

DEFINITIONS
 From New Castle County Unified Development Code, Adopted on December 31, 1997, and as amended.)

COCKEYSVILLE FORMATION WATER RESOURCE PROTECTION AREAS
 The Cockeysville Formation Water Resource Protection Areas consist of: (1) areas that are directly underlain (topography by the Cockeysville Formation, and (2) land surface areas which drain to the areas underlain by the Cockeysville Formation (Cockeysville Formation Drainage Area). The Formation Water Resource Protection Areas were obtained from Plate 1 of a report prepared by the Delaware Geological Survey in 1991 titled "Summary Report, Geology and Hydrology of the Cockeysville Formation, New Castle County, Delaware". Areas draining to and across the Cockeysville Formation were derived from the U. S. Geological Survey 7.5 minute topographic quadrangle maps.

The brown areas depicted on Plate 1 in the "Summary Report" mark areas underlain by the Woodcock or Settles formation. These areas have little to no recharge to the Cockeysville Formation is considered greater than average. For land use regulation purposes, these areas are considered as being in the Cockeysville Formation Drainage Area.

The Cockeysville Formation forms environmentally sensitive areas because the rocks which comprise the formation (calcite and dolomite) are fractured and subject to dissolution. The associated complex sub-surface drainage system, potential for rapid groundwater movement, and lack of topographic relief make the groundwater in this area highly susceptible to contamination. In addition, recharge to this formation, essential for maintaining the groundwater, is limited by the relatively small outcrop areas. The Cockeysville Formation in the Hockessin area currently supports public and private water supply wells producing an average of more than 1.5 million gallons per day.

WELLHEAD WATER RESOURCE PROTECTION AREAS
 Wellhead Water Resource Protection Areas are surface and sub-surface areas surrounding public water supply wells or wellfields where the quantity or quality of groundwater moving toward such wells or wellfields may be adversely affected by land use activity. Such activity may result in a reduction of recharge or may lead to introduction of contaminants to groundwater used for public supply.

Three classes of Wellhead Water Resource Protection Areas are shown on the maps.

Class A - The area within a 300 foot radius circle around all public water supply wells which are classified as water systems, as defined by Section 22.140 (Public Water Systems) in the State of Delaware Regulations Governing Public Drinking Water Systems. Class A wells are community, transient non-community, and non-transient non-community.

Class B - The Glenoldie and Eastern States Wellfields. These Wellhead Protection Areas have been delineated through the use of hydrogeologic mapping, analytical methods, and application of U.S. EPA modular semi-analytical models using a five year time-slice of the Delaware Geological Survey as discussed in a report prepared by the Delaware Geological Survey entitled "Application of the EPA WHPA Models for Delineation of Wellhead Protection Areas in the Glenoldie and Eastern States Wellfields, New Castle County, Delaware" dated January 1993.

Class C - Wellhead Protection Areas delineated by the Delaware Geological Survey and the Delaware Department of Natural Resources and Environmental Control through the interpretation of geologic and hydrologic reports and maps, water table maps, and professional judgment. Such areas are considered preliminary designations.

SURFACE WATER RESOURCE PROTECTION AREAS
 Surface Water Resource Protection Areas consist of: (1) the areas which drain on the surface or underground to existing public water supply intakes, (2) the land surface in the Flood Plain upstream of an approved public water supply intake. The Flood Plain is comprised of the 100 year Flood Plain as defined in Article 33 of the New Castle County Unified Development Code and (a) delineated by the Federal Emergency Management Agency (2010) and (b) soils frequently and very frequently flooded mapped by the New Castle County Survey prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (2010), and (c) Erosion Prone Slopes contiguous to and draining toward a Flood Plain or a water course upstream of an approved public water supply intake. Erosion Prone Slopes consist of soils with all or part of the area are greater than or equal to 15% slopes as mapped by the New Castle County Soil Survey, prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (2010) with map unit symbols B1D, B2F, B3F, C3, G3, G4, G4D, G4E, G4F, G4G, G4H, G4I, G4J, G4K, G4L, G4M, G4N, G4O, G4P, G4Q, G4R, G4S, G4T, G4U, G4V, G4W, G4X, G4Y, G4Z, and I4.

Surface water sources are susceptible to pollutants released in proximity to and upstream of intakes or storage facilities. Currently, these sources provide approximately 70% of the daily public water supply and most of the emergency water supply for New Castle County. The drainage areas, flood plains, and erosion prone slopes were derived from the following maps and reports: (1) U. S. Geological Survey Topographic Quadrangle maps; (2) WATER 2000, Volume VII, 1984, Water Resources Agency for New Castle County (1984); (3) Digital Flood Plain Mapping, Federal Emergency Management Agency (2010); and (4) New Castle County Soil Survey, U. S. Department of Agriculture, Natural Resources Conservation Service (2010).

The drainage areas, flood plains, and erosion prone slopes were derived from the following maps and reports: (1) U. S. Geological Survey Topographic Quadrangle maps; (2) WATER 2000, Volume VII, 1984, Water Resources Agency for New Castle County (1984); (3) Digital Flood Plain Mapping, Federal Emergency Management Agency, 1997; and (4) Soil Survey of New Castle County, U. S. Department of Agriculture, 1970.

RECHARGE WATER RESOURCE PROTECTION AREAS
 Recharge Water Resource Protection Areas are designated as having excellent potential for groundwater recharge. They were delineated using methodology described in a report prepared by the Delaware Geological Survey entitled "Delineation of Ground Water Recharge Resource Protection Areas in the Coastal Plain of New Castle County, Delaware (1993)." **ACKNOWLEDGEMENTS**

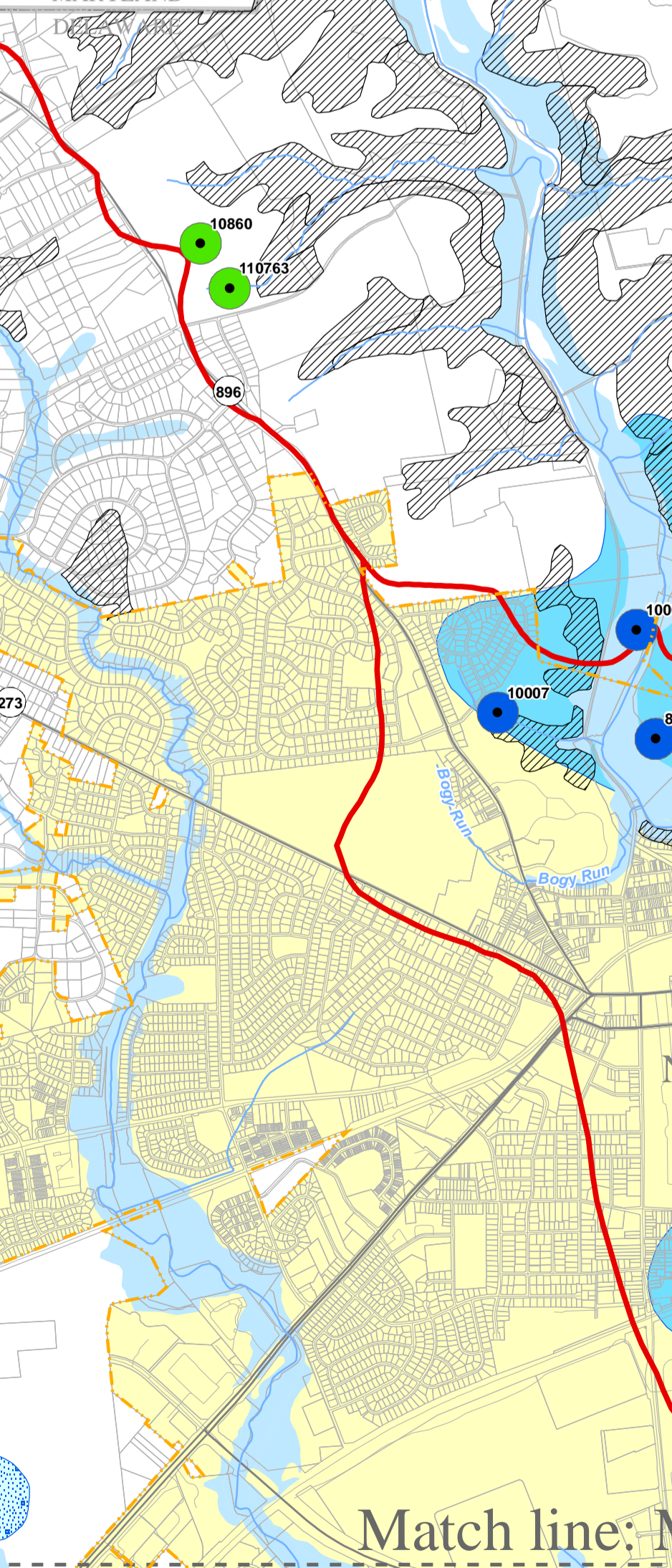
This map was prepared by the University of Delaware, Institute for Public Administration, Water Resources Agency with technical assistance from the Delaware Geological Survey, Delaware Department of Natural Resources and Environmental Control, New Castle County Department of Special Services, New Castle County Department of Land Use, New Castle County Conservation District, and the New Castle County Resource Protection Area Technical Advisory Committee. Technical reports completed by private consultants on individual development proposals were also used to revise WHPA boundaries.

REFERENCES
 New Castle County Department of Land Use, New Castle County Roads, 2011.
 Delaware Department of Natural Resources and Environmental Control, Public Surface Water Supply Intakes Database and Public Water Supply Wells Database, 2011.
 Delaware Geological Survey, Delineation of Ground-Water Recharge Resource Protection Areas in the Coastal Plain of New Castle County, Delaware, 1993.

Delaware Geological Survey, Application of the EPA WHPA Models for Delineation of Wellhead Protection Areas in the Glenoldie and Eastern States Wellfields New Castle County, Delaware, 1993.
 Delaware Geological Survey, Letter to Water Resources Agency for New Castle County, September 27, 1993.
 Delaware Geological Survey, Summary Report Geology and Hydrology of the Cockeysville Formation, New Castle County, Delaware, 1991.

Federal Emergency Management Agency, Digital Flood Plain Maps, 2010.
 New Castle County, Delaware, New Castle County Unified Development Code, adopted on December 31, 1997 and as amended.
 United States Department of Agriculture, Natural Resources Conservation Service, New Castle County Soil Survey, 2010.

United States Geological Survey, Newark East (1985), Newark West (1970), Kennett Square (1985), and Wilmington North (1973) Quadrangles.
 United States Geological Survey, Digital Line Graph (DLG) files, check this date 1993.
 Water Resources Agency for New Castle County, New Castle County Resource Protection Area Program Revision, 1987.
 New Castle County, Delaware " dated January 1993.



Match line: MAP 1
 MAP 2

Source Watersheds

— Watersheds upstream from Public Surface Water Intakes

Water Resource Protection Areas (WRPAs)

Cockeysville Formation WRPA

- [Blue hatched pattern] Outcrop
- [Orange fill] Wissahickon
- [Blue line] Drainage Area

Wellhead WRPA

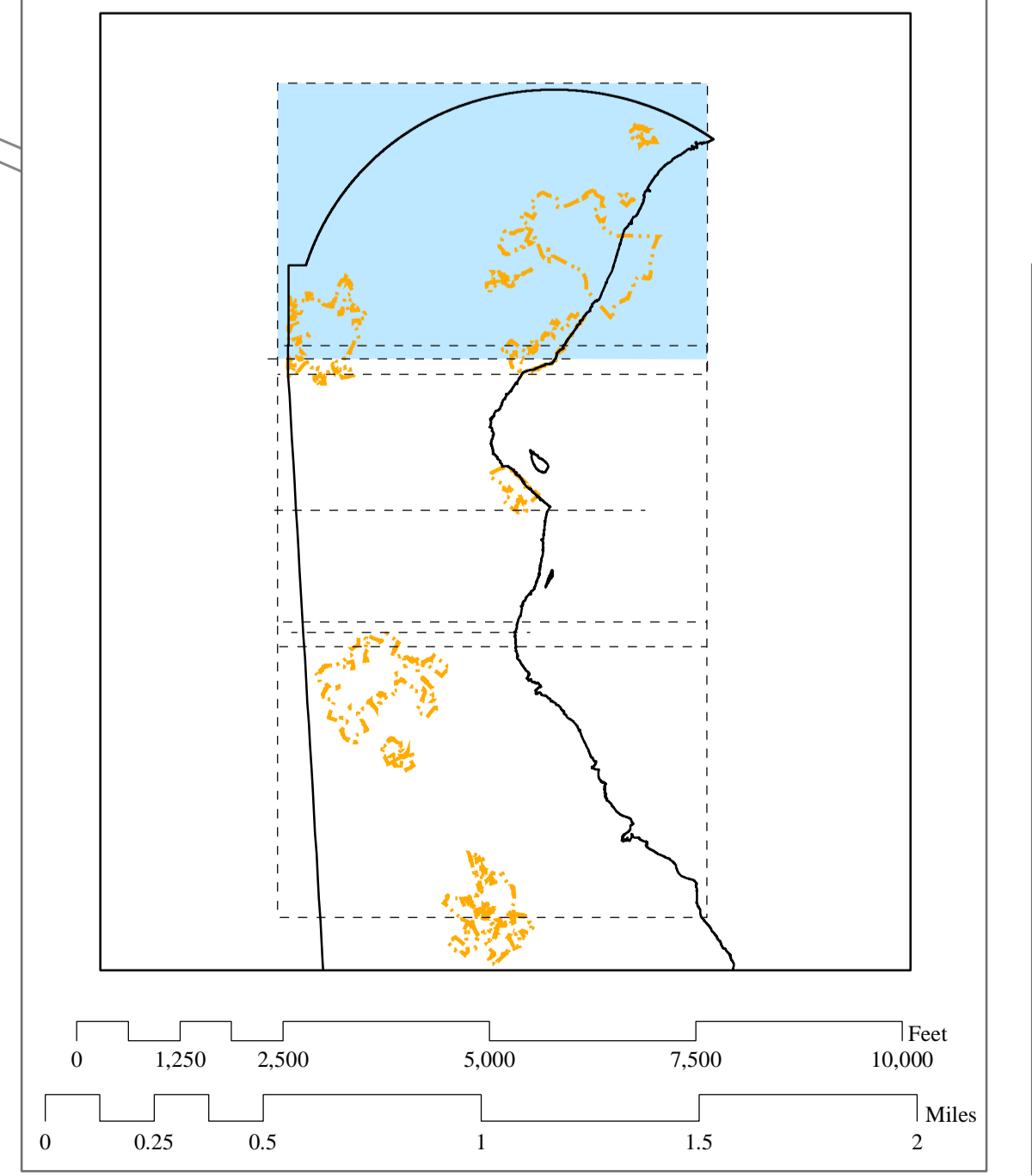
- [Blue circle with center dot] Class A WRPA
- [Blue circle] Class A WRPA - 150-foot Radius
- [Green circle with center dot] Transient, Non-Community Wells (Restaurants, Stores, Hotels, Parks, etc.)
- [Yellow circle with center dot] Non-Transient, Non-Community Wells (Schools, Daycare Centers, Office, Factory, etc.)
- [Light blue fill] Class C WRPA

Surface Water WRPA

- [Dotted blue line] Reservoir Watershed
- [Light blue fill] Flood Plains
- [Grey hatched pattern] Erosion Prone Slopes

Recharge WRPA

- [Blue dotted pattern] Recharge Areas



Water Resource Protection Areas
 for
 City of Newark
 City of Wilmington
 New Castle County
 Delaware

1987, Revised 1993, 2001, 2006, 2011 and March 2017.
 Draft - Map 1 of 3

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