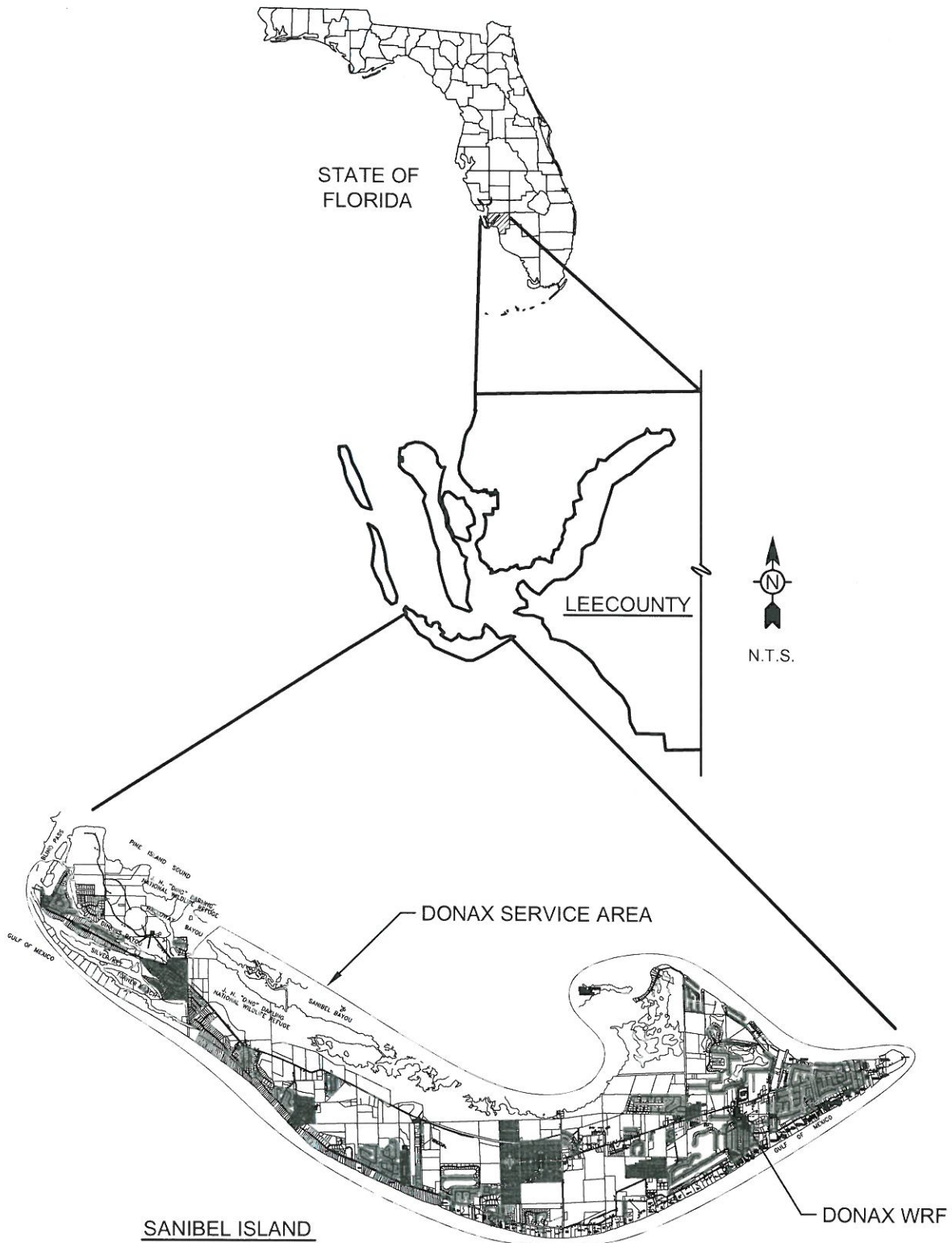


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THE CITY OF SANIBEL
DONAX WRF OPTIMIZATION STUDY

DONAX WRF
LOCATION MAP

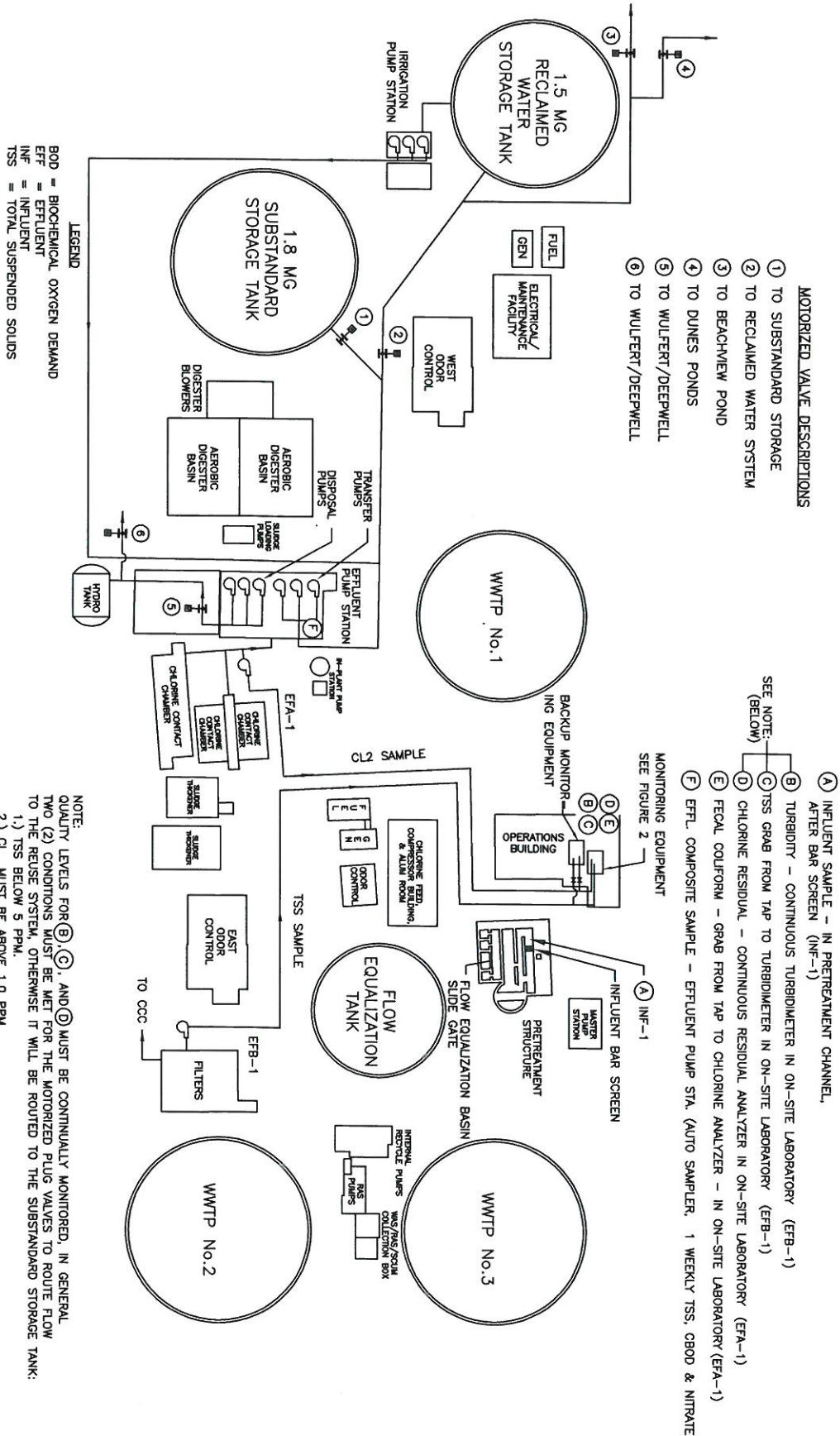
Project No.: 200-08498-13004

Date:

Designed By:

Figure

1



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THE CITY OF SANIBEL
DONAX WRF OPTIMIZATION STUDY

DONAX WRF (N.T.S.)

PROCESS FLOW DIAGRAM

Project No.: 200-08498-13004
Date:
Designed By:

Figure
2

Bar Measures 1 inch

Table 1 - Donax WRF Energy Consumption

Description	VFD	HP	Estimated Motor Efficiency	Hours / Day Operati on	Days / Year Operation	Annual Energy Cost	% of Total Energy Use
Sludge Treatment Blower #1	No	150	80.00%	8	365	\$36,759.15	8.91%
Sludge Treatment Blower #3	No	150	80.00%	8	365	\$36,759.15	8.91%
Sludge Treatment Blower #2	No	150	80.00%	8	365	\$36,759.15	8.91%
Blower #1	Yes	100	90.00%	6	365	\$16,337.40	3.96%
Blower #3	Yes	100	90.00%	6	365	\$16,337.40	3.96%
Blower #2	Yes	100	90.00%	6	365	\$16,337.40	3.96%
Blower #4	Yes	100	90.00%	6	365	\$16,337.40	3.96%
Odor Control System #1	NA	20	75.00%	24	365	\$15,683.90	3.80%
Odor Control System #2	NA	20	75.00%	24	365	\$15,683.90	3.80%
Odor Control System #3	NA	20	75.00%	24	365	\$15,683.90	3.80%
Transfer Pump #1	No	50	80.00%	8	365	\$12,253.05	2.97%
Transfer Pump #2	No	50	80.00%	8	365	\$12,253.05	2.97%
Transfer Pump #3	No	50	80.00%	8	365	\$12,253.05	2.97%
Submersible Master Pump #2	Yes	50	90.00%	8	365	\$10,891.60	2.64%
Submersible Master Pump #1	Yes	50	90.00%	8	365	\$10,891.60	2.64%
Submersible Master Pump #3	Yes	50	90.00%	8	365	\$10,891.60	2.64%
Irrigation Pump #3	Yes	75	90.00%	4	365	\$8,168.70	1.98%
Filter Air Compressor #1	Yes	20	90.00%	12	365	\$6,534.96	1.58%
Filter Air Compressor #2	Yes	20	90.00%	12	365	\$6,534.96	1.58%
Irrigation Pump #2	Yes	50	90.00%	4	365	\$5,445.80	1.32%
Irrigation Pump #1	Yes	50	90.00%	4	365	\$5,445.80	1.32%
Disposal Pump #1	Yes	200	90.00%	24	15	\$5,371.20	1.30%
Disposal Pump #3	Yes	200	90.00%	24	15	\$5,371.20	1.30%
Disposal Pump #2	Yes	200	90.00%	24	15	\$5,371.20	1.30%
Equalization Pump #1	*	10	60.00%	12	365	\$4,901.22	1.19%
Equalization Pump #2	*	10	60.00%	12	365	\$4,901.22	1.19%
Anoxic Mixer #1	*	5	60.00%	24	365	\$4,901.22	1.19%
Anoxic Mixer #3	*	5	60.00%	24	365	\$4,901.22	1.19%
Anoxic Mixer #2	*	5	60.00%	24	365	\$4,901.22	1.19%
Anoxic Mixer #4	*	5	60.00%	24	365	\$4,901.22	1.19%
Thickened Sludge Pump	*	15	60.00%	8	365	\$4,901.22	1.19%
Internal Recycle Pump #1	*	10	60.00%	8	365	\$3,267.48	0.79%
Internal Recycle Pump #3	*	10	60.00%	8	365	\$3,267.48	0.79%
Internal Recycle Pump #2	*	10	60.00%	8	365	\$3,267.48	0.79%
Washwater Booster Pump	*	10	60.00%	8	365	\$3,267.48	0.79%
Submersible Drain Pump #1	No	20	75.00%	4	365	\$2,613.98	0.63%
Submersible Drain Pump #2	No	20	75.00%	4	365	\$2,613.98	0.63%
RAS Pump #1	*	5	60.00%	12	365	\$2,450.61	0.59%
RAS Pump #2	*	5	60.00%	12	365	\$2,450.61	0.59%
Non-Potable Water pump #1	*	3	60.00%	12	365	\$1,470.37	0.36%
Non-Potable Water Pump #2	*	3	60.00%	12	365	\$1,470.37	0.36%
Waste Pump #1	*	5	60.00%	6	365	\$1,225.31	0.30%
Waste Pump #2	*	5	60.00%	6	365	\$1,225.31	0.30%
Rotary Drive Thickener #1	*	5	60.00%	6	365	\$1,225.31	0.30%
Automatic Bar Screen	*	1.5	50.00%	12	365	\$882.22	0.21%

Table 1 - Donax WRF Energy Consumption

Description	VFD	HP	Estimated Motor Efficiency	Hours / Day Operati on	Days / Year Operation	Annual Energy Cost	% of Total Energy Use
Odor Control Exhaust Fan	*	0.5	50.00%	24	365	\$588.15	0.14%
Odor Control Exhaust Fan	*	0.5	50.00%	24	365	\$588.15	0.14%
Truck Loading Pump #1	*	10	60.00%	2	260	\$581.88	0.14%
Truck Loading Pump #2	*	10	60.00%	2	260	\$581.88	0.14%
Exhaust Fan #2	*	2	50.00%	8	260	\$558.60	0.14%
Blower Room Exhaust Fan #1	*	1	50.00%	8	260	\$279.30	0.07%
Conveyor (Bar Screen)	*	1	50.00%	8	260	\$279.30	0.07%
Clarifier #2	*	1	50.00%	8	260	\$279.30	0.07%
Clarifier #3	*	1	50.00%	8	260	\$279.30	0.07%
Hypo Storage Tank Blower	*	1	50.00%	8	260	\$279.30	0.07%
Hypochlorite Feed Pump #4	*	1	50.00%	8	260	\$279.30	0.07%
Paddle Drive #1	*	0.75	50.00%	8	260	\$209.48	0.05%
Clarifier Drive #1	*	0.75	50.00%	8	260	\$209.48	0.05%
Exhaust Fan #4	*	0.75	50.00%	8	260	\$209.48	0.05%
Exhaust Fan #7	*	0.75	50.00%	8	260	\$209.48	0.05%
Exhaust Fan #5	*	0.75	50.00%	8	260	\$209.48	0.05%
Exhaust Fan #1	*	0.75	50.00%	8	260	\$209.48	0.05%
Exhaust Fan #2	*	0.75	50.00%	8	260	\$209.48	0.05%
Grit Pump #1	*	5	60.00%	1	365	\$204.22	0.05%
Hypochlorite Feed Pump #1	*	0.5	50.00%	8	260	\$139.65	0.03%
Hypochlorite Feed Pump #2	*	0.5	50.00%	8	260	\$139.65	0.03%
Hypochlorite Feed Pump #3	*	0.5	50.00%	8	260	\$139.65	0.03%
Dunes GC FCV	*	0.5	50.00%	8	260	\$139.65	0.03%
Donax Street FCV	*	0.5	50.00%	8	260	\$139.65	0.03%
Donax Influent FCV	*	0.5	50.00%	8	260	\$139.65	0.03%
Storage INK Valve	*	0.5	50.00%	8	260	\$139.65	0.03%
Overhead Crane	*	5	50.00%	1	52	\$34.91	0.01%
Overhead Door	*	1	50.00%	1	52	\$6.98	0.00%
					Total	\$412,627.53	

* Indicates that VFDs were not recommended or considered for motors 10 HP and smaller

Notes and Assumptions:

1. Motors 50 HP and above were assumed to be operating at 80% efficiency
2. Motors 20 HP and above were assumed to be operating at 75% efficiency
3. Motors 3 HP and above were assumed to be operating at 60% efficiency
4. Motors smaller than 3 HP were assumed to be operating at 50% efficiency
5. Motors w/ VFDs were considered to be operating at 90% efficiency to accommodate full load energy calculations

Table 2 - Dewatering Comparisons

Description	VFD	HP	Estimated Motor Efficiency	Hours / Day Operation	Days / Year Operation	Annual Energy Cost	20 Year Projected Energy Cost
Klammess 2.0 Meter Belt Press*	Yes	28.5	75.00%	8	365	\$7,449.85	\$148,997.09
Rotary Drum Thickener and Digester	No	See Table 1	See Table 1	See Table 1	365	\$127,186.66	\$2,543,733.18

Description	Approximate Capital Cost	Estimated Annual Maintenance Cost**	20 Year Projected Energy Cost	Projected 20 Year Operational Cost
Klammess 2.0 Meter Belt Press	\$805,000.00	\$18,000.00	\$148,997.09	\$1,313,997.09
Rotary Drum Thickener and Digester	\$0.00	\$18,000.00	\$2,543,733.18	\$2,903,733.18

Description	Projected Annual Truckloads of Cake Hauled	Estimated Hauling Cost per Load	Estimated Total Annual Hauling Cost	Projected 20 year Hauling Cost
Klammess 2.0 Meter Belt Press	49	\$1,750	\$85,750.00	\$1,715,000.00
Rotary Drum Thickener and Digester	NA	NA	\$133,207.20	\$2,664,144.00

Description	Total 20 Year Cost (Capital, Maintenance, Energy Consumption, and Hauling)	Annual Cost Savings (vs Drum Thickener and Digester)	Payback Period for Capital Cost (Years)
Klammess 2.0 Meter Belt Press	\$3,028,997.09	\$167,194.00	4.81
Rotary Drum Thickener and Digester	\$5,567,877.18	\$0.00	NA

* Includes a 20 HP Odor Control System

** Includes \$8,000 Annually for Odor Control Media (Belt Press and Drum Thickener Only)

Notes and Assumptions:

1. Belt press was assumed to be operating at 75% efficiency
2. Operational times are estimated
3. Annual maintenance costs are estimated
4. Capital costs include equipment, \$60k budgeted for engineering, \$150k budgeted for construction, \$50k for trailer, \$200k to repurpose digesters and \$100k budgeted for a new conveyor belt system (for belt press only)
5. Hauling costs are conservative estimates based on discussion with Karle Enviro-Organic Recycling, Inc.

Table 3

Existing Conditions - Rotary Drum Thickener and Digester	
Volume of Waste Currently Hauled (Gallons)	1,512,000.00
Waste Currently Hauled (LBS)	12,988,382.40
Solids Currently Hauled (LBS)	324,709.56

Klampspress 2.0 Meter Belt Press	
Solids Anticipated (LBS)	324,709.56
Water Anticipated (LBS) (at 16% solids)	2,029,434.75
Total Sludge Anticipated (LBS)	2,354,144.31
Projected Gallons to Be Hauled (assuming specific gravity of 1.1)	256,610.45
Cubic Yards to Be Hauled	1,270.51
Annual # of Truckloads @ 26 CY/Load	49

Table 4

Total Project Cost	
Engineering	60,000.00
2.0 Meter Belt Press or similar	240,000.00
Construction	155,000.00
Repurpose Digestors	200,000.00
Conveyor Belt	100,000.00
Trailer	50,000.00
Total	805,000.00