



COPPERHEAD
ENGINEERS

91st Avenue Regional Advanced Water Purification Facility - Proposal

December 5th, 2025 : CENE 476

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Project Introduction

Project Information:

- Background: Use effluent wastewater from Tres Rios Regulating Wetlands
- Design: Advanced Water Purification Facility-Safe Drinking Water
- Design Flow: 30 MGD

Client:

- City of Phoenix
- Dr. Heiderscheidt
- AZ Water
- Water Environment Federation(WEF)

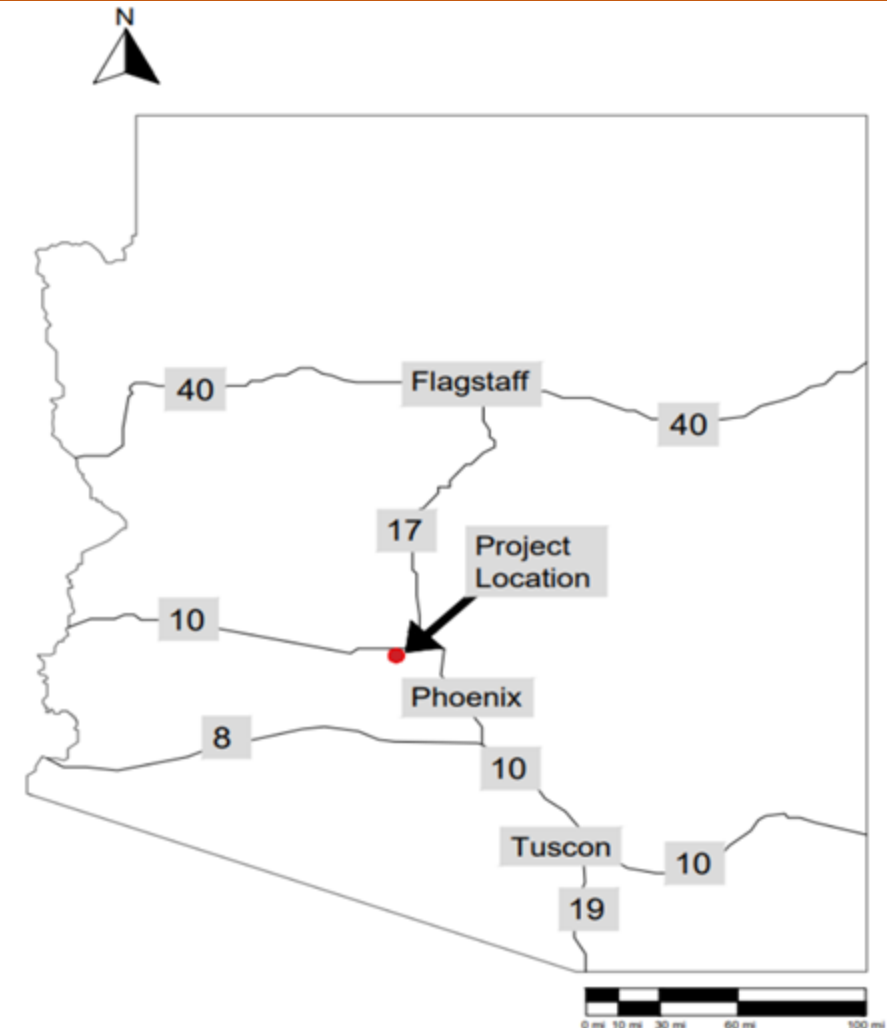


Figure 1: Location Map [1]

Project Maps

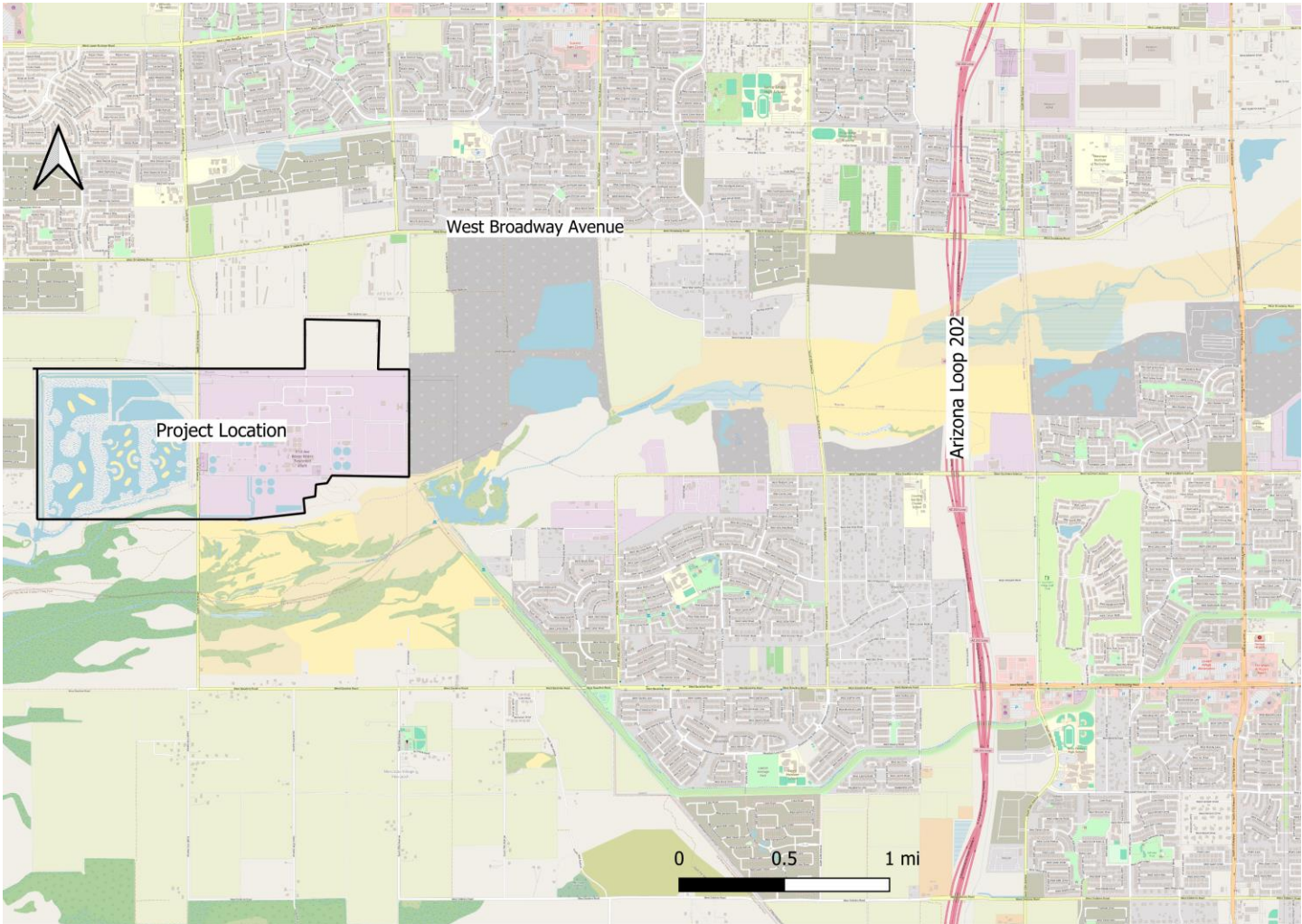


Figure 2 : Vicinity Map [2]

Project Maps

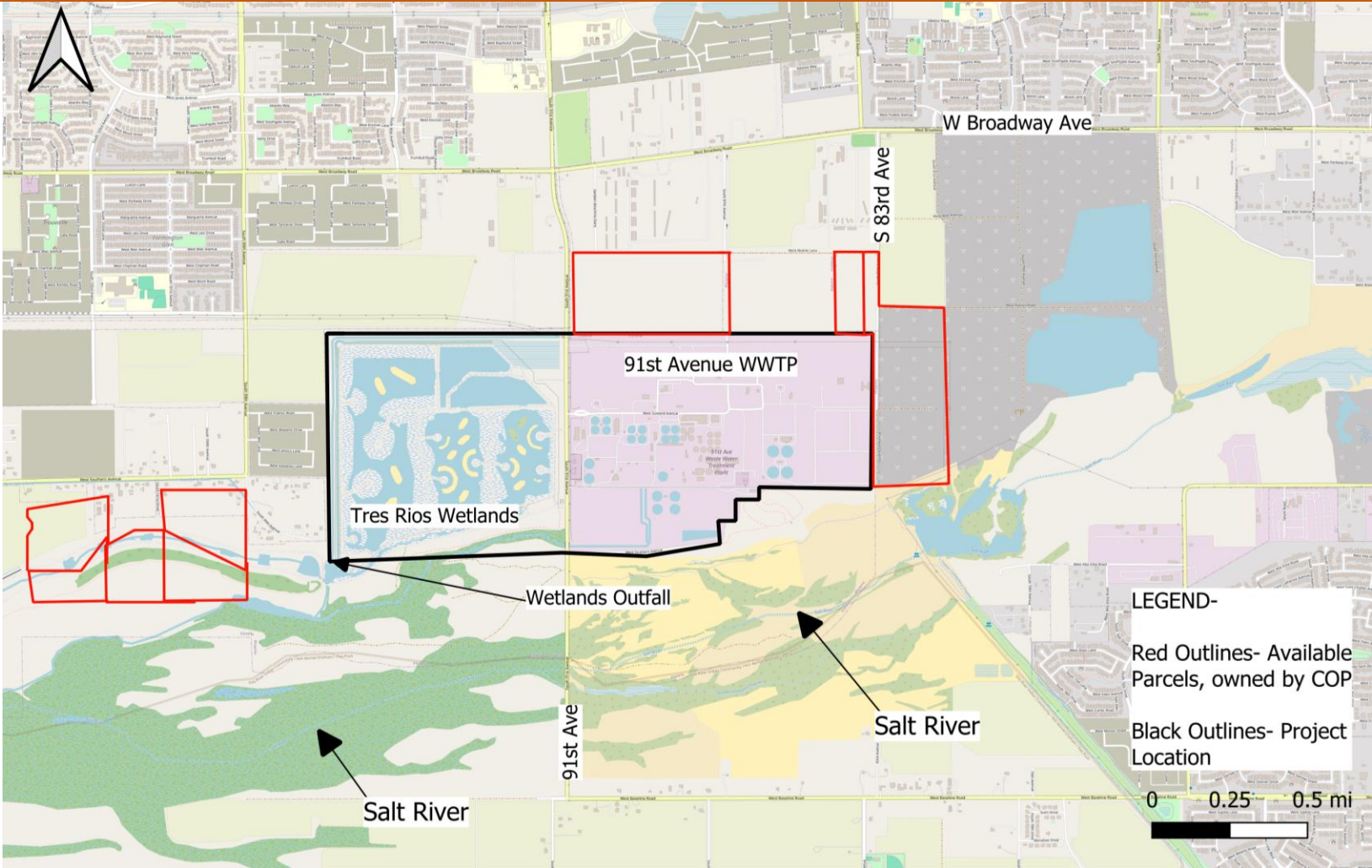


Figure 3: Site Map [2]

Task 1: Research Preparation

Task 1.1 : WEF Application

Task 1.2 : Regulation Research



Figure 4: AZ water logo [3]

Task 2: Site Assessment

Task 2.1 : Site Visit

Task 2.2 : Data analysis



Figure 5: 91st Avenue WWTP [4]

Task 3: Treatment Selection Process

Task 3.1- Determine Plant Requirements

Task 3.2- Coagulation/Flocculation

Task 3.2.1- Define Criteria

Task 3.2.2- Develop Treatment Alt.

Task 3.2.3- Eliminate Least Suitable Alt.

Task 3.3- Sedimentation

Task 3.3.1- Define Criteria

Task 3.3.2- Develop Treatment Alt.

Task 3.3.3- Eliminate Least Suitable Alt.

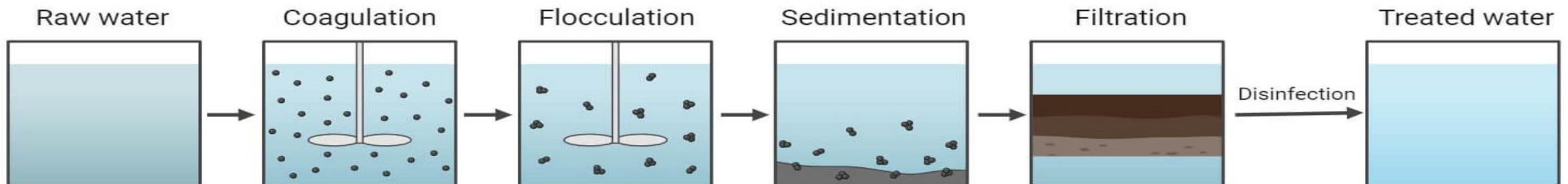


Figure 6 : Example of Water Purification Treatment Train [5]

Task 3: Treatment Selection Process(Cont.)

Task 3.4- Membrane Filtration

Task 3.4.1- Define Criteria

Task 3.4.2- Develop Treatment Alt.

Task 3.4.3- Eliminate Least Suitable Alt.

Task 3.5- Advanced Oxidation

Task 3.5.1- Define Criteria

Task 3.5.2- Develop Treatment Alt.

Task 3.5.3- Eliminate Least Suitable Alt.

Task 3.6- Ultraviolet Disinfection

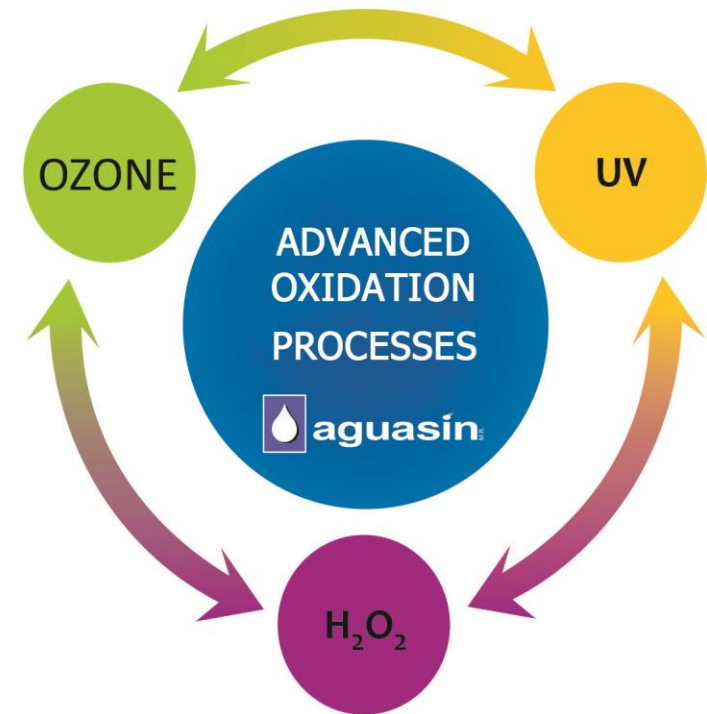


Figure 7: Example of AO Process[6]

Task 3: Treatment Selection Process(Cont.)

Task 3.7-Final Chlorination

Task 3.7.1- Define Criteria

Task 3.7.2- Develop Treatment Alt.

Task 3.7.3- Eliminate Least Suitable Alt.

Task 3.8- Brine Management

Task 3.8.1- Define Criteria

Task 3.8.2- Develop Treatment Alt.

Task 3.8.3- Eliminate Least Suitable Alt.

Task 3.9- Develop and Select Treatment Train

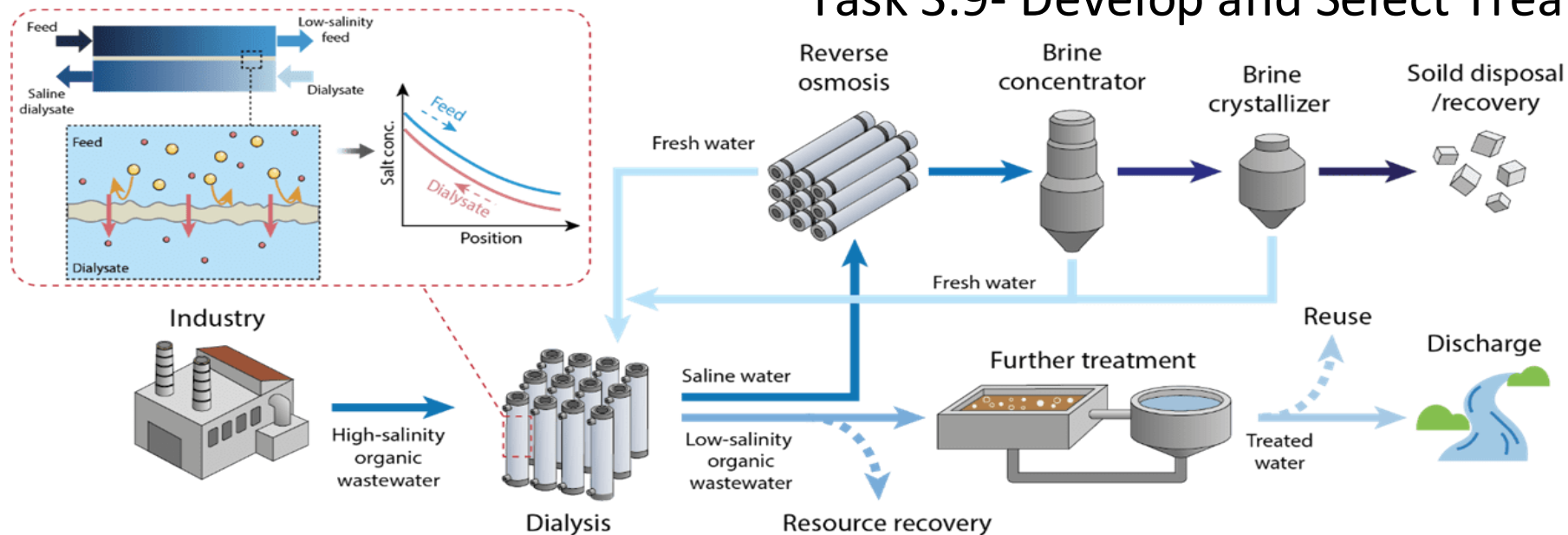


Figure 8: Example of water advanced water treatment[7]

Task 4: Final Design

Task 4.1- Selected Treatment Process Design

Task 4.2- Site Layout

Task 4.3- Hydraulic Analysis

Task 4.3.1- Lift Station Design

Task 4.3.2- Pump Selection

Task 4.3.3- Piping Design

Task 4.4- Public Outreach Plan

Task 4.5- Construction Phasing

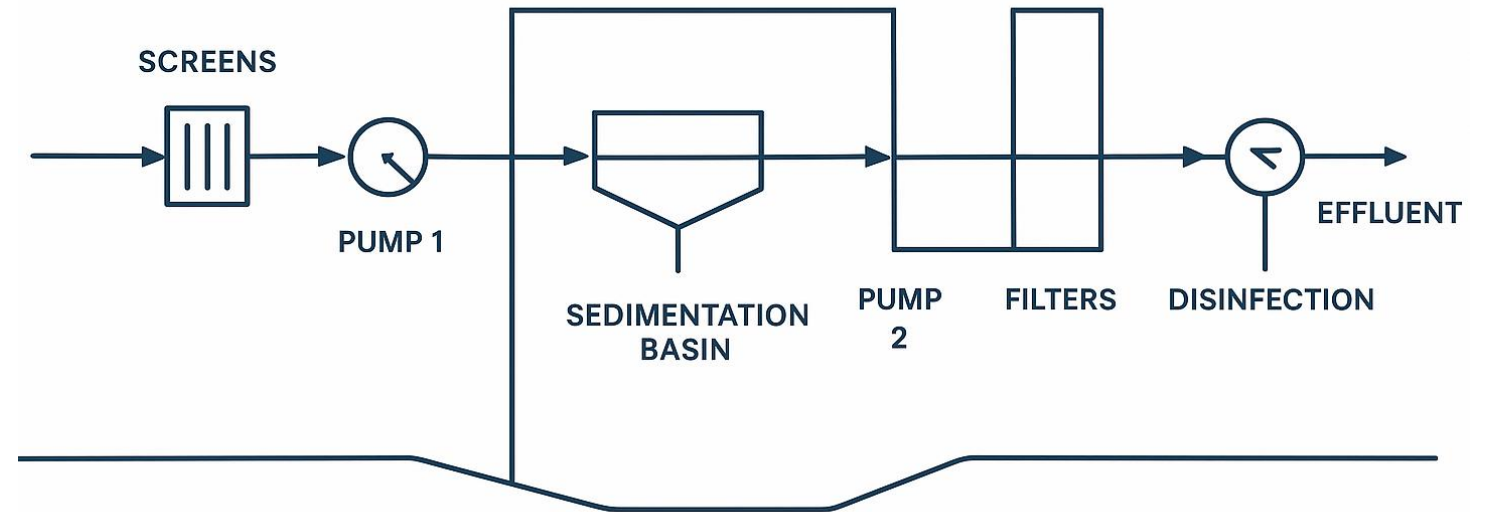


Figure 7: Example of an Advanced Water Purification Hydraulic Profile[8]

Task 5: Cost Analysis

Task 5.1 : Opinion of Probable Construction Costs (OPCC)

Task 5.2 : Operation and Maintenance(O&M)

Task 5.3 : Life Cycle Cost

Task 6: Impact Analysis

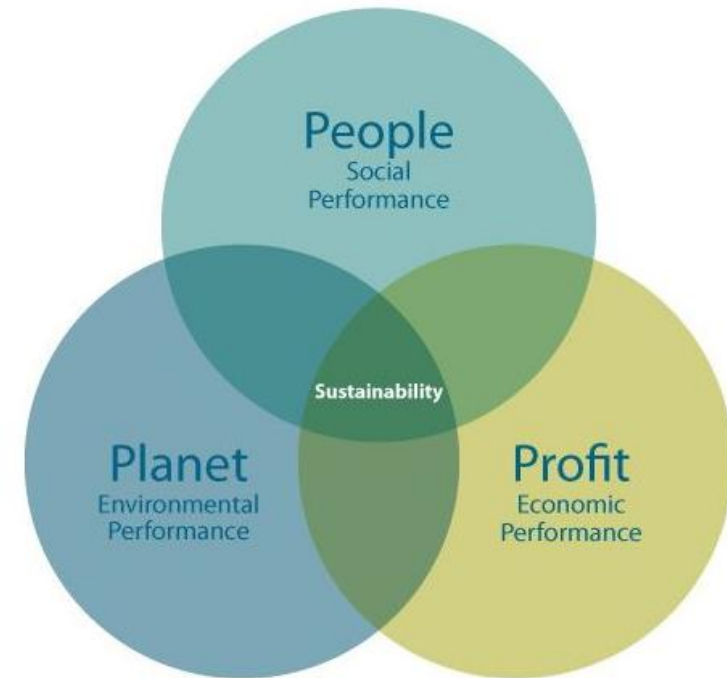


Figure 8: Triple Bottom Line [9]

Task 7: Final Deliverables

7.1-30% Deliverable

-Foundations/framework/alternatives

Tasks 1&2

7.2-60% Deliverable

-Design updates/hydraulic profile/1st OPCC

Tasks 3&4

7.3-90% Deliverable

-Near Final/Updated OPCC/O&M/LCC/Support materials

Tasks 5&6

7.4-Final Deliverable

-Final Project/Design

7.5-Competition Final Report

-Summarization of final deliverable to WEF standards

7.6-Competition Final Presentation

-Presentation given to the WEF competition



Figure 9: AZ Water logo[3]

Task 8: Project Management

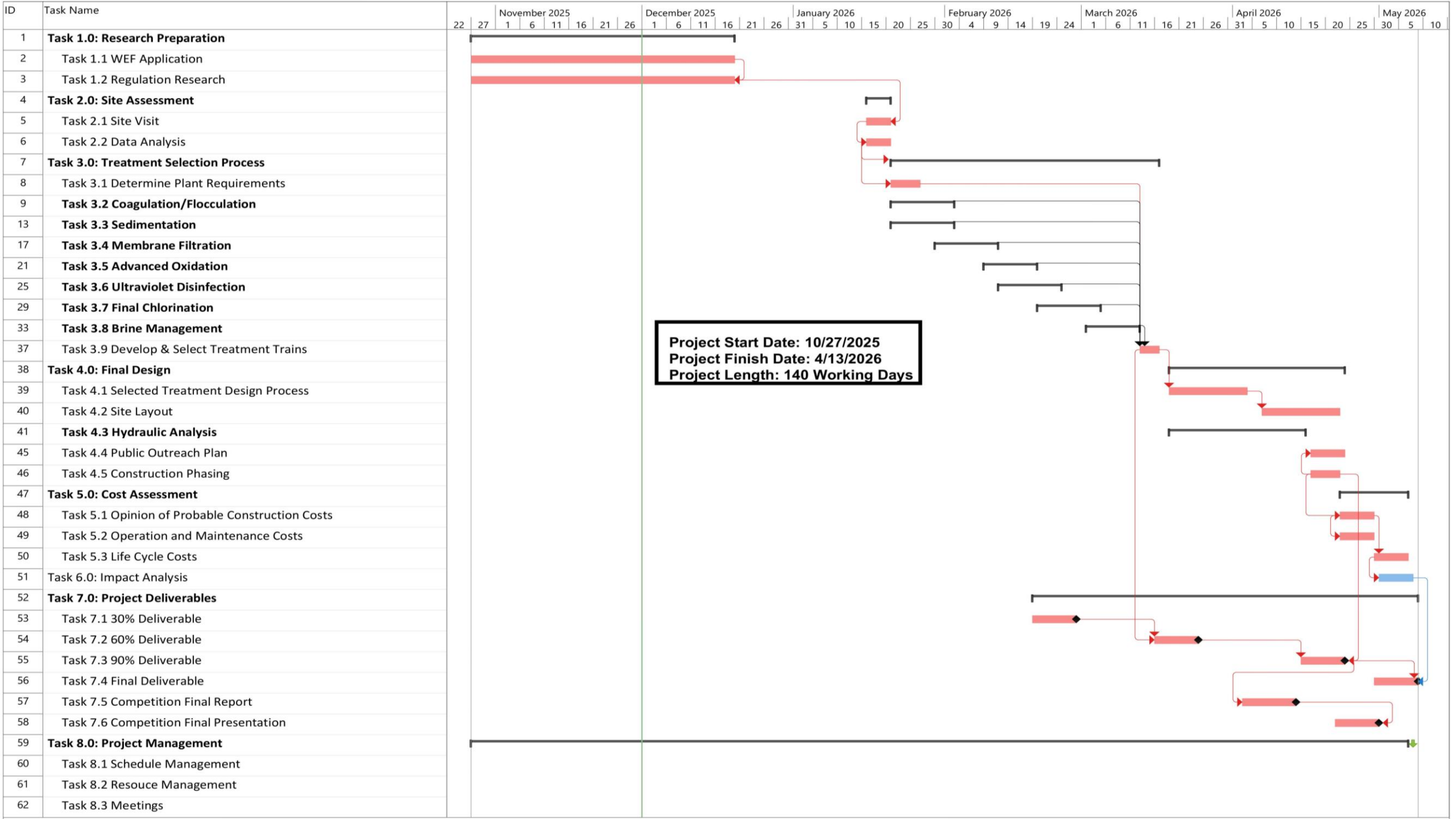
Task 8.1 : Schedule Management

Task 8.2 : Resource Management

Task 8.3 : Meetings

Exclusions

- Surveying
- Sampling
- Lab Work
- Mapping
- Existing Hydraulic Data



Staffing Plan

Roles-

Senior Engineer(S.ENG):

- Experience: 10 Years
- License: PE

Project Manager(PM):

- Experience: 7 Years
- License: PM, PE

Professional Engineer(PE):

- Experience: 5 years
- License: PE

Engineer In Training(EIT):

- Experience: 2 years
- License: FE

Intern(INT):

- Entry Level, College

Tasks:	S ENG (hrs)	PM (hrs)	PE (hrs)	EIT (hrs)	INT(hrs)	Total
1. Research Preperation	1	0	1	12	16	30
2. Site Assesment	9	0	9	14	10	42
3.Treatment Selection Process	10	10	40	80	70	195
4. Final Design	10	10	30	70	38	185
5. Cost Assesment	0	0	5	20	15	40
6. Impact Analysis	0	0	5	10	10	25
7. Project Deliverables	15	5	15	50	30	115
8. Project Managment	5	15	10	20	20	70
Total	50	40	115	276	209	690

Table 1- Staffing Matrix Summary [10]

Cost of Engineering Services

1.0 Personnel	Classification	Billing Rate (\$/hr)	Time (hrs)	Cost
	SENG	325	50	\$ 16,250
	Engineer (PE)	130	115	\$ 14,950
	Project Manager	174	40	\$ 6,960
	EIT	90	276	\$ 24,840
	Engineer Intern	42	209	\$ 8,778
	Total Personnel	-		\$ 71,778
2.0 Travel/Competition		Units	Cost	
	WEF Application	4 People	\$21/person	\$ 84
	2 trip (round)	620 mi	\$0.42/mi	\$ 260
	Vehicle	3 days	\$77/day	\$ 230
	Hotel: rooms x nights	3 x 3	\$150/night	\$ 1,350
	Per Diem 5 ppl	2 days	\$62/day	\$ 620
	Total Travel			\$ 1,924
3.0 Supplies				
	Software and Computer Lab	30	\$100/day	\$ 3,000
Total EGR Team				\$ 76,702

Table 2- Summary of Engineering Services [10]

References

- [1] “Autodesk Autocad 2026: Get prices & buy official autocad software,” Autodesk, https://www.autodesk.com/products/autocad/overview?mktvar002=5396764%7CSEM%7C328349723%7C1152288837888718%7Ckwd-72018828340442%3Aloc-190&utm_source=BNG&utm_medium=SEM&utm_campaign=BNG_ACAD_AutoCAD_AMER_US_eComm_SEM_BR_New_EX_ADSK_5396764_General&utm_id=5396764&utm_term=kwd-72018828340442%3Aloc-190&msclkid=f6d0c09f87cf1b6f57d1a9bcfd376271&utm_content=AutoCAD+Software
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- [4] “Phoenix-area water providers explore options for direct potable reuse,” One Water News, <https://www.onewaternews.com/phoenixarea-water-providers-explore-options-for-direct-potable-reuse-final>
- [5] P. Shrestha and Pavan, “Water purification methods and steps: A complete guide,” Microbe Notes, <https://microbenotes.com/water-purification/>
- [6] “Advanced oxidation processes (AOPS - Aguas Industriales Ltda.,” Industria Minera, <https://www.industriaminera.cl/producto/aguas-industriales-ltda-advanced-oxidation-processes-aops/> (accessed Nov. 25, 2025).
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- [10]N. Dawson, M. Marsico, L. Still, S.Tompson, *Project Proposal: Assessment and Design of the 91st Avenue Regional Advanced Water Purification Facility for the City of Phoenix*, NAU CENE 2025.