Christina Basin
Water Resource Protection Area Overlay Program
Mar 7, 2012

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Water Resources Agency
Newark, Del.
Delaware is downstream from NY, PA, and NJ in the Delaware River Basin.

The DRBC was formed by JFK.

DRBC is led by 4 Governors and U.S. Army Corps of Engineers who are Commissioners.

The DRBC protects Delaware water supply interests.
60% of Del. drinking water is from Christina Basin.

2/3 of Del. surface water supply is from Pa.
Northern New Castle County

- Population unchanged through 2030.
- Over 2/3 of surface water flows from Pa.
- 75% surface water/25% groundwater
- Served by 6 systems: 4 public, 2 private
- Over 2 billion gallons of water storage developed since droughts of 1999/2002.
- Almost 1 billion gallons of surplus storage.
- Surface water quality is improving but N and PCBs remain.
- 54% of drinking water watersheds protected in NCC.
New Castle County Water Supply

Northern NCC
surface water, 94 mgd (66%)
ground water, 33 mgd (23%)

Southern NCC
groundwater, 15 mgd (11%)
60% of Delaware’s drinking water is from streams and wells in the Christina Basin:

- Brandywine Creek
- Red Clay Creek
- White Clay Creek
- Christina River
The NCC Unified Devel. Code and public/private open space protect 54% of the source watershed:

* Brandywine Cr. (46%)
* White/Red Clay (59%)
* White Clay Newark (75%)
* Christina River (45%)
<table>
<thead>
<tr>
<th>Category</th>
<th>Brandywine Creek at Wilmington</th>
<th>White Clay/Red Clay at Stanton</th>
<th>White Clay Creek at Newark</th>
<th>Christina at Smalley’s Pond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A Wellhead</td>
<td>3.3</td>
<td>11.3</td>
<td>0.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Class B Wellhead</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>567.6</td>
</tr>
<tr>
<td>Class C Wellhead</td>
<td>0.0</td>
<td>989.4</td>
<td>161.1</td>
<td>1,232.0</td>
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<tr>
<td>Cockeysville Formation</td>
<td>0.0</td>
<td>1,490.2</td>
<td>0.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Cockeysville Drainage Area</td>
<td>0.0</td>
<td>6,323.6</td>
<td>62.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Recharge Areas</td>
<td>0.0</td>
<td>39.3</td>
<td>0.0</td>
<td>655.7</td>
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<tr>
<td>Erosion Prone Slopes</td>
<td>1,614.5</td>
<td>4,874.8</td>
<td>646.4</td>
<td>582.1</td>
</tr>
<tr>
<td>Slopes &gt; 15%</td>
<td>2,584.7</td>
<td>7,273.6</td>
<td>1,438.1</td>
<td>341.4</td>
</tr>
<tr>
<td>Forest</td>
<td>2,528.5</td>
<td>6,907.4</td>
<td>1,970.0</td>
<td>4,711.8</td>
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<tr>
<td>Floodplains</td>
<td>880.8</td>
<td>4,027.0</td>
<td>349.5</td>
<td>2,050.1</td>
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<tr>
<td>Wetlands</td>
<td>253.0</td>
<td>969.5</td>
<td>57.2</td>
<td>1,156.9</td>
</tr>
<tr>
<td>Riparian Buffer</td>
<td>1,873.9</td>
<td>7,427.1</td>
<td>709.3</td>
<td>4,246.1</td>
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<tr>
<td>Public/Private Open Space</td>
<td>1,857.7</td>
<td>7,966.2</td>
<td>2,445.5</td>
<td>3,203.1</td>
</tr>
<tr>
<td>Hoopes Reservoir</td>
<td>10.0</td>
<td>1,240.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Newark Reservoir</td>
<td>0.0</td>
<td>1,207.1</td>
<td>1,207.1</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Non-exclusive Total, Acres</strong></td>
<td><strong>11,606.4</strong></td>
<td><strong>50,747.0</strong></td>
<td><strong>9,047.9</strong></td>
<td><strong>18,750.6</strong></td>
</tr>
<tr>
<td><strong>Exclusive Total, Acres</strong></td>
<td><strong>5,840.4</strong></td>
<td><strong>25,334.5</strong></td>
<td><strong>3,389.1</strong></td>
<td><strong>10,291.4</strong></td>
</tr>
<tr>
<td><strong>Exclusive Total, Sq. Miles</strong></td>
<td><strong>9.1</strong></td>
<td><strong>39.6</strong></td>
<td><strong>5.3</strong></td>
<td><strong>16.1</strong></td>
</tr>
<tr>
<td>% of Watershed Protected</td>
<td>45.8%</td>
<td>59.2%</td>
<td>74.9%</td>
<td>44.6%</td>
</tr>
</tbody>
</table>
Impervious Cover

• **WRPA** – Imp. Cover 19%, up 4% since 2000.
• **UDC** - 83 sq mi or 20% of New Castle County
• **Floodplains** - 12% IC
• **Erosion Prone Slopes** - 14% IC
• **Hoopes Reservoir Watershed** - 11% IC
• **Cockeysville Formation** - 32% IC
• **Recharge Areas** – 16% IC
• **Class A Wellheads** - 37% IC
• **Class B Wellheads** - 33% IC
• **Class C Wellheads** - 29% IC
Groundwater Monitoring

- pH
- Specific Conductance
- Total Dissolved Solids (TDS)
- Chemical Oxygen Demand (COD)
- Total Organic Carbon (TOC)
- Total Carbon
- Total Petroleum Hydrocarbon (TPH)
- Inorganic Chemicals (141.11)
- Organic Chemicals (141.12)
- Turbidity (141.13)
- Volatile Organic Contaminants (141.61)
NOTE:
THIS LOCATION PLAN IS BASED ADAPTED FROM "PROPOSED SITE PLAN FOR REPROGRAPHICS FACILITY - INK
DYE RESITE PROJECT," PREPARED BY A E & C, DRAWING NO. 9370, C-1 AND DATED 5/25/93 (REV. 6/1/93)
AND "PRELIMINARY MAJOR AND SUBDIVISION LAND DEVELOPMENT PLAN, PROPERTY OF ZENECO INC./ICI AMERICAS INC.,

RECHARGE BASIN LOCATION SKETCH
ZENECO
REPROGRAPHICS FACILITY
NEW CASTLE COUNTY, DELAWARE
Figure 7.1. Public water supply and irrigation withdrawals in southern New Castle County (gallons per day).
Figure 4.1. Generalized cross section extending from near Newark to southeastern New Castle County.

Northwest - Southeast Cross Section

C & D Canal

Columbia

Mt. Laurel

Rancocas

Potomac

Magothy

Bedrock

Elevation (feet NAVD 1988)

Distance (meters)
Figure 2.2. Projected population growth in southern New Castle County.

Source: Delaware Population Consortium, October 2005
## Groundwater Quality in Del. (200 individual wells)

<table>
<thead>
<tr>
<th>% Wells</th>
<th>Pesticide</th>
<th>Metals</th>
<th>Nutrients</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;MCL</td>
<td>5%</td>
<td>16%</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>Detect</td>
<td>67%</td>
<td>95%</td>
<td>77%</td>
<td>73%</td>
</tr>
<tr>
<td>Nondetect</td>
<td>33%</td>
<td>5%</td>
<td>23%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Pellerito et al. 2008
Questions?