



Figure 1: WEF Logo [1]

Water Environment Federation (WEF) Student Design Competition

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CENE 476

12/3/21

Project Background

- **Project Purpose**
 - Design a water or wastewater treatment plant for WEF
- **Client**
 - City that owns potential plant
- **Stakeholders**
 - Surrounding community, Regulators, Customers, ADEQ, County, and City
- **Location**
 - Unknown city in Arizona

Project Background

- Purple=Aeration Basin Units
- Orange= Secondary Clarifier
- Pink= Primary Clarifier



Figure 2: Existing Layout for GWRP [2]

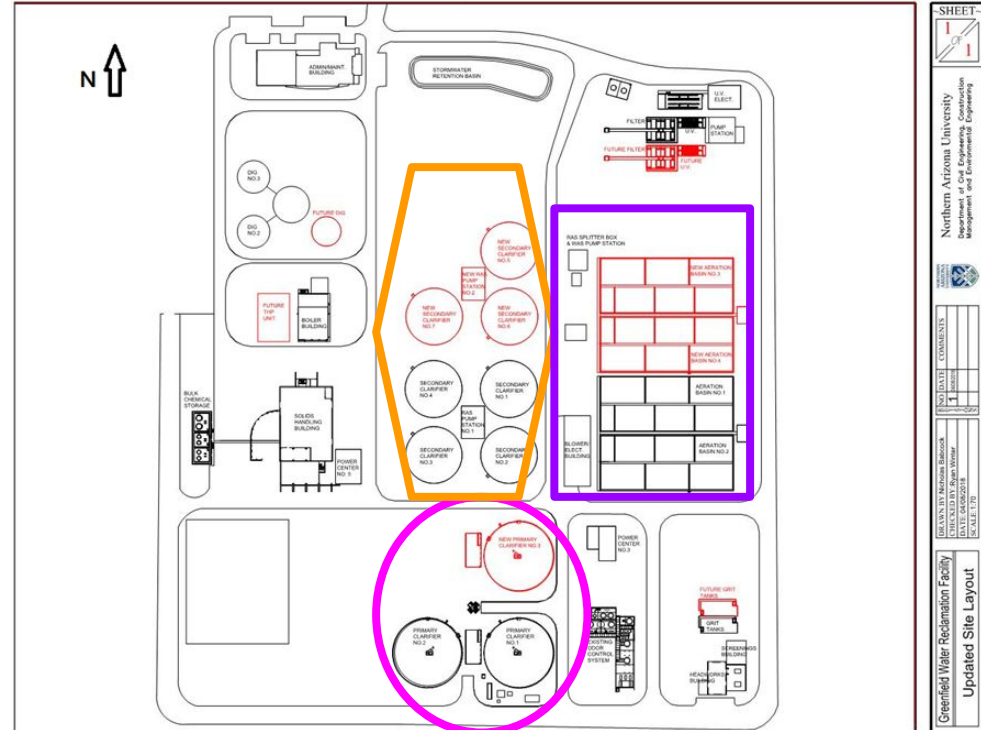


Figure 3: Proposed Design Layout for GWRP [2]

Task 1: Initial Project Preparation

- **Task 1.1: Application for WEF**
 - Sign up for the competition by the due date.
- **Task 1.2: Review WEF Rules and Criteria**
- **Task 1.3: Additional Treatment Research**
 - Study and collect relevant information on either water and wastewater

Task 2: Site Investigation

- **Task 2.1 Field Visit**
- **Task 2.2 Collect Current Data from Operators**
 - Inlet and outlet flows, types of treatment, and water quality data

Task 3: Evaluation of Site Investigation Data

- **Task 3.1: Analyze Data from the Current Plant**
 - Examine how well the plant is operating
- **Task 3.2: Review Existing Site Design and Technology**
 - Analyzing current technologies

Task 4: Population Estimation

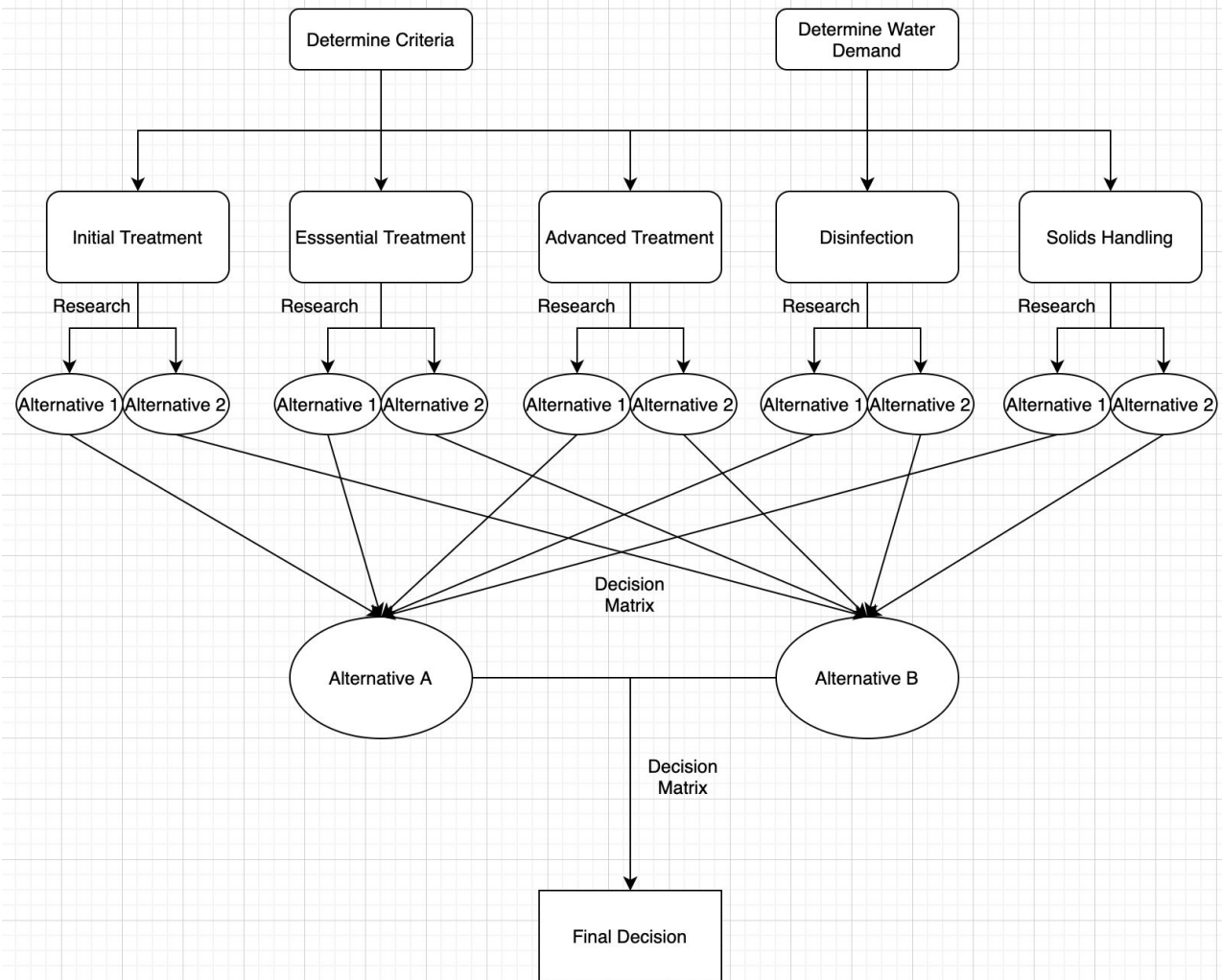
- **Task 4.1: Current Population Research**
 - Current population data used to calculate the future population
- **Task 4.2: Future Population Calculation**
 - Standard population estimation equation
 - Current population, death and birth rates, population rate of increase, and required design year for lifetime of plant

Task 5: Analyze Applicable Regulations

- **Task 5.1 Federal Regulations**
 - **Task 5.2 State Regulations**
 - **Task 5.3 County Regulations**
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Task 6: Treatment Design

- **Task 6.1: Determine Criteria**
- **Task 6.2 Determine Water Demand**
- **Task 6.3 Initial Treatment**
- **Task 6.4 Essential Treatment**
- **Task 6.5 Advanced Treatment**
- **Task 6.6 Disinfection**
- **Task 6.7: Solids Handling**
- **Task 6.8: Final Decision Matrix**
- **Task 6.9 Final Decision and Design**



Task 7: Life Cycle Cost Analysis

- **Task 7.1 Construction Cost**
- **Task 7.2 Operation and Maintenance Cost**
- **Task 7.3 Expected Life Cycle Cost**

Task 8: Impacts Analysis

- **Positive and/or negative impacts including social, economic, and environmental impacts**



Figure 5: Impact Analysis [3]

Task 9: Deliverables

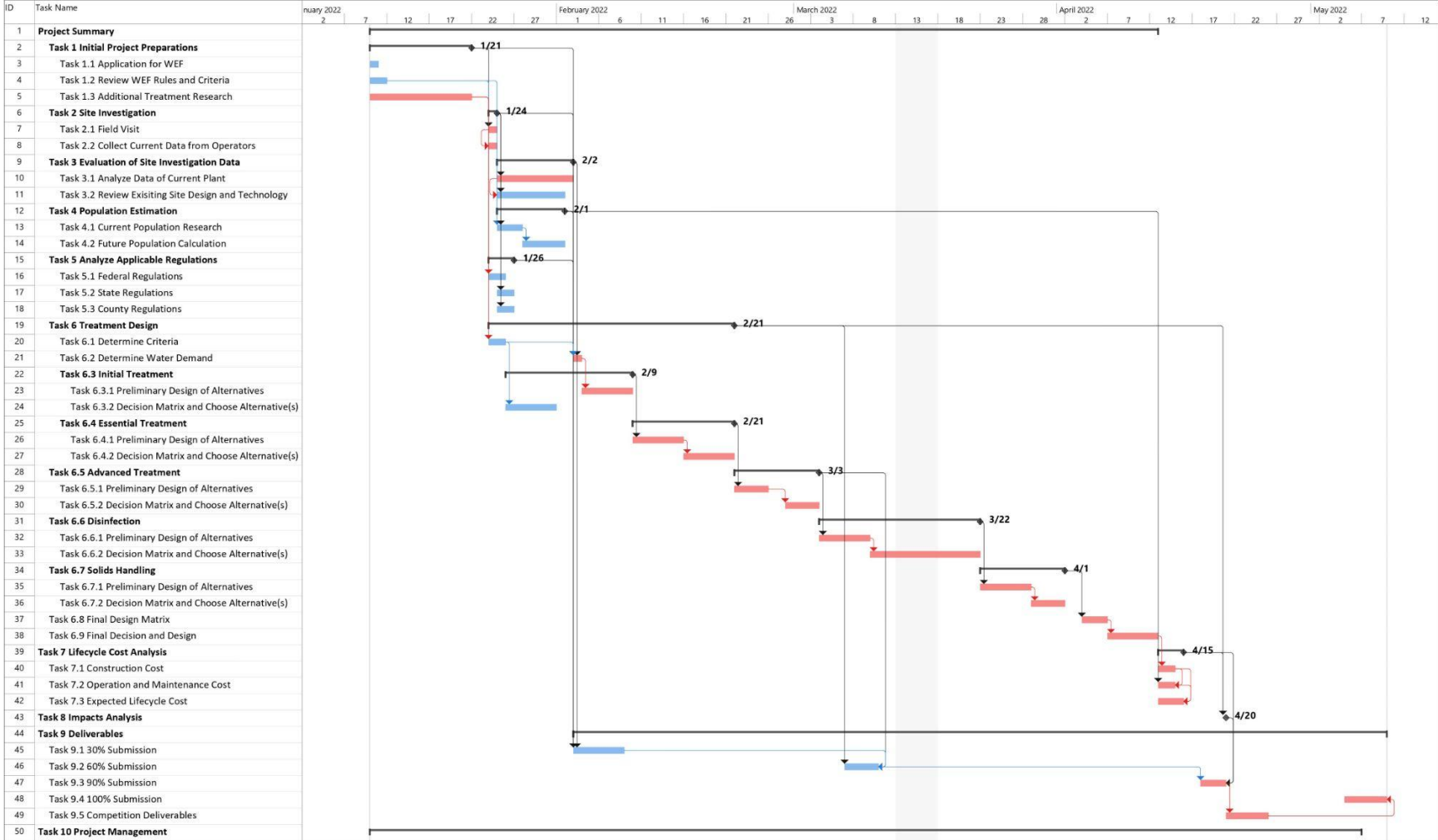
- **Task 9.1 30% Completion**
 - Task 1.0-Task 5.0
 -
- **Task 9.2 60% Completion**
 - Task 6.0-Task 8.0
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- **Task 9.3 90% Completion**
 - All technical tasks
- **Task 9.4 100% Completion**
- **Task 9.5 Competition Deliverables**
 - Entry form, Project Description, Supporting Documentation and References

Task 10: Project Management

- **Task 10.1: Meetings**
 - Team, client, TA, and G.I.
- **Task 10.2: Schedule Management**
 - Ensure that milestones, deliverables, and final completion are on time
- **Task 10.3: Resource Management**
 - Track hours spent and resources used to ensure project completed on time within budget.

Exclusions:

- Site construction
- Lab experiments
- Acquisition of permit
- Land Surveying & sampling
- Hydrogeology analysis



Project: WEF Schedule Projects
Date: Wed 12/1/21

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Critical Split
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	Progress
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Critical	Manual Progress

Staffing

Table 1: Staffing With Tasks and Hours

Task	SENG (hr)	ENG (hr)	EIT (hr)	TECH (hr)	INT (hr)	Total (hr)
Task 1: Initial Project Preparation	1	7	9	10	12	39
Task 2: Site Investigation	0	8	9	9	8	34
Task 3: Evaluation of Site Investigation Data	2	6	12	8	8	36
Task 4: Population Estimation	2	9	13	4	11	39
Task 5: Analyze Applicable Regulations	0	12	18	0	12	42
Task 6: Treatment Design	19	103	80	47	78	327
Task 7: Lifecycle Cost Analysis	6	9	16	6	20	57
Task 8: Impacts Analysis	2	2	12	0	6	22
Task 9: Deliverables	10	36	52	30	60	188
Task 10: Project Management	24	32	32	28	32	148
Total Hours	66	224	253	142	247	932

Cost

Table 2: Cost of Engineering Services

1.0 Personnel	Classification	Hours	Rate, \$/hr	Cost
	SENG	66	180	\$11,880
	ENG	224	100	\$22,400
	EIT	253	80	\$20,240
	TECH	142	55	\$7,810
	INT	247	25	\$6,175
Personnel Cost				\$68,505
2.0 Travel			Cost Per, \$	Cost
Site Visit Rental Van	1 Van 2-Day Trip		44/day	\$88
Competition Rental Van	1 Van 2-Day Trip		44/day	\$88
Site Visit Mileage	550 mi Roundtrip		0.23/mi	\$126.5
Competition Mileage	300 mi Roundtrip		0.23/mi	\$69
Site Visit Hotel	3 Rooms 1 Night		119/night	\$357
Competition Hotel	3 Rooms 1 Night		94/night	\$282
Site Visit Per Diem	5 People 2-Day		33.75/day	\$337.5
Competition Per Diem	5 People 2-Day		33.75/day	\$337.5
Total Travel Cost				\$1,010.50
3.0 Supplies			Cost Per, \$	Cost
	Computer Lab, 10 days		100/day	\$1,000
4.0 Total Project Cost				\$70,515.50

References

[1] WEF, "Water Environment Federation Facebook Page ,"
<https://www.facebook.com/WaterEnvironmentFederation/> . .

[2] Town of Gilbert Public Work Departments, "WW075 / WW114: Greenfield Water Reclamation Plant Phase III Expansion," Town of Gilbert Public Work Department, ND ND ND. [Online]. Available: <https://www.gilbertaz.gov/departments/public-works/engineering-services/capital-improvement-projects/ww075-ww114-greenfield-water-reclamation-plant-phase-iii-expansion>. [Accessed 18 September 2021].

[3] Ecommerce, Artist, Importance of Requirement Analysis and Impact Analysis. [Art]. MercuryMind, 2013.

Questions?