

January 23, 2018



Mr. Bill Pedersen
Director of Public Works
City of Deer Park
710 East San Augustine
Deer Park, Texas 77536

Subject: Proposal to Provide Professional Engineering Services
City of Deer Park
Surface Water Treatment Plant Residuals Handling Alternatives

Dear Mr. Pedersen:

Engineering
& Disaster
Management

Ardurra Group, LLC (“Ardurra”) is pleased to submit this proposal to the City of Deer Park for development and evaluation of alternatives for handling solids residuals generated from the City’s surface water treatment plant. Current solids disposal methods have proven costly to mitigate and the City desires to identify options to ease plant operations as well as provide more economical disposal methods.

The following presents our understanding of the proposed project, the required scope of work for engineering services, our proposed technical approach, anticipated schedule, and estimated fees.

1.0 Project Understanding

The existing surface water treatment plant was constructed in 1989 and treats raw water from the Trinity River via Lake Livingston. The raw water is disinfected with chloramines and treated with various chemicals including coagulant, polymers and sodium hexametaphosphate. The plant switched coagulant from ferric chloride to AquaPAC 8503 approximately two years ago. Filter backwash and clarifier sludge is currently discharged to one of the existing holding lagoons where additional solids are settled out. Supernatant from the ponds is recycled back to the head of the plant where it is mixed with raw source water. The holding lagoons are currently full and in the process of being cleaned out via sludge disposal contract with a vendor utilizing roll off containers.

2.0 Description and Scope

As such, Ardurra will provide the following scope of services:

- Task 1 – Project Management and Coordination
- Task 2 – Data Collection and Sludge Characterization
- Task 3 –Evaluation of Residual Handling Alternatives
- Task 4 –Development of Evaluation Report

Ardurra Group, LLC
2032 Buffalo Terrace
Houston, TX 77019
346.666.5130
Ardurragroup.com



Task 1 – Project Management and Coordination

- 1.1 Engineer will perform project management and coordination duties throughout the project, including tracking budget, schedule, and progress of work. Engineer will provide a project status report to the City with the monthly invoices.
- 1.2 Engineer will provide quality control reviews and technical reviews of all evaluations and recommendations, and technical memorandum.
- 1.3 Engineer will coordinate with regulatory agencies for inputs and guidance.
- 1.4 Engineer will conduct up to two (2) site visits/meetings with plant staff to gather operations data and field-verify conditions.

Task 2 – Data Collection and Sludge Characterization

- 2.1 Engineer will review the existing plant drawings, previous reports, and operations data necessary to have an understanding of current operating conditions and residuals generated. The following data will be requested from the City, if available:
 - 5-year worth of plant raw water flow data in excel format.
 - 5-year work of plant raw water quality data in excel format, including turbidity, color, total organic carbon, etc.
 - 5-year worth of plant chemical dosage in excel format, including coagulant (ferric and AquaPAC 8503), coagulant polymer, flocculant polymer, and other chemicals that are feed upstream of clarifiers.
 - Chemical MSDS sheets.
 - Record Drawings for Plant Construction and Expansion, as well as other Improvement projects that were related to residual handling processes (such as recent Recycle Pump Station and Sludge Lagoon Supernatant Pump Station Improvements project), preferably in PDF.

The Engineer will perform an analysis of the plant operations data to estimate the current and potential solids production quantities.

- 2.2 Engineer will coordinate with up to three (3) residual handling equipment companies to conduct bench-scale testing and analysis of the residual solids generated from the plant. The dewatering equipment manufacturer will be contacted and sludge samples will be shipped for laboratory analysis. In addition, a volute press manufacturer will be contacted for setting up an on-site pilot test of the solids generated. The solids samples will be tested and analyzed for determining the characteristics (anticipated percent of solids capture, anticipated percent of cake solids, polymer recommendation and dosage), sizing, and treatability assessment using the respective equipment, and to develop the preliminary design criteria for sludge dewatering facilities.



Task 3 –Evaluation of Residual Handling Alternatives

3.1 Sludge Dewatering Alternatives - Engineer will evaluate and compare up to four (4) sludge dewatering alternatives, including the following. It is assumed that sludge cake will be disposed off-site for landfill.

- a. Mechanical dewatering via belt filter press
- b. Mechanical dewatering via centrifuge
- c. Mechanical dewatering via volute press
- d. Gravity dewatering via roll-off container system such as FloTrend

The alternative analysis will include process flow diagrams, preliminary equipment selection and sizing criteria, and conceptual layouts depicting general footprint of solids handling facilities.

3.2 Sludge Thickening – Engineer will perform preliminary equipment selection and sizing for sludge thickener and thickened sludge feed pumps. Per initial discussion with WTP operations staff, double disc pumps will be considered in this analysis.

3.3 Residual Liquid Handling – Residual liquid generated at the plant includes backwash waste from filters, supernatant from gravity thickeners, and decant (centrate or filtrate) from sludge dewatering equipment. The study will evaluate current residual liquid handling operation and assess needs for improvements and modifications to pump residual liquid back to the head of the plant.

3.4 Cost Analysis - Engineer will coordinate with equipment vendors and manufacturers to obtain necessary engineering, operational, layout and budgetary cost information, and develop conceptual-level cost opinions (capital costs and operation and maintenance costs), to evaluate each alternative on a lifecycle basis.

Task 4 – Evaluation Report

4.1 Prepare and develop a draft evaluation report with associated graphs, tables, and figures. Engineer will provide plan views of alternative layouts in pdf format utilizing existing aerial images and existing site layout drawings. A draft table of content is provided below:

- Section 1 – Introduction
- Section 2 –Sludge Production and Characterization
- Section 3 – Sludge Dewatering Alternative Evaluation
- Section 4 – Cost Evaluation
- Section 5 - Recommendations



4.2 Upon review of the City, Engineer will incorporate review comments and issue the final report.

2.0 Schedule

We anticipate being able to schedule the kickoff meeting within 7 days of Notice to Proceed and commence work immediately after and submitting deliverables on the following schedule:

- Draft Report – within 90 days of Notice to Proceed
- Final Report – within 21 days of receiving comments from the City on the Draft Report.

3.0 Fees, Terms and Conditions

Based on the scope of services outlined above, we have prepared a level of effort estimate. We estimate a lump sum, not to exceed fee of \$74,880.00 to complete the subject project. A detailed level of effort estimate is shown on **Exhibit A**. Our fee estimate is based on the scope of work defined for the project and in part on an estimate of required services.

We will not exceed our quoted budget unless the nature of the project changes. Your approval will be secured before any extra charges are incurred.

Services will be billed on a monthly basis in accordance with the scope of services for work incurred. Payment shall be due within 30 days after date of invoice. Interest at the rate of 1% per month (or the highest rate allowable by law) shall accrue on all amounts not paid within 30 days after date of invoice. All attorney fees and expenses associated with collection of past due invoices will be paid to client. Failure to timely pay any invoice shall constitute a waiver of any and all claims against Ardurra.

Please feel free to contact me at (713) 208-9463 or Jeff Peters at (713) 385-5601 to discuss any questions you may have. Thank you for the opportunity to propose these professional engineering services for the City of Deer Park.

Very truly yours,

Yue Sun, P.E., BCEE
Senior Project Manager/Water Treatment Practice Leader
TBPE Firm Registration No F-17004

cc: Jeff Peters, PE, BCEE, Client Account Manager, File

Exhibit A-1 - Level of Efforts Fee Estimate
City of Deer Park
Surface Water Treatment Plant - Residuals Handling Alternatives



Task No.	Task Description	Principal / QA/QC \$275 hrs	Sr. Project Manager \$240 hrs	Sr. Project Engineer \$230 hrs	Engineer 5/6 \$180 hrs	Project Engineer \$160 hrs	Sr. CAD Designer \$150 hrs	Admin Support \$120 hrs	Accounting \$120 hrs	Ardurra Subtotal Cost \$	OP \$	ODC \$	Totals \$	Total hrs
1.0	Project Management and Coordination													
1.1	Plant Management, Coordination, invoicing and progress reports		8			4		4	6	\$3,760			\$3,760	22
1.2	QA/QC Review	4								\$1,100			\$1,100	4
1.3	Regulatory Coordination		6							\$1,440			\$1,440	6
1.4	Site Visit (up to 2)		4			4				\$1,600			\$1,600	8
	Expense (5% of labor cost)											\$400	\$400	
	Task 1.0 - Sub Total	4	18	0	0	8	0	4	6	\$7,900	\$0	\$400	\$8,300	40
2.0	Data Collection and Sludge Characterization													
2.1	Plant Record Drawing and Data Research and Data Analysis		6			24		4		\$5,760			\$5,760	34
2.2	Sludge Sample Collection and Laboratory Testing Coordination		8			24				\$5,760			\$5,760	32
	Expense (5% of labor cost)											\$580	\$580	
	Task 2.0 - Sub Total	0	14	0	0	48	0	4	0	\$11,520	\$0	\$580	\$12,100	66
3.0	Alternative Evaluation													
3.1	Sludge Dewatering Alternative Evaluation	4	12			40	40			\$16,380			\$16,380	96
3.2	Sludge Thickening Evaluation		10			24	16			\$8,640			\$8,640	50
3.3	Residual Liquid Evaluation		8			24	16			\$8,160			\$8,160	48
3.4	Cost Analysis	2	8			24				\$6,310			\$6,310	34
	Expense (5% of labor cost)											\$1,980	\$1,980	
	Task 3.0 -Sub Total	6	38	0	0	112	72	0	0	\$39,490	\$0	\$1,980	\$41,470	228
4.0	Evaluation Report													
4.1	Development of DRAFT Report		16			24		6		\$8,400			\$8,400	46
4.2	Incorporate Comments and FINAL Report	2	8			8		2		\$3,990			\$3,990	20
	Expense (5% of labor cost)											\$620	\$620	
	Task 4.0 -Sub Total	2	24	0	0	32	0	8	0	\$12,390	\$0	\$620	\$13,010	66
	TOTAL	12	94	0	0	200	72	16	6	\$71,300	\$0	\$3,580	\$74,880	400