

City of Marco Island

RWPF Advanced Wastewater Treatment (AWT) Conversion Evaluation

I. PROJECT OVERVIEW

The CITY of Marco Island (OWNER) maintains and operates a system of potable water, wastewater, and reclaimed water utility facilities. This includes the Reclaimed Water Production Facility (RWPF) which has a Three-Month Average Daily Flow (3MADF) of 4.92 million gallons per day (mgd). The existing Marco Island RWPF is a Modified Ludzack-Ettinger (MLE) process which treats wastewater from the OWNER's collection system and provides reclaimed water to reclaimed water customers.

The OWNER desires to evaluate concepts and alternatives to convert the Marco Island RWPF from an irrigation quality effluent to Advanced Wastewater Treatment (AWT) as defined by FDEP; which ultimately means the effluent water quality will not exceed the following criteria:

Parameter	Max Value ¹	Units
CBOD ₅	5	mg O ₂ /L
TSS	5	mg TSS/L
Total Nitrogen (TN)	3	mg N/L
Total Phosphorus	1	Mg P/L
1. Based on annual averages		

The OWNER has retained Black & Veatch (CONSULTANT) to conduct an evaluation of treatment alternatives to achieve AWT. A conversion to AWT would allow the OWNER to enhance its environmental stewardship and comply with the Grizzle-Figg statute. To achieve AWT limits, the CONSULTANT will evaluate several treatment alternatives at the Marco Island RWPF. The evaluation will include the following components:

- Facility Assessment
- Regulatory Compliance Evaluation
- Treatment Alternatives Analysis
- Conceptual opinion of probable construction costs (OPCC) – Probable capital expenditure (CAPEX) and Probable operating expenses (OPEX)
- Alternative Evaluation Report
- City Council Presentation (Optional)

II. SCOPE OF SERVICES

TASK 1 – PROJECT MANAGEMENT AND KICKOFF MEETING

CONSULTANT will perform project management and administrative duties associated with the project, including project set-up, resource management, progress monitoring, scheduling, trend/change

management, general correspondence, project administration, and invoicing. CONSULTANT will maintain progress documentation and project cost accounting system throughout the project, including the preparation of monthly status reports and invoices for professional services in format acceptable to OWNER. Status reports will include a summary of work completed each month.

CONSULTANT will coordinate and lead a project kickoff meeting with OWNER's Staff to review the project purpose and objectives, scope of work, schedule for project activities and deliverables, and the data request. Current RWPF operations, conditions, treatment limitations, and concerns will also be discussed at the kickoff meeting. Meeting minutes will be recorded by the CONSULTANT and submitted to the OWNER. This will be an in-person meeting or, if required, a conference call.

TASK 2 – REPORT PREPARATION

2.1 - Facility Assessment

CONSULTANT will review the existing City of Marco Island RWPF design and operational capacity. CONSULTANT will rely on the most recent Capacity Analysis Report (CAR) and the most recent Operations and Maintenance Performance Report (OMPR) to perform the assessment.

General permitting and area constraints will be considered in the facility assessment.

2.2 – Regulatory Compliance Evaluation

CONSULTANT will confirm the effluent requirements for the City of Marco Island RWPF, including potential future regulatory requirements associated specifically with nutrients.

2.3 – Treatment Alternatives Analysis

CONSULTANT will evaluate the alternatives for improving Total Nitrogen (TN) and Total Phosphorus (TP) removal at the RWPF. The following list of specific alternatives will be evaluated under this study.

1. Conversion to a Sidestream Enhanced Biological Phosphorus Removal (S2EBPR) + Four Stage Bardenpho. Under this alternative, TP will be removed by an S2EBPR reactor for conditioning the mixed liquor to promote biological phosphorus removal, while the existing Modified Ludzak-Ettinger (MLE) process will be converted to a four stage Bardenpho (pre-Anoxic -AX/Oxic - OX/post Anoxic, reaeration-membrane bioreactor (MBR) configuration to promote removing nitrogen to TN < 3 mg/L as N. Supplemental carbon will be added for compliance with the TN limit.
2. Conversion to a chemical phosphorus removal + 4 Stage Bardenpho. Under this alternative, the MLE process will be converted to a four stage Bardenpho (AX/OX/AX/Reaeration-MBR) to address TN removal (supplemental carbon will be required). To address phosphorus removal, a metal salt system (i.e. alum) prior to the MBR will be added for precipitating PO₄ to address TP removal.

3. Conversion of the MLE plant to a Partial denitrification-anammox (PDNA) with S2EBPR. The PDNA concept will include an integrated PDNA in the biological reactor coupled with chemical phosphorus removal.
4. Nuquatics. CONSULTANT will evaluate the phosphorus removal technology by Nuquatics as an alternative to reduce TP in the effluent.

2.4 – Opinion of Probable Construction Cost - CAPEX and OPEX.

CONSULTANT will perform an evaluation of the existing capital assets to determine CAPEX and OPEX estimates. A Class 4 conceptual level Opinion of Probable Construction Cost (OPCC) will be prepared. The Class 4 OPCC, in accordance with the American Association of Cost Engineers International (AACE) includes the following criteria:

- End usage – Feasibility, preauthorization, detailed strategic planning, economic feasibility, preliminary budget approval.
- Methodology – Equipment factored or parametric models, stochastic estimating methods.
- Accuracy – ANSI Standard Reference Z94.2-1989 - Budget Estimate

OPEX will focus specifically on the OPEX differences (additions/deductions) that the new alternatives will entail.

2.5 – Alternative Evaluation Report

CONSULTANT will prepare a draft Report summarizing the findings and evaluation results and submit one (1) electronic copy to the OWNER for review. CONSULTANT will conduct a virtual project review workshop with the OWNER to review comments on the draft Report. CONSULTANT will prepare a final Report, incorporating comments from the OWNER and submit one (1) electronic copy.

The following deliverables are included in this project scope of work:

- Kickoff meeting minutes
- Workshop meeting minutes
- Draft Alternative Evaluation Report
- Final Alternative Evaluation Report

TASK 3 – CITY COUNCIL PRESENTATION (OPTIONAL)

After completion of the final alternative evaluation report, Consultant will attend a City Council meeting and develop a presentation for the City Council members to highlight the results of the alternative evaluation report.

PARTICIPATION BY THE OWNER

The following participation by the OWNER will be needed to support execution of work.

- Provide CONSULTANT with available relevant data.

- Provide CONSULTANT Staff access to facilities for on-site assessments and data gathering.
- Review and comment on draft submittals within 2 weeks of submittal dates.
- Participate in meetings, interviews, and site visits with CONSULTANT as identified herein

PROPOSED IMPLEMENTATION SCHEDULE

The proposed implementation schedule for Task 1 is outlined below. The Notice to Proceed shall be the date of approval of the Work Assignment by the City Council. The expected duration of the project is TBD weeks. The proposed schedule assumes 2 weeks for OWNER review of deliverables, unless otherwise indicated in the scope. Additionally, the schedule assumes the results of the fractionation sampling will be available within 2 weeks of NTP.

PROPOSED SCHEDULE	
Deliverable or Activity	Target Completion Following NTP
Project Management and Kickoff Meeting	190 days
Report Preparation - Draft Report	150 days
Alternatives Workshop	160 days
Report Preparation – Final Report	190 days

COMPENSATION

For the Scope of Services described herein, CONSULTANT shall be compensated on a Lump Sum basis for in the total amount of \$182,959.00. The table below summarizes the fee by scope task.

TASK #		COST (\$)
1	Project Management and Kickoff Meeting	\$8,847
2.1	Facility Assessment	\$2,875
2.2	Regulatory Compliance Evaluation	\$15,150
2.3	Treatment Alternatives Analysis	\$69,786
2.4	Opinion of Probable Cost - CAPEX and OPEX	\$45,820
2.5	Alternative Evaluation Report	\$34,767
3	City Council Presentation (Optional)	\$5,714
Total		\$182,959

CONSULTANT will submit monthly invoices to be paid by the OWNER based on the progress and services completed each month. Compensation shall be made in accordance with the terms of the Agreement between the OWNER and CONSULTANT.

ASSUMPTIONS

1. OPCCs developed for this project will be conceptual based on main equipment and concrete/steel quantities. Piping, electrical, I&C, sitework, etc. will be estimated as a percentage of the above items.
2. No computer-aided design (CAD) figures will be developed. Aerial imagery or existing CAD backgrounds will be used to develop conceptual layout figures for the proposed alternatives.