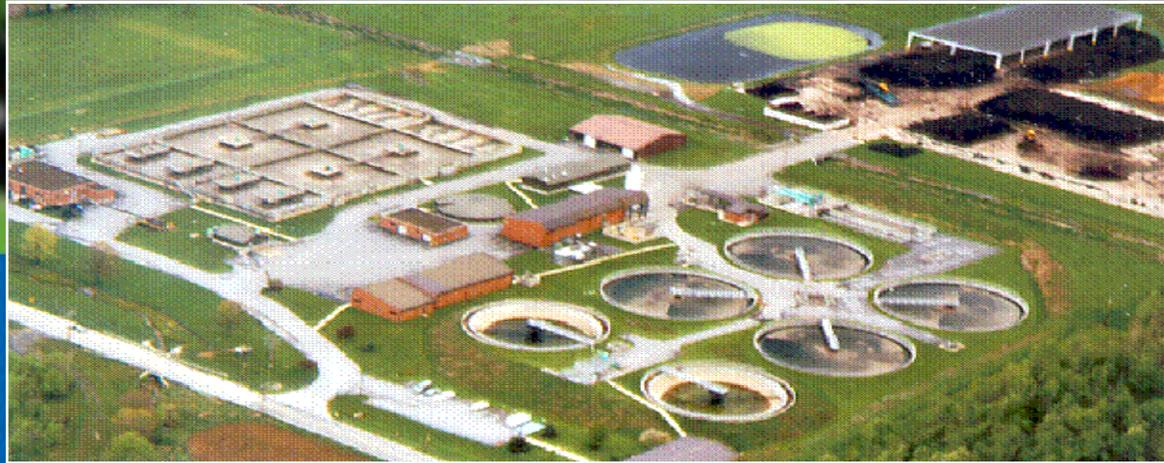


Springettsbury Township



Waste Water Treatment Plant BNR Upgrade & Grit Removal Project



Springettsbury Township BNR Upgrade and Grit Removal Project

Main Reasons for the Biological Nutrient Removal (BNR) Project

- Aeration Upgrade
- PADEP Bay Strategy

Springettsbury Township BNR Upgrade and Grit Removal Project

Aeration Upgrade

- Current Aeration System is inadequate (over 20 years old)
- More oxygen is required for additional treatment
- Diffused air provides better oxygen transfer



Springettsbury Township BNR Upgrade and Grit Removal Project

PADEP Strategy

- Stricter effluent discharge limits for Nitrogen and Phosphorous
- In addition to Biological Oxygen Demand (BOD), Nitrogen removal will require additional oxygen and volume
- Phosphorous removal can be accomplished by chemical or biological means

Springettsbury Township BNR Upgrade and Grit Removal Project

PADEP Strategy (cont'd)

One main goal of this project was to design a BNR system without incurring into the substantial expense of building new tanks (about 25 % more expensive).



Springettsbury Township BNR Upgrade and Grit Removal Project

Integrated Fixed-Film Activated Sludge (IFAS)

- Conventional Aeration Systems – Microorganisms are suspended in tank (suspended growth).
- IFAS Systems – Microorganisms are attached to a suspended media.
- More microorganisms:
 - Provide higher degree of treatment
 - Can offset the need for additional aeration basin capacity

Springettsbury Township BNR Upgrade and Grit Removal Project

Evaluated IFAS Systems

- AnoxKaldnes - HYBAS™ System (dispersed media)
- Brentwood Industries - AccuWeb™ System (fixed media)
- Lotepro - LINPOR® System (dispersed media)

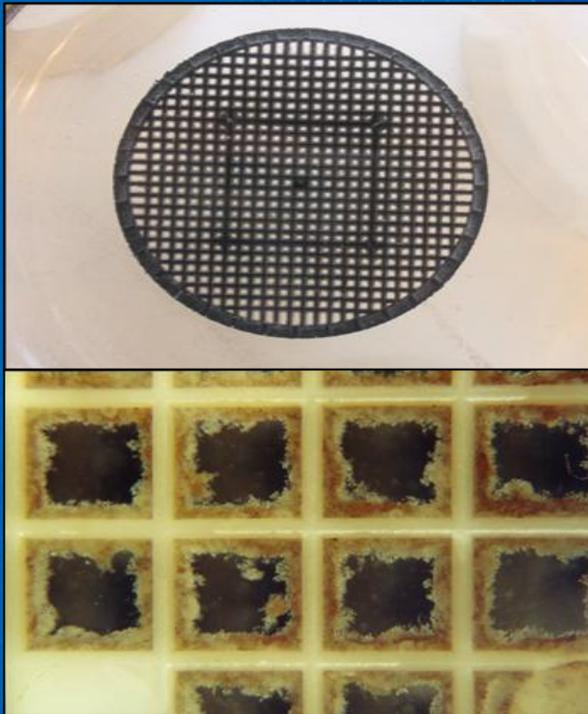
Springettsbury Township BNR Upgrade and Grit Removal Project

IFAS System Field Visits

- Cities of Broomfield, Johnstown, William Monaco, Colorado (AnoxKaldnes)
- Windsor Locks, Connecticut (Brentwood)
- Westerly, Rhode Island (Lotepro)

Springettsbury Township BNR Upgrade and Grit Removal Project

AnoxKaldnes'HYBAS™ IFAS System



Springettsbury Township BNR Upgrade and Grit Removal Project

Brentwood's AccuWeb™ IFAS System



Springettsbury Township BNR Upgrade and Grit Removal Project

Lotepro's LINPOR[®] IFAS System

The LINPOR[®] Foam Media



The LINPOR[®] System Tank Internals



Springettsbury Township BNR Upgrade and Grit Removal Project

BNR Capital Requirements

- Blowers and Blower Building
- IFAS Media, Screens and Controls
- Internal Mixed Liquor Recycle Pumps
- Conversion of Primary Clarifiers to Anaerobic/Anoxic selectors (anaerobic portion for phosphorous removal; anoxic portion for nitrogen removal)

Springettsbury Township BNR Upgrade and Grit Removal Project

BNR Upgrade Cost Estimates

Cost Description	BNR System		
	Brentwood's AccuWeb™	Lotepro's LINPOR®	AnoxKaldnes' HYBAS™/Disk
Construction Cost	\$13,848,000	\$15,580,000	\$14,711,000
Associated Cost	\$3,462,000	\$3,895,000	\$3,678,000
Total Capital Cost	\$17,310,000	\$19,475,000	\$18,389,000

Springettsbury Township BNR Upgrade and Grit Removal Project

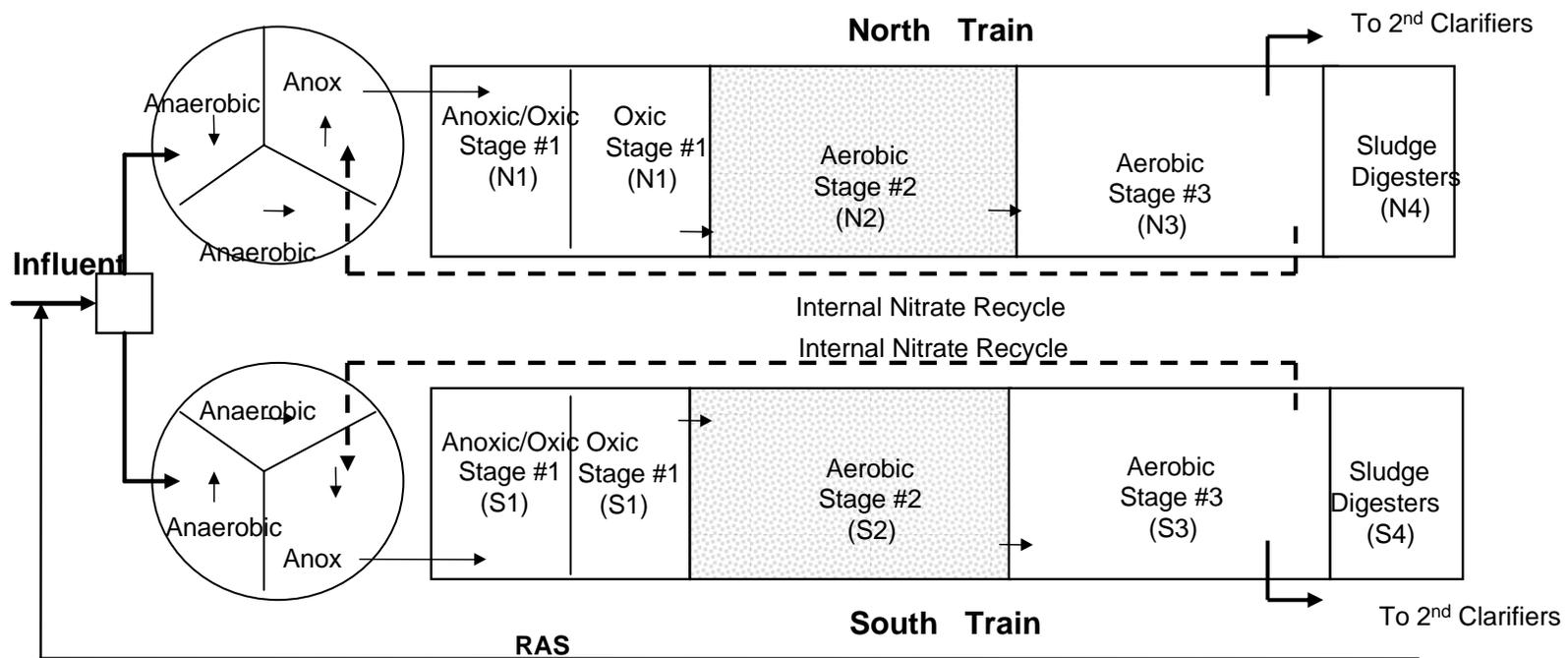
BNR System Selection

AnoxKaldnes's HYBAS™ BNR is the recommended manufacturer because of the following:

- Simpler to Maintain (i.e. by concentrating media in two basins instead of six)
- More Flexibility (i.e. basins without media can use either air diffusers or higher efficiency aerators)
- Track Record (i.e. municipal and industrial plants around the World)

Springettsbury Township BNR Upgrade and Grit Removal Project

BNR System Proposed Site Plan (AnoxKaldnes)



Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal System Feasibility Study

- Reasons for grit removal
 - Protect equipment from abnormal wear & tear
 - Prevent treatment tanks from filling-up with grit
- Existing Aeration tanks
 - Have surface aeration and no equipment on tank floor
- Proposed Aeration tanks
 - Will have air diffusers and piping on entire tank floor

Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal System Feasibility Study

- Two technologies considered
 - Hydro International's Grit King[®]
 - Eutek Systems' Headcell[™]
- Field Visits
 - Fruitland, Maryland (Headcell[™])
 - Derry Township, Pennsylvania (Grit King[®])
- On-site Pilot Plant of Grit King[®] provided by Hydro International

Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal Capital Requirements

- Grit Removal Equipment, Structure and Controls
- Grit Transfer Pumps
- Grit Dewatering Equipment and Building
- Grit Leveling Conveyor
- Grit Storage Dumpster

Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal System Cost Estimates

Cost Description	Grit Removal System	
	Grit King®	Eutek's Headcell™
Construction cost	\$1,852,000	\$1,773,000
Associated Project Cost	\$463,000	\$443,000
Total Capital	\$2,315,000	\$2,216,000

Springettsbury Township BNR Upgrade and Grit Removal Project

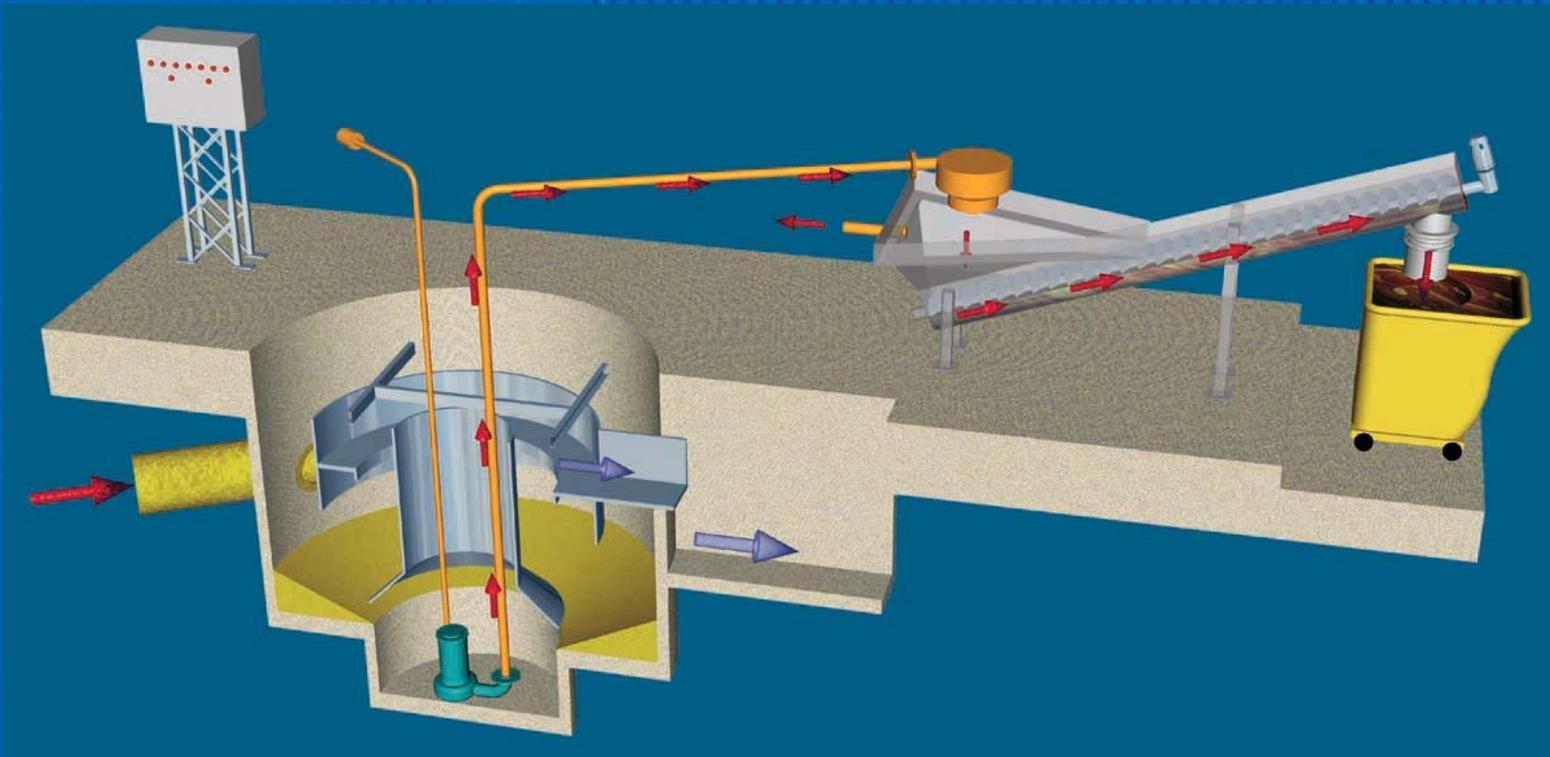
Grit Removal System Selection

Hydro International's Grit King[®] is the recommended manufacturer because of the following:

- Simpler to Operate and Maintain
- Track Record

Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal System Selection; Process Schematic



Springettsbury Township BNR Upgrade and Grit Removal Project

Grit Removal System Selection; Probable Layout



Springettsbury Township BNR Upgrade and Grit Removal Project

Other Considerations

- Motor Control Center (MCC) Upgrade
- Emergency Power Upgrade
- Headworks Screening System Upgrade
- Final Clarifier Improvements
 - Current Density Baffles
 - Algae Control System

Springettsbury Township BNR Upgrade and Grit Removal Project

Upgrades Cost Estimates

Description	Amount
MCC Replacement	\$546,000
Second Electric Service	\$188,000
Current Density Baffles	\$116,000
Headworks Screening System	\$503,000
Algae Control System	\$131,000
Associated Cost	\$371,000
Total Capital Cost	\$1,855,000

Springettsbury Township BNR Upgrade and Grit Removal Project

Total Cost Estimates

Description	Amount
BNR System	\$18,389,000
Grit Removal System	\$2,315,000
Upgrades	\$1,855,000
Grand Total	\$22,559,000

Springettsbury Township BNR Upgrade and Grit Removal Project

Proposed Design and Construction Schedule

Phase	Completion Date
Grit System Design	May 2007
Grit System Construction	November 2008
BNR System Design	December 2008
BNR System Construction	December 2010