

NBC Wastewater Treatment Plant Updates

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FIELDS' POINT WWTF

Treatment Upgrades for Kruger AnoxKaldnes Integrated Fixed Film Activated Sludge (IFAS) System



Add Carbon Feed
(Methanol or Micro-C
Glycerin) for Second
Anoxic Zone

Add Fine Screening to
Protect AT Sieves and
Add NaOH Feed to
Adjust Alkalinity

Modify 10 Aeration
Tanks to IFAS System

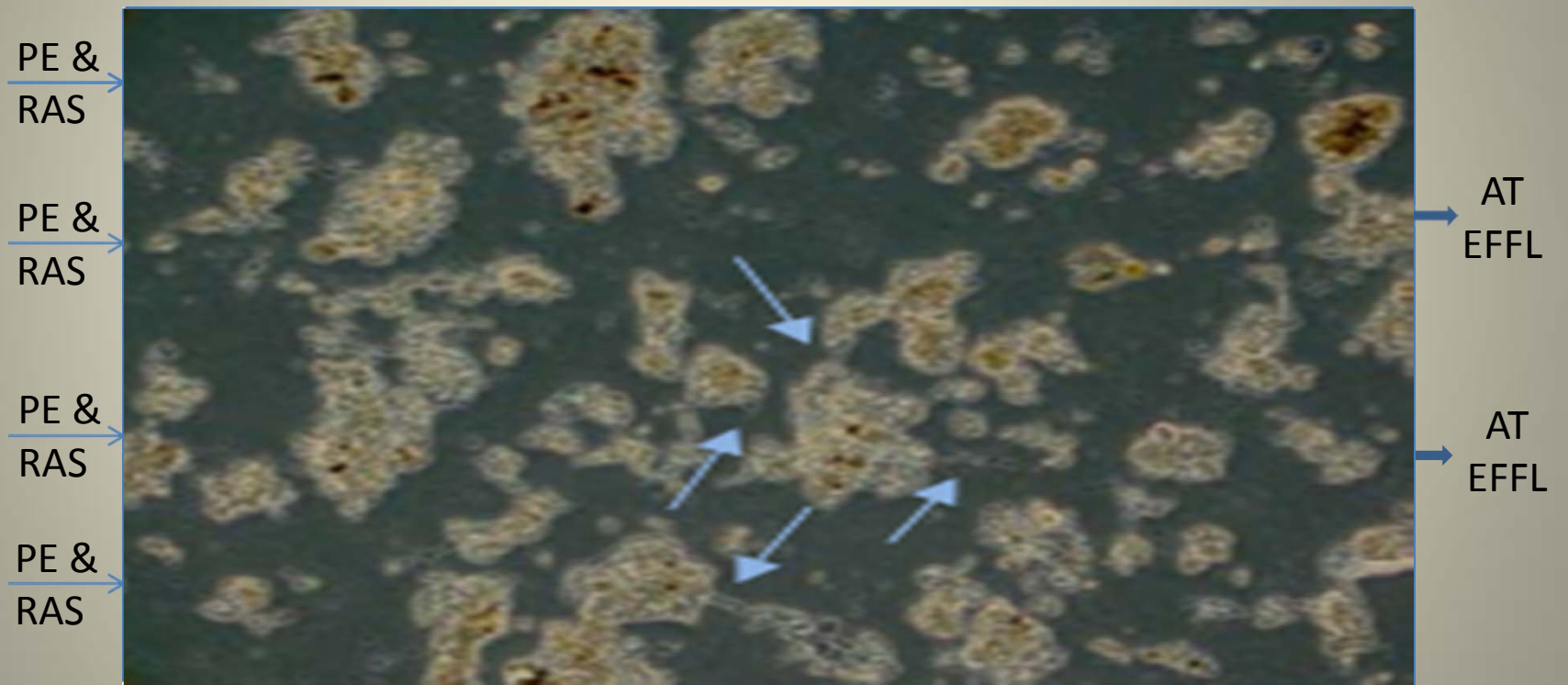
Install 9 Turbo
Blowers to Increase
Aeration Capacity

Increase Lift of
4 Screw Pumps

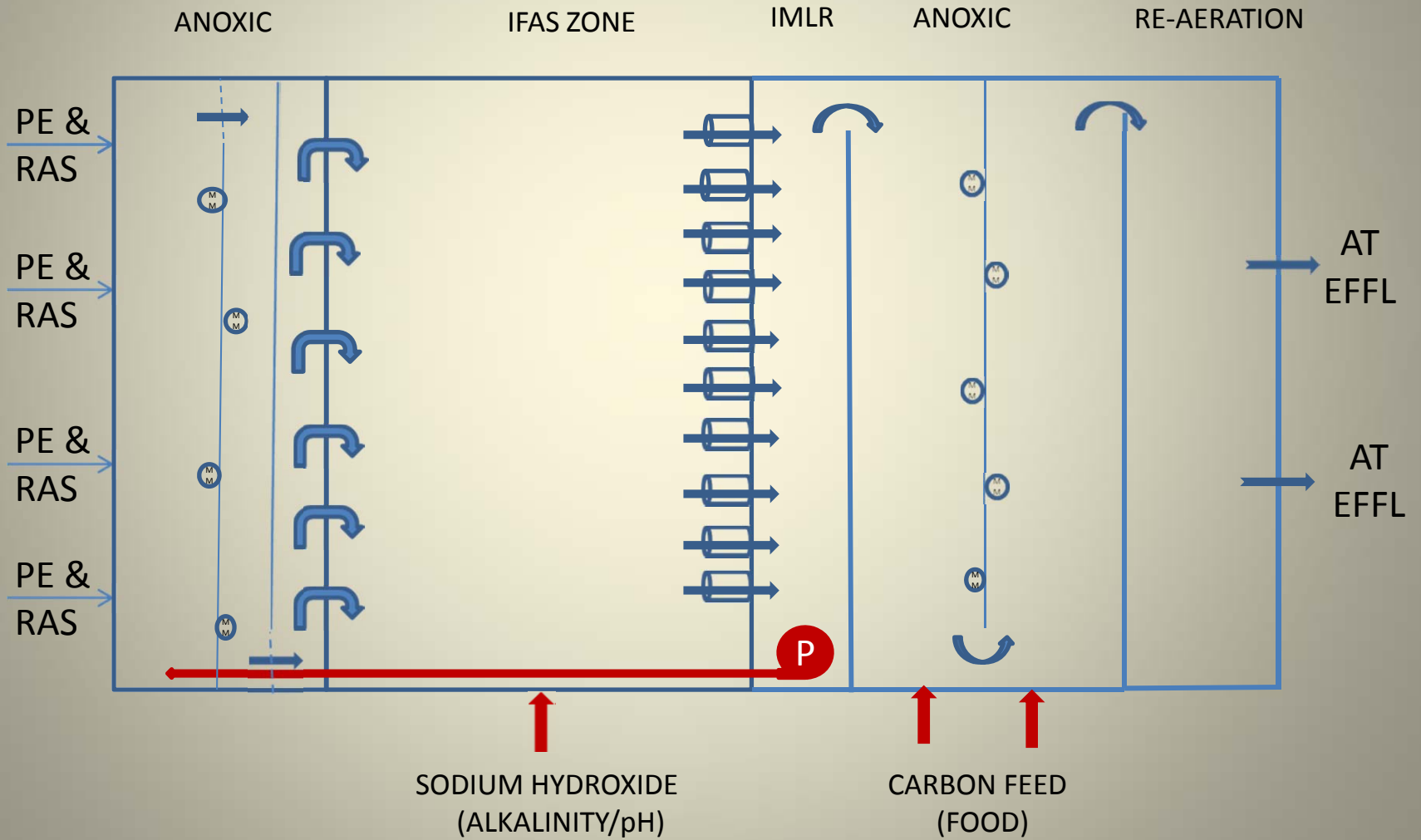
FIELDS' POINT WWTF

EXISTING COMPLETE MIX ACTIVATED SLUDGE

food (primary effluent) + bugs (RAS) = O₂ (air from blowers) = BOD reduction



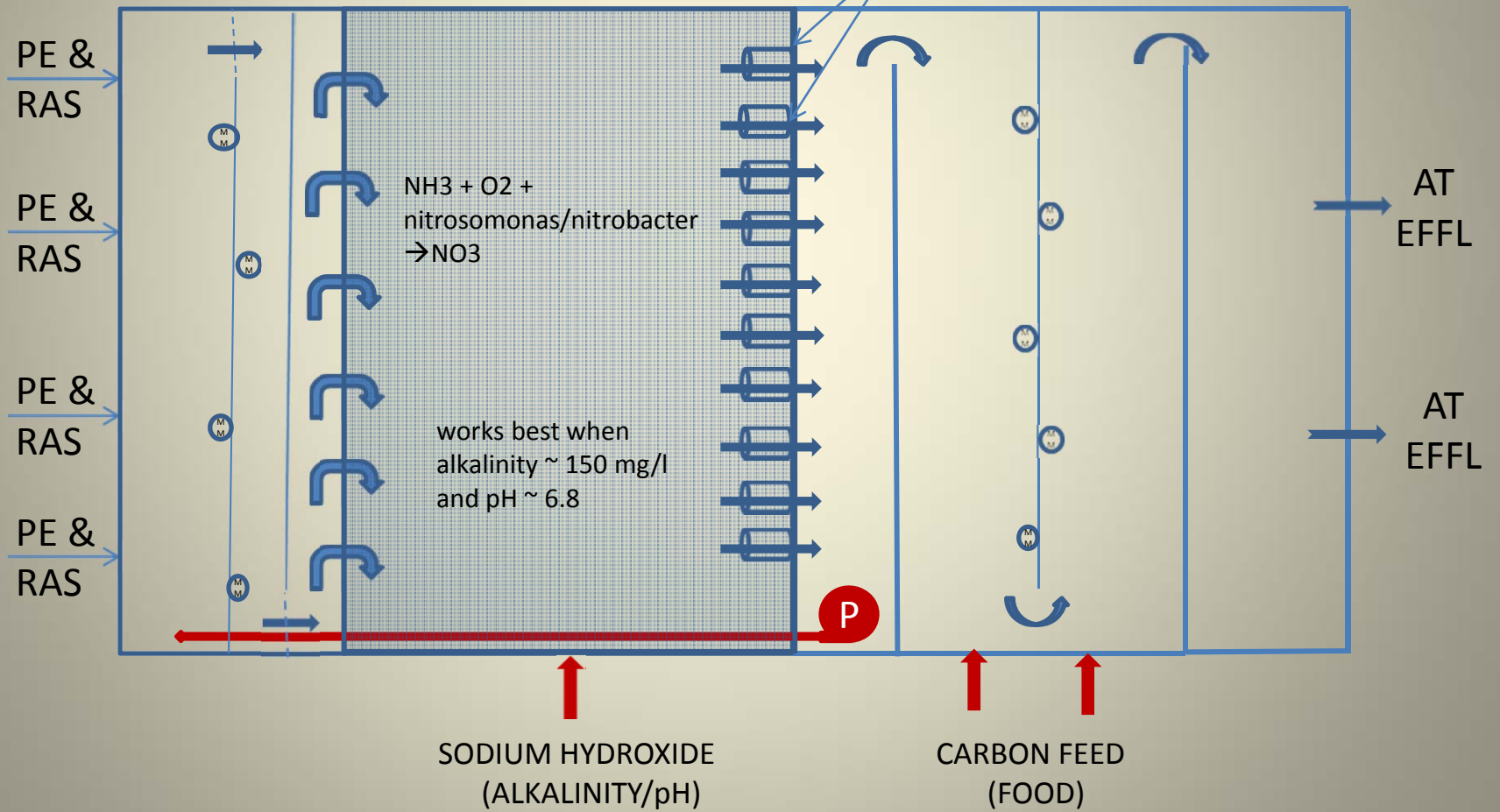
FIELDS' POINT WWTF
FUTURE IFAS SYSTEM
(Under Construction)



IFAS (AS) ZONE

Mixed Liquor and IFAS Media

Screens to keep media in IFAS zone but allow MLSS to next zone



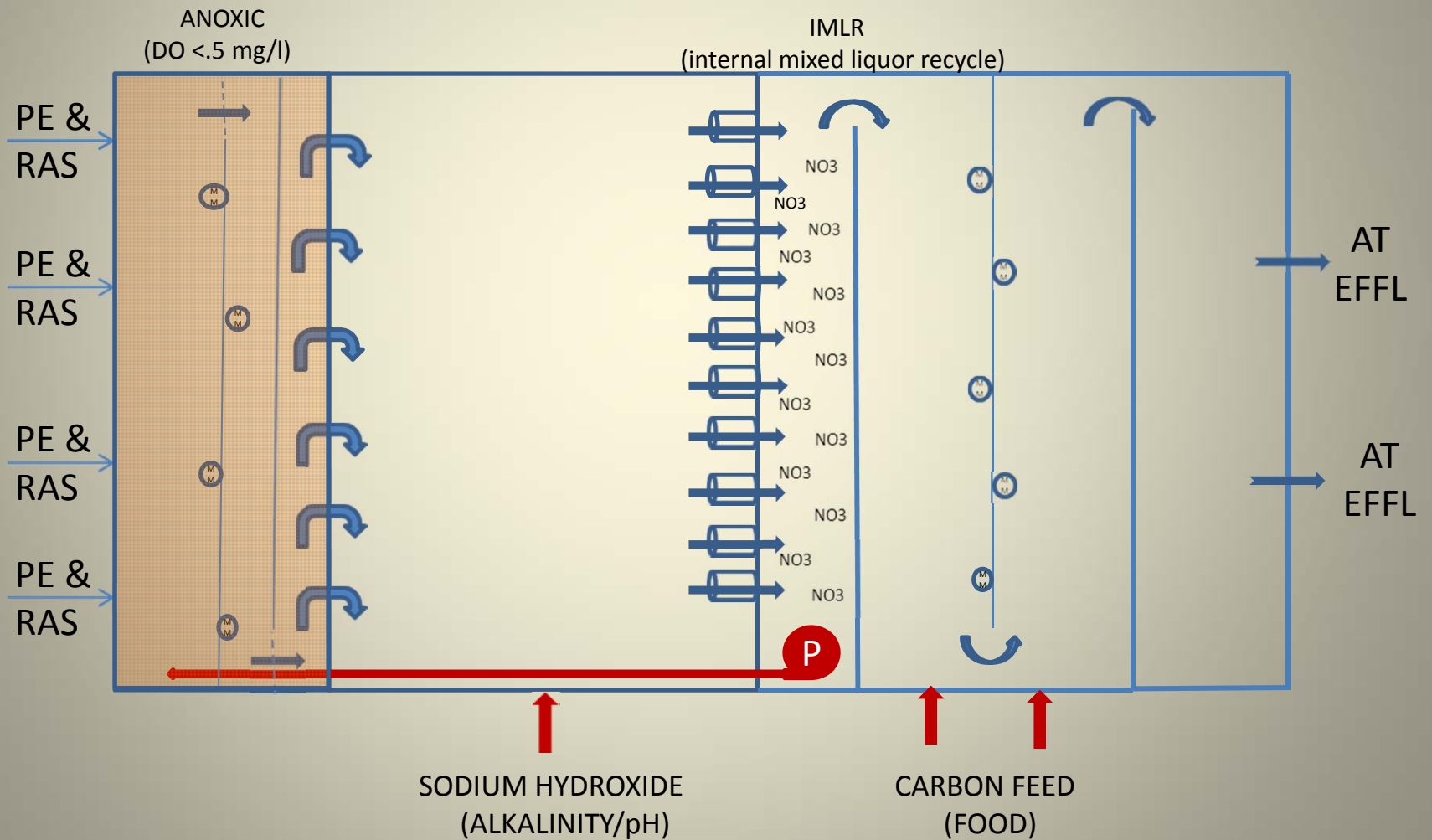
FIRST ANOXIC ZONE

DO < .5 mg/l

$\text{NO}_3 + \text{PE (food)} + \text{RAS (bugs)} = \text{N(gas)} + \text{BOD removal (Total Nitrogen to 8-9 mg/l)}$

Mixers but slow enough not to generate O₂

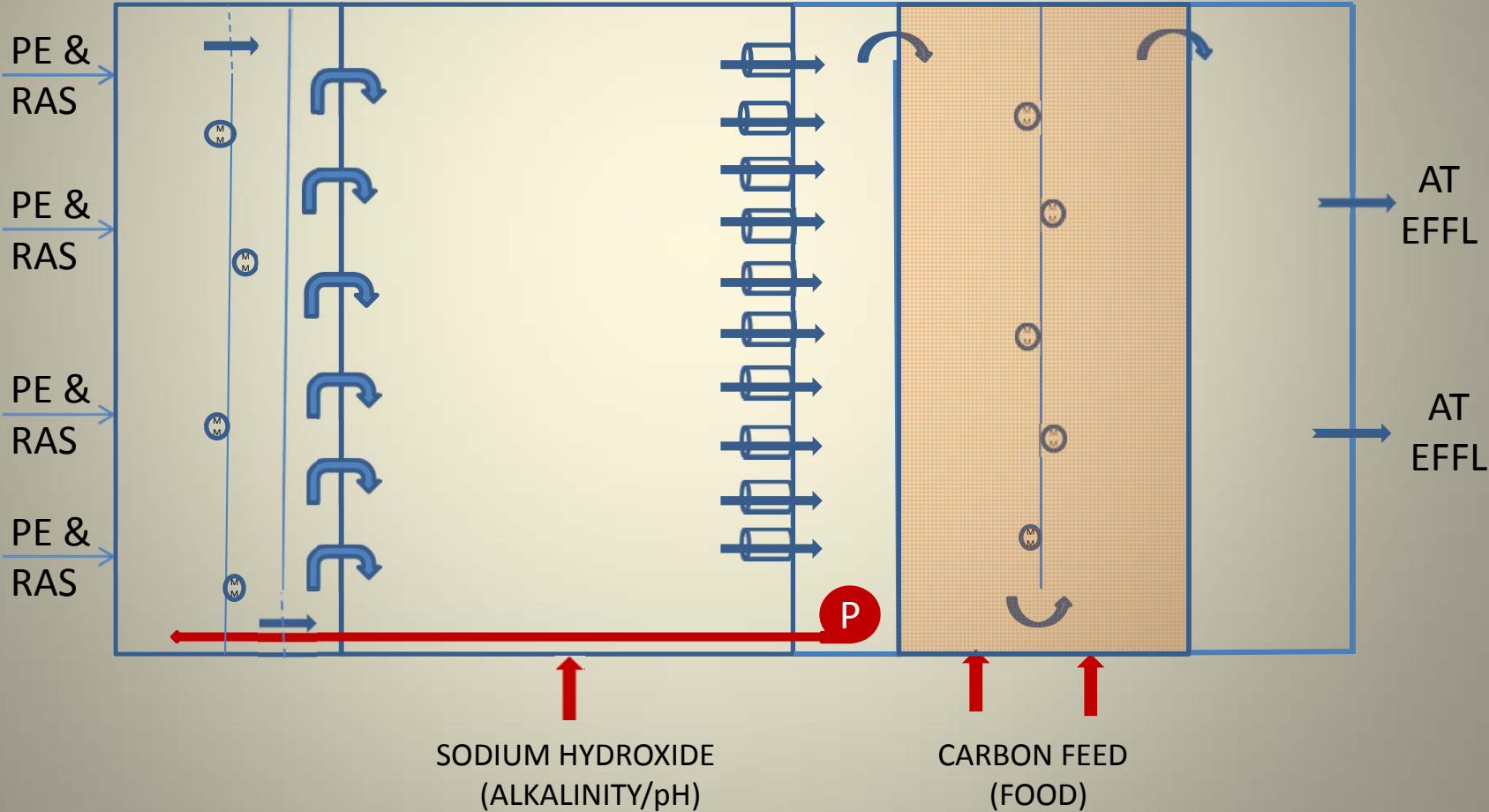
Internal recycle of NO₃ enriched ML from IFAS zone



SECOND ANOXIC ZONE

DO < .5 mg/l

In second anoxic zone there will still be some NO3 enriched MLSS but no food
NO3 + food (carbon source) + bugs = N (gas) ↑ total nitrogen to 5 mg/l





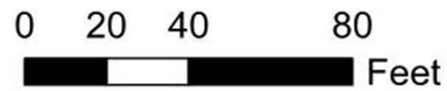


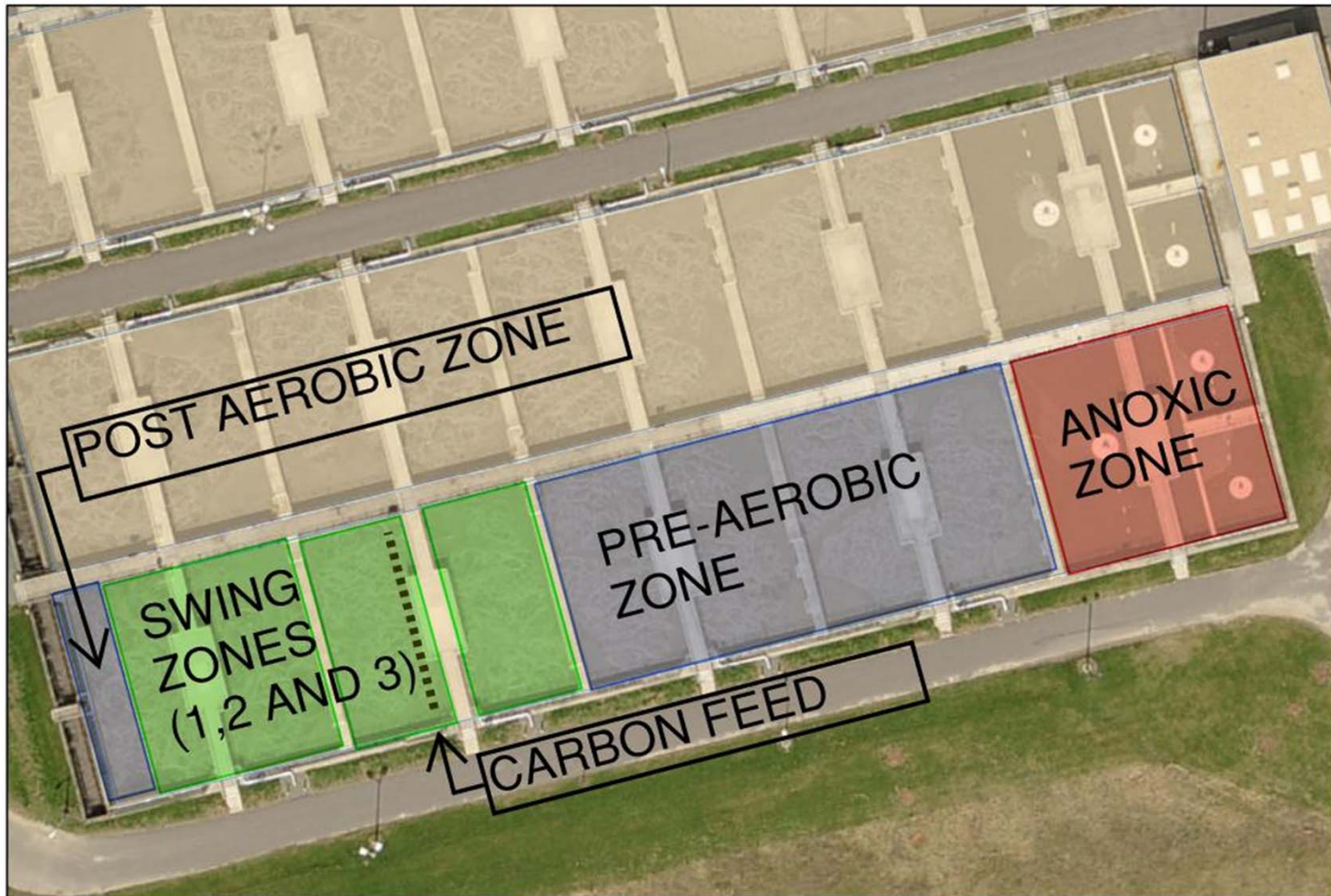
FP Construction Summary

- Goal of BNR Improvements is to achieve 5 mg/L total nitrogen
- Construction Costs = \$31 million
- Annual Operating Costs increase by \$2 million
- Tank 10 online July 2011 (limited nitrogen removal)
- All tanks online with full operation March 2013



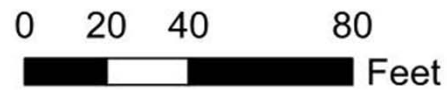
**Bucklin Point WWTF
Existing Aeration Tanks**





Bucklin Point WWTf

Proposed Revisions to Aeration Tanks



Costs for Nitrogen Removal at NBC WWTF's

	Effluent TN mg/L	Reduction lb/Year	Const. Cost \$ M	Increased O&M Cost \$ M/YR	Annualized Capital and O&M \$ M/YR	Nitrogen Removal Cost \$/lb N
Fields' Point WWTF	5	445,056	\$31.0	\$2.0	\$4.19	\$9.42
Bucklin Point WWTF (2006)	7.5	367,647	\$8.3	\$0.7	\$1.29	\$3.51
Bucklin Point WWTF (2011)	5	15,372	\$13.0	\$0.3	\$1.22	\$79.37
Bucklin Point Overall	5	382,000	\$21.3	\$1.0	\$2.51	\$6.57

Annual Electrical and Chemical Usage for Nitrogen Removal At NBC WWTF'S

	N Rem Lb/yr	Power & Chemicals Added MkWhr per year	Alk. MLb/yr	Carbon Lb/yr	Green House Gases
BP					
2004	0	7.5	0	0	
2006	368,000	9.6	1.9	0	++
2011	15,000	10.7	1.9	640,000	+++
FP					
2010	0	17	0	0	
2013	445,000	26.5	2.3	915,000	+++