Photo by Steve Droter, Chesapeake Bay Program: https://flic.kr/p/2eMDazG
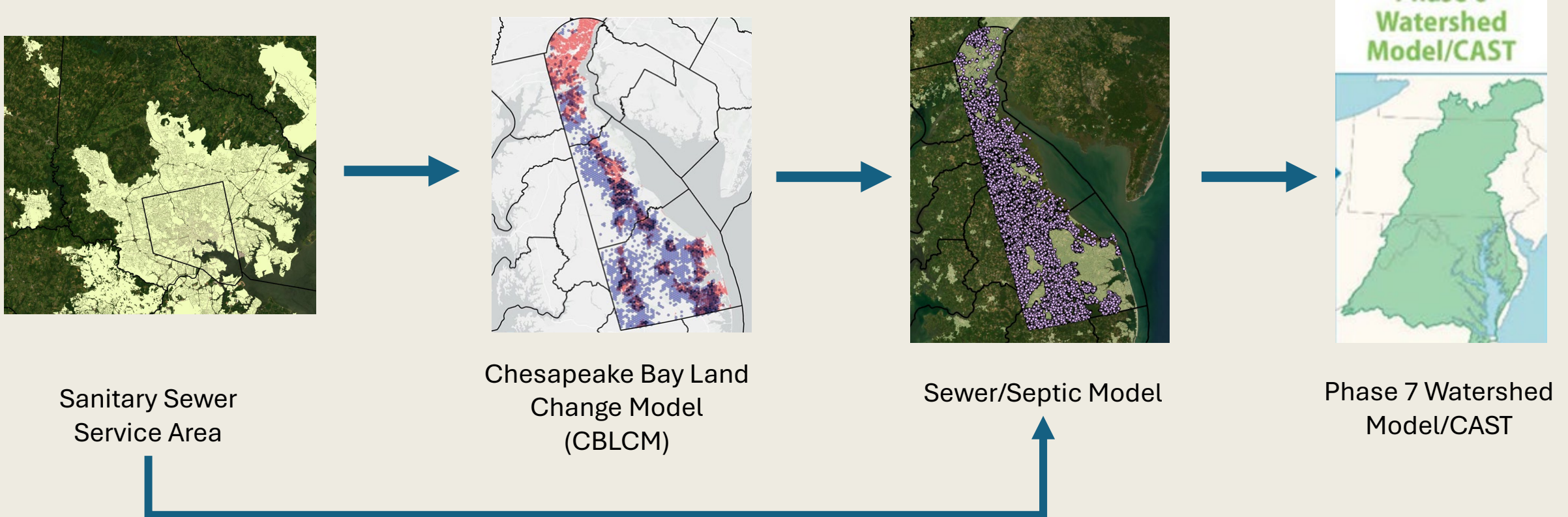
Updates to Modeled Sewer and Septic for the Phase 7 Watershed Model

Water Quality Goal Implementation Team: Office Hours

September 2025

Jackie Pickford, Peter Claggett, Michelle Katoski, Labeeb Ahmed, Sarah McDonald, USGS-CBPO

U.S. Department of the Interior
U.S. Geological Survey
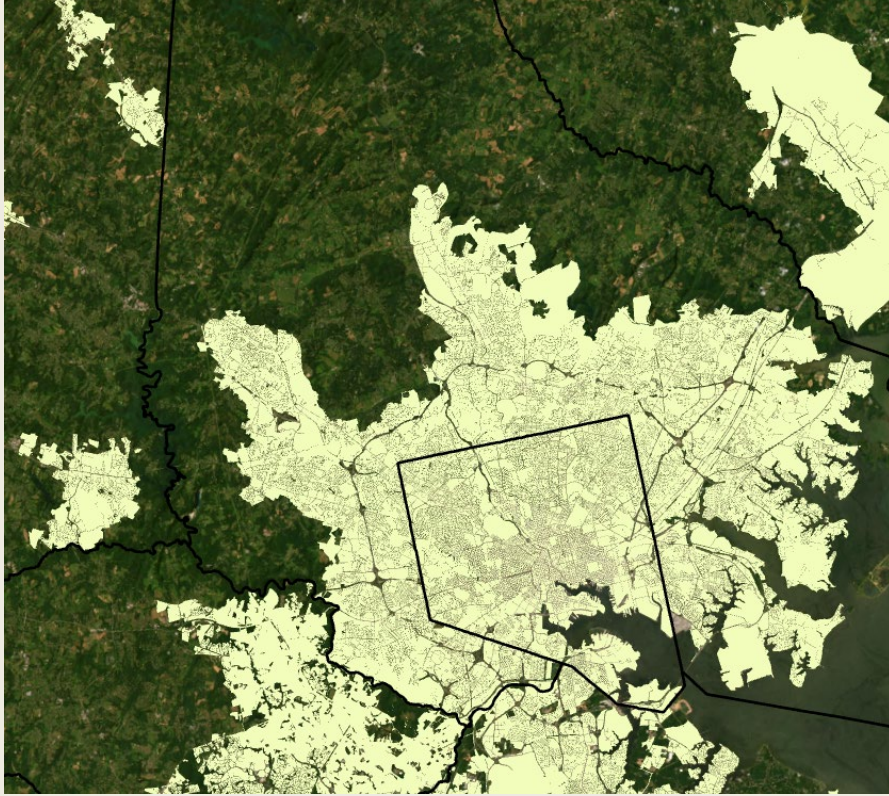
Background/Context

The USGS models septic system counts and populations served by sewer and septic within the Chesapeake Bay Watershed from 1985 through future years (e.g., 2050) to inform the Chesapeake Bay Watershed Model and CAST.

Sanitary Sewer Service Area

Chesapeake Bay Land Change Model (CBLCM)

Sewer/Septic Model

Phase 7 Watershed Model/CAST
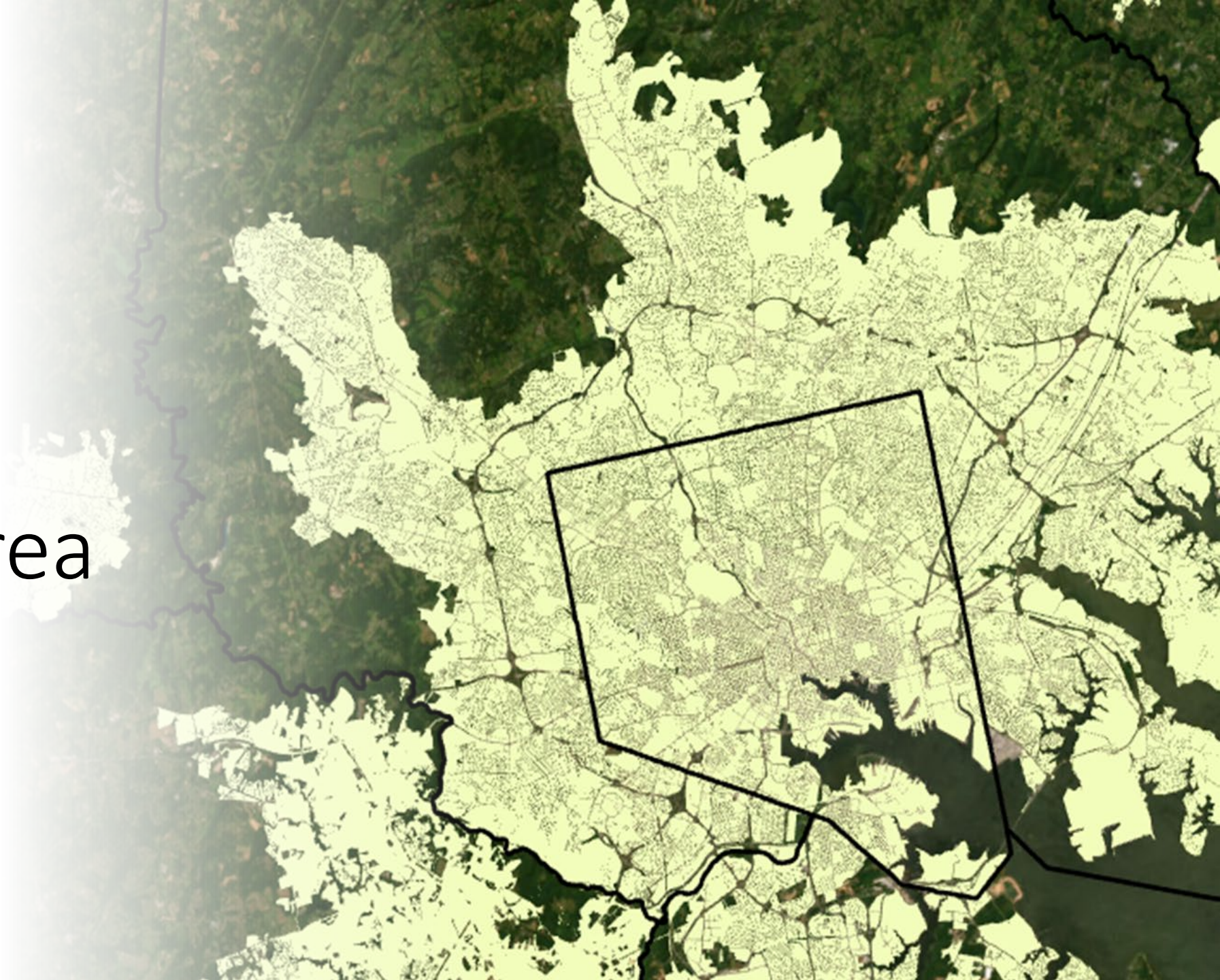
Approvals from the WWTWG in July 2025

1. Approved Phase 7 sanitary sewer service area.
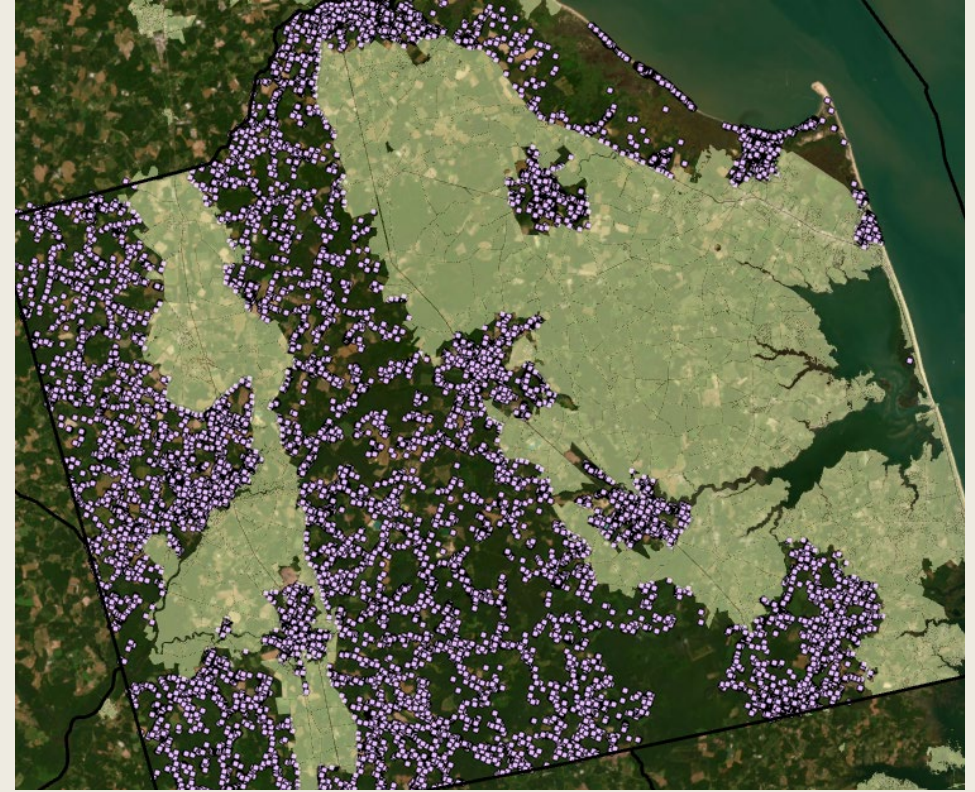
2. Approved the updated methods for the sewer/septic model.
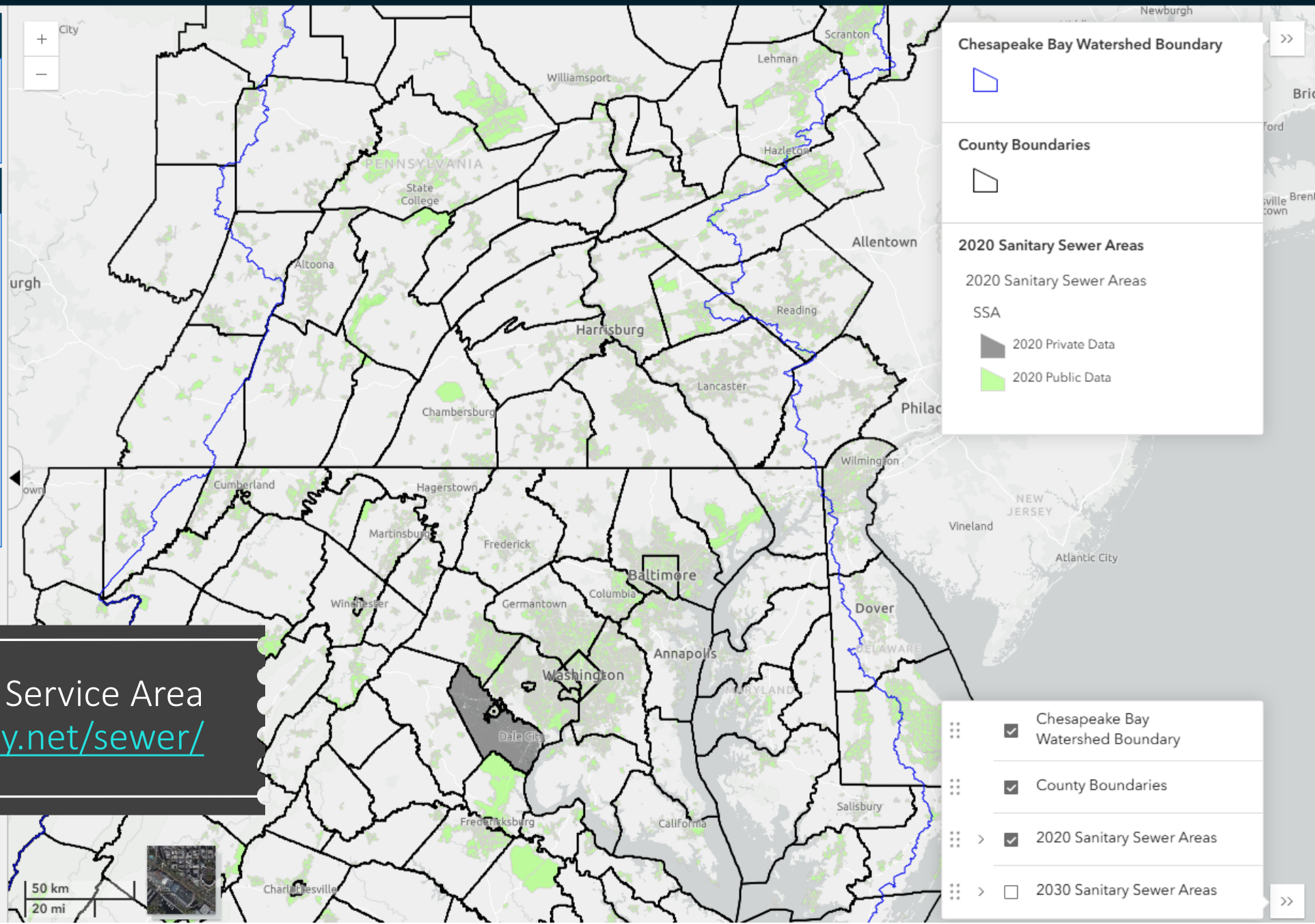
I. Sewer Service Area

P7 Sanitary Sewer Service Area
https://gis.chesapeakebay.net/sewer/

II. Sewer/Septic Model

Updates to the Sewer/Septic Model

Phase 6 Method: modeled septic systems as single detached housing units in *census blocks* that fall outside of sewer service areas.

Phase 7 Method: models septic systems as developed *parcels* that fall outside of sewer service areas.

Proposed Phase 7 Methods: Septic Footprint

Parcels with no buildings or structures are **excluded**

Parcels *inside* the sewer service area are **excluded**

Parcels with buildings *outside* the sewer service area are **included**

= sewer service area

= septic footprint

Fairfax County, VA

Proposed Phase 7 Methods: Septic Count

1 septic system per developed parcel

○ = septic systems

■ = sewer service area

■ = septic footprint

Fairfax County, VA

Proposed Phase 7 Methods: Septic Count

If there's more than one building per parcel, the septic point is located between the two buildings

Hardy County, WV

■ = buildings

○ = septic systems

■ = sewer service area

■ = septic footprint

Proposed Phase 7 Methods: Population on Sewer & Septic

Calculate 2020 baseline population within sewer footprint & within septic footprint using Census Data

Backcast population on sewer & septic based on decennial changes in housing units

Fairfax, VA

= sewer service area

= septic footprint

FIPS	County	Septic Count (2017/2020)		Population on Septic (2017/2020)		Population on Sewer (2017/2020)	
		Phase 6	Phase 7	Phase 6	Phase 7	Phase 6	Phase 7
10001	Kent	16,454	20,044	42,753	56,572	134,001	125,279
10003	New Castle	7,551	11,533	19,291	42,778	537,200	527,941
10005	Sussex	35,270	37,382	85,448	99,087	139,249	138,291
24005	Baltimore	33,479	28,984	82,330	77,675	746,626	776,860
36003	Allegany	14,614	16,376	34,988	29,899	11,681	16,557
36007	Broome	16,781	20,472	38,324	50,009	154,931	148,674
36015	Chemung	6,747	11,531	15,732	28,181	69,093	55,967
36017	Chenango	11,971	17,633	28,430	35,461	19,412	11,759
36023	Cortland	5,608	8,715	13,526	20,298	34,308	26,511
36025	Delaware	18,061	19,886	40,003	30,073	5,058	14,235
36043	Herkimer	12,840	16,551	30,312	30,065	31,881	30,074
36051	Livingston	10,392	12,121	25,084	30,233	38,419	31,601
36053	Madison	14,296	16,335	34,408	37,604	36,585	30,412
36067	Onondaga	29,358	97,641	69,630	321,003	392,213	155,513
51059	Fairfax	9,701	16,553	26,515	50,696	1,122,831	1,099,613
54003	Berkeley	15,698	15,763	40,394	46,359	74,840	75,717
54023	Grant	3,636	4,671	7,842	7,619	3,783	3,357
54027	Hampshire	8,937	8,876	20,168	17,594	3,230	5,499
54031	Hardy	4,878	5,656	10,450	10,111	3,409	4,188
54037	Jefferson	9,924	11,024	25,642	29,481	30,944	28,220
54057	Mineral	4,671	4,188	10,920	8,245	16,307	18,693

*These are draft numbers as of 08/01/2025 and are subject to change.

Updates to Methods

The following updates* will be discussed at the [Sept 25, 2025 WWTWG Meeting](#):

- Incorporation of a 1990, 2000, & 2010 sewer service area to better account for changes in sewered area over time
  - Will more accurately reflect the change in % of population on septic over time
- Slight improvements to the 2020 sewer service area
  - Incorporation of sewer data provided by two jurisdictions that missed the original submission deadline
  - Adjustments to fix overestimation of septic systems adjacent to the sewer service area
  - Adjustments to fix overestimation of septic systems in counties that didn't provide local sewer data (Pennsylvania & Virginia)

*Incorporating these updates will depend on the input of the WWTWG and will not impact the overall Phase 7 timeline.

Discussion/Questions?

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Acronyms

- CAST: [Chesapeake Assessment Scenario Tool](#)
- CBP: Chesapeake Bay Program
- CBPO: Chesapeake Bay Program Office
- CBLCM: Chesapeake Bay Land Change Model
- CBW: Chesapeake Bay Watershed
- FIPS (codes): Federal Information Processing Standards codes
- P6: Phase 6 [Watershed Model]
- P7: Phase 7 [Watershed Model]
- SSA: Sewer Service Area
- USGS: United States Geological Survey
- USWG: Urban Stormwater Workgroup

- WWTWG: Wastewater Treatment Workgroup