

# City of Rehoboth Beach, Delaware Wastewater Treatment Plant Facility Plan and Preliminary Engineering Report

Commissioners Meeting

May 18, 2012



# Agenda

## Review Preliminary Engineering Report Required for USDA Funding

- Condition Assessment of Existing Plant
- Alternatives Analysis
  - Filtration
  - Biosolids Treatment
- Cost Estimate

# Condition Assessment

Category 1: Rehabilitation Needed Immediately

Category 2: Rehabilitation Needed Within 5 – 20 Years

Category 3: Rehabilitation for Cosmetic Reasons Only

Category 4: No Rehabilitation Required Within Next 20 Years



# Consequences of Failure

## High:

- Could Impact Ability to Meet Discharge Permit Requirements

## Medium:

- Could Increase Operability/Maintainability of Plant
- No Immediate Impact on Ability to Meet Discharge Permit Requirements

## Low:

- Minimal Impact to Operability/Maintainability of Plant
- No Immediate Impact on Ability to Meet Discharge Permit Requirements

# Preliminary Treatment

		<u>Category</u>	<u>CF</u>
<b>Screening</b>	\$541k	1	M
Add'l screen, new compactor, bypass			
<b>Grit Removal</b>		2	M
Complete rehab			
<b>1<sup>st</sup> Floor Corroded Piping</b>		2	H
Blast clean, paint, replace joints			
<b>2<sup>nd</sup> Floor Corroded Piping</b>	\$ 57k	1	H
Replace			
<b>Influent Flow Meters</b>	\$136k	3	L
Replace mag meters			



# Emergency Storage

1 / M

Repaint

\$194k each



# Oxidation Ditches

## Blowers

Replacement Under Separate Project

## Mixers

Replacement Under Separate Project

## RAS Piping

Interconnection Between Oxidation Ditches

3 / H

Leaking Wall Castings \$ 13k

Air Sparger Rings \$ 64k

Replace

1 / H

Effluent Flow Meters \$ 66k

Replace

Effluent Valves \$110k

Replace



# Secondary Clarifiers

## Mechanisms (center column and drive)

- T-3B replaced 2010
- T-3A replaced 2011

## Other Items \$134k

- Inspection of Steel Components
- Blast and Repaint
- Replace Squeegees

1 / H



# Disinfection

Sodium Hypochlorite Mixers

2 / H

Raise Weirs

1

\$ 7k

Replace Cl<sub>2</sub> Analyzers

1

\$ 25k

Additional Feed Points

1



# Post Aeration

- Assumed no DO limit in new NPDES permit
- Utilize tanks for new plant effluent pumps



# Sludge Pumps

## Three Existing Activated Sludge Pumps

### Return Activated Sludge

- Pumps and VFDs \$ 273k

1 / H

### Flow Meters

- RAS \$ 22k
- WAS \$ 7k

1 / H

### Waste Activated Sludge

\$ 6k

- Flow Control Valve on Discharge Manifold 1 / H



# Aerobic Digestion

## Convert to Aerated Sludge Holding Tank

Mixers: Replacement Under Separate Project

Blowers: 1 / L

## Miscellaneous

- Clean
- Blast and Recoat Structural Steel
- Replace Small Diameter Corroded Piping
- Tank Drain Improvements
  - o Diversion to Plant Drain Pumping Station Not Recommended
  - o New Sump with Permanent Pumps



# Sludge Thickening/Dewatering

## Abandon Existing Gravity Thickener

- Aerated Sludge Holding Tank can provide approximately same level of thickening
- Eliminates replacement of equipment Nearing the end of its useful life

## Existing Dewatering System

- Never completely commissioned
- Not in use
- Equipment obsolete



# Scum Handling

## Scum Pit Locations

- Adjacent to Activated Sludge Pumping Station
- Gravity Thickener (proposed for abandonment)

Scum Pumps

1 / L

Scum Mixers

1 / L

} Recirculating type submersible pump  
\$ 107k

# Chemical Feed Systems

## Replacing All Chemical Feed Pumps Plant-Wide with Peristaltic Pumps

- **Ferric Chloride:** Replace (planned O&M) 1 / H
- **Sodium Hypochlorite:** Replace (planned O&M) 1 / H
- **Sodium Bisulfite:** Replace (planned O&M) 1 / H
- **Soda Ash:** Replace with NaOH 1 / H \$ 938k
  
- **Lime silo demo** \$ 69k



# Plant Drain System

Three Existing Constant Speed Pumps	2 / L
Completely Redundant Installed Spare	
Replace two pumps	\$ 53k

Additional Evaluation Required to Verify Adequate Capacity for Planned Improvements

# Power

## Distribution system

### Existing

- Delmarva Power dual feed system
- Auto switching station
- Redundant feeders
- Generally good condition but some component failures
- Replacement parts not available

### New

- In environmentally controlled bldg
- \$ 2,397k

## Emergency Power

### Existing

None

### New

Diesel Genset

Weather enclosure

\$ 920k



# Structures, Buildings and Site

## Structural

- Top of vertical walls \$ 124k
- Side walls \$ 32k

## Building Assessments

(Structural / Architectural / HVAC / Plumbing)

- Control and Sludge Dewatering Bldg \$ 475k
- Microscreen Building \$ 450k
- Blower Building \$ 238k
- Activated Sludge Pumping Station \$ 240k
- Preliminary Treatment Facility \$ 369k
- Chemical and Blower Building \$126k
- New Maintenance Building \$ 279k

Site Settling \$ 266k



# Filtration Alternatives

Alternative **F-1**: Cloth Disc Filters

Alternative **F-2**: Continuous Backwash Filters

Alternative **F-3**: Traveling Bridge Filters



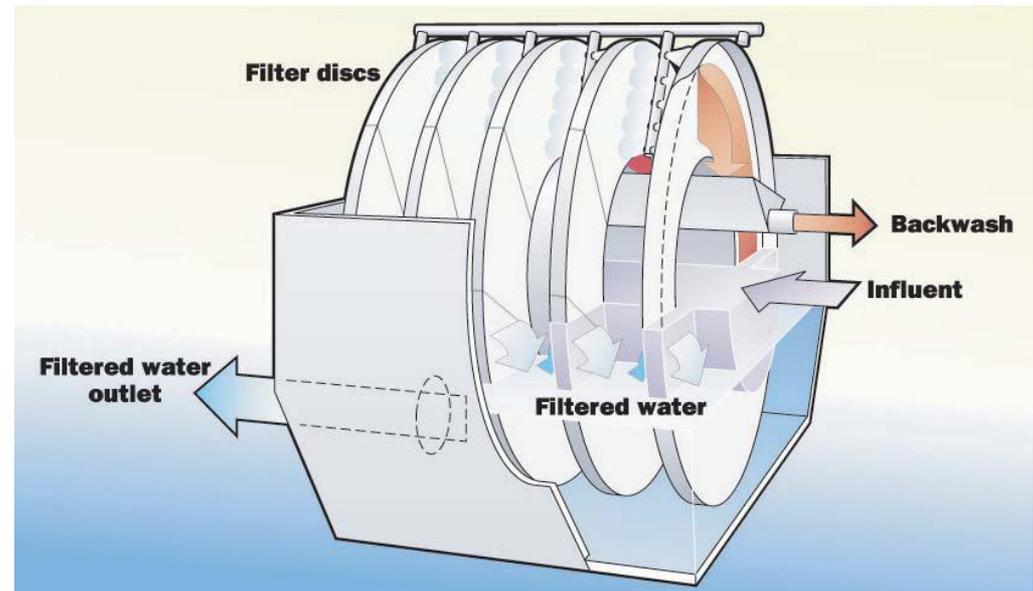
# Alternative F-1: Cloth Disc Filters

## Advantages

- Low Headloss (No Additional Pumping)
- Can be Installed in Existing Microscreen Building
- Continuous operation
- Competitively bid

## Disadvantages

- Sequence of Construction
- False Floor to Provide Access



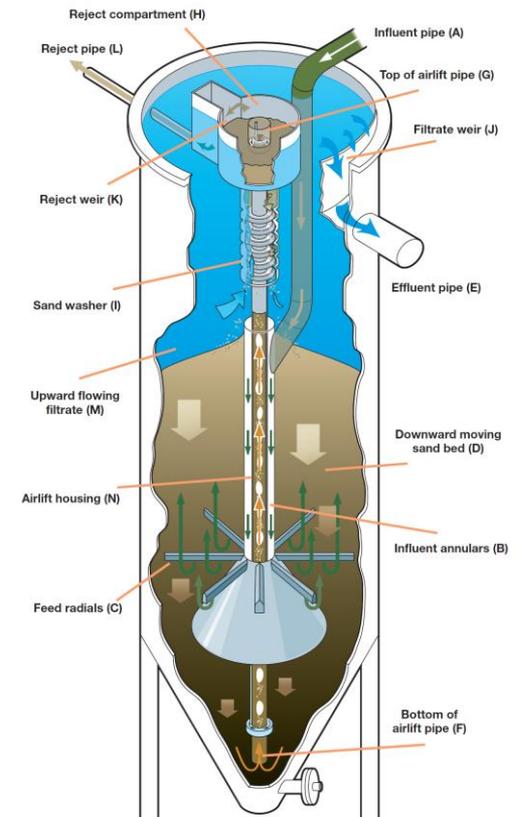
# Alternative F-2: Continuous Backwash Filters

## Advantages

- Well proven technology
- Continuous operation
- Competitively bid

## Disadvantages

- Significant Headloss
- Requires New Structures
  - Filtration Tank
  - Pumping Station
- Sequence of Construction
- Disturb Existing Plant Road



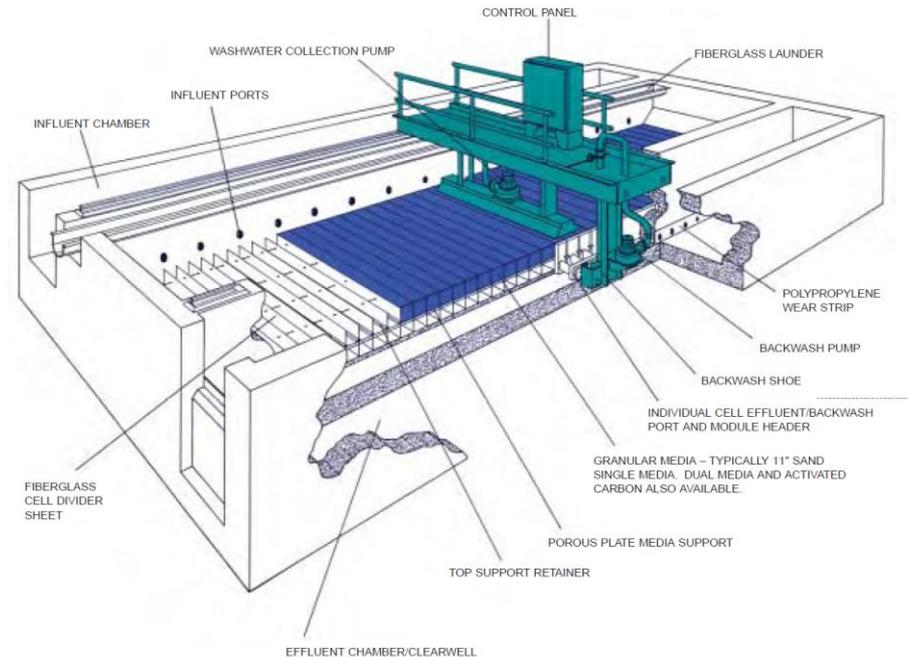
# Alternative F-3: Traveling Bridge Filters

## Advantage:

- Low Headloss
- Continuous operation
- Competitively bid

## Disadvantages

- Requires New Structures
  - Filtration Tank
  - Pumping Station
- Sequence of Construction
- Disturb Existing Plant Road



# Anticipated Costs

<b>Alternative</b>	<b>Capital Cost</b>	<b>20-Year Life Cycle Cost</b>
F-1: Cloth Disc Filters	\$1,722,000	\$2,284,000
F-2: Continuous Backwash Filters	\$4,043,000	\$4,946,000
F-3: Traveling Bridge Filters	\$3,860,000	\$5,105,000

# Biosolids Treatment and Disposal Alternatives

Alternative **B-1**: Liquid Disposal of Class B Biosolids Product

Alternative **B-2**: Autothermophilic Aerobic Digestion (ATAD)

Alternative **B-3**: Lime Pasteurization

Alternative **B-4**: Solids Drying

Alternative **B-5**: Outsourcing Biosolids Treatment and Disposal



# Alternative B-1: Liquid Disposal of Class B Biosolids

## Maintain Existing Disposal Practices

- Convert existing Aerobic Digesters to Aerated Sludge Holding Tanks
- Abandon existing Gravity Thickeners
- Decant to thicken
- Build new Aerobic Digester confirming to Part 503 regs  
(Applies also to Alternatives B-3, B-4, and B-5)

## Advantages

- Familiar practice
- Relatively easy construction sequencing

## Disadvantages

- No reduction in labor requirements
- Does not achieve Class A product
- Pending disposal regulations could require additional disposal sites
- Does not eliminate onsite storage issues



# Alternative B-2: ATAD

## Advantages

- No supplemental heat required
- Consumes approximately half of the solids
- Existing Aerobic Digesters can be used for required tankage
- Achieves Class A product
- Reduction in labor

## Disadvantages

- Temporary facilities/treatment
- Requires odor control
- Requires additional upstream thickening (5%)
- Requires new facilities
  - ATAD equipment building
  - Sludge dewatering facility
  - Onsite sludge cake storage facility
- Includes significant amount of equipment requiring maintenance
- Sole source: Thermal Process Systems



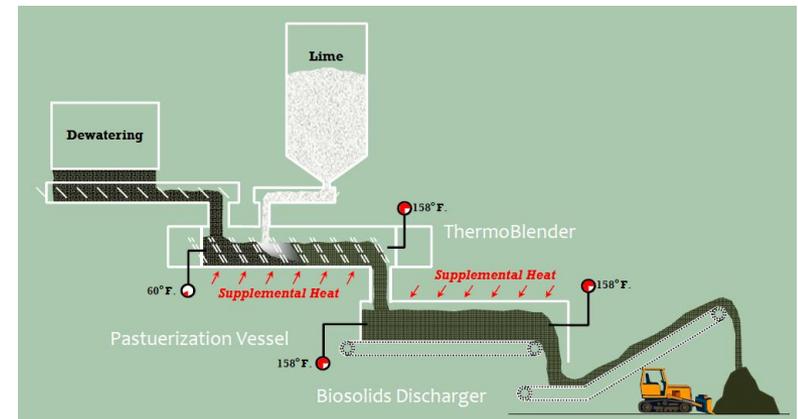
# Alternative B-3

## Advantages

- Addition of lime matches agronomic demands
- Existing systems could remain in service during construction
- Achieves Class A product
- Multiple manufacturers allow competitive bidding
- Reduction in labor

## Disadvantages

- Difficult to accommodate required size of structures onsite
  - Requires demolition of existing Gravity Thickener
  - Construction over existing plant influent force mains
  - Increase vehicular traffic at Administration Building parking lot
- Requires supplemental heat
- Requires odor control
- Requires new facilities
  - Lime Stabilization/Dewatering Building
  - Onsite Sludge Cake Storage Facility



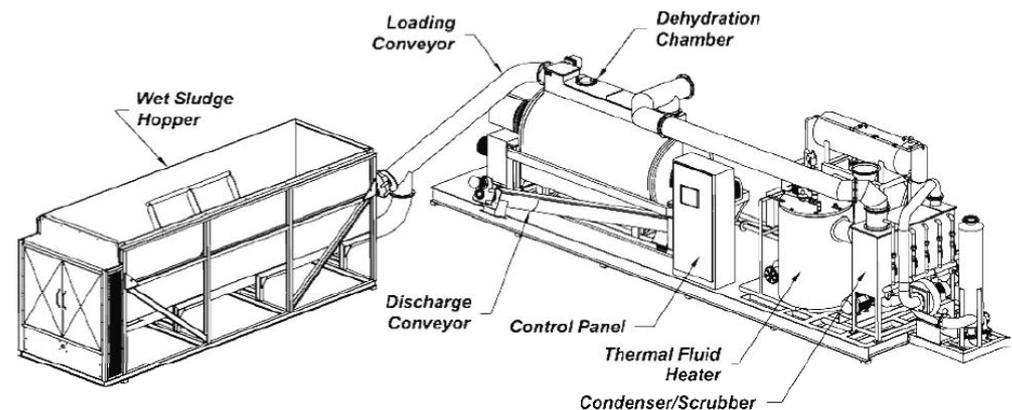
# Alternative B-4: Solids Drying

## Advantages

- Existing systems could remain In service during construction
- Achieves Class A product
- Product concentration: 90 – 95% solids
- Potentially no disposal costs
- Multiple manufacturers allow competitive bidding
- Reduction in labor

## Disadvantages

- Requires fuel Source for supplemental heat (propane)
- Requires New Facilities
  - Dewatering/Dryer Building
  - Onsite Sludge Cake Storage Facility



# Alternative B-5: Outsource Biosolids Treatment and Disposal

## Advantages

- Class of Product No Impact on Plant Operations
- Multiple Manufacturers Allow Competitive Bidding
- No Onsite Sludge Cake Storage Required
- Reduction in Labor

## Disadvantages

- Temporarily Stop Processing When Trailer Full
- Subject to Future Changes in Outside Contractor Costs
- Requires New Sludge Dewatering Facility

# Anticipated Costs

<b>Alternative</b>	<b>Capital Cost</b>	<b>20-Year Life Cycle Cost</b>
B-1: Liquid Disposal of Class B Product	\$3,746,000	\$12,258,000
B-2: ATAD	\$11,981,000	\$17,046,000
B-3: Lime Pasteurization	\$8,554,000	\$12,443,000
B-4: Solids Drying	\$8,452,000	\$12,540,000
B-5: Outsourcing Treatment and Disposal	\$5,268,000	\$8,964,000

# Project Costs

## Phase 1 Upgrades

Unit process improvements		3,692,000
Effluent filtration		1,722,000
Biosolids treatment		8,452,000
Electrical		3,317,000
Buildings		<u>2,177,000</u>
	Subtotal	19,360,000
Escalate to 2015		<u>1,795,000</u>
Total Construction		21,155,000
Engineering	Design (8%)	1,549,000
	Construction (5%)	1,058,000
	Construction Inspection (5%)	<u>1,058,000</u>
	<b>Total Project Cost</b>	<b>\$ 24,820,000</b>





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