Chickahominy Riverfront Park
Raw Water Intake and
Water Treatment Facility
Public Information Meeting

July 25, 2016
PERMITS THAT DETERMINE AVAILABLE WATER CAPACITY

GROUNDWATER WITHDRAWAL PERMIT
ANNUAL AVG = 8.8 MGD
MAX MONTH = 11.8 MGD

WATERWORKS OPERATION PERMIT
MAX = 9.973 MGD
Why do we need a new water supply?

Eastern Virginia Groundwater Management Area

- Declining groundwater levels
- Advancing salt water intrusion
- Land subsidence

JCSA Permitted Groundwater Withdrawal Reduction
(DEQ Proposal: 8.8 mgd reduced to 3.8-4.0 mgd)
JCSA Water Supply

Existing Supply

<table>
<thead>
<tr>
<th>Production Facility</th>
<th>DEQ Annual Withdrawal (mgd)</th>
<th>VDH Capacity (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five Forks WTP</td>
<td>5.9</td>
<td>5.000</td>
</tr>
<tr>
<td>7 Well Locations</td>
<td>2.9</td>
<td>4.973</td>
</tr>
<tr>
<td>Owens-Illinois</td>
<td></td>
<td></td>
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<tr>
<td>Stonehouse</td>
<td></td>
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<tr>
<td>Ford’s Colony</td>
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<td>Kristiansands</td>
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<tr>
<td>The Pottery</td>
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<tr>
<td>Canterbury Hills</td>
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<tr>
<td>Ewell Hall and Olde Towne Road</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>8.8</strong></td>
<td><strong>9.973</strong></td>
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</tbody>
</table>

Potential Future Water Supply

Newport News Waterworks (NNWW) Purchase Agreement = 2 mgd (drought condition)*

*JCSA infrastructure improvements required for delivery.
Average water demand is projected to increase.
Future demand will exceed existing permitted capacity.
Reduction in DEQ permitted groundwater withdrawal to 4.0 mgd will result in immediate deficit.
Reduction in DEQ permitted groundwater withdrawal to 4.0 mgd impacts VDH permitted maximum capacity.
Water Supply Alternatives

- No Action
- Water Conservation Only
- Alternative Water Supply with Water Conservation
Water Conservation Measures – Already in Effect

- Water conservation and drought management program
- Install low water use fixtures – Building Code
- Irrigation management – Outdoor Water Use Ordinance
- Rebate programs
  - Rain Sensor
  - Rain Barrel
  - Rebate programs for Water Smart landscapes, cisterns, “on-demand” hot water re-circulators, and high-efficiency toilet, washing machine, and dishwasher replacements
- Tiered water rate structure
- Public education – Let’s Be Water Smart Program
Alternative Water Supply Considerations with Water Conservation

Previous Efforts
- Ware Creek Reservoir (local)
- Regional Raw Water Study Group Alternatives
- King William Reservoir (regional)

Short-Term
- Newport News Waterworks

Long-Term
- Chickahominy River
- James River
- York River

Alternatives Deemed Inadequate
- Five Forks WTF Expansion with Riverbank Filtration
- Cranston’s Mill Pond
Water Supply Alternatives

Long-Term Water Supply Alternatives

Chickahominy River
James River
York River
James River

**Existing Withdrawals**

- Public water supply (upstream) = 4
- Commercial/Industrial (including 5 upstream) = 6

**Existing VPDES Discharges** = 7

Legend:
- VPDES Permit Facilities
- EPA STORET Monitoring Station
- USGS Monitoring Stations
- NWVW Monitoring Station
- Water Facility
- Concentrate Main

Land Use:
- Federal Parcel
- State Parcel
- Occupied County Parcel
- Vacant County Parcel
- Vacant Private Parcels
- Primary Service Area

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Sources: Esri, HERE, DeLorme, USGS, Intermap, iNFO3D, increment P Corp, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.
York River

Existing Withdrawal (approx. 21 miles downstream of proposed intake)

Yorktown Fossil Power Plant (cooling water)

Existing VPDES Discharges (approx. 10 miles upstream of proposed intake)

Pulp mill owned by Rocktenn CD LLC – West Point

HRSD West Point sewage treatment plant
Chickahominy River

Existing Withdrawal

Newport News Waterworks (NNWW)
- Above Walker’s Dam
- Drainage area = 301 sq mi
- Average river flow = 180 mgd
- MIF = 10 cfs (6.5 mgd)

Existing VPDES Discharge

Hideaway Sewage Treatment Plant (Mount Airy)
How was site selected?

Evaluation Criteria

- Land Availability
- Flow Availability
- Water Quality
  - Ambient
  - Existing VPDES Discharges
- Existing Withdrawals
- Impact to Downstream Users
- Environmental Impacts
- Construction and O&M Costs
Chickahominy Riverfront Park

Chickahominy River (tidal flow)
Conceptual Site Plan – Raw Water Intake

![Diagram of Raw Water Intake Site with various elements labeled such as '7' Diameter Intake Screen (Typical of 3)', 'Raw Water Pump Station', '30" Raw Water Main', '36" Raw water main and 10" air backwash supply line (typical of 3)', 'Chickahominy River (Tidal Flow)', 'Colonial Pipeline', '100 Year Flood Event', '2016 Field Data Waterbird Survey', 'Non-Jurisdictional (pending USACE confirmation)', 'Jurisdictional (pending USACE confirmation)']
Raw Water Intake Profile

NOTES:
1. MHW AND MLW LEVEL BASED ON NOAA SEWELL'S POINT MONITORING DATA.
2. MINIMUM LOW WATER LEVEL BASED ON 1 DAY, 50-YR RECURRENCE, NOAA SEWELL'S POINT MONITORING DATA.
## Ways to Mitigate Impacts

<table>
<thead>
<tr>
<th>Category</th>
<th>Mitigation Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetic Quality (Scenic River)</td>
<td>• Submerged intake and pipe</td>
</tr>
<tr>
<td>Aquatic Life/Anadromous Fish/Atlantic Sturgeon</td>
<td>• Impingement/entrapment prevention (1.0 mm screen mesh; 0.25 fps flow-through velocity)</td>
</tr>
<tr>
<td></td>
<td>• Instream work time of year restriction</td>
</tr>
<tr>
<td></td>
<td>• Modeling to determine impact of withdrawal and concentrate discharge on salinity gradient</td>
</tr>
<tr>
<td>Archaeological Resources</td>
<td>• Locating treatment facility on east side to avoid impact to archaeological resources primarily on west side</td>
</tr>
<tr>
<td></td>
<td>• Coordination with DHR and potential field surveys</td>
</tr>
<tr>
<td>Botanical Significance</td>
<td>• Locating intake away from cypress-gum swamp forests and bottomland hardwood forests on south shore of Gordon Creek and submerged aquatic vegetation (SAV) beds</td>
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</tbody>
</table>
Ways to Mitigate Impacts

**Navigation**
- Intake and pipe located closer to shore than midstream
- Intake velocities low compared to normal flow – no noticeable effect on navigation due to river flow changes
- Work with Coast Guard on type of hazard warning requirements

**Parks and Recreation**
- Locate treatment facility on east side of property to try to preserve recreational use (boat launch access and open field)

**Existing Discharge Assimilation**
- Tidally influenced, low-velocity, low-volume withdrawal not anticipated to appreciably affect river’s ability to assimilate discharges from upstream sources
Beneficial Impacts

Groundwater
- Reduces withdrawal from Eastern Virginia Groundwater Management Area, allowing for aquifer recharge
- Replenishing aquifer improves baseflow for perennial streams in Chickahominy River watershed

Water Supply
- Public water supply to meet long-term projected demands of James City County residents
References

- http://www.jamescitycountyva.gov/611/James-City-Service-Authority
Questions/Comments
Archaeological Resources
FEMA 100-Yr Flood Elevation
Submerged Aquatic Vegetation Beds (SAVs)

Figure 1. Submerged aquatic vegetation beds 2013-2015 (Virginia Institute of Marine Science)
## Raw Water Quality

<table>
<thead>
<tr>
<th>Location</th>
<th>TDS, Average (mg/L)</th>
<th>TDS, Max (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickahominy River at Brickyard Landing</td>
<td>1,100</td>
<td>7,000</td>
</tr>
<tr>
<td>Chickahominy Riverfront Park</td>
<td>1,700</td>
<td>8,800</td>
</tr>
<tr>
<td>James River</td>
<td>5,600</td>
<td>12,500</td>
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<tr>
<td>York River</td>
<td>10,000</td>
<td>16,820</td>
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</table>
## Cost Estimates

<table>
<thead>
<tr>
<th></th>
<th>4 mgd</th>
<th>8 mgd</th>
<th>12 mgd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickahominy Riverfront Park¹</td>
<td>$106M</td>
<td>$128M</td>
<td>$149M</td>
</tr>
<tr>
<td>Chickahominy River at Brickyard Landing¹</td>
<td>$106M</td>
<td>$127M</td>
<td>$148M</td>
</tr>
<tr>
<td>James River²</td>
<td>$99M</td>
<td>$122M</td>
<td>$144M</td>
</tr>
<tr>
<td>York River¹</td>
<td>$113M</td>
<td>$138M</td>
<td>$162M</td>
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</tbody>
</table>

**Notes:**
1. Need to refine cost for concentrate discharge main after location is identified.
2. Need to refine cost for RW transmission, concentrate discharge main, and finished water main after site is identified.
NNWW Cost

MB = Mounts Bay Road Interconnection
LT = Lightfoot Connection

Scenario A: MB=2 mgd
  Infrastructure = $6M

Scenario B: MB = 2mgd, LT = 2 mgd
  2nd Payment w/debt service: $60M
  Infrastructure Improvements: 15M
  Disinfection Improvements: 2M
  Total: $77M

Scenario C: LT = 4 mgd
  2nd Payment w/debt service: $60M
  Infrastructure Improvements: 17M
  Disinfection Improvements: 2M
  Total: $79M