C1.04 - City of Kyle Water Treatment Plant

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Contaminants

The graph depicts the average constituent levels from eleven test water wells.

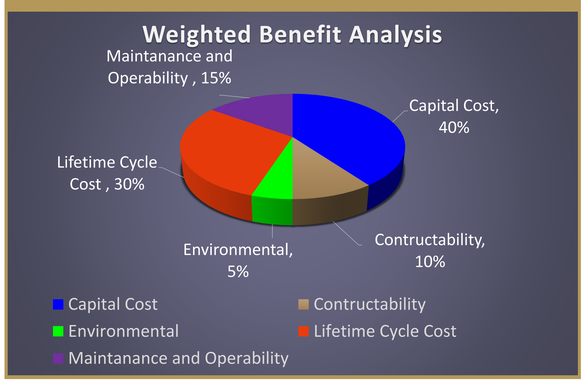
Constituent	Units	Primary Standard	Secondary Standard	Average Constituent Levels Across 11 Test Wells
Regulated Contaminants				
Inorganic Contaminants				
Hydrogen Sulfide	ppm		0.05	0.24
Dissolved Iron	ppm		0.30	2.80
Iron	ppm		0.30	6.45
Disolved Manganese	ppm		0.05	0.16
Manganese	ppm		0.05	0.17
Organic Contaminants				
SOCs				
Polychlorinated biphenyls (PCB)	ppm	0.00		<0.1

Standards / Constraints

- TCEQ & EPA primary and secondary water standards
- Minimum disinfectant residual
- Maximum hydraulic loading rate
- $56 million dollar budget

Criteria

The pie graph below shows the weights assigned to the criteria used to select alternates.



Project Overview

Rising Star Water CO. has been assigned the task of evaluating alternatives and designing a 19.5 MGD groundwater treatment plant for the City of Kyle. The plant is being developed to comply with TCEQ primary and secondary drinking water standards, with the Carrizo-Wilcox Aquifer serving as its water source.

Sustainability Evaluation

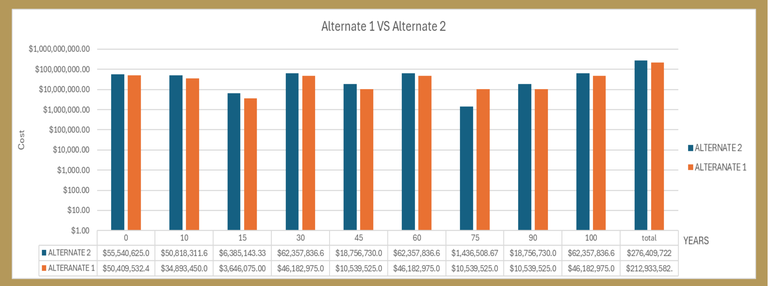
The Envision framework was selected for its evaluation system. Alternate one received a score of 30% and received a silver level of achievement Alternate two received a score of 28% with a verified score.

Alternate 1

	Submitted Score Information		
Credit Category	Applicable	Submitted	Percentage
Quality of Life	86	39	45%
Leadership	0	0	NaN%
Resource Allocation	92	14	15%
Natural World	48	11	23%
Climate and Risk	61	21	34%
Total Points / %	287	85	30%

Life Cycle Cost Analysis

The LCCA period will cover the recommended Civil Engineering infrastructure time of 100 years for water treatment plants.
Alternate 1 is $213,000,000
Alternate 2 is $276,500,000



	0	10	15	30	45	60	75	90	100	total
ALTERNATE 2	$55,540,625.0	$50,818,311.6	$6,385,143.33	$62,357,836.6	$18,756,730.0	$62,357,836.6	$1,436,508.67	$18,756,730.0	$62,357,836.6	$276,409,722
ALTERNATE 1	$50,409,532.4	$34,893,450.0	$3,646,075.00	$46,182,975.0	$10,539,525.0	$46,182,975.0	$10,539,525.0	$10,539,525.0	$46,182,975.0	$212,933,582.

Capital Costs

RISING STAR WATER.CO
Opinion of Probable Construction Cost
ALTERNATE 1

PHASE-PRELIMINARY — 11/24/2024
19.5MGD GROUNDWATER TREATMENT PLANT — Proposal # 1

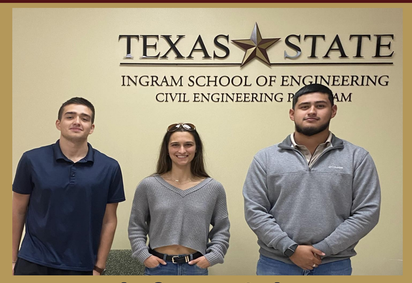
ITEM	DESCRIPTION	UNIT	QUANITY	UNIT PRICE($)	TOTAL
1	Mobilization, Bond And Insurance	L.S	1	$100,000	$100,000
2	OSHA Compliant Trench Safety System	L.S	1	$5,000	$5,000
3	Utiliy Locates and Construction Staking	L.S	1	$10,000	$10,000
4	Gravity Filters (11ft*25ft)	EA.	12	$900,000	$10,800,000
5	Static Mixer	EA.	1	$25,000	$25,000
6	Sedimentation Basin (45@ 48 Ft Diamet	EA.	5	$2,500,000	$12,500,000
7	Clear Well	EA.	2	$1,500,000	$3,000,000
8	Sedimentation tanks	EA.	5	$500,000	$2,500,000
9	HMAC Roads(Width 25ft)	L.S	1	$180,000	$180,000
10	Control and Supply Building (100ft x 100f	L.S	1	$800,000	$800,000
11	Chlorine Injection Disinfection	EA.	1	$100,000	$100,000
12	Feed Tank 1.65 Million Gallons	EA.	1	$3,000,000	$3,000,000
13	Piping	LF	400	$250	$100,000
14	Excavation	CY	237	$35	$8,296
15	Owners Allowance for Material Testing	L.S	1	$40,000	$40,000
				CONSTRUCTION TOTAL	$33,168,296
				20% CONTENGENCY TOTAL	$6,633,659
				15% ALLOWANCE FOR ELECTRICAL TOTAL	$4,975,244
				ENVISON SUSTAINABILITY VERIFICATION FEE	$25,000
				DESIGN FEES	$829,207
				TOTAL ESTIMATED COST	**$45,631,407**

RISING STAR WATER.CO
Opinion of Probable Construction Cost
ALTERNATE 2

PHASE-PRELIMINARY — 11/24/2024
19.5MGD GROUNDWATER TREATMENT PLANT — Proposal # 1

ITEM	DESCRIPTION	UNIT	QUANITY	UNIT PRICE($)	TOTAL
1	Mobilization, Bond And Insurance	L.S	1	$100,000	$100,000
2	OSHA Compliant Trench Safety System	L.S	1	$5,000	$5,000
3	Utiliy Locates and Construction Staking	L.S	1	$10,000	$10,000
4	Rapid Mixer (20,000 Gallons)	EA.	1	$1,000,000	$1,000,000
5	Slow Mixer	EA.	1	$35,000	$35,000
6	Sedimentaion Basin	EA.	5	$2,500,000	$12,500,000
7	Flocculation Basin (100,000 gallon)	EA.	3	$550,000	$1,650,000
8	Gravity Filters	EA.	12	$1,000,000	$12,000,000
9	Chlorine Injection Disinfection	EA.	1	$100,000	$100,000
10	Feed Tank 1.65 Million Gallons	EA.	1	$3,000,000	$3,000,000
11	Clarifiers	EA.	5	$500,000	$2,500,000
12	Clear Well	EA.	2	$1,500,000	$3,000,000
13	HMAC Roads(Width 25ft)	EA.	1	$180,000	$180,000
14	Control and Supply Building (100ft x 100ft)	EA.	1	$800,000	$800,000
15	Piping	LF	400	$250	$100,000
16	Excavation	CY	237	$35	$8,296
17	Owners Allowance for Material Testing	L.S	1	$40,000	$40,000
				CONSTRUCTION TOTAL	$37,028,296
				20% CONTENGENCY TOTAL	$7,405,659
				15% ALLOWANCE FOR ELECTRICAL TOTAL	$5,554,244
				ENVISON SUSTAINABILITY VERIFICATION FEE	$25,000
				DESIGN FEES	$925,707
				TOTAL ESTIMATED COST	**$50,938,907**

Team Members



From left to right: Isaac Cisneros, Beth Agee, Jesus Galvan

Design Alternatives

Alternate One: Uses Chlorine as well as potassium permanganate as the oxidizing agents for oxidation followed by sedimentation, filtration and disinfection to meet TCEQ standards.
Alternate Two: Uses the standard water treatment system. This consists of an oxidation stage, coagulation, flocculation and sedimentation which will be followed by filtration and disinfestation to meet TCEQ standards .

Design Alternatives

For the next semester, we plan to focus on Alternate One. We identified it as the most cost-effective while still satisfying all constraints and requirements.