Future generations will inherit clean waterways and be able to keep them clean.
Our History
Our History

1607 Capt John Smith arrives

1600 1700 1800 1900 2000

People pollute Chesapeake Bay

Shellfish beds condemned
Clean Water Act passed
Bay TMDL

HRSD created
Bay partnership formed
Who/What is HRSD?

• A political subdivision of the Commonwealth
• Truly a regional entity – no direct connection to local governments
• Governed by an 8 member Commission appointed by the Governor
• Independent rate setting authority with appeal rights through State Corporation Commission
• Very focused mission – *We protect public health and the waters of Hampton Roads by treating wastewater effectively.*
<table>
<thead>
<tr>
<th>City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Beach</td>
<td>447021</td>
</tr>
<tr>
<td>Norfolk</td>
<td>245782</td>
</tr>
<tr>
<td>Chesapeake</td>
<td>228417</td>
</tr>
<tr>
<td>Newport News</td>
<td>180726</td>
</tr>
<tr>
<td>Hampton</td>
<td>136836</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>96470</td>
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<tr>
<td>Suffolk</td>
<td>85181</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>15167</td>
</tr>
<tr>
<td>Poquoson</td>
<td>12097</td>
</tr>
<tr>
<td>Smithfield</td>
<td>8130</td>
</tr>
<tr>
<td>8 Counties</td>
<td>220000</td>
</tr>
<tr>
<td>Description</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Population served</td>
<td>1.6 million</td>
</tr>
<tr>
<td>Accounts</td>
<td>460,000</td>
</tr>
<tr>
<td>Average daily flow (FY 15)</td>
<td>151 MGD</td>
</tr>
<tr>
<td>Aggregate plant capacity</td>
<td>250 MGD</td>
</tr>
<tr>
<td>FY 16 operating budget</td>
<td>$141 M</td>
</tr>
<tr>
<td>FY 16 cash funded capital</td>
<td>$40 M</td>
</tr>
<tr>
<td>FY 16 debt service/reserve</td>
<td>$60 M</td>
</tr>
<tr>
<td>FY 16 Cap Ex</td>
<td>$155M</td>
</tr>
<tr>
<td>10 year CIP</td>
<td>$1.4 B</td>
</tr>
<tr>
<td>20 year CIP forecast</td>
<td>$4.2 B</td>
</tr>
<tr>
<td>Rate per CCF</td>
<td>$4.13</td>
</tr>
</tbody>
</table>
## HRSD Small Communities by the Numbers

<table>
<thead>
<tr>
<th></th>
<th>Middle Pen</th>
<th>% of HRSD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>42,000</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Accounts</strong></td>
<td>2,500</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Average Daily Flow</strong></td>
<td>0.4 mgd</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Plant Capacity</strong></td>
<td>0.775 mgd</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>HRSD Staff</strong></td>
<td>21</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Budget</strong></td>
<td>$1.5 M</td>
<td>1.0%</td>
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</tbody>
</table>
HRSD Treatment Plants

Atlantic (54 mgd)
Virginia Initiative Plant (40 mgd)
Nansemond (30 mgd)
Boat Harbor (25 mgd)
Army Base (18 mgd)
Chesapeake Elizabeth (24 mgd)
Williamsburg (22.5 mgd)
James River (20 mgd)
York River (15 mgd)
West Point (.6 mgd)
Central Middlesex (.025 mgd)
Urbanna (.1 mgd)
King William (.05 mgd)
Our History
Impact of Clean Water Act

- CWA included largest Federally funded construction grant program in history
  - Built treatment plants and piping systems throughout the country
  - 1972 – 1980s
  - Much of that infrastructure is reaching end of useful life
  - No Federal funding available for replacement/modernization
Clean Water Act Construction Grant Program
Challenges

• Increasingly demanding regulatory requirements
  – Nutrient reductions – Chesapeake Bay TMDL
  – Sewer overflow Federal Consent Decree
• Aging infrastructure
• Declining per capita water consumption
• Affordability
• Growth in areas outside of sewered areas
Pollution Sources

Wastewater loads based on measured discharges; the rest are based on an average-hydrology year. Does not include loads from direct deposition to tidal waters, tidal shoreline erosion or the ocean. Data and Methods: www.chesapeakebay.net/status_reducingpollution.aspx
Sewer Overflows
Sewer Overflows

- Treated
- Billed
Annual capital expenditures ($ millions)
Business Challenges - Affordability

- Affordability

Est Monthly Bill
Inflation Based Estimated Bill
• More efficient nutrient removal
• Resource recovery
• Reuse of water
• Energy production
Looking for cost effective service expansion
Long term issues with maintenance of infrastructure
  – Are we doomed to repeat the past?
Projected labor shortage
  – Challenge to garner interest in trades
Opportunities for reuse closer to customer – less water to move and treat
Plumbing and Toilets thru the Ages

- 2800 BC: Indus Valley Civilization toilets
- 1800 BC
- 800 BC: Roman sewers
- 200 AD: Modern flush toilet
- 1200: Dry Earth Toilets
• More people in the world have cell phones than access to toilets
• 2.6 billion people lack even a simple “improved” latrine
• 1.6 million people die each year from diarrheal diseases (90% are children under 5 years old)
Gates Foundation – Reinvent the Toilet Challenge

• Removes germs and recovers resources
• Operates off the grid – no connection to water, sewer, electricity
• Promotes sustainable and financially profitable sanitation services and businesses
• Is a truly aspirational next generation product
Study underway in Middlesex County
Mathews transmission force main
• 4 separate areas
• Total of approximately 500 EDU to serve
• Estimated capital cost approximately $18K/EDU
  – Equates to $1,500 per pound TN removal based on septic system contribution in Bay model
• Long narrow county that is low and flat
  – Requires vacuum or low pressure solutions
• Opposition and permitting challenges require spray or drip irrigation discharge solution
Options all looked at systems in the 25 – 50K gpd capacity range

Variations on treatment theme
  – MBBR
  – Package plants with easy expansion capability – modular solution

HRSD has issued follow on task to look at smaller distributed systems
  – Potentially on-site types for groups of properties or small developments
West Point – 600,000
Urbanna – 100,000 gpd
King William – 50,000 gpd
Central Middlesex – 25,000 gpd
Service to remote development parcels
Grinder pump vaults
On-site water recycling

• Challenging for business model based on water consumption
  – Consumption reduced but waste load delivered to plants is same
  – 100% on-site works if no capacity as back up has to be provided – think electric utilities and solar

• Brock Environmental Center
  – Pump and haul leachate

• HRSD Operations Center on Air Rail
  – Rain water harvesting for flushing
  – Urine separation
Decentralized systems role in large utilities

- Important tool to address smaller, remote sites
- Can accommodate phased growth
- Challenged to compete with large system unit prices due to economies of scale
- Loss of revenue could be challenging
- Other centralized system needs may trump use of decentralized system
- No silver bullet – sure could use one!
Questions?