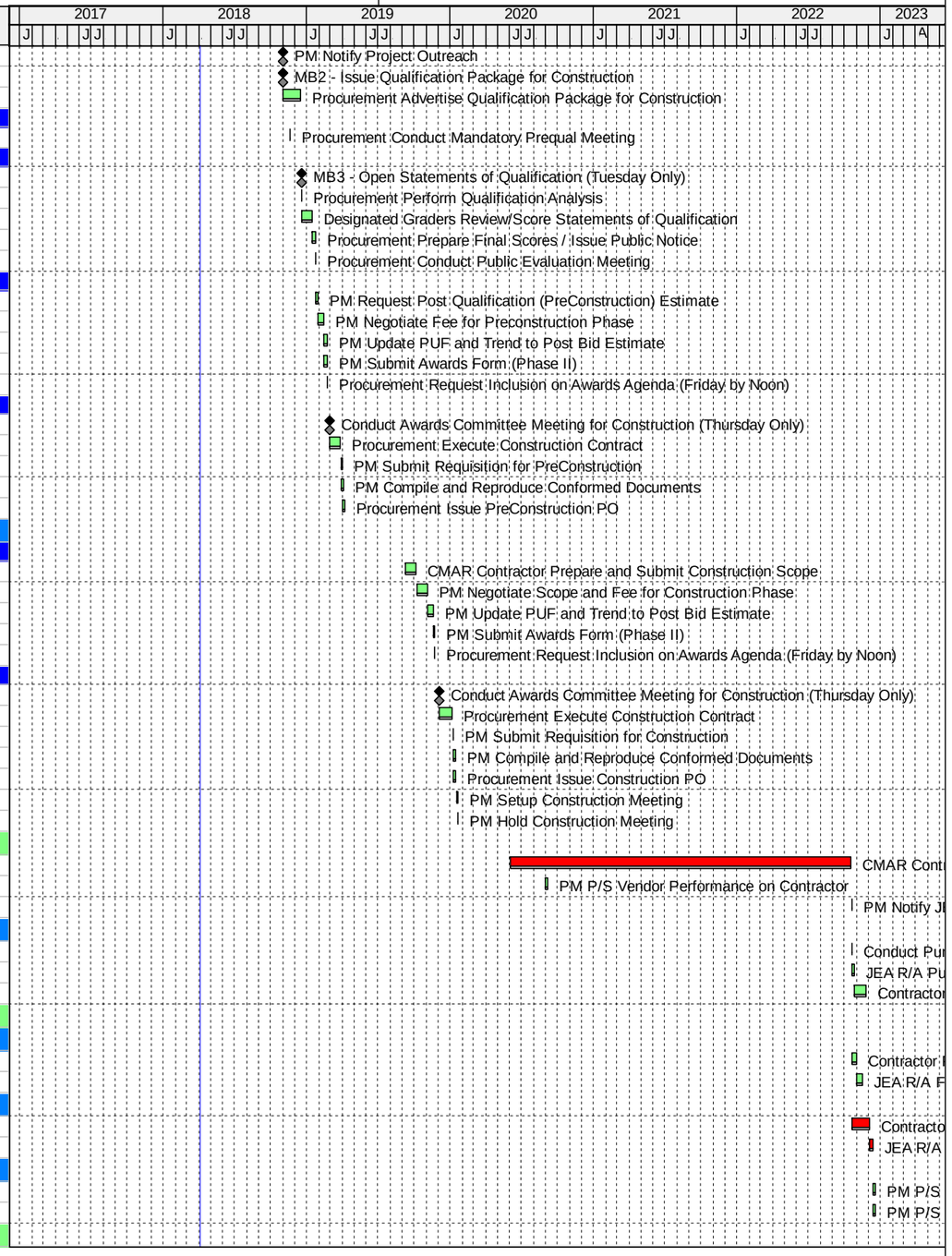
Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Time Delay
Project Baseline Bar
Milestone
Baseline Milestone

TASK filters: Do Not Show LOE, Do Not Show WBS Summaries.

FP 1815011 Southwest WWTF Expansion from 14 to 18 MGD

Run Date: 09-Apr-18
Data Date: 06-Apr-18

Activity ID	Activity Name	Original Duration	Actual Duration	Start	Finish	Start Variance	Finish Variance
BID1060	PM Notify Project Outreach	0	0	02-Nov-18		0	0
MB2	MB2 - Issue Qualification Package for Construction	0	0	02-Nov-18		0	0
BID1080	Procurement Advertise Qualification Package for Construction	45	0	02-Nov-18	16-Dec-18	0	0
Pre-Qualification							
BID1090	Procurement Conduct Mandatory Prequal Meeting	1	0	19-Nov-18	19-Nov-18	0	0
Qualification							
MB3	MB3 - Open Statements of Qualification (Tuesday Only)	0	0	18-Dec-18		0	0
BID1110	Procurement Perform Qualification Analysis	1	0	19-Dec-18	19-Dec-18	0	0
BID1120	Designated Graders Review/Score Statements of Qualification	15	0	20-Dec-18	14-Jan-19	0	0
BID1130	Procurement Prepare Final Scores / Issue Public Notice	5	0	15-Jan-19	22-Jan-19	0	0
BID1140	Procurement Conduct Public Evaluation Meeting	1	0	23-Jan-19	23-Jan-19	0	0
Project Update - Pre-Construction							
BID1150	PM Request Post Qualification (PreConstruction) Estimate	5	0	24-Jan-19	30-Jan-19	0	0
BID1160	PM Negotiate Fee for Preconstruction Phase	10	0	31-Jan-19	13-Feb-19	0	0
BID1170	PM Update PUF and Trend to Post Bid Estimate	5	0	14-Feb-19	21-Feb-19	0	0
BID1180	PM Submit Awards Form (Phase II)	5	0	14-Feb-19	21-Feb-19	0	0
BID1190	Procurement Request Inclusion on Awards Agenda (Friday by Noon)	1	0	22-Feb-19	22-Feb-19	0	0
Award Pre-Construction							
BID1200	Conduct Awards Committee Meeting for Construction (Thursday Only)	0	0	28-Feb-19		0	0
BID1210	Procurement Execute Construction Contract	20	0	01-Mar-19	28-Mar-19	0	0
BID1230	PM Submit Requisition for PreConstruction	2	0	29-Mar-19	01-Apr-19	0	0
BID1240	PM Compile and Reproduce Conformed Documents	5	0	29-Mar-19	04-Apr-19	0	0
BID1250	Procurement Issue PreConstruction PO	5	0	02-Apr-19	08-Apr-19	0	0
Phase 2 - Construction Award							
Project Update - Construction							
BID1220	CMAR Contractor Prepare and Submit Construction Scope	20	0	10-Sep-19	07-Oct-19	0	0
BID1260	PM Negotiate Scope and Fee for Construction Phase	20	0	08-Oct-19	04-Nov-19	0	0
BID1270	PM Update PUF and Trend to Post Bid Estimate	10	0	05-Nov-19	19-Nov-19	0	0
BID1280	PM Submit Awards Form (Phase II)	2	0	20-Nov-19	21-Nov-19	0	0
BID1290	Procurement Request Inclusion on Awards Agenda (Friday by Noon)	1	0	22-Nov-19	22-Nov-19	0	0
Award Construction							
BID1300	Conduct Awards Committee Meeting for Construction (Thursday Only)	0	0	05-Dec-19		0	0
BID1310	Procurement Execute Construction Contract	20	0	06-Dec-19	07-Jan-20	0	0
BID1320	PM Submit Requisition for Construction	2	0	08-Jan-20	09-Jan-20	0	0
BID1330	PM Compile and Reproduce Conformed Documents	5	0	08-Jan-20	14-Jan-20	0	0
BID1340	Procurement Issue Construction PO	5	0	10-Jan-20	16-Jan-20	0	0
BID1350	PM Setup Construction Meeting	2	0	17-Jan-20	21-Jan-20	0	0
BID1360	PM Hold Construction Meeting	1	0	22-Jan-20	22-Jan-20	0	0
Construction							
C1020	CMAR Contractor Perform Construction	870	0	02-Jun-20	19-Oct-22	0	0
VP20	PM P/S Vendor Performance on Contractor	5	0	31-Aug-20	04-Sep-20	0	0
C1022	PM Notify JEA Internal Stakeholers of SC	1	0	20-Oct-22	20-Oct-22	0	0
Punchlist							
C1600	Conduct Punchlist Walkthrough	1	0	20-Oct-22	20-Oct-22	0	0
C1610	JEA R/A Punchlist and Deliver to Contractor	5	0	21-Oct-22	27-Oct-22	0	0
C1030	Contractor Perform Construction Punchlist	30	0	28-Oct-22	26-Nov-22	0	0
Contract Closeout							
As Builts							
C1070	Contractor P/S Final As-Built Drawings	10	0	20-Oct-22	02-Nov-22	0	0
C1090	JEA R/A Final As-Built Drawings and Delivery to T5	10	0	03-Nov-22	17-Nov-22	0	0
Final Invoice							
C1080	Contractor P/S Final Invoice	30	0	20-Oct-22	05-Dec-22	0	0
C1100	JEA R/A Final Pay Request	5	0	06-Dec-22	12-Dec-22	0	0
Vendor Performance							
VP30	PM P/S Final Vendor Performance on Contractor	5	0	13-Dec-22	19-Dec-22	0	0
VP40	PM P/S Final Vendor Performance on Designer	5	0	13-Dec-22	19-Dec-22	0	0
Project Closeout							



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Time Delay
Project Baseline Bar
Milestone
Baseline Milestone

TASK filters: Do Not Show LOE, Do Not Show WBS Summaries.

Activity ID	Activity Name	Original Duration	Actual Duration	Start	Finish	Start Variance	Finish Variance
C1560	Project Manager Perform Close out	20	0	13-Dec-22	12-Jan-23	0	0
C1580	Project Controls Perform Close out	60	0	13-Jan-23	10-Apr-23	0	0