City of Astoria
Source Water Protection

Benefits & Challenges of a Municipally-Owned Watershed for Drinking Water

December 12, 2018
Astoria’s Water System Features

- Watershed
- Watershed Reservoirs & Dams
- Water Treatment Facility
- Water Transmission Main
- In-town Reservoirs
- Water Distribution System
Watershed Facts

- Approximately 3,700 acres
- Located about 12 miles east of Astoria, near Svensen
- Original 500 acres purchased in 1891 along with water system from Columbia Water Company (Private)
- Remaining 3,200 acres purchased from Crown Zellerbach between 1936 and 1954
- Current forest volume is 100 million board feet (MMBF)
- Current annual growth rate is 4 percent
- Current annual harvest rate is approximately 1 percent
- Forest has been FSC (Forest Stewardship Council) certified since 2003
- In 2016 & 2017 the City sold approximately $2 million in Carbon Credits
Drinking Water Treatment System
Drinking Water Slow Sand Filter Treatment System

- Slow Sand Filter System Built in 1993
- Economical method to treat drinking water
- Must meet state testing standards
- Need to re-sand filters every 5–6 years
- Currently at capacity of 4 million gallons per day in peak demand season which is summer fish processing season
Bear Creek Dam Today
Built in 1911 (75’) & raised in 1953 (15’)

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Source Water Storage Details

- **Bear Creek Dam (Main Lake)**
  - Storage capacity of 200 million gallons
  - Water must be pumped from lake to slow sand filter system
  - Completed seismic stability evaluation in 2016

- **Middle Lake Dam & Reservoir**
  - Storage capacity of 52 million gallons
  - Gravity feeds to system

- **Wickiup Lake Dam & Reservoir**
  - Storage capacity of 59 million gallons
  - Gravity feeds to system

Total of approximately 80–150 day supply
Drinking Water Transmission Main

- Delivers drinking water to city limits and multiple other wholesale water systems
- Last built in 1963 (4th generation pipe)
- 12 miles from Bear Creek Watershed to City
- Enters at Reservoir 3
- Recent resiliency study performed to identify vulnerable areas consisting of landslides and erosion hot spots
Wood Stave Pipe
<table>
<thead>
<tr>
<th></th>
<th>Reservoir No. 2</th>
<th>Reservoir No. 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Volume (gal)</strong></td>
<td>6 million</td>
<td>20 million</td>
</tr>
<tr>
<td><strong>Year Built</strong></td>
<td>1895</td>
<td>1919</td>
</tr>
<tr>
<td><strong>Depth (ft)</strong></td>
<td>17.3</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Construction Type</strong></td>
<td>Brick</td>
<td>Concrete</td>
</tr>
<tr>
<td><strong>Lining Date</strong></td>
<td>1980’s</td>
<td>1970’s</td>
</tr>
</tbody>
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Reservoir 2 – Before and After
Reservoir #3 Liner and Cover
Water Distribution System
Water Distribution System Features

- Approximately 80 miles of water line
- 4 booster pump station and a 131,000 gallon tank to serve higher elevations of city
- Some pipes as old as 1895 (1883 pipes all replaced)
- 3,900 water meters
- 448 fire hydrants
- Over a thousand control valves in system
Practices for Assuring Safe Drinking Water

- Protect drinking water source
- Practice effective water treatment
- Conduct regular monitoring for contaminants
- Protect distribution piping system & finished water storage
- Practice competent water system operation, maintenance and construction

From DEQ Source Water Assessment
Implementation of Practices

- **Protect drinking water source**
  - No public access
  - Dams are inspected annually
  - Well planned timber harvest projects
  - Proactive erosion control measures during projects
  - Proactive road maintenance program

- **Practice effective water treatment**
  - Manage water circulation & draw from 5 sources to optimize water quality
  - Optimization efforts examined periodically
  - Strict slow sand filter cleaning process

- **Conduct regular monitoring for contaminants**
  - Testing program taken very seriously
  - Proactive testing to avoid future issues
  - Use of UV254 instrument to check for organic compounds indicating potential DBP generation after filtering
  - Measure pH to determine potential for biological growth
Implementation of Practices Cont’d

- Protect distribution piping system & finished water storage
  - Finished water reservoir covers (built 9 years ago)
  - Proactive inspection and cleaning of reservoirs
  - Periodic inspections of susceptible areas

- Practice competent water system operation, maintenance and construction
  - Total Coliform and E. coli testing weekly
  - Full time Water Source Operator living on-site
  - Operations procedures are reviewed and discussed often
  - No pesticides or herbicides use in watershed
  - Maintenance is a priority over the many other pressing needs in our small underfunded system
  - Construction projects are well planned between engineering and operations staff
Benefits and Challenges

- Benefits of drinking water source ownership
  - Less worries about other land owners – need to have good relationships and communication with neighbors
  - Minimal public education since the public is not allowed in our watershed – controlled access
  - No pollution generators to deal with
  - Minimal spill response concerns – contractors use vegetable based hydraulic fluids
  - No land use zoning issues – except our own activities that sometimes require county permits

- Challenges of a Municipally Owned Watershed
  - There is no one to blame but yourself if something goes wrong
  - Trespassing especially during hunting season
Questions?