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
  o Filtration
  o 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

<table>
<thead>
<tr>
<th>Category</th>
<th>CF</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Screening</strong></td>
<td>$541k</td>
<td>1</td>
</tr>
<tr>
<td><strong>Grit Removal</strong></td>
<td>2</td>
<td>M</td>
</tr>
<tr>
<td><strong>1st Floor Corroded Piping</strong></td>
<td>2</td>
<td>H</td>
</tr>
<tr>
<td><strong>2nd Floor Corroded Piping</strong></td>
<td>$57k</td>
<td>1</td>
</tr>
<tr>
<td><strong>Influent Flow Meters</strong></td>
<td>$136k</td>
<td>3</td>
</tr>
</tbody>
</table>

*Image: Preliminary treatment image*
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  1 / H
  Replace

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Hypochlorite Mixers</td>
<td>2</td>
<td>$7k</td>
</tr>
<tr>
<td>Raise Weirs</td>
<td>1</td>
<td>$7k</td>
</tr>
<tr>
<td>Replace Cl2 Analyzers</td>
<td>1</td>
<td>$25k</td>
</tr>
<tr>
<td>Additional Feed Points</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
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 1 / H
- Pumps and VFDs $273k

Flow Meters 1 / H
- RAS $22k
- WAS $7k

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 Reccoat 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
Completely Redundant Installed Spare
Replace two pumps

2 / L
$ 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
  o Filtration Tank
  o 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

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Capital Cost</th>
<th>20-Year Life Cycle Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-1: Cloth Disc Filters</td>
<td>$1,722,000</td>
<td>$2,284,000</td>
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<tr>
<td>F-2: Continuous Backwash Filters</td>
<td>$4,043,000</td>
<td>$4,946,000</td>
</tr>
<tr>
<td>F-3: Traveling Bridge Filters</td>
<td>$3,860,000</td>
<td>$5,105,000</td>
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</table>
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
  o Dewatering/Dryer Building
  o 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

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

### Phase 1 Upgrades

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