North Side WWTP Study

City of Angleton



03/22/2022

Wastewater Service Area



Sum of MUD acreage= 2,770 acres



Population and Housing Density and Wastewater Flow

New Development Density

- Single Family Homes
 - 90% of land use
 - 4 homes per acre
 - 3 people per 4 home
- Commercial Development
 - 10% of land use
 - 1 connection per acre (average)

Wastewater Flow

- Angleton (2011) Rate Study
 - Average Daily Flow: 250 gpd/connection
- TCEQ Recommendations
 - 75-100 gpd/person
 - Assuming 3 people/connection
 - Average Daily Flow: 300 gpd/connection
- Commercial Development
 - Average Daily Flow : 600 gpd/connection

WWTP Phasing – Initial Construction & Future Growth



-----Flow Projections

WWTP Site Layout Schematic



Cost Estimate - WWTP

ltem	Cost (\$)
Influent Lift Station	1,503,000
Fine Screen	2,473,000
Aeration Basin (2)	7,000,000
Vortex Grit Chamber	450,000
Final Clarifier (2)	9,200,000
Aerated Sludge Storage Tank	10,292,000
UV Disinfection System	3,300,000
Chemical Feed	278,000
Blower Building	1,922,000
Disc Filter	1,632,000
Electrical Generator	1,630,000
Administration Building	1,800,000
Land	750,000
Total	42,230,000

Site 1





Site 2

Site 3



FX





Total Cost for 4 Site Options

	Site 1	Site 2	Site 3	Site 4
On-Site OPCC	\$46,378,000	\$46,378,000	\$46,378,000	\$46,378,000
Off-site OPCC	\$18,416,000	\$15,324,100	\$15,552,600	\$17,288,700
Total (\$)	\$64,794,000	\$61,702,100	\$61,930,600	\$63,666,700

Note:

- 1. Costs are in terms of 2021 dollars
- 2. Does not include a "mid-point of construction" escalation
- 3. Does not include a "market volatility" escalation

Questions?





Phasing of Growth



MUD	Phase 1 2021 – 2025 (ac)	Phase 2 2026 – 2030 (ac)	Phase 3 2031 – 2040 (ac)	Total Service Area of Development (ac)
Rancho Isabella	300			300
MUD 12		150	310	460
MUD 13	250		340	590
MUD 14		325	655	980
MUD 15		150	290	440
Total acreage per Phase	550	625	1,595	2,770

WWTP Design Summary

- Average Daily Flow Rate
 - Initial 2.0 MGD
 - Build Out 4.0 MGD
- Peak Flow Capacity
 - 16.0 MGD

- Influent Loading (HDR Recommendation):
 - BOD (Biological Oxygen Demand) 450 mg/L
 - TSS (Total Suspended Solids) 450 mg/L
 - Ammonia 50 mg/L

Process Design



Process Flow Diagram



Influent Lift Station

• 2 Submersible Pumps

Flow	2 MGD at 50 ft TDH
Power Requirement	40 HP
Efficiency	70%

• 2 Submersible Pumps (Peak Flow)

Flow	8 MGD at 55 ft TDH
Power Requirement	170 HP
Efficiency	70%



Fine Screening

Design Flow	2/4 MGD
Screen Diameter	8 ft
Screen Type & Material	Stainless Steel Perforated Plate
Power Requirement	3 HP, 480 VAC, 60 Hz
Sensor	Water level



Huber El2 Proposal for Fine Screen, Angleton WWTP, 2021



Grit Removal

Headcell

- Stacked tray system to remove grit
- 95% removal of 75 micron and larger
- Grit dewatering system



Source: Hydro International HeadCell

Primary Clarifier (Future)

Flow	4 MGD
Diameter	75 FT
Depth	14 FT
Surface Area	4,450 SQFT



Aeration Basin

Flow (Current Phase)	2 MGD (Peak Flow = 8 MGD)
Dimensions (Length & Width)	168' X 40' ea basin
Side Water Depth	16'
BOD Loading as per TCEQ	35 lb cBOD5/1000 CF



Blowers

Number & Type of Blowers	3 Multistage Centrifugal
Flow	5,250 SCFM at 7 psi
Power Requirement	750 HP



Diffusers

Aeration Basin Type of Diffuser	Membrane Diffuser
Flow	9,500 SCFM at 16 ft depth

Sludge Holding Type of Diffuser	Coarse Air Diffuser
Flow	1,000 SCFM at 16 ft depth



Secondary Clarifiers

Flow (Current Phase)	2 MGD (Peak Flow = 8 MGD)
Diameter (2 Clarifiers)	70 FT
Sidewater Depth	14 FT
Combined Volume	600,000 Gallons
RAS flow rate	1.5 MGD
WAS flow rate	0.125 MGD





Disc Filters

Flow (Current Phase)	2 MGD (Peak Flow = 8 MGD)
Number of Discs	24
Number of Units	1 duty, 1 standby
Power Requirement	24 HP
Dimensions	32' X 8' X 7.5'



Evoqua El2 Proposal for Disc Filters, Angleton WWTP, 2021

UV Disinfection System

Flow (Current Phase)	2 MGD (Peak Flow = 8 MGD)		
Number of bulbs	96		
Туре	Inclined		
Power Requirement	76 HP (equivalent)		
Number of UV Channels	1 duty, 1 standby		





Suez Aquaray UV Proposal, Angleton WWTP, 2021

Cost Considerations



Materials

Construction input and 'bid price' producer price indexes (PPIs)

cumulative change in PPIs, April 2020-Aug 2021 (not seasonally adjusted)





AGC Reports

- Supply chain issues
 - Longer fabrication times
 - One Steel Fabricator Bar Joists Supplier May 2022
 - Pre-Engineered Metal Building 48 Week Lead Time
 - Roofing Materials 4 to 6 month lead time Issues with availability of fasteners
 - Plant Shutdowns and Transportation Issues
 - Tight supplies, inventory draw-downs, and localized shortages
 - Port of Long Beach and LA 169 Ships Trucker shortage +30% (80,000)
 - New California emission standards Trucks 3 years 50% blocked from entry to ports
 - Asia and Europe cannot get enough shipping containers to send products to the USA.

Bidding Climate Context

- Pre-Covid & Supply Chain Conditions
 - Rule of Thumb for 0% 2% Design \rightarrow \$15 \$17 per gallon
 - Fall 2019 Bid of Similar 2 MGD WWTP
 - \$35M
 - \$17.5M per gallon
- Post-Covid & Supply Chain Conditions (Current)
 - Rule of Thumb for 0% 2% Design \rightarrow \$18 \$21 per gallon
 - Escalate similar 2 MGD WWTP
 - \$42.3M if bid today

Administration Building & Lab

ANGLETON Administration & Lab

	PROPOSI	ED NEW	NOTES
KOUIVIS/ SPACES FOR CITY HALL	QTY	AREA	
SUPERVISOR'S OFFICE	1	180	
OFFICE	3	150	
CONTROL ROOM	1	260	3 Workstations
RESTROOMS/LOCKERS&SHOWERS	1	600	will need area for men's + women's
BREAKROOM/KITCHEN AREA	1	350	area to gather/conference
BUNKHOUSE	1	400	for 4-6 people
WAITING/RECEPTION AREA	1	165	awards display, spot for future recep.
VESTIBULE	1	70	air lock at entry
RECORDS STORAGE	1	130	area for flat files
SERVER ROOM / IT ROOM	1	100	
MECHANICAL	1	150	
ELECTRICAL	1	90	
JANITOR'S CLOSET	1	60	
GENERAL STORAGE	1	200	
COPY ROOM	1	120	
WORK ROOM /CUBICLES FOR OPERATOR'S	1	300	6 cubes /36 sf each
LAB	1	320	2 hoods/casework
LAB SUPPORT/STORAGE/SUPPLY	1	120	lockable
GARAGE	1	450	
MUD ROOM	1	150	accessible from garage
YARD STORAGE	1	200	
SUB-TOTAL	23	4,565	
CIRCULATION / WALLS (30%)		1,370	
TOTAL GROSS SQUARE FOOTAGE		5,935	