Trout Run Well Development Wetland Maintenance & Monitoring Plan

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Who Is American Water
We are the largest publicly traded water and wastewater utility in the United States

- Broad national footprint and strong local presence
- Services to an estimated 14 million people in more than 1,500 communities in more than 30 states and parts of Canada
- Approx. 6,700 dedicated and active employees
- Treats and delivers more than one billion gallons of water daily
Our Company

- Subsidiary of American Water Works Co. Inc.
- Roots date back to early 1800s, Incorporated in 1904
- Largest regulated water and wastewater service provider in PA
- Serving approximately 2.2 million people in 36 counties
- Approximately 1,000 employees
- Customer base:
  - 640,000 water customers
    - 92% residential
    - 7% commercial
    - 1% industrial/other
  - 17,500 wastewater customers
Pennsylvania American Water Service Area

Serving 17 percent of the Commonwealth’s population

Note: Service areas current as of September 2013.
Our Pennsylvania Infrastructure

Source of Supply
• 92% surface water
• 7% groundwater
• 1% purchased water
• 54 regulated dams
• 121 groundwater well sources

Treatment Facilities
• 36 surface water plants
  ▪ 32 facilities received Directors Award from Partnership for Safe Water
• 9 wastewater plants

Storage & Transmission
• 279 water storage tanks
• 253 booster pumping stations

Distribution System
• 10,115 miles of water and sewer pipe

Water Capacity
• 193 MGD average daily delivery

Wastewater Capacity
• 11.7 MGD permitted
## Philipsburg System Overview

<table>
<thead>
<tr>
<th><strong>Customers Served</strong></th>
<th>7,526 customer connections (population 22,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communities Served</strong></td>
<td>Boggs, Bradford, Decatur, Graham, Morris and Rush Townships; and Chester Hill, Osceola Mills, Philipsburg and South Philipsburg Boroughs, in Centre and Clearfield Counties.</td>
</tr>
<tr>
<td><strong>Source of Supply</strong></td>
<td>Cold Stream Reservoir, Blue Spring and 5 Wells</td>
</tr>
<tr>
<td><strong>Water Treatment Plant</strong></td>
<td>3.8 MGD (million gallons per day)</td>
</tr>
<tr>
<td><strong>Miles of Main</strong></td>
<td>275 miles (4” to 20” diameter)</td>
</tr>
<tr>
<td><strong>Employees</strong></td>
<td>12 full-time</td>
</tr>
<tr>
<td><strong>Partnership Award</strong></td>
<td>Received the 10-Year Directors Award from the EPA Partnership for Safe Water and are still an active partner in the program. Philipsburg was the first Pennsylvania American Water treatment facility to receive the Directors Award.</td>
</tr>
</tbody>
</table>
Comprehensive Planning Study 1997

- Identified a source of supply deficit
- Created by regionalization efforts & growth
- Regionalization – 6 acquisitions of trouble systems
- Growth – Public / Private partnerships.
- Project initiated to find additional 0.98 mgd groundwater
Feasibility Study Completed 1998

- Target aquifer was identified
- Target Area identified within 0.5 miles of existing system
- Evaluate level of mining disturbance in Target Area
- 14 potential Target Areas were identified
- Water quality problems identified as major selection criteria
- PAWC Osceola Property selected
Trout Run Wellfield Pumping Tests

- **Two Production Wells sited by Meiser & Earl, Inc.**
  - Drilled and constructed in the Burgoon Formation
  - December 1998 - January 1999

- **Production Well TR-1**
  - Total depth: 248 feet
  - Static Water Level: ~44 feet below top of casing
  - Blown yield: 600 gallons per minute
  - Pumping Test Rate: 400 gpm
  - Permitted Rate: 0.53 million gallons per day (Average 368 gpm)

- **Production Well TR-2**
  - Total depth: 300 feet
  - Static Water Level: ~64 feet below top of casing
  - Blown yield: 1000 gallons per minute
  - Pumping Test Rate: 700 gpm
  - Permitted Rate: 0.98 million gallons per day (Average 680 gpm)
Trout Run Wellfield Pumping Test Impacts

• **Wetland Piezometer Impact:**
  - Water level decreases in Meadows Wetland

• **Spring Impact:**
  - Flow reduced by 0 to 55 gallons per minute

• **Trout Run and Minnie Run Impact:**
  - Predicted cumulative impact of 250 gallons per minute (approximately 10%)

• **Groundwater Flow System Impact:**
  - Water level lowered in the vicinity of the production wells

• **Wetland Monitoring and Maintenance Plan**
  - Consulted with SRBC and PADEP
### Wetland Augmentation Rate

**Augmentation Rates**
- Natural Recession, Pumping Impact, and Precipitation

<table>
<thead>
<tr>
<th>Wetland</th>
<th>Rise per 1 inch of Precipitation (inches)</th>
<th>Recession per day (inches)</th>
<th>Augmentation Rate (inches)</th>
<th>Wetland Size (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-2 Wetland Corridor</td>
<td>1.8</td>
<td>1.9</td>
<td>1.1</td>
<td>0.48</td>
</tr>
<tr>
<td>SP-4 Wetland Corridor</td>
<td>8.1</td>
<td>1.0</td>
<td>0.12 (0.5*)</td>
<td>0.19</td>
</tr>
<tr>
<td>Meadows Wetland</td>
<td>2.5</td>
<td>1.2</td>
<td>0.5</td>
<td>1.03</td>
</tr>
</tbody>
</table>

*Increased to 0.5 in. to make sure that the water was enough to soak soil*
Pennsylvania American Water Company
Trout Run Wetland Monitoring
MP-5 Water Level (Feet BPVC)

- Augmentation Trigger Level 1.94 Feet BPVC
- Wetland Hydrology Unit Depth 2.27' BPVC (12'' BGS)

- MP-5 Water Level (Feet BPVC) - Precipitation (inches)
Augmentation Season

- Wetlands Require Inundated/Saturated Soil
- **Total Plant Growing Season**: April 12 to October 26
  - Based on USACE Method
- **Trout Run are Seasonally Saturated Wetlands**
  - Inundated/saturated 12.5 – 25% Growing Season (25-50 days)
  - Site Specific Data (April to May generally above 12 inches)
- **Wetland Augmentation During the Evening**
<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Average</th>
<th>Median</th>
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</thead>
<tbody>
<tr>
<td>12&quot; BGS in April</td>
<td>--</td>
<td>100</td>
<td>79</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
<tr>
<td>12&quot; BGS in May</td>
<td>--</td>
<td>83</td>
<td>68</td>
<td>87</td>
<td>100</td>
<td>91</td>
<td>86</td>
<td>87</td>
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<tr>
<td>12&quot; BGS in June</td>
<td>40</td>
<td>59</td>
<td>81</td>
<td>85</td>
<td>66</td>
<td>86</td>
<td>70</td>
<td>74</td>
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<tr>
<td>10&quot; BGS in April</td>
<td>--</td>
<td>100</td>
<td>65</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>93</td>
<td>100</td>
</tr>
<tr>
<td>10&quot; BGS in May</td>
<td>--</td>
<td>67</td>
<td>62</td>
<td>79</td>
<td>100</td>
<td>82</td>
<td>78</td>
<td>79</td>
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<tr>
<td>10&quot; BGS in June</td>
<td>17</td>
<td>52</td>
<td>66</td>
<td>79</td>
<td>45</td>
<td>73</td>
<td>55</td>
<td>59</td>
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<tr>
<td>8&quot; BGS in April</td>
<td>--</td>
<td>95</td>
<td>48</td>
<td>100</td>
<td>95</td>
<td>87</td>
<td>85</td>
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<td>8&quot; BGS in May</td>
<td>--</td>
<td>38</td>
<td>46</td>
<td>73</td>
<td>90</td>
<td>69</td>
<td>63</td>
<td>69</td>
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<tr>
<td>8&quot; BGS in June</td>
<td>4</td>
<td>30</td>
<td>55</td>
<td>71</td>
<td>26</td>
<td>51</td>
<td>40</td>
<td>41</td>
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<tr>
<td>6&quot; BGS in April</td>
<td>--</td>
<td>36</td>
<td>31</td>
<td>100</td>
<td>58</td>
<td>39</td>
<td>53</td>
<td>39</td>
</tr>
<tr>
<td>6&quot; BGS in May</td>
<td>--</td>
<td>17</td>
<td>26</td>
<td>63</td>
<td>77</td>
<td>50</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>6&quot; BGS in June</td>
<td>0</td>
<td>17</td>
<td>34</td>
<td>61</td>
<td>13</td>
<td>28</td>
<td>26</td>
<td>23</td>
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<tr>
<td>4&quot; BGS in April</td>
<td>--</td>
<td>6</td>
<td>10</td>
<td>100</td>
<td>23</td>
<td>12</td>
<td>30</td>
<td>12</td>
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<tr>
<td>4&quot; BGS in May</td>
<td>--</td>
<td>1</td>
<td>8</td>
<td>43</td>
<td>38</td>
<td>16</td>
<td>21</td>
<td>16</td>
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<tr>
<td>4&quot; BGS in June</td>
<td>0</td>
<td>6</td>
<td>14</td>
<td>50</td>
<td>1</td>
<td>11</td>
<td>14</td>
<td>9</td>
</tr>
</tbody>
</table>

April analyses are from the 12th to 30th. May and June analyses are of the entire month.
Augmentation Delivery System
Operational Considerations

• Monitored Piezometers (April to June)

• Developed Water Level Triggers for Operation
  ▪ Triggers are within 12 inches from ground surface

• Operated Augmentation Delivery System
  ▪ Rarely needed in past three years
  ▪ Precipitation provides enough runoff

• Future Operations will be automated

• Does It Work?
Wetland Monitoring

• June Monitoring

• Wetland Boundary Survey
  ▪ Permanent benchmarks

• Seven Monitoring Locations
  ▪ 1 m² Vegetation Plots
  ▪ 100 m² Tree and Shrub Counts
Wentworth Index

• Based on Wentworth et. al. 1983
• Stem counts for species dominance
  ▪ # stems per species/total # of stems in plot
• Weighted values using USFWS Wetland Plant Indicators
  ▪ **Obligate**- almost always in wetlands; **Value=1**
  ▪ **Facultative Wetland**- usually in wetlands; **Value=2**
  ▪ **Facultative**- either wetlands or uplands; **Value=3**
  ▪ **Facultative Upland**- usually in uplands; **Value=4**
  ▪ **Upland**- almost never in wetlands; **Value=5**
• Total the weighted values to get plot Wentworth Index
Wetland Monitoring Results

• Pre-Well Operation Monitoring
  ▪ Averaged the Wentworth Values for Baseline
  ▪ Natural Variability

• Well Operation Monitoring
  ▪ 2006-2010 (< permitted rate)
  ▪ 2011-2013 (permitted rate)

<table>
<thead>
<tr>
<th>Wetland Area</th>
<th>Sample Plot</th>
<th>WI Value Baseline</th>
<th>Wetter Community Transition Threshold</th>
<th>Drier Community Transition Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP-2</td>
<td>Vegetation Plot 1</td>
<td>2.53 (FAC+)</td>
<td>1.83 (FACW+)</td>
<td>3.51 (FACU+)</td>
</tr>
<tr>
<td></td>
<td>Vegetation Plot 2</td>
<td>1.35 (OBL)</td>
<td>N/A</td>
<td>2.18 (FACW-)</td>
</tr>
<tr>
<td>SP-4</td>
<td>Vegetation Plot 1</td>
<td>1.55 (FACW+)</td>
<td>N/A</td>
<td>2.51 (FAC+)</td>
</tr>
<tr>
<td>SP-7</td>
<td>Vegetation Plot 1</td>
<td>2.28 (FACW-)</td>
<td>1.49 (OBL)</td>
<td>3.18 (FAC-)</td>
</tr>
<tr>
<td></td>
<td>Vegetation Plot 2</td>
<td>1.59 (FACW+)</td>
<td>N/A</td>
<td>2.51 (FAC+)</td>
</tr>
<tr>
<td>SP-8</td>
<td>Vegetation Plot 1</td>
<td>2.14 (FACW)</td>
<td>N/A</td>
<td>3.17 (FAC)</td>
</tr>
<tr>
<td></td>
<td>Vegetation Plot 2</td>
<td>2.67 (FAC+)</td>
<td>1.83 (FACW+)</td>
<td>3.84 (FACU+)</td>
</tr>
</tbody>
</table>
Wetland Monitoring Summary

Wentworth Index Values 2001, 2004-2013

- UPL
- OBL

Year


Wentworth Value
Successful Results

- Pennsylvania American found a supply of clean water
- Groundwater levels could be maintained by irrigation
- Wetlands were not impacted by pumping
Questions

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