10 Water Resources

INTRODUCTION

Growth and sustainable development depend on the capacity of the existing water resources and availability to provide for future needs. The City commits to provide water and wastewater to meet current demands and future development needs. The City intends to meet its requirements under the MS4 General Discharge Permit with continued support in developing restoration work plans and implementing water quality best management practices to address the impacts of stormwater runoff and nutrient loadings. This chapter has been prepared consistent with the State of Maryland's Twelve Planning Visions, as they relate to growth areas, infrastructure, and sustainability.

This chapter addresses the City's existing water resources including impacts on growth encompassing a 20-year planning period. Areas of consideration are identified to provide water and sewer capacity for current needs and future growth.

GOALS

This Chapter identifies and analyses the City's water resources and infrastructure strategies and recommendations. The following goals provide the foundation to serve and maintain Aberdeen's water resource service areas.

1. **Protect and conserve the existing drinking water supply and distribution system.**
    - Managing the City's wellfield to allow for increased infiltration enhanced forest regeneration, open space, and smart growth in providing adequate space to allow for the recharge of the shall wellfield aquifer.
    - Renewing and maintain bulk water purchase agreements with Harford County Government and the City of Havre de Grace.
    - Developing a long-term systemwide replacement strategy for watermains past their useful life.
    - Developing a long-term capital improvement program to rehabilitate existing pump stations, water towers, and water treatment plant.
    - Periodically reviewing the Wellhead Protection Plan to ensure potential source water contamination causes are being avoided as well as monitoring of water quality in the supply wells.
    - Assessing the vulnerability of the wellfield to saltwater intrusion and, if necessary, evaluate mitigation strategies.

2. **Provide safe drinking water to serve existing customers and future development demands.**
    - Continuing strategic planning to assess the feasibility of supplemental water sources, including but not limited to supplemental wellfields, additional or revised bulk water purchase agreements, and a raw water intake and treatment facility that draws from available and reliable surface water sources such as the Susquehanna River.

3. **Provide adequate wastewater treatment and conveyance capacity to serve existing and future development demands.**
    - Continuing to perform routine assessments of the current wastewater conveyance system and evaluating proven cost-effective repairs, replacements, and upgrades and

identifying funding constraints, priorities, and develop strategies to meet the City's needs.

- Developing a long-term system wide replacement strategy for wastewater mains that are currently past useful life.
- Identifying capacity issues in the current system and develop plans to upgrade to meet the future capacity requirements based on existing and future demand and growth.
- Developing a creative communications program to carry the message to the public regarding disconnecting rain gutters and sump pumps from the collection system to reduce rain induced system infiltration and reduce FROG (frats, rags, oils, and greases) deposits that cause decreased pipe capacity, blockages, and increased maintenance costs.
- Revising ordinances and inspection procedures to mitigate and eliminate illegal discharge of sump pumps and stormwater runoff into the sanitary conveyance system.
- Revising pretreatment standards to consider nutrient loading (quality) in addition to flow rates (quantity) for commercial customers.
- Assessing the vulnerability of the wastewater treatment facility to flooding including sea level rise (SLR) inundation and the impact of climate change. Consideration should be given to investigating mitigation options such as storage for overflows for future treatment.
- Continuing strategic planning to assess the feasibility of various options to expanding the wastewater treatment plant (WWTP) capacity.

4. **Reduce the overall stormwater runoff discharge of stormwater.**
    - Dedicate resources to comply with municipal separate storm sewer systems (MS4) permit requirements and the Chesapeake Bay's total maximum daily load (TMDL) goals.
    - Implement best management practices (BMPs) during roadway construction and reconstruction projects, such as the reduction in impervious surface and the use of open section roadways where applicable.
    - Review the Subdivision Regulations and revise where applicable to reduce road and right-of-way widths in all new developments to allow for the reduction in impervious surfaces.
    - Create a policy to offer stormwater credits on impervious area reductions throughout the City.

5. **Plan for resiliency in the face of more frequent floods caused by climate change and reduce flood induced pollutants to local waters and the Chesapeake Bay.**
    - Appropriating resources to flooding mitigation planning that considers the full range of economic and social costs/social vulnerabilities associated with frequent and intense flooding events.
    - Using plan reviews to ensure thick natural and native vegetation is preserved and/or planted along waterways, wetlands, and riparian buffers.
    - Educating property owners of repetitive loss properties on adoption to better withstand threats of climate change and about options offered by the Maryland Department of the Environment (MDE).
    - Examining and documenting threats to streams and their buffers due to climate change impacts (e.g., nuisance flooding, intense storms).

WATER SYSTEM

The City of Aberdeen system currently serves approximately 5,300 billable customers. The City receives its water from three sources: (1) a 1.5 MGD (Permitted) Water Treatment Plant utilizing 14 wells near the boundary of Aberdeen Proving Ground (APG)-North Area owned and operated by the City of Aberdeen; (2) through a contract purchase agreement with Harford County for up to 900,000 gallons per day; and (3) through a 2020 contract purchase agreement with the City of Havre de Grace to purchase 500,000 gallons per day (900,000 peak). The contract allows for an optional increase of up to 900,000 gallons per day (90-day notice provision). Construction of a new waterline main along the US Route 40 corridor from the City of Havre de Grace was completed in February 2023 to support the agreement. **Table 10-1, Current Water Sources** provides a summary of the existing water sources serving the City.

Table 10-1. Current Water Sources

SOURCE	TREATED WATER CAPACITY, MILLION GALLONS PER DAY (MGD) (Average Daily)	TREATED WATER CAPACITY, MGD (Peak Daily)	STATUS
City of Aberdeen Water Treatment Facility and 14 Wells	1.5 (permitted) 0.85 (actual)	2.0	Permit term July 2019 to May 2031
Harford County Agreement	0.9 (contract) 0.47 (current actual)	0.9	Agreement in renewal status**
City of Havre de Grace Agreement	0.5-0.9 (contract) 0.0 (current actual)	0.9	Agreement term 2020 to 2040. Waterline construction began 4/2022, booster pump construction scheduled for 2023.
Total	**2.9-3.3 (contract and permitted)** **1.33 (current actual)**	**4.0**	

*** Amounts based upon Amendment 11 dated August 18, 2018.*

Water Plant & Wellfield & Wellhead Protection

The City of Aberdeen's groundwater is harvested from the Talbot Formation which is part of Coastal Plain sediment of Harford County. The Talbot Formation is within the Quaternary System and functions as an unconfined aquifer in this area. The aquifer consists of shallow silt and clay facies and a deeper gravelly sand facies interbedded with dark clays. The lithology of the Coastal Plain sediments in Harford County is extremely variable and aquifer boundaries do not coincide with formation boundaries.

The City operates 14 groundwater wells to supply water to the public water distribution system. These wells draw water from the Quaternary aquifer. In general, water supplies in unconfined aquifers are susceptible to contamination from land use activities. The City routinely monitors for contaminants in drinking water according to federal and state laws and under the United States Environmental Protection Agency (EPA) guidelines of the Clean Water Act of 1972 (1996). This routine monitoring of contamination is essential in assuring a future supply of safe and healthy drinking water. When the City published the "Annual Drinking Water Quality Report" for 2021, the report indicated that any found regulated

constituents present in the water system were below the Maximum Contaminant Levels (MCL), which is determined safe by the EPA. The City's Water Appropriation and Use Permit (WAUP) for the community water system allows for an average withdrawal of 1.5 MGD on an annual basis and up to 2.0 MGD can be drawn from the aquifer during the month of maximum use.

The existing Aberdeen water treatment facility has the capacity to treat 3.0 MGD through the use of disinfection (sodium hypochlorite), fluoridation, degasification (forced aeration towers), and pH adjustment (soda ash) for groundwater sources. Should an increase in well production beyond the treatment plant's rated capacity occur in the future, additional water treatment capacity would be required to maintain the high-quality water currently provided. The City of Aberdeen should monitor the water quality and the treatment capacity as the demand for water increases with growth and plan for the expansion of the water treatment plant and/or additional sources of water to meet the growth.

Ten of the wells are located within City limits, and four of the wells are located on the west side of Gadsden Road, APG. All wells combined have a maximum capacity of approximately 3.061 MGD which exceeds the permitted average and maximum month average day limit. Assuming the largest well is out of service, a safe yield capacity of 2.571 MGD can be realized. For planning purposes, the month of maximum use (July) is used to determine the well capacity required. In July 2020, the wells produced an average of approximately 1.111 MGD.

The City adopted a revised *Wellhead Protection Ordinance* on August 20, 2018. The purpose of the Wellhead Protection Plan is to protect the public health, safety, and welfare through the preservation of groundwater resources of community public water supplies to ensure a future supply of safe and healthy drinking water. The designation of the Aberdeen Wellhead Protection Districts, and careful regulation of activities within these areas, can reduce the potential for groundwater contamination.

The groundwater underlying the community water supply Wellhead Protection Districts is a major source for the City's existing and future water supply. The aquifer systems providing ground water supply, is integrally connected with numerous surface waters and streams. Accidental spills and discharges of toxic and hazardous materials can threaten the quality of such water supplies, posing public health and safety hazards.

The Aberdeen Wellhead Protection Districts include differing zones of protection as recommended by MDE. Within the City, the wellhead protection region or district includes three zones of protection. Each zone is described as follows:

- Zone 1 represents the area bounded by a groundwater travel time of *one year (or less) to the Aberdeen supply wells.

- Zone 2 represents the area bounded by a groundwater travel time of * 10 years (or less) to the Aberdeen supply wells.
- Zone 3 represents the remaining land area of the wellhead protection district located within the City of Aberdeen.

*Amount of time a potential hazard excreted in groundwater takes to travel to City wells.

For more information on the Aberdeen Wellhead Protection District refer to the Code of the City of Aberdeen, Chapter 524 Wellhead Protection. Although there are no water quality issues at this time, it is recommended that the City continue monitoring water quality in the supply wells and periodically review the Wellhead Protection Plan to ensure potential source water contamination causes are being avoided.

Bulk Water Purchases

As noted in **Table 10-1, Current Water Sources**, the City receives water from the Harford County Water Treatment Plant and from the City of Havre de Grace Water treatment plant from facilities fed from the Susquehanna River, Perryman wellfield, and Abingdon Water Treatment Facilities through the ground wells and Harford County sources.

Daily Consumption & Capacities

The table below depicts system water demands; the Daily Average demand is based on the entire year while the Daily Max was the peak usage for one single day over the entire year. Bulk Purchase amounts are typically set, unless there is an emergency water usage requirement i.e., to support the system while due to a broken water line. Note: 2012 was listed as a drought in the City's files and appears that water usage likely increased due to irrigation needs. While yearly demands fluctuate, the trend when compared with the last three (2021 – 2019), five (2021-2016), and ten years (2021-2012) show general increase in water demand as shown in **Table 10-2, Historical Water Demands, Averages and Peak Factor**.

Table 10-2. Historical Water Demands, Averages and Peak Factor

Year	Well Field Production		Calculated	Bulk Purchase	Total System Demand		
	Daily Average (MG)	Daily Max (MG)	Peak Factor	Daily Average (MG)	Daily Average (MG)	Daily Max (MG)	Yearly (MG)
2012	0.84	1.18	1.40	0.54	1.38	1.69	506.25
2013	0.65	0.88	1.36	0.65	1.29	1.52	472.21
2014	0.68	0.97	1.43	0.66	1.34	1.63	488.86
2015	0.68	1.00	1.47	0.64	1.33	1.65	484.69
2016	0.67	0.89	1.34	0.64	1.31	1.53	479.35
2017	0.67	0.90	1.35	0.65	1.31	1.55	479.35
2018	0.79	1.05	1.33	0.54	1.33	1.59	484.92
2019	0.91	1.15	1.26	0.40	1.31	1.55	479.71
2020	0.90	1.09	1.22	0.39	1.29	1.49	472.83
2021	0.99	1.29	1.30	0.39	1.38	1.68	504.05
3-year average	0.93	1.18	1.26	0.39	1.33	1.57	485.53
5-year average	**0.85**	**1.10**	**1.29**	**0.47**	**1.33**	**1.57**	**484.17**
10-year average	0.78	1.04	1.35	0.55	1.33	1.59	485.22

Distribution System and Storage

The City of Aberdeen system serves most of the incorporated area. The water distribution system consists of approximately 92.5 miles of water pipe to distribute safe drinking water to its customers. Most of the system (83%) consists of 8-inch and 12-inch mains. The remaining consists of 4% (over 12-inch) and 13% (less 8-inch). The pipe material of the system is comprised of 85% metallic and 15% non-metallic. The system also utilizes four booster stations and four elevated water towers that have a total capacity of 1,190,000 gallons (75% storage capacity is used for planning purposes). The water treatment facility clear well has a 100,000-gallon capacity. Water is pumped from the water treatment plant or is delivered through the connections with Harford County.

The City assesses its pressures and fire flows within the community water system by flushing all the hydrants annually and adjusting the short cycles to meet the fire flows as well as utilizing a comprehensive hydraulic water model of the systems. Additionally, the City utilizes automated flushing units in the system to address a range of utility needs. On average these units pull 37,000 gallons per day from the system to maintain water quality in the distribution system. The units are programmed to run off peak hours, dechlorinate the water, and discharge into the storm sewer system. It is recommended that the City continue to perform the hydrant flushing and use of the automated flushing units to maintain the water model to identify any pressure and/or flow deficiencies and to identify the need for new or upgraded water mains as they relate to future growth.

Water System Improvements

The City is focused on the following improvements that are planned, under design, or in construction:

- Railbird Alley Booster Station: A Booster Station located at Railbird Alley will be constructed in 2023 to support the Aberdeen-Havre de Grace Interconnect Agreement.
- I-95 Elevated Water Tower: A water tank, currently in design, will support current and future development of the West Side (Planning Areas 9, 10, and 11). It is expected to provide in excess of 400,000 Gallons of storage. Final capacity will be determined when design is complete, subject to transfer agreements of the property to the City. Construction is planned in the next few years (Estimate completion by 2025).
- Long Drive Booster Station: Construction will begin in 2023 for a new water booster station in support of a new water supply line between Nonpareil and Long Drive to service the West Side Planning Areas.
- Heat Ctr Booster Pump Station Upgrade: An upgrade of the existing HEAT Center BPS is required to support the I-95 Water Tower Project. Design is expected to be completed FY24 and construction complete by FY25.

- Swan Meadows Water Line Replacement (Design): Designs are underway to replace 8,000+ LF of water mains in Swan Meadows. The waterline is at the end of service life, cannot accommodate pressures found in typical water systems, and impacts fire flow requirements.
- Raw Water Filtration Design: The City initiated plans in FY23 to design an upgrade to the Filtration system at the Water Treatment Plant. The City withdraws water from wells with shallow aquifers. The WTP does not have filtration to remove volatile organic compounds (VOC) and per-and polyfluoroalkyl substances (PFAs/PFOA). With new EPA mandates on the horizon a filtration system will be required to keep the facility compliant. Design is expected to be completed in FY24 with construction to occur in FY25-26.
- Water Main Replacement (Design): Forty-three (43%) percent of the City's inventory of ninety-two (92) miles are past their lifespan. Funding in 2023 will initiate designs to begin replacing water lines under a new program to prioritize and develop a long-term system wide replacement.

Growth Projections

The City of Aberdeen designated 13 Planning Areas, leaving 12 planning areas as future growth areas. These growth areas will be served by public water and sewer either by the City of Aberdeen or by Harford County. See **Map 10-1, Water Service Areas** which indicates the Water service areas per Harford County's Water and Sewer Master Plan 2022 Update. The City of Aberdeen plans for infrastructure extensions to the growth areas based on the phasing of the growth areas as described in **Chapter 5 – Municipal Growth**. When completely developed to the maximum density permitted by zoning, a potential of 9,732 equivalent dwelling units (EDUs)[1] can be added. **Table 10-3, Growth Area Summary,** shows the additional EDUs needed for two growth scenarios. Scenario 1, the Average Density Yield scenario, assumes development at average density for each land use and represents the projected (or likely) buildout of the City and growth areas. Scenario 2, the Ultimate Build-Out scenario, assumes full build out of all planning areas to the maximum density permitted by the current zoning ordinance and represents an aggressive growth scenario. **Table 10-3, Growth Area Summary** assumes that all additional EDUs will be served by city water and sewer even where no service is planned. Based upon the withdrawal limits and required water demands listed above, if the bulk purchase agreements remain in place and the allowable appropriations permitted by the current WAUP remain steady, the City can meet the anticipated future growth needs for scenario 1, but not scenario 2, unless some of the growth areas are served by other sources. See **Map 10-1, Water Service Areas,** which includes the Planned Service Areas. **Appendix E, Water Resource Calculations** includes the water resource calculation table which illustrates both average demand and anticipated peak demand for scenario 1 compared to available supply.

[1]Equivalent Dwelling Unit (EDU) is a measure where one unit is equivalent to water demand or wastewater effluent from one home, which is 250 gallons per day per home (1 EDU = 250 gallons per day).

Table 10-3. Growth Area Summary – Additional EDUs

Growth Area	Area *(acres)*	Scenario 1 Expected Build-Out[1] *(EDUs)*	Scenario 2 Aggressive Build-Out[2] *(EDUs)*	Served By[3]
Planning Area 1 – Aberdeen	3,880.66	3,966	6,936	City Water & Sewer
Existing & Infill	**3,880.66**	**3,966**	**6,936**	
Planning Area 2 – Swan Creek	360.55	0	0	Planned Service (11-20 yrs)
Planning Area 3 – Pulaski	221.65	114	224	City Sewer/Bulk Water
Planning Area 4 – Barkess	385.95	843	1,248	Planned Service (11-20 yrs)
Planning Area 5 – Old Robinhood	553.70	1,162	1,721	Planned Service (11-20 yrs)
Planning Area 6 – Titan Terrace	364.40	207	323	Planned Service (11-20 yrs)
Planning Area 7 – Paradise	252.11	656	971	Planned Service (11-20 yrs)
Planning Area 8 – Aldino-Stepney	786.49	1,391	2,056	No Planned Service
Planning Area 9 – Gilbert	251.76	482	752	No Planned Service
Planning Area 10 – Long/Heat	294.11	1,294	1,677	City Water & Sewer
Planning Area 11 – Grays	836.87	460	715	No Planned Service
Planning Area 12 – Bush Chapel	775.93	1,697	2,363	City Water & Sewer
Planning Area 13 – Old Philadelphia	166.59	149	215	No Planned Service
Additional EDUs		12,421	19,201	Total EDUs
Additional Water Demand/Sewer Flows (GPD)[3]		**3.105**	**4.800**	**Total New Demand**

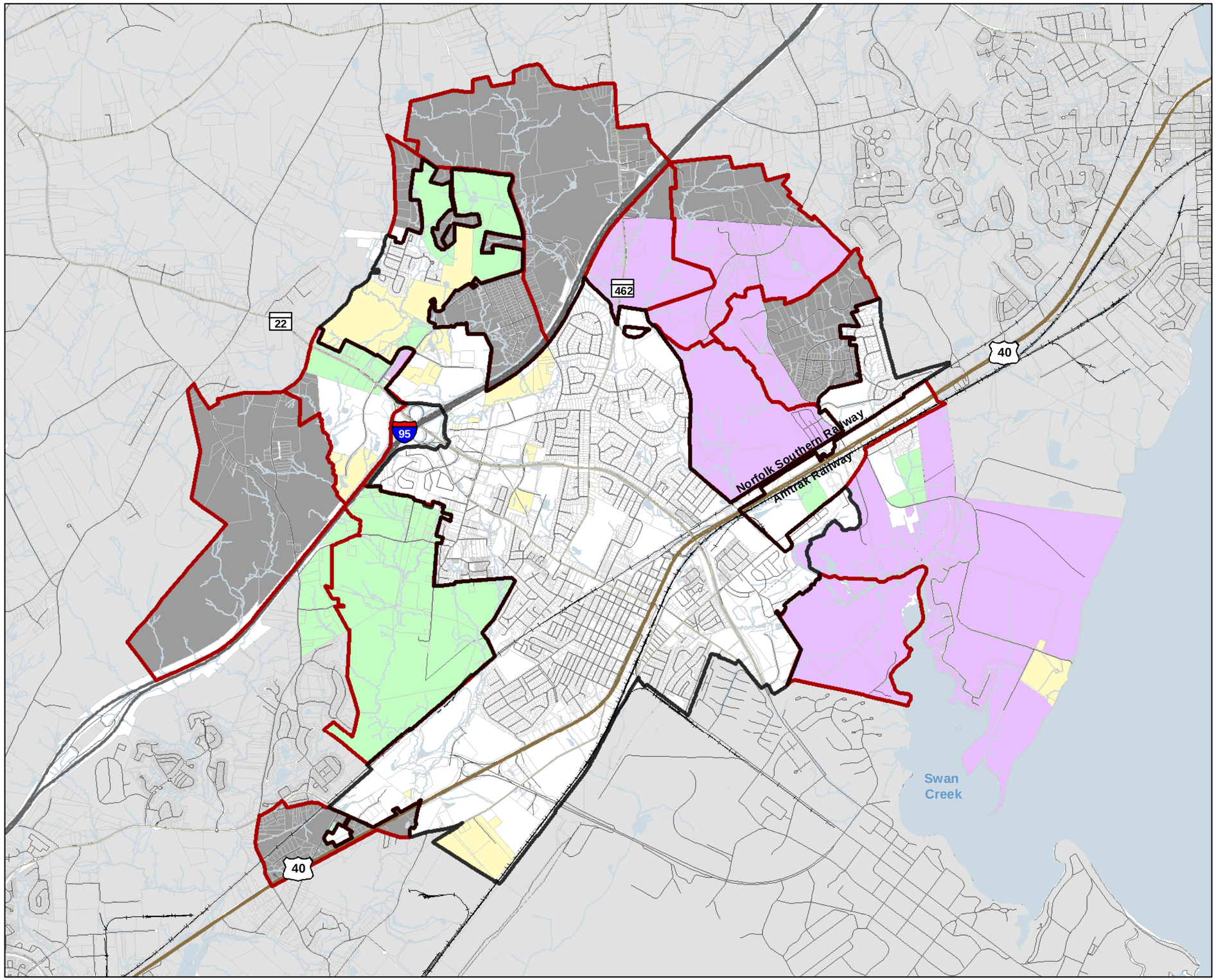
Source: Wallace Montgomery Calculations

Notes: [1] Proposed EDUs with average densities, including the existing development within Aberdeen and Planning Areas unless no service is planned.

[2] Ultimate build out of growth areas, not including the existing development, includes the existing development within Planning Area 1 – Aberdeen and Planning Areas with no planned service.

[3]New water and sewer demand was determined by 250 gpd/EDU.

The City Aberdeen has adequate capacity through its permit and bulk water purchase agreements to meet current water demand. The five-year average daily demand is 1.33 MG, while peak daily water demand is 1.57 MG. Meanwhile, the total capacity including wells and bulk purchases covers an average daily demand of 3.3 MG and a peak demand of 4.0 MG. Therefore, the current reserve capacity to serve additional customers is 1.97 MG average daily demand and 2.43 MG peak demand. However, the growth average daily demand is 3.071 MG for scenario 1 and 4.749 MG for scenario 2. The City cannot meet the demand for growth scenario 1 or scenario 2 and the City would exceed 80% of its capacity after adding 5,259 EDUs, which is expected to occur in 2030 based upon a linear growth projection of the expected growth rate (scenario 1). Therefore, as recommended by MDE, the City needs to complete a Water Capacity Management Plan to begin the planning process to increase its capacity.



MAP 10-1
Water Service Areas

- City of Aberdeen
- Planning Areas
- Water Bodies
- Railroad

Major Roads

- Interstates
- US Highways
- State Routes
- Local Routes

Water Service Areas

- W1 Existing Service
- W3 Planned Service (0-5 Yrs)
- W5 Planned Service (6-10 Yrs)
- W6 Planned Service (11-20 Yrs)
- W7 No Planned Service
- Outside City & Planning Areas

planABERDEEN
Our City. Our Plan. Our Future.

Source: Aberdeen Department of Public Works, Harford County

Wallace Montgomery created this map for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.

April 2023

0 0.5 1 Miles

N

The City should maintain the bulk water purchase agreement and continue to monitor water usage and further investigate the likelihood of utilizing surface water or the purchase of additional water from other sources should any change in planned development or water supply change. The City should also monitor the density of future developments, particularly commercial land uses where water uses vary greatly depending on the specific business needs. The City should update this plan if substantial growth is anticipated.

There are currently nine properties within the City with private wells. All are located on dead-end roads (Old Robin Hood Road, Northeast Road, and Johnson Lane) in Planning Area 11 and there are no immediate plans to connect these properties to the City's water distribution system. Accordingly, these properties were not included in the calculations.

Water Summary

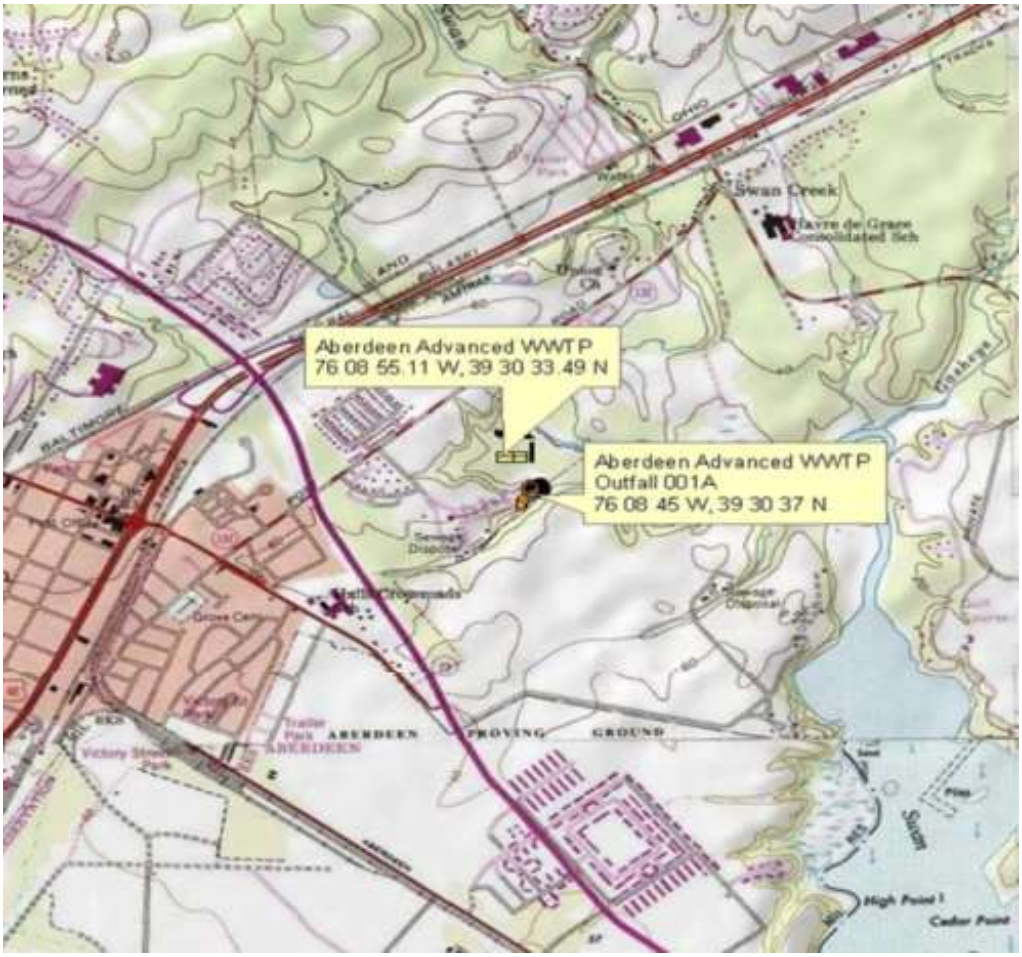
The City currently has sufficient water supply capabilities to accommodate the current population and permitted development assuming average density development with the 14 existing wells, four existing storage tanks, and one planned new storage tank along with the bulk water purchases from Harford County and the City of Havre de Grace. The City should continue to investigate contingency water sources should the growth projections, approved annexations, or current water supplies deviate from what is planned. If the bulk purchase agreements remain in place and the allowable appropriations remain steady, the City should expect to exceed 80% of its capacity after adding 5,259 EDUs, which is expected to occur in 2030 based upon a linear growth projection of the expected growth rate (scenario 1). Therefore, as recommended by MDE, the City should plan to complete a Water Capacity Management Plan to begin the planning process to increase its capacity.

WASTEWATER SYSTEM

Wastewater Plan Capacity

The City of Aberdeen wastewater system consists of 76 miles of various sized sanitary sewer lines and 11 pumping stations which collects wastewater. The wastewater is collected and treated at the City of Aberdeen's Advanced Wastewater Treatment Plant (WWTP). The City of Aberdeen owns and operates the facility located at the end of Michaels Lane. The facility has recently been modified and currently provides treatment to both secondary and tertiary levels. Sewage is treated to a tertiary level utilizing primary treatment, two-stage activated Enhanced Nutrient Removal (ENR) process. Phosphorous removal, UV disinfection, hypochlorite, chemical addition, anaerobic sludge digestion, and sludge composting utilizing the extended pile method. The treatment facility has a 4.0 MGD permitted capacity with 2.0 MG Equalization Storage Tanks for storm surges. The plant currently experiences average sewage influent flows of 1.78 MGD (3-year average) with instantaneous peak flows as high as 16.00 MGD during storm events and daily peak flows as high as 8.03 MGD (occurred in 2014). Treated effluent is released into an unnamed tributary of Swan Creek. Figure 10.1, Point of Discharge Location shows the location of the Aberdeen WWTP and outfall location.

Figure 10-1. Aberdeen AAWTP Point of Discharge Location



Source: Maryland Department of the Environment 2020

Table 10-4, Historical WWTP Averages and Peak Factors depicts the treatment of the sanitary system at WWTP. The Daily Average treatment is based on the entire year while the Daily Max was the peak usage for one single day over the entire year. While yearly demands fluctuate, the trend when compared with the last three (2021 – 2019), five (2021-2016), and ten years (2021-2012) generally show a decrease.

Table 10-4. Historical WWTP Averages and Peak Factor

Year	WWTP Operations		Calculated	Total Treated
	Daily Average (MG)	Daily Max (MG)	Peak Factor	(MG)
2011	1.73	6.79	3.92	631.17
2012	1.42	7.82	5.51	524.79
2013	1.70	6.03	3.55	621.33
2014	2.16	8.03	3.72	787.34
2015	1.90	6.80	3.58	682.41
2016	1.60	5.28	3.30	585.57
2017	1.60	6.27	3.92	584.62
2018	2.07	6.00	2.90	754.56
2019	1.85	7.44	4.02	673.46
2020	1.76	5.44	3.09	642.80
2021	1.74	6.68	3.84	631.68
3-year average	**1.78**	**6.52**	**3.65**	**649.31**
5-year average	1.79	6.27	3.52	650.73
10-year average	1.78	6.58	3.74	648.86

Daily Treatment and Operational Challenges

The peak factor for a treatment plant is determined by examining the actual flows the plant received over the years. In measuring capacity at the wastewater plant and the collection system, there are two major components that influence future planning:

- Inflow and Infiltration
- Services provided by others

Inflow and Infiltration (I&I): Inflow refers to clear water from rain and snowmelt that improperly drains into the sanitary sewer system. Infiltration refers to ground water that leaks into the sanitary sewer system through cracked or faulty sewer pipes. Both sources of water are basically clean. During heavy rainstorms, I&I may cause the sanitary sewers to quickly fill with clear rainwater that should be directed to the storm drain system. The City of Aberdeen WWTP peaks flows are extremely high due to wet weather. This undesired extraneous flow takes up wastewater system capacity that should be reserved only for wastewater. The I&I problems are also evident by examining the water supplied by the City and the wastewater received by the WWTP. **Table 10-5, Water to Sewer Comparison as Related to Rainfall,** provides a summary of the last ten years and provides a comparison of Daily Average of Water (Column 2) produced versus Daily Average (Column 3) of Sewer treated. Included in this chart is annual rainfall

measured from the wastewater treatment plant (Column 4) and City Hall (Column 7). Note: City Hall weather station did not start recording until the end of 2017 and therefore data is incomplete.

Weather events in the City are heavily influenced by the topography and its location near the Chesapeake Bay. Even a distance of several miles between two weather stations will yield differences measured (Note 2018 data). In general, higher annual flows treated coincide with higher yearly rainfall events.

Table 10-5. Water to Sewer Comparison as Related to Rainfall

Year	Water	Sewer	Rainfall at WWTP			Rainfall at City Hall		
	Daily Average (MG)	Daily Average (MG)	Yearly Total (in)	Max Rainfall per Month (in)	Month	Yearly Total (in)	Max Rain per Month (in)	Month
2012	1.38	1.42	33.35	7.06	Oct	N/A	N/A	N/A
2013	1.29	1.70	47.67	8.00	Jun	N/A	N/A	N/A
2014	1.34	2.16	43.61	7.66	Apr	N/A	N/A	N/A
2015	1.33	1.90	44.52	11.87	Jun	N/A	N/A	N/A
2016	1.31	1.60	27.21	5.87	Sep	N/A	N/A	N/A
2017	1.31	1.60	34.31	6.63	Jul	N/A	N/A	N/A
2018	1.33	2.07	48.41	6.65	Nov	63.49	8.62	Nov
2019	1.31	1.85	33.21	5.21	Jul	47.39	6.22	Jul
2020	1.29	1.76	50.06	11.45	Aug	47.07	9.48	Aug
2021	1.38	1.74	38.87	9.61	Jul	30.38	4.75	Jul

Efforts by City staff to curtail I&I into the collection system recently include the installation of 441 manhole cover inserts in 2017 and 2018 out of approximately 1900 manholes. Additional inserts are installed each year as funding allows. These inserts are placed under the manhole and prevent stormwater from entering the system. The City also has a program to perform video inspection of the entire system once every ten years. In 2022, the City started identifying and informing residents to repair broken cleanout caps in the yards that allow runoff to directly enter the sanitary sewer. Areas where there are breaks in the pipe are identified for repair. Long-term, the department challenges will be in funding constraints to repair broken pipes due to infiltration and residents/business that have a direct connect through sump pumps that inflow into the sewer. Efforts to measure success would be a decrease in the peaks from year to year and a closer delta between water produced and sewer treated on an annual basis. Reduced I&I can significantly reduce hydraulic loading into the WWTP during periods of wet weather and can be accomplished by emphasizing the evaluation and rehabilitation of the existing collection system.

Services provided by others: While the City has a bulk purchase water agreement with Harford County and the City of Havre de Grace, there are several instances where the City is the provider for Water and Harford County provides sewer service, and vice versa. On an average given year, 50,000 gallons per day are produced by the City and treated by Harford County's WWTP for some of the City's customers. These instances occurred because the cost to expand was prohibitive when the customer made the connections. In the planning of future growth, the ability to forecast the availability of the capacity in the system is driven by I&I issues and not in standing agreements for the City to serve sewage that it does not produce or purchase in bulk.

Wastewater System Improvements

The City is focused on the following improvements that are planned, under design, or in construction:

- Carsin's Run Sewer Pump Station Upgrade: Designs are planned to upgrade the lift station to support new development. This need is outlined in various APFO agreements with the developers and the City.
- Eagles Rest Sewer Pump Station: Designs are planned to provide upgrades to the lift station to support new development. This need is outlined in various APFO agreements with the developers and the City.
- Route 22 Sewer Line & Carsin's Run Sewer Line Upgrade: Designs are planned to upgrade the lift station and sewer lines to support new development. This need is outlined in various APFO agreements with the developers and the City.
- Swan Meadows Sewer Line Replacement: Designs are underway to replace over 8,000 LF of sewer mains in conjunction with a water main upgrade in Swan Meadows.
- Methane Flare System: Designs are complete with construction for FY24 to replace the Methane Flare System. The Methane system is comprised of the original equipment when installed in the late 1970s and is not functioning.
- Install AWWT Plant Auxiliary Power System (Construction): Designs are underway to secure the completion of a generator backup system for Process Control. An engineering firm in FY22 was selected to design a backup system to power the grit, primary, 1st stage, 2nd stage, and solids processing buildings at the WWTP. Backup generation allows essential equipment to operate during emergencies to maintain permit regulations.
- Sewer Main Lining: Pipe that can be rehabilitated are identified and lined to address voids in the pipe and extend the life especially when it is beyond the lifespan.
- Collection and Conveyance System Investigations: Developing a comprehensive sewer assessment program to identify and reduce I&I within the collection system.

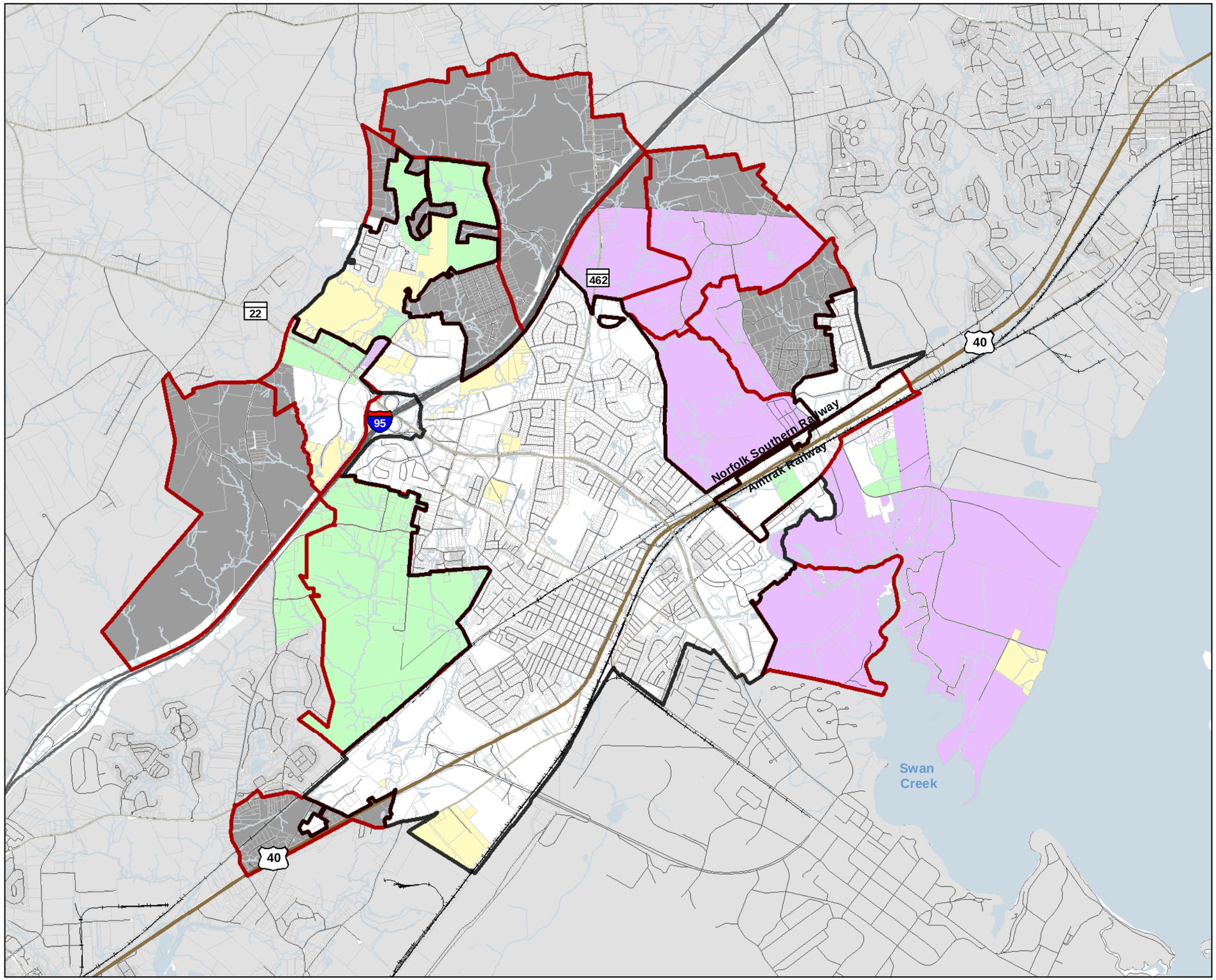
Growth Projections

As illustrated in **Table 10-3, Growth Area Summary,** the growth areas will be served by public water and sewer either by the City of Aberdeen or by Harford County. **Map 10-2, Wastewater Service Areas** indicates the Sewer service areas per Harford County's Water and Sewer Master Plan 2022 Update.

When developed to the expected density, a potential of 12,282 EDUs will be added (See Scenario 1 in **Table 10-3, Growth Area Summary**). To support this development, based on the average day demand of 250 gallons per day (gpd) per EDU, the City of Aberdeen would need an additional 3.071 MGD of wastewater capacity. Between January 2017 and December 2021, the City of Aberdeen's WWTP experienced an average influent flow of 1.78 MGD leaving 2.22 MGD reserve capacity. The WWTP is currently operating at 44.6% capacity and would exceed 80% of its capacity after adding 5,667 EDUs which is expected to occur in 2030 based upon a linear growth projection (Scenario 1). Therefore, as recommended by MDE, the City should complete a Wastewater Capacity Management Plan and begin the planning process to increase its capacity. Possible options could include a capacity upgrade of the existing WWTP, reduce I&I, process modifications that will further enhance the treatment and further reduce the nutrients which may subsequently increase permitted capacity. **Appendix E – Water Resource Calculations** includes the current and projected **Wastewater Flows for the City of Aberdeen & Proposed Growth Areas**.

There are currently nine properties within the City of Aberdeen corporate limits which currently have sewer exemptions to operate on private septic systems. All are located on dead-end roads in the Swan Creek Watershed (four parcels on Old Robin Hood Road and two parcels on Johnson Lane) and the Bush River Watershed (three parcels on Northeast Road). There are no current plans to connect these properties to the City's sewer collection system. Accordingly, they were not included in the calculations.

The City of Aberdeen's future growth is also limited by the Total Maximum Daily Limits (TMDLs) in Swan Creek where the WWTP discharges effluent. Increased nutrient loading is one of the key factors that have been attributed to the decline in water quality and living resources in the Chesapeake Bay. Sources of these nutrients include run-off from the land, WWTPs and septic systems, and atmospheric deposition. All sources of nutrients that enter the Bay have been studied extensively and quantified. Scientists have estimated the maximum amount of nutrients that the Bay can accommodate without adverse water quality affects. A Tributary Strategy for the Chesapeake Bay Watershed has become the standard to which cleanup efforts of the Bay are proceeding.



MAP 10-2

Wastewater Service Areas

- City of Aberdeen
- Planning Areas
- Water Bodies
- Railroad

Major Roads

- Interstates
- US Highways
- State Routes
- Local Routes

Wastewater Service Areas

- S1 Existing Service
- S3 Planned Service (0-5 Yrs)
- S5 Planned Service (6-10 Yrs)
- S6 Planned Service (11-20 Yrs)
- S7 No Planned Service
- Outside City & Planning Areas

planABERDEEN
Our City, Our Plan, Our Future.

Source: Aberdeen Department of Public Works, Harford County

Wallace Montgomery created this map for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.

April 2023

0 0.5 1 Miles

N

In order to meet the goals of the Chesapeake Bay Initiatives, all of the major public WWTPs in Harford County have been upgraded to ENR standards of 4.0 mg/l total nitrogen and 0.3 mg/l total phosphorus. These ENR standards are being utilized for today's National Pollutant Discharge Elimination System (NPDES) permits. In response to the new pollution limits, also known as the TMDL, the seven Bay jurisdictions have created individual Watershed Implementation Plans (WIPs), or restoration blueprints that detail specific actions each would take to meet their pollution reduction goals by 2025. The blueprints guide local and State Bay restoration efforts through the next decade and beyond. The Bay jurisdictions also set two-year pollution reduction milestones to track and assess near-term progress towards completing their restoration actions; EPA regularly reviews each jurisdiction's milestones and confirmed that Maryland achieved both the 2010-2011, 2012-2013, and 2014-2015 milestones. Harford County submitted its Phase II WIP to MDE in 2012 and submitted new 2016-2017 programmatic milestones to track water quality improvements.

The current nutrient loadings at existing and permitted flows for the WWTP are set forth in **Table 10.9, Swan Creek WWTP Annual Nutrient Discharge Loads**. The concentration-based limits at future flows for total nitrogen at the future flows totals 59,102 lbs/year, which is more than the current permit limit of 48,729 lbs/year. Similarly, the concentration-based limits at future flows for total phosphorus at future flows totals 4,432 lbs/year, which is more than the current permit limit of 3,655 lbs/year. Therefore, nutrient loading is also limiting factor in the City's growth and should be considered during the Wastewater Capacity Management Planning, particularly if maximum effluent limitations for the WWTP outfall are adjusted in future NPDES permit revisions or revisions to the Swan Creek / Chesapeake Bay TMDL.

Wastewater Summary

Based on this review, the City of Aberdeen has capacity at the WWTP to accommodate future anticipated growth and meet limitations set within the discharge permit but is expected to exceed the 80% capacity threshold in 2030. Therefore, as recommended by MDE, the City should complete a Wastewater Capacity Management Plan and begin the planning process to increase its capacity. Additional infrastructure improvements will continue to be necessary to provide public sewer service to the designated growth areas and reduce I&I. The City of Aberdeen should monitor growth to ensure that system capacity remains sufficient.

STORMWATER MANAGEMENT

Stormwater (or runoff) management is the planned set of public policies and activities undertaken to regulate runoff under various specified conditions within various portions of the drainage system. Stormwater management is distinct from floodplain management, which regulates the nature and location of construction on (or the occupancy of) lands subject to inundation, so that foreseeable flooding damages will have an average annual risk smaller than a preselected amount. Managing stormwater is of critical importance in protecting the quality of Maryland's streams and rivers. As development occurs, forest and farmland are converted to impervious surfaces, resulting in increased stormwater runoff and decreased infiltration. With development, stormwater runoff increases in volume and velocity and can result in degraded stream channels, erosion, and increased pollutant loads. In addition, the increase of impervious areas reduces the opportunities for pollutants to be filtered prior to entering rivers and streams. Ideally, these pollutants are reduced by stormwater management practices implemented at the time of site development. This section of the Water Resources Chapter will describe the City's current efforts toward managing and mitigating stormwater runoff and describe a proposed restoration plan to address urban pollutant loadings from the City into the Chesapeake Bay.

The City of Aberdeen adopted its Stormwater Management regulations on May 10, 2010, by Ordinance # 10-O-08 to be consistent with *The Maryland Stormwater Management Act of 2007*. As an operator of MS4s, the City's stormwater discharge is permitted through the NPDES Program regulated by the federal EPA and administered by Harford County the Watershed Protection and Restoration Office (MS4 Office) within the Department of Public Works. The City's Current General Discharge Permit No. 13-IM-5500 (NPDES No. MDR055500) was effective October 31, 2018 and expires on October 30, 2023.

Under this permit, the City is required to implement the following six minimum control measures:

1. Public Education and Outreach
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination (IDDE)
4. Construction Site Stormwater Runoff Control
5. Post Construction Stormwater Management
6. Pollution Prevention and Good Housekeeping

The City's current storm sewer assets include 61.44 miles of stormwater pipe, 282 outfalls, 89 drainage basins, 1,930 inlets, and 297 storm drains. In May 2018 the City adopted an Illicit Discharge ordinance, codified in Article XIII Section 250-34 through Section 250-42 prohibiting the discharge of certain substances into MS4. Recertification is required every five years. Stormwater retrofits and stream restoration projects within the Development Envelope are implemented through this program. The City currently uses contracted engineering services to manage its program to access its needs and develop

potential projects that provide stormwater credits toward the TMDL goals, such as stream restoration projects. Additionally, the City recently allocated dedicated positions and equipment to maintaining the separate storm sewer system. The City should continue to dedicate resources to assess, maintain and improve the separate storm sewer system.

Land Use Scenarios

Two land use scenarios were performed to determine non-point source loading. The first scenario looks at the affect infill development will have on increasing or decreasing non-point source runoff. The second scenario looks at the ultimate build out in the mapped growth areas. There are no scenarios based on the different developments.

Non-Point Source Summary

Table 10.6, Summary of Estimated Non-Point Nitrogen & Phosphorus Discharge for Scenarios 1 and 2 highlights the results of the following scenarios.

Scenario 1 - Existing City Boundaries (Infill Development)

Based on the Watershed Treatment Model (WTM), it is estimated that the City of Aberdeen is currently generating 25,040 pounds of nitrogen per year. Potential infill growth is estimated to increase discharge levels to 28,299 pounds of nitrogen per year generated by stormwater runoff; an increase of 3,259 pounds per year. Phosphorous levels are currently being discharged at an estimated 3,132 pounds per year. Projected infill growth is estimated to increase phosphorous discharge to 3,624 pounds per year.

Refer to **Table 10.6, Summary of Estimated Non-Point Nitrogen & Phosphorus Discharge for Scenarios 1 and 2** for the summary of initial and future nitrogen and phosphorous discharge in each of the watersheds. All estimates are based on projected future growth occurring inside the existing City limits. Any new development annexed into the City of Aberdeen will be required to address nutrient loading.

Scenario 2 – Future Growth Areas Build-Out

Based on the WTM, it is estimated that nutrient runoff within the City of Aberdeen's growth areas is generating 20,182 pounds of nitrogen per year. Potential new growth is estimated to increase discharge levels to 23,462 pounds per year generated by stormwater runoff; a increase of 3,280 pounds per year. Phosphorous levels are currently being discharged at an estimated 4,606 pounds per year. Projected new growth is estimated to increase phosphorous discharge to 2,930 pounds per year. See **Table 10-6, Summary of Estimated Non-Point Nitrogen & Phosphorus Discharge for Scenarios 1 and 2,** for the summary of initial and future nitrogen and phosphorous discharge in each of the watersheds. All estimates are based on projected future growth occurring inside and outside the existing City limits. Any new development annexed into the City of Aberdeen will be required to address nutrient loading.

Table 10-6. Summary of Estimated Non-Point Nitrogen & Phosphorus Discharge for Scenarios 1 and 2

Scenario		Total Non-Point Discharge			Swan Creek		Bush River		APG Watershed	
		% Change	Initial	Future	Initial	Future	Initial	Future	Initial	Future
Nitrogen	1	13%	25,040	28,299	13,144	15,804	8,624	9,007	3,272	3,489
	2	16%	20,182	23,454	12,672	15,017	7,510	8,437	N/A	N/A
Phosphorus	1	16%	3,132	3,624	1,599	2,006	1,110	1,166	423	452
	2	17%	2,513	2,929	1,644	1,950	869	979	N/A	N/A

Due to the limitations of the WTM, the results cannot be used to accurately predict actual nutrient loads within Swan Creek or other watersheds to allow for direct comparisons of TMDLs, but instead can only be used for comparing the relative impacts of alternative land use plans.

Table 10-7. Change in Impervious Surface Area (acres) for Scenarios 1 and 2

Scenario	Total		Swan Creek Watershed		Bush River Watershed		APG Watershed	
	Initial	Future	Initial	Future	Initial	Future	Initial	Future
1 - Infill	3880	3881	2440	2440	1019	1020	421	421
2 - Growth Areas	5235	5240	3240	3245	1995	1995	N/A	N/A

Swan Creek

Approximately 60% of the City of Aberdeen is in the Swan Creek Watershed. This watershed is listed as Category 3 under the Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Suspended Solids, and Combined Benthic/Fishes Bioassessments. Swan Creek Watershed is listed under Category 5 of the Integrated Report as impaired for impacts to biological communities. Approximately 46% of the Swan Creek Watershed is estimated as having fish and/or benthic indices of biological impairment in the poor to very poor category. The City of Aberdeen's WWTP with a design capacity of 4.0 MGD and Swan Harbor Dell WWTP, serving a mobile home park, are two-point sources discharging into Swan Creek.

However, there is also a TMDL for nitrogen and phosphorus loading into Swan Creek approved by the Watershed Protection Division of EPA Region III in March of 2002. According to the report, the State's 1996 list of Water Quality Limited Segments, Swan Creek is impaired by excess nutrients and suspended sediments. This report only addressed TMDL's for nitrogen and phosphorus and does not address sediment impairments. TMDL's for the nutrients are recorded on **Table 10.8, TMDLs for Annual Average Flow Conditions for Swan Creek** below and as follows:

Table 10-8. TMDLs for Annual Average Flow Conditions for Swan Creek

	Nitrogen	Phosphorus
Non-Point Source TMDL (lbs/yr)	121,907	9,774
Point Source TMDL (lbs/yr)	49,637	3,492
Total TMDL	**171,544**	**13,266**

Source: TMDL for Swan Creek

Estimated non-point nitrogen and phosphorous discharge for the City of Aberdeen scenarios is less than the non-point source TMDL of the Swan Creek. However, the City of Aberdeen is not the only jurisdiction

contributing to these non-point loadings. **Table 10.9, Swan Creek WWTP Annual Nutrient Discharge Loads** shows the major WWTPs within the Swan Creek watershed along with their current nutrient discharge loads and ENR load caps for planning purposes.

Table 10-9. Swan Creek WWTP Annual Nutrient Discharge Loads

WWTP	Current*		Permit Load Cap	
	Nitrogen	**Phosphorus**	**Nitrogen**	**Phosphorus**
Aberdeen (MD0021563) (lbs/yr)	5,871	308	48,729	3,655
Swan Harbor Dell (MDR0023043) (lbs/yr)	487	3	487	3

*Source: NPDES Permit. Note: *Current information is from the most recent year presented in the source document. Permit and effluent testing data not available for Swan Harbor Dell, values based upon average flows in permit application and statewide permitted nutrient limitations.*

Bush River

This watershed is also listed as Category 3 under the Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Estuarine Bioassessments, PCB in Fish Tissues, Suspended Solids, and Combined Benthic/Fishes Bioassessments. **Table 10-10, Bush River WWTP Annual Nutrient Discharge Loads** shows the major WWTPs within the Bush River watershed along with their current nutrient discharge loads and ENR load caps for planning purposes.

Table 10-10. Bush River WWTP Annual Nutrient Discharge Loads

WWTP	Current*		Permit Load Cap	
	Nitrogen	**Phosphorus**	**Nitrogen**	**Phosphorus**
APG-Edgewood (MD0021229) (lbs/yr)	4,231	913	14,619	1,096
Sod Run (MD0056545) (lbs/yr)	143,450	10,841	243,645	18,273

*Source: NPDES Permit. Note: *Current information is from the most recent year presented in the source document. Effluent testing data not available for Sod Run, current values based upon average flows and permitted nutrient limitations.*

Aberdeen Proving Ground

This watershed is listed as Category 5 under Integrated Report and identifies the potential pollutants as Nutrients (nitrogen, phosphorus), Estuarine Bioassessments, Toxics, Suspended Solids, and Combined Benthic/Fishes Bioassessments. **Table 10-11, Aberdeen Proving Ground WWTP Nutrient Discharge Loads** shows the major WWTP within APG watershed along with its current nutrient discharge loads and ENR load cap for planning purposes.

Table 10-11. Aberdeen Proving Ground WWTP Nutrient Discharge Loads

WWTP	Current*		ENR Load Cap	
	Nitrogen	**Phosphorus**	**Nitrogen**	**Phosphorus**
APG-Aberdeen (MD0021237) (lbs/yr)	11,132	252	34,110	2,558

*Source: NPDES Permit. Note: *Current information is from the most recent year presented in the source document.*

The City should continue to work to implement stormwater BMPs along all three watersheds to help reduce the pollutants through non-point source discharge. The City of Aberdeen should also monitor approval of the TMDL and implementation strategy for Bush River and APG. In addition, the City of

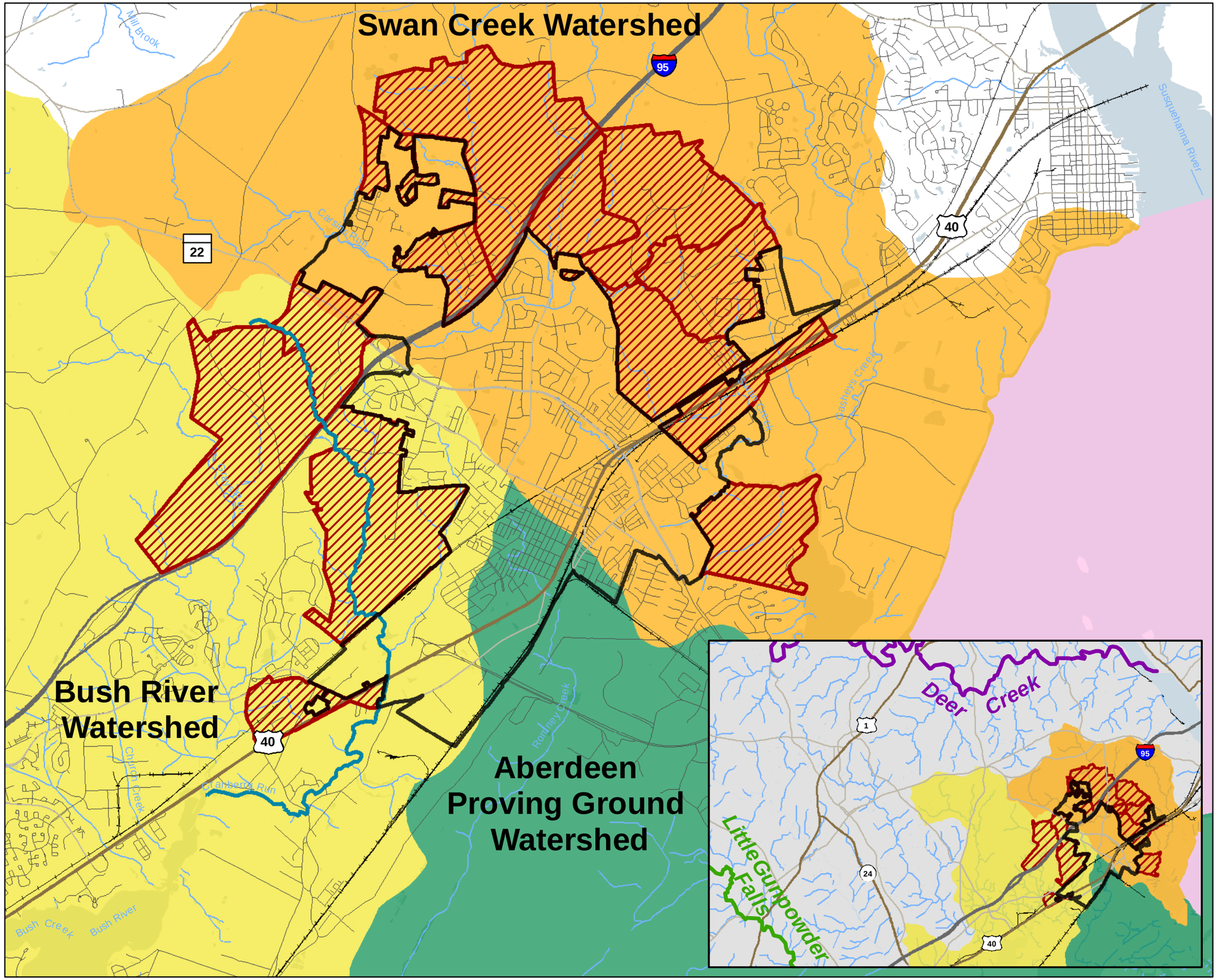
Aberdeen should monitor progress of future TMDLs for the Swan Creek Watershed for other impairments discussed above.

TIER II WATERWAYS AND ANTIDEGRADATION

Tier II waterways are considered to be waterways high in quality that require special protections. In Harford County, seven waterways have been given Tier II status: Deer Creek 1, Deer Creek 4, Deer Creek 2, Little Gunpowder Falls 8, Little Gunpowder Falls 9, Overshot Branch 8, and Overshot Branch 7. The City of Aberdeen is not within a sub watershed affecting these Tier II designated creeks. See **Map 10-3, Tier II Waterways** for the location of the waterways that require special protection. In the future, the City of Aberdeen should monitor future designations of Tier II waterways to ensure waterways affected by urban runoff or future development in the City are recognized and measured to maintain high-quality waterways are implemented.

Another policy used by the State to protect water quality is the Antidegradation Policy. For any amendments to a county water and sewer plan or discharge permit, MDE must review the proposed change in light of the Maryland Antidegradation Policy. This policy ensures that water quality continues to support designated uses. In addition to protecting designated uses, federal and State laws require protection of waters that are of higher quality than the minimum standards. These waters are designated "Tier II." Tier II waters in Harford County occur mostly in the Deer Creek, Broad Creek, and Little Gunpowder Falls watersheds and are depicted on the Sensitive Areas Map. All but one occurs outside of the Development Envelope. None of the major WWTPs in Harford County discharge to Tier II waters, and there are no plans for any future discharges to these waters. One small treatment plant, Spring Meadows, services an existing community in the Deer Creek watershed; there are no plans for expansion.

Swan Creek Watershed



MAP 10-3

Watersheds & Tier II Waterways

- City of Aberdeen
- Planning Areas
- Railroad
- Stream or River

Major Roads

- Interstates
- US Highways
- State Routes
- Local Routes

Tier II Waterways

- Deer Creek
- Little Gunpowder Falls

Aberdeen Sub-Watersheds

- Aberdeen Proving Ground
- Bush River
- Swan Creek
- Upper Chesapeake Bay
- Cranberry Run

planABERDEEN
Our City. Our Plan. Our Future.

Source: MD iMAP, MD Department of Natural Resources

Wallace Montgomery created this map for planning purposes from a variety of sources. It is neither a survey nor a legal document. Information provided by other agencies should be verified with them where appropriate.

April 2023

0 0.5 1 Miles

N

FLOOD RESILIENCY AND CLIMATE ACTION ADAPTATION

Urban and riverine flooding is a growing issue in Maryland. Accordingly, Maryland updated its *Stormwater Management Law, Environment Article 4-201.1*, effective June 1, 2021. The statute now requires local governments to plan for more frequent floods caused by climate change, and to reduce flood induced pollutants to local waters and the Chesapeake Bay.

Map 9-4, Flood Hazard Areas (**See Chapter 9 - Environmental Resources and Sensitive Areas**) illustrates the Federal Emergency Management Agency (FEMA) Flood Hazard Areas. **Map 9-6, Sea Level Rise Inundation,** (**See Chapter 9 – Environmental Resources and Sensitive Areas**) illustrates the SLR inundation for two-feet, five-feet and 10-feet inundation along Swan Creek. It is estimated that in 2020 – 2021, public works staff spent approximately 4% percent of its staff time dealing with flood cleanup activities. Appropriating resources on flood mitigation planning can be a more cost-effective use of staff time. Planning efforts should also be applied with an equity lens and not a simple cost benefit approach.

The National Flood Insurance Program (NFIP), managed by FEMA, makes federally backed flood insurance available in communities that agree to adopt and enforce floodplain management regulations to reduce flood damage. The NFIP's Community Rating System (CRS) encourages community floodplain management activities that exceed the minimum NFIP standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities based upon 19 creditable activities, organized in four categories: (1) public information; (2) mapping and regulations; (3) flood damage reduction; and (4) warning and responses. There are 10 CRS classes: Class 1 gets the largest premium reduction (currently 45%) and Class 10 receives no premium reduction. The City currently participates through Harford County, a Class 7 community, and all Harford County residents and business within Special Flood Hazard Areas (SFHA) currently receive a 15% premium reduction on flood insurance (5% reduction for non-SFHA). In sum, complying with Maryland's State requirement of improving flood management could help communities get the most out of the CRS and possibly rate premium reductions.