

Anne Arundel County Clean Water Program

Our wAAter Managed Aquifer Recharge Update

October 19, 2023

Our wAAter.



The Our wAAter Program

DPW has initiated an applied scientific research program for Managed Aquifer Recharge as a part of the Our wAAter Program.



5 initiatives | one strategy

Drivers for Managed Aquifer Recharge

Program Drivers:

Reduce Pollution to Bay and Tributaries

- Nutrient reduction and future Chesapeake Bay TMDL compliance
- Water quality improvements

Long-Term Water Resiliency

- Groundwater replenishment
- Re-pressurizing aquifers



Our wAAter.



Protecting our waterways
and the Chesapeake Bay.



Improving our groundwater
supplies and water resiliency.

Chesapeake Bay TMDL



Maryland's Phase III Watershed Implementation Plan (WIP)



“Maryland's Phase III Watershed Implementation Plan (WIP), published on August 23, 2019, is designed to be locally-driven, achievable, and balanced. Nitrogen is the primary focus in the plan because Maryland is well on track to meet its 2025 phosphorus and sediment goals.”

<https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Pages/Phase3WIP.aspx>

Chesapeake Bay TMDL Fact Sheet



Map of the Chesapeake Bay Watershed. The watershed encompasses six states and the District of Columbia.

Driving Actions to Clean Local Waters and the Chesapeake Bay

On December 29, 2010, the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load (TMDL), a historic and comprehensive “pollution diet.” This TMDL includes accountability features to guide sweeping actions to restore clean water in the Chesapeake Bay and the region’s streams, creeks and rivers.

Despite extensive restoration efforts during the prior 25 years, the TMDL was prompted by insufficient progress and poor water quality in the Chesapeake Bay and its tidal tributaries. The TMDL was required under the federal Clean Water Act and responded to consent decrees in Virginia and the District of Columbia from the late 1990s. It was also a keystone commitment of a federal strategy to meet President Barack Obama’s Executive Order to restore and protect the Bay.

- *Initial strategies focused on removals by sector – i.e. stormwater, wastewater, septics, etc.*
- **Phase III WIP** – County is on track to meet all Phase III WIP goals, but needs a long term strategy to balance growth and enhance cost effectiveness

Nutrient Management Alternatives



- Long-term plan needed to maintain compliance
- Less reliance of wastewater sector to allow planned growth
- Recognizing stormwater projects will become costly
- County reviewed projections - established target of reducing 115,000 lb TN/year over baseline by 2050 to maintain long-term nutrient compliance

Long-Term Stressors to TMDL



Wastewater



Population Growth



Climate Change

Sectors Available to Address



Small Systems



Water Reuse



Septic



Stormwater



Maintaining Current Progress



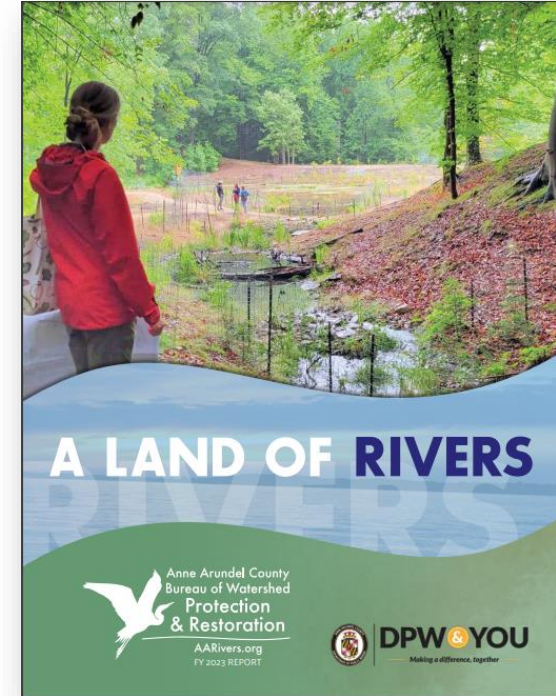
Wastewater Treatment

- Maintain excellent performance
 - *Over 50% TN reduction at treatment plants from 2010*
 - *2022 year end average 1.75 mg/L*
- Examine opportunities for improvements



Stormwater Management Key Areas

- Stormwater pond retrofits
- Stormwater outfall repairs
- Stream & Wetland restoration



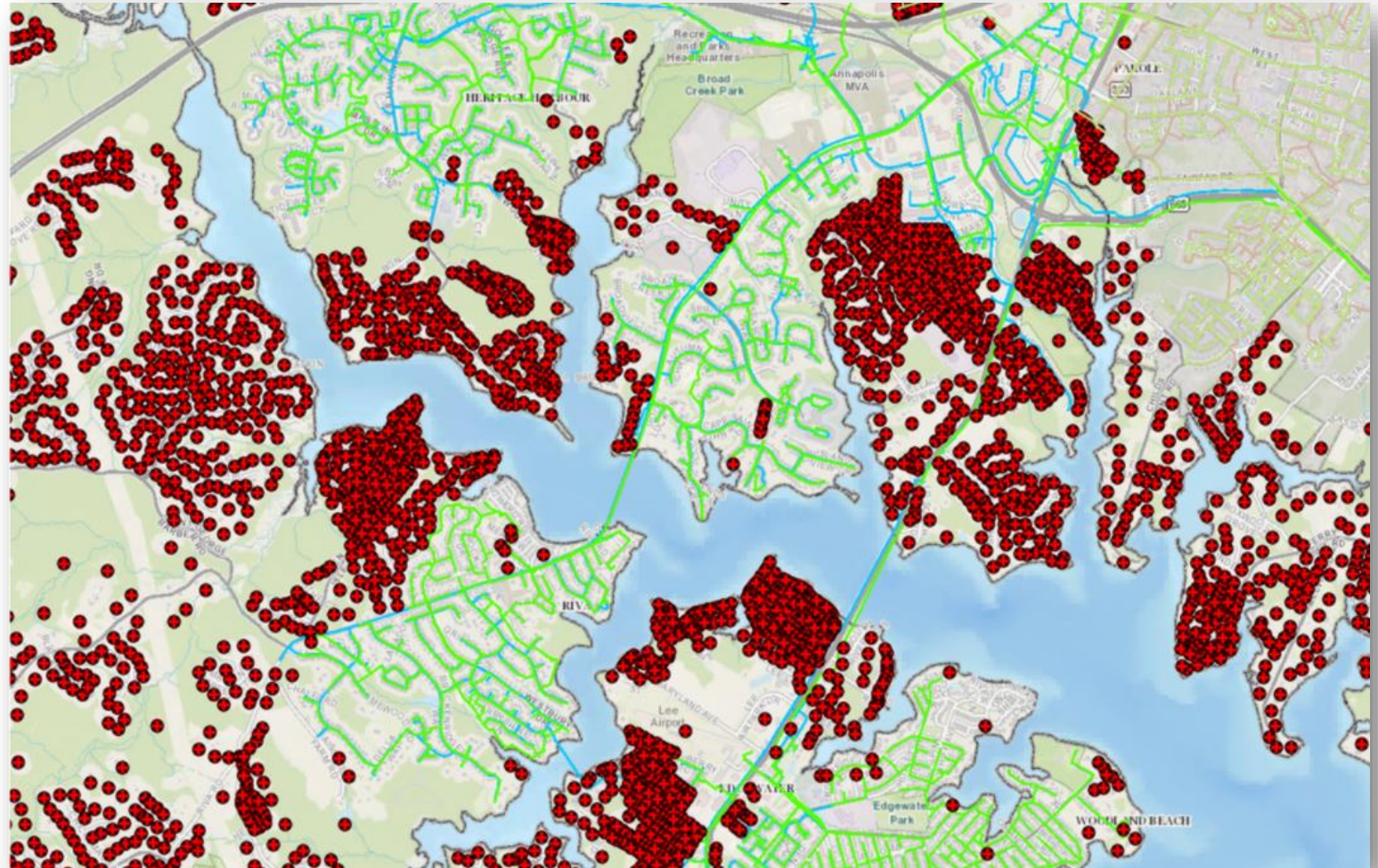
“...two years into the County’s current 5-year State-issued stormwater permit, we are already over halfway to achieving our current clean water goals.”

FY 23 Land of Rivers Report

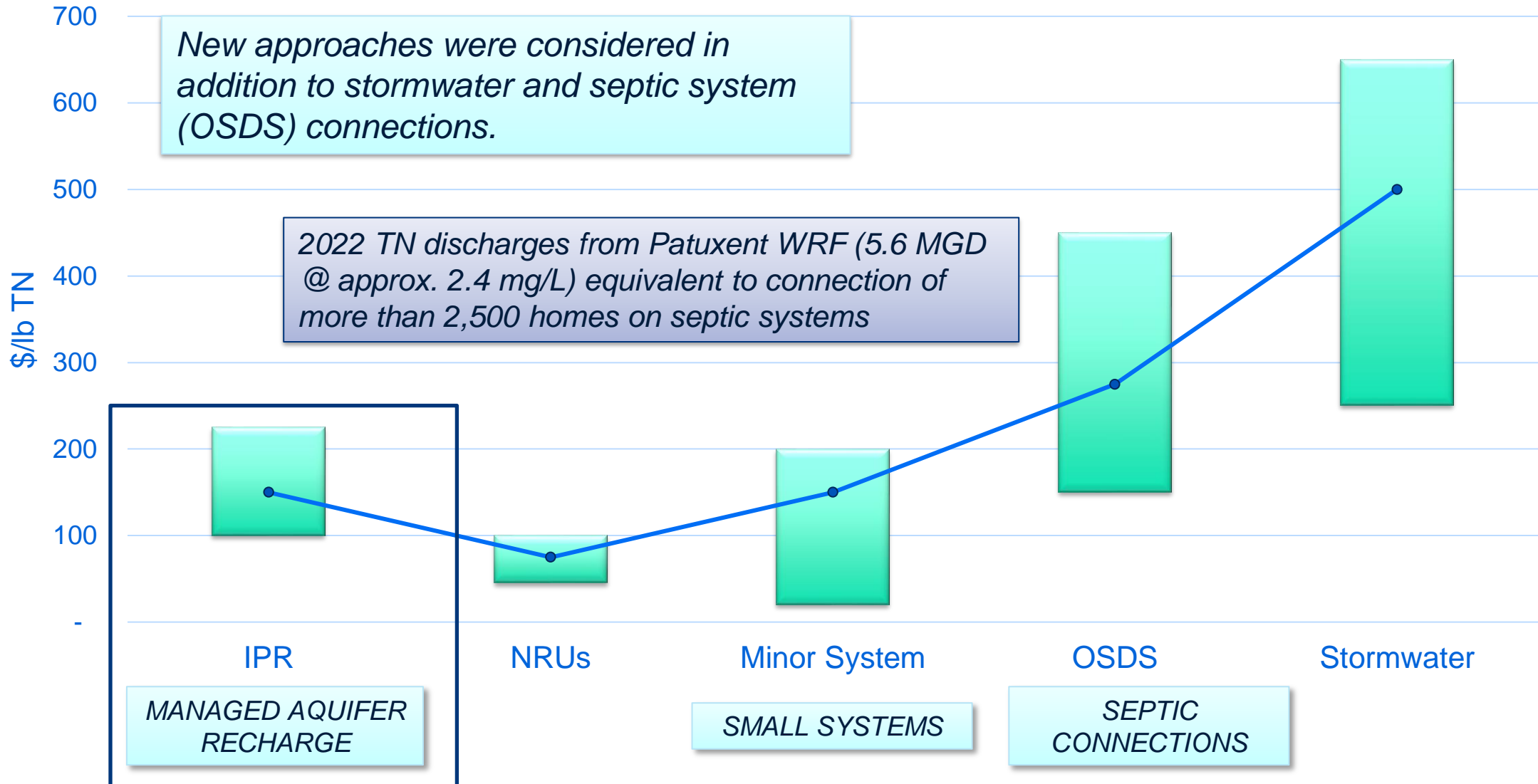
TMDL Sector - Septic Systems



- Many communities built before centralized infrastructure nearby
- More than 41,000 septic systems - little change since 2008
- 13,000 within 1,000 ft of tidal surface water
- Upgrades to nitrogen removing units at approx. 200 per year



Range of Capital Costs



Our wAAter.



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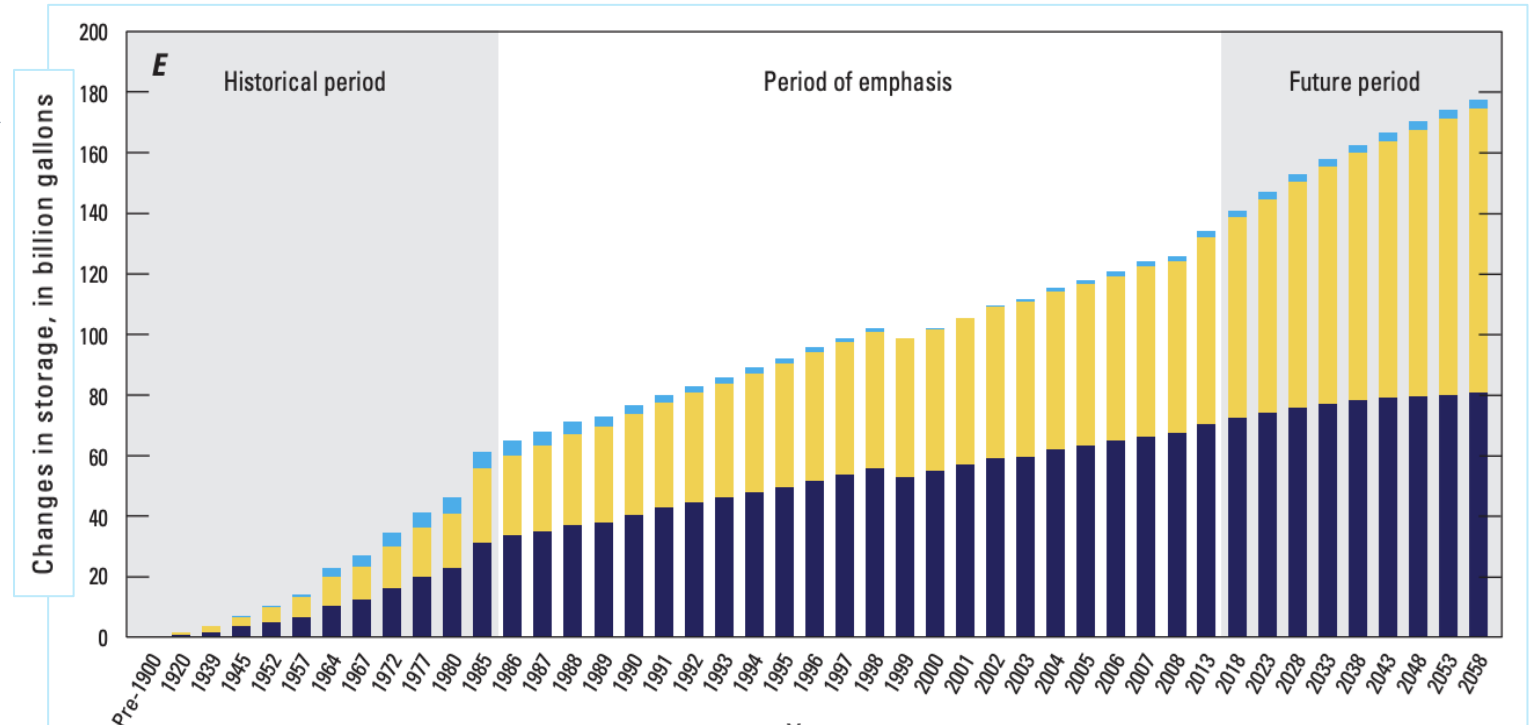


Improving our groundwater
supplies and water resiliency.

Why is the County Concerned About Long-Term Water Sustainability?



- All water use in AA County is groundwater – water withdrawals greater than recharge
- Confining unit is being depleted and projections are for this to continue



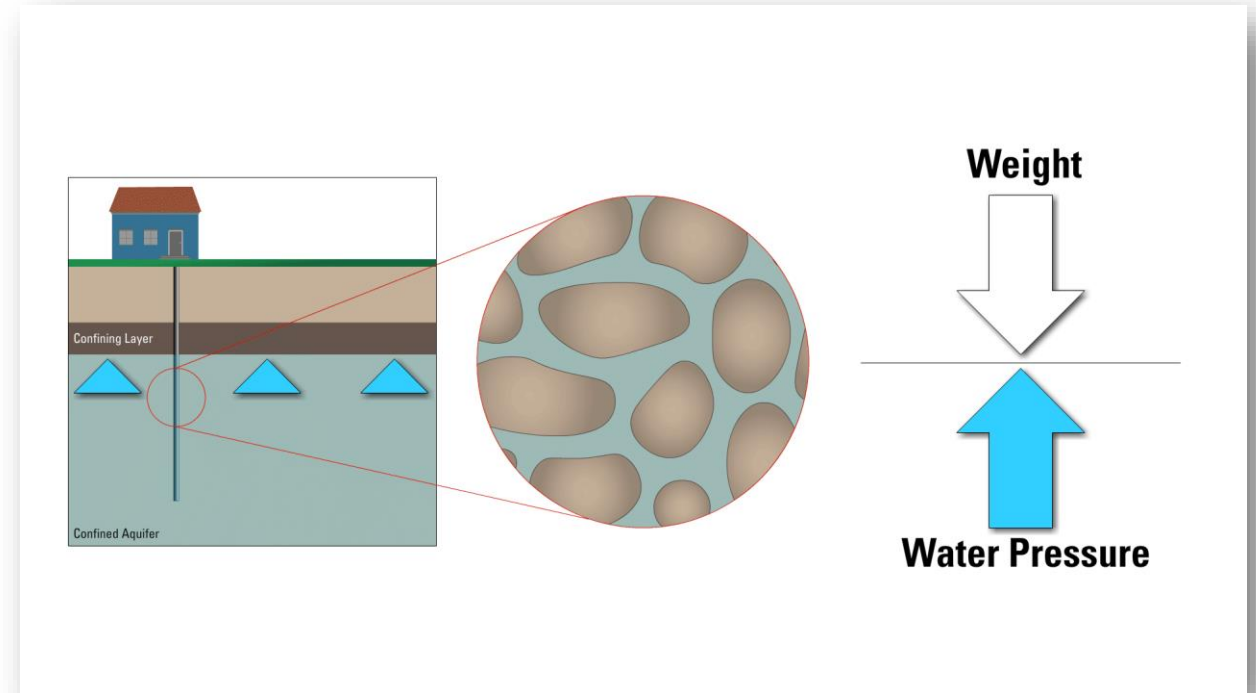
Source: Assessment of Groundwater Availability in the Northern Atlantic Coastal Plain Aquifer System From Long Island, New York, to North Carolina, Professional Paper 1829, USGS, 2016, pg.48

EXPLANATION

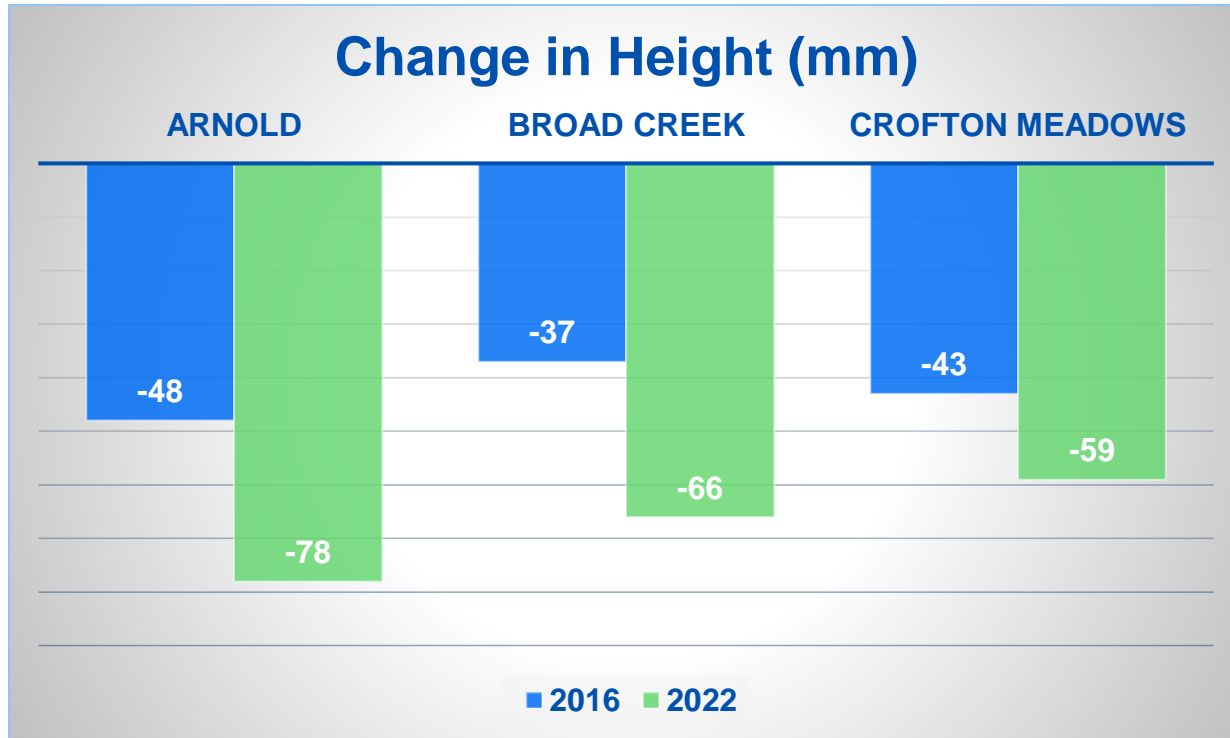
- Surficial aquifer depletion
- Surficial aquifer replenishment
- Confining unit depletion
- Confining unit replenishment
- Confined aquifer depletion
- Confined aquifer replenishment

Aquifer Compaction & Land Subsidence

- Withdrawing water from a confined aquifer reduces the hydrostatic pressure head in the pumped aquifer and in the adjacent confining layers (clay and silt).
- Reduction of pressure increases the load on the sediment which may lead to compaction and land subsidence.

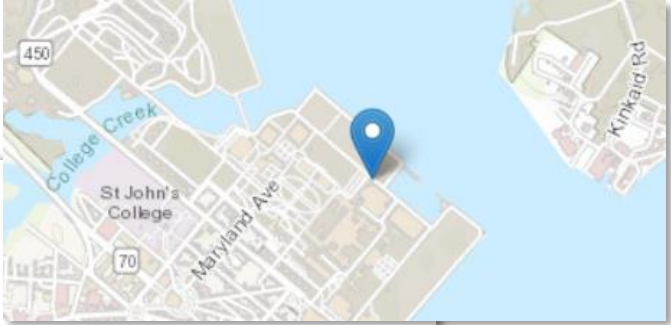


MGS Studies – Land Subsidence



- Regular monitoring at three WTP locations by MGS
- Reporting compared to 1999 baseline
- Arnold and Broad Creek locations changed by more than 50% in last 6 years

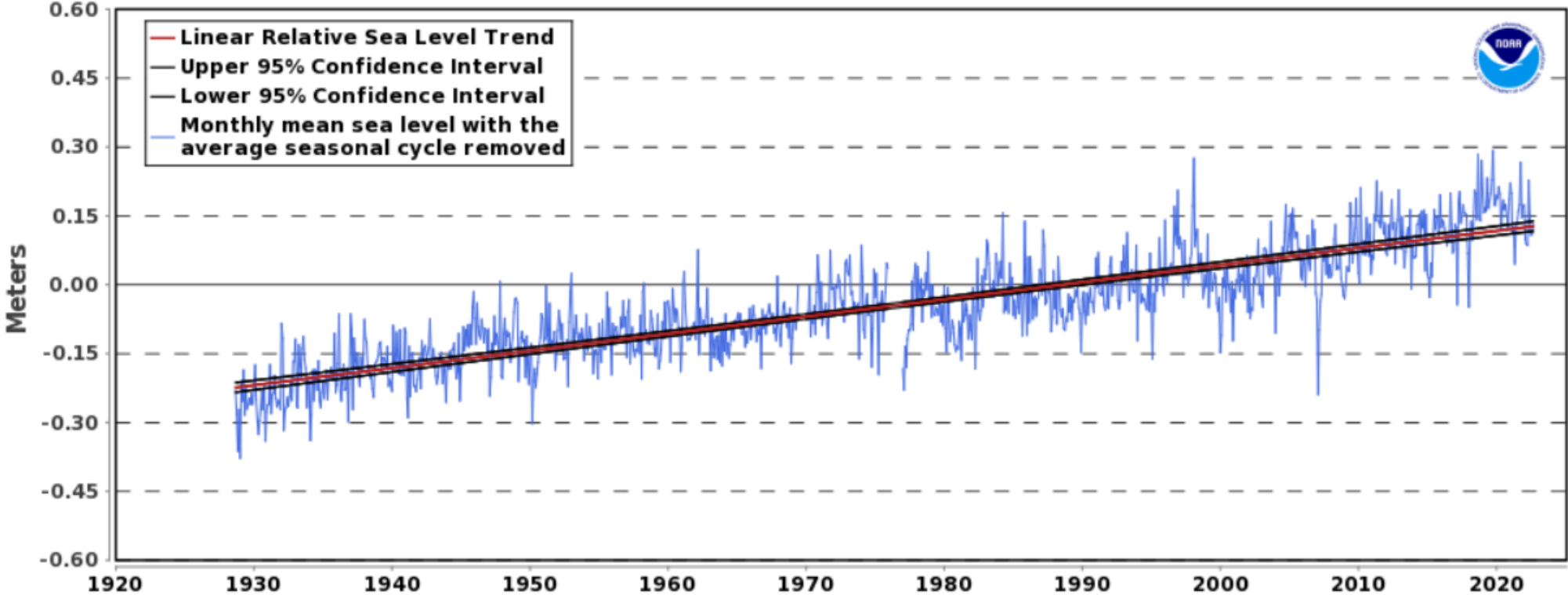
NOAA Sea Level Data - USNA



Relative Sea Level Trend
8575512 Annapolis, Maryland

8575512 Annapolis, Maryland

3.73 +/- 0.20 mm/yr



[EXPORT TO TEXT](#) | [EXPORT TO CSV](#) | [SAVE IMAGE](#)

The relative sea level trend is 3.73 millimeters/year with a 95% confidence interval of +/- 0.2 mm/yr based on monthly mean sea level data from 1928 to 2021 which is equivalent to a change of 1.22 feet in 100 years.



Managed Aquifer Recharge

Future Managed Aquifer Recharge

