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Master Planning for Future Nutrient Limits at one of the Largest Water Recycling Centers in the Nation

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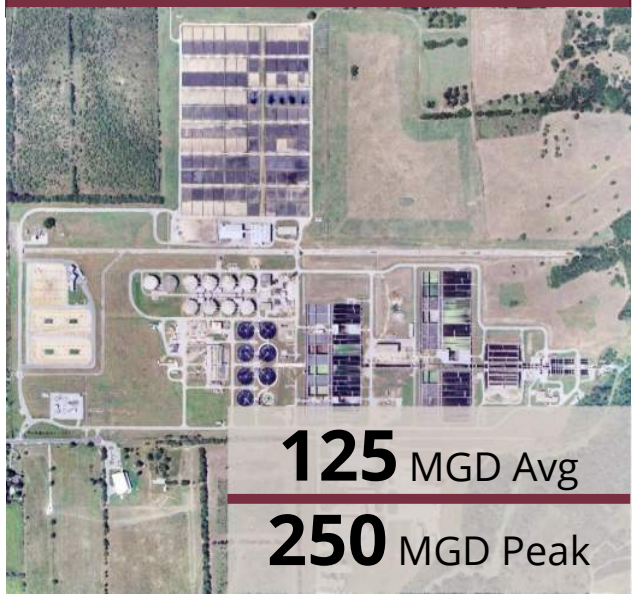
SAWS operates and maintains three water recycling centers

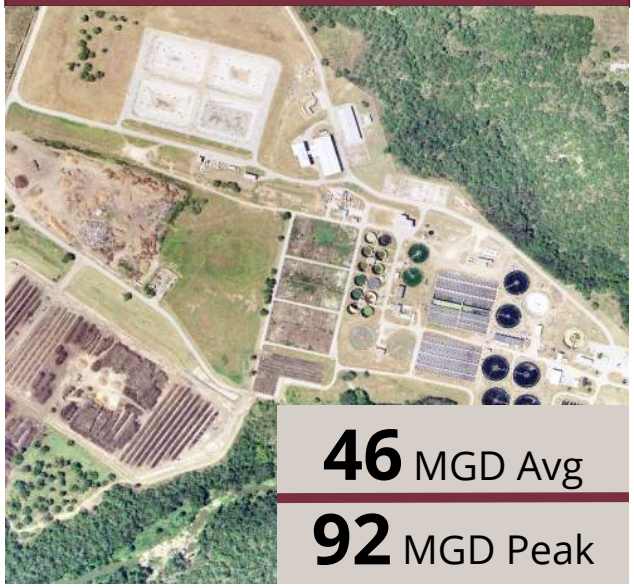
Steven M. Clouse WRC
1987



125 MGD Avg

250 MGD Peak

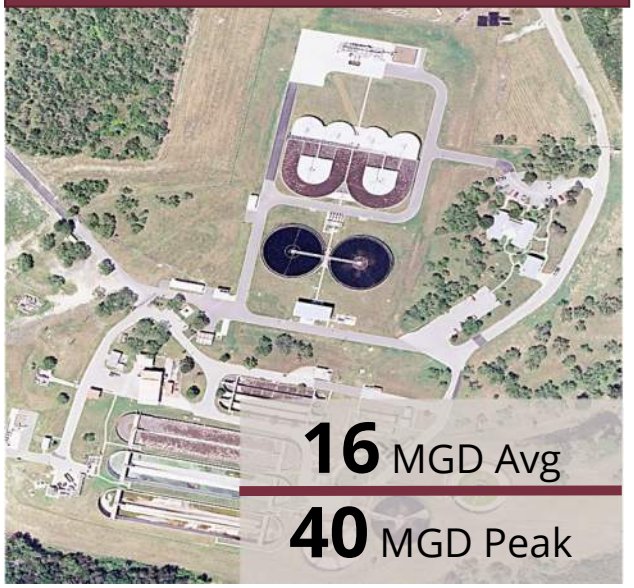
Leon Creek WRC
1965



46 MGD Avg

92 MGD Peak

Medio Creek WRC
1972



16 MGD Avg

40 MGD Peak

SAWS just completed a wastewater master plan to determine capital improvement projects needed

OUR AGENDA

01. The future of nutrient removal at SAWS

02. Projects required to get there

03. Impact to sidestream challenges

01. The future of SAWS nutrient removal

The Master Plan determined that phosphorus removal was absolutely needed at Clouse, and possible at Leon and Medio

	Medio Creek WRC 16 MGD		Leon Creek WRC 46 MGD		Clouse WRC 125 MGD	
Parameter	**Target Value**	**Historical Range**	**Target Value**	**Historical Range**	**Target Value**	**Historical Range**
Total Nitrogen (mg/L)	**≤10**	15-20	N/A	19-21	N/A	21
Total Phosphorus (mg/L)	**<0.5**	2.5-3.0	**<0.5**	3.0	**<0.5**	2.3 – 3.0

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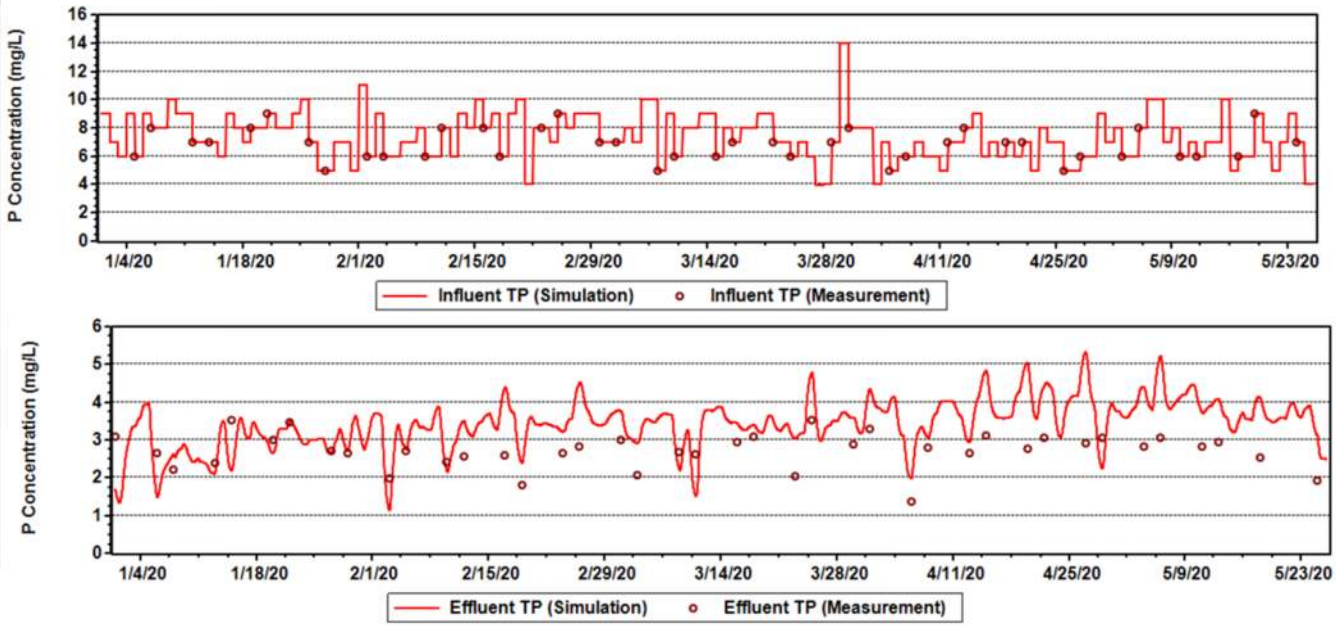
First, a model was built, calibrated and refined via dynamic validation and additional stress tests

Parameters	Historical Median	Simulation Median	Difference From Historical	Matching
Effluent TP (mg/L)	2.8	2.7	4%	Excellent



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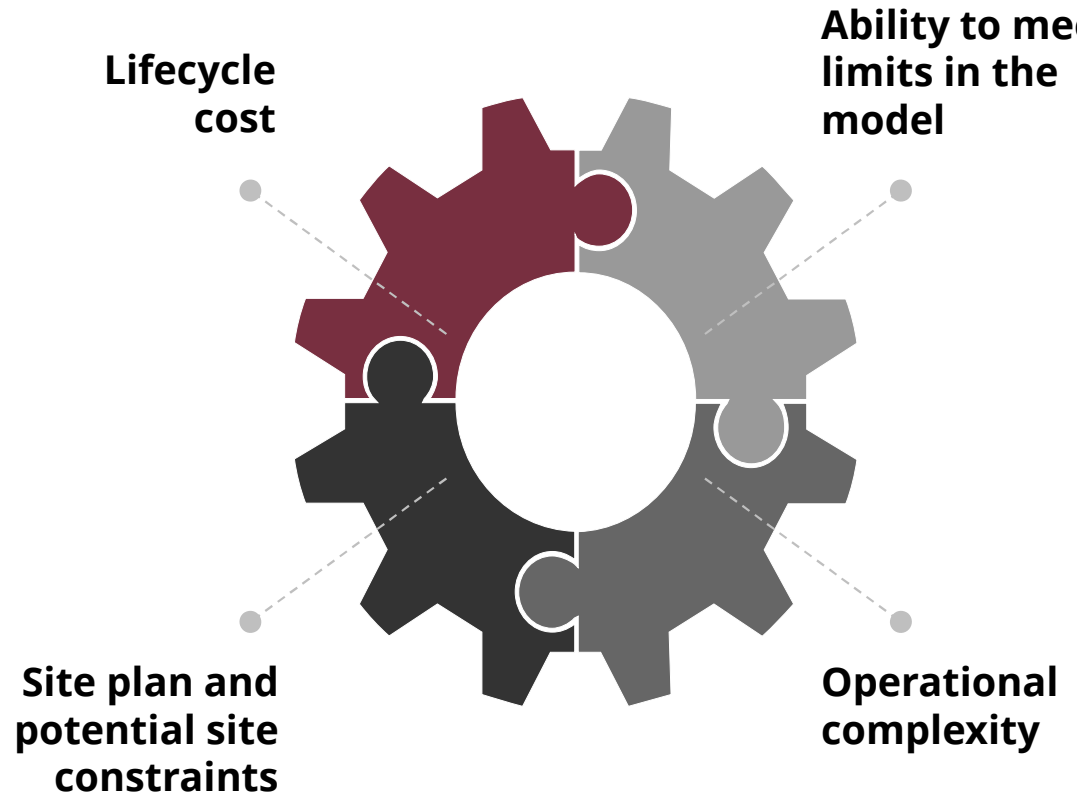
Seven biological reactor options were screened for additional evaluation



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Based on screening, detailed alternatives were evaluated for each individual WRC

MCWRC

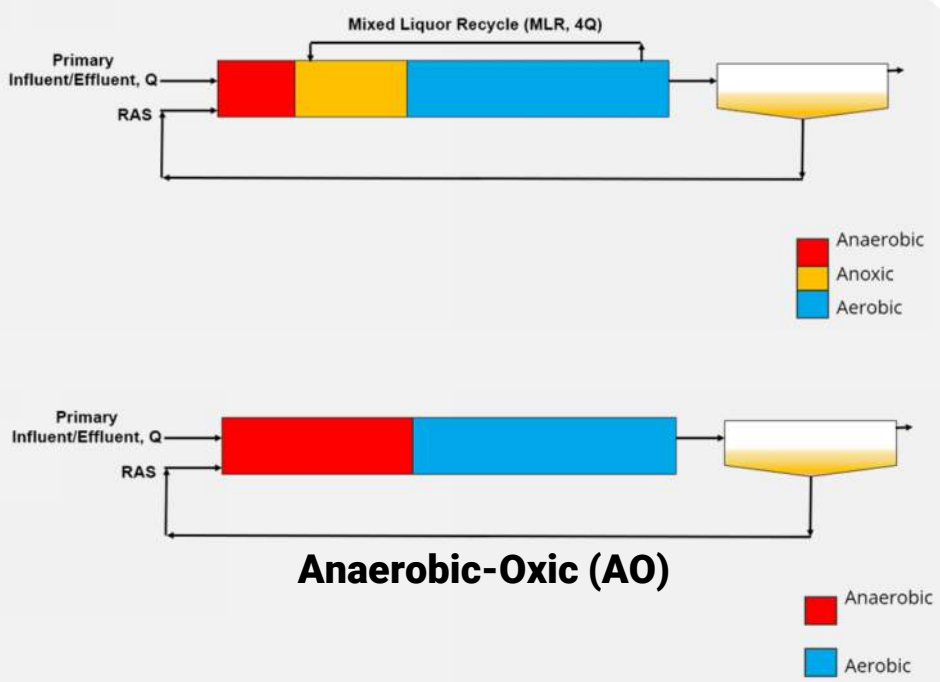
- MLE w/ Alum
- A2O
- A2O w/ S2EBPR

LCWRC

- Chemical Phos. removal
- AO
- A2O

SMCWRC

- CEPT
- AO w/ Alum



Life cycle costs were developed to determine an overall best value for each facility

SM Clouse – 125 MGD

Cost Factor	CEPT	A/O
30-Year Life Cycle Cost	$120,130,000	$91,190,000

Leon Creek – 46 MGD

Cost Factor	Chem Phos Removal	A/O	A2O
30-year Life Cycle Cost	$46,480,000	$49,890,000	$124,110,000

Medio Creek – 16 MGD

Cost Factor	MLE w Alum	A2O	A2O w S2EBPR
30-Year Life Cycle Cost	$38,110,000	$37,560,000	$38,210,000

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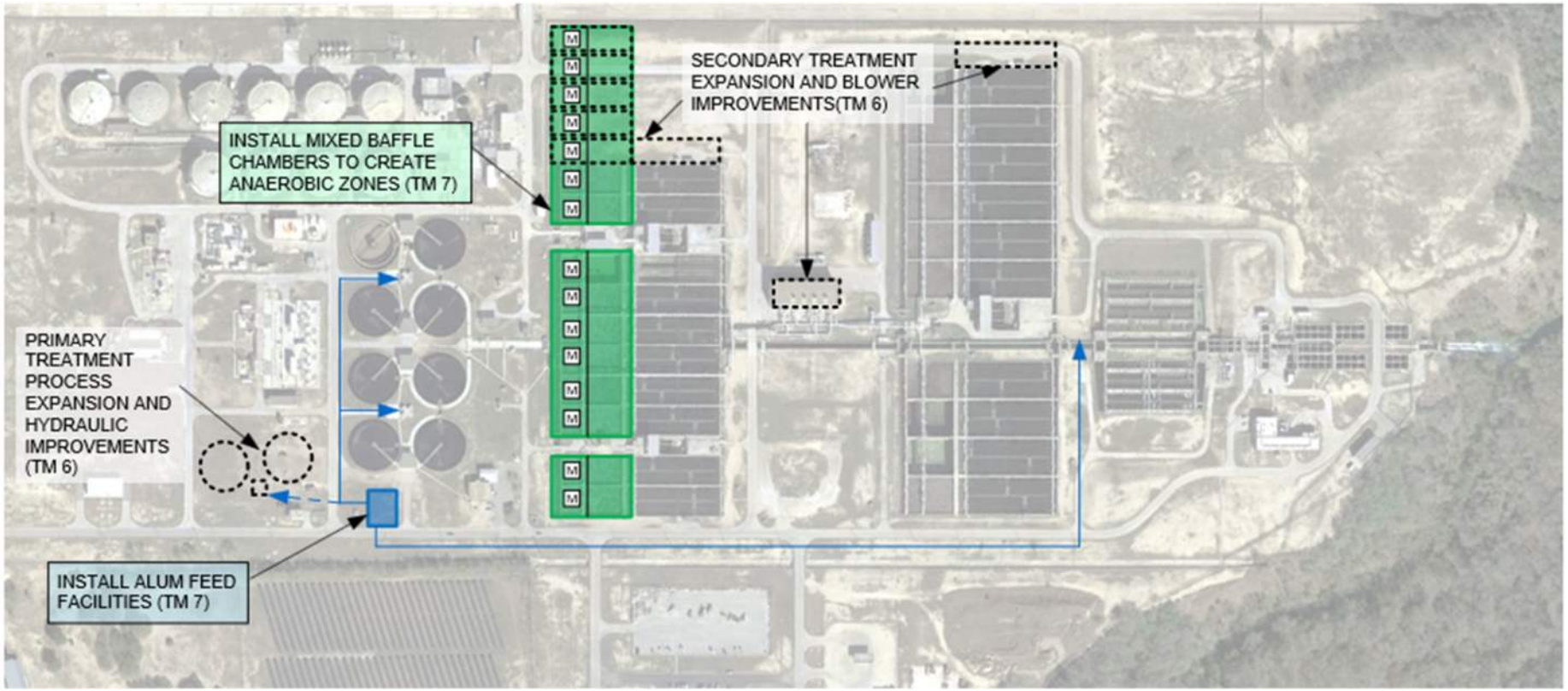
Each alternative was evaluated for process impacts and layouts were developed



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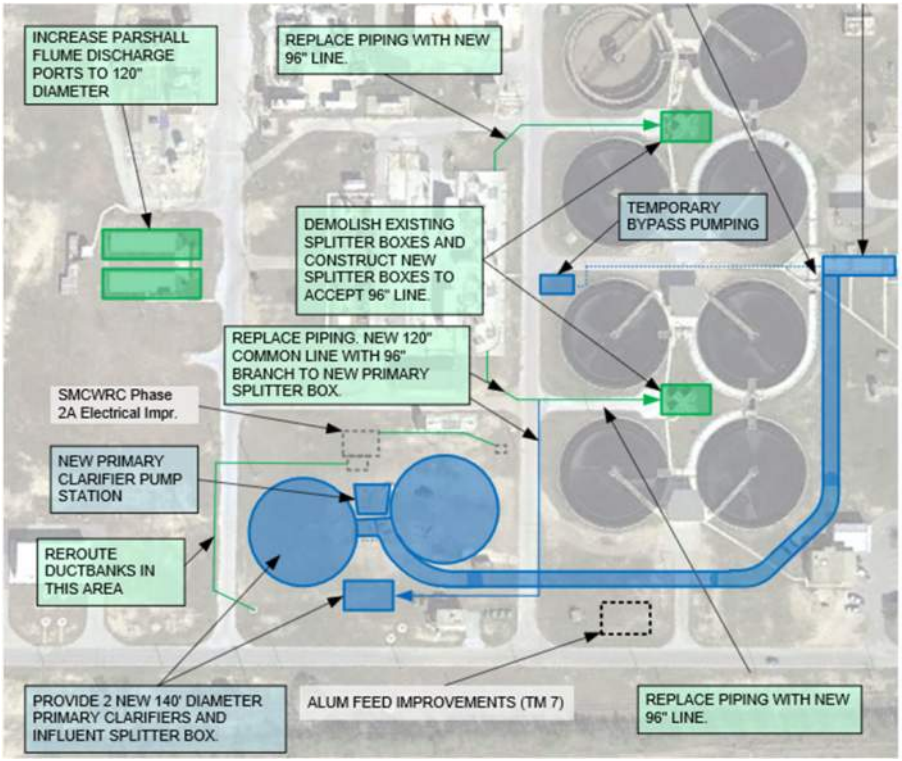
But adding anaerobic zones isn't the only thing required to prepare:

02. Other projects that are required to get there

First, additional primary clarifier capacity is required



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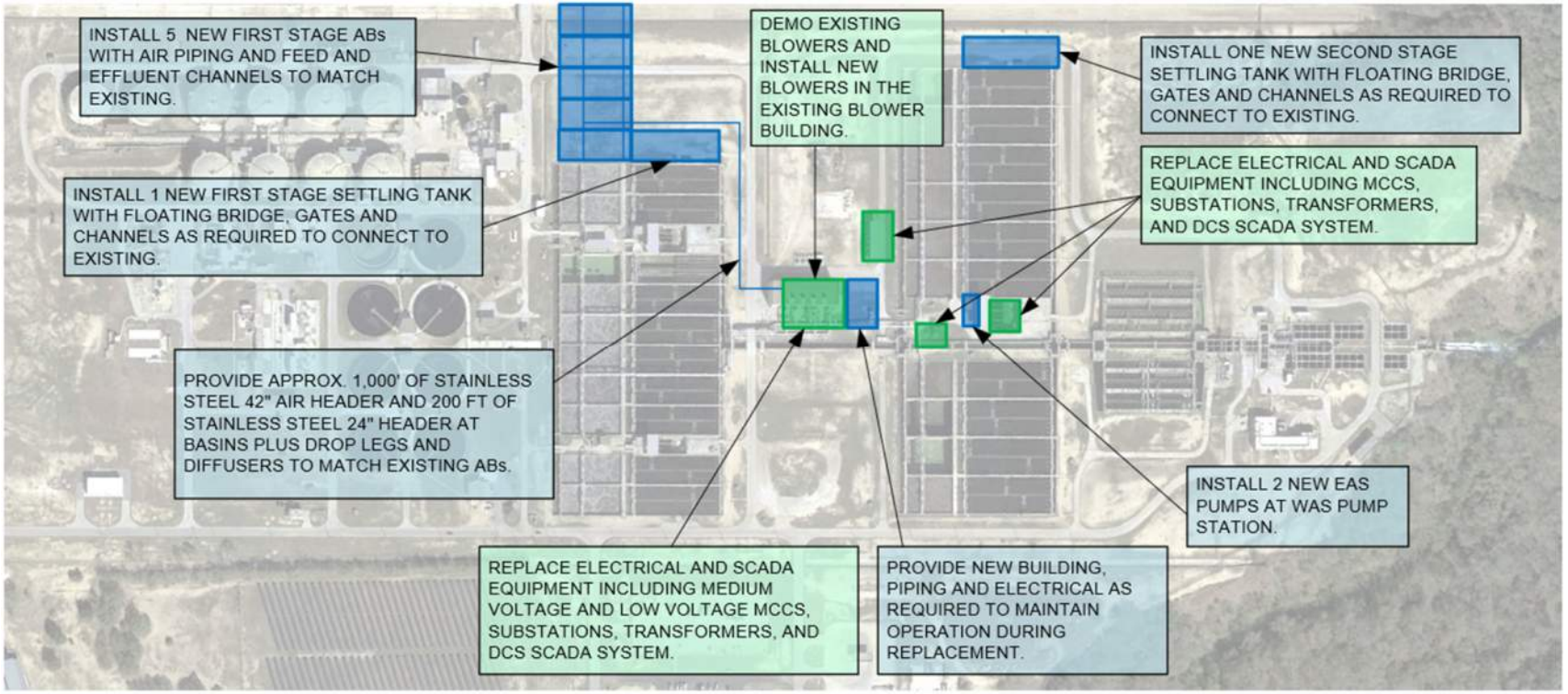
Next, additional organic capacity is required in the first and second stage



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Additional aeration basin and settling tank capacity will set the stage for future flows/loads and BNR

Parameter	2020 MM Gap (Firm)	2050 MM Gap (Firm)
BOD Loading (lb/day)	30,000	96,000

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Improvements to the existing aeration system is required for future capacity, control, and automation

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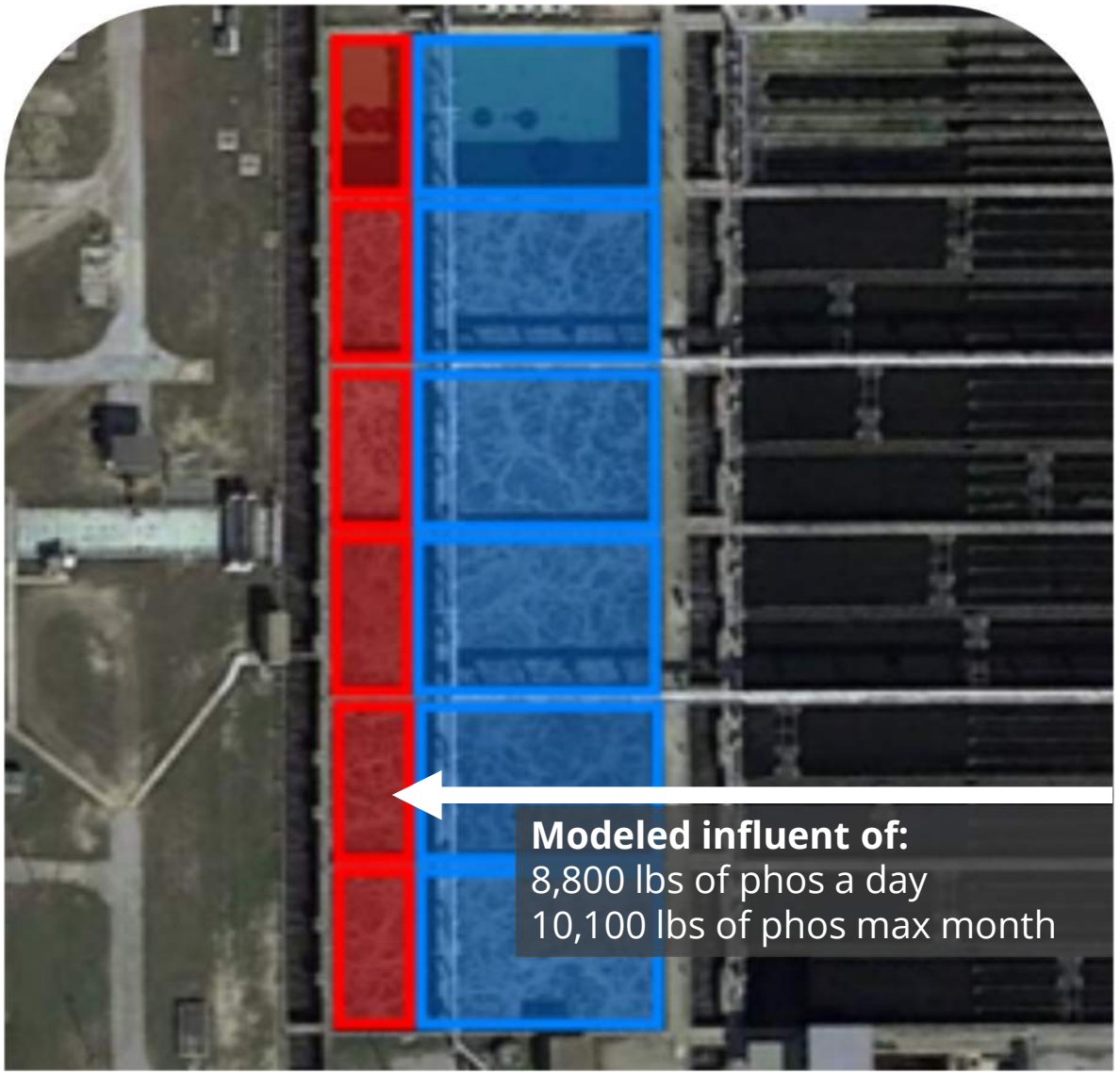
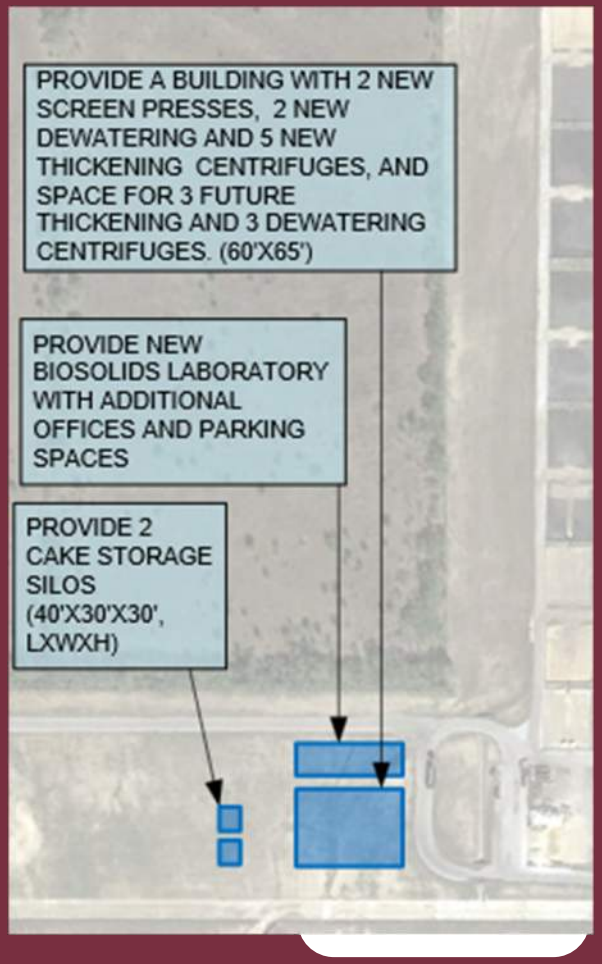
The removal of soluble phosphorus in the liquids stream will increase the phosphorus in the solids stream

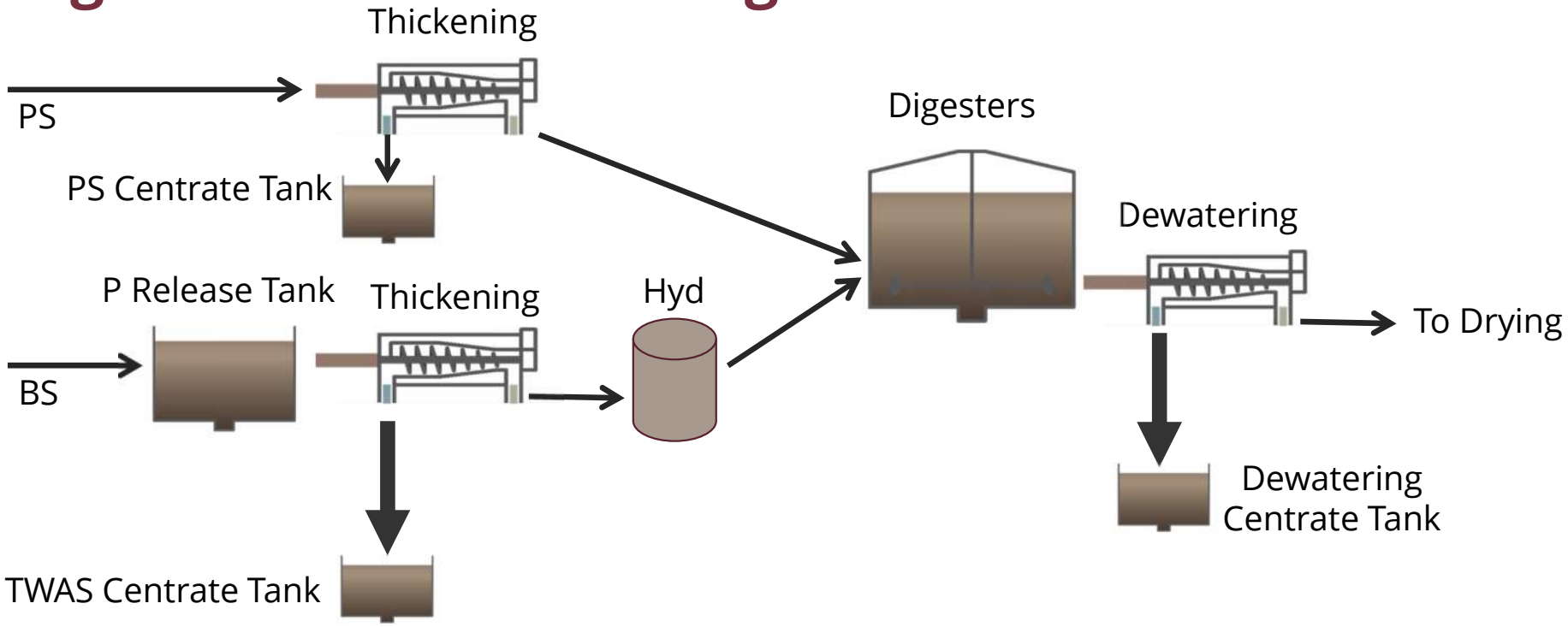




This additional phosphorus load will exacerbate existing challenges in the solids facilities and sidestream

03. Impact to sidestream challenges

SAWS operates a standard mesophilic anaerobic digestion process with thickening ahead of digestion and dewatering after



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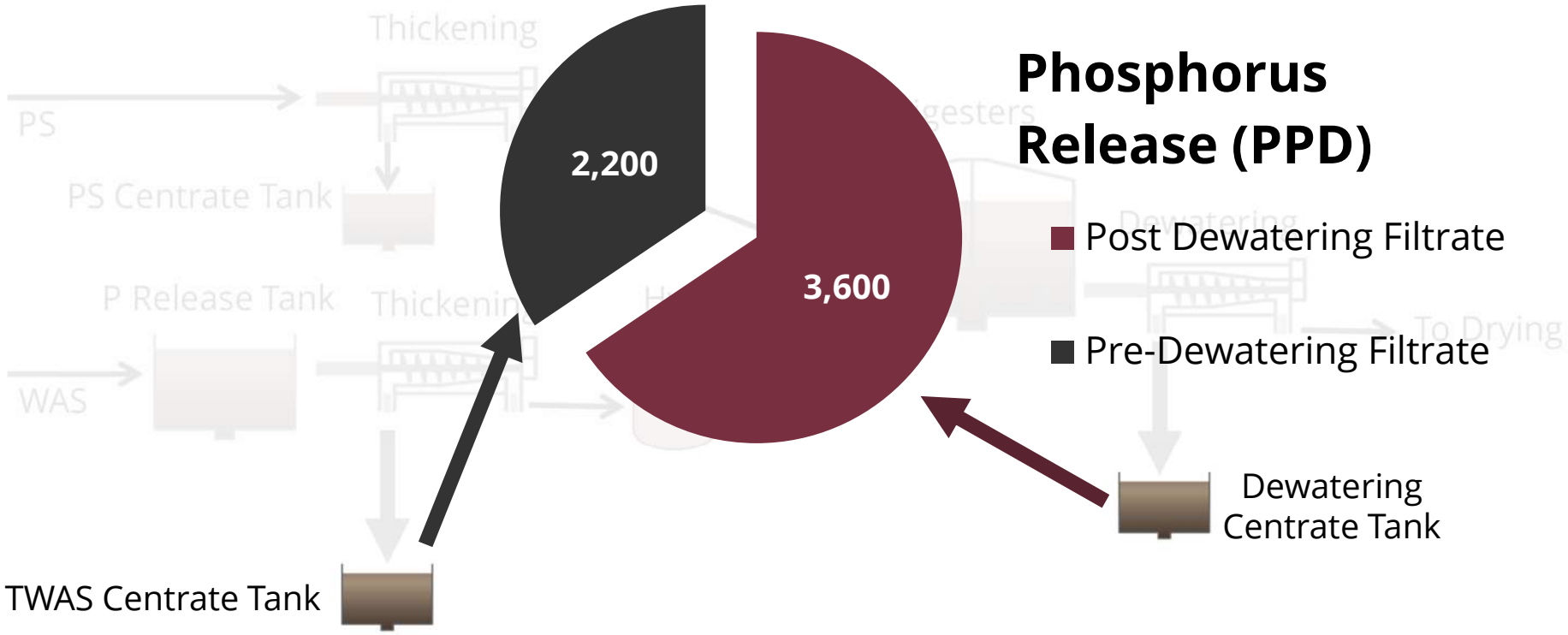
These two centrate streams are laden with soluble phosphorus



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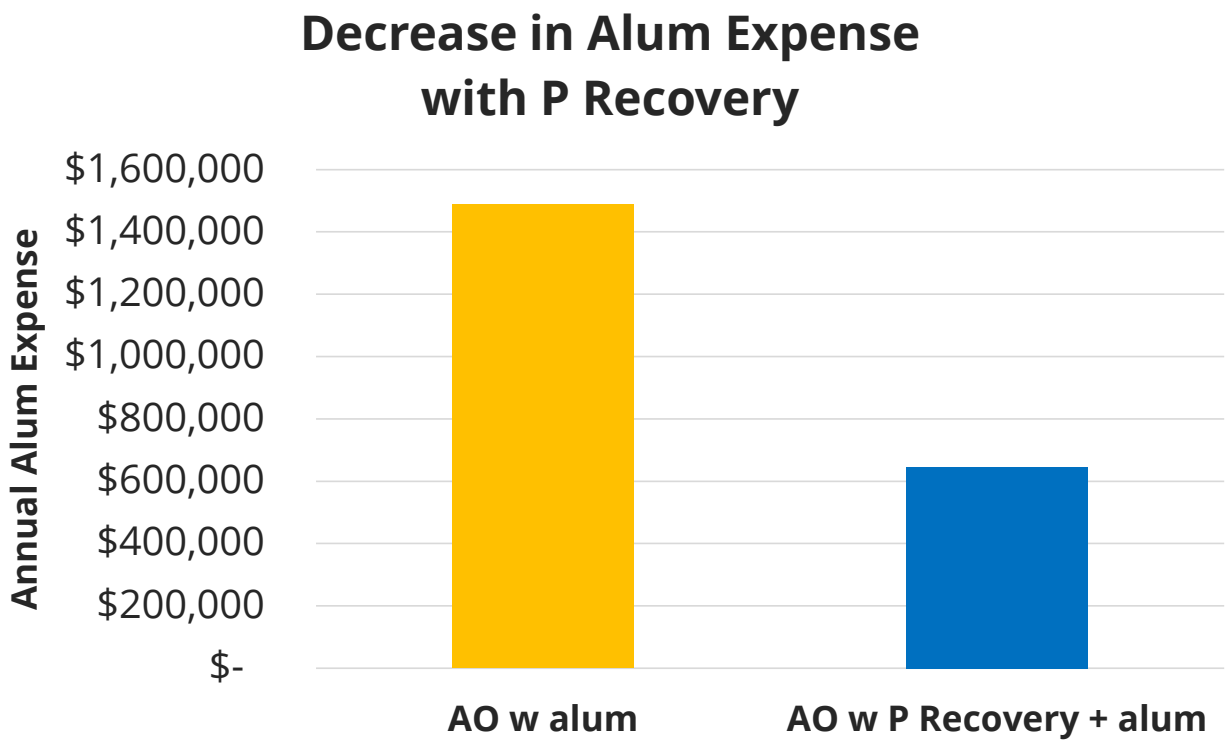
Detrimental struvite production can be a major concern in anaerobic digesters

Phosphate harvesting significantly decreases annual alum expense



Net alum decrease with P recovery is 2306 gal/d @ approx. $1/gal = $841,690/yr

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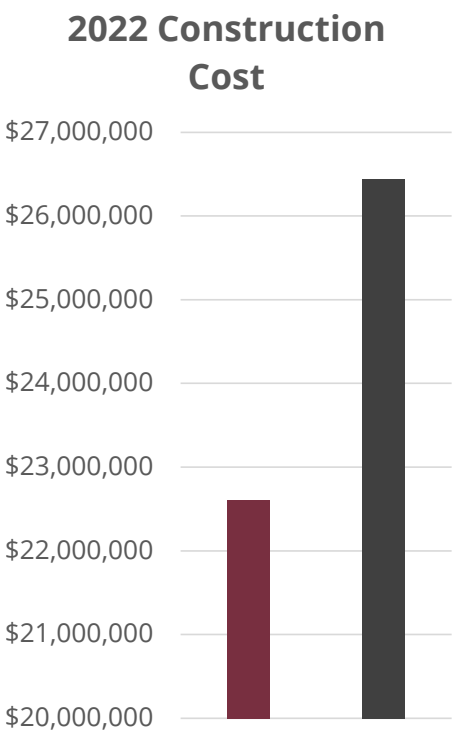
Struvite harvesting via Ostara is the best option under a life cycle cost evaluation



Ostara

Life Cycle Cost per lb removed over 30 yrs:
$2.61

Magprex

Life Cycle Cost per lb removed over 30 yrs:
$2.76

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In conclusion, all of these planned projects will put SAWS on the map for phosphorus removal by 2030

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Q&A

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