Decision Matrix

The decision criteria that were utilized when making choices for the water reclamation plant included efficiency, sustainability, maintenance and operation, staffing, feasibility, life cycle costs, and social and environmental impacts. The criteria was based on the Water Environment Federation (WEF) guidelines. In addition to these, the team felt it was also important to investigate sustainability and social and environmental impacts to evaluate how each process may be used in other ways to benefit the community along with the treatment plant.

- Efficiency is present when technology is decreasing energy use and head loss while increasing the quality of treatment as compared to the plant's current efficiency.

- Sustainability is defined as sustainably sourced materials where products can be reused, recycled, or limit harm to the environment.
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- Maintenance and operation were analyzed by factoring in processes that will need updates and maintenance, short- and long-term upgrade and maintenance needs in which factors into staffing for the number of staff needed to operate the plant.
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- Staffing is based on the amount of additional operator training, certification requirements, and the number of staff needed to run the plant.

- Feasibility and constructability are rated based on the use of innovative technology, reliability of the technology based on history of use in the U.S., ease to construct technology and obtain materials.

- Lifecycle costs are rated highest when limiting the amount of the technology cost for implementation along with the technologies economic impact being considered and the need to pay for staffing, maintenance, and local community costs.
- Lastly, social, and environmental impacts include reducing the short- and long-term impacts on environmental health, materials used, and cradle-to-grave impacts. It also examines how the project will positively or negatively impact the surrounding community.

The rating system used to score the decision criteria was based on a one to five scale with five being the highest ranked for each category. When evaluating the decision matrix, a technology received a one in the category if it did not meet the criteria and definitions given above. A rating of three was given to technologies that fit only the criteria. Lastly, a five was awarded for the technology that truly exceeded the criteria and was able to go beyond expectations for a given process. The following tables show each decision matrix for each technology design. The chosen design is highlighted in green.

INFLUENT

Parameter	Weight (%)	IPR- Surface Water Blending	DRP	IPR- Streambed Recharge	IPR- Well Injection (Aquifer Recharge)	Reclaimed Delivery
Environmental Impact	40	3	4	3	3	4
Social Impact	35	4	4	4	4	4
Life Cycle Cost	25	3	3	5	3	4
Total	100	3.35	3.75	3.85	3.35	3.75

SCREENING

Parameter	Weight (%)	Hand Cleaned Coarse Bar Screen	Continuous Belt Bar Screen	Fine Bar Screens
Efficiency (Process Improvement)	25	3	3	4
Sustainability	15	1	4	1
Maintenance and Operation	10	1	4	1
Staffing	10	4	2	4
Feasibility/ Constructability	15	4	2	1
Process Life Cycle Costs	15	4	2	4
Social and Environmental Impacts	10	2	4	4
Total	100	2.8	2.95	2.8

GRIT CHAMBER

Parameter	Weight (%)	Aerated Grit Chamber	Detritus Grit Tank	Horizontal Flow Grit Tank
Efficiency (Process Improvements)	25	3	2	3
Sustainability	15	4	3	1
Maintenance and Operation	10	4	3	1
Staffing	10	3	4	4
Feasibility/ Constructability	15	4	5	5
Process Life Cycle Costs	15	4	4	3
Social and Environmental Impacts	10	4	4	3
Total	100	3.65	3.4	2.9

EQUALIZATION BASIN

	Weight (%)	Side-line Equalization Basin	In-line Equalization Basin
Efficiency (Process Improvements)	25	4	5
Sustainability	15	1	1
Maintenance and Operation	10	4	2
Staffing	10	5	5
Feasibility/ Constructability	15	2	5
Process Life Cycle Costs	15	4	3
Social and Environmental Impacts	10	2	4
Total	100	3.15	3.2

PRIMARY CLARIFIER

Parameter	Weight (%)	Column Support Clarifier	Traction Clarifier
Efficiency (Process Improvements)	25	2	5
Sustainability	15	3	3
Maintenance and Operation	10	4	1
Staffing	10	4	3
Feasibility/ Constructability	15	5	5
Process Life Cycle Costs	15	3	2
Social and Environmental Impacts	10	4	5
Total	100	3.35	3.65

BIOLOGICAL TREATMENT

Parameter	Weight (%)	Membrane Bioreactors	Trickling Filters	Rotating Biological Contactors	Moving Bed Biofilm Reactor
Efficiency (Process Improvements)	25	4	2	3	3
Sustainability	15	3	3	3	4
Maintenance and Operation	10	2	4	4	3
Staffing	10	4	5	4	2
Feasibility/ Constructability	15	3	4	4	3
Process Life Cycle Costs	15	3	2	3	2
Social and Environmental Impacts	10	3	2	3	2
Total	100	3.25	3.4	3.5	2.95

ACTIVATED SLUDGE

Parameter	Weight (%)	Conventional Activated Sludge Process	Upflow Anaerobic Sludge Blanket
Efficiency (Process Improvements)	25	3	5
Sustainability	15	2	4
Maintenance and Operation	10	4	3
Staffing	10	3	4
Feasibility/ Constructability	15	2	3
Process Life Cycle Costs	15	2	2
Social and Environmental Impacts	10	3	4
Total	100	2.65	3.70

SECONDARY CLARIFIER

Parameter	Weight (%)	Spiral Scraper Clarifier	Upflow Clarifier	Suction
Efficiency (Process Improvements)	25	5	4	3
Sustainability	15	2	3	5
Maintenance and Operation	10	4	3	3
Staffing	10	4	3	4
Feasibility/ Constructability	15	3	3	2
Process Life Cycle Costs	15	3	3	2
Social and Environmental Impacts	10	3	4	5
Total	100	3.55	3.50	3.45

SAND FILTER

Parameter	Weight (%)	Membrane Filter	Sand Filter
Efficiency (Process Improvements)	25	3	4
Sustainability	15	4	4
Maintenance and Operation	10	2	3
Staffing	10	4	4
Feasibility/ Constructability	15	4	4
Process Life Cycle Costs	15	4	4
Social and Environmental Impacts	10	3	4
Total	100	3.45	3.9

DISINFECTION

Parameter	Weight (%)	UV Disinfectant	Chlorine Disinfection	Peracetic Acid Disinfection	Microalgae
Efficiency (Process Improvements)	25	5	3	4	3
Sustainability	15	4	3	3	4
Maintenance and Operation	10	2	3	4	3
Staffing	10	4	4	3	5
Feasibility/ Constructability	15	5	5	3	2
Process Life Cycle Costs	15	5	5	3	4
Social and Environmental Impacts	10	4	3	4	5
Total	100	4.35	3.70	3.45	3.55

SOLID HANDLING

Parameter	Weight (%)	Landfill	Incineration	Land Application
Environmental Impact	40	2	3	4
Social Impact	35	2	3	3
Life Cycle Cost	25	2	1	3
Total	100	2	2.5	3.4