Procurement Department Bid Office
Customer Center – 1st Floor, Room 002
21 W. Church Street
Jacksonville, Florida 32202

AUGUST 17, 2017

ADDENDUM NUMBER: One (1)

TITLE: Greenland WTP Expansion from 6.0 to 12.0 MGD

JEA RFP NUMBER: 116-17

PROPOSAL DUE DATE: September 12, 2017

TIME OF RECEIPT: 12:00 PM

TIME OF OPENING: 02:00 PM

THIS ADDENDUM IS FOR THE PURPOSE OF MAKING THE FOLLOWING CHANGES OR CLARIFICATIONS:

1. JEA is updating section 1.2.1 Minimum Qualification For Submission for this solicitation. Please see below.

1.2.1. MINIMUM QUALIFICATIONS FOR SUBMISSION
Proposer shall have the following Minimum Qualifications to be considered eligible to submit a Proposal in response to this RFP.

It is the responsibility of the Proposer to ensure and certify that it meets the Minimum Qualifications stated below. A Proposer not meeting all of the following criteria will have their Proposals rejected:

- The Company must be listed on JEA's Qualified Proposers List (QPL) in the following category~~y~~ies, at the time of the Proposal due date: WE1 Water Wastewater Treatment Plant Systems and Pump Stations Class III/IV **and** WE2 Potable Water Production Wells.

For any questions related to JEA QPL WE1 or WE2 lists contact Karen Wenberg at 904-665-8621, or wenbkw@jea.com.

Please note, any Proposer whose contract with JEA was terminated for default within the last two (2) years shall have their Proposal rejected.

Acknowledge receipt of this Addendum on the Proposal Form (Appendix B)

2. Question: "Can JEA schedule an optional site visit to the Greenland WTP?"

   Answer: Yes, the **optional site visit will be held on August 30, 2017 at 11:00 AM**. The Greenland WTP is located at 6850 Energy Center Drive, Jacksonville, FL. All attendees must email the project manager, Tim Perkins, at perkte@jea.com by 12:00 PM on August 29, 2017 if you plan on attending.

3. Question: "Can JEA provide as-build drawings for this project?"

   Answer: Yes, please refer to the two attached files listed below.

   116-17 Addendum 1 Grading Plan
   116-17 Addendum 1 Yard Piping

4. JEA is providing the project definition for the sulfide removal project at the Greenland WTP. Please refer to the attached document labeled 116-17 Addendum 1 PD.

Acknowledge receipt of this Addendum on the Proposal Form (Appendix B)

TECHNICAL MEMORANDUM

Index 268-W7 – Greenland WTP – Sulfide Removal System Project Definition

PREPARED FOR:	JEA Capital Budget Planning
PREPARED BY:	Water Plants Engineering & Construction
DATE:	11/14/14

Introduction

The purpose of this technical memorandum (TM) is to provide a definition of the scope, schedule, and capital cost for the design and construction of the Greenland Water Treatment Plant (WTP) Sulfide Removal System. In general, the design criteria comply with the latest editions of JEA Water and Sewer Standards and Water Treatment Plant Standards Manual.

Project Team

The project team is responsible for establishing the project goals and objectives and for project execution. The team will execute the project in accordance with the approved project definition and will submit any revisions as required.

Project Manager:	Andrew May – W/WW Engineer
O&M – Operations:	Mike Dvoroznak – Manager, Water Treatment
O&M – Engineering Svs:	Greg Peugh – Manager, W/WW Reuse Trmt Maint Planning & Eng
System Planning:	Rob Zammataro – Manager, W/WW System Planning
Environmental Services:	Kevin Holbrook – Director, Laboratory and Water Services

Project Description and Justification

The Greenland WTP, located within JEA's Greenland Energy Center at 6850 Energy Center Dr., Jacksonville, FL, is being designed and constructed in two phases. Phase 1, which is currently under construction, will yield an approximate 5.76 million gallons per day (MGD) maximum daily demand (MDD) plant. Phase 2 will increase the capacity of the WTP to 8.64 MGD MDD.

The plant receives raw water from (2) Floridan aquifer production wells. Recent water sample results indicate that the well water contains levels of sulfide which may require additional treatment. Jacobs Engineering, in their March 2014 Report, *Sulfide Evaluation, JEA Greenland WTP* compared three options to address the elevated sulfide levels:

- Using the existing tray aeration system
- Adding a Packed Tower Aeration system
- Adding a side stream ozone injection system

Based upon the evaluation matrix, adding a side stream ozone injection system was the option selected to address elevated sulfide levels, enhance disinfection, and improve water quality.

Side stream ozone injection utilizes ozone to oxidize sulfides that are present in the water. Ozone reacts with hydrogen sulfide, the compound responsible for the "rotten egg" smell, to produce elemental sulfur:

$$H_2S + O_3\ (aq) \rightarrow S_0\ (s) + O_2\ (aq) + H_2O$$

In addition to sulfide removal, ozone has shown to be effective in disinfection; it is able to destroy or inactivate a wide range of pathogenic organisms: viruses, bacteria, and protozoa. Table 1 below summarizes ozone's capability of disinfecting pathogens, as compared to other common disinfection techniques (AWWA, *Water Quality & Treatment*, 2011).

Table 1: Application of Ozone and Other Techniques for Disinfection

Application	O_3	Cl_2	ClO_2	UV
Bactericidal	Good	Good	Good	Good
Virucidal	Good	Moderate	Moderate	Moderate to Good
Efficacy against Protozoa	Moderate	Fair	Fair	Good

Natural organic matter (NOM) can react with chlorine to form disinfection byproducts (DBP's) such as trihalomethanes (THMs) and the five haloacetic acids (HAA5s). Ozone can reduce the DBP formation potential by oxidizing NOM, decreasing the NOM available to react with chlorine. Reducing the organic precursors in turn reduces the chlorine demand and therefore less sodium hypochlorite is needed to maintain an operating level of free chlorine in the distribution system.

A specific concern of using ozone is the formation of bromate from ozone reacting with bromide. Bromate is a possible human carcinogen and is regulated. Given the bromide levels of raw water at other JEA facilities, it does not appear that formation of bromate will be an issue for this ozone system. Along with other parameters, JEA will test the well water at Greenland for total sulfides, bromide, and chloride and provide the data to the design engineer. In case the level of bromide becomes an issue, techniques for controlling bromate formation will need to be evaluated and implemented. Such techniques may include ozonation at slightly acidic pH values or multistage ozonation.

Process Description

Overall Process

The proposed overall process flow diagram is shown in Exhibit A. Raw water will be pumped from the production wells. A high concentration ozone solution will be injected to the raw water to a side stream flow and mixed with the rest of the raw water to oxidize hydrogen sulfide. After ozonation, the water is pumped to the tray aerator for additional sulfide and dissolved oxygen removal. The treated water will be stored in the 1.0 MG reservoir, then chlorinated prior to being pumped to the distribution system.

Ozone System

A typical ozone system is shown in Exhibit A (courtesy of Mitsubishi Electric). The system includes the following:

- Liquid oxygen (LOX) storage and vaporization
- Gaseous oxygen (GOX) pressure regulation and filtration
- Supplemental air system
- Ozone generator and associated power supply unit
- Closed-loop cooling water system
- Open-loop cooling water system
- Ozone dissolution system injectors, degas separators, and injection spool
- Ozone contactor
- Ozone off-gas destruct units

- Ozone building
- Instrumentation and controls

This process begins with a stored LOX system. LOX is fed to an ozone generator and injected with nitrogen (which is provided by an air compressor). The generator uses electricity to generate ozone, usually at the 10-12 percent by weight level.

A side stream of well water would be pulled off the main pipeline feeding the existing aerators. This side stream would be injected with the ozone and reintroduced into the main water supply (still upstream of the aerators). Excess ozone off gas is collected after injection and eliminated through an ozone destruction unit.

Once the side stream mixture of raw water and ozone is reintroduced into the main plant flow, it is mixed and allowed to contact until all ozone has decayed. Since ozone is a strong oxidizer, all of the side stream and contactor piping is stainless steel. The contactor is simply a long section of stainless steel pipe or a baffled pressure tank.

Following the contactor, the water continues on to the existing tray aerators. From there, treatment occurs just as it does with the existing Greenland WTP.

Other Potential Related Projects (for Potential Coordination)

JEA is investigating the potential for building a storage tank, sodium hypochlorite injection system and high service pumping at the US 1 Booster site or at the Nocatee Reclaimed Pump site or potentially purchasing property in Nocatee.

Another related project is looping the distribution piping within the southern end of Nocatee back to US 1.

Functional Requirements

Project Scope, Capacity (sizing), Expansion and Phasing

In determining the general sizing and pricing for the ozone system, two vendors were contacted: Mitsubishi Electric and Ozonia. The sizing may vary somewhat based on the ultimate sulfide level chosen for design. In general, the sizing is as follows:

Table 2: Ozone Sizing

Parameter	Value
WTP Design Flow	
Phase 1, Minimum (MGD)	3.84
Phase 1, Maximum (MGD)	5.76
Phase 2, Maximum (MGD)	8.64
LOX	
Number of tanks/evaporators	2, one duty
Storage capacity per unit (gallons)	3,000
Ozone System	
Number of units, Phase I	2, both duty
Number of units, Phase 2	3
Side stream pumps	2
Number of Ozone Injectors	2

Sulfide levels may change in the raw water with time and depending on how the wells are pumped. Sulfide can be difficult to measure accurately and repeatedly, causing the ozone system to be under-or over-sized. There can also be additional parameters in the water that are difficult to isolate and measure but will create ozone demand. Accordingly, on-site pilot testing will be performed to determine the values needed for generator sizing.

Given the calculations above and the turndown capabilities of the ozone system, two units could accommodate both Phase 1 minimum and maximum conditions. By adding a third unit, the system could accommodate the Phase 2 maximum day conditions.

Water Quality

Raw Water Quality

The October 2013 Engineering Report *Construction and Testing of Two Upper Floridan Aquifer Production Wells at the JEA Greenland Energy Center in Jacksonville, Florida* by CH2M HILL utilizing the JEA Laboratory Services Department testing provides the raw water quality from Water Supply Well No. 1 and Well No. 2. The results of the raw water analyses for each well are also provided in the Jacobs Engineering Report *Sulfide Evaluation JEA Greenland WTP*, Appendix A.

Finished Water Quality

The finished water will meet applicable EPA and FDEP requirements for drinking water.

Process Parameters

Overall Process Flow Diagram

The overall process flow diagram is shown in EXHIBIT A.

Process Control System Philosophy

Process control system will conform to JEA Standards and/or designed to match the existing control system(s).

Reliability and Redundancy

Additional equipment will be installed for redundancy and reliability as required by regulations or as required by Operations & Maintenance.

Materials of Construction

Materials of construction will conform to the latest edition of JEA Water & Sewer Standards Manual.

Location & Site Planning Considerations

Land Ownership/Acquisition Issues

The project is to be constructed entirely within the Greenland WTP property. Therefore, no landownership issue is expected.

Existing Site Survey/Mapping

As-builts of previous construction and surveys of the existing site are available. However, a detailed survey, including aboveground utilities mapping, underground utilities investigation and geotechnical exploration may be required.

Regulatory and Permitting Requirements

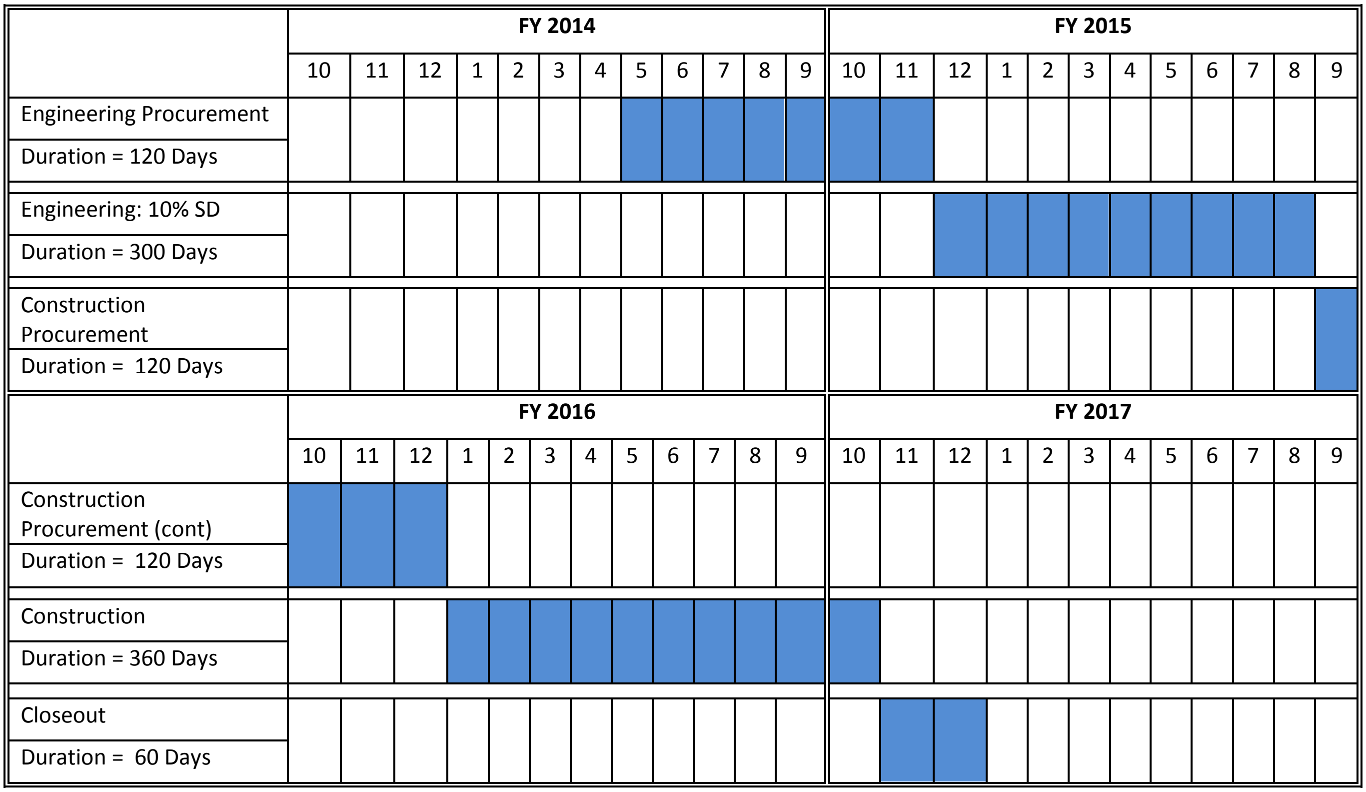
The following permits are expected to be required:

- An Environmental Resources Permit for stormwater management
- Florida Department of Environmental (FDEP) construction permit modification
- EPA NPDES General Permit for Construction Activities

Deliverables and Project Schedule

The major activities involved in the project are as follows:

- Project Definition (5%)
- Design
  - Schematic Design Deliverables (10%)
    - Updated PD+ (Schematic Design Document)
    - Process Flow Diagram
    - Draft P &ID
    - Major Equipment identified
    - Pilot Testing
    - Plan Views
    - Process Design
    - Cost/Benefit of Alternates
    - Cost Estimate (±30%)
  - Conceptual Design Deliverables (30%)
    - Updated SDD+ (Conceptual Design Document)
    - Process Calculations finalized
    - Process Flow Diagram finalized
    - P& ID finalized and locked
    - Plan Views, Major Elevations, Electrical Schematics
    - List of Specifications
    - Itemized Cost Estimate with Equipment Quotes (+30%/-15%)
    - Project Schedule Finalized
  - 60% Deliverables
    - Design Documents – Drawings and Specifications
  - 90%
    - Design Documents – Drawings and Specifications
    - Updated Cost Estimates
    - Updated Conceptual Design Documents
  - Draft Final (100%)
  - Final
    - Final Basis of Design Document – This document shall include all final process calculations in published forms
    - Final Cost Estimates
  - Permitting
  - At 30%, 90% and Final Milestones, provide O&M cost estimates, life cycle of equipment schedule/asset management information, and O&M Manuals (in draft and final form) for system design description
- Procurement of Contractor
- Construction by Contractor and Services during Construction by Engineer
- Closeout



Project Management & Delivery

This project's Project Request Form (PRF) has been approved by Capital Budget Planning and the project has been handed off to Project Engineering and Construction (PEC) for Project Definition completion and project implementation.

STAGE	Project Definition	Schematic Design	Conceptual Design	Design Development	Construction
To Project Delivery	PEC	PEC	PEC	PEC	PEC

Opinion of Probable Cost and Cash Flow Projection

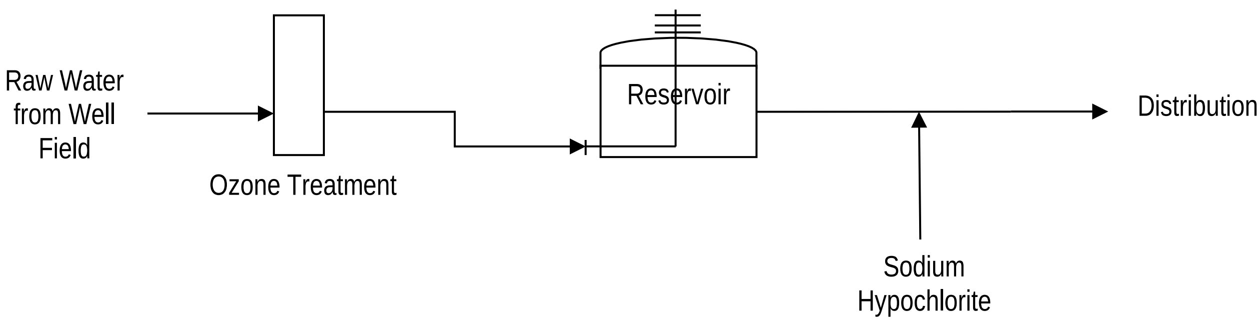
The engineer's opinion of probable cost is shown in **Exhibit C**. The cash flow projection is shown in **Exhibit D**.

Risks

The risks of not completing this project includes customer complaints from odor, sulfide bacteria growth could damage downstream water system components, THMs in production water is regulated by EPA and could be a health hazard to consumers.

EXHIBIT A

Overall Process Flow Diagram



Typical Ozone System Components (courtesy of Mitsubishi Electric)

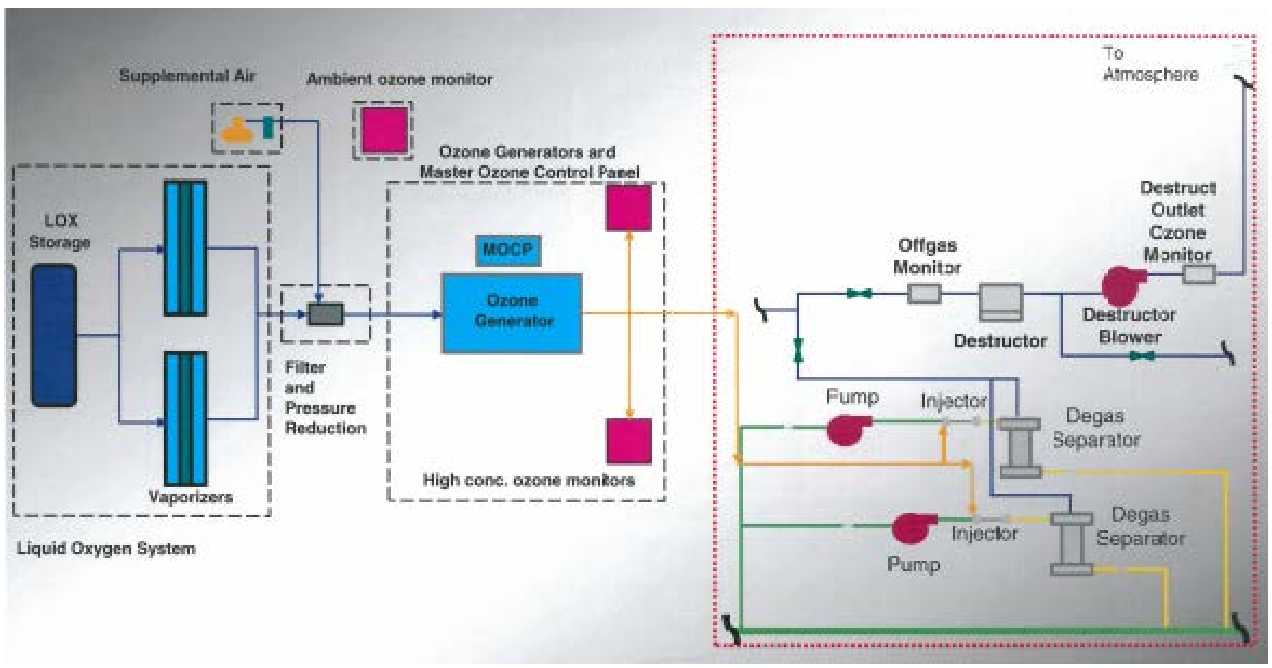


EXHIBIT B

Project Schedule

	Duration	**Start**	**Finish**
Design Selection Process	7 months	May 2014	Nov 2014
Design /Permitting	9 months	Dec 2014	Aug 2015
Bid and Award Construction	4 months	Sept 2015	Dec 2015
Construction	10 months	Jan 2015	Oct 2016
Closeout	2 months	Nov 2016	Dec 2016

JEA CONSTRUCTION COST OPINION

Date: 11/14/14

Project: Greenland WTP Sulfide Removal						
Contractor Cost	**Percent**	**Material**	**Labor**	**Equipment**	**Contractor Cost**	**TOTAL**
Ozone System (O_3 generator, Sidestream, Off Gas Destruct, Analyzers, HEX)					$2,331,720	$2,331,720
Static Mixer					$60,000	$60,000
Building					$330,000	$330,000
Generator					$200,000	$200,000
Piping & Contactor					$239,500	$239,500
LOX System (Storage Tanks, Vaporizers)					$220,500	$220,500
LOX Piping					$11,025	$11,025
LOX Site Facilities					$11,025	$11,025
Sitework					$170,189	$170,189
Electrical/I&C					$510,566	$510,566
General Conditions					$408,452	$408,452
Contingency (Contractors Risk)	15%					$612,679
Total Contractor Costs		**$0**	**$0**	**$0**	**$4,492,977**	**$5,105,656**
Additional Direct Costs		**Material**	**Labor**	**Equipment**	**Other/Sub-Cont.**	**TOTAL**
JEA Supplied Material & Labor		$0	$0	$0	$0	$0
JEA Contingency		$0	$0	$0	$0	$0
Total Direct Costs		**$0**	**$0**	**$0**	**$0**	**$5,105,656**
JEA Cost & Engineering			**Labor**		**Sub-Cont.**	**TOTAL**
Project Management	4.0%		$204,226			$204,226
Inspection	4.0%		$204,226			$204,226
Engineering - Design	12.7%				$650,974	$650,974
Engineering - SDC	4.6%				$232,901	$232,901
Miscellaneous	4.9%				$250,017	$252,017
Total: JEA Cost and Engineering	**30.25%**	**$0**	**$408,452**	**$0**	**$1,135,892**	**$1,544,344**
Total Project Costs		**$0**	**$408,452**	**$0**	**$5,628,869**	**$6,650,000**

EXHIBIT D

Projected Cash Flow by Fiscal Year

	PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR (x $1000)										
ACTIVITY	**FY 14**				**FY 15**				**FY 16**	**FY 17**	**TOTAL**
QUARTER	**1st**	**2nd**	3rd	4th	1st	2nd	3rd	4th	All	All	
JEA Cost & Engineering, 10%	$7	$21	$3	$8	$72						$111
JEA Cost & Engineering, 30%						$190					$190
JEA Cost & Engineering, Final							$280	$185			$465
Construction									$5,200	$664	$5,864
Closeout										$20	$20
TOTAL	$7	$21	$3	$8	$72	$190	$280	$185	$5,200	$684	$6,650