



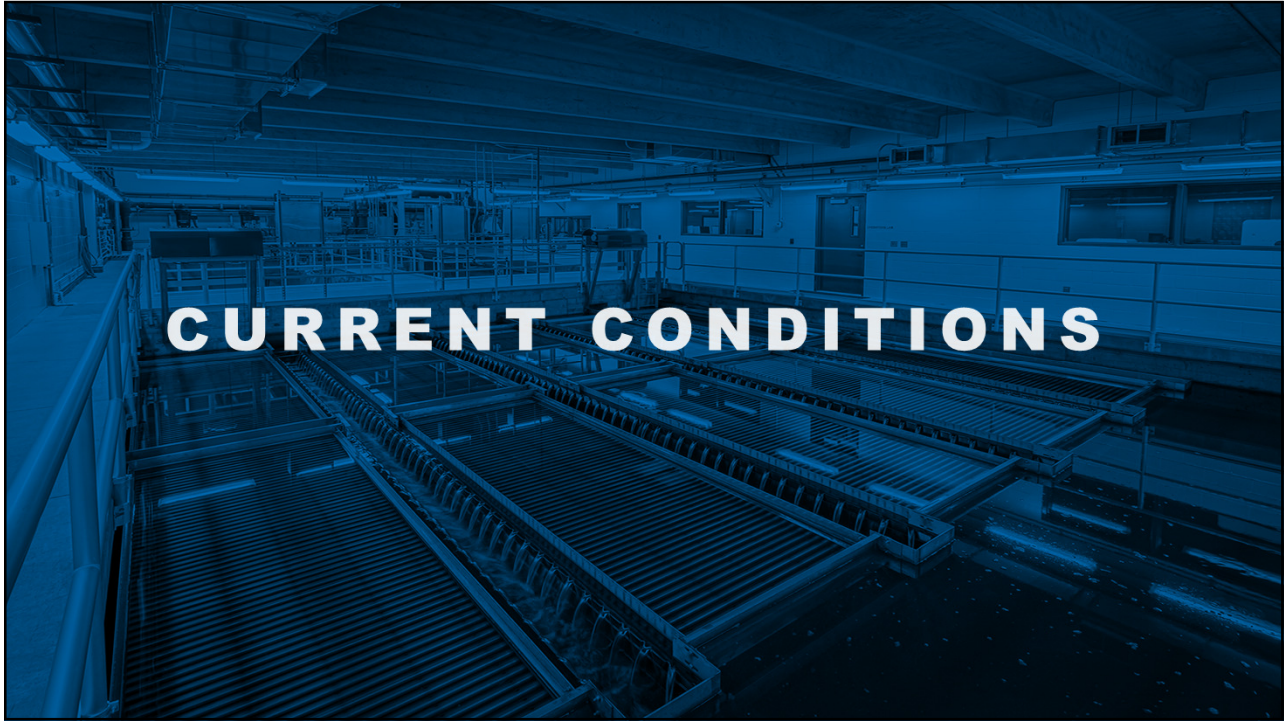
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Agenda

- ▶ Introductions
- ▶ Current Conditions
- ▶ Short-Term Approach
- ▶ Long-Term Approach
- ▶ Comparison
- ▶ Land Options
- ▶ Q&A



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Johnstown Water Supply



▶ Seasonal taste & odor issues

- Aesthetic
- Not health limit

▶ Cause

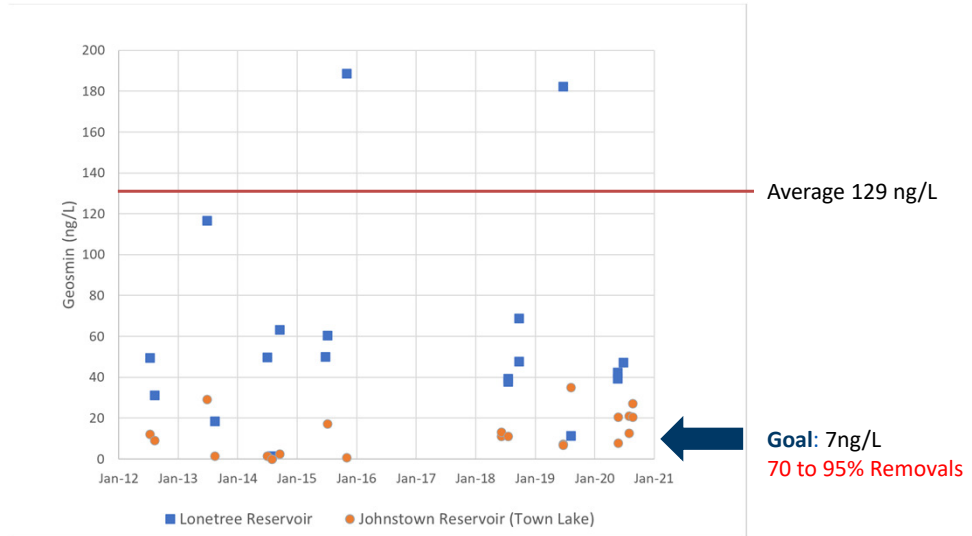
- Microbial and algae growth in reservoirs
- Earthy, musty, fishy
- Attributed to Geosmin & MIB

▶ How to Address?

- Short term
- Long term with WTP expansion

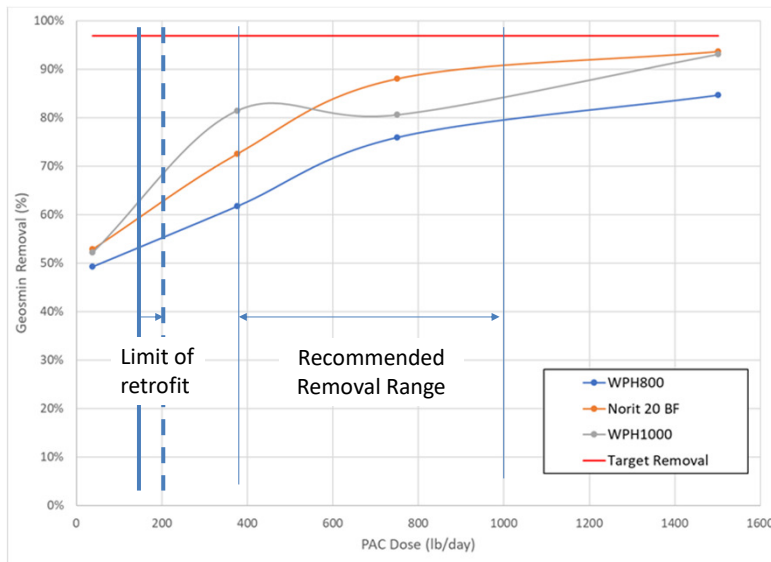
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Historic Geosmin Concentrations



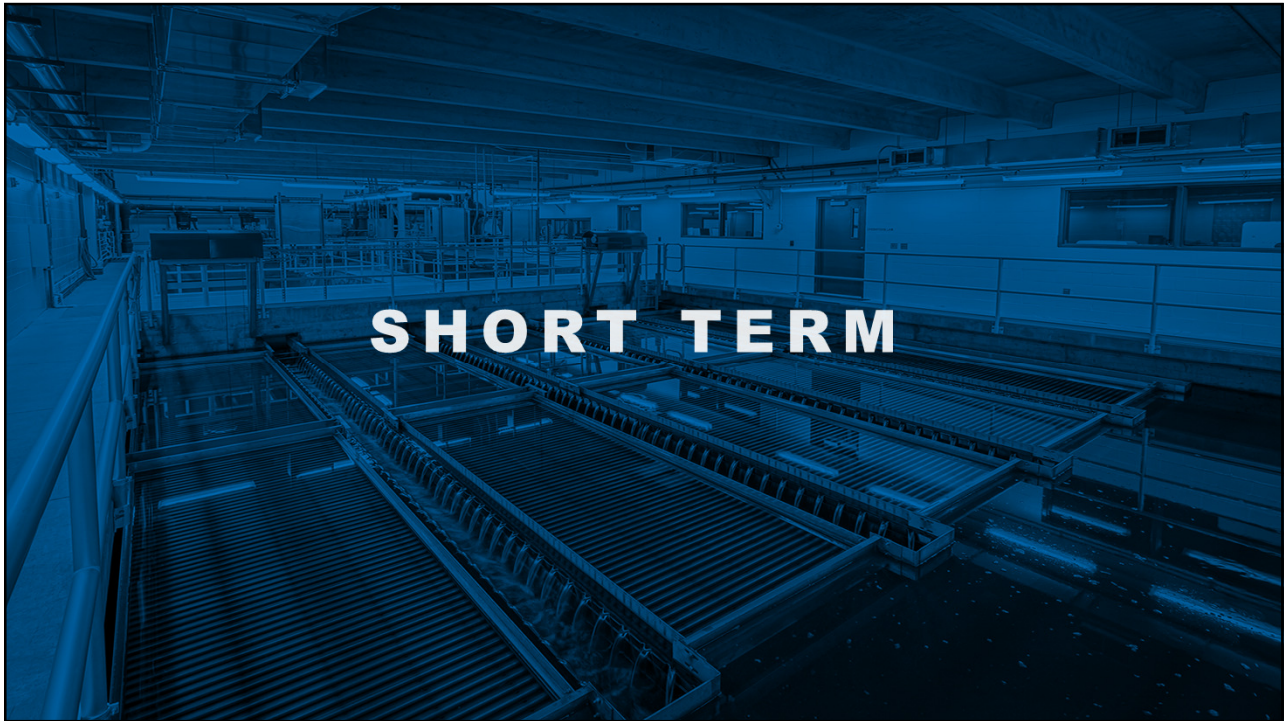
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Need to dose over 20x current PAC dose to reach 90%

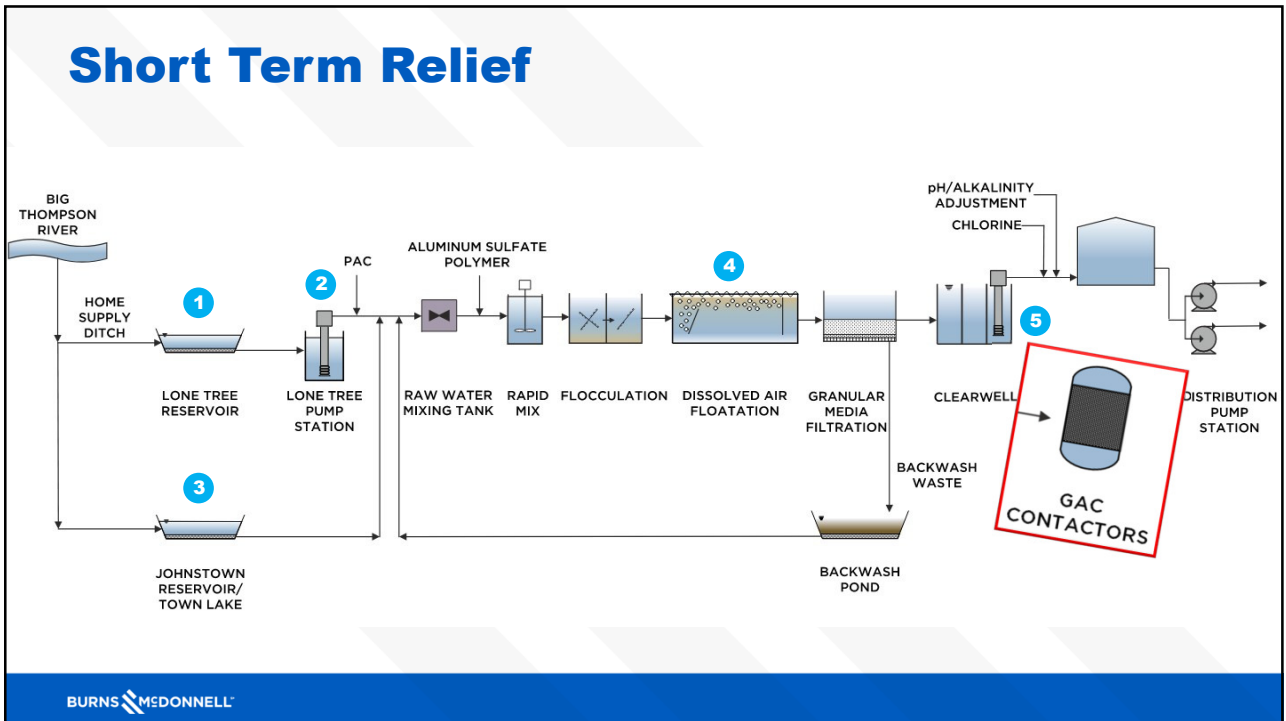


- ▶ Current dose approx. 50% removal
 - Still 15x detection threshold
- ▶ 150-200 lb/day improve to approx. 60 to 65%
- ▶ 400-800 lbs/day increased removal to 80%
- ▶ Highest dose provided almost 95% removal
 - High operating cost
 - Impact to WTP and WWTP

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Temporary Taste & Odor Cost

Item	Rent	Purchase	Purchase & Resale
2021	\$835,000	\$1,486,000	\$1,486,000
2022	\$571,000	\$356,000	\$356,000
2023	\$582,000	\$236,000	<\$26,000>
Total	\$1,988,000	\$2,078,000	\$1,816,000

Scope:

- 6 GAC Vessels
- 1 Rebed Per Year
- Winterize GAC Vessels
- Buoys on Town Lake
- Upgrade PAC Equipment at Lonetree
- Resale GAC Vessels at 30% Equipment Cost



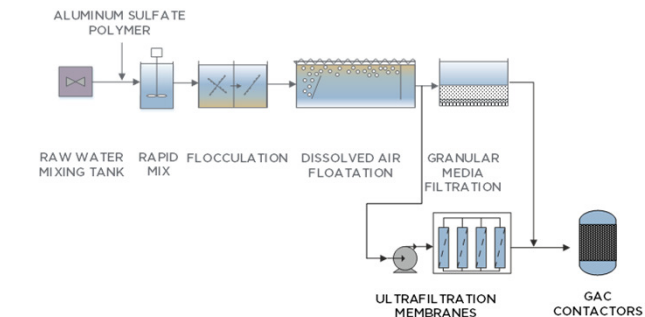
WTP Phasing

Current Capacity	Phase I	Phase II
<ul style="list-style-type: none"> • 6 mgd • 16,000 population 	<ul style="list-style-type: none"> • 12.5 mgd • 34,000 population 	<ul style="list-style-type: none"> • 18 mgd • 50,000 population

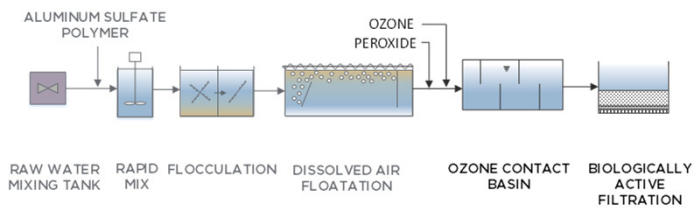
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Taste & Odor Removal Trains

1. Membranes + GAC



2. Ozone + BAF



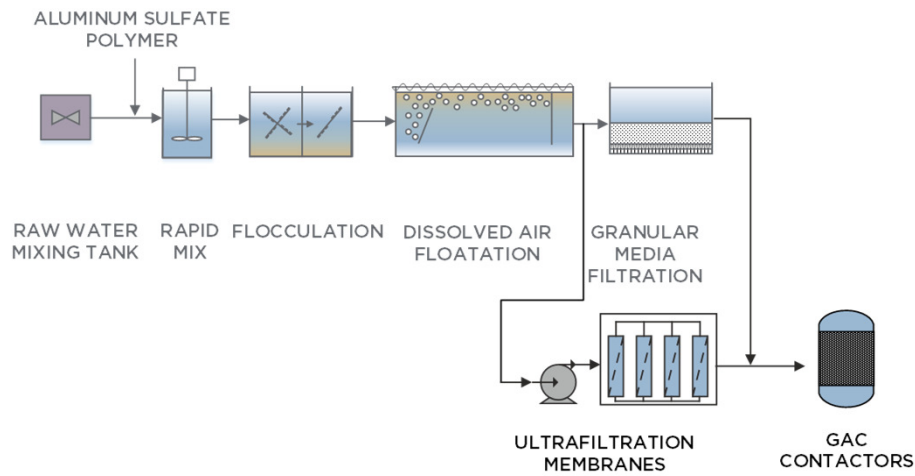
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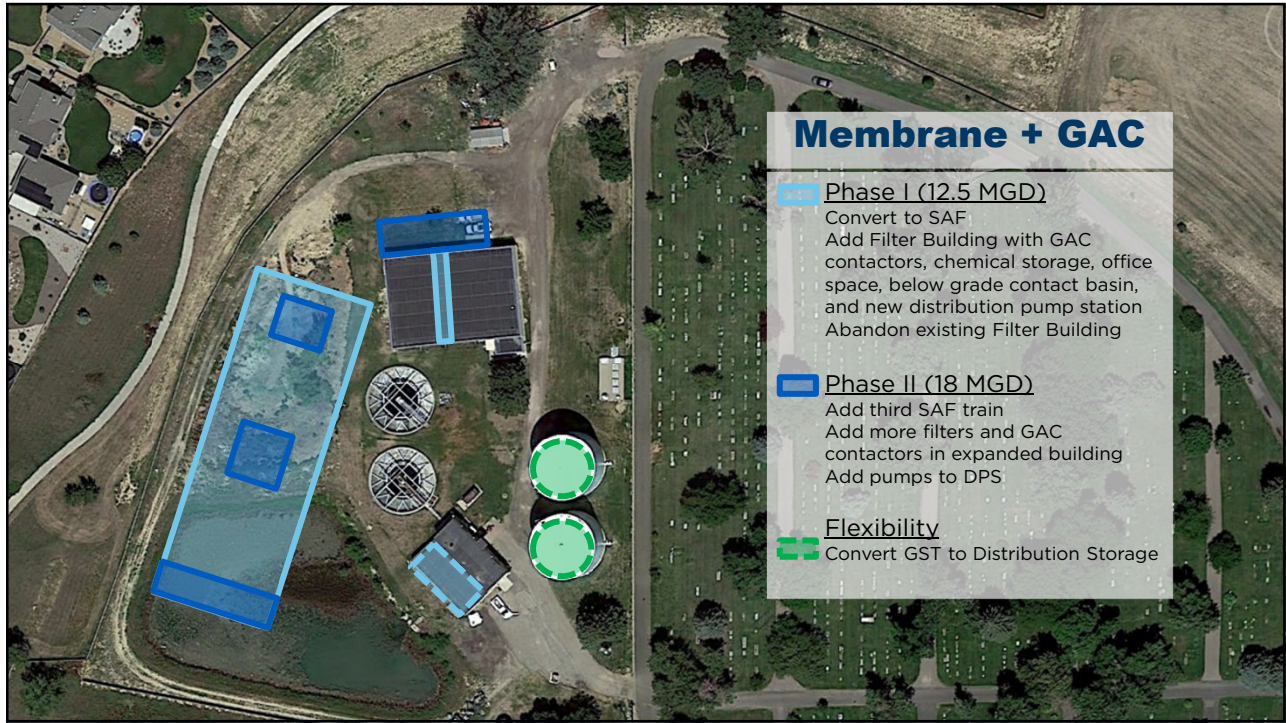
Removal Scenarios*

Scenario	1		2		3		4		5	
Description	Existing Conditions		Existing PAC Buoy Optimize DAF Temp GAC		Existing PAC Buoy Optimize DAF Temp GAC		No PAC Buoy Convert to SAF GAC		No PAC Buoy Convert to SAF Ozone	
Starting conc. ng/L	220		220		80		220		220	
PAC at Lonetree	110	50%	88	60%	32	60%	220	0%	220	0%
Buoy Town Lake	110	0%	62	30%	22	30%	176	20%	176	20%
Pretreatment	99	10%	43	30%	16	30%	88	50%	88	50%
GAC	99	0%	6	85%	6	60%	9	90%	88	0%
Ozone & Biologic Filtration	99	0%	6	0%	6	0%	9	0%	4	95%
Resulting conc. ng/L	99	55%	6	97%	6	92%	9	96%	4	98%
Target 7 ng/L										

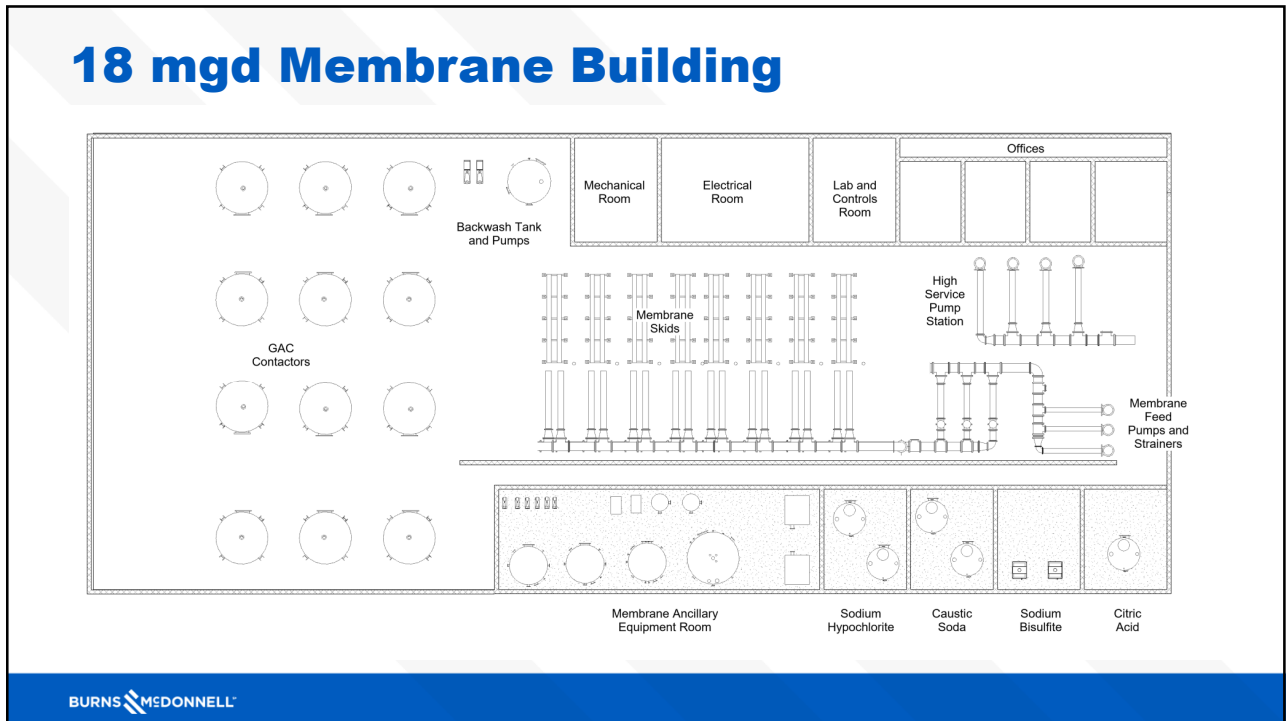
*Estimated Range of Removals. Actual to Vary.

Membrane Filtration and GAC



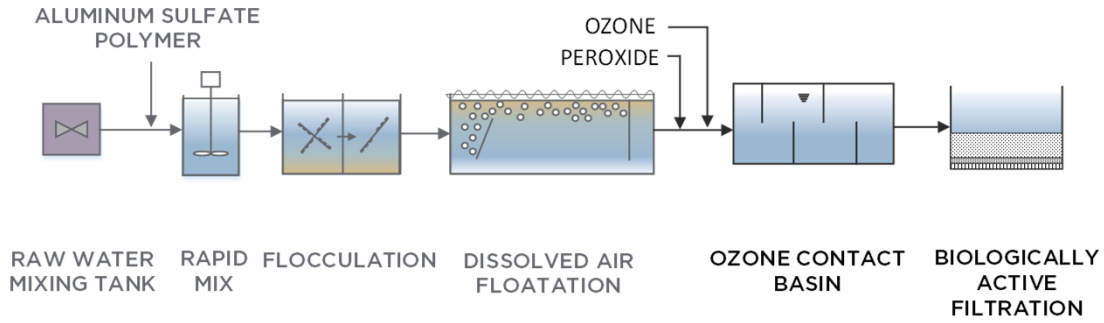


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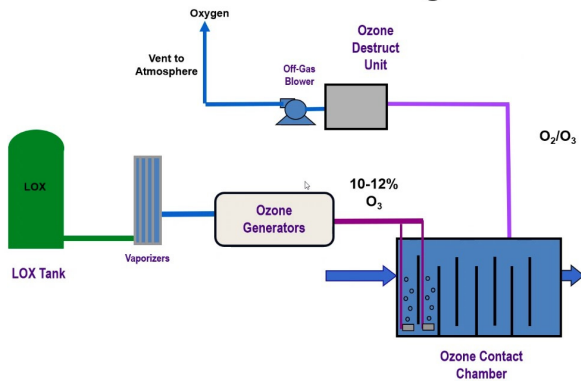
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Ozone and Biologically Active Filtration

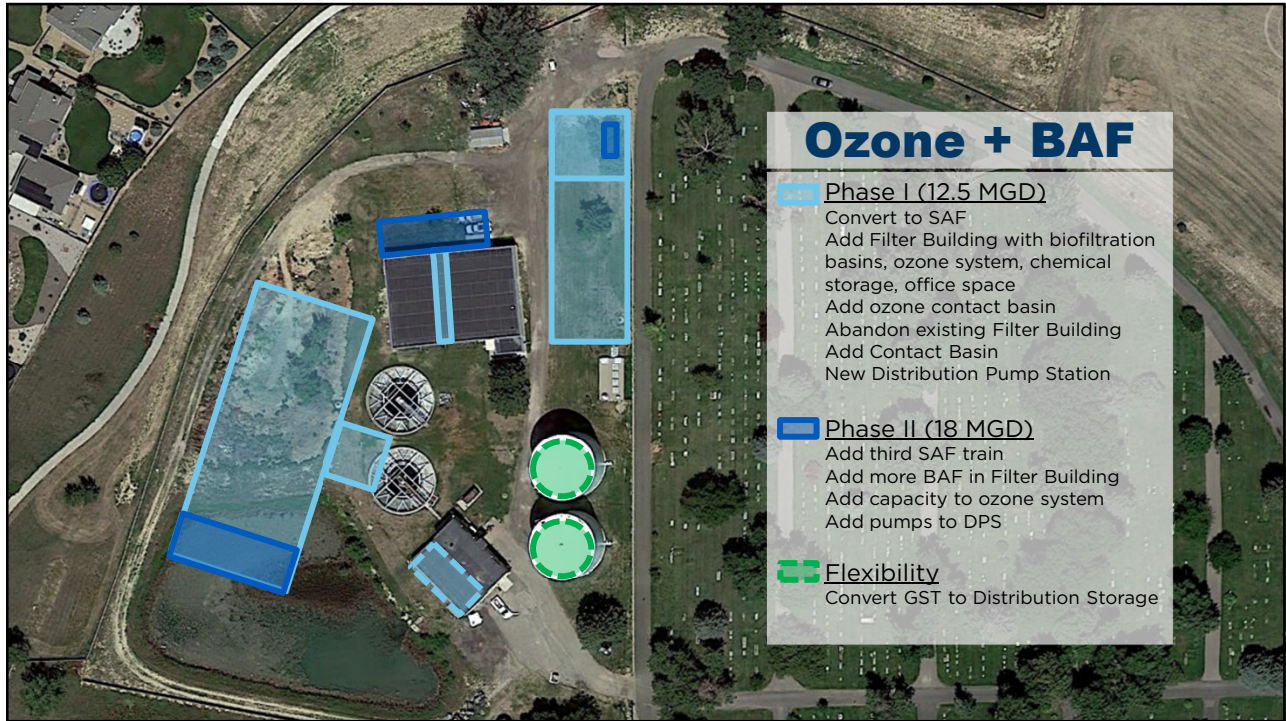


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Ozone Process Flow Diagram



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Cost Assumptions

- ▶ Based on 2021 Dollars
- ▶ Class V Estimate
 - <2% Project Definition
 - Concept screening
 - - 20% to + 30%
- ▶ Capital costs based on Phase 1 (12.5 mgd)
- ▶ Operation Cost based on 2023
 - Phase I Expansion Complete
 - 7 mgd maximum day

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Estimated Construction Cost

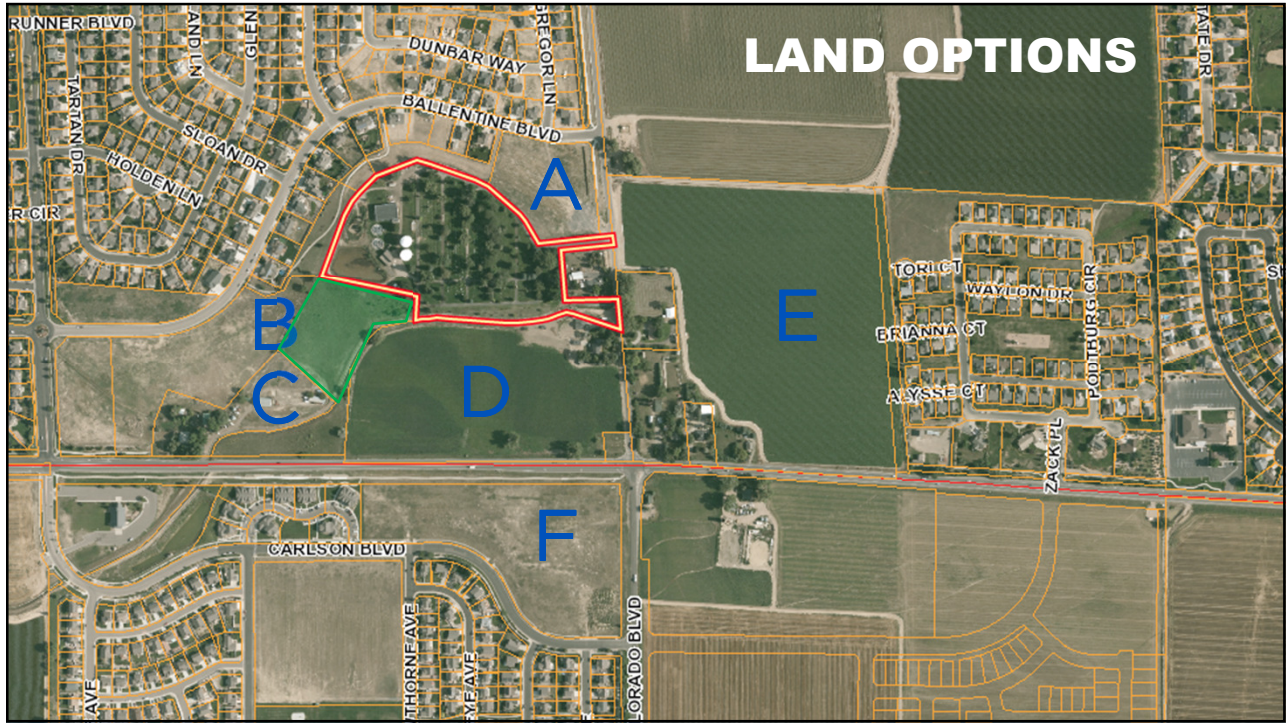
Item	UF/GAC	O3/BAF

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Operating Cost Comparison

Item	GAC	Ozone
Year 1 (7 mgd)	\$342,000	\$50,000
Ultimate (18 mgd)	\$608,000	\$129,000
Construction Cost		
Life Cycle Cost (30 years)		

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