Water Supply and Demand in Southern New Castle County through 2050

Draft Dec 20, 2019

Prepared for:

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1. Introduction

The University of Delaware Water Resources Center (UDWRC) was requested by the New Castle County Department of Land Use to estimate water supply and demand in Southern New Castle County through 2050. To compile these estimates, we utilized data from the Delaware Department of Natural Resources and Environmental Control (DNREC), Delaware Geological Survey (DGS), and our GIS lab. These estimates build on the *Ninth Report to the Governor and General Assembly regarding the Progress of the Delaware Water Supply Coordinating Council, Estimates of Water Supply and Demand in Southern New Castle County through 2030* (DNREC 2006).

2. Population

Population growth with conversion of agricultural land to urban/suburban uses is projected to increase demand for public water supply in southern New Castle County. The Delaware Population Consortium (2018) projected the population of New Castle County south of the C&D Canal will increase from 52,454 in 2010 to 69,634 by 2020 and almost double to 90,636 by 2050 (Table 1 and Figure 1).

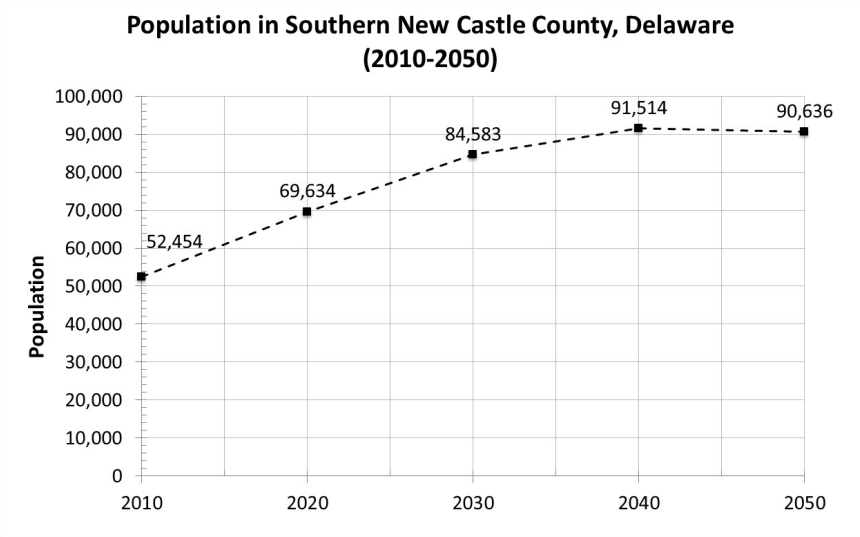

Figure 1. Projected population growth in southern New Castle County (Delaware Population Consortium 2018)

Table 1. Projected population in New Castle County through 2050 (Delaware Population Consortium 2018)

Year	NCC Population		Northern NCC Population		Southern NCC Population	
	Pop.	%	Pop.	%	Pop.	%
2010	539,211	0.0%	486,758	0.0%	52,454	0.0%
2020	571,650	3.1%	502,015	6.0%	69,634	32.8%
2030	594,225	1.5%	509,642	3.9%	84,583	21.5%
2040	603,613	0.5%	512,099	1.6%	91,514	8.2%
2050	601,726	-0.2%	511,089	-0.3%	90,636	-1.0%

3. Water Providers

A DNREC database indicates over 4,600 individual wells are dispersed throughout southern New Castle County that provide 1.5 mgd of drinking water. Over 3,100 individual wells are distributed north of the MOT area (Figure 2).

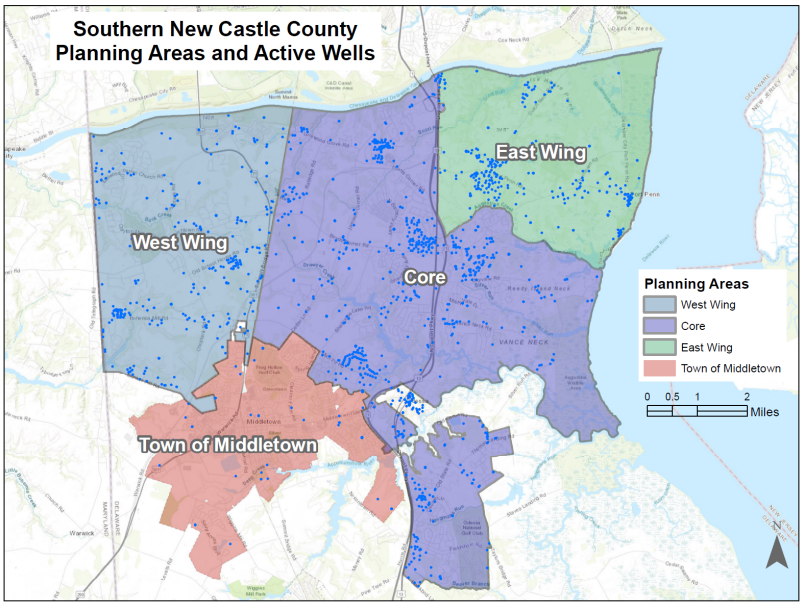

Figure 2. Individual wells in southern New Castle County

Figure 3 delineates the water supply franchise areas of purveyors in southern New Castle County. For a private water utility, and in certain circumstances a municipal water utility, to expand its service territory it must apply for and be granted a Certificate of Public Convenience and Necessity (CPCN) from the Delaware Public Service Commission. According to DNREC, the following water systems provide drinking water in southern New Castle County.

Public Community Wells
- Artesian Water Company (26 wells)
- Artesian Water Company, Delaware Correctional Center (4 wells)
- Tidewater Utilities (24 wells)
- Town of Middletown (4 wells)
- Mount Pleasant Trailer Park (2 wells)
- Cantwell Water Company (2 wells)

Self-Supplied Non-Community Wells (20 wells)
- Transient: Restaurants, stores, hotels, parks
- Non Transient: Schools, daycare centers, office, factories

Residential Individual Wells (4,600 wells)

Irrigation Water Supplies
- Farms (26 wells)
- Golf courses, nurseries (1 well)

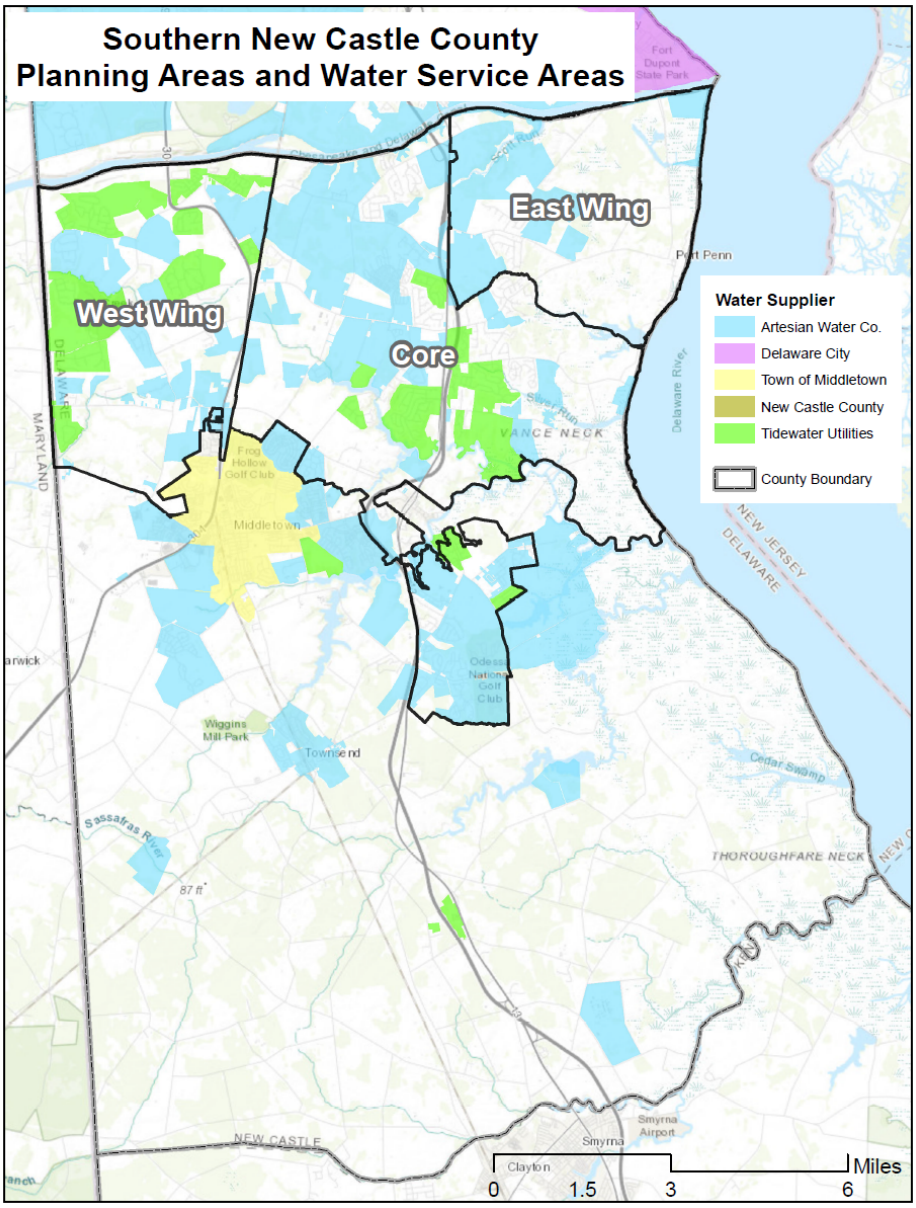

Figure 3. Public water supply franchise areas in southern New Castle County

4. Groundwater Availability

Groundwater drawn from aquifers is the sole source of drinking water in Southern New Castle County. The aquifers yield this water within a southeasterly dipping and thickening wedge of unconsolidated sediments of the Atlantic Coastal Plain (Figure 4). Ground-water in the shallow Columbia formation is drawn for irrigation and is also the source of stream flow in the watersheds (Figure 5). Deeper aquifers in the Rancocas, Mt. Laurel, Magothy, and Potomac formations are tapped by potable drinking water wells by the water purveyors. Groundwater availability in the shallow aquifers may be impacted by impaired water quality from rural sources or septic systems (high nitrogen) or salt water intrusion along Delaware Bay.

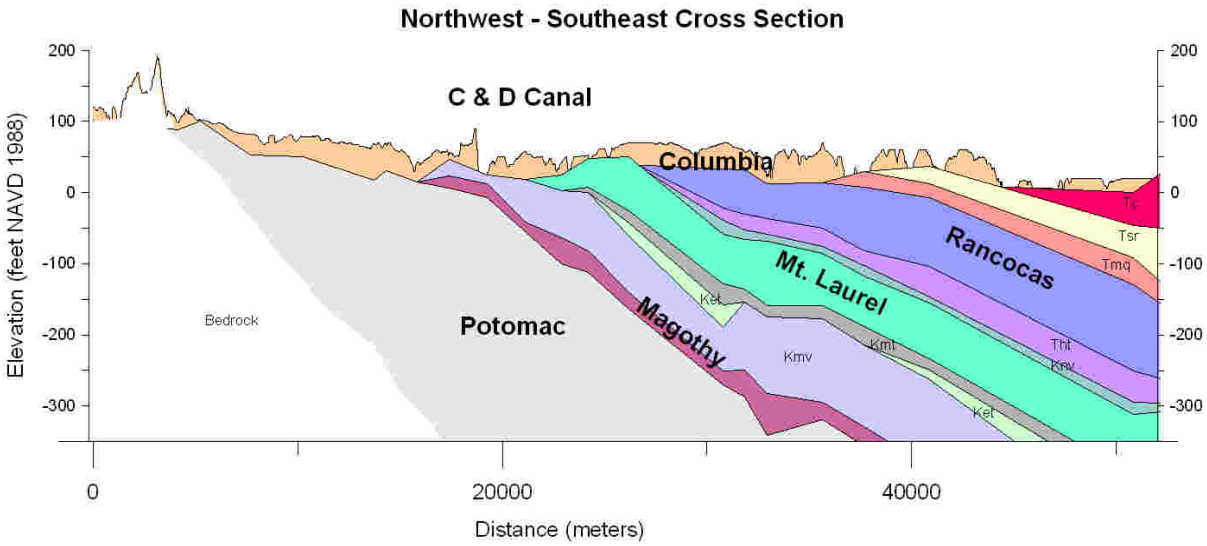

Figure 4. Cross section extending from near Newark to southeastern New Castle County.

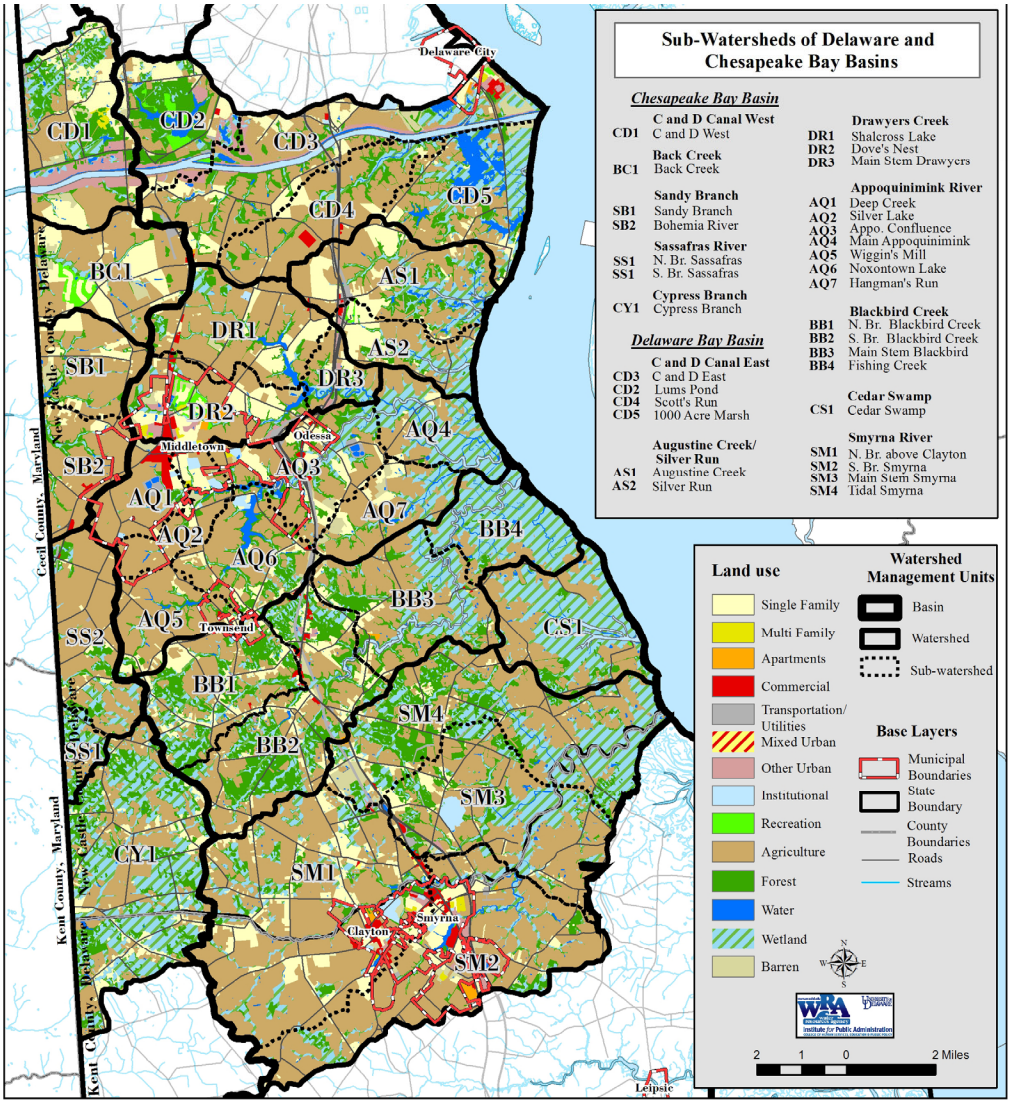

Figure 5. Watersheds in southern New Castle County

5. Water Supply

Southern New Castle County is served by (1) potable water supplies from public community wells, self-supplied wells, and residential individual wells and 2) non-potable farm, nursery and golf course irrigation wells (Table 2 and Figure 6). With continued of agriculture to urban/suburban land, irrigation water demands for farms and nurseries in southern New Castle County are not projected to increase.

Table 2. Maximum allocated ground-water supplies in southern New Castle County.

Water System	Daily Supply (mgd)	Monthly Supply (mgd)	Annual Supply (mgd)	Nonpotable Supply (mgd)
Artesian Water Company	8.8	7.3	6.7	
AWC: DE Correctional Center	2.1	2.1	2.1	
Tidewater Utilities, Inc.	2.7	2.5	1.3	
Middletown	1.7	1.7	1.5	
Mt. Pleasant Trailer Park	0.02	0.02	0.01	
Cantwell Water Company	0.04	0.03	0.02	
Self-Supplied Non-Community Wells	0.3	0.2	0.1	
Public Water Supply	**15.7**	**13.9**	**11.7**	
Residential Individual Wells	1.5	1.5	1.5	
Farms, Nurseries				9.7
Golf Courses				0.3
Total	**17.2**	**15.4**	**13.2**	**10.0**

6. Water Demand

Population in southern New Castle County is projected to increase by 173% from 52,454 in 2010 to 90,636 by 2050 (DPC 2018). Table 3 projects public water demands through 2050 assuming increases in demands coincide with population growth. The population of 52,454 in 2010 included 14,530 people on individual wells who are subtracted to calculate the population who depend on public water systems. Water demands at the Delaware Correctional Center are not expected to increase. Under the New Castle County UDC, new communities with 25 homes or more will be served by public water systems, therefore, we project little increase (0.5%) in individual wells in southern New Castle County.

Table 3. Public water demand in southern New Castle County (2010-2050)

Year	2010	2020	2030	2040	2050
% increase in population	--	32.8%	21.5%	8.2%	-1.00%
Population	52,454	69,634	84,583	91,514	90,636
Less population individual wells	14,530	15,266	16,039	16,500	16,650
Population public water supply	37,924	54,368	68,544	75,014	73,986
% increase public water supply		43.3%	26.1%	9.4%	-1.0%
Water Purveyor	**(mgd)**	**(mgd)**	**(mgd)**	**(mgd)**	**(mgd)**
Artesian Water Co.	2.3	3.3	4.1	4.5	4.5
AWC: DE Correctional Center	2.1	2.1	2.1	2.1	2.1
Tidewater Utilities	1.7	2.4	3.1	3.3	3.3
Middletown	1.7	2.4	3.1	3.3	3.3
Self-Supplied Non-Community Wells	0.4	0.4	0.4	0.4	0.4
Peak Daily Public Water Demand	**8.2**	**10.6**	**12.8**	**13.6**	**13.6**
Individual Wells (0.5% /yr)	1.5	1.6	1.7	1.8	1.9
Potable Peak Daily Demand	**9.7**	**12.2**	**14.5**	**15.4**	**15.5**

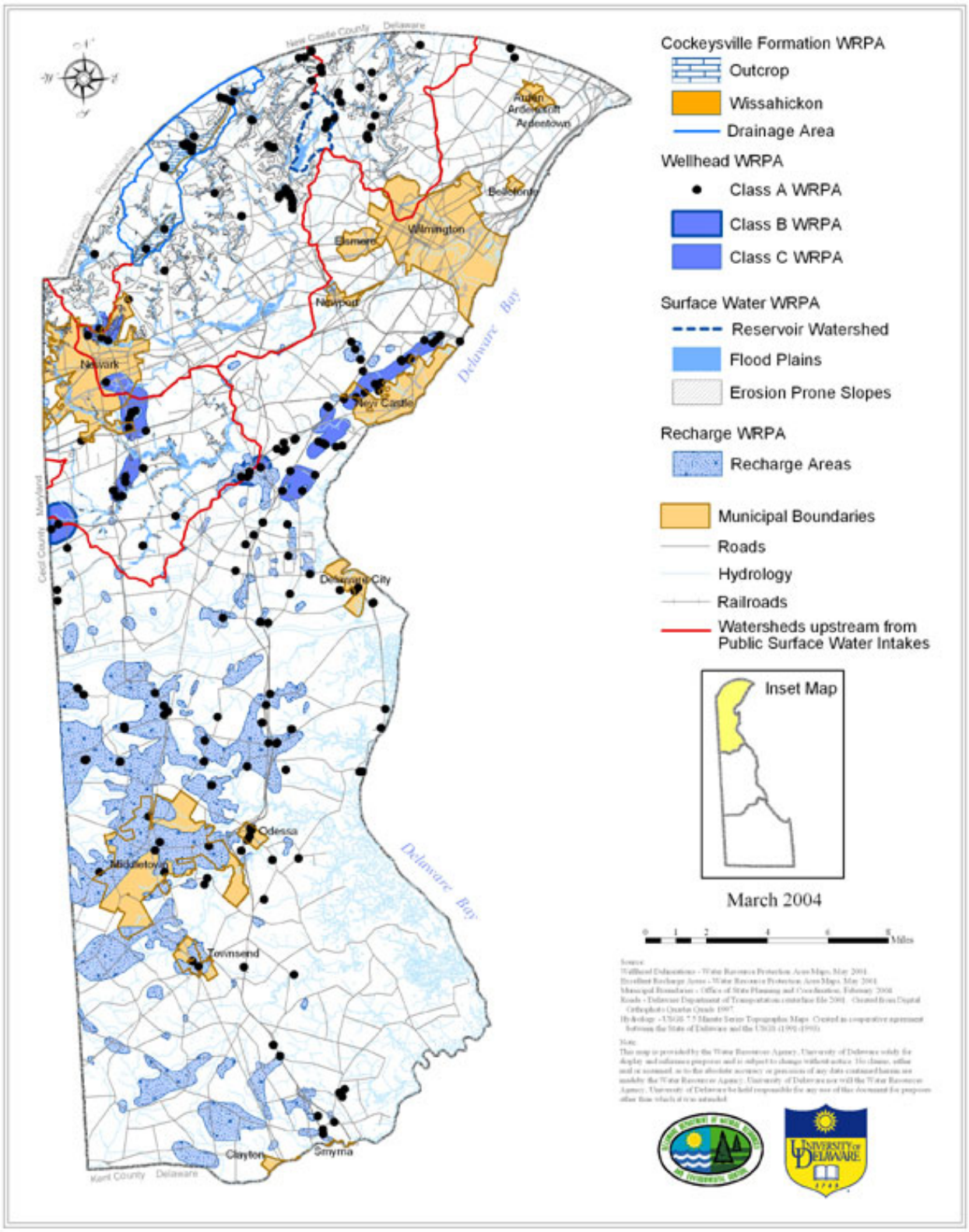

Figure 6. Public water supplies in New Castle County

7. Water Supply and Demand

Table 4 compares water supply and demand for public water purveyors for existing (2010) and future (2050) population conditions. In 2010, public water suppliers had existing supplies (15.7 mgd) that exceed peak daily demands (8.2 mgd) thus accounting for a healthy surplus (+7.5 mgd). By 2050, the public water purveyors are projected to have supplies (15.7 mgd) that exceed the forecasted peak daily demand (13.6 mgd) for a surplus of 2.1 mgd. Surplus/deficit calculations are based upon peak daily supplies in accordance with current DNREC water allocation permits. Water purveyors will apply for additional allocations to meet projected demands particularly in the Tidewater Utilities and Middletown service areas. Since this analysis compares peak day supply and demands with average ground-water availability, these projections conservatively indicate that public water purveyors are comfortably equipped to meet future peak water demands by 2050 in southern New Castle County.

Table 4. Water supply and demand in southern New Castle County (2010-2050)

Water Purveyor	Current Max Daily Allocation (mgd)	2010 Peak Day Demand (mgd)	2010 Surplus / Deficit (mgd)	Current Max Daily Allocation (mgd)	2050 Peak Day Demand (mgd)	2050 Surplus / Deficit (mgd)
Artesian Water Co.	8.8	2.3	6.5	8.8	4.5	4.3
AWC: DE Correctional Center	2.1	2.1	0.0	2.1	2.1	0.0
Tidewater Utilities, Inc.	2.7	1.7	1.0	2.7	3.3	-0.6
Middletown	1.7	1.7	0.0	1.7	3.3	-1.6
Self-Supplied	0.4	0.4	0.0	0.4	0.4	0.0
Public Water Supply	**15.7**	**8.2**	**7.5**	**15.7**	**13.6**	**2.1**
Individual Wells	1.5	1.5	0.0	1.9	1.9	0.0
Total Potable Water	**17.2**	**9.7**	**7.5**	**17.6**	**15.5**	**2.1**

The projections (Figure 7) indicate there is sufficient supply (17.6 mgd) to meet demand (15.5 mgd) in 2050 from public water supply in southern New Castle County provided DNREC continues to monitor public water supply and irrigation wells during the summers so as not to diminish the capacity of producers who wish to remain competitive and sustain agriculture in southern New Castle County.

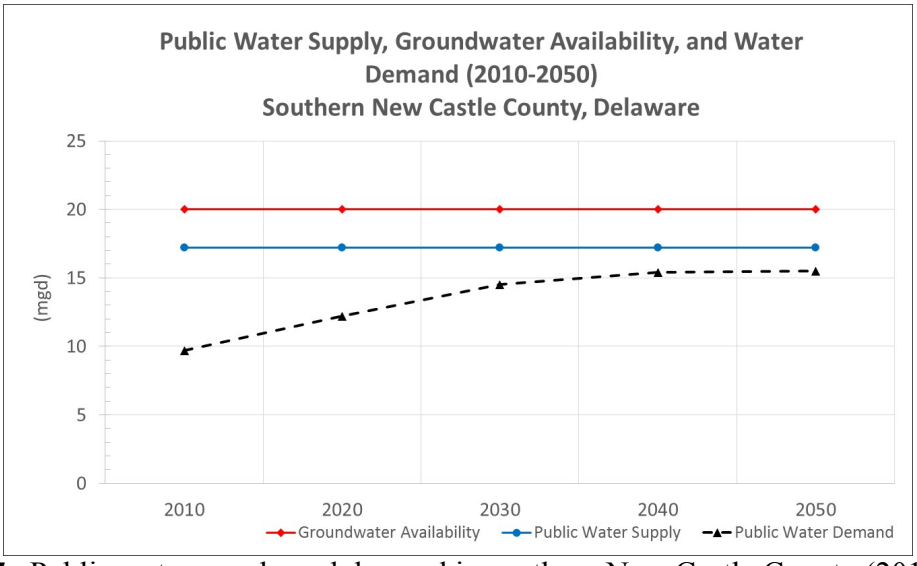

Figure 7. Public water supply and demand in southern New Castle County (2010-2050)

8. Conclusions/Recommendations

To protect the quantity and quality of aquifers that provide sole source drinking water and to manage water supplies by the principles of contiguity and compactness, subdivisions should be served by public water systems rather than by individual wells. The New Castle County Unified Development Code (Section 40.12.115) requires that subdivisions with more than 25 lots should be served by public water systems. New Castle County should work with public water suppliers to hook up public water systems to neighborhoods with more than 25 lots that are presently served by individual wells to bring these areas in to compliance with the UDC.

The population of southern New Castle County is expected to nearly double from 52,454 in 2010 to 90,635 by 2050, thus the demand for public water supply is projected to increase at a similar rate. In 2010 there was sufficient ground-water availability to meet peak demands from public water supply uses. By 2050, the projections indicate there will be sufficient public water supply to meet peak water demands provided that:

- Public water supply and irrigation wells are pumped in accordance with Delaware Department of Natural Resources and Environmental Control (DNREC) water allocation limits. DNREC should continue to monitor demands and water levels from allocated public water supply wells and irrigation wells so as not to diminish the capacity of irrigation wells for producers that wish to sustain farming in southern New Castle County.

- Water purveyors interconnect between and within systems, add new finished water storage and aquifer storage and recovery, and transport water from aquifers with excess availability south of Townsend to growth areas between Middletown/Odessa and the Chesapeake & Delaware Canal (Figure 8).

9. References

Delaware Department of Natural Resources and Environmental Control, 2006. Ninth Report to the Governor and General Assembly Regarding the Progress of the Delaware Water Supply Coordinating Council, Estimates of Water Supply and Demand in Southern New Castle County through 2030.

Delaware Population Consortium. 2018. New Castle County Population Allocations.

New Castle County Department of Land Use. December 31, 1997, amended May 2019. Unified Development Code.

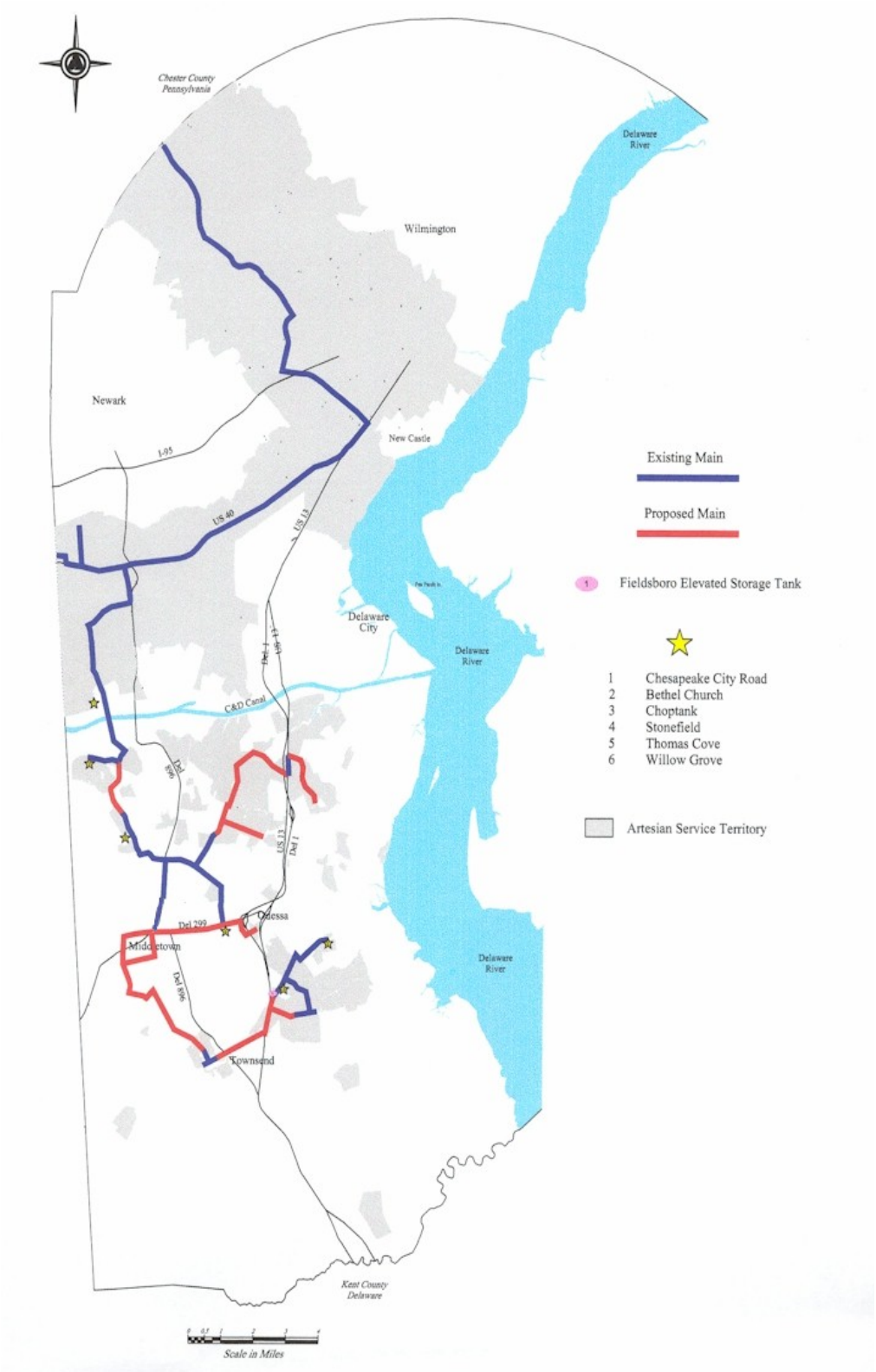

Figure 8. Interconnected public water system in southern New Castle County