WRE

2024

Comprehensive Plan Element for:

Carroll County/Freedom
Hampstead
Manchester
Mount Airy
New Windsor
Sykesville
Taneytown
Union Bridge
Westminster

Draft for Planning Commissions Review

As of 12 June 2025

Preface

This plan document was a joint effort between Carroll County and its municipalities: Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster. Coordination and review took place through the Water Resources Coordination Council. **The plan is based on the adopted comprehensive/land use plans, zoning/regulations, and policies in place in 2022 – 2024 (not on any proposals)**. Upon adoption by each of these jurisdictions, it is intended to satisfy the requirements of House Bill 1141 (2006) to develop and adopt a Water Resources Element (WRE) of the comprehensive plan for each of these jurisdictions and the requirement of HB 409 (2013) for a jurisdiction to review and update its comprehensive plan every 10 years.

The entire plan document is intended to be applied to and adopted by each jurisdiction, with the exception of the "Overview by Municipal System." Within this section, only the portion specific to an individual jurisdiction is intended to apply to and be adopted by that jurisdiction. If any jurisdiction chooses not to or fails to adopt this plan document, it does not invalidate the document and/or adoption for the other jurisdictions.

The plan provides information and evaluation of the county's water resources at the MDE 8-digit watershed level and a countywide assessment of stormwater issues. Strategies are offered on a countywide basis. Water supply and wastewater are also discussed for each individual municipal system that serves a designated growth area. Strategies that are specific to those systems and that reflect the unique characteristics and needs of those systems and communities are included in the individual municipal systems sections. Strategies are intended to identify measures that could, and should, be taken by each jurisdiction to achieve the goals and intentions of this plan document, given the circumstances in place at the time this plan was updated. However, they do not require any jurisdiction to implement every strategy contained in the document.

The information and recommendations provided in this plan are supported by technical assessments conducted and reported in documents separate from, but as support to, the WRE plan document. The supporting reports, some originally prepared by Malcolm Pirnie and updated by Hazen & Sawyer ("Hazen") and others prepared by Hazen, are referenced for more detailed information than the summaries provided in this plan document. They are:

- Technical Memorandum, "Emerging Contaminants Assessment and Recommendations," dated September 1, 2023
- Technical Memorandum, "Evaluation of Climate Change Impacts on Water Resources in Carroll County, MD," dated November 16, 2023
- Technical Memorandum, "Review of 1988 Water Resources Study," dated March 26, 2009, updated April 18, 2024
- Report, *Carroll County Demands and Availability*, dated July 30, 2009, updated May 21, 2024
- Report, *Carroll County Wastewater Limitations*, dated May 29, 2009, updated May 14, 2024
- Report, *Carroll County Alternatives Evaluation*, dated September 28, 2009, updated May 14, 2024
- Technical Memorandum, "WRE Update: Carroll County Water and Wastewater Options and Strategies," dated May 14, 2024

The information contained within and addressed by this plan is based on the requirements of the legislation as interpreted by guidance originally presented within the Models and Guidelines (No. 26) *The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management,* which was updated by Maryland Department of Planning in 2022. Additional guidance on information to be included and issues to be addressed was originally provided by Maryland Departments of Environment, Planning, and Natural Resources through a "Guidance Team" and the cooperative process undertaken to include these State agencies in the planning process for the initial development of the WRE, adopted in 2010.

Prepared by ***Carroll County Department of Planning & Land Management…***

In collaboration with the:
Carroll County Water Resource Coordination Council

On behalf of:
- Carroll County
- Hampstead
- Manchester
- Mount Airy
- New Windsor
- Sykesville
- Taneytown
- Union Bridge
- Westminster

Adopted by:
- Carroll County
- Hampstead
- Manchester
- Mount Airy
- New Windsor
- Sykesville
- Taneytown
- Union Bridge
- Westminster

Table of Contents

Regulatory Setting

Drinking Water Supply

Wastewater

Stormwater

Countywide Strategies: Objectives & Action Items for All

Overview by Municipal System

Except for Carroll County and Sykesville, each municipal system-specific section follows the basic outline below, with some variations that reflect the individual municipal system.

XX.1 Water Supply
- xx.1.1 Source Water Assessment
- xx.1.2 Water Supply Demand
- xx.1.3 Water Supply Capacity
- xx.1.4 Water Supply Limitations
- xx.1.5 Water Demand Management

XX.2 Wastewater
- xx.2.1 Wastewater Demand
- xx.2.2 Wastewater Capacity
- xx.2.3 Limitations Based on Design Capacity
- xx.2.4 Limitations Based on Local Water Quality
- xx.2.5 Limitations Based on Bay Nutrient Caps
- xx.2.6 Limitations Based on 2005 Reservoir Watershed Management Agreement (WMA) [Hampstead & Manchester only]
- xx.2.6/7 Summary of Wastewater Limitations

XX.3 System-Specific Strategies: [Municipal System]

Water
- xx.3.1 Protect and sustain existing drinking water supplies serving existing development
- xx.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources
- xx.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

xx.3.4 Develop emergency supply plans and measures
Wastewater
xx.3.5 Sustain existing wastewater treatment capacity
xx.3.6 Develop new public wastewater treatment and disposal capacity
Stormwater
xx.3.7 Protect / restore water quality and make progress toward any applicable TMDLs

List of Supporting, Contributing, & Guiding Documents

- Technical Memorandum, "Review of 1988 Water Resources Study," dated March 26, 2009, updated April 18, 2024
- Report, *Carroll County Demands and Availability*, dated July 30, 2009, updated May 21, 2024
- Report, *Carroll County Wastewater Limitations*, dated May 29, 2009, updated May 14, 2024
- Report, *Carroll County Alternatives Evaluation*, dated September 28, 2009, updated May 14, 2024
- Technical Memorandum, "WRE Update: Carroll County Water and Wastewater Options and Strategies," dated May 14, 2024
- Guidance Document, *Models and Guidelines Managing Maryland's Growth No. 26*, "The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management," Prepared by Maryland Departments of Environment, Planning, and Natural Resources, dated June 2007, and updated online in January 2022
- Guidance Document, *Water Supply Capacity Management Plans*, Maryland Department of the Environment, dated June 2013
- Guidance Document, *Wastewater Supply Capacity Management Plans*, Maryland Department of the Environment, dated July 2006
- Plan, *Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan*, Maryland Departments of Natural Resources, Environment, Planning, and Agriculture, dated February 22, 2006, draft
- Plan, *Carroll County Master Plan for Water & Sewerage*, Carroll County Planning Department, dated September 2023

Acronyms

APFO	Adequate Public Facilities Ordinance
BRF	Bay Restoration Fund
BMC	Baltimore Metropolitan Council
BMP	best management practice
BNR	biological nutrient removal
BLI	Buildable Land Inventory
CMP	capacity management plan
CIP	Capital Improvement Program or Community Investment Plan
CBP	Chesapeake Bay Program
CWA	Clean Water Act
CWP	Center for Watershed Protection
DGA	Designated Growth Area
DU	dwelling unit
DNR	(Maryland) Department of Natural Resources
EAC	Environmental Advisory Council
ENR	enhanced nutrient removal
ESD	Environmental Site Delineation
GAB	Growth Area Boundary
Gpd	gallons per day
GHG	greenhouse gas
GW	groundwater
HB	House Bill
HUC	hydrologic unit code
I&I	infiltration and inflow
IPA	installment purchase agreement
LULC	Land Use/Land Cover
LID	Low-impact design or low-impact development
MACS	Maryland Agricultural Cost Share Program
MCL	maximum contaminant level
MD	Maryland
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDP	Maryland Department of Planning
mgd	million gallons per day
NPDES	National Pollutant Discharge Elimination System
OSDS	onsite disposal system
PLM	Carroll County Planning & Land Management Department
PFA	Priority Funding Area
PFAS	Per- and Polyfluoroalkyl Substances
PDR	purchase of development rights
SBR	sequencing batch reactor
SDWA	Safe Drinking Water Act
SOC	synthetic organic compounds
SSA	sewer service area
SW	surface water
SWA	source water assessment
TMDL	Total Maximum Daily Load
TDR	transfer of development rights
U&O	use and occupancy (permit)
USACE	United State Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compounds
WSA	water service area
WLA	wasteload allocation
WWCMP	Wastewater Capacity Management Plan
WWTP	Wastewater Treatment Plant
WSCMP	Water Supply Capacity Management Plan
WTP	Water Treatment Plant
WIP	Watershed Improvements Plan
WMA	Watershed Management Agreement
WSM	watershed model
WRCC	Water Resources Coordination Council
WRE	Water Resource Element

Introduction

Eight municipalities reside within Carroll's borders – Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster. All but Sykesville also own and operate their own water systems. All but Sykesville and Hampstead own and operate their own wastewater systems. The County provides public water and sewer service to Sykesville through the systems that serve the Freedom area. The County owns and operates the sewer system that serves Hampstead.

- For decades, a major tenet of the County Master Plan has been to direct growth to the municipalities and Freedom (Designated Growth Areas, or DGAs), where public facilities and services are most available and accessible.
- Carroll County has eight municipalities, each with their own planning and zoning authority. All but one own and operate their own public water supply and/or wastewater systems.
- The political boundary of Carroll County includes lands which drain to nine different 8-digit watersheds. Two of these watersheds – Double Pipe Creek and Liberty Reservoir – cover most of Carroll County. Watershed boundaries cross jurisdictional borders.
- The County and all 8 municipalities are legally required to meet the conditions of their joint stormwater permit, which includes treating stormwater runoff to improve water quality and implementing projects to reduce pollution to local streams and the Chesapeake Bay.

Both the original 2010 WRE and the 2024 WRE represent a joint effort by the County and all eight municipalities to cooperatively and collaboratively develop one document that all nine jurisdictions adopt. The majority of the plan document applies to all nine jurisdictions, except for the individual system-specific sections. This joint effort provides a holistic look at the demand and capacities countywide, water availability, and joint and regional options for addressing future needs. The WRE then helps to inform that comprehensive planning process by showing areas where growth may or may not be possible due to availability and limitations of water resources.

1.0 Water Resources Element (WRE)

1.1 Legislation

Legislation (HB 1141) passed by the 2006 Maryland General Assembly resulted in several significant changes to land use regulations, including new watershed-based planning requirements. At the time, the land use regulations were controlled by Section 3.05 (a)(vi) of Article 66B of the Annotated Code of the State of Maryland. In 2012, the Maryland General Assembly repealed Article 66B and Article 28 and replaced it with the Land Use Article.

The requirements that are now a part of the Land Use Article mandate that all Maryland counties and municipalities that exercise planning and zoning authority prepare and adopt a water resources element to their comprehensive plans. The legislation required the Water Resources Element (WRE) to be developed and adopted by all local governments on or before October 1, 2009. The legislation also provided for the granting of up to two six-month extensions of that deadline. Carroll County and all eight municipalities requested and were granted an extension of the deadline to April 1, 2010.

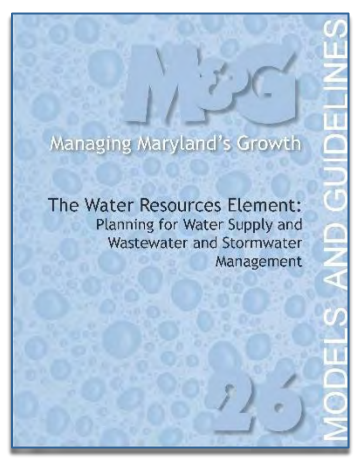
The purpose of the WRE is to ensure that future county and municipal comprehensive plans reflect the opportunities and limitations presented by local and regional water resources. WREs are intended to improve local jurisdictions' contribution to the protection of state land and water resources; to the protection of public health, safety, and welfare; and to meet local and state smart growth policies.

1.2 Requirements

Specific requirements MDE reviews for include:

- Adequate Water Resources**:** Identify sufficient drinking water and other water resources for existing and future development, considering MDE data.
- Stormwater and Wastewater Management**:** Identify suitable receiving waters and land areas for stormwater management and wastewater treatment and disposal, also considering MDE data.
- Consistency with State Programs**:** The WRE must align with MDE's general water resources program and goals.
- Water Quality**:** The WRE should address water quality protection and restoration, potentially including measures to reduce nutrient loading.
- Integration of Climate Change Adaptation**:** Consider the impacts of climate change on water resources and integrate adaptation measures into the plan.
- Equity Lens**:** Consider the impacts of planned growth and development on water resources through an equity lens.

1.3 Models & Guidelines



The *Models and Guidelines* document was prepared by the Maryland Departments of Planning (MDP), Environment (MDE), and Natural Resources (DNR) and released in July 2007. Its purposes are to help local governments prepare the WRE in a manner that will not only meet the requirements of the law but will strengthen their planning efforts by ensuring that water resources will be adequate to support smart growth while meeting local economic, environmental and land use goals. The guidance document suggests assessments and methodologies to be used in completing the WRE plan document. Plans submitted to the State for review will be evaluated based on the inclusion of these components.

In January 2022, MDP released an updated online Water Resources Element (WRE) Guidance Update, which included addressing best practices for integrating climate change, identifying suitable receiving waters, and looking at projects through an equity lens. This includes analyses and approaches for:

- ensuring receiving waters are protected as the local land use plan is developed and implemented, reflecting changes to the MDE's water resources programs over the past decade;
- integrating climate change considerations, particularly flooding risks, into the drinking water, wastewater, and stormwater assessments of the WRE; and
- Considering planned growth and development impacts on water resources through an equity lens.

To achieve these purposes, planning efforts must reflect the broader geographical context of watersheds. Successful WREs should be based on this perspective. The common goals for Maryland's water resources are reflected in the Maryland Watershed Implementation Plans (WIPs) – Phases 1 through 3, federal and state regulatory programs, and sustainable growth policies.

The 2024 WRE update, therefore, incorporates climate change impact and adaptation and resilience measures, as well as identification and evaluation of suitable receiving waters to the information already addressed in the 2010 WRE. The document also has been updated to reflect more current supporting information, regulatory and policy requirements and implementation, and subsequent strategies to address needs.

1.4 Process

Carroll County and its municipalities worked collaboratively to develop one unified WRE document that can be adopted by all of Carroll County's jurisdictions to satisfy the requirements of House Bill (HB) 1141, both for the original 2010 documents as well as the 2024 updated document.

The ***Water Resources Coordination Council*** (WRCC) was formed in March 2007 to serve as the lead intergovernmental agency for water resource planning, development, and protection in Carroll County. The Council consists of representatives from each of the municipalities, the County, and the Carroll County Health Department.

Since this process involved substantial technical information, a WRE Guidance Team was formed to discuss issues as they arise when the original document was being developed. This team included representatives of County staff, each municipality, the Carroll County Health Department, and the three relevant State agencies – MDE, MDP, and DNR. The Carroll County Water Resources Coordination Council served as the local body for guiding, directing, and reviewing the assessments and development of the plan document. All meetings of this group were open to the public. A WRE Work Group, consisting of the County and municipal representatives from the Water Resources Coordination Council (WRCC), met periodically to work through more specific issues related to data collection and technical background assessments. The WRE Work Group followed the Models and Guidelines (No. 26) developed jointly between MDE, MDP, and DNR for the development of this plan element.

The Group collected data on the current capacity of each community municipal water and wastewater system. This information helped identify additional capacity needs based on current and planned future demand/growth. If limitations were identified that could not be overcome, reductions in future demand were considered. The methodology and format for collecting this data were based on MDE's guidance documents for Water Supply Capacity Management Plans (2006) and Wastewater Capacity Management Plans (2006).

For the 2010 WRE, the County hired a consultant, Malcolm Pirnie, to provide technical assistance with several of the background assessments needed to inform decisions and develop strategies to be included in a plan element. The consultant provided a number of assessments/evaluations, including.

- Updating the 1988 water study completed by RE Wright
- Completing a water balance assessment for each 8-digit watershed (water available for future consumption, from both groundwater and surface water sources)
- Assessing overall limitations of wastewater
- Evaluating options/alternatives for individual water and wastewater municipal systems as well as countywide
- Identifying strategies to address water and wastewater issues

Technical reports were developed by Malcolm Pirnie and summarized in this plan document as needed and appropriate.

For the 2024 update, the County hired Hazen & Sawyer to update these supporting documents.

- *Carroll County Water Demands and Availability*, July 30, 2009, updated May
- *Carroll County Wastewater Limitations*, May 29, 2009
- *Carroll County Alternatives Evaluation*, September 28, 2009

Hazen was also tasked with identifying the impacts of climate change and emerging contaminants on water resources in Carroll County and identifying adaption and resilience measures to address these impacts. Additional technical memoranda were produced to address these additional issues:

- *Emerging Contaminants Assessment and Recommendations*, September 1, 2023
- *Evaluation of Climate Change Impacts on Water Resources in Carroll County, MD*, November 16, 2023

The stormwater component of this plan, previously referred to as the nonpoint source (NPS) component, addresses both stormwater and individual private septic systems. This component was completed by County staff. For the 2010 WRE, MDP and MDE provided a loading analysis model. Recommended strategies needed to address the nonpoint source/urban stormwater contribution to or impact on impaired waters (303d), Total Maximum Daily Loads (TMDLs), Tier II waters (high quality), and Tributary Strategies, among other things. The 2024 WRE uses the TMDL process, wasteload allocations (WLA), National Pollutant Discharge Elimination System (NPDES) Phase 1 Municipal Storm Sewer System (MS4) requirements, and other regulations and policies in place since 2010 to identify and evaluate the needs associated with stormwater and water quality.

A WRE Technical Team was created, consisting of Carroll County technical staff and the Chair of the WRCC. The Technical Team provided technical information to the consultant and reviewed and provided feedback on the technical memoranda provided by Hazen. The WRCC Chair and the WRE project manager served as coordinators with the municipalities and Carroll County Utilities for the information gathering process.

The methodology and format for collecting capacity and demand (C&D) data for each public water supply and wastewater system (serving a designation growth area) were again based on MDE's guidance documents for Water Supply Capacity Management Plans (2013) and Wastewater Capacity Management Plans (2006). The Capacity & Demand (C&D) Workbooks were updated to reflect current data.

As part of the 2010 WRE effort, the County participated in the Center for Watershed Protection's Builders for the Bay Better Site Design Standards assessment and consensus document. This project provided the stormwater programmatic assessment required in the WRE guidance document. The consensus document primarily provided recommendations for addressing impervious surfaces and reducing runoff. Many of the recommendations were implemented prior to completion of the draft WRE. Others were incorporated into the County's comprehensive planning process. Since 2010, many of these strategies have been implemented.

For the 2024 WRE, upon completion of these assessments, County and municipal staff worked together to draft/update the actual WRE plan document. The background assessments and resulting strategies for the WRE were primarily based on ***2023 current conditions*** – adopted plans, policies, and zoning/regulations in place at the time the assessments were completed or under consideration in 2023. The assessments and strategies do not consider proposals or drafts ***not*** adopted at the time of the drafting of the WRE. However, recommendations to address or support some of the issues surrounding other proposals may be included in the strategies as appropriate.

2.0 Significant Changes to the Water-Related Regulatory & Policy Setting Since the 2010 WRE

A number of water-related changes have occurred since the 2010 WRE was developed. Some of these changes are incredibly impactful for water resources in the county and either have required and/or will continue to require careful planning and consideration to support future growth and development.

Among the most important changes since 2010 is the establishment of the Chesapeake Bay TMDL (Total Maximum Daily Load) by the U.S. Environmental Protection Agency (EPA) in December 2010. This action essentially replaced the Tributary Strategies effort that was in place prior. Subsequently, the MDE developed the Maryland Watershed Implementation Plan (WIP), which has enacted three phases to date. The Maryland WIP requires the incorporation of National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) permit requirements for reductions in pollutant loadings from stormwater. The MDE also released a new TMDL tracking tool in 2023 called the TMDL Implementation Progress and Planning Tool (TIPP) to be used for annual compliance reporting.

In 2015, the Maryland Commission on Climate Change was codified into law (Environment Article §2-1301 through 1306), requiring State agencies to review their "planning, regulatory, and fiscal programs to identify and recommend actions to more fully integrate the consideration of Maryland's greenhouse gas reduction goal and the impacts of climate change." This includes explicit consideration of sea level rise, storm surges and flooding, increased temperature and precipitation, and extreme weather. These statutory and regulatory changes, as well as additional State legislation mandating nuisance flood plans for coastal jurisdictions, siting and design guidelines for certain

State-funded buildings, and a statewide plan to adapt to saltwater intrusion and salinization, all have a direct impact on water resource management and land development programs and policies.

Climate change continues to compound water resource challenges and will likely intensify in the coming decades. In Carroll County, climate change will most likely lead to warmer temperatures, more extreme hydrologic conditions (intense precipitation and/or prolonged or more severe drought), more frequent or severe flooding, and potentially a reduction in water supply availability. The MDE's Advancing Stormwater Resiliency in Maryland (A-StoRM) initiative was developed in 2021 to account for urban flood risks in the state and to adjust design criteria for stormwater facilities and drainage systems. A-StoRM was developed to account for climate change in urban flood risk assessment and urban stormwater management.

Since 2010, all of the major (>0.5 mgd) wastewater facilities in Carroll County have upgraded or are currently upgrading to enhanced nutrient removal (ENR) wastewater treatment processes. Most of the funding for these upgrades themselves came from Bay Restoration Funds (BRF) that were made available as part of the Bay TMDL compliance program. Target thresholds for wastewater effluent from ENR facilities are 3.0 mg/L for total nitrogen and 0.3 mg/L for total phosphorus.

Water reuse, particularly potable reuse, has emerged as a viable water supply alternative and will likely become a more familiar and favorable water supply option for municipalities in the coming decades. Westminster has piloted and, as of 2024, is designing a new indirect potable reuse system to purify wastewater effluent and discharge water directly into Cranberry Reservoir for treatment at the Cranberry Water Treatment Plant (WTP). This system, which is known as PUREWater Westminster, is the first indirect potable reuse system in Maryland. As a result of this pilot project and collaboration with the MDE, as of 2024, the MDE was working on regulations related to potable water reuse.

New drinking water quality regulations were released that may dramatically affect treatment processes and supply availability in the county. Among these, on April 10, 2024, the EPA issued the first-ever national, legally enforceable drinking water standard to protect communities from exposure to harmful per-and polyfluoroalkyl substances (PFAS), also known as 'forever chemicals.' This rule sets limits for five specific PFAS: PFOA, PFOS, PFNA, PFHxS, and HFPO-DA (also known as "GenX Chemicals"). The EPA set the maximum contaminant level (MCL) at 4.0 parts per trillion for PFOA and PFOS in public drinking water. These regulations are challenging for many municipalities in the county because PFAS levels are high in some groundwater wells and treatment is expensive. High PFAS levels have already caused some municipal wells in the county to be taken offline. Most municipalities are now testing water sources for PFAS to understand which wells or pumphouses will require PFAS treatment.

What is PFAS, and why is it important?

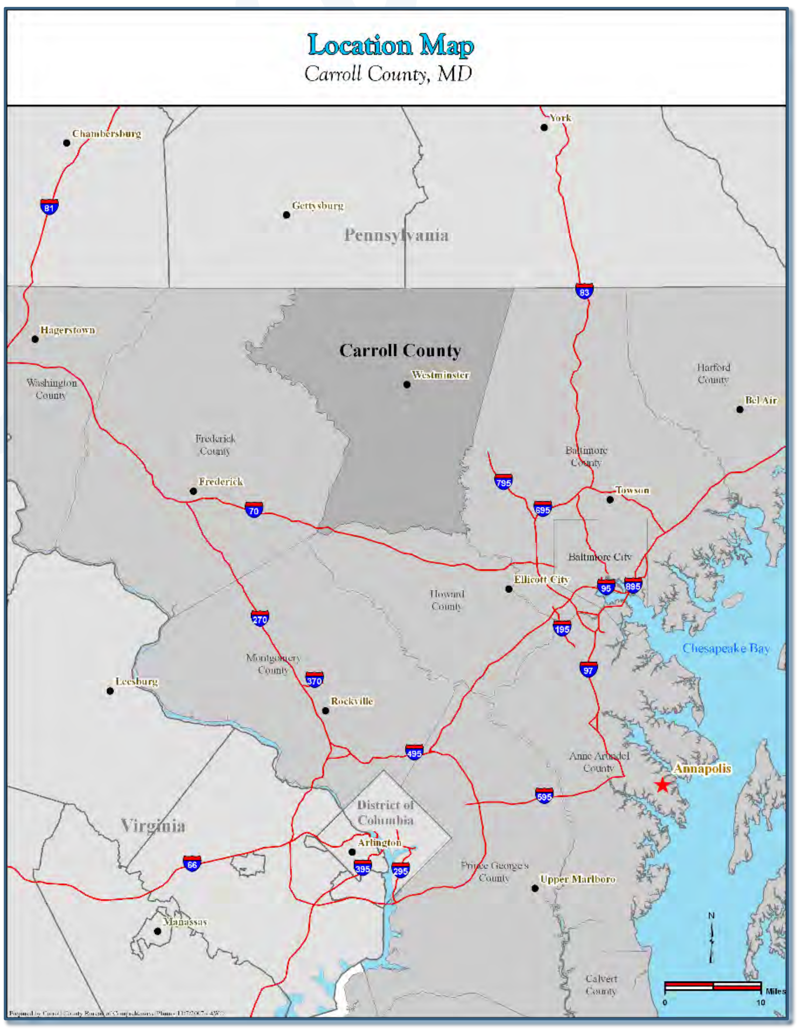
PFAS is an acronym that stands for per- and polyfluoroalkyl substances. These substances were developed in the middle part of the 20th century and are noted for their waterproof and nonstick properties. PFAS chemicals are found in many everyday materials and products, such as raincoats, food packaging, water bottles, nonstick cookware, carpets, firefighting foam, and more.

The same properties that make PFAS such a wonder chemical also make it incredibly dangerous. These chemicals break down slowly over time, meaning they can build up to dangerous levels in the environment and animals (including humans). New research has shown strong links between high PFAS concentrations and a slew of negative health conditions like cancer. Due to its prevalence in many household products, most people have had some exposure to PFAS and may have some level of PFAS accumulation in their bodies.

- Conduit Street, MACo, May 1, 2024

The Lead and Copper Rule Revisions (LCRR) were released in October 2021, and the Lead and Copper Rule Improvements (LCRI) were released in November 2023. LCRR requires water systems to inventory all public and private services lines to determine service line materials across municipal systems. LCRI requires that all lead and some galvanized service lines be replaced. LCRR and LCRI regulations do not directly affect water and wastewater supplies and planning, but these new regulations will most likely require costly and time-intensive compliance programs that may siphon resources from other water resource planning efforts.

Access to clean and safe drinking water, sanitary sewerage systems, and protection and resiliency to water driven hazards like floods are fundamental to the health and economic prosperity of every Maryland community. Communities of color, economically disadvantaged rural communities, and other disempowered communities often suffer the most from inadequate water infrastructure, conveyance systems, extreme weather and climate-driven water changes. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," issued in 1994, provides that "each Federal agency shall make achieving environmental justice (EJ) part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." However, since the 2010 WRE, this issue has become more prominent at the state level. Review of environmental justice issues and factors have been integrated to many State processes and requirements. This rise in awareness of potential inequities can be seen through much of the legislation in the Maryland General Assembly since 2010. In addition, Maryland launched the EJ Screening Tool. The goal of this tool is to provide users with data to inform their decisions on siting, permitting, enforcement, and infrastructure improvements.



3.0 Location & Watersheds

3.1 Location

Carroll County is located in the Piedmont region of north-central Maryland, between Baltimore and Frederick Counties. The county is 289,678 acres in total size, or 452.6 square miles. See the "Location Map" for Carroll's location respective to the rest of the Baltimore metropolitan area.

3.2 Watersheds

At the most basic level a watershed is the total land area that drains surface water and/or groundwater into a common body of water. Because of the nature of gravity, surface-water watersheds (also known as drainage or catchment basins) are confined by their surrounding topography. Water, both above and below ground, originates at the highest point and drains downhill to the lowest ground area. As one waterbody flows into another, the flows gradually increase in size. A small spring turns into a run and progressively merges with ever-larger creeks, streams, and rivers. Ultimately, these flows collect into the largest water bodies, such as the Chesapeake Bay, and eventually feed into the world's oceans.

Watersheds can be defined at many different scales. The United States Geological Survey (USGS) developed a ranked system for mapping all of the nation's watersheds. They are grouped from largest to smallest. These areas are called Hydrologic Units and are assigned a number known as a Hydrologic Unit Code (HUC) based on size. Currently, the most detailed level of nationwide drainage basin mapping available from the USGS is the 8-digit HUC. This plan will utilize this system of 8-digit watersheds, as shown on the map – **MDE's Watershed Boundaries in Carroll County, MD**.

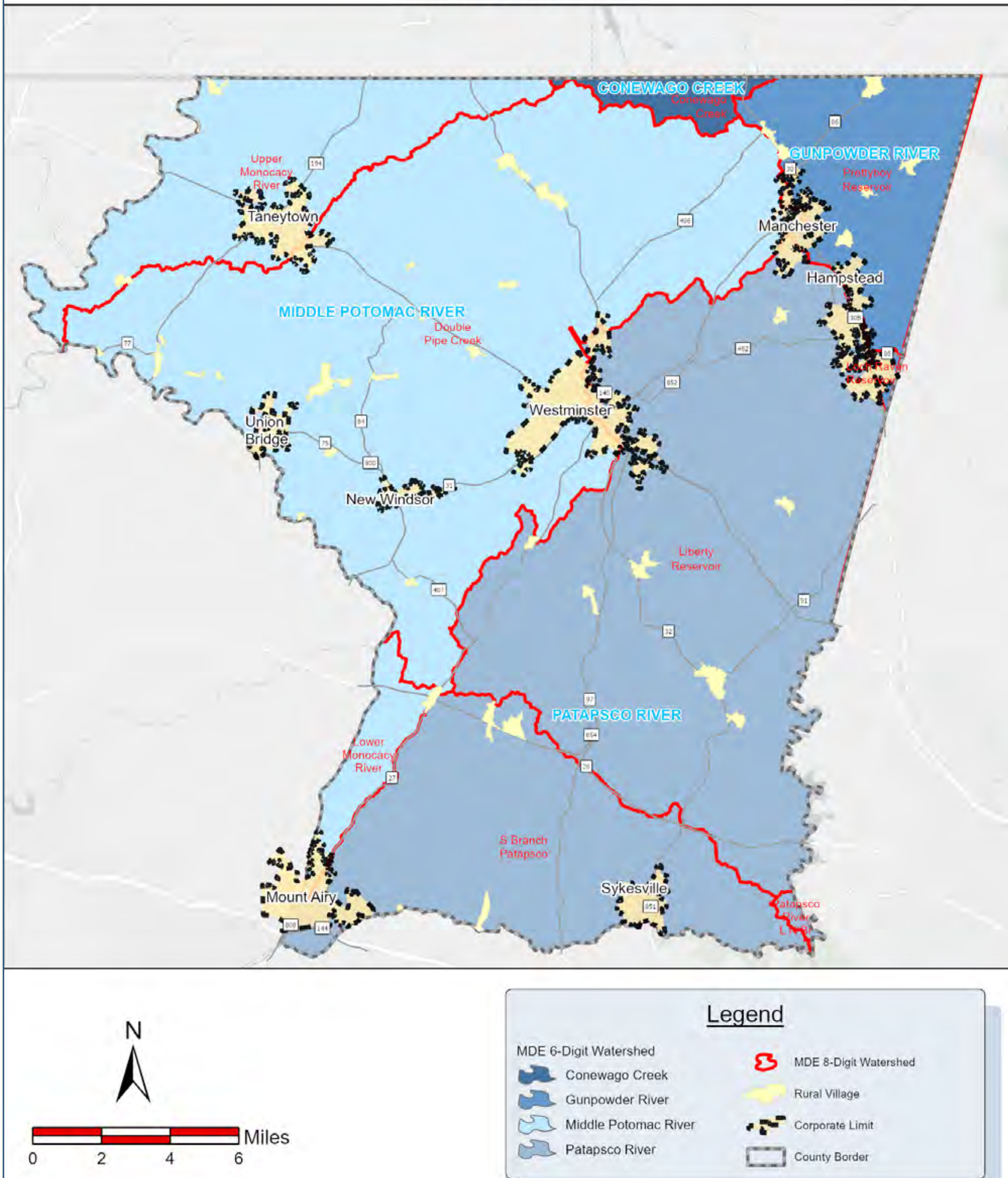
The political boundary of Carroll County includes lands which drain to nine different 8-digit watersheds. Two of these watersheds – Double Pipe Creek and Liberty Reservoir – cover most of Carroll County. Parr's Ridge, which runs roughly along MD 27 from Manchester to Mount Airy, is the east-west boundary between these two major drainage basins. Streams to the north and west drain into the Monocacy and eventually the Potomac. Streams to the south and east flow into the Patapsco and Gunpowder Rivers. Their southern boundaries approximately follow MD 26. To the north, MD 30 roughly follows these watersheds' upper reaches.

The map – **MDE's Watershed Boundaries in Carroll County** – depicts the nine 8-digit watersheds found wholly or partially in Carroll County. Water throughout the county eventually flows to the Chesapeake Bay.

Following is a summary of the nine watersheds of Carroll County. The watersheds are listed from west to east beginning at the northernmost edge of the County.

MDE's Watershed Boundaries

Carroll County, MD



Map prepared by the Carroll County Department of Planning & Land Management. 2025

3.2.1 Upper Monocacy River

The Carroll County portion of the Upper Monocacy River Watershed is located in the northwest corner of the County, where it forms the border with Frederick County, MD. This watershed contains most of the City of Taneytown and consists of eight 12-digit subwatersheds that cover a total land area of 27,123 acres. The watershed is within the Potomac River Basin, part of the Piedmont physiographic province of Maryland.

The entire portion of the Upper Monocacy River watershed within Carroll County is designated as Use IV-P (Water Contact Recreation, Protection of Aquatic Life, Recreational Trout Waters, and Public Water Supply). The Upper Monocacy River watershed was placed on Maryland's 303(d) list of impaired waters for nutrients and sediments in 1996 and fecal bacteria in 2002. Total Maximum Daily Loads (TMDLs) for both Total Suspended Sediments (TSS) and bacteria were developed and approved in December of 2009. A TMDL for phosphorus was developed and approved in May of 2013.

3.2.2 Conewago Creek

The Carroll County portion of the Conewago Creek Watershed is located in the north central area of the County, where it abuts the Mason-Dixon Line, and extends just east of MD 30 north of the village of Melrose. The vast majority of this watershed is located in south central Pennsylvania, primarily York and Adams Counties. This watershed within Carroll County consists of 3,431 acres within two 12-digit subwatersheds. The watershed is part of the Piedmont physiographic province of Maryland and is located within the Susquehanna River basin. The watershed is part of the Piedmont physiographic province of Maryland and is located within the Susquehanna River basin.

The entire portion of the Conewago Creek Watershed within Carroll County is designated as Use I-P (Water Contact Recreation, Protection of nontidal warm water aquatic life and Public Water Supply). Presently, there are no approved TMDLs for the Conewago Creek Watershed.

3.2.3 Prettyboy Reservoir

The Carroll County portion of the Prettyboy Reservoir Watershed is located in the northeast corner of the County, where it borders York County, PA to the north and Baltimore County, MD to the east. This watershed contains significant portions of both Manchester and Hampstead and consists of five 12-digit subwatersheds that cover a total land area of 21,025 acres. The watershed is within the Gunpowder River Basin, part of the Piedmont physiographic province of Maryland.

The entire portion of the Prettyboy watershed within Carroll County is designated as Use III-P (Non-tidal Cold Water and Public Water Supply). The Prettyboy Reservoir Watershed was placed on Maryland's 303(d) list of impaired waters for nutrients in 1996 and for bacteria in 2002. A TMDL for phosphorus was developed and approved in March of 2007, and a subsequent TMDL for bacteria was developed and approved in October of 2009.

3.2.4 Double Pipe Creek

The Carroll County portion of the Double Pipe Creek Watershed is located along the western portion of the County, where it borders Frederick County, MD. This watershed . spans MD 27 between approximately MD 30 in the north and MD 26 to the south (Taylorsville area) and extends from Manchester in the northeast to Detour in the west. This watershed is the largest in Carroll County, and includes portions of Taneytown, Manchester, Westminster and all of New Windsor and Union Bridge, and consists of twenty 12-digit subwatersheds that cover a total land area of 105,457 acres.

The entire portion of the Double Pipe Creek Watershed within Carroll County is designated as Use IV-P (Recreational Trout Waters). The Double Pipe Creek Watershed was placed on Maryland's 303(d) list of impaired waters for nutrients and sediment in 1996 and bacteria in 2002. A TMDL for sediment was developed and approved in September of 2008, for phosphorus in August of 2012, and for bacteria in December of 2009.

3.2.5 Liberty Reservoir

The Carroll County portion of the Liberty Reservoir Watershed is located along the eastern part of the County, where it borders Baltimore County, MD. This watershed is the second largest in land area within Carroll County, with the northeastern boundary beginning in Manchester near the junction of MD 27 and MD 30, extending south to the Eldersburg Area, and west to Taylorsville. This watershed contains portions of Manchester, Hampstead, and Westminster, as well as the unincorporated areas of Finksburg and a portion of the Freedom Growth Area and consists of seventeen 12-digit subwatersheds that cover a total land area of 87,249 acres. The watershed is within the Patapsco River Basin, part of the Piedmont physiographic province of Maryland.

The Liberty Reservoir Watershed within Carroll County consists of streams with a variety of designated uses, ranging from Use I (non-tidal warm water) to Use IV-P (recreational trout waters and public water supply). The Liberty Reservoir Watershed was placed on Maryland's 303(d) list of impaired waters for bacteria in 2002; a TMDL for bacteria was developed and approved in December of 2009. MDE identified Liberty Reservoir on the State's 2010 Integrated Report as impaired by sediments - sedimentation/siltation (1996) and nutrients - phosphorus (1996). A TMDL for phosphorus and sediment was developed and approved in May of 2014.

3.2.6 Loch Raven Reservoir

The Carroll County portion of the Loch Raven Reservoir Watershed is located in the northeast corner of the County, where it borders Baltimore County, MD. This watershed is the second smallest land area of any of the County's nine watersheds, contains a portion of the Town of Hampstead and consists of a total land area of 592 acres. The watershed is within the Gunpowder River Basin, part of the Piedmont physiographic province of Maryland.

The entire portion of the Loch Raven watershed within Carroll County is designated as Use III-P (Non-tidal Cold Water and Public Water Supply). The Loch Raven Reservoir Watershed was placed on Maryland's 303(d) list of impaired waters for nutrients and sediments in 1996. A TMDL for phosphorus and sediment was developed and approved in March of 2007.

3.2.7 Lower Monocacy River

The Carroll County portion of the Lower Monocacy River Watershed is located in the southwest corner of the County, where it forms the border with Frederick County, MD. This watershed contains a portion of the Town of Mount Airy and consists of two 12-digit subwatersheds that cover a total land area of 5,463 acres. The watershed is within the Potomac River Basin, part of the Piedmont physiographic province of Maryland.

The entire portion of the Lower Monocacy River watershed within Carroll County is designated as Use IV-P (Water Contact Recreation, Protection of Aquatic Life, Recreational Trout Waters, and Public Water Supply). The Lower Monocacy River watershed was placed on Maryland's 303(d) list of impaired waters for nutrients in 1996 and fecal bacteria in 2002. A TMDL for bacteria was developed and approved in 2009 and for phosphorus in 2013.

3.2.8 South Branch Patapsco River

The Carroll County portion of the South Branch Patapsco Watershed is located along the southern portion of the County, where it forms the border with Howard County, MD. This watershed spans most of the southern portions of Carroll County that lie south of MD 26. The watershed contains the largest portion of the Carroll County section of Mount Airy, the entire Town of Sykesville, and a portion of the Freedom Growth Area. The watershed consists of eleven 12-digit subwatersheds that cover a total land area of 38,735 acres. The watershed is within the Patapsco River Basin, part of the Piedmont physiographic province of Maryland. Additionally, the Piney Run Reservoir is located in the eastern section of the watershed, and the planned Gillis Falls Reservoir will also be located in this watershed.

The South Branch Patapsco Watershed within Carroll County has surface waters with a variety of designated uses, ranging from Use I (non-tidal warm water) to Use IV-P (recreational trout waters and public water supply). The Baltimore Harbor was identified on the State's 1996 list of water quality limited segments (WQLSs) submitted to the U.S. EPA by MDE as impaired by nutrients. The Baltimore Harbor has also been identified on the 303(d) list as impaired by bacteria (fecal coliform) (1998), toxics (polychlorinated biphenyls, or PCBs) (1998), metals (chromium, zinc and lead) (1998), suspended sediments (1996), and impacts to biological communities (2004). As part of the Baltimore Harbor TMDL, Carroll County has an approved SW-WLA for phosphorus and sediment in the South Branch Patapsco watershed.

3.2.9 Lower North Branch Patapsco River

The Carroll County portion of the Lower North Branch Patapsco River Watershed is located in the southeastern corner of Carroll County. The watershed covers a total land area of 565 acres, with the majority of the Carroll County portion lying within Patapsco Valley State Park.

The entire portion of the Lower North Branch Patapsco Watershed within Carroll County is designated as Use I (Water Contact Recreation, and Protection of nontidal warm water aquatic life). The Lower North Branch Patapsco River watershed was placed on Maryland's 303(d) list of impaired waters for fecal bacteria (2008), nutrients (1996, revised in 2008 to phosphorus), sediments (1996), metals (1996), impacts to biological communities (2002, 2004, and 2006), and polychlorinated biphenyls (PCBs) (2008). A TMDL for bacteria was developed and approved in 2009.

It should be noted that the Town of Mount Airy is divided between two counties – Frederick and Carroll. Although this WRE is based on Carroll County, the Town of Mount Airy needs to be reported as a whole. The boundaries need to consider the entire limits, and, therefore, need to include the applicable Frederick County watersheds. In particular, the following Frederick County watersheds are within the Town of Mount Airy: Upper Bush Creek, Lower Linganore Creek, and Upper Linganore Creek. For the purposes of Mount Airy's requirements, additional information regarding these watersheds is found in the Frederick County WRE.

Carroll County Master Plan, Municipal Comprehensive Plans, & Planned Growth

4.0 Relationship between WRE & Master Plan / Comprehensive Plans

The WRE provides important information related to the short- and long-term availability of public drinking water infrastructure and sources, public wastewater, stormwater restoration/mitigation, and water quality implications.

Although an element of the County Master Plan and the municipal comprehensive plans, the WRE in Carroll County is a standalone document for several reasons.

- The WRE includes substantial technical information to support and develop the plan document, which also takes a lot of space in a document to be able to address requirements and State guidance.
- The WRE represents a collaborative, joint effort between the County and all eight municipalities to address related strategies and action items both countywide and individually, which is different than other elements
- Timing between the nine jurisdictions' plan updates differs.
- Maryland Department of the Environment's (MDE) has a more substantial role in reviewing the proposed WRE than in most plan elements, as MDE is responsible for water resource management and regulation and plays a significant role in ensuring adequate water supply and water quality for the state's population. MDE's review assesses if the WREs align with state water quality standards, regulations, and other relevant policies. The agency also coordinates with other State agencies, such as DNR and MDP, to ensure a comprehensive approach to water resource planning.
- The availability of this information prior to developing the land use element and other relevant plan elements and the implications of that information helps to inform land use decisions and the process to update other comprehensive plan elements. Examples of considerations for the land use and other comprehensive plan elements might include:
  - The mix of planned land uses over the short-term (~10 years) and long-term (~beyond 10 years) that fits with the timing and availability of water and wastewater to serve future demand;
  - Limitations to expansion or accommodating additional growth that any individual systems might experience;
  - Whether these limitations can be overcome to accommodate planned growth;
  - Land needed to accommodate future public water, wastewater, and/or stormwater facilities; and
  - Whether funding mechanisms can be identified and put in place for needed capacity improvements and/or expansion.

As each Planning Commission updates its comprehensive plan, Action Items should be identified that are _not already included_ in the WRE that could address limitations and water quality protection in the comprehensive plan in the areas of land use, policies, regulations, and capital/financial considerations.

Each Planning Commission may also identify Action Items that _are included_ in the WRE relating to land use or other relevant comprehensive plan issues and that should be prioritized by also including that in the comprehensive plan and expanded further.

5.0 Overview of Master Plan & Comprehensive Plans

The *2000 Carroll County Master Plan* represented the first review and revision of the direction set forth by the original *1964 Carroll County Master Plan*. The 2000 plan essentially reaffirmed support for the basic premises, concepts, and development patterns charted in the 1964 Plan. There were two overriding goals of the 1964 plan. The first was to focus growth in and around existing population centers, primarily the incorporated towns, where public water and sewer service is already available. The second goal was to preserve farmland.

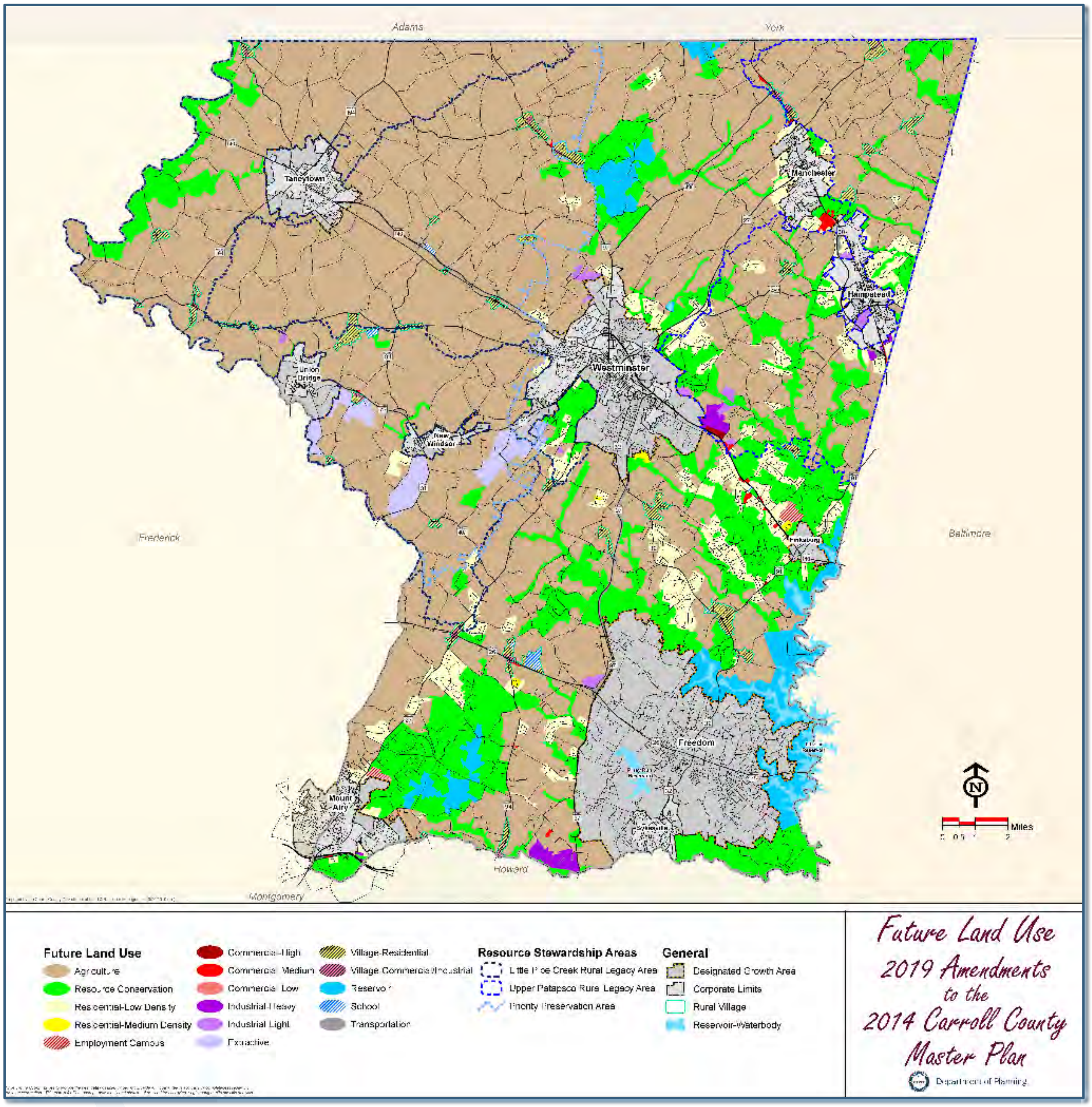
In the 2000 master plan, Carroll's eight municipalities and the Freedom area would continue to serve as the county's DGAs. These are the areas in which the majority of planned growth is focused. The rural character of the county is to be preserved through measures that protect our natural and cultural resources, minimize residential sprawl, and save farmland. The County would also continue to pursue the long-standing goal of preserving 100,000 acres of farmland. Employment growth and provision of adequate public facilities are also priorities. The implementation of the concurrency management program came about through the 2000 master plan process.

The 2014 master plan has the same premise, centering development in the DGAs while preserving land outside these DGAs. The 2014 master plan incorporated to the document new State legislation, such as Water Resources, Municipal Growth, Priority Preservation Area, and additional requirements in the Sensitive Areas and Environmental Resources Elements. The 2014 master plan also took into consideration the *Smart, Green, and Growing* legislation that presented 12 State Planning Visions that each Master Plan, in the state, must address and implement.

5.1 Carroll County Master Plan Water-Related Goals

- Protect and enhance the water quality of Carroll County's rivers, streams, reservoirs, and aquifers; comply with applicable state and federal requirements related to water quality and quantity; and maintain and protect adequate water supplies to serve current and planned development.

- Protect, maintain, and restore, where feasible, the environmental resources and natural ecosystems in the county by promoting land use practices that are in balance with, and minimize the effects on the natural environment, subject to appropriate cost/benefit analysis.



5.2 Designated Growth Areas (DGA)

Designated Growth Areas are the smaller geographic areas of the county where the majority of Carroll County's growth is planned to occur. **Comprehensive plans are prepared for each of**

these areas and evaluate land uses at a more local scale. Carroll's eight municipalities are at the heart of the DGAs, with the exception of Sykesville, which lies along the southern edge of the Freedom area. Additional land surrounding most of the municipalities is identified and planned for future annexation into the municipality to accommodate and serve planned growth. In most cases, the Freedom DGA extends well beyond what Sykesville will ever annex. The Finksburg area is not considered a DGA but is considered a Priority Funding Area (PFA). The municipal PFAs can be found within these boundaries. Except for Finksburg, the DGAs are the areas for which municipal public water and sewer services are provided. Each of these communities develops an individual community comprehensive plan.

Carroll County's DGAs and PFAs are shown on the map – **Designated Growth Areas and Priority Funding Areas**.

5.3 Priority Funding Areas (PFAs)

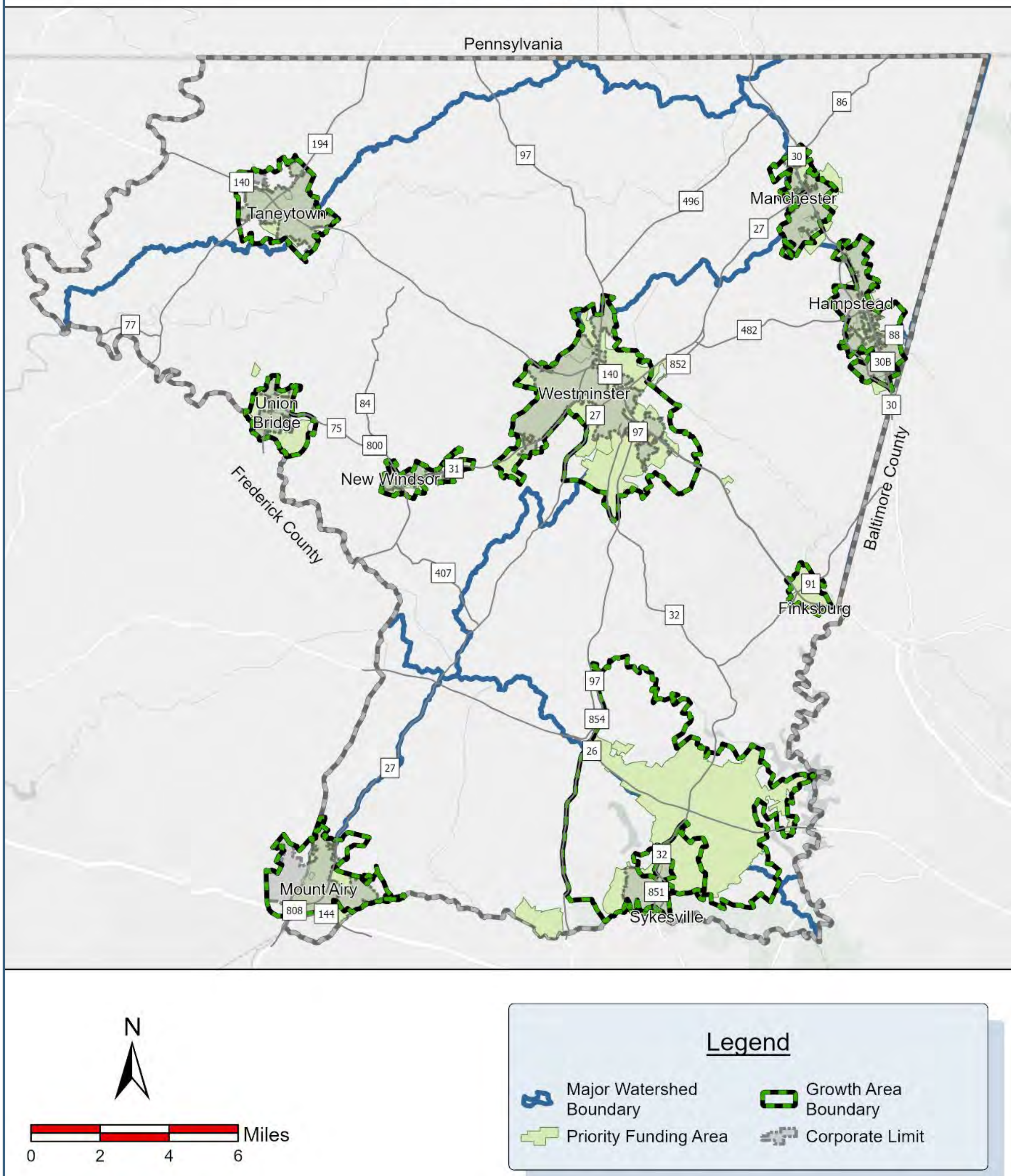
The PFA requirements were adopted in 1997 as part of a larger group of State Smart Growth implementation measures and became effective on October 1, 1998. The intent is to ensure that State funding and resources are directed to the most appropriate areas for growth and development. The measure established criteria to define PFA boundaries. Locations that were already developed (such as existing towns or rural villages) and could grow further, via infill development and residential or business development within planned growth areas, were targeted.

To be designated as a PFA, a residential area needed to meet minimum density requirements, already be served (or planned to be served) by public sewer facilities, and land use designations and/or development plans must satisfy Smart Growth guidelines for minimum density. Other land uses such as employment, industrial, commercial/business, or mixed-use or transit-oriented developments may also be designated as a PFA as long as sewer service is (or will be) provided and these uses fall within DGAs. A PFA was originally designated for each of the municipalities or growth areas, eligible industrial areas, and the 35 rural villages in Carroll County. The PFAs may be periodically amended to include additional areas that meet the criteria.

The existing PFA boundaries for Carroll County are shown on the map – **Designated Growth and Priority Funding Areas**.

Designated Growth and Priority Funding Areas

Carroll County, MD



Map prepared by the Carroll County Department of Planning & Land Management, 2024

6.0 Existing (2023) Planned Growth

This section presents growth estimates for future residential, commercial, and industrial development that is based on the land use designations identified in the county's community comprehensive plans and countywide comprehensive plan as currently adopted. The tables provided report additional residential growth in *lots*. Additional commercial and industrial growth is reported in acres of *land*.

6.1 Buildable Land Inventory

The Buildable Land Inventory (BLI) is an analysis of land that is considered to have development potential based on the zoning in place in 2022. It estimates where, how much, and what type of future development may occur in the county and the eight municipalities. The BLI estimates the number of residential lots that could occur and the acreage available for future commercial, industrial, or employment campus development.

The BLI is a planning tool for evaluating the potential impacts of planning policies and recommendations. The residential BLI considers all parcels that are zoned Residential, Agricultural, or Conservation, along with some parcels zoned Commercial and/or Employment Campus that allow residential use. Many factors influence a parcel's ability to be developed, including zoning, size, existing easement, ownership floodplains, and other environmental features.

6.2 Population Projections

Annual population projections produced by the Carroll County Planning & Land Management Department (PLM) are primarily derived from number of households. The number of use and occupancy (U&O) permits issued each year is one factor used to determine population growth. Over the last decade, the county has experienced an estimated population growth from 167,217 (2012) to 175,305 (2022), per the U.S. Census. This would account for a 4.8% population growth rate for the 10-year period. Based on Round 10 population projection, the County is projecting a population increase from 172,891 in 2020 to 179,140 in 2030. This indicates an average population increase of approximately 625 people per year.

Based on 2022 zoning in the county, the entire county will grow to a total population of nearly 214,138 once all land is fully developed (i.e., at buildout). Using the Round 10 projections, it was determined that the county would add approximately 4,651 additional households, or roughly 233 units per year, between 2020 and 2039. The table below – **Carroll County Population Projections (2022 Zoning)** – shows the projected population for 2040 and the projected year the county would reach build out under 2022 zoning.

Carroll County Population Projections (2022 Zoning)

	2020	2040	Buildout (2110)
Population	172,891	183,956	214,138
Households*	63,050	67,701	81,306
Persons per Household (PPH)*	2.74	2.72	2.63

** excludes group quarters*
Source: Carroll County Department of Planning & Land Management (Round 10 submittal to BMC), July 2022

The BLI data were used to estimate development capacity of each Census Block Group, essentially a smaller subdivision of Census Tracts and Election Districts. The number of future lots was determined by adding the number of existing lots to the number of potential lots. Once the number of potential lots was reached in a determined area, the growth rate was no longer applied, and the population and household numbers remained static. If more development potential existed, the applicable growth rate continued to be applied.

6.3 Within Each Watershed

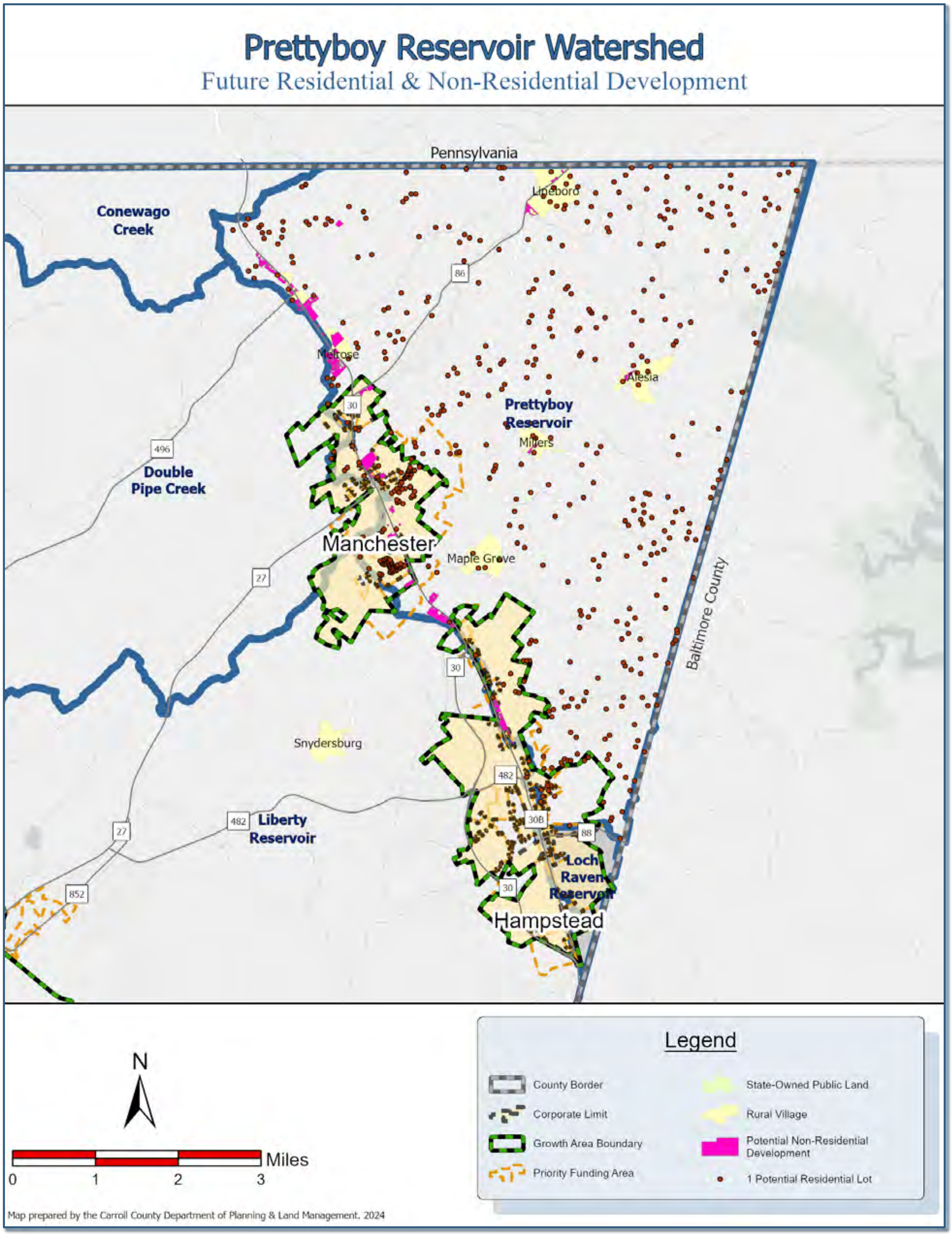
The table – **Planned Additional Residential, Commercial, and Industrial Development for each Watershed** – provides estimated future residential, commercial, and industrial development within the county, broken down by watershed. The Liberty Reservoir and Double Pipe Creek watersheds represent the majority of the county's land area. Combined, therefore, it is not surprising that they account for almost two-thirds of the total number of additional residential lots. The same watersheds account for over two-thirds of the developable acreage planned for non-residential development. Countywide, an additional 19,173 potential residential units were estimated as of 2022.

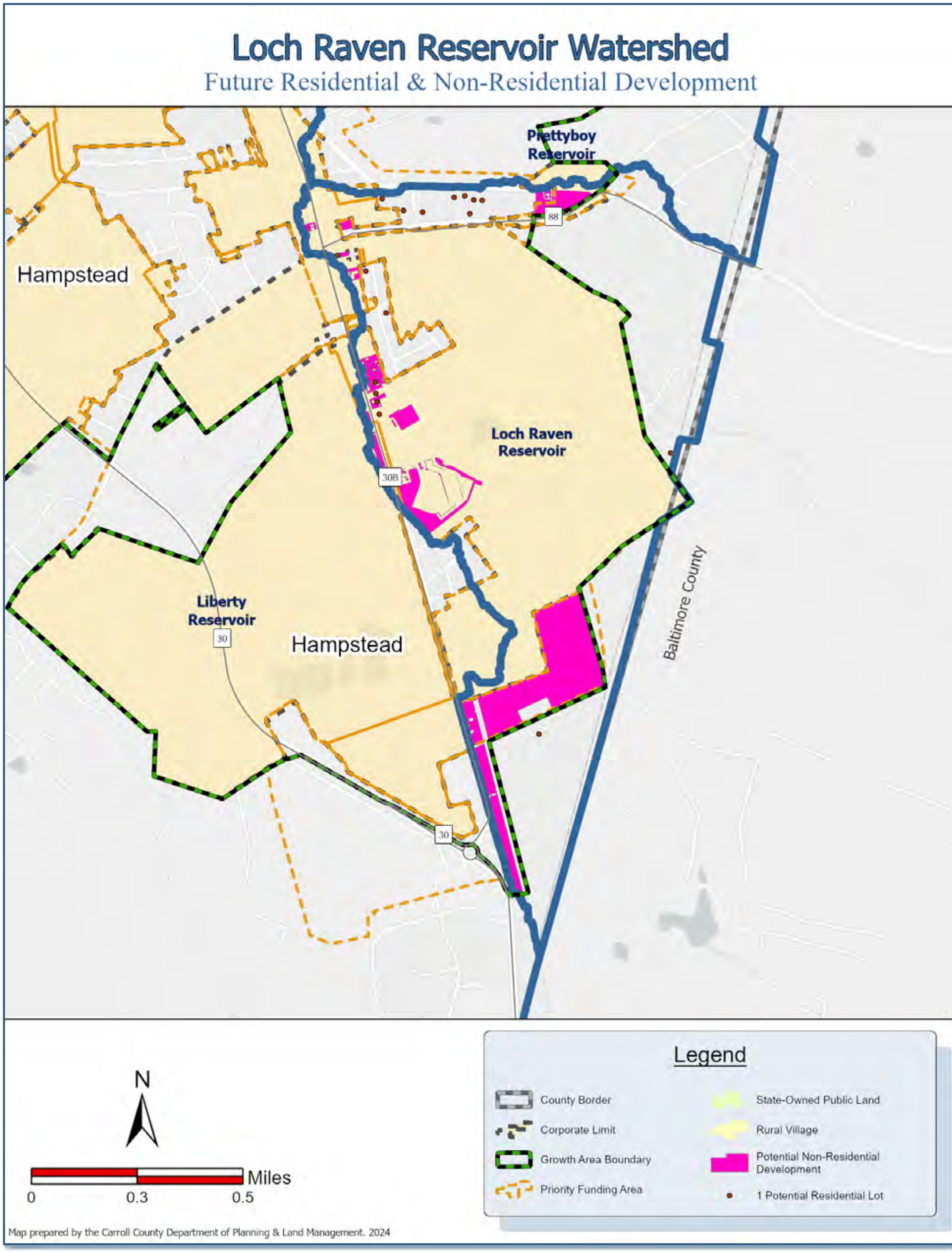
Planned Additional Residential, Commercial, and Industrial Development for each Watershed based on 2022 Zoning

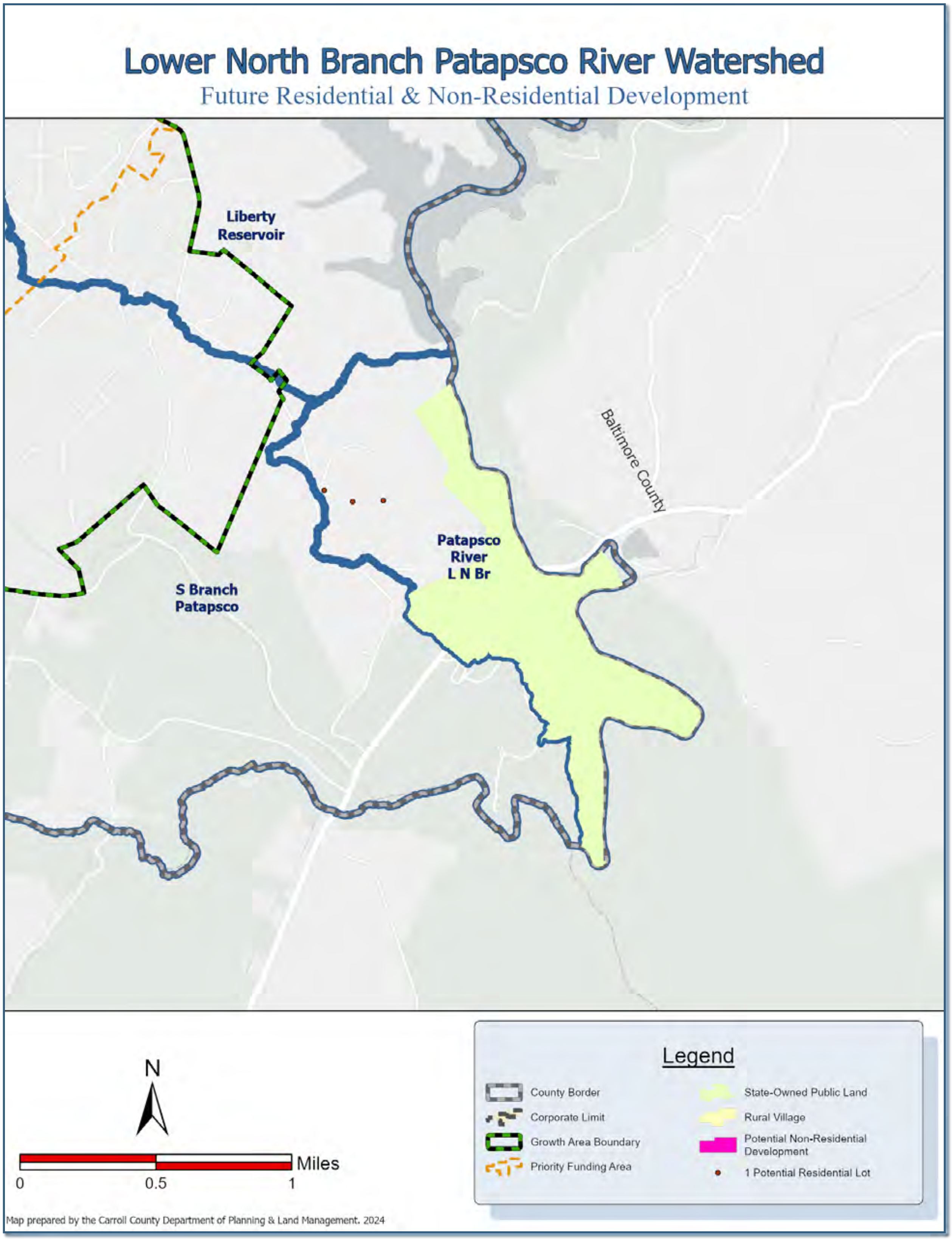
Watershed	Additional Residential Units (lots)	Developable Non-Residential Land (acres)
Prettyboy Reservoir	1,631	161
Loch Raven Reservoir	104	51
Lower North Branch Patapsco River	24	0
Liberty Reservoir	6,542	1,483
South Branch Patapsco River	3,129	602
Lower Monocacy River	351	37
Double Pipe Creek	5,585	910
Upper Monocacy River	1,652	278
Conewago Creek	155	0
County Total	***19,173***	***3,522***

Source: Carroll County Department of Planning & Land Management, June 2024

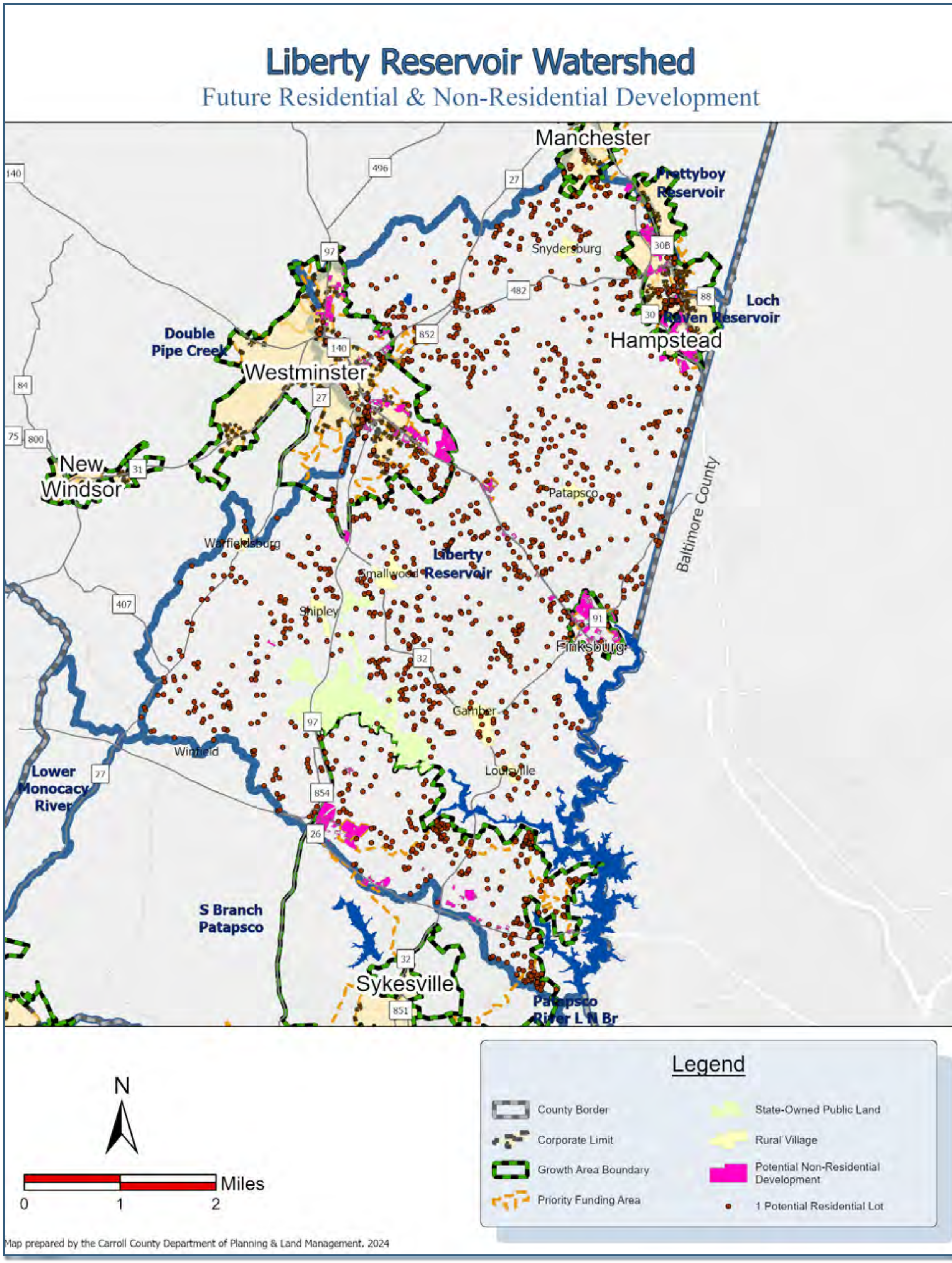
The following nine maps show potential additional residential lots and developable commercial and industrial land based on current land use plans. Each map provides this information within the confines of one of the nine watersheds that comprise Carroll County. As can be seen on the maps, much of the planned growth is concentrated within the planned growth areas and municipalities. However, substantial growth, particularly new residential units, would still occur outside these planned growth areas.

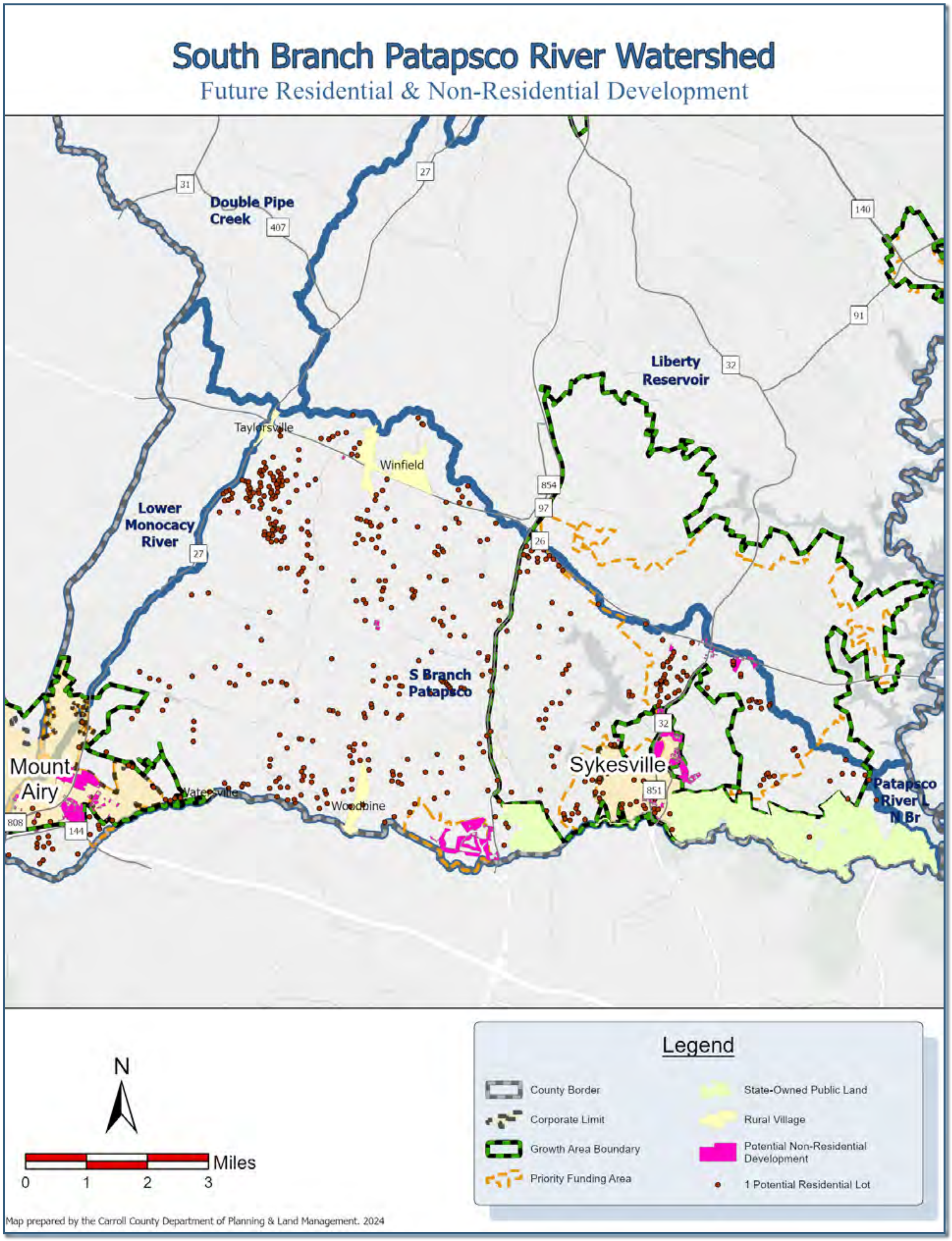

Prettyboy Reservoir Watershed
Future Residential & Non-Residential Development
Pennsylvania
Conewago Creek
Lineboro
Melrose
Alesia
Prettyboy Reservoir
Millers
Double Pipe Creek
Manchester
Maple Grove
Baltimore County
Snydersburg
Liberty Reservoir
Loch Raven Reservoir
Hampstead
86
30
496
27
30
482
30B
88
30
482
27
852
N
Miles
0
1
2
3
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management. 2024

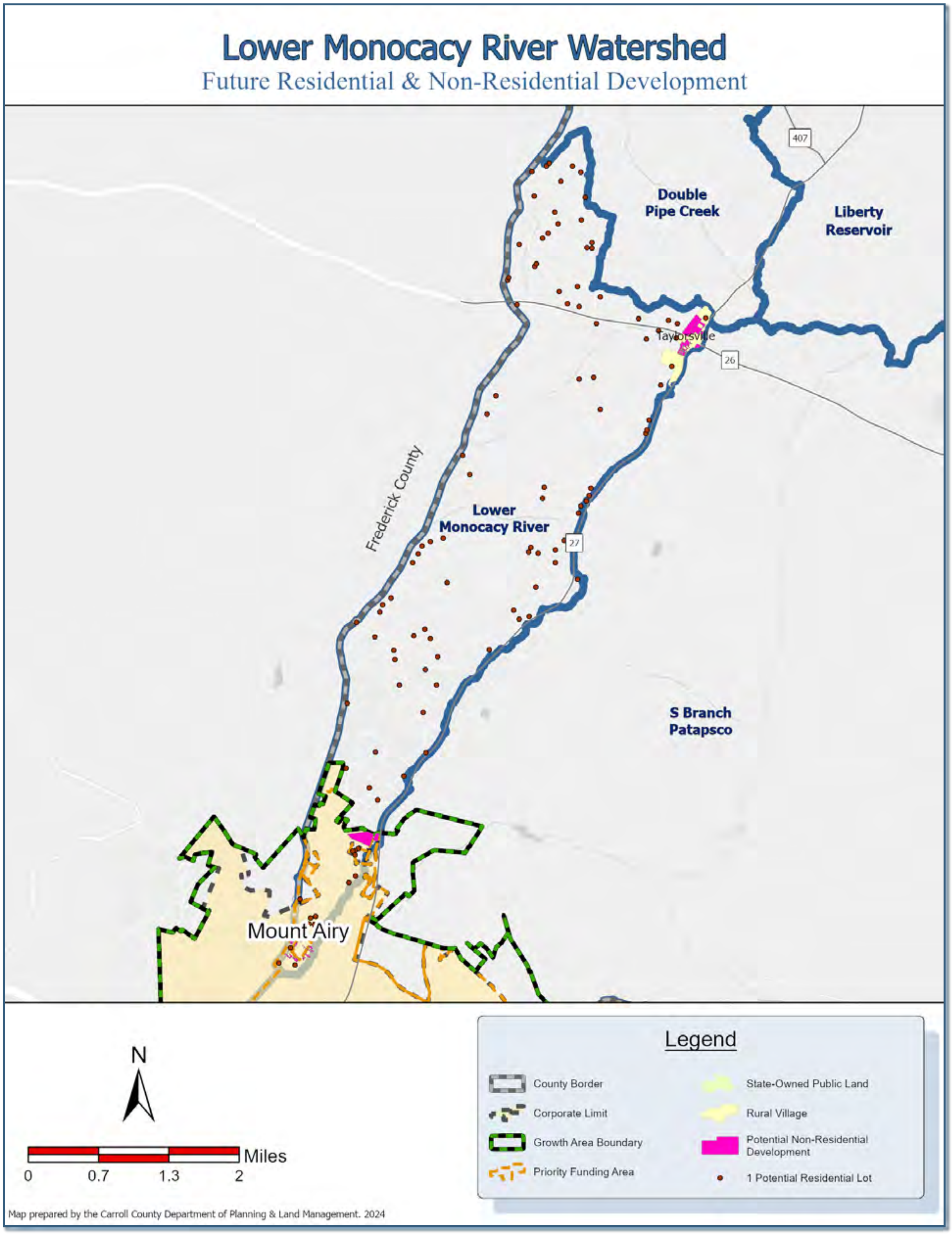

Loch Raven Reservoir Watershed
Future Residential & Non-Residential Development
Prettyboy Reservoir
88
Hampstead
Loch Raven Reservoir
30B
Baltimore County
Liberty Reservoir
30
Hampstead
30
N
Miles
0
0.3
0.5
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management. 2024

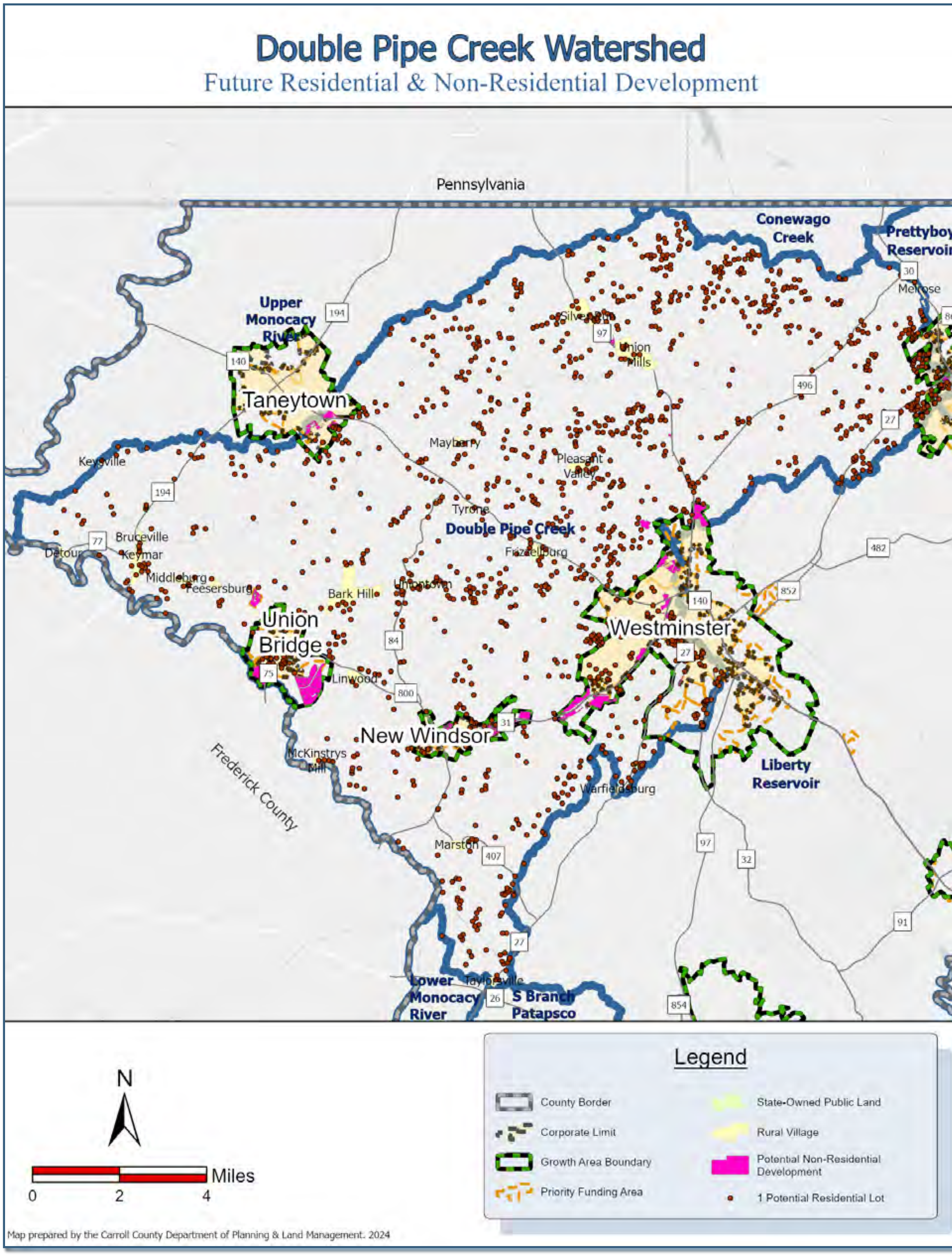


Lower North Branch Patapsco River Watershed
Future Residential & Non-Residential Development
Liberty Reservoir
Baltimore County
Patapsco River L N Br
S Branch Patapsco
N
0
0.5
1
Miles
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management. 2024

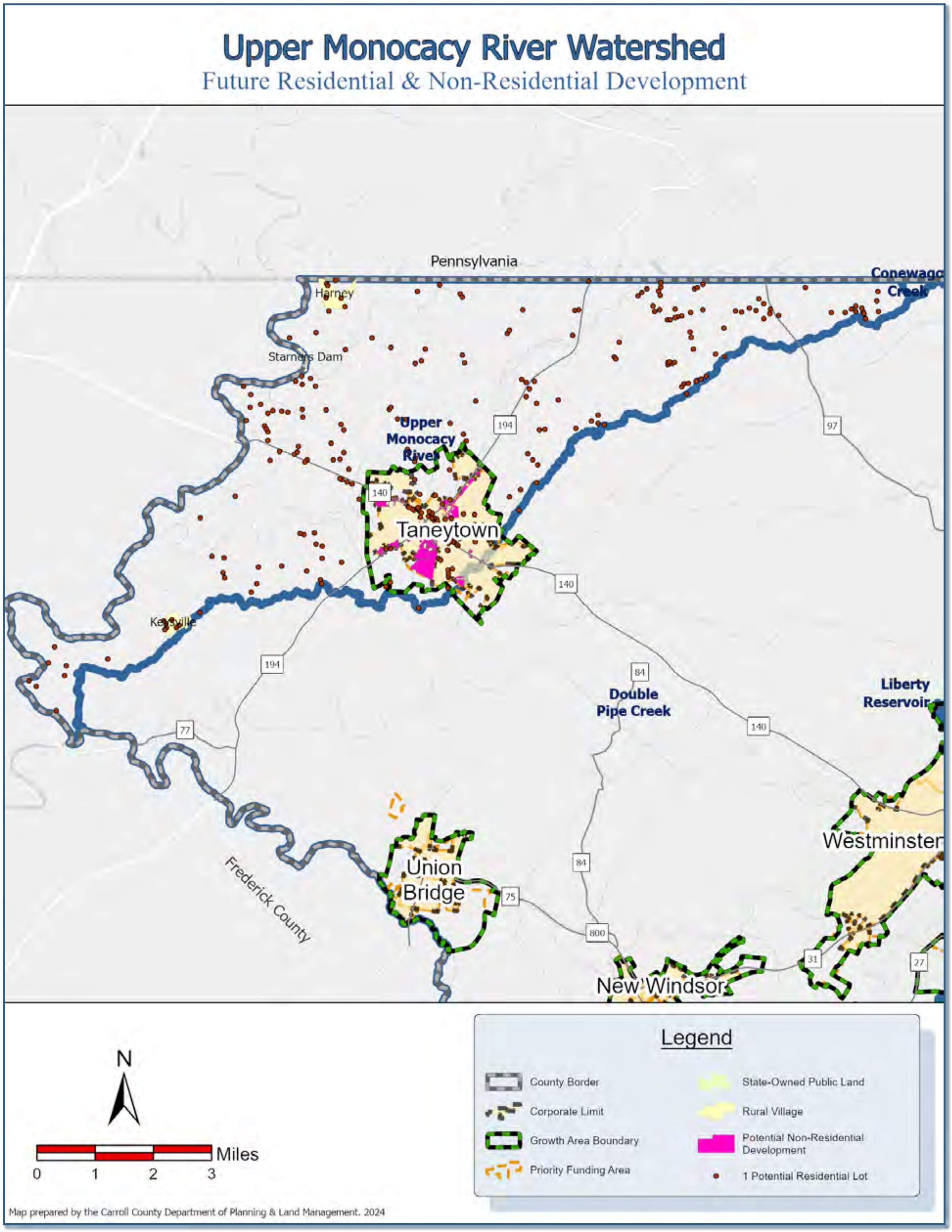

Liberty Reservoir Watershed
Future Residential & Non-Residential Development
Manchester
Prettyboy Reservoir
Snydersburg
Loch Raven Reservoir
Hampstead
Double Pipe Creek
Westminster
New Windsor
Patapsco
Baltimore County
Warfieldsburg
Liberty Reservoir
Smallwood
Shipley
Finksburg
Gamber
Winfield
Louisville
Lower Monocacy River
S Branch Patapsco
Sykesville
Patapsco River L N Br
N
Miles
0
1
2
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management, 2024

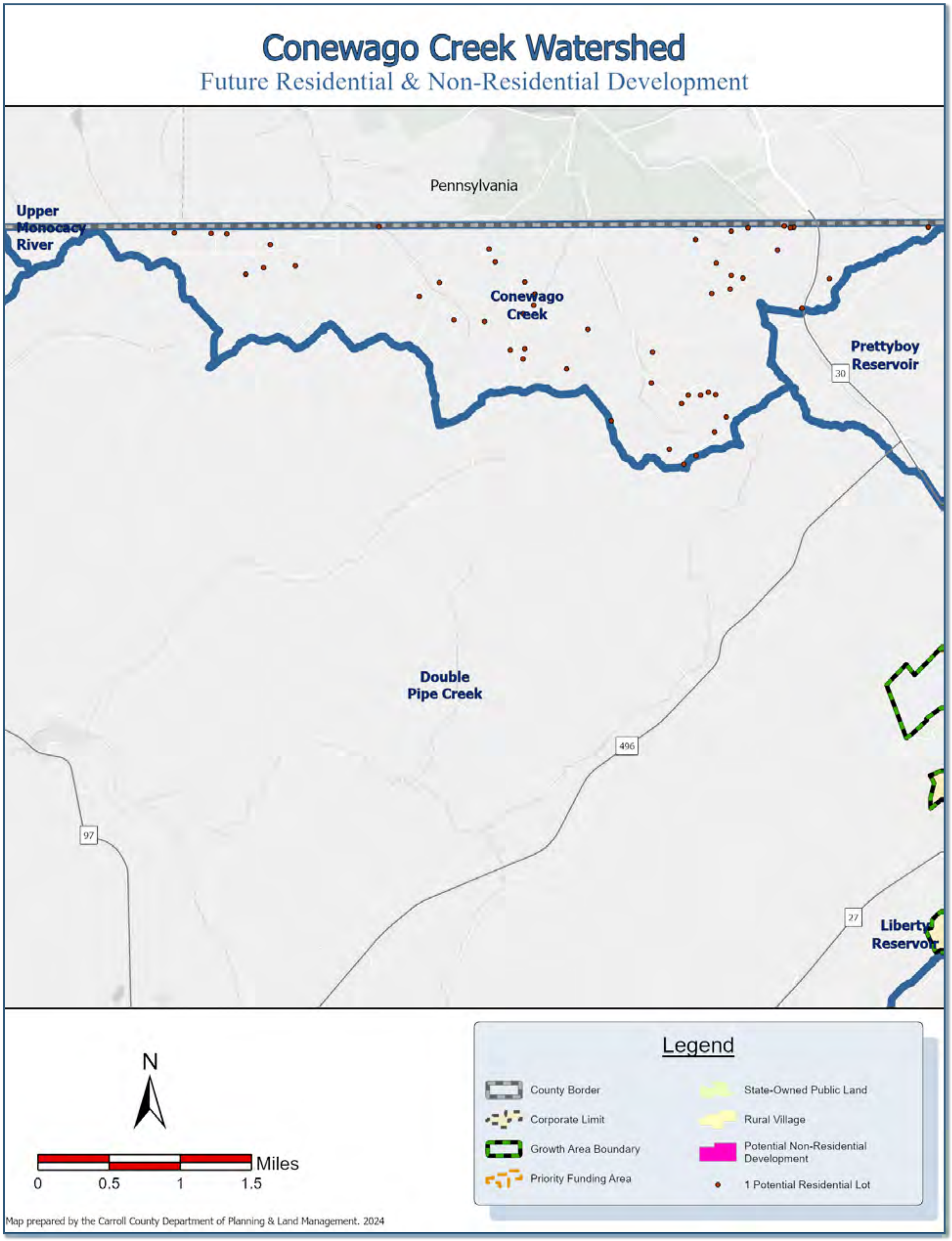

South Branch Patapsco River Watershed
Future Residential & Non-Residential Development
Double Pipe Creek
Liberty Reservoir
Lower Monocacy River
S Branch Patapsco
Patapsco River L N Br
Taylorsville
Winfield
Mount Airy
Sykesville
Woodbine
31
27
407
140
91
32
854
97
26
851
808
144
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
N
Miles
0
1
2
3
Map prepared by the Carroll County Department of Planning & Land Management. 2024


Lower Monocacy River Watershed
Future Residential & Non-Residential Development
Double Pipe Creek
Liberty Reservoir
407
Taylorsville
26
Frederick County
Lower Monocacy River
27
S Branch Patapsco
Mount Airy
N
0
0.7
1.3
2
Miles
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management. 2024



Double Pipe Creek Watershed
Future Residential & Non-Residential Development
Pennsylvania
Conewago Creek
Prettyboy Reservoir
Upper Monocacy River
Taneytown
Keysville
Bruceville
Keymar
Detour
Middleburg
Feesersburg
Union Bridge
Bark Hill
Uniontown
Linwood
New Windsor
McKinstrys Mill
Frederick County
Mayberry
Pleasant Valley
Tyrone
Double Pipe Creek
Fizzelburg
Silver Run
Union Mills
Melrose
Westminster
Liberty Reservoir
Warfieldsburg
Marston
Taylorsville
Lower Monocacy River
S Branch Patapsco
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
N
Miles
0
2
4
Map prepared by the Carroll County Department of Planning & Land Management. 2024


Upper Monocacy River Watershed
Future Residential & Non-Residential Development
Pennsylvania
Conewago Creek
Harney
Starners Dam
Upper Monocacy River
Taneytown
Keysville
Double Pipe Creek
Liberty Reservoir
Westminster
Union Bridge
New Windsor
Frederick County
194
140
97
84
77
75
800
31
27
N
Miles
0
1
2
3
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management. 2024


Conewago Creek Watershed
Future Residential & Non-Residential Development
Pennsylvania
Upper Monocacy River
Conewago Creek
Prettyboy Reservoir
30
Double Pipe Creek
496
97
27
Liberty Reservoir
N
Miles
0
0.5
1
1.5
Legend
County Border
Corporate Limit
Growth Area Boundary
Priority Funding Area
State-Owned Public Land
Rural Village
Potential Non-Residential Development
1 Potential Residential Lot
Map prepared by the Carroll County Department of Planning & Land Management, 2024

6.4 Within Designated Growth Areas

The following table reports additional development potential for each of the county's DGAs that have public water supply and sewerage systems that serve a portion of the DGA.

The overall planned water and sewer service areas include not only the areas that are developed and currently served, but also additional areas that are planned to be served. Some of these additional areas are undeveloped. Others have existing development but are currently unserved. The data in the table below pertain only to *new*, additional development that would be served by the respective system.

For most of the communities, the geographic area covered by the planned water service area and sewer service area are very similar, although differences do exist. There are some properties that may be served or planned to be served by one but not the other. In addition, the planned water and sewer service areas are located within the overall DGA and comprise a majority of that area for most communities. However, there are a few instances where the planned service area extends beyond the GAB. In the case of Mount Airy, the numbers of additional residential lots estimated for the planned service areas slightly exceed the number for the overall growth area. Other DGAs contain areas designated as No Planned Service, either because they are not intended to be served or they are not intended to be served within the ten-year timeframe of the Water and Sewerage Master Plan.

6.5 Within Priority Funding Areas

The table – **Planned Additional Residential, Commercial, and Industrial Development within Priority Funding Areas** – indicates additional development for each of the PFAs associated with larger communities. For a given community, the PFA generally comprises a portion of the area defined for the DGA.

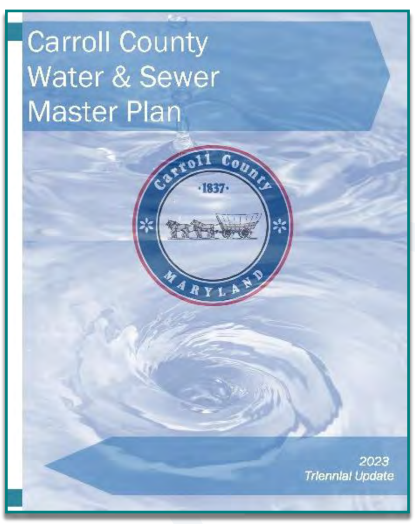
2022 Planned Additional Residential and Non-Residential Development within Priority Funding Areas

Priority Funding Area	Additional Residential Units (lots)	Developable Non-Residential Land (acres)
Finksburg	21	166
Freedom	1,859	399
Sykesville	124	93
Hampstead	722	406
Manchester	592	53
Mount Airy	361	262
New Windsor	124	118
Taneytown	475	328
Union Bridge	768	284
Westminster	2,110	585
Rural Villages	210	192
Other PFAs	--	196
Total of All PFAs	***7,366 Lots***	***3,536 Acres***

Note: This table includes only those PFAs that are associated with the County's major DGAs, plus the PFA for Finksburg; excluded are the PFAs relating to Rural Villages and various industrial areas located outside the DGAs.

Source: Carroll County 2022 Planning Annual Report, June 2023

7.0 *Carroll County Water & Sewer Master Plan* and Service Areas



The residents and businesses of Carroll County receive their water supplies and sewer services from a mixture of public and private systems. The majority of Carroll's *land area* is served by individual wells and septic systems which are privately owned and operated. Most of these systems serve individual properties while some serve a small cluster of users. Almost half (83,017, or about 47%) of the county's *population* is served by public water and/or sewer systems. According to the *Water & Sewer Master Plan*, approximately 257,324 acres (89%) of the total county land area is located outside of an existing or planned public water supply service area.

Maryland law requires that operators of public water and/or sewer systems develop and regularly update a master plan for these services. Operators are directed to describe not only the current systems components, capacities, service areas, and operational requirements, but also plans for future service needs, demands, and capacities. In Carroll County this plan, the *Water & Sewer Master Plan*, is an implementing tool of the master plan, municipal comprehensive plans, and Water Resources Element. It is updated by the County in cooperation and consultation with each of the municipalities every three years and has historically been amended bi-annually. While the local governing bodies develop and adopt the plan, it cannot be implemented until reviewed and approved by MDE.

The Carroll County *Water & Sewer Master Plan* presents the goals for water and sewer planning for the entire county. Background information is provided for water and sewer planning and service in Carroll County and its municipalities, including legislative and policy decisions that have been made by local and state governments. The *Water & Sewer Master Plan* is updated on a triennial basis. With the triennial updates, revisions are made to reflect changes that have occurred to various water and wastewater facilities or plans for improvement to these facilities around the county. Amendments to the plan are processed on a biannual basis – in the spring and fall each year. For more information and details regarding operations and management or specific improvements in design and capacity, please reference the *Carroll County Water & Sewer Master Plan*.

Among the most important components of this master plan are the planned service areas for each system. These system service areas describe the location where the service exists or is planned to be provided. They also establish a prioritized sequence for expanding the systems. Both the water and sewer (wastewater) facilities are separated into service areas. Existing and planned facilities and associated infrastructure are detailed. In addition, the plan contains more specific information on the maintenance and operations of the public systems and associated infrastructure. Charts and maps illustrate where the specific water and sewer infrastructure is located, as well as the planned water service and sewer service areas. Information is included for specific privately and publicly owned systems. Carroll County has no combined stormwater sewer systems or overflows.

The current public systems serve Carroll's DGAs, in which the highest densities are located, including the County's eight municipalities. Four of the County's rural villages are also served by either public water and/or sewer systems, as a result of problems that occurred in those areas. These systems are not intended to accommodate additional growth beyond any existing infill potential. The master plan establishes four categories for providing either water or sewer system services:

Existing/Final Planning Service Areas: These are locations where community systems are either in place, under construction, or have completed final plans and/or engineering specifications for that portion of the system.

Priority Service Areas: These are areas that are likely to be served by community systems and are anticipated to begin construction within two years or where major system components will likely either be funded or completed as part of the current six-year capital improvement program (CIP) budgeting cycle. Priority areas also include areas which are immediately adjacent to existing facilities. It is a standard requirement that any development projects occurring in a Priority Service Area will be required to connect to the community system(s).

Future Service Areas: Future Service Areas are those regions where community systems are anticipated to expand and be served within a seven- to ten-year period. Location in the Future Service Area, however, does not guarantee that services will be provided within that time period or that the region will develop in any specified timeframe. Before a property can connect to the relevant community system(s), the master plan would need to be amended to place the property in at least the priority service area(s).

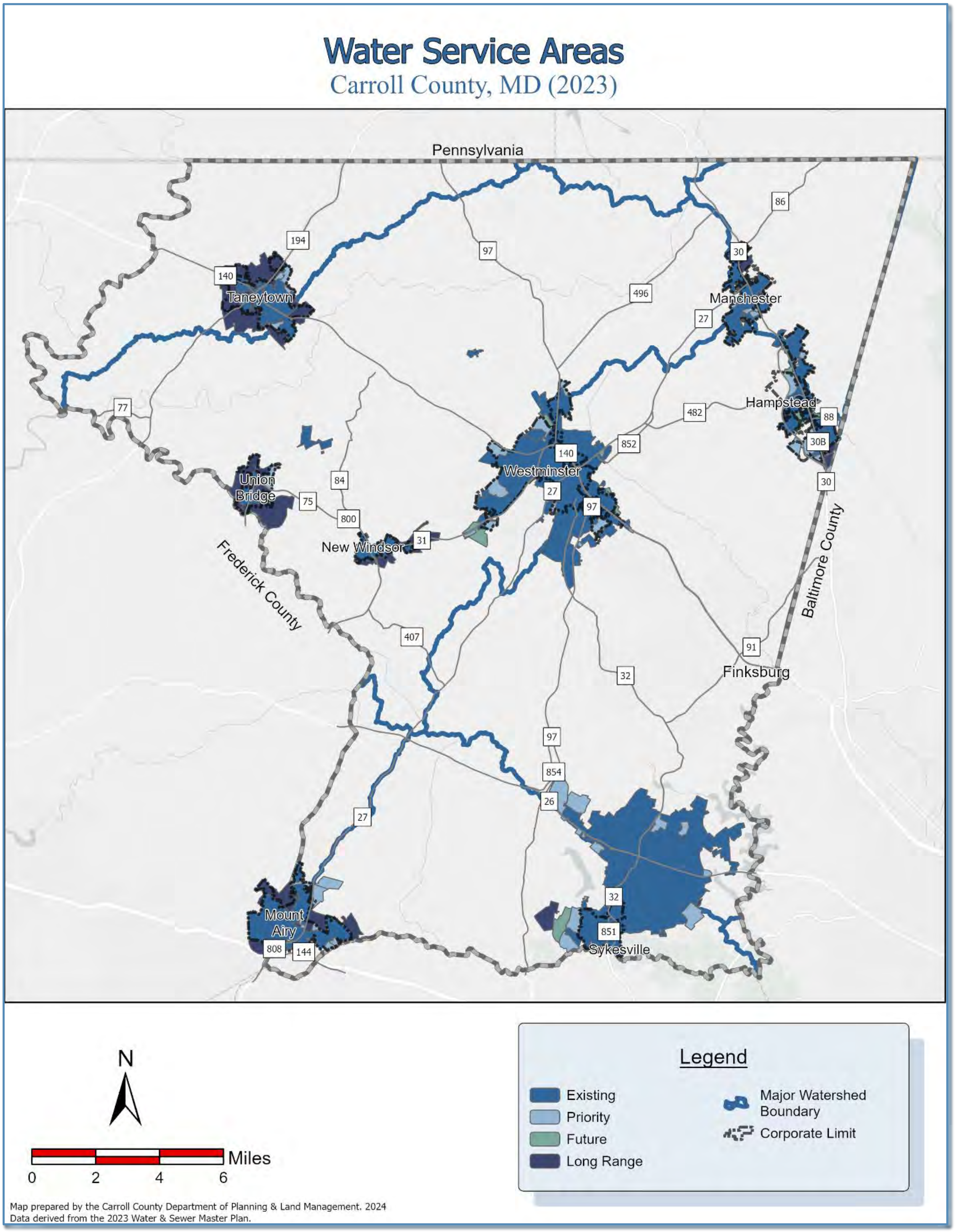
Long-Range Service Areas: Long-Range Service Areas are Areas that are generally located within a Designated Growth Area and are intended to be served by a public water and/or sewer system but are not within the planning horizon of this plan. They are included within the *Water & Sewer Master*

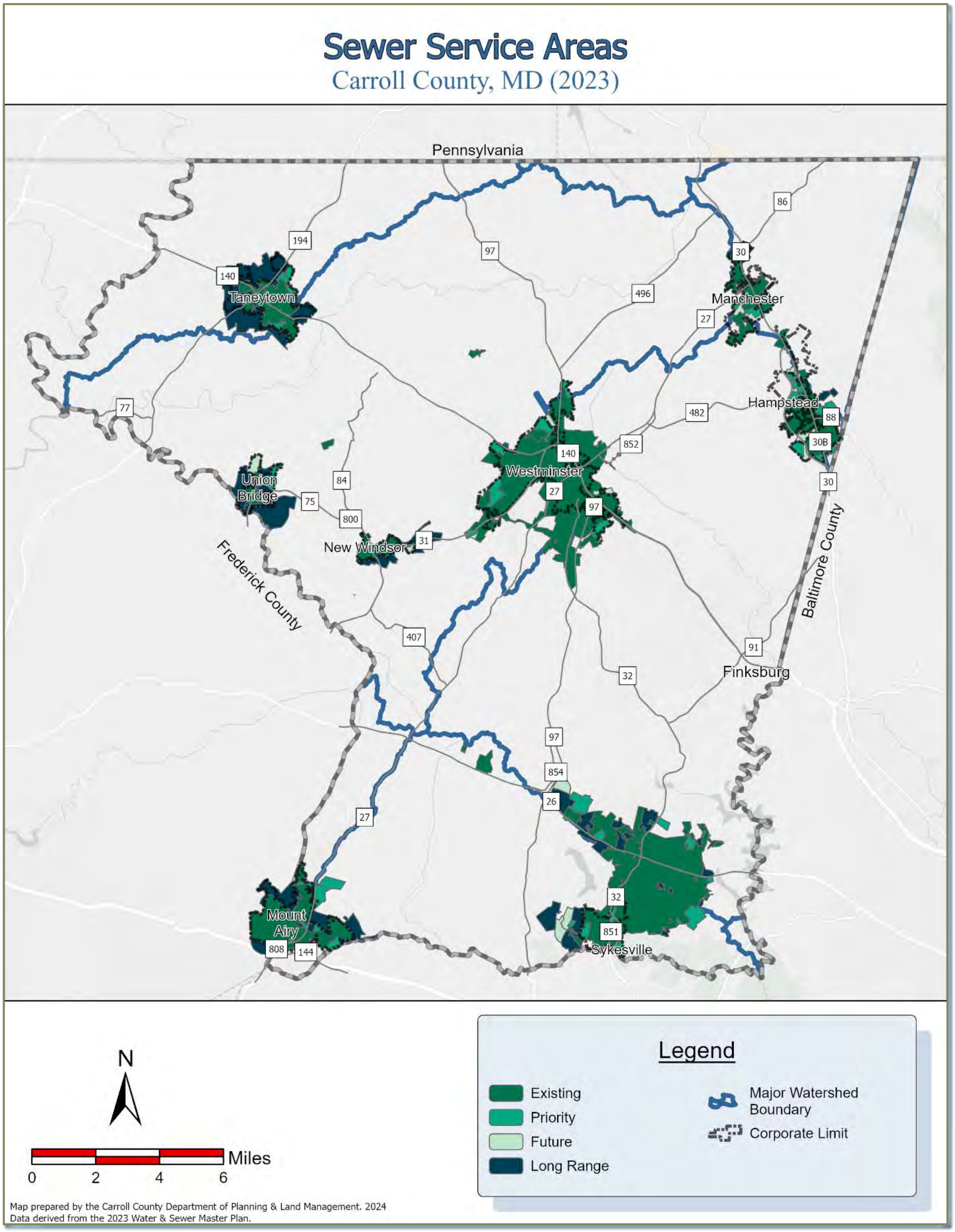
Plan for purposes of looking at public water and/or sewer needs associated with implementation of the comprehensive plans, even though MDE does not require this category to be included and addressed in the *Water & Sewer Master Plan*.

No Planned Service Areas: No Planned Service Areas are those locations which are not envisioned to be served by a public water and/or sewer system within the current construction or CIP cycle or within the current comprehensive plan horizon for the relevant area.

This delineation process helps individual communities direct their growth and development patterns. By planning for needed expansion, system operators seek to balance the rates of residential growth with needed commercial, employment or other business development while ensuring that appropriate capacity will be available for public facilities such as schools, libraries, and other community services. These prioritized rankings are also intended to aid system operators in budgeting for and seeking funding needed to ensure that planned capacity and system needs are met on a timely basis.

It should be noted that Maryland's regulations for the Water & Sewer Master Plan prescribe tables that do not provide information in a manner consistent with MDE's Waters Supply and Wastewater Capacity Management Plan (CMP) methodology. The WRE guidance directs local jurisdictions to use the CMP methodology to prepare the capacity and demand information for the WREs. Water & Sewer Master Plans prepared consistent with the WRE would likely not be approved since the regulations do not match the CMP guidance methodology.


Water Service Areas
Carroll County, MD (2023)
Pennsylvania
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Frederick County
Baltimore County
Finksburg
Mount Airy
Sykesville
194
140
97
496
86
30
27
482
88
30B
852
77
84
75
800
31
407
91
32
854
26
808
144
851
Legend
Existing
Priority
Future
Long Range
Major Watershed Boundary
Corporate Limit
N
Miles
0
2
4
6
Map prepared by the Carroll County Department of Planning & Land Management. 2024
Data derived from the 2023 Water & Sewer Master Plan.


Sewer Service Areas
Carroll County, MD (2023)
Pennsylvania
Taneytown
Manchester
Hampstead
Union Bridge
New Windsor
Westminster
Finksburg
Frederick County
Baltimore County
Mount Airy
Sykesville
140
194
97
496
86
30
27
77
482
88
30B
852
84
75
800
31
407
32
91
854
26
808
144
851
N
Miles
0
2
4
6
Legend
Existing
Priority
Future
Long Range
Major Watershed Boundary
Corporate Limit
Map prepared by the Carroll County Department of Planning & Land Management. 2024
Data derived from the 2023 Water & Sewer Master Plan.

Carroll County's 2023 public water and sewer systems and their 2023 planned service areas are shown on the maps – **Water Service Areas** and **Sewer Service Areas.** As depicted on these maps, planned service areas for public water do not always match planned service areas for public sewer.

The following tables – **2023 Existing and Planned Water Service Areas Acreage** and **2023 Existing and Planned Sewer Service Areas Acreage** – detail the major public water and sewer systems within Carroll County. The data are organized by service area and relationship to the total area within a DGA. For each municipal system, the tables show the acreage for the planned service area within the DGA and outside it. The portion of the DGA that is in the No Planned Service Area is also reported by acreage. These acreages are summed for a countywide total. It should be noted, however, that, for the purposes of this plan, the No Planned Service Areas are not considered in estimating future demand for public water and sewer systems.

2023 Existing and Planned Water Service Areas Acreage

	Existing/Final Service	Priority Service	Future Service	Long-Range	No Planned Service
Freedom/Sykesville	9,169	1,309	213	261	9,585
Hampstead	1,506	491	249	30	656
Manchester	1,289	101	4	78	410
Mount Airy	2,339	237	284	748	52
New Windsor	457	12	26	379	3
Taneytown	1,372	65	0	1,915	0
Union Bridge	289	116	0	567	676
Westminster	6,945	563	302	0	3,025
Total Acreage	***23,366***	***2,894***	***1,078***	***3,978***	***14,407***

Source: Carroll County Department of Planning & Land Management, 2023

2023 Existing and Planned Sewer Service Areas Acreage

	Existing/Final Service	Priority Service	Future Service	Long-Range	No Planned Service
Freedom/Sykesville	6,473	821	317	1,619	11,307
Hampstead	1,467	376	277	73	739
Manchester	1,041	102	93	79	567
Mount Airy	2,321	244	277	765	53
New Windsor	376	26	77	396	2
Taneytown	1,340	63	0	1,956	0
Union Bridge	316	112	111	1,061	48
Westminster	7,258	464	113	0	3,000
Total Acreage	***20,592***	***2,208***	***1,265***	***5,949***	***15,716***

Source: Carroll County Department of Planning & Land Management, 2023

The data in the following table – **Planned Additional Residential and Non-Residential Development within 2023 Planned Water and Sewer Service Areas** – is based on zoning in place in 2022.

Planned Additional Residential and Non-Residential Development within 2023 Planned Water and Sewer Service Areas

Community	Defined Area	Additional Residential Units (lots)	Developable Non-Residential Land (acres)
Freedom	Water Service Area	2,435	586
(including Sykesville)	Sewer Service Area	2,271	582
Hampstead	Water Service Area	724	352
	Sewer Service Area	715	376
Manchester	Water Service Area	498	34
	Sewer Service Area	485	33
Mount Airy	Water Service Area	356	220
	Sewer Service Area	356	220
New Windsor	Water Service Area	143	118
	Sewer Service Area	143	118
Taneytown	Water Service Area	554	331
	Sewer Service Area	555	331
Union Bridge	Water Service Area	774	229
	Sewer Service Area	774	229
Westminster	Water Service Area	1,601	537
	Sewer Service Area	1,998	535

Source: Carroll County Department of Planning & Land Management, June 2023

Regulatory Setting

8.0 2024 Federal & State Water Resources Regulatory Setting

8.1 Federal

8.1.1 Clean Water Act

"The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with groundwater or with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support 'the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water.'

"For many years following the passage of CWA in 1972, US EPA, states, and Indian tribes focused mainly on the chemical aspects of the "integrity" goal. During the last decade, however, more attention has been given to physical and biological integrity. Also, in the early decades of the Act's implementation, efforts focused on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities, with little attention paid to runoff from streets, construction sites, farms, and other "wet-weather" sources.

"Starting in the late 1980s, efforts to address polluted runoff increased significantly. For "nonpoint" runoff, voluntary programs, including cost-sharing with landowners, are the key tool. For "wet weather point sources" like urban storm sewer systems and construction sites, a regulatory approach is being employed.

"Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach." (*Source: Excerpted from the U.S. Environmental Protection Agency (US EPA) website, "Introduction to the Clean Water Act," found at http://www.epa.gov/watertrain/cwa/*.)

8.1.2 Impaired Waters and Total Maximum Daily Loads (TMDLs)

An impairment is identified when water quality monitoring data suggest that a waterbody (river, lake, estuary, or ocean) does not meet or is not expected to meet water quality standards (WQS). When a waterbody is listed, the cause (pollutant) and the priority of the impairment are identified. Waters scheduled for development of a total maximum daily load (TMDL) in the next two years are also identified in the State's list of impaired waters, also known as the 303(d) list.

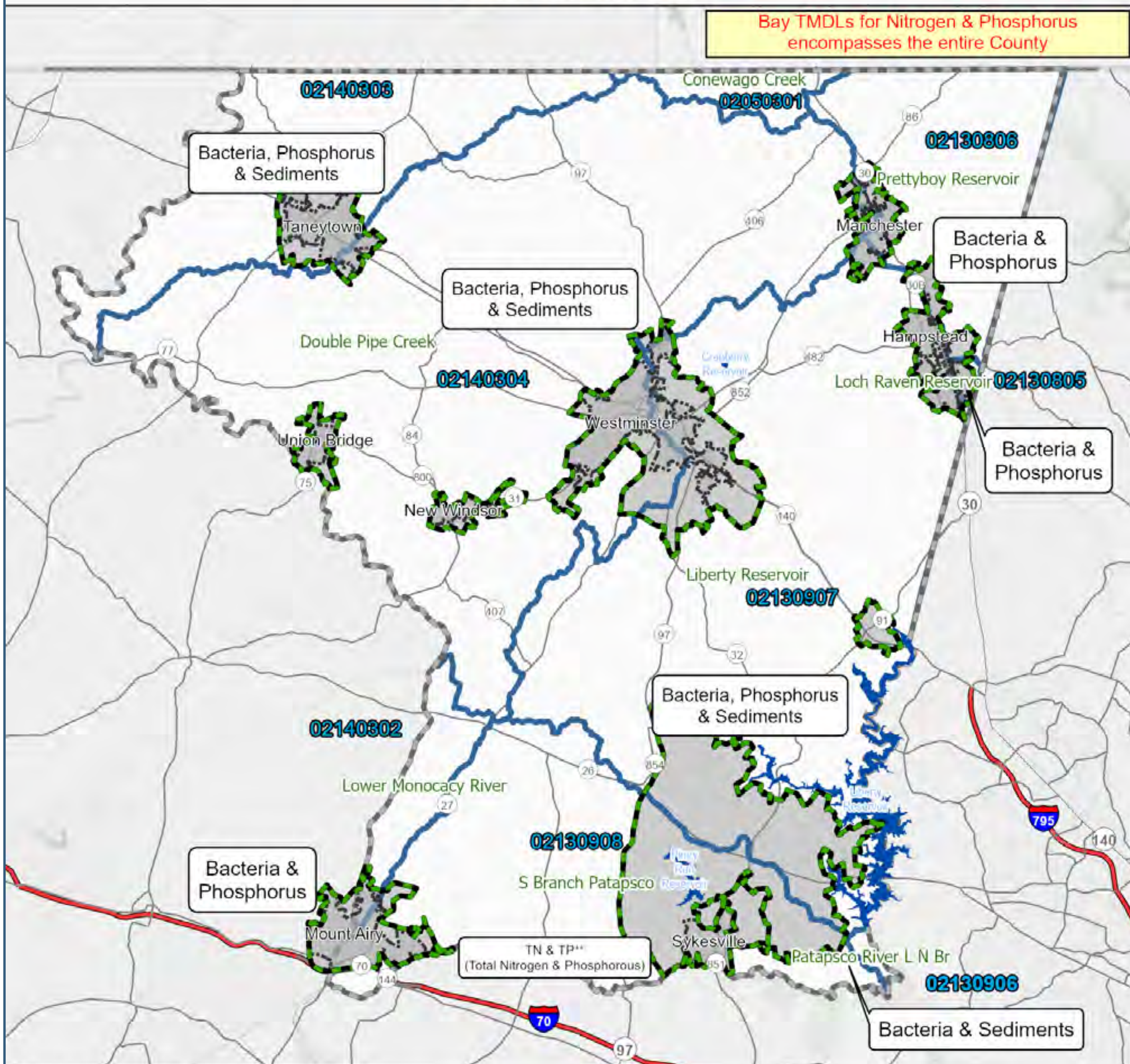
A load refers to the amount of a given type of pollutant found in a body of water coming from all sources.

A TMDL establishes the maximum amount of an impairing substance or stressor that a waterbody can assimilate and still meet water quality standards. TMDLs are based on the relationship between pollution sources and in-stream water quality conditions. TMDLs calculate pollution contributions from the entire watershed and then allocate reduction requirements to the various contributing sources. Within the 8-digit watersheds, these allocations are divided among counties and municipalities and then further divided among sources, including agriculture, wastewater, and stormwater.

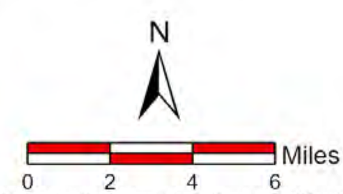
Simply put, *a TMDL is the highest amount of a pollutant that a body of water can accept from all sources and still meet water quality standards*. A body of water is tested and assigned a TMDL value. In Maryland, nitrogen and phosphorous are the most common pollutants.

Local TMDLs* & Watershed Boundaries

Carroll County, MD



Map shows approved TMDLs as of February 16, 2022.
***Map shows Non-Tidal River TMDLs for all pollutants.**
****South Branch Patapsco is part of the Baltimore Harbor TMDL.**



Map prepared by the Carroll County Department of Planning & Land Management, 2025

In 1998, the Chesapeake Bay and many of its tidal tributaries were added to the State's 303(d) list, thus requiring the development of a TMDL to comply with the Clean Water Act. In June of 2000, the State of Maryland signed *Chesapeake 2000* (C2K), a new Agreement for restoration of the Chesapeake Bay. Maryland, together with Virginia, Pennsylvania, the District of Columbia, the US EPA, and the Chesapeake Bay Commission, pledged to achieve over 100 specific actions designed to restore the health of the Bay and its living resources by 2010. The actions, along with revised goals, were incorporated into *Maryland's Tributary Strategies Statewide Implementation Plan*. The County participated in the Tributary Teams for the Upper Potomac, Upper Western Shore, and Patapsco/Back River watersheds. Participation in the Tributary Teams allowed the County to provide input and receive information on the design and timing of the basin implementation plans.

In December 2010, the EPA completed TMDLs for the Chesapeake Bay and its tributaries for nitrogen, phosphorus, and total suspended solids (TSS aka sediment), replacing the Tributary Strategies. Through this process, pollutant load targets were developed by Bay segment, by source sector, and by county. More information on the Bay TMDLs can be found on the EPA website at http://www.epa.gov/chesapeakebaytmdl/. TMDLs require a very specific implementation plan, with "reasonable assurances" (e.g., enforceable permit limits) that pollutant load allocations will be achieved.

Because these TMDLs represent a legally enforceable limit on the amount of nutrient loading from each tributary watershed of the Bay, it is in the interest of the State and each local jurisdiction to incorporate these strategies into its decision-making process and planning efforts.

State and federal requirements to meet water quality standards using TMDL limits are resulting in revised land use and environmental requirements for the future. TMDL requirements are intended to correct the existing conditions that add pollutants to a body of water. New TMDLs and new requirements for meeting TMDLs also mean new or updated planning strategies to prevent activities that may add pollutants in the future.

The **TMDL Watershed Status** map indicates the areas of the county, based on watershed, that were identified as impaired for at least one pollutant. The Conewago Creek watershed is the only watershed within the county that is not included on Maryland's 303(d) list. This watershed does, however, fall within the Chesapeake Bay watershed. Therefore, 100% of the county's land area is affected by a TMDL. See Stormwater Section 27.0 Restoration Progress for more information on the nutrient TMDLs within Carroll County.

The *Countywide TMDL Stormwater Implementation Plan*, required by the County's NPDES MS4 permit, is updated each year to track and summarize progress toward meeting all applicable TMDLs for each 8-digit watershed with an approved stormwater wasteload allocation (SW-WLA) TMDL.

8.1.3 National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4)

The Clean Water Act was developed to control water pollution from wastewater discharges and stormwater runoff. In 1988, the US EPA created the NPDES Municipal Separate Storm Sewer System (MS4) to require municipalities, including counties, to apply for permits to control stormwater discharges. Beginning in 1990, US EPA, through State delegation to MDE, required large municipalities, certain industrial facilities, and construction sites to obtain NPDES permits for stormwater discharges. The Phase 1 jurisdictions, located in counties or metropolitan areas with populations larger than 100,000, were required to obtain permit coverage. Carroll County was included as a Phase 1 jurisdiction.

8.1.4 Safe Drinking Water Act (SDWA)

“The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and groundwater wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

“SDWA authorizes the US EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

“Millions of Americans receive high quality drinking water every day from their public water systems, (which may be publicly or privately owned). Nonetheless, drinking water safety cannot be taken for granted. There are a number of threats to drinking water: improperly disposed of chemicals; animal wastes; pesticides; human wastes; wastes injected deep underground; and naturally occurring substances can all contaminate drinking water. Likewise, drinking water that is not properly treated or disinfected, or which travels through an improperly maintained distribution system, may also pose a health risk.

“Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

“SDWA applies to every public water system in the United States. There are currently more than 160,000 public water systems providing water to almost all Americans at some time in their lives.”

(*Source: Excerpted from the U.S. Environmental Protection Agency (US EPA) website, "Safe Drinking Water Act (SDWA), Basic Information," found at http://www.epa.gov/OGWDW/sdwa/basicinformation.html*.)

8.2 State Laws and Policies

Trends in the implementation of the water appropriation and permitting process have created challenges to water resource development. Local governments are finding it difficult to secure enough water from sources to meet existing or projected demands. In some instances, the physical ability to develop groundwater sources may be limiting, but in the majority of cases, it is administrative or policy issues that create obstacles. The multitude of technical and administrative issues makes development of groundwater sources costly, time-consuming, and quite unpredictable in the Piedmont setting. One example is finding ways to address the adequacy of water recharge areas, which has resulted in additional work, costs, and timeframes for moving forward with planned growth.

The utilization of surface water resources has likewise become costly and complicated. Approval for stream withdrawals currently requires additional storage capacity within a water supply system. Therefore, using streams as a water source is typically difficult, expensive, and often not a viable option.

8.2.1 High Quality/Tier II Waters

"Tier II Waters" relate to Maryland's Antidegradation Policy (COMAR 26.08.02.04, COMAR 26.08.02.04-1, and COMAR 26.08.02.04-2), which follows the national model required by the US EPA. Tier II protects surface water that exceeds the minimum requirements specified by water quality standards. All of Maryland's current Tier II waters were designated on the basis of biological indices of integrity. The MDE map – **High Quality (Tier II Waters) in Carroll County** – shows the locations of the segments and their catchment areas (watersheds) that are located in part or in whole in Carroll County.

Although a Tier II antidegradation review is not required when a WRE is adopted by a local government, understanding the review is essential to understanding how future development envisioned within the local land use plan could be affected, and whether the proposed land use plan approach, along with any associated water protection strategies, would be sufficient to protect the Tier II waters. Generally, the State expects the land use plan to avoid new development within Tier II watersheds and the WRE to include strategies for ensuring the implementation of BMPs and other environmental protection measures recommended by MDE within Tier II watersheds.

The designation of Tier II waters affects the ability to obtain permits for regulated activities within those watersheds, such as discharge and appropriation permits for new water supply wells. A Tier II antidegradation review is required for new or modified NPDES permit applications, Nontidal Wetlands and Waterways permits, and activities requiring a 401 Water Quality Certification (also issued by MDE). Additionally, the review is required for new or proposed amendments to local water and sewer plans. The Tier II review is applicable to applications and approvals for local, state, and federal entities and projects.

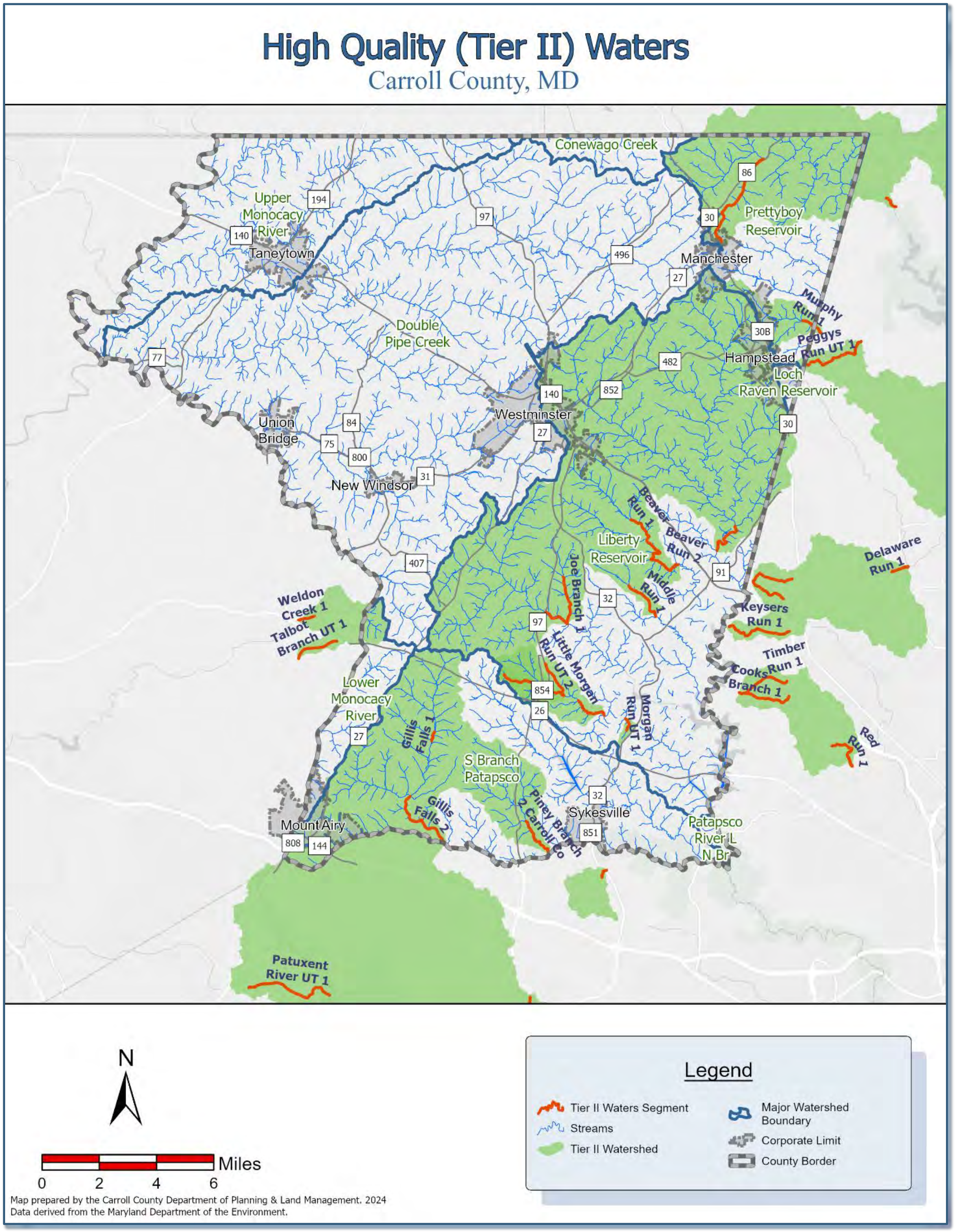
The Tier II review is implemented on a watershed basis using an upstream approach intended to protect downstream water quality. This means that regulated activities occurring anywhere within a

Tier II watershed area may require a Tier II review. Using a science-based implementation strategy, the review identifies common impacts associated with a given regulated activity, and provides, where appropriate, comments to help address those impacts. (*Source: MDP website. https://planning.maryland.gov/Pages/OurWork/envr-planning/water-resources-mg/2022/02/framework-cwa-wqprotection2.aspx. May 2024*)

The Antidegradation policy requires an applicant for discharge permits to discharge to Tier II waters that will result in a new, or an increased, permitted annual discharge of pollutants and a potential impact to water quality, to evaluate alternatives to eliminate or reduce discharges or impacts. If impacts are unavoidable, an applicant must prepare and document a social and economic justification. MDE determines, through a public process, whether these discharges can be justified. A jurisdiction must provide a social and economic justification to MDE for permitting limited degradation of the water quality if a reasonable alternatives analysis indicates that an impact cannot be avoided or no assimilative capacity remains. *(Source: MDE website. Maryland's High Quality Waters (Tier II). https://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/Antidegradation_Policy.aspx. May 2024.)*

Water quality in Carroll County is generally quite high with 25.5 miles of Tier II streams and ~87% of streams designated as Use Class III or IV. Climate change and an associated increase in latent and sensible heating may threaten cool and cold water Use Classes and pose a serious county-wide concern about meeting water quality standards. Promulgation of a temperature TMDL could present a regulatory challenge for some areas in the county. MDE drafted the first proposed temperature TMDL in the state in 2025 – Gwynns Falls watershed, which lies within Baltimore County.

Overall, stream temperature has not historically been a major concern in Carroll County, but this may change with climate change, and additional regulations may emerge as a hurdle for future growth and development. Potential water temperature concerns are most likely limited to surface water that may warm through increasing air and surface temperatures. Potential warming of groundwater is likely limited because the ground insulates and modulates groundwater temperature changes.


High Quality (Tier II) Waters
Carroll County, MD
Conewago Creek
Upper Monocacy River
Taneytown
Prettyboy Reservoir
Manchester
Murphy Run 1
Peggys Run UT 1
Hampstead
Loch Raven Reservoir
Double Pipe Creek
Westminster
Union Bridge
New Windsor
Beaver Run 1
Beaver Run 2
Liberty Reservoir
Joe Branch 1
Middle Run 1
Delaware Run 1
Keysers Run 1
Weldon Creek 1
Talbot Branch UT 1
Timber Run 1
Cooks Branch 1
Little Morgan Run UT 2
Morgan Run UT 1
Lower Monocacy River
Gillis Falls 1
S Branch Patapsco
Red Run 1
Gillis Falls 2
Piney Branch 2 Carroll Co
Sykesville
Patapsco River L N Br
Mount Airy
Patuxent River UT 1
N
Miles
0 2 4 6
Map prepared by the Carroll County Department of Planning & Land Management. 2024
Data derived from the Maryland Department of the Environment.
Legend
Tier II Waters Segment
Streams
Tier II Watershed
Major Watershed Boundary
Corporate Limit
County Border

As of 2022, stream segments shown in the table – **Tier II Segments and Catchment Areas** – were listed for classification as Tier II streams. See the table for specific segment names and listing dates. The Tier II segments and their watersheds are shown in the map – **High Quality (Tier II) Waters in Carroll County**.

Tier II Segments and Catchment Areas

2022

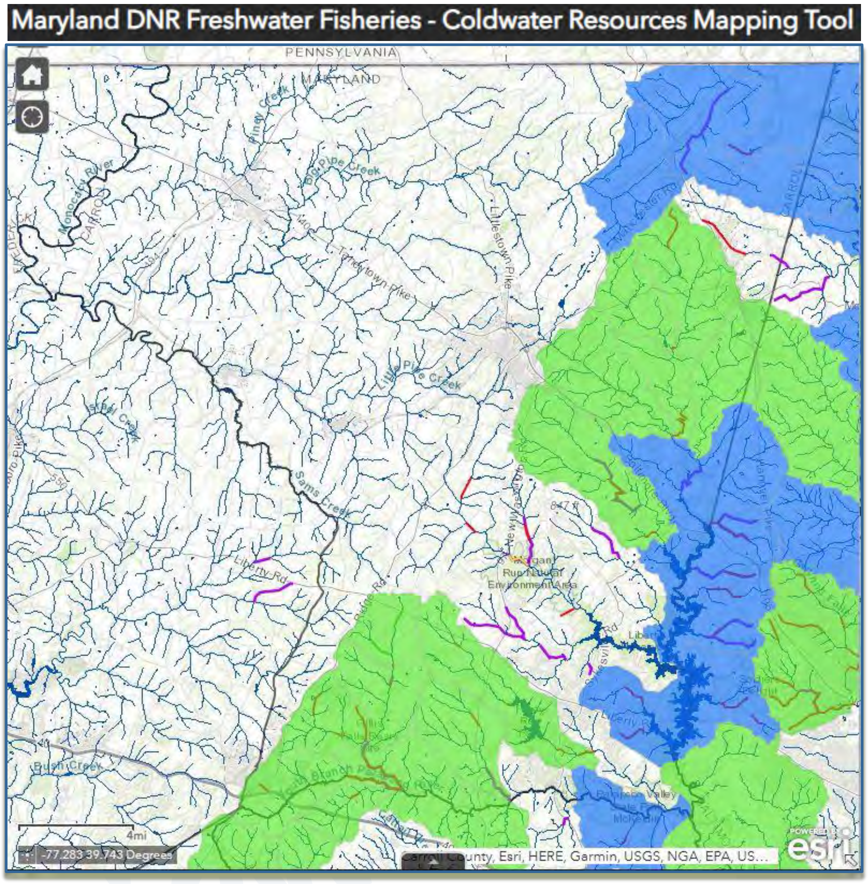
Segments/Catchment Areas	Year Listed	Acres*	Assimilative Capacity?
Peggys Run 1	2021	1,680	No
N Branch Patapsco River 1	2021	33,669	No
Murphy Run 1	n/a	1,960	Yes
Gunpowder Falls 1	n/a	18,944	Yes
Peggys Run UT 1	2016	799	No
Little Morgan Run 1	2021	1,824	No
S Branch Gunpowder Falls UT 1	2021	2,317	No
Little Morgan Run UT 1	2021	364	No
Morgan Run 1	n/a	12,226	Yes
Morgan Run UT 1	2012	189	No
Piney Branch 2 Carroll County	2016	5,121	No
Little Morgan Run 2	2021	3,341	No
Gillis Falls 2	2021	12,262	No
Beaver Run 2	2021	7,234	No
Middle Run 1	2016	1,605	No
Joe Branch 1	2012	2,318	No
Little Morgan Run UT 2	2016	460	No
Weldon Creek 1	2012	2,630	No
S Branch Patapsco River 1	2012	7,387	No

**Rounded up to nearest acres*
Source: Maryland's Tier II High Quality Waters (2022) Web Tool (https://mdewin64.mde.state.md.us/WSA/TierIIWQ/index.html)

8.2.2 Cold Water Resources and Designated Use Classifications for Surface Waters

Maryland designates and protects cold water streams under the federal Clean Water Act, identifying them as Use Class III (nontidal cold water use), or Use Class IV (trout-stocking waters). Growing concerns around climate change and warming temperatures highlights the importance of protecting these valuable cold water resources in Maryland. Elevated water temperatures due to climate change will limit the available cold water habitat for dependent species, threatening their populations. Increased development in the watersheds of cold water streams or best management practices (BMPs) lacking cold water protections can compound the problem, contributing to higher influxes of warm temperature stormwater runoff into vulnerable cold water streams. Water quality standards in conjunction with strategies to best manage and mitigate high temperatures are, therefore, critical to the survival and health of cold water communities. (*DNR Website: Protecting Cold Water Resources in Maryland, 2024*)

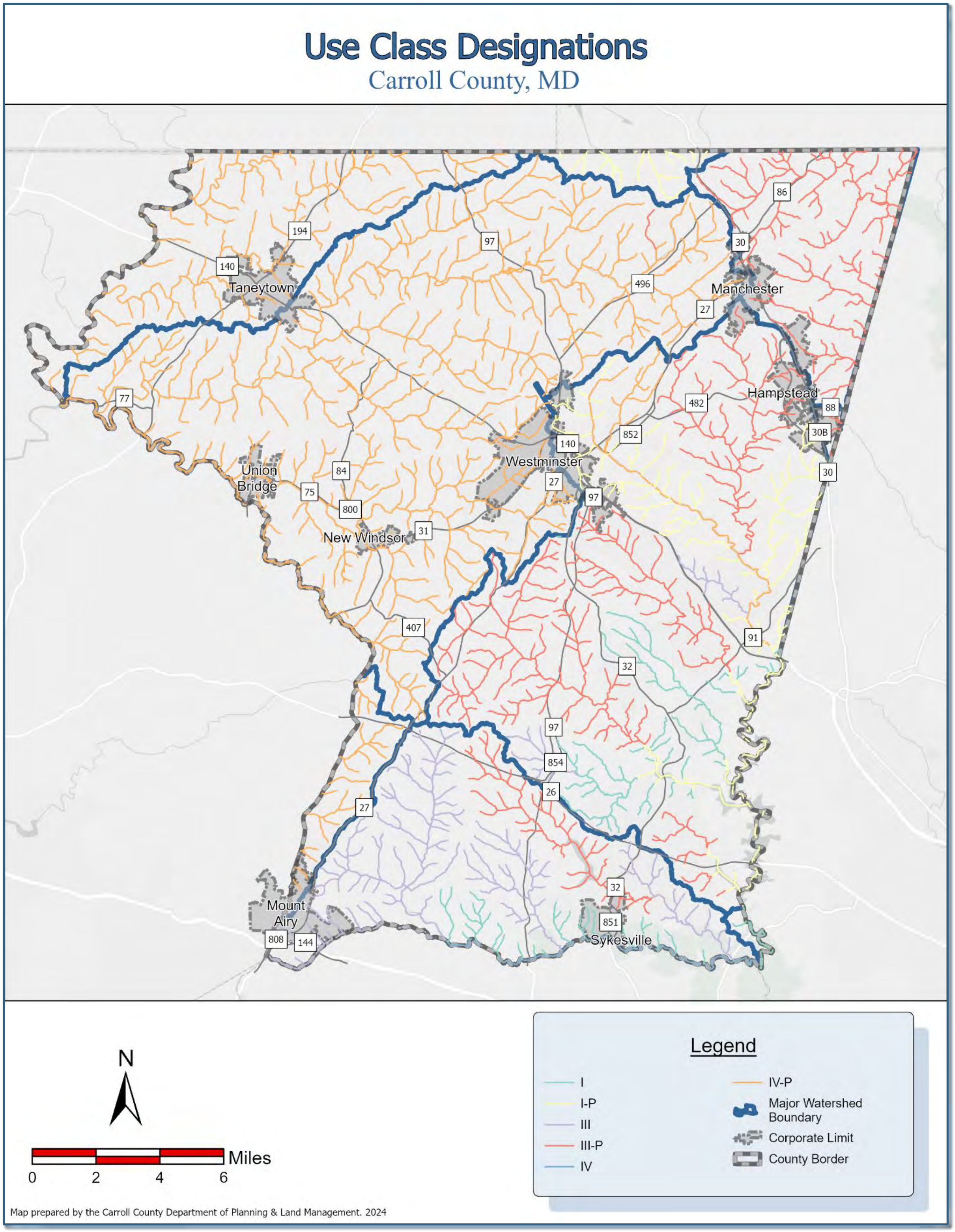
If temperature data indicates that a Use III (or Use III-P) waterbody does not meet the established temperature criteria, the waterbody is listed as impaired for temperature. Once a Class III (or III-P) water body is listed as impaired for high water temperatures, MDE prioritizes this water for TMDL development. MDE is currently developing the State's first TMDLs for water temperature impairment and will provide links to additional information as it becomes available. To date, MDE has conducted spatially dense temperature monitoring in 12 watersheds around the State in preparation for TMDL development. Once submitted to and approved by EPA, these TMDLs will help focus implementation efforts to those actions that best maintain and cool water temperatures. (*MDE Website: Protecting Cold Water Resources in Maryland, 2024*)



Source: *Maryland DNR Freshwater Fisheries – Coldwater Resources Mapping Tool, accessed November 2024*

More detailed information describing Maryland's designated uses and where they apply can be found in the Code of Maryland Regulations (COMAR) Sections 26.08.02.02, and 26.08.02.02-1, and 26.08.02.08. These designations could change as Maryland has recently evaluated and identified the existing use for several streams that are different than the currently specified designated uses for those streams as listed in COMAR 26.08.02.08. Changes could impact Carroll County where the State finds streams supported cold water obligate species and water temperatures cooler than what their currently specified designated use requires. (*MDE Website: Maryland's Designated Uses for Surface Water, 2024*)

Maryland Department of Natural Resources' (DNR) Freshwater Fisheries – Coldwater Resources Mapping Tool indicates the watersheds that support brook trout or brown trout in Carroll County. The map – **Use Class Designations** – identifies the use class for the streams in Carroll County.


Use Class Designations
Carroll County, MD
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Mount Airy
Sykesville
194
140
97
86
30
496
27
482
88
30B
852
140
84
75
800
31
27
97
77
407
91
32
97
854
26
27
32
851
808
144
N
Miles
0
2
4
6
Legend
I
I-P
III
III-P
IV
IV-P
Major Watershed Boundary
Corporate Limit
County Border
Map prepared by the Carroll County Department of Planning & Land Management. 2024

8.2.3 2008 Brinkley Bill Water Allocation

The 2008 Brinkley Bill, specifically Chapter 197 of the Laws of Maryland, 2008, aimed to address concerns about water allocation policies in Carroll, Frederick, and Washington counties. It sought to ensure that municipalities and PFAs in these counties could develop at densities aligned with the goals of Maryland's Priority Funding Areas Act. The bill prioritizes municipalities in these counties for groundwater use, specifically for wells within certain watersheds. Essentially, it provided a methodology for MDE to allocate more groundwater to public water systems serving these areas, enabling higher groundwater withdrawal allocations, particularly for redevelopment and infill within established boundaries. The Brinkley Bill is helpful for some of Carroll's municipalities and not for others. MDE developed a guidance document for Applications for Water Allocation, dated June 2014.

8.2.4 Maryland's Climate Planning Requirements

In 2015, the Maryland Commission on Climate Change was codified into law (Environment Article §§2-1301 through 1306) requiring State agencies to review their "planning, regulatory, and fiscal programs to identify and recommend actions to more fully integrate the consideration of Maryland's greenhouse gas reduction goal and the impacts of climate change." This includes explicit consideration of sea level rise, storm surges and flooding, increased temperature and precipitation, and extreme weather (Environment Article §2-1305(b)). The legislation also calls on the Maryland Commission on Climate Change, which includes State agencies, to assist "local governments in supporting community-scale climate vulnerability assessments and the development and integration of specific strategies into local plans and ordinances" (Environment Article §2-1303(d)(10)).

8.2.5 Advancing Stormwater Resiliency in Maryland or "A-StoRM"

Urban and riverine flooding is a growing issue in Maryland. The increasing number of extreme rainfall events that produce intense precipitation will continue to lead to more urban and riverine flooding events unless steps are taken to mitigate their impacts. Maryland worked to address these flooding issues in 2020 by updating Maryland's stormwater management law that became effective on June 1, 2021. Senate Bill 227 (SB 227) tasked MDE with developing plans to evaluate current flooding risks and update regulations to improve urban stormwater flood management. The State's Stormwater Management Law, Environment Article 4-201.1, requires MDE to report on the most recent precipitation data available, investigate flooding events since 2000, and update Maryland's stormwater quantity management standards for flood control. MDE released a report, "Advancing Stormwater Resiliency in Maryland," that provides a roadmap towards modernizing stormwater management in Maryland.

MDE formed a Stakeholder Consultation Group, as well as a few technical work groups, to provide feedback as MDE develops proposed revisions to the stormwater regulations as a result of SB 227 and the A-StoRM report recommendations. MDE will also update its stormwater manual to reflect the changes in the regulations.

8.2.6 Stormwater Management Act of 2007

The Stormwater Management Act of 2007 (SB 784/HB 786) was passed in Maryland in 2007. Stormwater runoff is a major cause of stream erosion and Bay overnutrification and, in Carroll County, water quality impairment and stream ecosystem disruption. The Act required stormwater management practices to mimic natural water runoff and minimize land development impact on water resources via the use of low-impact development (LID) methods. The stricter standards reduce pollution runoff to receiving water bodies from impervious surfaces such as pavement, roofs, and structures. The County and most of its municipalities had already adopted ordinances which mimicked the State's model ordinance to a great extent. The use of non-structural practices as a requirement, greater use of infiltration practices and natural attenuation and increased management on redevelopment projects have been in place since 2004.

The A-StoRM report calls for revisions to the stormwater regulations as a result of SB 227. The March 2024 draft proposed revisions incorporate requirements that put greater emphasis on capture and conveyance, channel protection volume, and the use of ESD practices to help address flood management. This iteration of the proposed regulations would result in a significant increase in staff resources and funding to implement.

Once the State's final updated stormwater regulations are in place, the County and municipalities will update their own stormwater management regulations to incorporate the required provisions.

8.2.7 Maryland Stronghold Watersheds

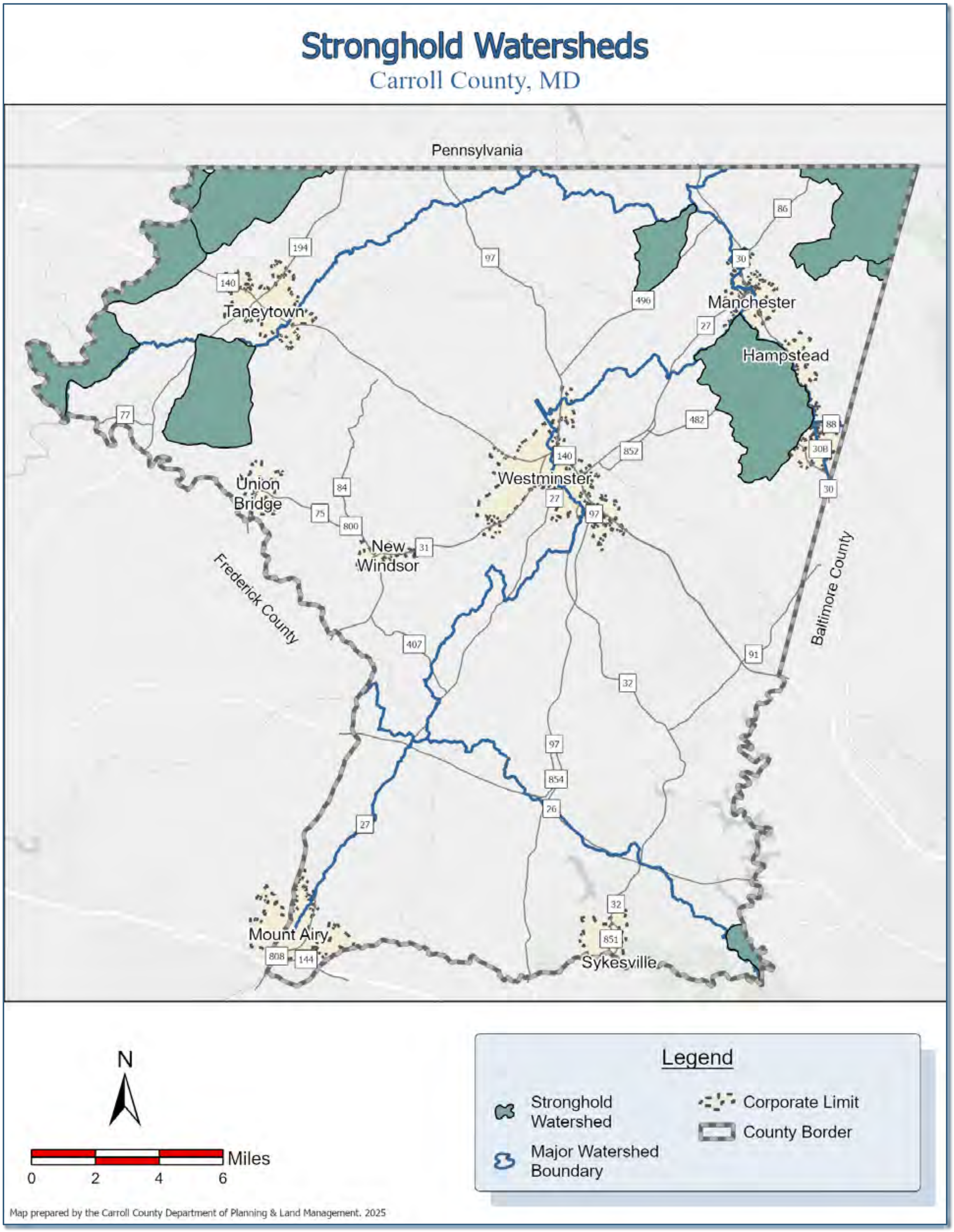
Stronghold watersheds, shown on the map – **Stronghold Watersheds** – are those watersheds in the state that are most important for the protection of Maryland's aquatic biodiversity. Stronghold watersheds are the places where rare, threatened, or endangered freshwater fish, amphibians, reptiles, or mussel species have the highest numbers (abundance and number of occurrences). Special protection of these watersheds is necessary to ensure the persistence of these imperiled fauna.

Most of these species used to have greater abundance and distribution throughout the State, but now are holding out in these limited areas. Generally, these species are the most sensitive to environmental degradation. A small change in watershed or stream health can permanently eliminate one or more of these sensitive species. As a result, maintaining the health of these watersheds is of critical importance if we are to sustain these species and the vital ecosystem services they provide.

8.2.8 Equity

Equity considerations and funding to disadvantaged communities is being prioritized at the federal level through the Justice40 initiative. Local communities that incorporate equity considerations into their planning and capital projects will be best positioned to benefit from these federal resources. The local comprehensive plan can be used as a tool that creates a vision for more equitable and sustainable communities, both in quantity and quality, and helps prioritize water resource protection, infrastructure maintenance, and capital projects in areas that have been historically underserved.

Maryland launched the Environmental Justice "EJ" Screening Tool. The goal of this tool is to provide users with data to inform their decisions on siting, permitting, enforcement, and infrastructure improvements.



9.0 Local Regulations & Protections

The County and its municipalities have a unique relationship regarding the development and implementation of regulations and protection measures. The relationship is founded in a formal Town/County Agreement, which establishes the roles and responsibilities of each party. The agreements, while similar, are customized for each municipality. The implementation of State and local laws are then established between the County and municipalities by ordinance. The agreement allows for a cooperative environment under which coordinated, efficient implementation of regulations and protection measures can take place. In most cases, the County provides staff and other resources to manage, implement, and enforce measures needed to ensure compliance with applicable regulations and protection measures.

9.1 Environmental/Resource Management

The regulations which provide for the protection and management of natural resources and the role assumed by the County and municipalities can be seen in the table – **Review, Inspection, and Bonding: Assignment of Responsibilities**. This table identifies the entity responsible for the key steps in the implementation of resource management. This arrangement between the County and its municipalities for the most part allows for consistent and uniform application of resource management regulations.

The Water Resource Management Ordinance was an unmandated action adopted by the Board of County Commissioners in 2004 to enhance the protection of water quality and quantity in Carroll County. This ordinance is one of the few of its kind in the State of Maryland. Even though not all of the municipalities have formally adopted the ordinance, reviews of development plans are still performed by County staff and comments / recommendations are forwarded.

In addition, the County and municipalities, along with the local Health Department, created the Carroll County Water Resource Coordination Council (WRCC). This group was formed in 2007 by a joint resolution signed by all parties. The WRCC meets monthly to discuss and address water resource management issues of mutual interest. The group has been overseeing the consultant work and drafting of this joint WRE effort.

Review, Inspection, and Bonding: Assignment of Responsibilities

TOWNS	FLOODPLAIN				GRADING			SEDIMENT CONTROL			STORMWATER MANAGEMENT				LANDSCAPE			FOREST CONSERVATION				WATER RESOURCES			
	Review*	Bond	Inspection	Easement	Review*	Bond	Inspection	Review*	Bond	Inspection	Review*	Bond	Inspection	Easement	Review*	Bond	Inspection	Review*	Bond	Inspection	Easement	Review*	Bond	Inspection	Easement
HAMPSTEAD	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	CO	CO	CO/ CO	CO	CO	M	CO/ CO	CO	CO	CO/ CO	CO	CO	CO	CO/ NO CODE	N/A	N/A	N/A
MANCHESTER	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	CO	CO	CO/ CO	CO	CO	M/ CO	CO/ CO	CO	CO	CO/ CO	CO	CO	CO	CO/ CO	N/A	CO	CO
MOUNT AIRY	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	M	CO	CO/ CO	M	CO	M	CO/ M	M	M	CO/ CO	CO	CO	CO	CO/ CO	N/A	N/A	TN
NEW WINDSOR	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	CO	CO	CO/ CO	CO	CO	M	CO/ CO	CO	CO	CO/ CO	CO	O	CO	CO/ CO	/A	O	CO
SYKESVILLE	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	M	M/ CO	CO/ CO	M	CO	M	CO/ M	M	M	CO/ CO	CO	CO	CO	CO/ CO	N/A	CO	CO
TANEYTOWN	CO/ CO	NA	CO	CO	CO/ CO	N/A	CO	SCD/ST	M	CO	CO/ CO	M	CO	M	CO/ CO	CO	CO	CO/ CO	CO	CO	CO	CO/ NO CODE	N/A	N/A	N/A
UNION BRIDGE	CO/ M	N/A	CO	M	CO/ CO	N/A	CO	SCD/ST	CO	CO	CO/ M	M	CO	M	M/ M	M	M	CO/ CO	CO	CO	CO	M	M	M	TN
WESTMINSTER	M/ M	N/A	M	M	CO/ CO	N/A	CO	SCD/ST	CO	CO	CO/ M	M	CO	M	M/ M	M	M	CO/ CO	CO	CO	CO	CO/ NO CODE	N/A	N/A	N/A

Key: CO = County M = Municipality ST = State SCD = Carroll Soil Conservation District
** Review performed by/Whose code*
Source: Bureau of Resource Management, May 17, 2024

9.2 Adequate Public Facilities and Concurrency Management

In addition to the resource management regulations found in the **Review, Inspection, and Bonding: Assignment of Responsibilities** table, the County and each municipality also have Adequate Public Facilities laws in place. This table indicates activities and responsibilities associated with a proposed development – subdivision or site plan – and which jurisdiction implements those items.

The Carroll County Adequate Public Facilities and Concurrency Management Ordinance ensures that proposed or planned residential growth proceeds at a rate that will not unduly strain public facilities, including schools, roads, water and sewer facilities, and police, fire, and emergency medical services. Minimum adequacy standards, or thresholds, are established for these facilities and services and mandate that the cumulative impacts of proposed or planned residential growth, within the municipalities and the County, be considered in testing for adequacy under these standards.

Chapter 156 of the Carroll County Code of Public Local Laws includes thresholds for adequacy, approaching inadequacy, and inadequacy for each facility or service. When PLM staff determine that a preliminary plan may be presented to the Planning & Zoning Commission, the PLM staff test all facilities and services that will be impacted by the proposed development. If all public facilities and services are adequate during the six-year Community Investment Plan (CIP) cycle, the Commission may approve the plan to proceed to the final plan stage and issue a recordation schedule and building permit reservations.

If a public facility or service is approaching inadequate during the six-year CIP or if a public facility or service is inadequate and a relief facility is planned in the six-year CIP to address the inadequacy, the Commission may conditionally approve the preliminary plan to proceed to the final plan stage and issue a tentative recordation schedule and tentative building permit reservations, subject to modification at final plan stage.

When the PLM determines that the final plan may be presented to the Planning & Zoning Commission, any public facility or service that was approaching inadequate or inadequate at the preliminary stage is retested. If a given facility or service continues to be approaching inadequate or inadequate and a relief facility is planned in the six-year CIP, the Planning & Zoning Commission can place the project in a queue or subject the project to a phasing plan for recordation. For inadequate facilities and services, no residential plat may be recorded or final residential site plan approved until a relief facility planned to address the inadequacy has construction underway and completion is anticipated within six months.

If a public facility or service is inadequate during the six-year CIP at the preliminary plan stage and no relief facility is planned in the six-year CIP that addresses the inadequacy, the plan will be denied by the Commission. At the request of the developer, the plan may be placed in a queue and retested on an annual basis. A developer may propose mitigation to alleviate the inadequacy. The Board of County Commissioners determines whether or not mitigation is acceptable.

When a facility or service is inadequate, the Board of County Commissioners can adopt restrictions on the issuance of building permits. These restrictions can be placed on specific geographic areas based on the area served by the inadequate facility or service.

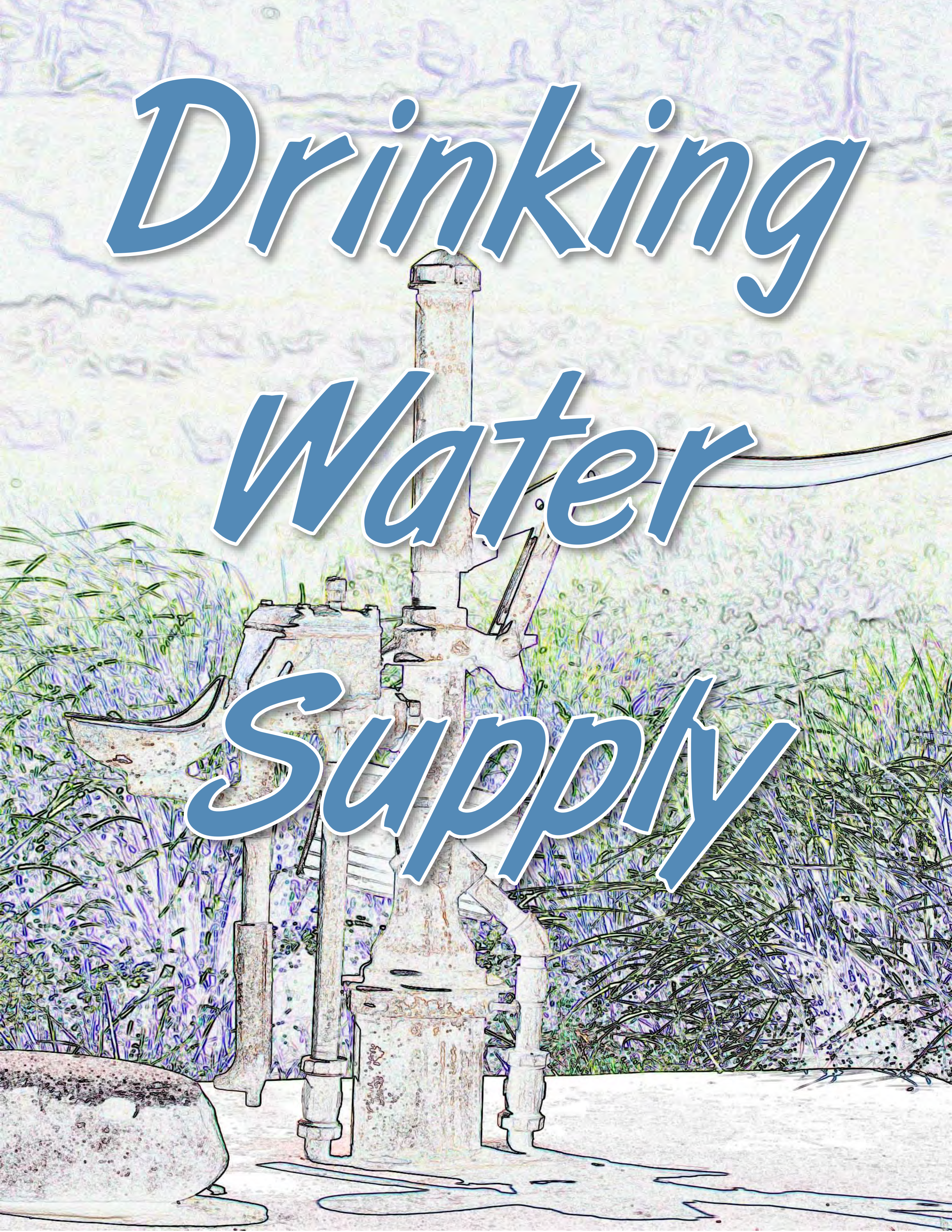
Please refer to the table below – **Water and Sewer Facility Minimum Adequacy Standards** – for thresholds for public water and sewer facilities.

Water and Sewer Facility Minimum Adequacy Standards

Adequate	Approaching Inadequate	Inadequate
Water: The 'maximum day demand' is less than 85% of the total system production capacity.	Water: The projected maximum day demand is equal to or greater than 85% but less than 95% of the total system production capacity.	Water: The projected maximum day demand is equal to or greater than 95% of the total system production capacity.
Sewer: The projected annual average daily flow is less than 85% of the wastewater treatment facility permitted capacity.	Sewer: The projected annual average daily flow is greater than or equal to 85% but less than 95% of the wastewater treatment facility permitted capacity.	Sewer: The projected annual average daily flow is greater than or equal to 95% of the wastewater treatment facility permitted capacity.

Each of the municipalities has also adopted an Adequate Public Facilities Ordinance. Many of them use the same or similar standards to those adopted by the County.

Drinking Water Supply



Drinking Water Supply

According to the *Models & Guidelines No. 26, Managing Maryland's Growth, The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management, June 2007,* "A safe and adequate drinking water supply is critical to the sustainability of existing communities and to the viability of future planned growth. Increasing demand from the 1.1 million additional people projected to live in Maryland over the next 25 years is expected to challenge local utilities' ability to provide safe drinking water and maintain good water quality. Some communities are already at or near current supply limitations.

"By 2030, the statewide demand for water for most uses, excluding self-supplied commercial and industrial uses, is expected to increase from 1,447 million gallons per day (mgd) in the year 2000 to 1,680 mgd, an increase of 233 mgd, or 16%. This total increase includes about 84 mgd of additional water for agricultural irrigation. Regional projections for 2030 demand are not available for irrigation uses.

"Maryland has faced a number of record drought periods in recent years that have necessitated the implementation of some difficult protective measures to enable the state to continue providing adequate water supplies. These stressors on water resources highlight the need to plan ahead to ensure adequate drinking water supplies at the local, comprehensive planning level.

"Existing regional and county water resource studies should be used to inform local planning efforts. Local government experience in obtaining permits for water appropriation should also be taken into account when assessing the reasonableness of future expectations.

"Decisions regarding growth and proposed land uses should consider planning-level assessments of the adequacy of drinking water resources for the planning time period under consideration. For the proposed number and location of homes, businesses and industrial facilities to be viable, the availability, costs and timeframes to provide an adequate water supply must be achievable. Local comprehensive plans must provide the vision and path needed to provide adequate water supplies for planned uses and needs within the planning timeframe.

"Limited water supplies can slow or stop planned development, resulting in the inability to fulfill the vision of local comprehensive plans and implement smart growth policies. Options for addressing these circumstances need to be explored, including, but not limited to, modifying the land use element to change the amount or location of growth, thereby capping growth where it cannot be supported. Local planning and zoning entities must be flexible enough to react to these changes.

"Protection of water supplies is a critical component of the vision for the comprehensive plan. Local land use and zoning decisions can have a profound impact on the risk of contamination to valuable drinking water supplies. Water supplies have varying degrees of vulnerability to contamination due to the nature of the aquifer being used, the size of the watershed, existing land uses and the potential sources of contamination within a recharge or watershed area."

10.0 Carroll County Hydrogeologic Setting

10.1 Topography

Carroll County lies entirely within the Piedmont physiographic province. This is an area of moderate relief and rounded hills, with relatively gentle slopes. In much of the county, this subdued topography is formed by the underlying, deeply weathered, lower Paleozoic to Precambrian-aged metamorphic rocks (500 million to 1 billion years old).

The northwesternmost corner of Carroll County falls in the Triassic Uplands sub-province. This sub-province derives its name from the unique, Triassic-aged (250-million-year-old) sedimentary rocks found there. Topography in this area is more subdued than that found in the eastern portion of the county.

The most prominent physiographic feature in Carroll County is the Parrs Ridge/Dug Hill Ridge topographic high which trends northeast-southwest and bisects Carroll County, separating the Piedmont Uplands into eastern and western divisions. Low and often broad valleys are formed in the easily weathered carbonate rocks of Carroll County. Carbonate rocks also exist as lenses and stringers, which may be mixed with other metamorphic rock types. Stream segments, generally straight for short distances, follow closely the joints and fractures in the bedrock systems, which represent zones of relative weakness.

10.2 Geology

Carroll County is underlain by rocks of the easternmost Appalachian Mountain system. Sedimentary, igneous, and metamorphic rocks of diverse lithology, complex structure, and ages ranging from Precambrian to Triassic are found here. The distribution of these rock types reflects a complicated geologic history, shaped by numerous orogeny's (mountain-building events) and millennia of erosion.

The majority of Carroll County is underlain by metamorphosed sedimentary and volcanic rocks overlain by a thick mantle of unconsolidated weathered material (saprolite). The general structural trend of Carroll County is northeast to southwest, reflecting general regional strike. The grade of metamorphism, that is the general grain size of the rocks, increases perpendicular to strike, from northwest to southeast. Slates and phyllites are exposed near the northwesternmost outcrop area of the Piedmont Uplands near the Pennsylvania state line and Blacks Corner. These phyllites and slates (very fine to fine-grained metamorphic rocks) grade gradually to phyllites and fine-graded schists in the central portion of Carroll County, and finally to coarser schists and gneisses in the southeastern portion of the county near Sykesville, as the core of the Ancient Appalachians is approached. The Precambrian Baltimore gneiss is the oldest rock type found in Carroll County and is generally interpreted as representing the central core of the Appalachian system.

These rocks are tightly folded into anticlines and synclines with varying axes, with beds ranging in dip from horizontal to vertical. Faults are very numerous, but the lack of rock outcrops limits their mapping and hinders structural interpretation. Joints and fractures are common throughout the metamorphic rocks of Carroll County.

The remainder of Carroll County, the northwesternmost corner, is underlain by much younger Triassic-aged sedimentary rocks which form the Triassic Uplands. These are consolidated alluvial deposits of the New Oxford Formation. They generally become coarser textured east and southeastward from the Carroll County/Frederick County line, grading from shale to siltstone, and sandstone, to the ancient metamorphic rocks. These Triassic rock strata have a gentle west and northwest dip, and generally trend northeast just north of Union Bridge, and gradually bend to the north as the Pennsylvania line is approached. These beds are cut by a few large and numerous small faults and have well-developed joint and fracture systems.

10.3 Hydrogeology and Groundwater Resources

The vast majority of groundwater in Carroll County occurs in the upper 500 feet of the earth's crust. Rocks in this zone are by no means totally solid. All rock types have been subjected to various earth stresses, which have created a network of fracture systems which often extend to great depths. This rock system in Carroll County has been subjected to a great amount of weathering and erosion, which has created an upper weathered zone referred to as saprolite. The deepest weathered zones are found in areas along pre-existing fractures. This combination of the weathered zone and underlying fractured rock system constitutes the geologic "environment" in which groundwater occurs.

There are three distinct aquifer types in Carroll County which may be delineated from a groundwater resource development standpoint. These are the saprolite aquifer, carbonate rock aquifer, and Triassic rock aquifer. Groundwater development strategies in these aquifers is unique and must be addressed as such.

The saprolite aquifer underlies the majority of the County. It occurs over all of the non-carbonate metamorphic rock in the county, and is the sole source aquifer for Mount Airy, Hampstead, Manchester, and the Freedom District, and a partial source for New Windsor and Westminster. This is a hybrid aquifer from which high-yielding water supplies have not traditionally been developed, though unusually productive wells were drilled and developed in the Freedom District and portions of Mount Airy. The carbonate rock aquifer underlies limited portions of New Windsor, Union Bridge, and Westminster, and is the most productive and environmentally sensitive aquifer type in Carroll County. It is the sole source for Union Bridge and a partial source for New Windsor and Westminster. The Triassic rock aquifer underlies the northwestern portion of the county and provides all the potable water needs for Taneytown.

Groundwater in the metamorphic rocks of the Maryland Piedmont is transmitted primarily in joints, fractures, and bedding planes in bedrock, and along the saprolite/bedrock interface. The size, number, and openness of fractures naturally determines the rate and amount of groundwater transmitted through them. In coarser grained schists and gneisses, which are often very competent, fractures are generally narrower but remain open to relatively great depths. Water bearing fractures may occur to depths exceeding 500 feet. In finer grained phyllites, deep fracturing may occur less frequently due to the softness of these rocks. The discreteness of fracturing makes possible the development of very high yielding wells completely in fractured zones directly adjacent to "dry holes" not tapping such fractures.

In soluble carbonate rocks, fractures may be greatly enlarged by solution, although they are characteristically filled with a significant amount of insoluble residual material, usually silts and clays. Carbonate rock well yields may be quite large but may also be prone to creating sinkholes in the overlying soils. Therefore, determining optimal well production to reduce the creation of sinkholes becomes necessary. This aquifer type is also susceptible to an increased risk of pollutants due to the rapid movement of groundwater, and the creation of open pathways from the surface into the groundwater system via sinkholes.

Groundwater occurs in a somewhat different fashion in the Triassic rocks underlying the Taneytown region. Groundwater is primarily stored and transmitted along rock layers (bedding plane partings), joints, fractures, and faults. The weathered zone over these rocks is generally quite thin, and the water table is usually below this zone, in the fractured bedrock.

The layered nature of the Triassic rocks, with permeable sandstone sandwiched between less permeable shales, dipping at relatively low angles, creates a multi-aquifer system. Each competent, fractured sandstone/siltstone bed may respond as a single aquifer when it occurs between shale layers on local scale. Fracture zones often connect various beds vertically, creating the aquifer system.

11.0 Future Additional Water Demand & Capacity Based on Existing Planned Growth

11.1 Capacity & Demand Methodology

To identify water supply and capacity needs, **current** (2023) service capacity must be determined. Guidance published by MDE, Guidance Document: *Water Supply Capacity Management Plans* (WSCMP) (2006), provides a methodology for determining the net available capacity of existing water supplies.

This remaining net available capacity, along with any additional capacity available from new water sources or expansion of existing sources, can then be used to develop an estimate of the approximate number of additional households and associated non-residential water demand that can potentially be served.

Data was collected for each of the public water systems owned or operated by Carroll County or a municipality. MDE's Water Supply Capacity Management Plan Worksheet, along with MDE's Guidance Document: *Water Supply Capacity Management Plans* (Revised 2013) was used as a template and guide for collecting this data. A Capacity and Demand (C&D) Workbook was prepared for each of these eight systems to capture a snapshot of the **current** (2023) capacity and projected demand, based on **existing** adopted zoning, ordinances, and policies in place in 2022.

The Average Annual Daily Demand was based on data collected through either calendar year 2021 or 2022 (some systems updated data at the end of 2022 after the initial data collection for 2021). The appropriate data was collected for each system to determine the existing water demand. For efficiency and productivity, 2023 data was used for the C&D Workbooks and water supply information, so the process could continue without constant changing of data.

For a standard WSCMP submission, the WSCMP worksheet requests information on potential additional water demand for approved (but undeveloped) subdivision lots and issued building permits. However, for the purposes of the WRE, the potential demand was based on all of the potential residential units (lots), regardless of development status.

Potential additional residential demand was initially estimated based on the County's BLI data. Within the W-1 Existing/Final Planning, W-3 Priority, and W-5 Future Water Service Areas (WSAs), the potential additional residential lots were based on the 2022 zoning. These were the required categories shown on MDE's worksheet.

The MDE WSCMP worksheets did not address demand that would be generated by areas within the DGA that are not currently within the planned WSA. A portion of this additional demand, however, was evaluated as part of Carroll County's WRE process. Future demand for water from development in the Long-Range WSAs that fall within the County's DGAs but not within a planned WSA was estimated for the WRE and included in the C&D Workbooks. The Long-Range WSAs represent areas that are planned to be served long term but not within the 10-year planning horizon of the *Water & Sewer Master Plan*. This service area is used by Carroll County for planning purposes but is not a service area required by MDE within water & sewer master plans.

Potential additional residential lots were used to estimate the future residential demand for water. It was assumed that the total number of additional residences that could be served would consume 250 gallons per day (gpd) per household/lot, which is MDE's standard rate for residential water demand projections.

To arrive at future non-residential demand, areas with adopted 2022 zoning of Commercial, Industrial, and Employment Campus were reviewed. The buildable acreage of unimproved land was also estimated. Buildable acreage excludes wetlands and floodplains. Developed but not yet served acreage was added to buildable acreage to get a total acreage on which future demand was calculated. The combination of acreage from these two types of commercial land was multiplied by 700 gallons per acre per day. Industrial acreage was multiplied by 800 gallons per acre per day (based on MDE guidance and the *Water & Sewer Master Plan*).

For consistency, the potential future residential lots and commercial and industrial acreage to estimate future demand were the same numbers used for the 2023 *Water & Sewer Master Plan*.

For Hampstead and Mount Airy, numbers for residential, commercial, and industrial demand were modified by the municipality rather than strictly using the BLI data.

Additionally, Mount Airy capacity and demand numbers may not match the BLI estimates, as the County does not have BLI information for the portion of Mount Airy that lies within Frederick County. Therefore, where this is a factor in estimating figures used in these analyses, the Town used their own calculations to capture its entire area.

To determine the capacity of the water supply system, the best available data were collected for each municipal system. The estimated excess water supply capacity available for allocation was determined through a series of formulas identified on MDE's worksheets.

Additional demand is not expected for any of the smaller water systems in the county, such as Pleasant Valley and Bark Hill. These systems were designed to address a specific problem and were not intended to accommodate additional growth. The areas in which these small systems are located are not considered DGAs. Therefore, per guidance from MDE, these systems were not included in the analysis of future water supply needs.

11.2 Future Water Supply Demand Outside WSAs

11.2.2 Rural Areas

For the area of the county that lies outside the DGAs, according to the Carroll County *2022 Planning Annual Report*, it is estimated that 8,320 additional residential lots could be developed, along with 680 acres of developable non-residential land. Based on this amount of future development, an estimated 2,080,000 gpd of additional water demand would be generated by residential development and an estimated additional water demand of 476,000 gpd from non-residential development. In total, the county's rural areas are estimated to generate an average of 2,556,000 gpd of additional water usage.

While the Finksburg area is more urbanized than is typically found in rural areas, it is included in the analysis for rural areas, given that it lacks community water and sewer facilities.

[Note: These estimates were calculated using data based on 2022 zoning only.]

11.2.3 Agricultural Use

As of the 2022 Agriculture Census, agriculture and its associated support businesses are the leading economic generator in Carroll County. The County ranks 11th in the State in total value of agricultural products sold. The county has approximately 130,195 acres in farmland, with an average farm size of 110 acres and median farm size of 29 acres. Cropland comprises approximately 70% of total farmland. The county ranks within the top 5 in the state regarding the livestock categories for cattle and calves, milk from cows, and sheep, goats, wool, mohair, and milk.

The U.S. Geological Survey (USGS) provides data on estimated water use. According to the 2015 data, agricultural operations in Carroll County devoted an estimated 1,930 acres to irrigation and consumed an estimated 210,000 gpd through irrigation withdrawals. An estimated 460,000 gpd were withdrawn for livestock operations. In total, agricultural uses consumed an estimated 2,180,000 gallons of water per day in 2015. (*https://waterdata.usgs.gov/md/nwis/water_use?format=html_table&rdb_compression=file&wu_area=County&wu_year=2015&wu_county=013&wu_category=LI&wu_county_nms=Carroll%2BCounty&wu_category_nms=Livestock*)

Carroll County anticipates that growth in water use for agricultural purposes will be minimal, projecting an increase in the range of one to two percent.

11.3 Municipal Systems & Designated Growth Areas

The following table – **Future Water Demand by Service Category for Each Designated Growth Area at Buildout of 2023 Water Service Area** – provides estimated future water demand, broken out by planned WSA, for each of the major community (public) water supply systems that operate in the county. "2023 Demand" represents actual water usage by residents, businesses, and industries. Demand is measured as the average number of gallons consumed per day. Infill Demand represents areas with the Existing WSA that are not yet served, while Future Demand includes the Priority and Future WSAs combined. For purposes of this plan document, properties that are currently designated in the Long-Range WSA are shown under Long-Range Demand, are located within the DGA boundary, and are assumed to be served in the long term. There may be properties within the DGA that are not planned for service; these properties have not been included in projected demand for public water supply.

Future Water Demand by *Service Category* for Each Designated Growth Area at Buildout of 2023 Water Service Area

(Gallons per Day)

Community	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Freedom/Sykesville	1,877,200	672,311	369,027	6,000	2,924,538
Hampstead[4]	343,593	114,583	288,022	53,987	800,185
Manchester	277,096	99,087	44,928	4,210	425,322
Mount Airy	703,534	60,394	275,700	102,000	1,141,628
New Windsor	97,481	60,436	26,679	40,619	225,215
Taneytown	384,915	127,124	27,547	234,623	774,209
Union Bridge	85,135	43,126	45,750	287,804	461,815
Westminster	2,361,296	524,832	290,362	0	3,176,489
Countywide Total	***6,130,250***	***1,701,893***	***1,368,015***	***729,243***	***9,929,401***

[1] These data are the greatest annual average daily demand for the 5-year period from either 2017 through 2021 or 2018 through 2022.

[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.

[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.

[4] Calculations for future water demand used the capacity & demand (C&D) data. This demand is reflected under "Infill Demand." However, the C&D data do not account for additional demand that would occur within the balance of the growth area that is designated in the "No Planned Water Service Area."

Source: WRE Capacity & Demand Workbook, 2023

The following table – **Future Water Demand by Land Use for Each Designated Growth Area at Buildout of 2023 Water Service Area** – presents the same water demand estimates as the preceding table, except that demand is categorized by type of land use – residential and non-residential.

Future Water Demand by *Land Use* for Each Designated Growth Area
at Buildout of 2023 Water Service Area
(Gallons per Day)

Community	2023 Existing Demand[1]	Additional Demand[2] by Land Use		Total Demand
		Residential	Non-Residential	
Freedom/Sykesville	1,877,200	608,750	438,588	2,924,538
Hampstead	343,593	181,000	275,592	800,185
Manchester	277,096	124,500	23,726	425,322
Mount Airy	703,534	301,050	137,044	1,141,628
New Windsor	97,481	35,750	91,985	225,215
Taneytown	384,915	138,500	250,794	774,209
Union Bridge	85,135	193,500	183,180	461,815
Westminster	2,361,296	400,250	414,943	3,176,489
Countywide Total	***6,130,250***	***1,983,300***	***1,815,852***	***9,929,401***

[1] These data are the greatest annual average daily demand for the 5-year period from either 2017 through 2021 or 2018 through 2022.
[2] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.
Source: WRE Capacity & Demand Workbook, 2023

11.4 Annexation Areas within the Municipal Growth Elements

Portions of several of the DGAs are predominantly located outside the corporate limits of the municipality. Many of these areas also are outside the area planned for public water service within the horizon of the *Water & Sewer Master Plan*. Some of these areas are designated for “Long-Range” Service or “No Planned Service” in the *Carroll County Water & Sewer Master Plan*. While the Long-Range Service Area is not recognized by the MDE, these areas represent properties which the municipality/County plan to provide service beyond the 10-year *Water & Sewer Master Plan* horizon and are, therefore, included for planning purposes. Typically, these areas are planned to be served upon annexation. Other areas are designated as “No Planned Service,” because service is not planned for these properties, even though they are located within the DGA.

11.5 Countywide Demand

Total 2023 existing water demand for the eight municipal water supply systems is estimated to be ***6,130,250*** gpd. The additional projected demand from areas *within* a WSA but not yet served is ***3,799,152*** gpd, which accounts for drought demand. Total future water demand would be estimated at ***9,929,402*** gpd for the eight municipal systems.

The combined additional residential and non-residential water demand for the balance of the county (i.e., the rural area *outside* the various WSAs) that would be generated by future development is estimated to be ***1,272,650*** gpd. This represents 536,250 gpd for residential uses and 736,400 gpd for non-residential uses (at 700 gpd per acre).

An estimated ***1,066,400*** gpd of water were used for agricultural purposes, based on agricultural use related permits in MDE’s 2022 permit database for Carroll County. (There may be exempt users not reflected in this figure.)

Given the above estimates for future water demand throughout the county, both within and outside of the DGAs, total additional water demand is estimated to be ***12,268,452*** gpd.

12.0 Current Capacity

The municipal water supply systems serve the populations in the DGAs. Combined, existing usage (average daily demand) totaled 6,109,436 gpd countywide. Residential population served by these systems countywide was about 92,756. The following table indicates the existing usage based on 5-year average annual daily demand from 2017-2021 or 2018-2022, depending on the system, and the population estimated to be served, based on Water Supply Capacity & Demand (C&D) workbook data.

2023 Existing Demands* and Residential Population Served

Municipal System	Existing Usage*	Population Served
Freedom/Sykesville	1,877,200	26,032
Hampstead	343,593	6,281
Manchester	277,096	5,427
Mount Airy	703,534	9,873
New Windsor	97,481	1,717
Taneytown	384,915	7,234
Union Bridge	85,135	936
Westminster	2,361,296	35,256
Totals	***6,130,250***	***92,756***

Source: Water Supply Capacity & Demand Workbooks, 2023.
**Existing Usage/Demand is based on a 5-year average, either 2017-2021 or 2018-2022.*

The following table – **Water Supply Capacity Available for Existing and Future Growth for Each Designated Growth Area at Buildout of 2023 Water Service Area** – is a snapshot in time of the capacity of each water supply system in the county, based on 2021-2023 data in the C&D Workbooks. The net average day capacity available at buildout indicates the amount of additional capacity that would be needed to meet projected demand at full buildout of the water service areas. The water service areas are based on the 2023 *Water & Sewer Master Plan*. Capacity gained from planned improvements included in either a municipality's capital improvement program or in the 2023 *Water & Sewer Master Plan* would not be reflected in this figure.

To arrive at the net average day capacity available at buildout (of the Water Service Areas), the combined total of existing flows plus the sum of the capacity needed for infill, future, and long-range service ("Unserved Demand") is subtracted from the remaining capacity. If the remaining capacity is a negative number, the total unserved demand adds to that negative number to determine the net average day capacity available at buildout.

Water Supply Capacity Available for Existing and Future Growth for Each Designated Growth Area at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current: 2023 Permitted	Current: Avg Day Capacity Limitation	Current: Avg Day Drought Demand[1]	Remaining Capacity	Unserved Demand Water Service Areas[2]	Net Avg Day Capacity Available at Buildout
Freedom/Sykesville	4,427,000	4,000,000	2,064,920	1,935,080	1,047,337	887,743
Hampstead	630,000	543,120	377,953	165,167	456,592	(291,425)
Manchester	581,000	403,200	316,466	86,734	148,226	(61,493)
Mount Airy	927,000	927,000	787,958	139,042	438,094	(299,052)
New Windsor	196,100	70,000	107,229	(37,229)	127,735	(164,954)
Taneytown	552,100	457,103	423,407	33,696	389,294	(355,598)
Union Bridge	208,300	100,800	93,649	7,151	376,681	(369,530)
Westminster	3,824,000	2,750,000	2,597,426	152,574	815,193	(662,619)
Totals	***11,345,500***	***9,251,223***	***6,769,008***	***2,482,215***	***3,799,152***	***(1,316,928)***

[1] *Average Day Demand here includes an additional 10% for drought demand.*

[2] *These data relate to areas located within the designated planned water service area. This includes infill (unserved in "Existing/Final Planning" service category, as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.*

Source: 2023 Capacity & Demand Workbooks

13.0 MDE Source Water Assessments within DGAs

"Source water is water from rivers, streams, reservoirs, and aquifers that is treated and used for drinking water purposes. A source water assessment is a process for evaluating a public water system's source water and assessing its vulnerability to contamination. The assessment does not address the treatment processes, or the storage and distribution aspects of the water system, which are covered under separate provisions of the Safe Drinking Water Act. A source water protection program is intended to add an extra layer of protection by ensuring that the water entering a public water system is as safe as possible. Preventing contamination at the drinking water source protects public health and makes good economic sense."

"Groundwater is the most commonly used source of water supply. In Maryland, groundwater is obtained from both unconfined and confined aquifers. Confined aquifers are more protected from contamination than are unconfined aquifers. In [most of] Central Maryland, the aquifers are unconfined."

"Source water assessments conducted in Maryland indicate that the most common potential sources of contamination for systems in unconfined aquifers are underground storage tanks, service stations, dry cleaners, onsite septic systems, and agriculture. Volatile organic compounds and nitrates were the most common contaminants found in these water supplies, although microbiological pathogens were found in some wells located in limestone areas of Central and Western Maryland. Some of the systems that are in deeper confined aquifers were found to be susceptible to naturally occurring contaminants like arsenic, fluoride, and radium, but were not found to be susceptible to contaminants originating from local land use activity."

"In Maryland, about 10% of the community water systems (around 50 systems) rely on surface water, yet these surface water systems serve about 80% of the population using public water systems. Protecting a surface water source involves protecting the entire watershed, which can be relatively small (less than one square mile) to very large."

"Agricultural activities and urban development were the most prevalent sources of contaminants for surface water systems. Contaminants from agricultural land include nutrients and microbial pathogens. Excessive erosion (sediment) and de-icing compounds were contaminants of concern from runoff in developed areas. The discharge of treated wastewater and risks from overflowing sewage collection systems upstream of intakes were noted as a significant source of contaminants in some watersheds. Sources relying on river intakes are more susceptible to elevated levels of fecal contamination and turbidity following rain, while sources using reservoirs were more susceptible to eutrophication from phosphorus. Major roads, rail lines, and pipeline crossings presented the potential for spills above some intakes." *(Source: MDE. "Maryland's Source Water Assessment Program." Website: https://mde.maryland.gov/programs/water/water_supply/source_water_assessment_program/pages/factsheet.aspx#:~:text=Maryland%20has%20about%20than%203%2C653%20public%20water%20systems. May 2024.)*

The MDE completed most of the Source Water Assessments (SWAs) described herein between 2000 and 2005. In 2013, S.S. Papadopulos and Associates, Inc. was engaged by the MDE to complete a SWA for the City of Westminster's groundwater supply sources. Except as noted, wellhead protection areas (or source water assessment areas) included in the SWAs were delineated by the Carroll County Bureau of Resource Management using US EPA-approved methodologies. Information on water sources has been updated to reflect conditions as of 2023.

13.1 Freedom-Sykesville

Water is provided from both surface and groundwater sources in the Freedom Designated Growth Area (DGA), which serves the Freedom area, including the Town of Sykesville. The unconfined fractured rock aquifer in the Sykesville Formation is the source of groundwater supply for the Freedom DGA. This system is comprised of nine permitted groundwater supply wells, only three (Fairhaven, RC-1, and RC-2) of which have been connected to the water system. The Fairhaven well is located within the Piney Run Watershed. The Raincliffe wells are approximately 0.6 mile south of the Fairhaven well and were drilled to approximately 500 feet. The Freedom DGA groundwater supply is susceptible to volatile organic compounds (VOCs) and radionuclides, but not susceptible to synthetic organic compounds (SOCs), nitrates, other regulated inorganic compounds, or microbiological contaminants. The RC-1, RC-2, and Fairhaven wells were offline as of 2024.

Carroll County owns a water treatment plant (WTP) on the western shore of Liberty Reservoir. The reservoir was constructed in 1954 on the North Branch of the Patapsco River and is owned by Baltimore City. Carroll County, under agreement with Baltimore City, purchases raw water from this source. The treatment plant was expanded and now has a treatment capacity greater than 4 mgd (million gallons per day).

Per the April 2003 Liberty Reservoir Watershed Assessment completed by Gannett Fleming, Inc., potential sources of contamination for the Liberty Reservoir include point and non-point sources, including industrial sites, transportation (e.g., highways), a railroad, a petroleum product pipeline, agriculture, and septic tanks in rural portions of the watershed. The majority of point sources are located in the North Branch and Liberty subwatersheds.

The City of Baltimore maintains an extensive water quality monitoring program for Liberty Reservoir and its tributaries, as well as the Ashburton Water Filtration Plant. Routine sampling is performed at the City's water treatment plant, six tributaries of Liberty Reservoir, and four in-reservoir locations in an effort to monitor and improve the water quality conditions of the Liberty Reservoir water supply.

13.2 Hampstead

The unconfined fractured rock aquifer in the Prettyboy Schist and Gillis Group (phyllitic to schistose, and sometimes called the Marburg Formation) is the source of Hampstead's water supply, which as of 2024, is comprised of 21 groundwater wells. Of the 21 wells, 14 are routinely utilized. Two unused wells have historically had elevated nitrate concentrations, and the Town plans to incorporate these two wells into one of three new centralized water treatment plants in the coming years. Two other wells that are now unused were taken offline in late 2020 due to elevated per- and polyfluoroalkyl substances (PFAS) concentrations. The remaining offline wells exhibit elevated turbidity, iron, and/or manganese concentrations and are unused for these reasons.

As of the October 2002 MDE Source Water Assessment, all of Hampstead's wells were determined susceptible to contamination by nitrates, VOCs, SOCs, and radionuclides, but not to other inorganic compounds. Hampstead's wells were determined not to be susceptible to protozoans, but four wells were identified as susceptible to total coliform. The MDE assessment was completed when the Town's supply consisted of fourteen wells, though not all of those relied upon in 2002 were being utilized as of 2024.

13.3 Manchester

The unconfined fractured rock aquifer in the Marburg Formation is the source of water supply for the Town of Manchester.

As of the January 2004 MDE Source Water Assessment, all of Manchester's wells were determined susceptible to contamination by nitrates and VOCs, but not to SOCs, radionuclides, or other inorganic compounds. None of Manchester's water supply sources were determined susceptible to protozoan contamination, except for the Walnut Street well and Crossroads Well 1. In addition, the Bachman Road, Patricia Court, and Walnut Street wells were determined susceptible to total coliform. The 2004 MDE assessment was completed when the Town's supply consisted of only 17 groundwater wells and two springs. There has been no additional identification of contamination since that time, with the exception of the Walnut Street spring, which had coliform. The Huppman spring is no longer tied into the system.

As of 2024, the system included 19 groundwater wells, though not all of these sources were utilized to obtain the Town's drinking water. The Patricia Court well is temporarily offline until per- and polyfluoroalkyl substances (PFAS) treatment is installed. The Walnut Street spring is offline but could be incorporated back into the system if adequate treatment was installed. System operators have indicated that the Bachman Road and Patricia Court wells have not had a positive coliform detection since the 2004 MDE source water assessment was completed.

13.4 Mount Airy

The unconfined fractured rock aquifer within the Ijamsville Formation and Marburg Schist is the source of water supply for the Town of Mount Airy. As of 2024, the system uses 11 wells to obtain its drinking water. As of the September 2000 MDE Source Water Assessment, the Mount Airy water supply was determined to be susceptible to contamination by nitrates, VOCs (except one well), SOCs, and radionuclides, but not susceptible to protozoans. Further, two of the wells (Nos. 2 & 7) were determined to be susceptible to bacteria and viruses. The MDE assessment was completed when the Town's supply consisted of seven active wells and one standby well, all of which were being utilized in 2024.

13.5 New Windsor

The Town of New Windsor relies upon groundwater for its potable supply. The unconfined fractured rock aquifer within the Wakefield Marble, Sam's Creek Formation, Marburg Formation, and Ijamsville Phyllite provides the source of water supply for the Town. While six sources are included in water appropriation permits (4 wells and 2 springs), only three groundwater wells and one spring were actively being utilized in 2024. One permitted groundwater well could be connected to a large transmission main originating from Main Spring Farm, while the unutilized spring was determined groundwater under the influence of surface water (GWUDI) and would require advanced treatment for bacteriologicals in accordance with the Surface Water Treatment Rule.

The Hillside wellfield consists of two wells completed in the phyllite (and possibly Silver Run Limestone), while the Main Spring system is located near a geologic contact between the Sam's Creek and Marburg Formations, where a unit of Wakefield Marble also exists. The Denning's Well is located upgradient of the Main Spring and is completed in the Marburg Formation. As of the February 2001 MDE Source Water Assessment, the Hillside wells were determined to be susceptible to contamination from VOCs associated with commercial enterprises, as well as radionuclides. The Main Spring system was determined to be susceptible to contamination by nitrates, viruses, and bacteria associated with surface sources.

As of 2024, the Town was working with MDE to seek incorporation of the Atlee well into the water supply system. If approved after MDE required aquifer and water quality testing, the well would be added to the Town's existing appropriation permit for the two Hillside wells. The Town's other groundwater appropriation permit lists the Dennings Well, MSF-5, Main Spring, and Roop's Meadow Spring. For well MSF-5 to remain on that second groundwater appropriation permit, MDE will require the Town to connect that well to the water supply system, secure a certificate of potability, and keep the well capable of operation. The Town was also evaluating several potential groundwater supply development projects within and near Town in order to provide redundant water supply capacity, particularly while the Town considers options for rehabilitation of the long-serving approximately 3.5-mile water transmission line that provides water from Main Spring Farm and the Dennings Well to the Town.

13.6 Taneytown

The unconfined fractured rock aquifer in the New Oxford Formation is the source of water supply for the City of Taneytown system, which is comprised of five wells in the Piney Creek drainage area and three wells in the Big Pipe Creek drainage area. Two other additional wells exist in the city; one was taken offline due to VOC contamination, and the other was previously taken out of service.

As of the October 2000 MDE Source Water Assessment, the water supply for Taneytown was determined to be susceptible to contamination by nitrates, VOCs, and radionuclides, but it was not determined to be susceptible to SOCs. Well No. 12 was also determined to be susceptible to bacteria, based on raw water sampling. As of 2024, Well No. 11, which is located in the Piney Creek watershed, was offline due to elevated PFAS concentrations.

13.7 Union Bridge

The unconfined fractured rock aquifer in the Wakefield Marble is the source of water for the Town of Union Bridge. As of 2024, the system uses two wells (Locust and Whyte Street) to obtain its drinking water. As of the June 2005 MDE Source Water Assessment, all water supply sources for Union Bridge were determined to be susceptible to contamination by nitrates and protozoans. The water supply was not determined to be susceptible to organic compounds, radionuclides, or other inorganic compounds.

13.8 Westminster

The City of Westminster relies upon both ground and surface water for its potable supply. The unconfined fractured rock aquifer within the Wakefield Marble, Sam's Creek Formation, Marburg Formation, Ijamsville Phyllite, and Wissahickon Formation (with some of these formation names since reclassified and incorporated into the Sam's Creek, Marburg, and Prettyboy Groups) provide the source of water supply for 15 groundwater wells. Of the 15 wells, only 12 were routinely relied upon for potable supply in 2024. Two wells are unused, and another is used for stream augmentation purposes only. Four of the City's wells are completed in the Wakefield Marble, though at least one other well is completed within a carbonate rock unit classified as part of the Sam's Creek Formation. The remaining wells are within the other various crystalline bedrock formations.

The City also withdraws water from the Cranberry Run Reservoir. The Source Water Assessment (SWA) area was delineated by a consultant in accordance with the 1999 MDE SWAP guidance document. A January 2004 SWA completed by the MDE for the City's surface water source indicated that nutrient enrichment, sedimentation, and contamination by pathogenic organisms were the major concerns at that time. Cranberry Branch was determined to be susceptible to nitrate contamination, and the MDE indicated that the surface supply was "particularly susceptible to contamination by protozoa, as demonstrated by the high fecal concentration." While the surface water source wasn't susceptible to SOCs based on a review of water quality, the MDE indicated that intakes were susceptible to spills of such compounds. The water system was determined to be susceptible to disinfection byproducts (DBPs), which are formed by the chlorination of organic matter.

In October 2013, S.S. Papadopulos & Associates Inc., completed a Source Water Protection Plan (a step beyond a SWA) for the City of Westminster's groundwater supply sources. The October 2013 report referenced a 2005 SWA completed by Advanced Land and Water, Inc. (ALWI) for the groundwater supply sources; that report found that most of the City's wells were susceptible to nitrate. The October 2013 report concluded that the City's "groundwater and surface water sources are potentially susceptible to surface contamination, including VOCs, IOCs and SOCs".

14.0 Water Balance – Supply Available for Consumption

A water balance assessment was completed to help identify 'untapped' water supplies that might be available for consumption. In assessing available water supply, both groundwater and surface water were evaluated and pertinent inputs and outputs to the hydrologic system were considered. Total estimated water availability for each watershed was determined.

14.1 Methodology

The water balance methodology is based on the approach outlined in Maryland's June 2007 Water Resources Element of the Comprehensive Plan – Guidance Document (M&G #26*)* and detailed in MDE's May 2006 *An Evaluation of the Water Resources in the Catoctin Creek Watershed*. MDE's Catoctin Creek report did not include a comprehensive discussion of all source data and methods used in the analyses. Therefore, specific assumptions and changes were made in developing methodology which may differ somewhat from MDE's approach. A few notable exceptions to the methodology were made. The recharge from septic systems, as well as water returned to the system from wastewater discharge, was counted toward the available water. In addition, the impact of agricultural water demand also was considered. Also, newer and/or County-specific datasets are incorporated into this analysis. The list of noteworthy differences in methods (or more detailed method specifications) is as follows:

1. Self-supplied residential water demands are estimated based on the number of existing households (not served by public water) in the current address database provided by the County. It is assumed that the water demands for all households outside of the service areas are self-supplied by onsite individual groundwater wells and that each household consists of a single family with an average day water demand of 250 gpd, following MDE planning guidance. Households from the County address database are used as the basis for self-supplied residential demands, as the Census data may not be as representative of the current population and location.

2. The methodology incorporates septic returns to groundwater to determine the final groundwater availability. These returns are included because a significant portion of the groundwater demands are returned via septic systems. While some failures in septic systems may occur in the future, it is anticipated that the majority of systems will continue to operate and return significant quantities of water as the county grows. Based on 2015 United States Geological Survey (USGS) water use data (USGS, 2015), the average return rate assumed for domestic use is approximately 80%. The County's intent to incorporate septic-based recharge of

the aquifer system was discussed with MDE with the 2009 Malcom Pirnie study prior to moving forward.

3. Future demands for serviced and self-supplied residences are evaluated based on the number of additional households estimated at buildout in the County's BLI. The BLI data used in this analysis was developed in 2022 by the County's Department of Planning & Land Management and provides a reasonable estimate of the remaining locations in the county where a building permit would likely or potentially be issued according to the BLI's analysis of geospatial constraints, such as zoning, avoidance of floodplains, and other factors that may limit development. The BLI is considered to constitute the best source of available data representing potential future development through the planning horizon, while also providing the spatial resolution necessary for analyses at the subwatershed level.

4. The analysis of surface water availability included in the Carroll County analysis was generally based on MDE's approach in the Catoctin Creek analysis. However, MDE did not explicitly describe its methodology for determining the storage-safe yield curves. For the purposes of the 2024 WRE methodology, equivalent storage-safe yield curves are developed for each subwatershed using the worst drought on record for the gauges used in the groundwater availability calculations.

Malcolm Pirnie prepared a detailed report titled *Carroll County Water Demands and Availability,* dated July 30, 2009, on methods and results for completing water balance assessments for 8-digit watersheds in Carroll County. More detailed information can be found in the report updated by Hazen, *WRE Update: Carroll County Water Demands and Availability*, dated May 21, 2024.

14.2 Water Balance Assessment by Watershed

The following tables and graphs compare by watershed the average use, maximum permitted, and buildout water demands, returns, and availability. "Average use" was estimated using MDE permitted *daily average* water appropriations in 2022 for users who withdrew more than 10,000 gpd. For residential self-supply through private groundwater wells, or non-residential users who do not require an MDE appropriation permit, existing water use was estimated using MDE's planning water use assumptions (250 gpd/household). "Maximum Permitted" refers to the maximum withdrawals permitted from the month of maximum use for groundwater, or the maximum daily use for surface water, based on MDE appropriations. The month of maximum use is the greatest amount that can be withdrawn from a well over the course of a month, whereas the max daily use is the highest amount of water that can be taken from a surface water source within a single day. However, with both permit types, permittees still need to adhere to their annual average use appropriation. "Buildout," for purposes of this particular analysis, was based on projected water demand (average day) for all areas within Existing/Final, Priority, Future, and Long-Range Water Service Areas in the 2023 *Water & Sewer Master Plan*. All data are reported in gallons per day, with the exception of the surface water storage figures. These figures represent total storage capacity in millions of gallons (mgal).

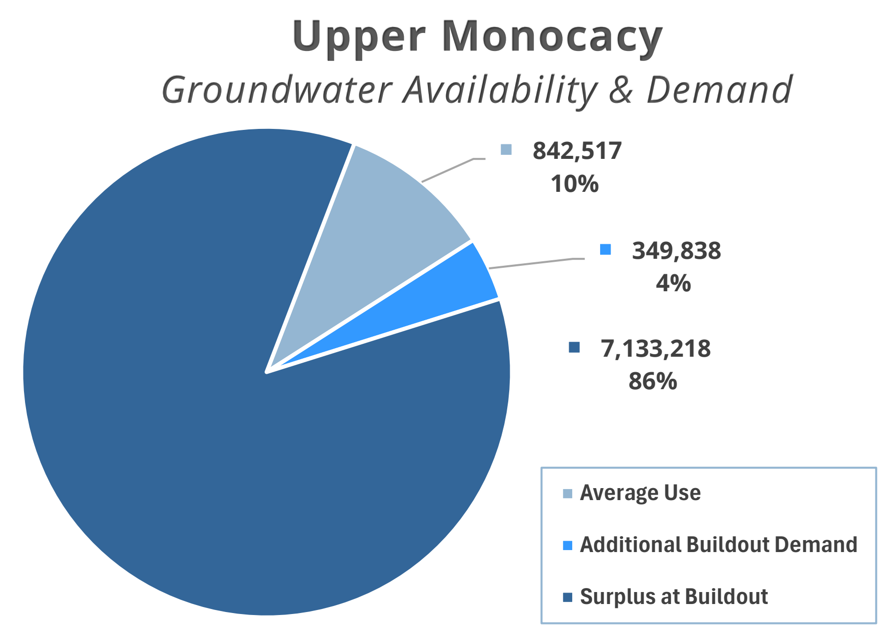
The analysis focused on returns from WWTPs, NPDES permitted facilities, quarries, and residential and non-residential septic systems. The returns for each are reflected in the following tables.

In the following **Water Balance Assessment Results Summary** tables, the groundwater demand less septic returns equals the difference between the available groundwater and groundwater surplus. (GW Demands – Septic Returns = GW Availability – GW Surplus). In addition, it should be noted that buildout demand was apportioned to the watershed in which the demand originates. Therefore, the buildout figure is less than the permitted figure for surface water. Many of the DGAs, however, are split between two or more watersheds. In this case, demand in a given watershed could be served by water that originated from another watershed.

14.2.1 Upper Monocacy River Watershed

Upper Monocacy River

Given the present level of analysis, water resources in the Upper Monocacy River watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



Upper Monocacy River Watershed
Water Balance Assessment Results Summary

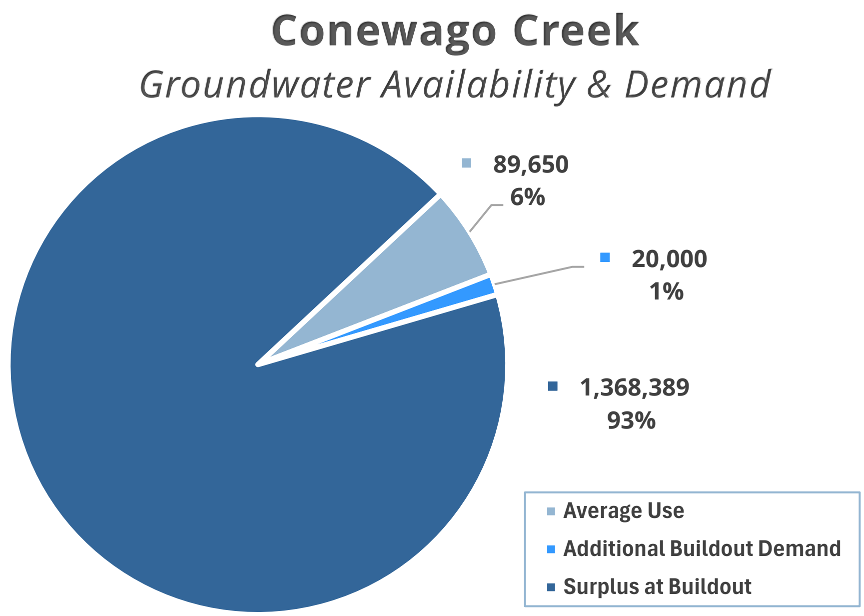
		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water	21,000	77,000	21,375
GW	Groundwater	842,517	1,578,650	1,192,355
	Total	***863,517***	***1,655,650***	***1,213,730***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	307,932	973,440	1,072,390
GW	Residential and Non-Residential Septic (gpd)	411,600	487,000	405,600
	Total	***719,532***	***1,460,440***	***1,477,990***
WATER RESOURCES				
SW	Flowby (gpd)	5,581,106	5,581,106	5,581,106
SW	Storage (mgal)	688	702	689
GW	Available Groundwater (gpd)	7,919,973	7,919,973	7,919,973
GW	Surplus Groundwater (gpd)	7,489,056	6,828,323	7,133,218

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.2 Conewago Creek Watershed

Conewago Creek

Groundwater availability in the Carroll County portion of Conewago watershed was estimated to be approximately 1.4 mgd. Therefore, given the present level of analysis, water resources in the Conewago Creek watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



Conewago Creek Watershed
Water Balance Assessment Results Summary

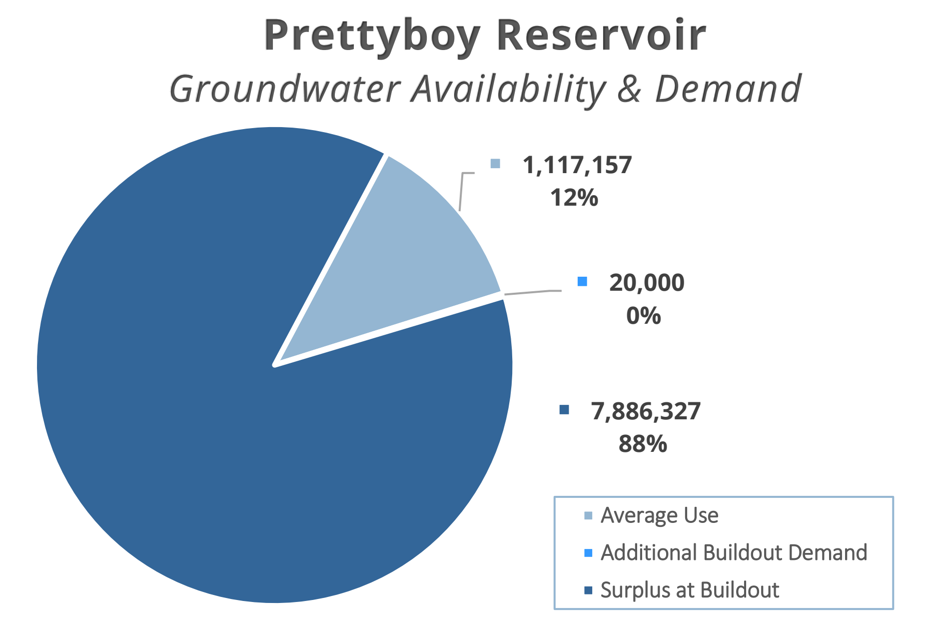
		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water	0	0	0
GW	Groundwater	89,650	92,750	109,650
	Total	***89,650***	***92,750***	***109,650***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	0	0	0
GW	Residential and Non-Residential Septic (gpd)	*69,800*	*69,800*	*85,800*
	Total	***69,800***	***69,800***	***85,800***
WATER RESOURCES				
SW	Flowby (gpd)	1,692,436	1,692,436	1,692,436
SW	Storage (mgal)	0	0	0
GW	Availability Groundwater (gpd)	1,392,239	1,392,239	1,392,239
GW	Surplus Groundwater (gpd)	1,372,389	1,369,289	1,368,389

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.3 Prettyboy Reservoir Watershed

Prettyboy Reservoir

Given the present level of analysis, water resources in the Prettyboy Reservoir watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



Prettyboy Reservoir Watershed
Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	10,100	40,400	10,100
GW	Groundwater (gpd)	1,117,157	1,888,700	1,517,729
	Total	***1,127,257***	***1,929,100***	***1,527,829***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	719	723	719
GW	Residential and Non-Residential Septic (gpd)	742,055	949,658	992,541
	Total	***889,518***	***1,405,840***	***1,358,352***
WATER RESOURCES				
SW	Flowby (gpd)	10,431,070	10,431,070	10,431,070
SW	Storage (mgal)	719	723	719
GW	Available Groundwater (gpd)	8,411,515	8,411,515	8,411,515
GW	Surplus Groundwater (gpd)	8,036,413	7,472,473	7,886,327

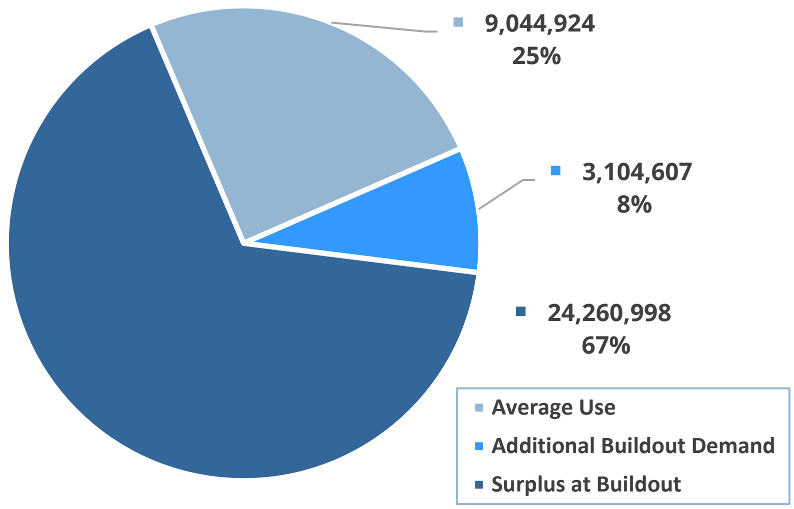
Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.4 Double Pipe Creek Watershed

Double Pipe Creek

Water returns in the watershed are largely comprised of permitted returns, such as municipal WWTP returns, quarry discharges, and NPDES MS4 facilities (5.3 mgd, 61%). Total returns are projected to increase from the existing rate of 8.7 mgd to a buildout rate of 12.2 mgd.

Given the present level of analysis, water resources in the Double Pipe Creek watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



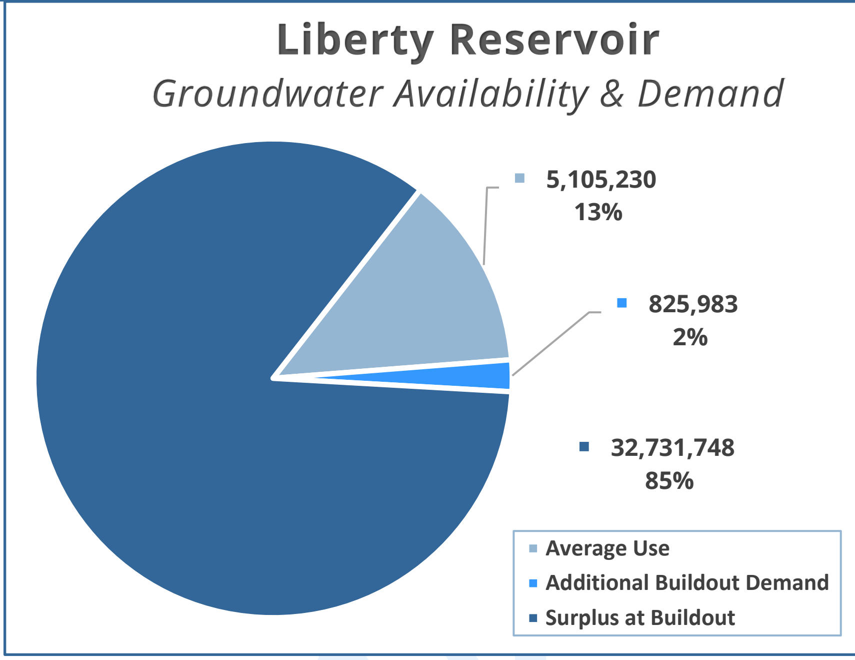
Double Pipe Creek Watershed
Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	783,400	5,784,200	1,168,952
GW	Groundwater (gpd)	9,044,924	17,091,750	12,149,531
	Total	***9,828,324***	***22,875,950***	***13,318,483***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	5,307,521	12,517,725	7,913,741
GW	Residential and Non-Residential Septic (gpd)	3,436,200	5,063,840	4,239,470
	Total	***8,743,721***	***17,581,565***	***12,153,211***
WATER RESOURCES				
SW	Flowby (gpd)	37,707,072	37,707,072	37,707,072
SW	Storage (mgal)	5,029	5,254	5,447
GW	Available Groundwater (gpd)	32,171,059	32,171,059	32,171,059
GW	Surplus Groundwater (gpd)	26,562.335	20,143,149	24,260,998

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.5 Liberty Reservoir Watershed

Liberty Reservoir



Water returns in the watershed are estimated to be 3.4 mgd and are almost completely comprised of septic returns and industry discharges. Currently, the only municipal discharge into the Liberty Reservoir Watershed is Hampstead WWTP through the BTR Hampstead Outfall 001A, which is only 50% of Hampstead's effluent. Westminster WSA has also acquired an MDE-issued reuse permit to return up to 0.5 mgd of treated effluent to Cranberry Reservoir as an indirect potable reuse source. Therefore, for the buildout scenario, returns were estimated to increase to 5.1 mgd, with 0.5 mgd assumed to always be WWTP discharge from Westminster. Given the present level of analysis, water resources in the Liberty Reservoir watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.

Liberty Reservoir Watershed
Water Balance Assessment Results Summary

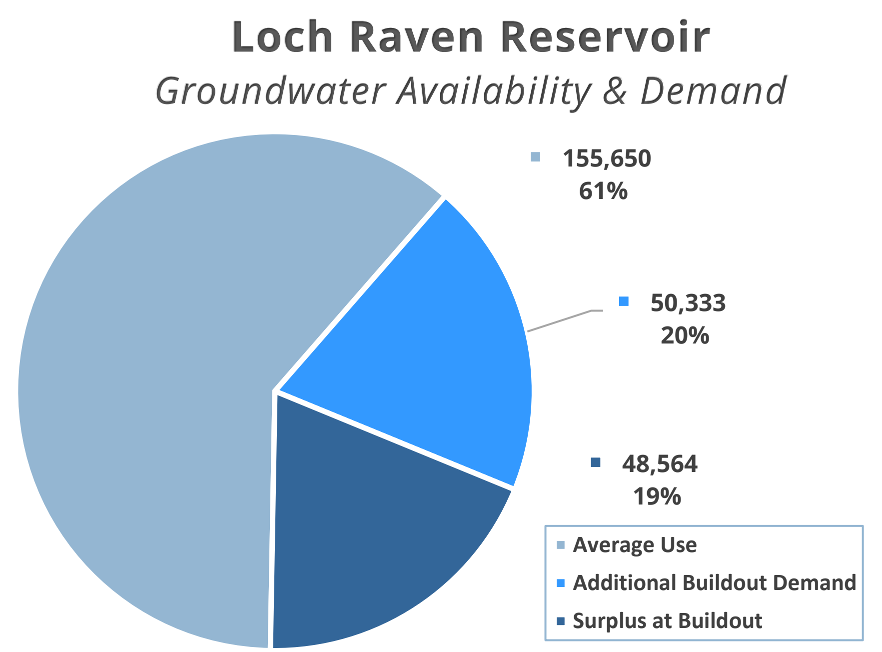
		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	3,633,848	10,357,600	4,724,862
GW	Groundwater (gpd)	5,105,230	6,615,300	5,931,213
	Total	**8,739,078**	**16,927,900**	**10,656,076**
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	586,437	802,600	1,406,204
GW	Residential and Non-Residential Septic (gpd)	3,403,520	3,534,520	3,650,040
	Total	***3,989,957***	***4,337,120***	***5,056,244***
WATER RESOURCES				
SW	Flowby (gpd)	42,672,450	42,672,450	42,672,450
SW	Storage (mgal)	3,441	4,847	3,654
GW	Available Groundwater (gpd)	35,012,921	35,012,921	35,012,921
GW	Surplus Groundwater (gpd)	33,311,211	31,932,141	32,731,748

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.6 Loch Raven Reservoir Watershed

Loch Raven Reservoir

At the present level of analysis, water resources in the Loch Raven Reservoir watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



Loch Raven Reservoir Watershed
Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	0	0	0
GW	Groundwater (gpd)	155,650	231,300	205,983
	Total	***155,650***	***231,300***	***205,983***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	275,937	353,600	457,204
GW	Residential and Non-Residential Septic (gpd)	15,720	20,040	16,820
	Total	***291,657***	***373,640***	***474,024***
WATER RESOURCES				
SW	Flowby (gpd)	288,987	288,987	288,987
SW	Storage (mgal)	0	0	0
GW	Available Groundwater (gpd)	237,727	237,727	237,727
GW	Surplus Groundwater (gpd)	97,797	26,467	48,564

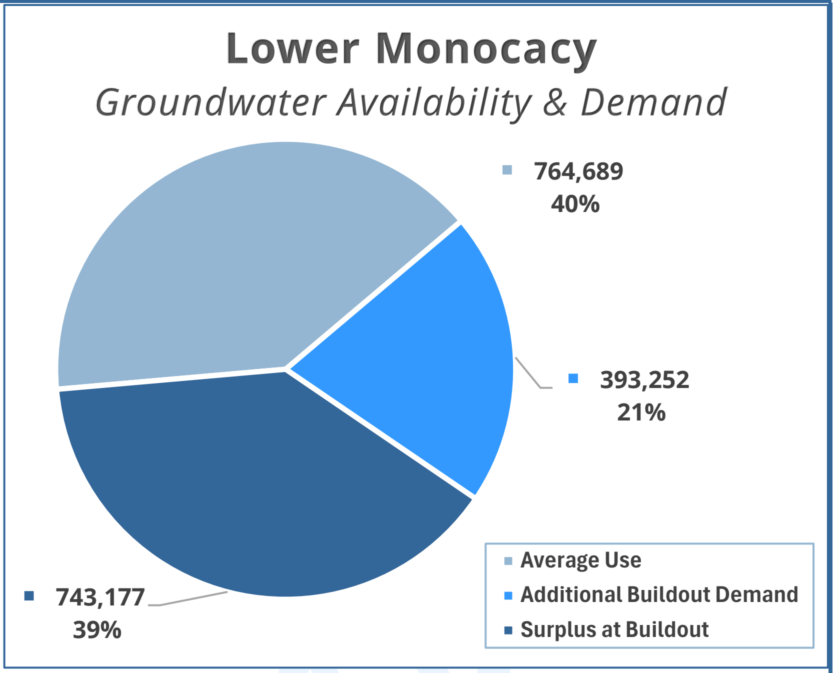
Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024
The average use was modified to better account for Hampstead's water appropriation permit in this watershed. The surface water return was also updated based on the average discharge from the WWTP to Piney Run in 2023.

14.2.7 Lower Monocacy River Watershed

Lower Monocacy River

In 2023, average daily demands in the watershed were approximately 0.76 mgd; at permitted levels self-supply constitutes 34% and municipal supply constitutes 66%. Demands are estimated to increase to approximately 1.15 mgd at full Carroll County Buildout.

There are currently no surface water withdrawal appropriations in the watershed. As such, groundwater demands are projected to capture the entirety of increased demand.



Given the present level of analysis, water resources in the Lower Monocacy River watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.

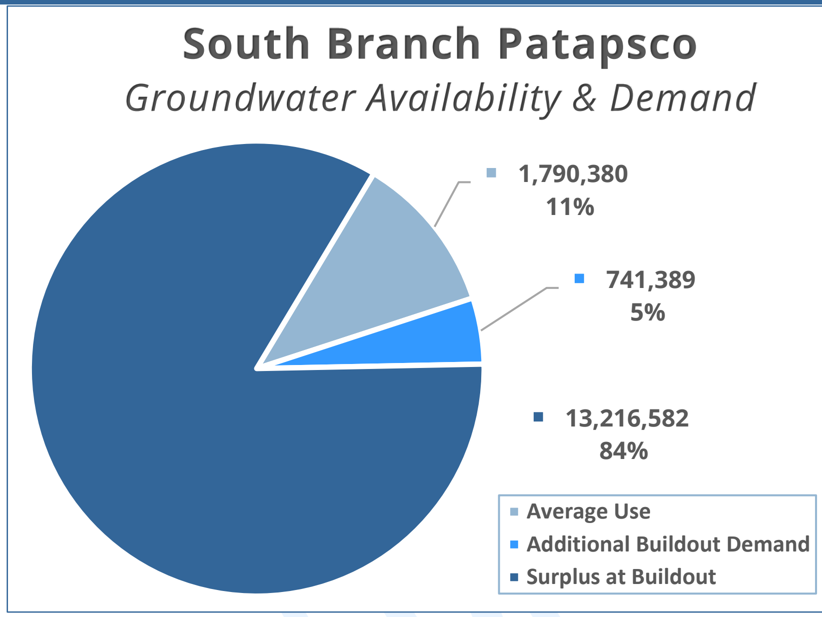
Lower Monocacy River Watershed
Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	0	0	0
GW	Groundwater (gpd)	764,689	1,305,700	1,157,941
	Total	***764,689***	***1,305,700***	***1,157,941***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	0	0	0
GW	Residential Septic	210,600	213,000	236,000
	Total	***210,600***	***213,000***	***236,000***
WATER RESOURCES				
SW	Flowby (gpd)	2,057,587	2,057,587	2,057,587
SW	Storage (mgal)	NA	NA	NA
GW	Available Groundwater (gpd)	1,665,118	1,665,118	1,665,118
GW	Surplus Groundwater (gpd)	1,111,029	572,418	743,177

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.8 South Branch Patapsco River Watershed

South Branch Patapsco River



Existing surface water withdrawals are not expected to increase significantly at full buildout, unless or until Gillis Falls Reservoir is developed. Groundwater withdrawals are predicted at buildout conditions to be below the current total maximum daily allocation of 3.68 mgd. Future returns are projected to increase to 9.0 mgd under buildout conditions.

Given the present level of analysis, water resources in the South Branch Patapsco River watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.

South Branch Patapsco Watershed
Water Balance Assessment Results Summary

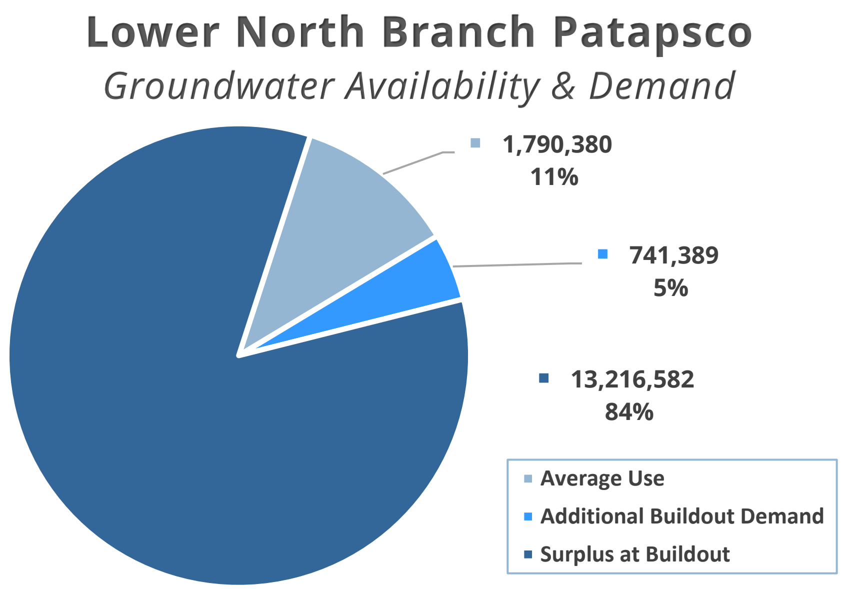
		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	118,100	872,500	133,875
GW	Groundwater (gpd)	1,790,380	3,682,650	2,531,769
	Total	***1,908,480***	***4,555,150***	***2,665,644***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	2,210,705	7,226,000	7,694,431
GW	Residential and Non-Residential Septic (gpd)	1,313,436	1,866,260	1,349,565
	Total	***3,524,141***	***9,092,260***	***9,043,996***
WATER RESOURCES				
SW	Flowby (gpd)	18,109,302	18,109,302	18,109,302
SW	Storage (mgal)	1,509	1,656	1,512
GW	Available Groundwater (gpd)	14,398,786	14,398,786	14,398,786
GW	Surplus Groundwater (gpd)	13,921,842	12,582,396	13,216,582

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.9 Lower North Branch Patapsco River Watershed

Lower North Branch Patapsco River

Given the present level of analysis, water resources in the Patapsco River Lower North Branch watershed *are available* in sufficient quantities that they could be developed to meet projected buildout demands.



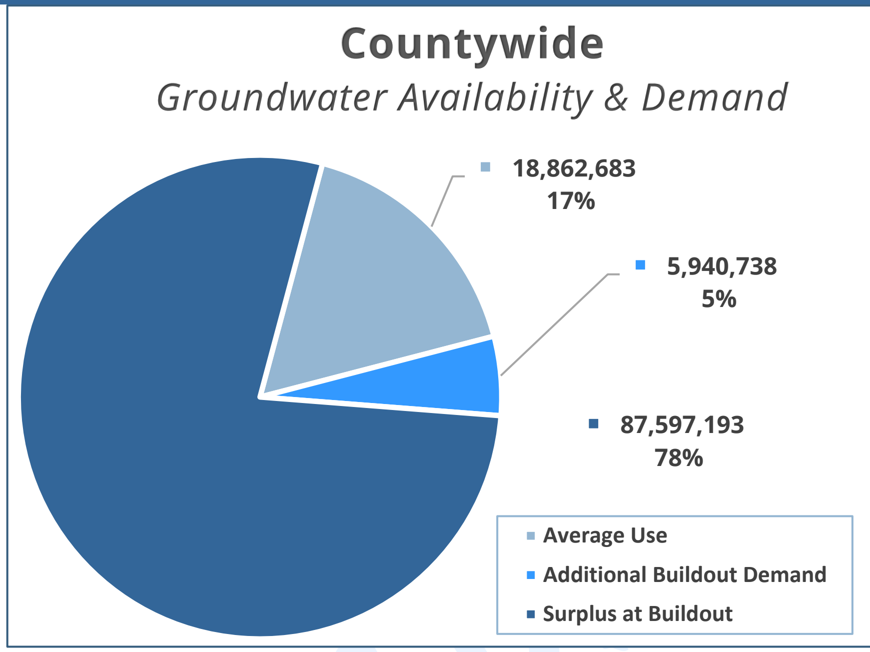
Lower North Branch Patapsco River Watershed
Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	0	0	0
GW	Groundwater (gpd)	4,500	4,500	7,250
	Total	***4,500***	***4,500***	***7,250***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	0	0	0
GW	Residential and Non-Residential Septic (gpd)	3,600	3,600	5,800
	Total	***3,600***	***3,600***	***5,800***
WATER RESOURCES				
SW	Flowby (gpd)	276,398	276,398	276,398
SW	Storage (mgal)	NA	NA	NA
GW	Available Groundwater (gpd)	209,640	209,640	209,640
GW	Surplus Groundwater (gpd)	208,740	208,740	208,190

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

14.2.10 Countywide

Countywide



Average Use Scenario

Current average daily demands countywide are about 23.4 mgd, the majority of which are residential uses, including 5.3 mgd (23%) for municipally supplied residential demands and 8.7 mgd (37%) for self-supplied residential demands.

Other demands in the county include municipally supplied commercial (2.5%) and industrial demands (0.7%), self-supplied industrial/commercial demands (15%), agricultural demands (6.8%), and quarry operations (15%). The majority of average water demands are met by groundwater wells (81%), primarily self-supplied domestic users, rather than surface water sources (19%).

Maximum Permitted Scenario

Existing MDE-permitted maximum daily appropriations accounted for about 40 mgd countywide in 2023. Once an approximate average 8.7 mgd of self-supplied residential withdrawls are added in, the total maximum daily allowable withdrawal was 50 mgd, with an average 8.7 mgd being self-supplied residential withdrawals. The largest type of allocation in the county (38%) is municipal supply to the WSAs. Private appropriations in the county include self-supplied industrial / commercial entities (14%), quarry and mining operators (14%), and agricultural users (16%).

Current daily maximum permitted withdrawals, not including self-supplied withdrawals, are met by approximately 38% surface water supply and 62% groundwater supply. Existing usage for both groundwater and surface water are well below appropriations.

Buildout Scenario

Projected average daily buildout demands in the county are approximately 30.8 mgd. The majority of buildout demands (55%) are associated with residential uses, including 7.4 mgd (24%) for municipally supplied residential demands and 9.6 mgd (31%) for self-supplied residential demands.

Other projected buildout demands in the county include municipally supplied commercial (5%) and industrial demands (6%), self-supplied industrial/commercial demands (15%), and agricultural demands (5%). The dewatering of quarries is projected to account for approximately 14% of the buildout demands in the county.

With estimated existing and projected buildout demands of 23-31 mgd, groundwater and surface water resources in the county are theoretically more than adequate to meet existing and buildout demands.

Countywide Water Balance Assessment Results Summary

		Average Use	Maximum Permitted	Buildout
DEMANDS				
SW	Surface Water (gpd)	4,566,448	17,131,700	6,059,164
GW	Groundwater (gpd)	18,862,683	32,491,300	24,803,421
	Total	***23,429,131***	***49,623,000***	***30,862,585***
RETURNS				
SW	WWTP, NPDES Permits, and Quarries (gpd)	8,697,495	22,329,547	18,909,782
GW	Residential and Non-Residential Septic (gpd)	9,606,531	12,207,718	10,981,636
	Total	***18,304,026***	***34,537,265***	***29,891,418***
WATER RESOURCES				
SW	Flowby (gpd)	118,816,408	118,816,408	118,816,408
SW	Storage (mgal)	11,609	14,904	11,867
GW	Available Groundwater (gpd)	101,418,978	101,418,978	101,418,978
GW	Surplus Groundwater (gpd)	92,162,826	81,135,396	87,597,193

Source: "WRE Update: Carroll County Water Demand and Availability," Hazen & Sawyer, May 21, 2024

The above information was excerpted from the *WRE Update: Carroll County Water Demands and Availability* report, dated May 14, 2024, and produced by Hazen. Please refer to this report for more detail on the water balance assessment.

15.0 Summary of Capacity & Limitations

15.1 Countywide Capacity

It is estimated that countywide ***87,597,193*** gallons of groundwater will be available after the county has fully developed (i.e., buildout) as currently (2023) planned. Based on groundwater resources alone, there appears to be ample water supplies available to accommodate future water demands for development. Combining available groundwater and surface water resources at buildout, the county has sufficient water supplies to accommodate future water demand.

When the county is examined in whole, even at buildout, the total demand from all sources is approximately 25% of the theoretical resource, as determined by the water balance assessment (*WRE Update: Carroll County Water Demands and Availability*, May 21, 2024). The question becomes "Why are there apparent water shortages in some areas of the county?" First and foremost, abundant water resources are not evenly distributed across the region. Local hydrogeologic conditions and watershed or catchment area size are just some of the potential limiting factors. In addition, the ability to access the water resource, either directly due to land ownership issues or through expensive transmission methods, may be limiting factors. Those limiting factors and a host of additional ones are then evaluated for cost and administrative barriers. Therefore, the countywide results provide a more regional look at resources in the bigger picture of larger watersheds and ultimately the Chesapeake Bay.

15.2 Individual Municipal Systems & Service Areas Capacity

At the individual municipal system/service area, the **2023 Water Supply Demand & Capacity** graph provides a picture of the public drinking water supply needs of the county's public water systems. Each bar on the graph represents the total demand for the 2023 WSAs for each system. The light blue indicates the amount of the total demand that could be served by the available capacity of each system. The magenta indicates the additional capacity needed to serve the total demand. The only system in the county that has the water source available to serve total projected demand is Freedom, which draws from Liberty Reservoir.

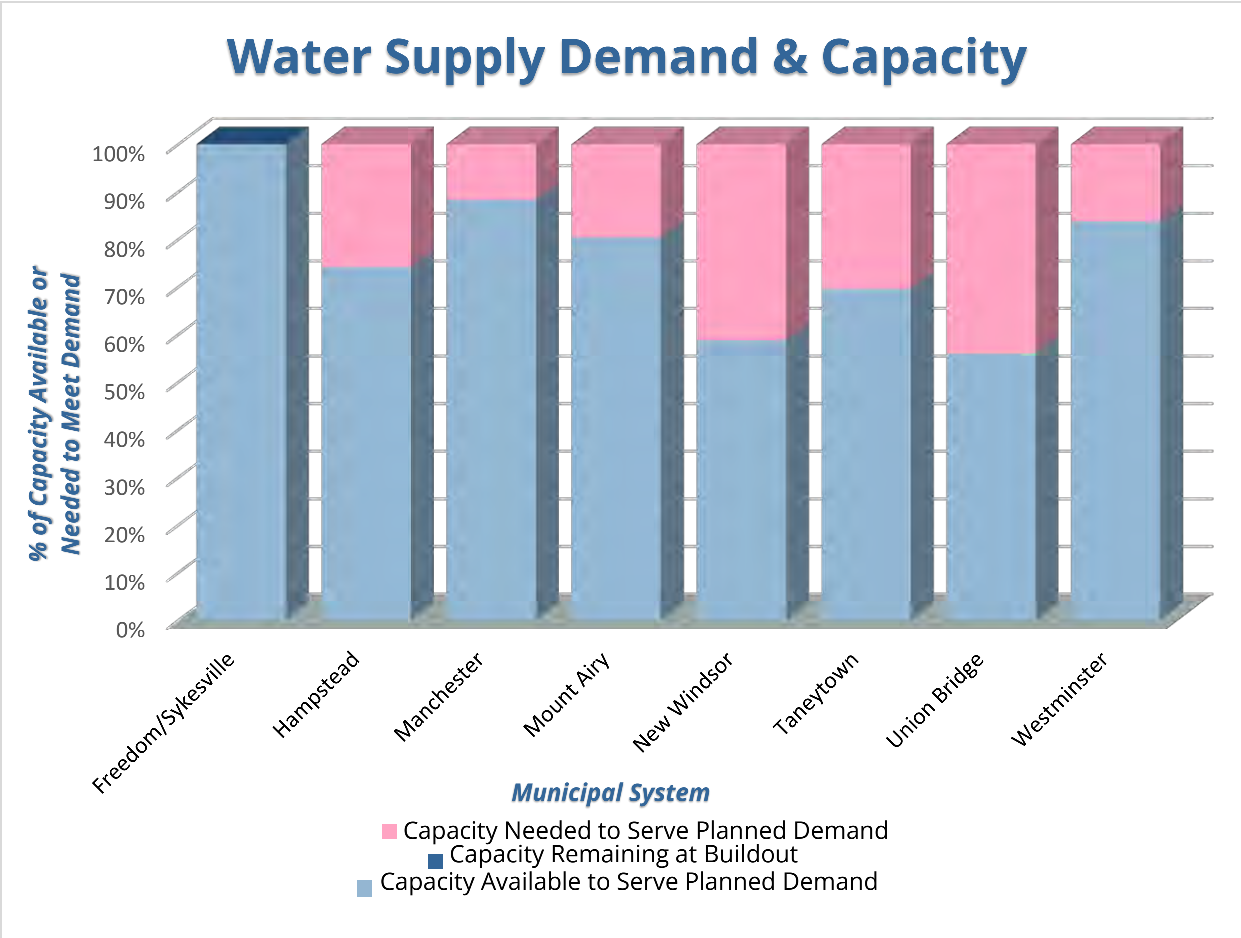
The table – **2023 Water Supply Capacity Needed or Remaining to Meet Total Buildout Demand in 2023 Planned Water Service Areas** – displays the capacity needed to serve the remaining demand for each system.

See the Individual System-Specific sections for more information about each system's specific limitations, beyond funding.

Water Supply Capacity Needed or Remaining
To Meet Total Buildout Demand in 2023 Planned Water Service Areas

Municipal System	Total 2023 Buildout Demand[1]	Additional Capacity Needed to Meet Service Area Buildout Demand	% of Total Buildout Demand for Which Additional Capacity Needed	Remaining Capacity Available at Buildout
Freedom/Sykesville	3,112,257	0	0%	887,743
Hampstead	834,545	291,425	47%	0
Manchester	464,692	61,493	26%	0
Mount Airy	1,226,052	299,052	52%	0
New Windsor	234,964	164,954	182%	0
Taneytown	812,701	355,598	84%	0
Union Bridge	470,330	369,530	96%	0
Westminster	3,412,619	662,619	68%	0

[1] *Total Buildout Demand includes MDE's 10% drought factor. Therefore, the demand here does not match the straight demand calculation in the Future Water Demand by Land Use or Service category in prior tables.*



Each Bar Represents Total Demand in 2023 Planned Water Service Area

15.3 Funding

The ability to fund future improvements has not been included in general evaluations for this plan. However, funding remains a significant, primary limitation for all systems. If funding were available, not all, but many of the limitations could be overcome.

15.3.1 Operations & Maintenance

In Maryland, public water systems are intended to be self-supporting. The user fees paid by customers are meant to cover essential daily and regular operational expenses, such as equipment, chemicals, salaries, supplies, pump stations, and transmission mains. Generally, the rates should cover the cost of routine operations and maintenance.

Rising costs in general as well as additional regulatory requirements, such as the LCRI and PFAS treatment, have triggered a subsequent need to raise user rates. For some of the municipalities, the rates may be considered prohibitively high, such as New Windsor. While growth may increase the number of users that pay into the system's fund, it also comes with added infrastructure and additional costs, for which user rates may not be adequate to cover the additional expenses. In some cases, it's also possible that affordability is a problem for disadvantaged communities.

15.3.2 Capital Improvement

Funds may also be used to pay for debt service for related projects or to replace or expand the system's infrastructure, such as installation of new may also be used related to these projects. It is common for new development to be required to pay for the infrastructure or costs to serve the additional demand on the system. However, this may not address increased operational expenses. In addition, for some systems, the costs to upgrade or add infrastructure is prohibitive to the developer.

15.4 Summary of Drinking Water Supply Limitations

While a few systems rely heavily on surface water sources, groundwater serves as the primary source for the majority of public water supply systems in the county. The water balance assessment shows that groundwater is available to serve future buildout demand. The challenge is accessing the available water. Several factors influence the ability for a municipal system to access additional sources, some requiring a greater investment of time and resources than others.

- Permitted capacity: MDE permitted to be pumped from groundwater sources.
- Allocability: Ability to meet MDE's owned & controlled policy and recharge requirements.
- Pump capacity: Amount the pump(s) can withdraw per day. This may not be the same as the permitted capacity.
- WWTP capacity: Generally speaking, water pumped ultimately flows through the WWP. Therefore, amount pumped should not exceed the WWTP flow (design) capacity.
- PFAS + other contaminants: PFAS can be treated but is very costly. Potential new sources with PFAS may limit the available options.
- Funding for improvements: Funding is always a consideration and potential limitation.

The table – **Summary of Buildout Capacity and Limitations Individual Municipal Water Supply Systems** – briefly summarizes the limiting factors for each municipal water supply. It also provides the overall greatest limitation for each system, as well as the design capacity, 2022 usage ("Demand"), and future buildout demand. A green status indicates if the 2022 permitted capacity for each system is projected to be able to accommodate future demand at buildout of the WSA, including Long-Range. Yellow status indicates that the permitted capacity is not projected to be able to accommodate buildout demand with the 2023 Water Service Area. However, the gap or the nature of the limiting factor can be more easily overcome. A red status indicates that the limitation is firm or would take a substantial, and *possibly* not feasible, financial investment to overcome. This table provides a quick overview of all factors to consider in determining which systems can accommodate additional demand in the future.

Summary of 2023 Buildout Capacity and Limitations
Individual Municipal Water Supply Systems

Municipal System	Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing [1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
Freedom / Sykesville	🟢	4,427,000	4,000,000	2,064,920	3,112,257	0	-	▪ No limitations, but needs redundancy
Hampstead	🟡	630,000	543,120	377,953	834,545	291,425	▪ System Capacity	▪ Addn'l water sources ▪ ↗ appropriations
Manchester	🟡	581,000	403,200	316,466	464,692	61,493	▪ System Capacity	▪ Addn'l water source ▪ ↗ pump capacity
Mount Airy	🟡	927,000	927,000	787,958	1,226,052	299,052	▪ System Capacity ▪ Allocability	▪ Addn'l water sources ▪ ↗ appropriations ▪ WWTP expansion
New Windsor	🔴	196,100	70,000	107,229	234,964	164,954	▪ System Capacity ▪ WWTP Capacity	▪ New WWTP ▪ Addn'l water sources ▪ ↗ appropriations
Taneytown	🟡	552,100	457,103	423,407	812,701	355,598	▪ System Capacity ▪ Allocability	▪ Water recharge easements ▪ Addn'l water sources ▪ ↗ appropriations
Union Bridge	🔴	208,300	100,800	93,649	470,330	369,530	▪ System Capacity ▪ WWTP Capacity	▪ New WWTP ▪ Addn'l water sources ▪ ↗ appropriations
Westminster	🟡	3,824,000	2,750,000	2,597,426	3,412,619	662,619 162,619[2]	▪ System Capacity	▪ .5 mgd permitted via PUREWater indirect potable reuse system (online 2027) ▪ 1 mgd design ➡↗ permitted

🟢 *Water supply system will have capacity remaining at buildout of 2023 Water Service Area, including Long-Range.*

🟡 *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

🔴 *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, and limitations would be very difficult to overcome*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.

[2] Additional capacity needed once the PUREWater plant comes online

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

Public water supply *is* expected to be a limiting factor, but most should be able to overcome via additional water sources %/or increased appropriations.

The Freedom water supply system is the only system that will have capacity available once buildout of the 2023 Water Service Area is reached.

Hampstead, Manchester, Mount Airy, Taneytown, and Westminster would not have enough capacity to meet buildout demand in the 2023 Water Service Area. However, excluding Westminster, the limiting factors can be overcome with additional water sources and increased appropriations. For Westminster, the PUREWater reuse plant will be permitted to provide an additional .500 mgd of capacity, which is roughly 75% of the additional capacity needed. Design capacity will be 1.0 mgd. Therefore, capacity will be available when needed if permitted capacity is increased.

Both New Windsor and Union Bridge face limitations much more difficult to overcome. While funding is an issue for every system, significant funding would be needed for both systems, as the WWTPs do not have capacity to accommodate the water demand, even if adequate water capacity is available. New WWTPs would need to be constructed.

16.0 Potential Effects Related to Climate Change: Water Supply

In Carroll County, total average annual precipitation is projected to increase from 44.1 inches/year (historical) to 48.4 inches/year by the end of the century (based on the average across model projections). However, the greater impact will likely be from increases in the fluctuations in weather patterns that occur from one year to another and from more frequent occurrences of extreme precipitation. Extreme hydrologic conditions put a greater strain on water resources and water-related infrastructure.

Climate change may compound future water supply limitations, and the County may find that future water supply needs are greater than currently anticipated. Effects of climate change are already being seen in Carroll County and most likely will continue to intensify in the coming decades. Briefly, some of the most important climate-change considerations that may affect water supply availability in Carroll County include:

- In general, climate change will lead to warmer temperatures and wetter conditions in the county. However, wetter conditions will not necessarily correspond with increased water supply availability because precipitation, evaporation, and transpiration do not occur evenly across the year, winter precipitation will shift from snow-dominated (more groundwater infiltration) to rain-dominated (less groundwater infiltration), and rain will more often fall in short extreme bursts that lead to large runoff events rather than sustained light to moderate rain events that are well suited for groundwater recharge.
- Seasonally, climate change will likely lead to warmer summer temperatures, longer growing seasons, higher evaporation rates, and higher water demands for domestic, industrial, and agricultural users.
- Extreme hydrologic conditions attributed to climate change may also affect water supply reliability in Carroll County. For example, more intense precipitation events may lead to more overland runoff, less infiltration, lower groundwater recharge, and water supply limitations.
- Although drought is not predicted to be a major threat to county-wide water resources, increased interannual variability and extremes in hydrologic conditions are expected and periodic droughts may threaten water supplies in the county, especially in municipalities with low resiliency and limited supply redundancy such as those with small buffers between supply capacity and demand and those that are entirely reliant on one source type.
- Climate change has already led to more extreme precipitation events in Carroll County, and this is likely to continue into the future. Extreme precipitation can lead to severe flooding and water quality and quantity issues if flooding contaminates source waters.
- A primary water quality concern related to climate change is the potential for more extreme and extensive flooding that may contaminate drinking water wells or to infiltrate areas of potential contamination. For example, flooding in around a wellhead may introduce contaminants into a well and cause water quality issues or treatment challenges.
- The last multi-year drought in Carroll County occurred in 2001-2002, but climate change makes the possibility of severe drought more likely.

For the 2024 WRE update, the most up-to-date federal report on climate change trends and impacts is the 5th National Climate Assessment. This report was released by the US Global Change Research Program in November 2023 and includes chapters on water-related impacts of climate change (Chapter 4) and climate change impacts in the northeast, which include the Mid-Atlantic region (Chapter 21).

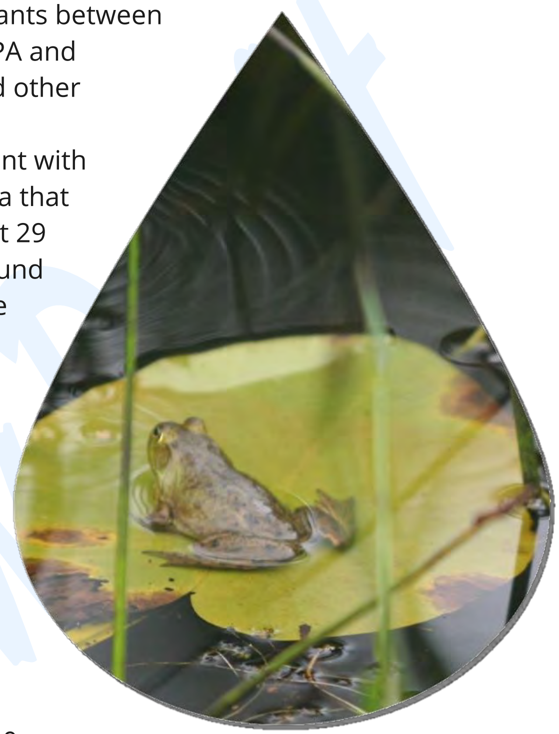
The potential water quality and quantity effects of climate change are discussed in detail in Hazen's WRE 2024 updated Technical Memo, *Evaluation of Climate Change Impacts on Water Resources in Carroll County, MD*, dated May 14, 2024.

17.0 Potential Effects of Emerging Contaminants of Concern: Water Supply

There are several emerging contaminant concerns that were not yet on the County's radar when the 2010 WRE was developed. Among these new concerns are Per- and Polyfluoroalkyl Substances (PFAS), lithium, manganese, pharmaceuticals and endocrine disruptors, and algal issues or cyanotoxins.

Problematic levels of emerging contaminants can be hard to predict, especially in areas with fractured bedrock where adjacent wells might not be hydraulically connected. The presence of emerging contaminants in a drinking water source can temporarily or permanently take a source offline and lead to reduced water supply availability. Diversification of sources and source types (i.e., avoiding overreliance on groundwater only) can build supply resiliency and redundancy should a source be compromised by contamination. A proactive approach to water quality monitoring for potentially problematic contaminants of emerging concern is encouraged so that the County and municipalities have plenty of time to mitigate or prepare for potential water supply shortages.

The fifth Unregulated Contaminant Monitoring Rule (UCMR 5) was published on December 27, 2021. UCMR 5 requires sample collection for 30 chemical contaminants between 2023 and 2025, using analytical methods developed by the EPA and consensus organizations. This action provides the agency and other interested parties with scientifically valid data on the national occurrence of these contaminants in drinking water. Consistent with the EPA's PFAS Strategic Roadmap, UCMR 5 provides new data that will improve the agency's understanding of the frequency that 29 per- and polyfluoroalkyl substances (PFAS) and lithium are found in the nation's drinking water systems, and at what levels. The monitoring data on PFAS and lithium helps the EPA make determinations about future regulations and other actions to protect public health under SDWA. The data will also ensure science-based decision-making, help the agency better understand whether these contaminants in drinking water disproportionally impact communities with environmental justice concerns, and allow the EPA, states, Tribes, and PWSs to target solutions. (*EPA, 2024*)



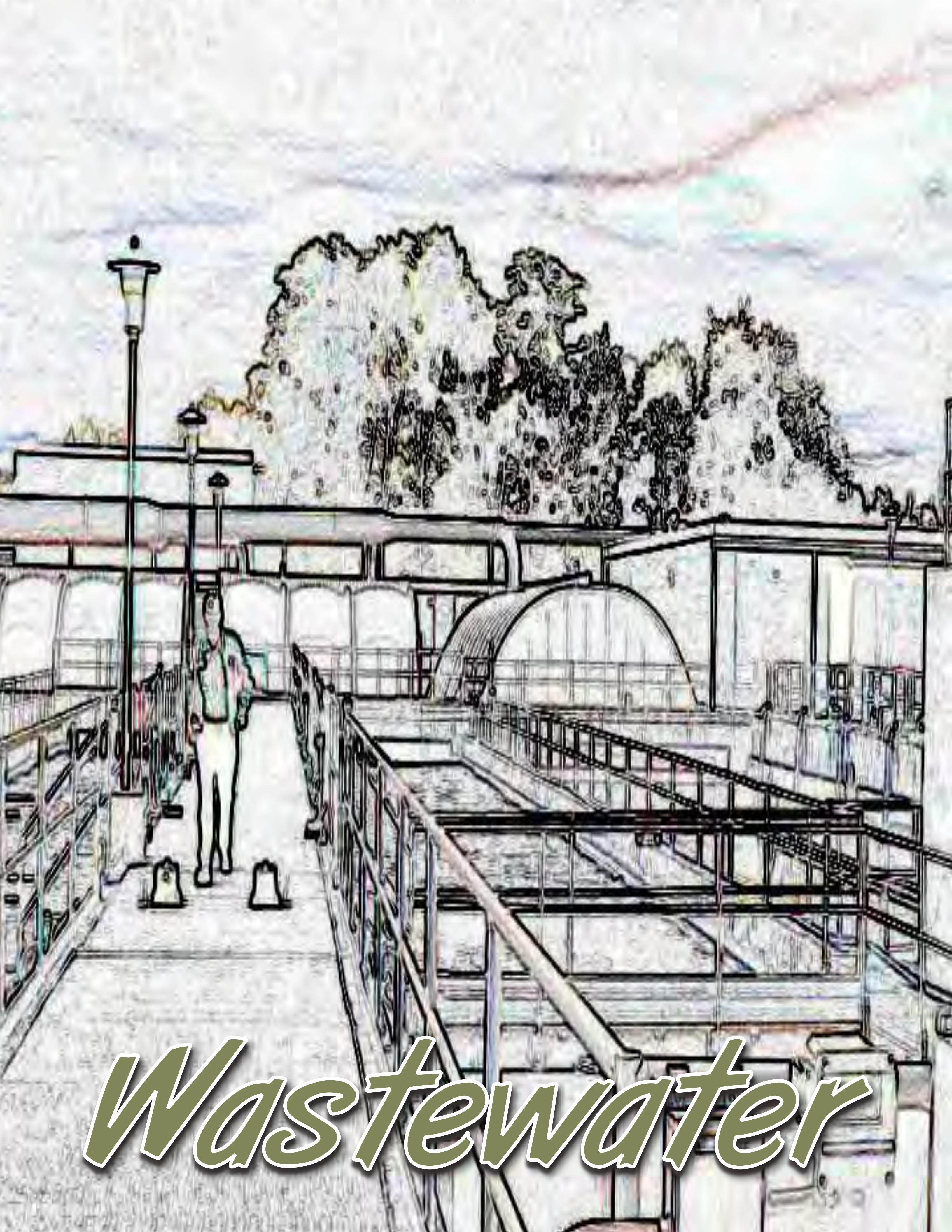
The US EPA released new drinking water quality regulations that may dramatically affect treatment processes and supply availability in the county. Among these, on April 10, 2024, the EPA issued the first-ever national, legally enforceable drinking water standard to protect communities from exposure to harmful PFAS, setting the maximum contaminant level (MCL) at 4.0 parts per trillion for PFOA and PFOS in public drinking water. The final rule requires (*EPA, 2025: https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas*):

- Public water systems must monitor for these PFAS and have three years to complete initial monitoring (by 2027), followed by ongoing compliance monitoring. Water systems must also provide the public with information on the levels of these PFAS in their drinking water beginning in 2027.
- Public water systems have five years (by 2029) to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs.
- Beginning in five years (2029), public water systems that have PFAS in drinking water which violates one or more of these MCLs must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.

These regulations are challenging for many municipalities in the county because PFAS levels are high in some groundwater wells and treatment is expensive. High PFAS levels have already caused some municipal wells in the county to be taken offline. Most municipalities are now testing water sources for PFAS to understand which wells or pumphouses will require PFAS treatment. Some municipalities are already moving forward with planning, design, and construction of PFAS treatment for their systems.

Cyanobacteria (blue-green algae) is a type of bacteria common in lakes and drinking water reservoirs that can cause treatment challenges and public health issues. Cyanotoxins are produced by cyanobacteria and can cause algal blooms that are harmful and potentially deadly to humans and animals. Cyanobacteria and cyanotoxins primarily affect surface waters where high nutrient inputs, stagnant water, and warm temperatures can create ideal conditions for cyanobacterial growth. Although the occurrence of cyanotoxins in groundwater is limited, surface waters are more likely to be impacted and may become a larger portion of the municipal supply in the future.

Emerging contaminants are discussed in more detail in Hazen's WRE 2024 updated Technical Memo, *Emerging Contaminants Assessment and Recommendations*, dated September 1, 2023.


Wastewater

Wastewater

Wastewater management in Carroll County takes place via one of two general methods. The first is sewage collection at an individual private home or business with treatment by a septic system or similar onsite facility. This type of method is considered to generate a discharge which is referred to as a nonpoint source (NPS). The second type of collection is implemented in DGAs. In these areas, the sewage is collected from numerous homes and businesses in a public sewer system, transmitted to a wastewater treatment plant (WWTP), and processed utilizing various methods. The treated flow is then released to a stream via a single discharge point. This type of wastewater treatment is considered to generate a discharge which is referenced to as a point source. Public WWTPs are the focus on this section of the WRE.

This second wastewater treatment system above, utilized by municipalities and the County in select areas, requires a NPDES permit. This federally required permit is administered and issued by the State of Maryland. Following treatment, the amount of potential pollutant which is allowed to be discharged from the WWTP to a receiving water body (in most cases a stream or river) is regulated by the permit. The specific amount of pollutants is allocated by the amount of flow discharged and the assimilative capacity of the receiving waterbody. Various caps or limits have been applied to wastewater discharges to maintain the theoretical water quality standards of the receiving waterbody. Ultimately, the limitations on wastewater discharge are applied to help achieve the TMDLs established to clean up the Chesapeake Bay.

This section of the WRE looks at the existing and planned capacity limits associated with municipal wastewater system in Carroll County, as well as individual non-point source facilities.

18.0 Future Additional Wastewater Demand Based on Existing Planned Growth

18.1 Capacity & Demand Methodology

To identify wastewater capacity needs, you must first determine current service capacity. MDE expects potential demand and wastewater capacity needs for a planning area to be estimated using the guidance document prepared by MDE, *Wastewater Capacity Management Plans* (WWCMP).

A WWCMP is required to contain information on sewage system capacity and the demand created by existing and projected growth and development. A WWCMP is required by MDE for municipalities operating at or above 80% of design capacity. However, MDE also recommended using this tool to determine current capacity for purposes of the WRE as well.

Data was collected for each of the municipal wastewater systems owned or operated by Carroll County or a municipality. MDE's Guidance Document: *Wastewater Capacity Management Plans* (2006) was used as a template and guide for collecting this data. A Capacity and Demand (C&D) Workbook was prepared for each of these eight systems to capture a snapshot of the **current** (2023) capacity and projected demand, based on **existing** adopted zoning, ordinances, and policies in place in 2022.

The current demand represents an average of the average daily flow for 2020, 2021, and 2022, less infiltration and inflow (I&I). I&I, for most systems, was estimated by subtracting the 2002 average daily flow (a particularly dry year) from the 2003 average daily flow (a particularly wet year) per MDE's worksheet. For efficiency and productivity, 2023 data was used for the capacity & demand (C&D) Workbooks and wastewater information, so the process could continue without constant changing of data.

The S-1 Existing/Final Planning Sewer Service Areas (SSAs) were used to identify Existing and Encumbered S-1 Infill flow (numbers 6 through 10 on the worksheet). To estimate "future" flows, the Priority and Future Sewer Service Areas (S-3 and S-5) were used (number 11 on the worksheet). These were the required categories shown on MDE's worksheet. Demand for future flows from the Long-Range Service Areas that fall within the County's DGAs was also estimated.

The County's BLI data provides estimates of potential additional residential development based on either zoning or on adopted land use designations. Within the Existing/Final Planning Service Area, potential additional residential infill lots were based on the current zoning. Infill lots could potentially apply for a building permit and request to connect to the system at any time. For all other areas, future potential additional residential lots were estimated using the adopted zoning in place in 2022, which would reflect the growth that is ultimately planned.

Potential additional residential lots were used to estimate the future residential demand for wastewater. The total demand then was estimated assuming residential lots would consume 250 gpd per household/lot.

To arrive at future commercial and industrial demand, collectively referred to as "Non-Residential" in this document, areas with 2022 adopted zoning for commercial or industrial use were reviewed. Acreage was estimated for areas that are developed but not yet served. The buildable acreage of unimproved land was also estimated. Buildable acreage excludes streams, wetlands, and floodplains. The combination of acreage from these two types of commercial land was multiplied by 700 gallons per acre per day. Industrial acreage was multiplied by 800 gallons per acre per day (based on MDE guidance and the *Water & Sewer Master Plan*).

For Hampstead and Mount Airy, BLI numbers for residential, commercial, and industrial demand were modified by the municipality rather than strictly using the BLI data.

Mount Airy capacity and demand numbers may not match the BLI estimates, as the County does not have BLI information for the portion of Mount Airy that lies within Frederick County. Therefore, where this is a factor in estimating figures used in these analyses, the Town used their own calculations to capture its many of the developable areas.

On the worksheets, total demand for Infill and Future (Priority + Future Service Areas) flows were added. The I&I estimate was added to total demand to arrive at a total Future Capacity Needed. The difference between total future capacity needed and the current permitted flow represented the excess capacity available or additional capacity needed to serve the current SSAs, including the Long-Range Service Area. The Long-Range Service Area accounts for planned service beyond the 10-year timeframe of the Future Service Area. It was assumed that any areas within the DGA that are not within a SSA will not be planned for service in the future at buildout.

Additional demand is not expected for any of the smaller wastewater systems in the county, such as Pleasant Valley. These systems were designed to address a specific problem and were not intended to accommodate additional growth. The areas in which these small systems are located are not considered DGAs. Therefore, per guidance from MDE, these systems were not included in the analysis of future wastewater capacity needs.

18.2 Demand for Each Municipal System & Designated Growth Area

The table – **Future Wastewater Demand by Service Category for Each Designated Growth Area at Buildout of 2023 Sewer Service Area** – provides estimated future sewer demand, broken out by planned sewer service area, for each of the major municipal (public) sewer systems that operate in the county. "2023 Demand" represents actual sewer flows generated by residents, businesses, and industries. Demand is measured as the average number of gallons treated per day. "Planned Future Demand" and "Long-Range Demand" include all additional demand within one of the planned SSAs. For purposes of this plan document, demand was not included for properties that are currently designated in the "No Planned Sewer Service Area." However, properties within the Long-Range Sewer Service Area are represented in both tables and are assumed to be served in the long term.

All demand estimates are based on the zoning in place in 2022 within the 2023 Sewer Service Areas.

Future Wastewater Demand by Service Category
for Each Designated Growth Area at Buildout of 2023 Sewer Service Area
(in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Freedom/Sykesville[4]	1,530,000	513,348	384,568	105,385	*2,533,301*
Hampstead	246,333	209,489	261,535	1,750	*719,107*
Manchester	268,000	81,854	52,178	10,266	*412,298*
Mount Airy	681,125	60,394	275,700	102,000	*1,119,219*
New Windsor	41,716	30,345	56,514	40,914	*169,489*
Taneytown	502,333	126,123	6,500	235,876	*870,832*
Union Bridge	99,433	43,997	141,750	191,047	*476,227*
Westminster	2,687,000	663,923	277,522	0	*3,628,445*
Total	***4,260,947***	***1,741,239***	***1,252,727***	***692,583***	***7,947,495***

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022. [2]
[2] These data relate to areas located within the designated planned sewer service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Sewer Service Area" of the DGA

[4] *It should be noted that the County is only allocated 2.74 mgd of the 3.5 mgd design capacity of the WWTP.*

Source: WRE Capacity & Demand Workbook: CC PLM, CC DPW, + individual municipalities, 2023

The table – **Future Wastewater Demand by Land Use for Each Designated Growth Area at Buildout of 2023 Sewer Service Area** – presents the same sewer demand estimates as the previous table, except that demand is broken out by type of land use: residential and non-residential (commercial and industrial).

Future Wastewater Demand by Land Use for Each Designated Growth Area at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]		Total Buildout Demand
		Residential	Non-Residential	
Freedom/Sykesville	1,530,000	567,750	435,551	*2,533,301*
Hampstead	246,333	178,750	294,024	*719,107*
Manchester	268,000	121,250	23,048	*412,298*
Mount Airy	681,125	301,050	137,044	*1,119,219*
New Windsor	41,716	35,750	92,023	*169,489*
Taneytown	502,333	138,750	229,749	*870,832*
Union Bridge	99,433	193,500	183,294	*476,227*
Westminster	2,687,000	499,500	441,945	*3,628,445*
Total	***4,260,947***	***1,824,250***	***1,862,298***	***7,947,495***

[1] *These data represent, in general, the annual average daily demand over the 3-year period 2020-2022.*

[2] *Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.*

Source: WRE Capacity & Demand Workbook: CC PLM, CC DPW, + individual municipalities, 2023

19.0 Current Capacity and Existing Wastewater Limitations

19.1 Capacity of Individual Municipal Systems by Watershed

The municipal wastewater systems serve the populations in the DGAs. Combined, existing flows totaled 6,239,685 gpd countywide. Population served by these systems countywide was about 69,838. The table – **2023 Existing Flows and Population Served** – indicates the existing flows in 2023, based on C&D Worksheet data, and the population estimated to be served, as indicated in the 2023 *Water & Sewer Master Plan*.

2023 Existing Flows and Population Served

Municipal System	Existing Flows (from C&Ds)	Population Served (from W&S Plan)
Freedom/Sykesville	1,530,000	25,964
Hampstead	246,333	6,094
Manchester	256,785	4,046
Mount Airy	640,347	9,654
New Windsor	41,716	1,441
Taneytown	502,333	7,234
Union Bridge	99,433	936
Westminster	944,000	28,839
Totals	***4,260,947***	***84,208***

Source: WRE Capacity & Demand Workbook: CC PLM + individual municipalities, 2023

In the table – **Wastewater Capacity for Each Designated Growth Area at Buildout of the 2023 Sewer Service Area**, the "2023 Current" figures identify the capacity that should be available ("Remaining Capacity") at each WWTP to serve existing and future demand once I&I is subtracted. The "Capacity Needed" represents the projected Infill and Future demand for unserved land within the SSA. Areas designated for Long-Range Service fall within the community's DGA, which generally represents the future annexation limit. However, while these areas are planned to be served at some point, provision of service is not anticipated to occur within a 10-year timeframe. However, for purposes of long-range planning, these areas are included in future demand projections for the buildout scenario. Remaining capacity minus the existing flows yields the amount of capacity available to serve future demand. If the future demand exceeds the capacity available, the difference between the capacity available to serve future demand and the projected future demand results in a negative number. Areas within the No Planned Service area on the Sewer Service Area maps have not been included in the demand projections.

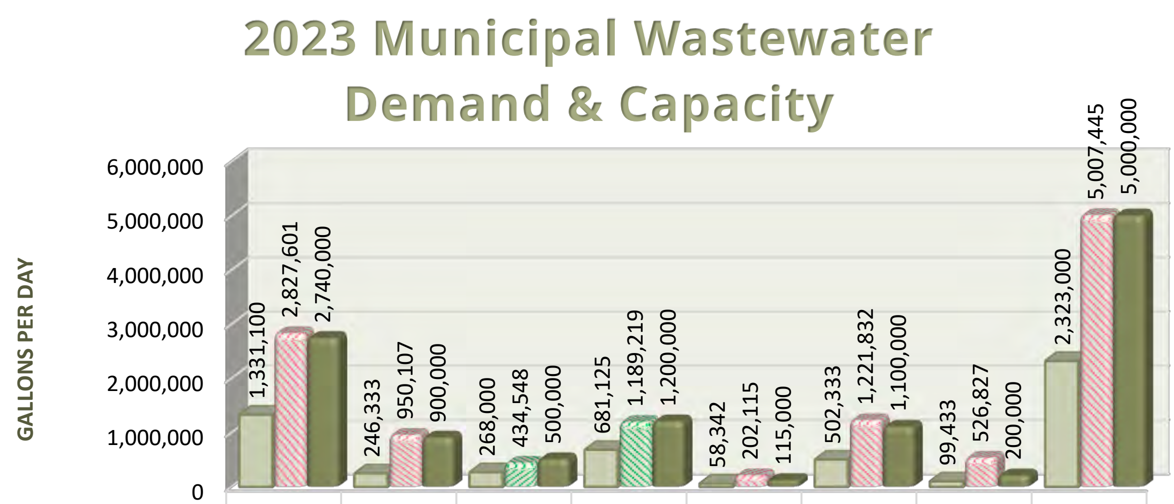
Based on the existing capacity of the community systems, all result in a negative available capacity at buildout. However, using the methodology from the MDE guidance documents for capacity management plans, these figures do not account for already identified system improvements that can be found in the 2023 *Water & Sewer Master Plan*. Limitations that restrict expansion of design capacity are identified in the Individual System-Specific section for each municipal system.

Wastewater Capacity for Each Designated Growth Area at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Current			Existing Flows (2022)	Capacity Needed			Capacity Available at Buildout
	2023 Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Freedom*	2,740,000	493,200	2,246,800	1,331,100	513,348	384,568	105,385	(87,601)
Hampstead	900,000	231,000	669,000	246,333	209,489	261,535	1,750	(50,107)
Manchester	500,000	22,250	477,750	268,000	81,854	52,178	10,266	65,452
Mount Airy	1,200,000	70,000	1,130,000	681,125	60,394	275,700	102,000	10,781
New Windsor	115,000	16,000	90,000	58,342	30,345	56,514	40,914	(87,115)
Taneytown	1,100,000	351,000	749,000	502,333	126,123	6,500	235,876	(121,832)
Union Bridge	200,000	50,600	149,400	99,433	43,997	141,750	191,047	(326,827)
Westminster	5,000,000	1,743,000	3,257,000	2,687,000	663,923	277,522	0	(371,445)
Total	***11,755,000***	***3,027,050***	***8,601,950***	***5,873,666***	***1,729,473***	***1,456,267***	***687,238***	***(1,018,694)***

** Note that the Freedom WWTP is owned by the State and operated by MES. The table reflects the capacity available of the 2.74 mgd allocated to the County of the WWTP's 3.5 mgd total capacity.*
Source: WRE Capacity & Demand Workbook: CC PLM, CC DPW, + individual municipalities, 2023

The **2023 Municipal Wastewater Demand & Capacity** graph shows the existing flows, projected total estimated demand for the SSA, and the design capacity. Red bars depict where deficits in capacity are projected based on 2023 design capacity. The future demand for all WWTPs but Manchester and Mount Airy is projected to exceed the design capacity if no additional improvements are made to increase capacity.



	Freedom Allocated	Hamp-stead	Man-chester	Mount Airy	New Windsor	Taney-town	Union Bridge	West-minster
Existing Flows	1,331,100	246,333	268,000	681,125	58,342	502,333	99,433	2,323,000
Buildout	2,827,601	950,107	434,548	1,189,219	202,115	1,221,832	526,827	5,007,445
Design Capacity	2,740,000	900,000	500,000	1,200,000	115,000	1,100,000	200,000	5,000,000

Buildout Demand Exceeds 2023 Capacity **MUNICIPAL SYSTEM** *2023 Capacity Available for Long-Range Demand*

- *Manchester and Mount Airy will have remaining capacity available after buildout of 2023 Service Area.*
- *The total demand figures for the above table and graph may vary slightly from the Future Wastewater Demand tables, as those tables do not factor in I&I.*

The table – **2023 Wastewater Capacity Needed or Remaining to Meet Buildout Demand in 2023 Planned Sewer Service Areas** – shows the additional capacity needed, which is the portion of the total demand that cannot be accommodated by 2023 design capacity, and the percentage of total demand this represents.

Wastewater Capacity Needed or Remaining to Meet Buildout Demand for 2023 Planned Sewer Service Areas
(Gallons per Day)

Municipal System	Total Buildout Demand	Additional Capacity Needed to Meet Service Area Buildout Demand	% of Total Demand for Which Additional Capacity Needed	Remaining Capacity Available at Buildout
Freedom (CCG alloc)	2,334,401	87,601	4%	0
Hampstead	719,107	50,107	7%	0
Manchester	412,298	0	0%	65,452
Mount Airy	1,119,219	0	0%	10,781
New Windsor	186,115	87,115	47%	0
Taneytown	870,832	121,832	14%	0
Union Bridge	476,227	326,827	69%	0
Westminster	3,628,445	371,445	10	0

19.2 Limitations of Individual Municipal Systems by Watershed

There are no major (500,000 gpd or greater) WWTP discharges to the Conewago Creek, Liberty Reservoir, Lower Monocacy River, or Lower North Branch Patapsco River watersheds. Therefore, these watersheds are not discussed in this section. "Total Demand" refers to demand at the buildout of the entire planned Sewer Service Area (SSA), including the Long-Range SSA. For planning purposes, quantities reported as inflow, sewer demand, or discharge are considered comparable.

19.2.1 Double Pipe Creek

Westminster WWTP Summary of Wastewater Limitations: The existing controlling limitation for the WWTP is the current design capacity and the total phosphorus cap. By expanding to 6.5 mgd, the Westminster WWTP would be able to accommodate all wastewater demands to buildout, and still have excess capacity, without exceeding loading limits imposed by the City's NPDES permit. The total phosphorus cap and the design capacity, each of which is 5.0 mgd, are the controlling limitations until the ENR upgrade is complete and/or the design capacity of the plant is expanded.

Union Bridge WWTP Summary of Wastewater Limitations: The existing design capacity (0.2 mgd) of the Union Bridge WWTP represents the controlling limitation under current conditions. Longer-term, the Bay-related nitrogen loading cap represents a 0.67-mgd limit to surface water discharges, which is over 2023 projected demand. A new location for the WWTP would likely need to be considered if expansion is pursued, particularly due to flooding issues.

New Windsor WWTP Summary of Wastewater Limitations: The existing design capacity (.115 mgd) of the New Windsor WWTP represents the controlling limitation under current conditions. As the plant expands and upgrades, the rated design capacity is likely to remain the controlling limitation to discharge as continuous sequential batch reactor (CSBR) technology is employed. If the Town expands the capacity of the WWTP to accommodate demand at buildout of the SSA, the controlling limitation would be the nitrogen ENR cap of 0.35 mgd.

19.2.2 Loch Raven Reservoir

Hampstead WWTP Summary of Wastewater Limitations: The current design capacity of 0.90 mgd will remain the controlling limitation. In the longer term, the Bay-related phosphorus loading cap represents a 0.90 mgd limit to surface water discharges.

19.2.3 Prettyboy Reservoir

Manchester WWTP Summary of Wastewater Limitations: Given the limited land area to expand the plant and to spray irrigate, the existing design capacity (0.5 mgd) of the Manchester WWTP represents the effective wastewater limitation.

19.2.4 South Branch Patapsco River

Freedom WWTP Summary of Wastewater Limitations: The Bay-related phosphorus loading cap represents a 3.5 mgd limit to surface water discharges for the Freedom WWTP itself. However, based on the County's allocation of the total WWTP capacity, the more immediate limitation to the County is the allocation of plant capacity. The Long-Range demand projection exceeds the County's allocation of treatment capacity.

Mount Airy WWTP Summary of Wastewater Limitations: The phosphorus ENR cap (1.2 mgd) of the Mount Airy WWTP represents the controlling limitation under 2023 conditions. The approximate nitrogen-based capacity limitation of 1.6 mgd in discharge is larger than the maximum projected flows and is not anticipated to be a controlling limitation. If an expansion of the WWTP is pursued, the nutrient caps may be re-evaluated at that time.

19.2.5 Upper Monocacy River

Taneytown WWTP Summary of Wastewater Limitations: The existing design capacity (1.1 mgd) of the Taneytown WWTP represents the controlling limitation under current and long-range conditions. Longer term, the ENR-related phosphorus loading cap represents a 1.1-mgd limit to surface water discharges.

19.2.6 Nutrient Discharge Caps Summary

The table – **2023 WWTP Discharge Caps: Most Limiting Pollutant** – summarizes the watersheds into which the municipal systems discharge, as well as the nutrient cap that will represent the most limitation. The nutrient caps are not necessarily the most limiting factor for all WWTPs.

2023 WWTP Discharge Caps: Most Limiting Pollutant

Municipal System	Watershed	Pollutant	WWTP Nutrient Cap (mgd)
Freedom	S. Branch Patapsco	Total Phosphorus	3.500
Hampstead	Loch Raven	Total Phosphorus	0.900
Manchester	Prettyboy	Total Phosphorus	0.652
Mount Airy	S. Branch Patapsco	Total Phosphorus	1.200
New Windsor	Double Pipe Creek	Total Nitrogen	0.350
Taneytown	Upper Monocacy	Total Phosphorus	1.100
Union Bridge	Double Pipe Creek	Total Nitrogen	0.670
Westminster	Double Pipe Creek	Total Phosphorus	5.000

Source: *MDE Wastewater Permits Interactive Search Portal, 2024. (https://mes-mde.mde.state.md.us/WastewaterPermitPortal/)*

19.3 Summary of Approaches & Limitations

All the municipal WWTPs in Carroll County, with the exception of Manchester and Mount Airy, are projected to experience limitations to wastewater discharges at full buildout of the SSAs.

Many of the municipalities in the county are already performing or planning activities to address wastewater limitations, such as WWTP expansions, ENR upgrades, and infiltration and inflow (I&I) reduction. Effluent reuse (*e.g.*, spray irrigation) has been implemented by one municipality (Manchester) and considered by others.

Design capacity and nutrient caps represent the most important long-term limitations to surface water discharges in Carroll County. Most of the WWTPs have already implemented ENR and have seen significant gains from I&I reduction projects. With few WWTPs planning to expand and flow projections estimated to push most WWTPs over the 80% MDE threshold, other strategies to maintain capacity and offset nutrient loads will need to be considered.

19.3.1 Approaches

Infiltration and Inflow (I&I): Data from the C&D Workbooks indicate that I&I is a major component of the total influent at most municipal WWTPs in Carroll County. Based on differences between 2002 (drought year) and 2003 (very wet year), the method used by MDE in the WWCMPs, I&I comprised a quarter to a third of the average influent flow at all of the larger WWTPs, except the Manchester WWTP, where it represented less than 10%. Most of the municipal systems, such as Westminster, Freedom, Mount Airy, Taneytown, and Hampstead, implement ongoing programs to identify and reduce I&I. These programs include elements such as smoke testing, camera surveys, pipe replacement, lining of pipes, and identification of inappropriate routing of stormwater into the sanitary sewer systems. The smaller municipalities, such as New Windsor and Union Bridge, appear to be resource-limited with regard to I&I reduction. Additional I&I improvements continue to be an efficient approach to regain flow capacity.

Wastewater Treatment Plant Expansion: Of the eight municipal WWTPs in Carroll County, only half of them (Freedom, Manchester, Mount Airy, and Taneytown) are projected to be able to accommodate existing, infill, and future wastewater demands without an expansion of treatment capacity. *Only Manchester and Mount Airy are projected to be able to accommodate estimated wastewater demands at buildout of the SSA without expansion*. WWTP expansion projects are currently being planned for the Westminster and New Windsor. Other municipalities are likely to plan for WWTP expansions as wastewater demands increase, if limitations can be overcome, and as funding becomes available.

Several facilities face potential site limitations or other engineering challenges to expanding the plant at the current location, including the Freedom and Manchester WWTPs. The Freedom WWTP has sufficient capacity to accommodate both existing and Infill + Future flows, so there is no near-term need to address site constraints. Challenges with expanding the Manchester WWTP represent a technical limitation to enlargement of the Manchester SSA, unless additional area for land application could be identified, or a new WWTP were constructed outside of the Prettyboy Reservoir watershed. The Town currently does not plan to expand the SSA, and thus expansion might not be necessary.

The Taneytown WWTP is approaching its design capacity and has sufficient room to expand at the current location. However, the City's near-term strategy is focused on I&I reduction rather than plant expansion. The Union Bridge WWTP would need a major expansion—or construction of a new WWTP—to accommodate future demands. Such a project would likely be contingent upon an agreement by developers to fund the majority of the expansion costs, and MDE has determined that plant expansion is contingent on relocation and rebuilding a new plant on a new site.

Regulatory Effect of Expansion on Minor Plant's Nutrient Allocations: Minor (≤0.5 mgd) plants that expand to an additional treatment capacity of more than 0.1 mgd will have their nutrient loading cap converted from goals to enforceable permit limits. In addition, when a minor plant expands, its nutrient loading caps will be assessed for adjustment to *no more than* 6,100 lbs/yr total nitrogen and 457 lbs/yr total phosphorus. Under this policy, the Manchester, Union Bridge, and New Windsor WWTPs would be susceptible to losing a portion of their nutrient allocations upon expansion.

Upgrades to Enhanced Nutrient Removal (ENR): ENR upgrades are the primary strategy being undertaken by Carroll County municipalities for complying with the Chesapeake Bay-related nutrient loading caps. The cost for most of these projects is eligible to be funded from Maryland's Bay Restoration Fund (BRF). All of the County's "major" (>0.5 mgd) WWTP facilities (Westminster, Freedom, Mount Airy, Taneytown, and Hampstead) have installed or are in the process of installing ENR technology.

Some "minor" facilities are also exploring ENR. For example, as of May 2024, the Town of Manchester was in the design phase for ENR upgrades, primarily as a polishing step rather than a necessity for regulatory compliance. Bay-related nutrient caps will become enforceable permit limits upon completion of the planned Manchester WWTP expansion upgrade. ENR upgrades are not currently required for regulatory compliance at the New Windsor and Union Bridge WWTPs because the Bay-related nutrient caps are goals rather than enforceable limits, but both New Windsor and Union Bridge are currently evaluating ENR upgrades as an expansion option.

Though total phosphorus (TP) may limit facilities more than total nitrogen (TN), phosphorus concentrations lower than 0.3 mg/L can often be achieved by chemical addition and filtration. In contrast, many ENR plants cannot consistently achieve effluent total nitrogen concentrations significantly lower than 3.0 mg/L. Hence, the total nitrogen cap may be more limiting than the total phosphorus cap at ENR facilities where the nitrogen cap does not significantly exceed the Priority + Future and Long-Range flows.

Of the County's five major (500,000 gpd or greater) WWTPs, only Mount Airy is estimated to have the capacity available to serve projected demand at full buildout of the SSA, including Long-Range. Of the three minor (<500,000 gpd) WWTPs, only Manchester is projected to have remaining capacity available. These projections are based on conditions in place in 2023 and do not account for any planned improvements or expansions.

19.3.2 Funding

The ability to fund future improvements has not been included in general evaluations for this plan. However, funding remains a significant, primary limitation for all systems. If funding were available, not all, but many of the limitations could be overcome.

Operations & Maintenance: In Maryland, public sewer systems are intended to be self-supporting. The user fees paid by customers are meant to cover essential daily and regular operational expenses, such as equipment, chemicals, salaries, supplies, and transportation of sewage. Generally, the rates should cover the cost of routine operations and maintenance.

Rising costs in general as well as additional regulatory requirements, such as ENR upgrade, have triggered a subsequent need to raise user rates. While growth may increase the number of users that pay into the system's fund, it also comes with added infrastructure and additional costs, for which user rates may not be adequate to cover the additional expenses. In some cases, it's also possible that affordability is a problem for disadvantaged communities.

Capital Improvements: Funds may also be used to pay for debt service for related projects or to replace or expand the system's infrastructure, such as installation of new may also be used related to these projects. It is common for new development to be required to pay for the infrastructure or costs to serve the additional demand on the system. However, this may not address increased operational expenses. In addition, for some systems, the costs to upgrade or add infrastructure is prohibitive to the developer, such as Union Bridge.

19.3.3 Summary of Limitations

The table – **Summary of Long-Range Capacity and Limitations Individual Municipal Wastewater Systems** – briefly summarizes the limiting factors for each municipal WWTP. It also provides the overall greatest limitation for each system, as well as the design capacity, 2023 flows ("Demand"), and buildout demand. A green status indicates if the 2023 design capacity for each system is projected to be able to accommodate buildout demand at buildout of the SSA, including Long-Range. Yellow status indicates that the design capacity is not projected to be able to accommodate buildout demand within the 2023 Sewer Service Area. However, the gap or the nature of the limiting factor can be more easily overcome. A red status indicates that the limitation is firm or would take a substantial, and possibly not feasible, financial investment to overcome. This table provides a quick overview of all factors to consider in determining which systems can accommodate additional demand in the future.

Summary of 2023 Buildout Capacity and Limitations Individual Municipal Wastewater Systems

Municipal System	Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*: Design Capacity	Site Limitation	TN Cap	TP Cap	Other	Limitation (mgd)	Actions Under Consideration to Increase Capacity
Freedom	S. Branch Patapsco	🟡	2,740,000	2,337,648	2,827,601	87,601	✓			✓	✓	**2.740**	Negotiate allocation
Hampstead	Loch Raven	🟡	900,000	686,822	950,107	50,107	✓			✓		**0.900**	I&I improvements
Manchester	Prettyboy	🟢	500,000	372,104	434,548	0	✓	✓				**0.500**	n/a
Mount Airy	S Branch Patapsco	🟢	1,200,000	811,519	1,189,219	0	✓			✓		**1.200**	WWTP expansion
New Windsor	Double Pipe Creek	🔴	115,000	104,687	202,115	87,115	✓					**0.115**	WWTP expansion
Taneytown	Upper Monocacy	🟡	1,100,000	979,456	1,221,832	121,832	✓			✓		**1.100**	I&I improvements
Union Bridge	Double Pipe Creek	🔴	200,000	194,030	526,827	326,827	✓	✓				**0.200**	Construct new WWTP
Westminster	Double Pipe Creek	🟡	5,000,000	4,729,923	5,007,445	7,445	✓			✓		**5.000**	I&I improvements

🟢 *WWTP will have capacity remaining at buildout of 2023 Sewer Service Area, including Long-Range.*

🟡 *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, but limitations can more easily be overcome.*

🔴 *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, and limitations would be very difficult to overcome*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

TP = Total Phosphorus; TN = Total Nitrogen

The expansion of WWTPs and improvements to collection systems require the following:

- demonstrated consistency with the local comprehensive land use plan,
- inclusion in the *Water & Sewer Master Plan*,
- a wastewater discharge NPDES permit modification (including applicable nutrient loading caps and TMDL waste load allocation), and
- other permits for the construction of the facility, including any permits required for impacts to wetlands, waterway, or the 100-year floodplain.

Public wastewater capacity *is* expected to represent a significant limitation. However, most systems should be able gain flow capacity via I&I improvements.

Manchester and Mount Airy are the only systems that will have capacity available at buildout of the 2023 Sewer Service Area.

Freedom, Hampstead, Taneytown, and Westminster will need additional capacity to serve the projected 2023 buildout demand. However, they may be able to increase flow capacity enough to meet demand through identifying and fixing inflow & infiltration (I&I) issues. The County also may be able to negotiate with the State to increase its allocation of the WWTP capacity. Beyond I&I improvements, all of these WWTPs will be constrained by caps on total phosphorus based on current design capacity. Nutrient caps would need to be evaluated if an expansion were contemplated.

To serve 2023 buildout demand, New Windsor would need to expand its WWTP, and Union Bridge would need to construct a new WWTP. Funding represents a significant limitation for both systems within these small towns.

20.0 Individual Private Septic Systems

20.1.1 Existing & Potential Septic Systems

Growth and development in Carroll County is concentrated in the DGAs where public water supply and wastewater services are available. Development outside the DGAs is generally served by individual private wells and septic systems. Existing development within a DGA but not yet annexed and served by a municipal system also is generally served by individual private wells and septic systems. The map – **Estimated Existing Septic Systems** – shows the estimated number and locations that may reasonably be assumed to be served by a private septic system. Each dot represents a lot that is likely served by a septic system based on its status as an improved lot and on its location outside of a public sewer service area.

As of 2024, the total number of residential septic systems outside of SSAs is estimated at 34,332, based on the total number of improved residential parcels outside of SSAs. Residential septic systems within the SSAs represent an additional 1,865 existing septic systems, based on existing residences with the SSAs but outside of the Existing/Final Service Area. Any systems within the Priority, Future, and Long-Range Service Area are anticipated to be replaced by public sewer service upon annexation of areas into the municipal limits or the addition of properties to the sewer service area.

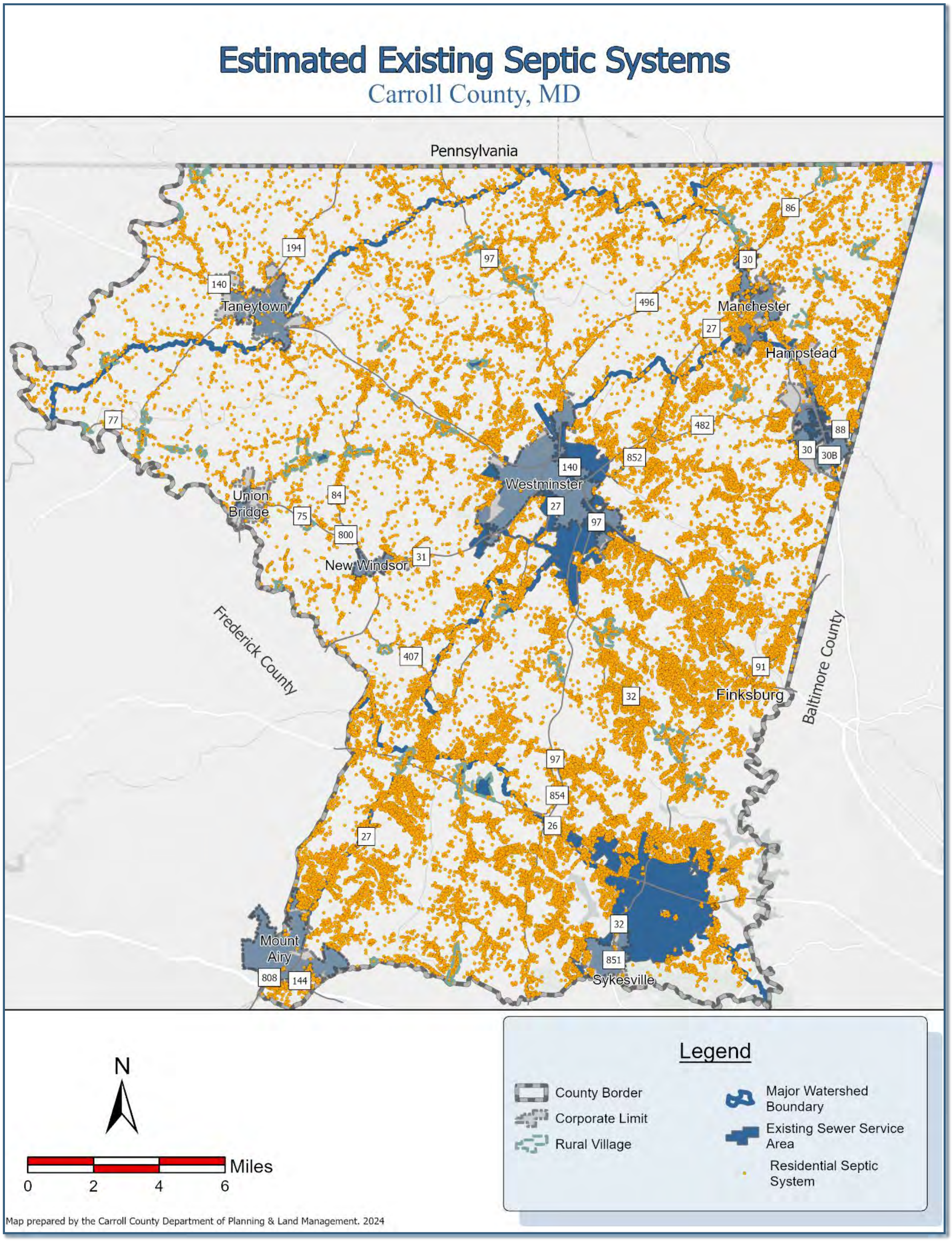
20.1.2 Wastewater Issues in Small Communities

The Carroll County Health Department (CCHD) identifies areas of the county where septic systems may be failing. With each update of the *Carroll County Water & Sewer Master Plan,* the table titled "Unincorporated Sewage Area Problem Areas" within that plan provides an inventory of these sewage problem areas. Reference this table for specific locations.

In the 1990s, the CCHD performed sanitary surveys on these small communities with potential water and/or wastewater issues. Factors evaluated as part of these sanitary surveys included total number of households, average lot size, average age of septic and wells, inadequate replacement areas, condition of onsite water and sewer systems, and other demographic data.

A committee that included representatives from the CCHD, Carroll County Departments of Public Works and Planning & Land Management, and the Carroll County Grants Office reviewed the surveys from the CCHD. The committee evaluated and prioritized the communities. The committee worked closely with the owners and residents of these communities to gage interest and socio-economic factors. As a result of these efforts, projects were completed in some of the communities to improve water and wastewater issues. These improvements included extending waterlines, building a wastewater treatment plant, and development of new community wells. Other communities were removed from the list for various reasons. For some, improvements were deemed unnecessary. For others, residents were not supportive, and/or the income survey results indicated that the community did not qualify for the Maryland Community Development Block Grant Program.

Since the mid-1990s, the Carroll County Commissioners have provided funding to resolve the nature and seriousness of water and wastewater issues in about 36 small communities or groupings of homes in the county. These small communities, or Rural Villages, are unincorporated, primarily residential, include historic structures, are characterized by older communities with high potential for water/septic problems, and are not within a DGA. The issues with onsite water and sewer systems include poor soils, small lots, high groundwater table, low-yield wells, old systems, contamination threats, and limited replacement areas.



Estimated Existing Septic Systems
Carroll County, MD
Pennsylvania
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Frederick County
Baltimore County
Finksburg
Mount Airy
Sykesville
194
140
97
496
86
30
27
77
482
88
30B
852
84
75
800
31
407
91
32
854
26
851
808
144
N
Miles
0
2
4
6
Legend
County Border
Corporate Limit
Rural Village
Major Watershed Boundary
Existing Sewer Service Area
Residential Septic System
Map prepared by the Carroll County Department of Planning & Land Management. 2024

Examples of projects implemented include the construction of a water supply system in the Bark Hill community in 1993 and the construction of a new WTP and WWTP in Pleasant Valley in 1994. Evaluations have occurred for other small communities, such as Lineboro and Finksburg, but, as of 2023, new projects had not been constructed in these communities.

Lineboro:
The CCHD conducted a sanitary survey in 1992 to collect data from the property owners and residents about Lineboro's water supply and septic systems. The Lineboro sanitary survey revealed problems with both water supplies and sewage disposal. There is very limited area to replace sub-standard water supplies. There is also little to no area to replace septic systems on many of the lots in Lineboro. This is due, in large part, to the small lots that don't allow an adequate distance between wells and septic systems or between septic systems and streams.

Since the water supply issue can be addressed more easily on individual properties, the focus has been on the viability of a public wastewater collection and treatment system. Constructing a public sewerage system in Lineboro is a long-term solution to an on-going public health problem. While the cost of such a project is high, grants and loans can make the cost more affordable to Lineboro households.

In 2009-2010, a project, consisting of a package wastewater treatment plant and collection system that would discharge highly treated effluent to a stream, was proposed and discussed with the community and MDE by County and CCHD staff. MDE recommended "package" treatment options that can meet the stringent permitting requirements for discharge to a stream that feeds a drinking water reservoir. The estimated cost at that time was between $2.5 and $3.5 million for a package plant and collection system. Money would also have been needed to purchase the property for the plant. Before moving forward, the WWTP and collection system would have needed to be included in the *Water & Sewer Master Plan.*

The project did not move forward, as the residents were not willing to pay the ongoings costs of the treatment system.

Finksburg:
In 2015, CCHD conducted a sanitary sewer survey for the Finksburg Corridor with residents in the area.

In 2024, County Planning & Land Management staff engaged in a cooperative effort with the Maryland Environmental Service (MES) and the University of Maryland Environmental Finance Center (EFC) to complete an alternatives analysis to investigate options to upgrade from failing septic tanks to a community-based wastewater treatment plant. MES partnered with an A/E sub-consultant, Watek Engineering, to support this task. Watek's proposal is included as an attachment. MES will provide technical review and oversight for the alternative's analysis and report development. This project is part of the As-Requested Services task in support of the US Environmental Protection Agency (US EPA) Region 3 Water Technical Assistance (WaterTA) Program. The Board of County Commissioners will determine if and how to move forward once the study is complete.

21.0 Potential Effects Related to Climate Change: Wastewater

Another important climate change consideration is increased flows that may strain wastewater treatment plants and sewer systems. For example, intense runoff from extreme precipitation or increased inflow and infiltration (I&I) can exceed the design capacity of wastewater systems, potentially leading to overflow of untreated wastewater or backups, clogs, and equipment malfunctions. Most wastewater systems were designed based on historical standards and conditions; a challenge with climate change is that historical conditions may not be representative of future flows that may bring high hydraulic and nutrient or other contaminant loads.

Warmer temperatures are not anticipated to substantially affect wastewater processes because air temperatures predicted for the County are within the range of conditions that are generally considered to be good for bacteria involved in waste breakdown. It is possible that warmer temperatures associated with climate change may lead to odor issues, low dissolved oxygen in receiving waters because the solubility of oxygen is lower in warmer water than cooler water, and occasional treatment challenges. However, given the range of potential climate changes, it is likely that extreme hydrologic events that affect influent loads and characteristics will negatively affect wastewater plants more than warmer air temperatures.

Another potential concern associated with climate change is septic systems that are common on residential properties in Carroll County. These private systems do not fall under the purview of the County or municipalities but are vulnerable to climate change (e.g., increased export of organic matter from system failures or incomplete microbial breakdown) and may affect water quality regulatory compliance. For example, shifting hydrologic conditions such as more intense precipitation, warm saturated soils, and rising water tables associated with climate change may put additional strain on buried septic systems. Insufficient nutrient treatment by impacted septic systems can result in increased nutrient loadings into County water resources.

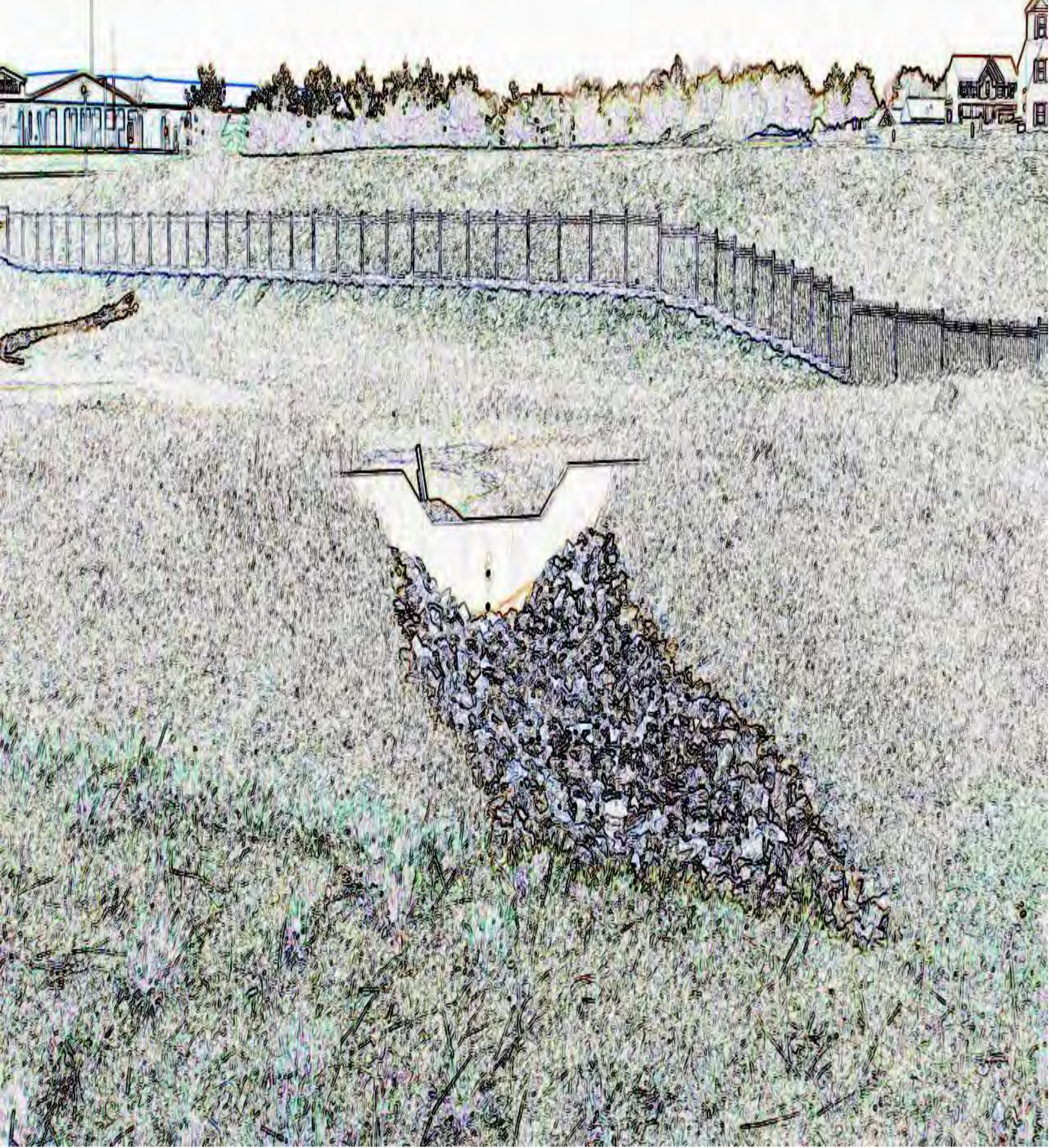
In addition to the 80% threshold and peaking factors set forth in MDE's 2006 *Guidance Document, Wastewater Capacity Management Plans*, climate change resiliency requirements that address peak inflow surges must be included in draft NPDES wastewater permits (MAMWA, 2023). Permittees will assess and maintain facilities to confirm that they can adequately meet potential inflow surges from extreme weather events. Facilities with less than 20% available capacity, or non-compliance records from surge events, must develop and submit plans to address peak flow surges (MAMWA, 2023). Additional information about potential climate change conditions that may affect WWTPs is discussed *Task 5 Climate Change Technical Memorandum* (Hazen and Sawyer, 2023).

22.0 Potential Effects of Emerging Contaminants of Concern: Wastewater

The presence of endocrine disruptors (compounds that can mimic hormones such as estrogen) and pharmaceuticals has been a concern for water utilities since the early 1990s. Wastewater treatment plants are one of the top sources for these compounds, though other sources such as agriculture and manufacturing can contribute as well. Conventional wastewater treatment technologies were not designed to remove pharmaceuticals, and many of these compounds pass through wastewater treatment.

In February 2023, MDE paused authorization of new permit applications for the land application of biosolids (sewage sludge) due to PFAS concerns (MDE, 2023). Wastewater treatment plants are being targeted by MDE to test for the presence of PFAS in influent, effluent, and biosolids to gather data and better understand where action, including regulations, may reduce risk to human health. The Westminster WWTP is on the list of identified test sites given the City's plans for indirect potable reuse. Renewal of existing land application of biosolids permits will continue as information is evaluated; as PFAS testing results become available, results will be posted on the Wastewater Pollution Prevention and Reclamation Program's website (MAMWA, 2023).

Stormwater



Stormwater

This section of the WRE is intended to assess the current level of existing and planned land use regarding nonpoint source (NPS) pollutant loading. It is also intended to evaluate the land use planning and management processes within the County and municipalities as to their effectiveness in addressing NPS loading issues. The specific NPS impacts are associated with stormwater runoff from urban/suburban development, agricultural runoff, and septic system loading via subsurface flow. Components of each of these sources may be regulated to some degree, but only from an individual permitting prospective. This evaluation and analysis provides a larger, more regional assessment of NPS loading. It provides, as called for in the Models and Guidance Document #26, "preliminary assessment… crafted to provide general insight into this process and serve as a starting point for future nonpoint source analysis."

23.0 Restoration-Related Requirements

23.1 Chesapeake Bay TMDLs and Restoration

Despite restoration efforts between the 1980s and 2000s to restore the Chesapeake Bay and its tributaries, the EPA, in December of 2010, established the Chesapeake Bay TMDL (Total Maximum Daily Load). The Chesapeake Bay TMDL identified the reductions necessary, across all jurisdictions within the watershed, and set limits on nutrient loadings in order to meet the designated uses within the Bay and its tributaries.

The pollutants of concern for the Bay TMDL are nitrogen, phosphorus, and sediment. Excessive nitrogen and phosphorus in the Chesapeake Bay and its tidal tributaries promote a number of undesirable water quality conditions, such as excessive algal growth, low dissolved oxygen (DO), and reduced water clarity (Smith et al. 1992; Kemp et al. 2005).

The TMDL sets Bay watershed limits of 185.9 million pounds of nitrogen, 12.5 million pounds of phosphorus, and 6.45 billion pounds of sediment (aka Total Suspended Solids or TSS) per year. This reflects the need for a 25% reduction in nitrogen, a 24% reduction in phosphorus, and a 20% reduction in sediment. All states in the Chesapeake Bay watershed need to work toward achieving the overall reductions, and all counties in the Bay watershed have a stormwater wasteload allocation (SW-WLA) to achieve.

23.2 National Pollutant Discharge Elimination System (NPDES) Municipal Storm Sewer System (MS4) Permit Restoration Requirements

Stormwater runoff is considered a non-point source discharge. Stormwater pollution is regulated under the U.S. Clean Water Act (CWA) as a means of addressing water quality.

The permit requires all permittees to manage, implement, and enforce a stormwater management program (SWMP) in accordance with the Clean Water Act (CWA) and corresponding stormwater NPDES regulations. According to the MDE, the goals of Carroll County's MS4 permit are to control stormwater pollutant discharges and unauthorized discharges into the MS4, to improve water quality within the county's urban watersheds, and to work toward meeting water quality standards.

In alignment with these goals, 402(p)(3)(B)(iii) of the CWA requires the County to implement "…controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and systems, design and engineering methods, and such other provisions as the administrator or state determine appropriate for the control of such pollutants."

The U.S. EPA, MDE, and the courts have determined that the impervious acre restoration requirements and associated pollutant reductions are consistent with Maryland's Phase III Watershed Implementation Plan (WIP) and satisfactory for addressing both the Chesapeake Bay and other applicable TMDL wasteload allocations (WLAs). The MS4 permits require each jurisdiction to restore a specific amount of uncontrolled impervious surfaces based on watershed assessments during each five-year permit cycle. The County and the municipal co-permittees continue to actively implement an adaptive and substantial restoration program.

The County's NPDES MS4 permit requires that a countywide TMDL implementation plan addressing each EPA-approved stormwater WLA be submitted to MDE for approval. Any subsequent TMDL WLA approved by the EPA is required to be addressed in a restoration plan within one year of EPA approval.

In addition to restoration requirements and TMDL reductions, the MS4 permit requires that management programs be implemented jurisdiction-wide. These management programs are designed to control stormwater discharges and reduce associated pollutant loadings to the maximum extent practicable (MEP) and shall be maintained for the term of this permit. Additionally, these programs shall be integrated with other permit requirements to promote a comprehensive adaptive approach toward solving water quality problems. The management programs include but are not limited to:

- Stormwater management,
- Erosion and sediment control,
- Illicit discharge detection and elimination,
- Property management and maintenance, which includes, among other things, developing, implementing, and maintaining good housekeeping plans for County or municipal-owned properties and salt management plans to reduce the use of winter weather deicing and anti-icing materials, and
- Public education.

23.3 Countywide TMDL Stormwater Implementation Plan & Restoration Plans

The County's fifth-generation NPDES MS4 permit requires that a restoration plan for each EPA-approved stormwater WLA be submitted to MDE for approval. Any subsequent TMDL WLA approved by the EPA is required to be addressed in a restoration plan within one year of EPA approval.

In addition to the Chesapeake Bay TMDL, seven watersheds within Carroll County have approved TMDLs that require pollutant reductions in order to meet water quality standards. The table – **Baseline, TMDL, & % Reduction Required** – below shows the baseline loads, TMDLs to achieve, and the associated percent reductions needed to achieve them.

SW-WLA TMDLS by Watershed
Baseline, TMDL, & % Reduction Required
Carroll County & Municipalities

Watershed	TMDL Pollutant	Baseline (units/yr*)	TMDL (units/yr*)	% Reduction Required
Liberty Reservoir	Bacteria	86,352	9,326	89.2%
	Phosphorus	13,889	6,995	50.0%
	Sediment	4,630	2,880	38.0%
Prettyboy Reservoir	Bacteria	37,268	5,650	84.8%
	Phosphorus	1,843	1,572	15.0%
Loch Raven Reservoir	Bacteria	5,140	125	98.0%
	Phosphorus	472	401	15.0%
Upper Monocacy River	Bacteria	432,969	13,855	96.8%
	Phosphorus	1,427	1,353	5.0%
	Sediment	657.9	371.5	44.0%
Lower Monocacy River	Bacteria	116,000	1,856	98.4%
	Phosphorus	1,155	806	30.0%
Double Pipe Creek	Bacteria	4,423,635	67,365	98.5%
	Phosphorus	16,129	4,441	72.0%
	Sediment	4,759	3,149	34.0%
South Branch Patapsco River	Phosphorus	7,889	6,706	15.0%
	Nitrogen	72,890	61,957	15.0%

** Bacteria loads are in billion MPNs/yr, phosphorus and nitrogen are in pounds/yr, and sediment is in tons/yr*

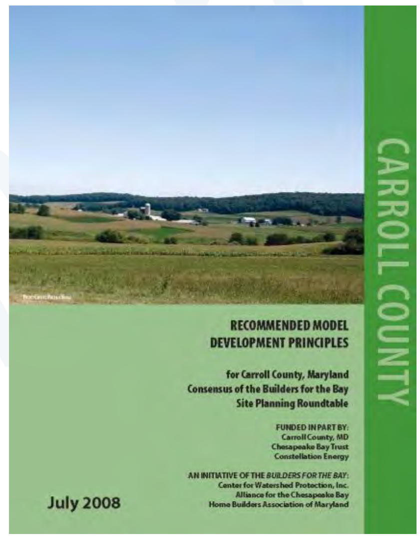
The list of EPA-approved TMDLs for Carroll County includes bacteria. The bacteria TMDL is calculated and broken down into four main sources: human, domestic pet, livestock, and wildlife. While the County recognizes a need for bacteria reductions across all sources, the focus is on the reduction of human-related sources associated with the stormwater wasteload allocation (SW-WLA).

24.0 Stormwater Programmatic Initiatives

24.1 Stormwater Programmatic Assessment: Builders for the Bay Process

According to the State Models and Guidelines document for the WRE, a jurisdiction should provide a stormwater programmatic assessment. This assessment should include a review of all stormwater management requirements and the effectiveness of program implementation. This analysis should include a review of local ordinances, policies, plan approval requirements, enforcement, as well as other key components of the program.

Carroll County Government participated in a "Builders for the Bay" roundtable in coordination with the Alliance for the Chesapeake Bay, Home Builders Association of Maryland, and the Center for Watershed Protection (CWP). The purpose of the roundtable in Carroll County was to adapt the principles developed at the national level for local application and to identify local codes and ordinances that act to promote Better Site Design through a consensus-building process. The roundtable process was modeled after the National Site Planning Roundtable and has four basic objectives:



- Reduce overall site impervious cover
- Preserve and enhance existing natural resources
- Integrate stormwater management
- Retain a marketable product

The first step in the process was an evaluation of the County's existing codes, ordinances, policies, and regulations. The evaluation was performed via *Model Development Principles* and scored based on national benchmarks for Better Site Design. The evaluation was performed by staff from CWP. The findings in the final evaluation document (July 2008) provided an excellent summary regarding the County's existing efforts:

"The results of this review revealed that the County has an existing set of strong developed standards. In particular, the natural resource protection and stormwater management program are some of the best in the state. These programs include strong stream buffers and tree protection as well as requiring all new homes to disconnect their roof tops. In addition, the County's dedicated staff addressed environmentally friendly regulations even before the Roundtable process began."

The roundtable process started September 2007 with a kick-off meeting that allowed all of the members to become acquainted with the Better Site Design principles. At this meeting, members were presented with the results of the in-depth review of the existing county codes, ordinances, and regulations. This meeting produced a detailed analysis of regulatory barriers to environmentally sensitive site designs for Carroll County. The 35 participants of the roundtable process met several times over the course of eight months. From September 2007 through January 2008, subcommittee meetings were held, separating the participants into four committees based on their strengths and interests. These four committees went hand-in-hand with the four objectives of the roundtable. The committees were:

- Residential Streets and Parking Lots,
- Lot Development,
- Natural Resource Management, and
- Stormwater Management.

In February 2008, the roundtable participants reconvened to collect consensus on each subset of the *Model Development Principles* for better site plans and discuss their final recommendations. In April 2008, the members met again to discuss implementation principles.

Over the course of eight months, the roundtable composed specific recommendations and rationales based on suggestions from the four subcommittees. Each of the four subcommittees offered specific principles, recommendations, and rationale to minimize the amount of new impervious cover throughout the county and to reduce NPS pollution. The final consensus document was presented to and approved by the Carroll County Board of Commissioners on July 24, 2008. Prior to the presentation to the Commissioners, numerous boards and groups also presented findings. The specific recommendations of each subcommittee can be found in the consensus document for the *Carroll County Builders for the Bay Site Planning Roundtable*. (The report can be found on the Center for Watershed Protection's website at https://owl.cwp.org/?mdocs-file=5135).

24.2 Stormwater Management Code

When runoff from precipitation flows over impervious surfaces, it can accumulate debris, chemicals, sediment, and other pollutants that may adversely affect the water quality of a stream. Additionally, the volume and velocity of the runoff can erode the stream banks, which results in habitat degradation and sediment mobilization, resulting in potential additional pollution from legacy nutrients that are bound to the soil. Together, these physical and chemical stressors create a high potential for stream degradation.

The State of Maryland began requiring stormwater management for new development in the mid-1980s to manage the quantity of runoff. In 2000, MDE released a new design manual for stormwater (MDE, 2000) that increased water quality and quantity control requirements and included stormwater management for subdivisions with lots greater than two acres. The manual was then revised in 2009 to reflect the use of environmental site design (ESD) practices.

Chapter 151 Stormwater Management of the Carroll County Code was adopted pursuant to the Environmental Article, Title 4, Subtitle 2 of the Annotated Code of Maryland. Municipalities in Carroll County either implement Chapter 151 or have their own stormwater management code. The purpose of this chapter is to protect, maintain, and enhance public health, safety, and general welfare by establishing minimum requirements and procedures to control the adverse impacts of increased stormwater runoff. This code applies to all development and establishes minimum requirements to control the adverse impacts associated with stormwater runoff.

The goal of Chapter 151 is to manage stormwater by using environmental site design (ESD) to the maximum extent practicable (MEP) to: maintain after development, as nearly as possible, the predevelopment runoff characteristics; reduce stream channel erosion, pollution, and sedimentation; and use appropriate structural BMPs only when necessary. Implementation of Chapter 151 helps to restore, enhance, and maintain the physical, chemical, and biological integrity of streams, minimize damage to public and private property, and reduce the impacts of land development.

The current chapter was adopted in 2010 and was written to include the State of Maryland revisions to the design manual (MD Code, Environmental Article, Title 4, Subtitle 2), which mandated the use of non-structural ESD practices statewide to the MEP to mimic undeveloped hydrologic conditions.

As part of MDE's Advancing Stormwater Resiliency in Maryland (A-StoRM) initiative in 2023 - 2024, MDE drafted proposed revisions to the stormwater regulations. MDE worked with a Stakeholder Consulting Group to review proposed revisions and generate feedback. MDE anticipates adopting revisions to the stormwater regulations in 2025. Carroll County and its municipalities will be required to adopt revisions to their codes that reflect the changes to the State regulations.

24.3 Public Outreach and Education

An informed community is crucial to the success of any stormwater management program (US EPA, 2005). Throughout the year, County staff help inform the public of the importance of stormwater management and protecting water resources through a variety of outreach channels.

Across County and municipal websites, information is available to the general public on the MS4 program, stormwater management, and how to report pollution incidents. Various newsletters, such as the quarterly Bureau of Resource Management newsletter, and the *Carroll Environment* Facebook page provide updates on restoration projects, monitoring efforts, and outreach events to the public.

The County and municipalities also provide outreach at local events, where an information booth is set up to provide materials and displays on homeowner stewardship, restoration efforts, volunteer opportunities, and other related topics. Staff engage with the public to answer questions and help connect them with their local watersheds and natural resources. Other hosted events, such as stream clean-ups or tree plantings, provide additional opportunities for involving the public in stewardship and restoration directly.

Carroll County also works with students to introduce concepts of stream health, watershed protection, restoration, and monitoring into their curriculum. These types of events range from in-classroom presentations to full field days with students and from pre-school through college-level groups.

The County's *MS4 Public Outreach Plan* is iteratively updated and provides a roadmap for public education and outreach development for each MS4 permit term. The County continues to expand its education and outreach efforts within all watersheds, regularly seeking additional opportunities to engage the public in water resource-related issues.

24.4 Water Resource Protection Easements

As part of the development process, Carroll County protects waterways and floodplains with perpetual easements to minimize the potential for impacts to these sources during and after construction. The purpose of the Carroll County Water Resource Code (Chapter 154) is to protect and maintain ground and surface water resources of the County by establishing minimum requirements for their protection. The Carroll County Floodplain Code (Chapter 153) also provides a unified, comprehensive approach to floodplain management. Floodplains are important assets that provide vital natural functions such as temporary storage of floodwaters, moderation of peak flood flows, maintenance of water quality, and prevention of erosion.

These perpetually protected easements limit landowner use of environmentally sensitive areas and reduce the amount of nutrients and other pollutants entering the waterways. Easement locations associated with Carroll County's Chapters 153 and 154 are shown on the map – **Floodplain and Water Resource Protection Easements**.

24.5 Rural Legacy Areas

Maryland's Rural Legacy Program was created in 1997 to protect large, continuous tracts of land from sprawl development and to enhance natural resource, agricultural, forestry and environmental protection through cooperative efforts among state and local governments and land trusts (https://dnr.maryland.gov/land/pages/rurallegacy/home.aspx).

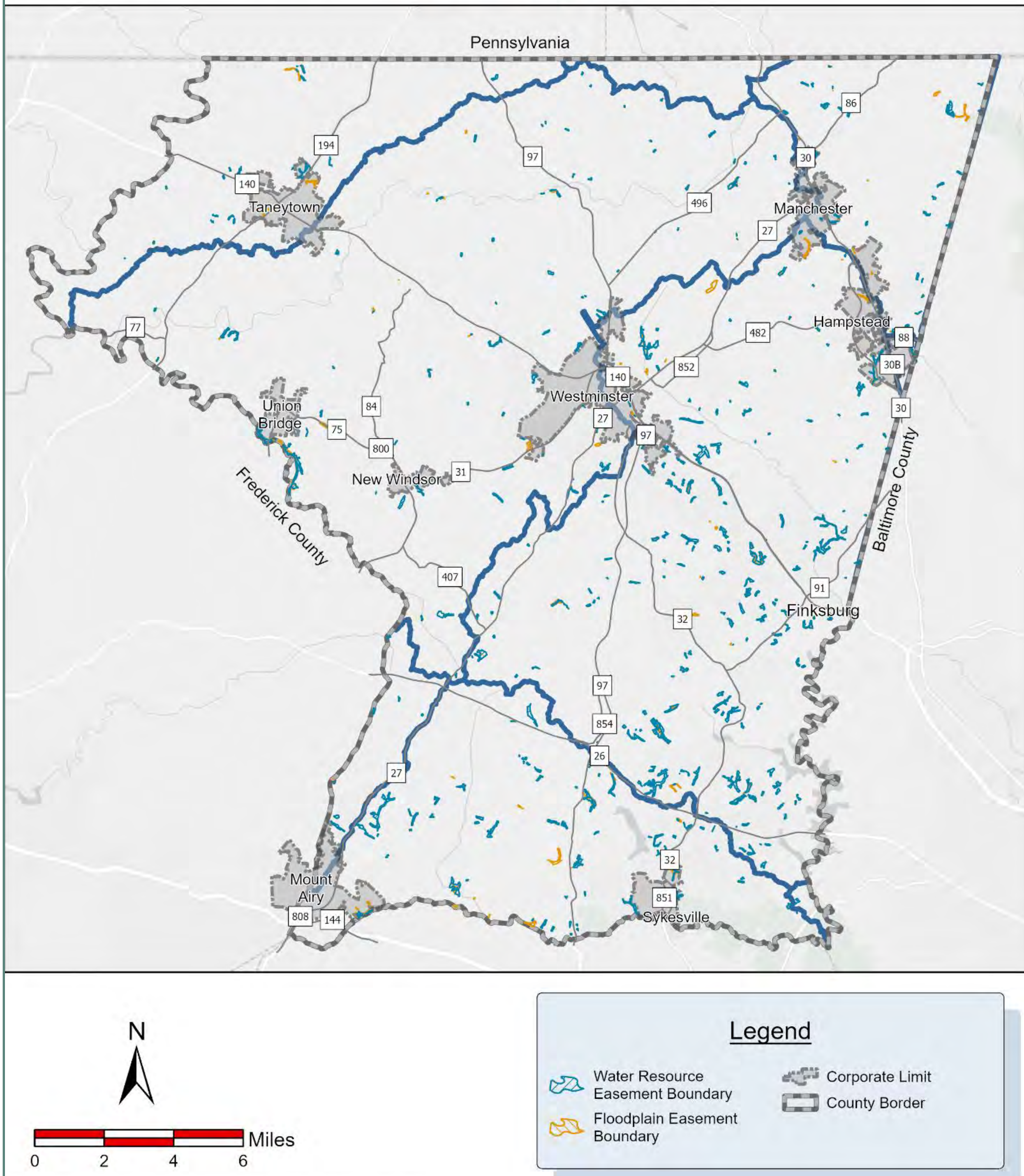
The goals of the Rural Legacy Program are to:

- Establish greenbelts of forests and farms around rural communities in order to preserve their cultural heritage and sense of place;
- Preserve critical habitat for native plant and wildlife species;
- Support natural resource economies such as farming, forestry, tourism, and outdoor recreation, and;
- Protect riparian forests, wetlands, and greenways to buffer the Chesapeake Bay and its tributaries from pollution run-off.

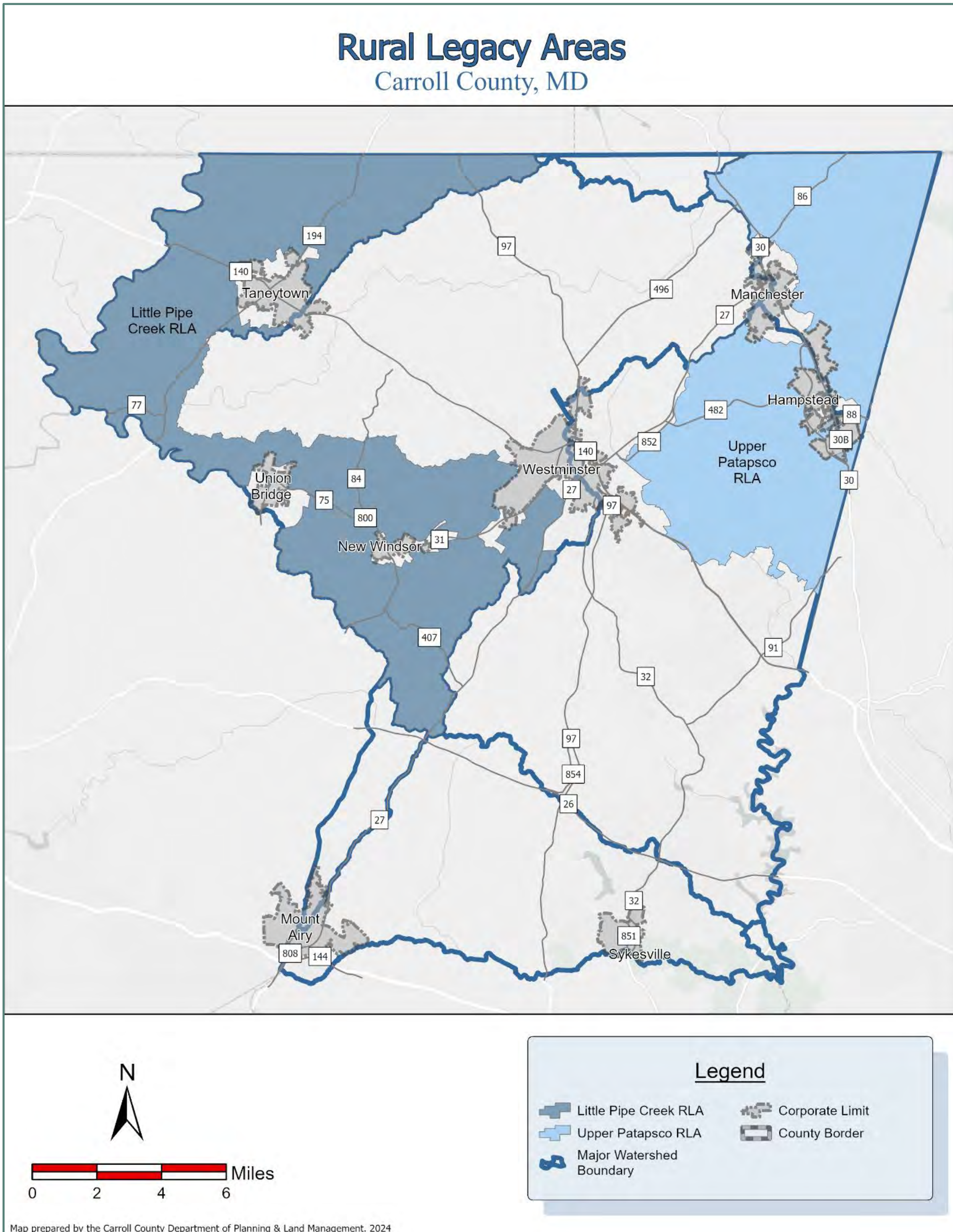
Carroll County includes the Little Pipe Creek Rural Legacy Area and part of the Upper Patapsco Rural Legacy Area. These areas within Carroll County account for over 98,745 acres, which is nearly 40% of the land outside of the growth area boundaries. In 2025, Carroll County was applying to expand the Rural Legacy Areas to include more acres. The extent of the Rural Legacy Areas within Carroll County can be found on the map – **Rural Legacy Areas**.

Floodplain and Water Resource Protection Easements

Carroll County, MD



Map prepared by the Carroll County Department of Planning & Land Management. 2024


Rural Legacy Areas
Carroll County, MD
Little Pipe Creek RLA
Upper Patapsco RLA
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Mount Airy
Sykesville
194
140
97
496
86
30
27
77
482
88
30B
852
84
75
800
31
407
91
32
854
26
808
144
851
N
Miles
0
2
4
6
Legend
Little Pipe Creek RLA
Upper Patapsco RLA
Major Watershed Boundary
Corporate Limit
County Border
Map prepared by the Carroll County Department of Planning & Land Management. 2024

25.0 Coordination & Support

25.1 Water Resources Coordination Council

The Water Resources Coordination Council (WRCC) was formed by the Carroll County Commissioners, the eight municipalities, and the Carroll County Health Department in February of 2007 through a cooperative partnership and by formal joint resolution to discuss and address issues related to water resources. Monthly meetings, attended by representatives from the eight municipalities, the County, and the Carroll County Health Department, provide an excellent opportunity to discuss pertinent issues related to drinking water, wastewater, and stormwater management.

The WRCC led the effort to coordinate and develop the joint WRE. Since this process involved substantial technical information, for the initial WRE in 2010, a WRE Guidance Team was formed to discuss issues as they arise. This team included representatives of County staff, each municipality, and the three relevant State agencies (MDE, MDP, and DNR). A WRE Work Group (consisting of the County and municipal representatives from the WRCC) met periodically to work through issues related to data collection and technical background assessments.

The WRCC also served as the local Watershed Implementation Plan (WIP) team for development and implementation of Maryland's Phase III WIP and continues to address WIP-related issues and tasks as they arise.

In FY 2013 and FY 2014, the WRCC collaborated to develop and sign a Memorandum of Agreement (MOA) to implement NPDES MS4 permit requirements, with specific provisions to cost share the capital costs of meeting the municipalities' stormwater restoration requirements. The WRCC acts as the forum for setting project priorities, and the County will continue to provide administrative and operating support services for the restoration program. The MOA was subsequently updated and re-affirmed on October 7, 2021.

25.2 Carroll County NPDES MS4 Team

The NPDES team was formed following the issuance of the County's fourth-generation MS4 permit, which became effective on December 29, 2014. The team meets quarterly to discuss goals and progress related to MS4 permit compliance. The team consists of personnel from the Department of Planning & Land Management, including administration, water resources, stormwater, grading, engineering, and compliance.

25.3 Environmental Advisory Council

The Environmental Advisory Council (EAC) is a Commissioner-appointed citizen board that provides an open forum on environmental issues and concerns. Monthly meetings are open to the public. The EAC functions at the direction of the Carroll County Board of Commissioners, works cooperatively with County environmental staff to research environmental policy issues, advises the Board of County Commissioners on environmental issues, fosters environmental education, and acts in the best interest of County residents by promoting effective environmental protection and management principles. The EAC is briefed periodically on NPDES permit specifics and implementation.

In its role to promote environmental awareness and outreach, the EAC accepts nominations for Environmental Awareness Awards every other year. Winners are typically recognized in a joint ceremony with the Board of County Commissioners, in the press, and on the EAC's website.

Since 2014, the EAC biennially prepares the *Environmental Stewardship in Carroll County* booklet, which is made available on the website and distributed at various other venues. The booklet describes efforts and initiatives undertaken by the County to demonstrate environmental stewardship and protection, including stormwater restoration, management projects, and progress.

The EAC also continually develops public outreach documents for a wide range of environmental topics, many of which are applicable to water supply, water quality, and NPDES MS4 permit requirements.

25.4 Monocacy Scenic River Board

The Carroll County Monocacy Scenic River Board advocates for the Monocacy River, its watershed, and the varied resources contained within. The Board is charged with promoting best management practices, advocating for sustainable land uses, and encouraging the restoration and enhancement of the natural resources within the Monocacy River Watershed. This mission is accomplished through public education, volunteer opportunities, and encouraging multi-jurisdictional partnerships that will maintain and improve the river's water quality and ecological health, while respecting the property rights of landowners within the watershed.

26.0 Agricultural Best Management Practices (BMPs)

26.1 Carroll County Agricultural Land Preservation Program

This program, implemented through the County Department of Planning & Land Management (PLM), establishes permanent protection easements, through the purchase of development rights on lands throughout the County. The purchase of easements occurs in the rural region of the county, outside municipal boundaries and DGAs. In addition to the elimination of development potential (residential as well as other permitted uses), the establishment of an easement also requirements the implementation of a Total Farm Soil and Water Conservation Plan. These plans are designed and implemented through the local Conservation Partnership to protect and enhance the county's soil and water resources. Therefore, the program provides two vital functions related to NPS loading, the elimination of potential onsite wastewater systems and the development of a conservation plan designed to reduce nutrient and sediment runoff.

As of October 2024, the County has approximately 80,461 acres of permanently preserved land with a goal of 100,000 acres. This acreage places Carroll County among the leaders nationally in preserved land. This critical programmatic/funding initiative has produced a tremendous restoration and preservation effort toward achieving NPS watershed goals and ultimately the restoration of the Chesapeake Bay.

26.2 Conservation Partnership

The Regional Conservation Partnership Program (RCPP) is the combined efforts of the Federal Natural Resources Conservation Service, Maryland Department of Agriculture (MDA) and the locally funded/implemented Carroll County Soil Conservation District. The Partnership, which is located in Westminster, provides technical assistance and funding (through various federal/state programs) to local agricultural producers. The overall goal of the Partnership is to provide technical and administrative assistance to agricultural producers to help them implement Agricultural Best Management Practices (BMPs) that enhance/protect soil and water resources.

The Carroll County Partnership is a continual leader in the State of Maryland for conservation implementation, as shown in the table – **Maryland Agricultural Cost Share Program.** This table indicates the total number of agricultural BMPs installed through the Maryland Agricultural Cost Share (MACS) program during the years between 2000-2008 and 2016-2023 (the MACS annual reports are no longer available on the website for years prior to 2016) (*2022 Annual Report: Growing to Meet New Challenges*. *Maryland Department of Agriculture)*. The table also indicates the dollars of State-provided cost share monies received by producers. The local partnership consistently ranks first in the state with the construction of BMPs. The construction of BMPs results in specific reductions of nutrient and sediment runoff from agricultural operations.

Maryland Agricultural Cost Share Program
Carroll County

Year	Cost Share Received	Ag BMPs Completed	State of MD Ranking	Cover Crop (Acres)
2000	$457,841	184	1	1,292
2001	$642,785	204	1	No Data Available
2002	$562,277	213	2	1,675
2003	$546,266	273	1	4,726
2004	$403,024	177	1	5,982
2005	$674,809	149	1	1,666
2006	$579,842	132	1	4,495
2007	$600,458	140	1	14,796
2008	$683,092	153	1	10,443
2016	$1,699,049	131	1	32,065
2017	$888,183	68	1	34,469
2018	$437,673	36	5	19,967
2019	$760,290	30	3	18,774
2020	$633,456	62	1	25,883
2021	$897,216	70	1	29,294
2022	$1,007,564	61	1	22,640
2023	$1,622,567	83	1	24,211*

Source: Maryland Department of Agriculture, MACS Annual Reports
**denotes Spring Certified Acres*

The Partnership is the direct source of cost-share funding and develops, with the producer, a Soil and Water Conservation Plan for farm operations. These plans provide the design and timeframe for the implementation of the above referenced BMPs. The Soil and Water Conservation Plan acts as a comprehensive plan for the farm's operations.

Other BMPs and programs implemented within MACS include developing nutrient management plans and the Conservation Resource Enhancement Program (CREP).

Nutrient Management Plans: Farmers are required to follow nutrient management plans when fertilizing crops and managing animal waste. These plans specify how much fertilizer, manure, or other nutrient sources may be safely applied to crops to achieve yields and prevent excess nutrients from impacting waterways. These plans generally are required for all agricultural land used to produce plants, food, feed, fiber, animals, or other agricultural products. Maryland's updated regulations now require farmers to establish setback areas next to waterways.[1]

Conservation Resource Enhancement Program (CREP): CREP is a federal-state program that pays landowners to take environmentally sensitive cropland out of production for 10 to 15 years and to install conservation practices that protect water quality and provide wildlife habitat. In Fiscal Years (FY) 2021 and 2022, a total of 20 CREP projects were completed in Carroll County with $48,530 and $1,996, respectively, in cost-share grants to install stream protection measures.

The program provided about $897,216 in FY 2021 and $1,007,562 in FY 2022 in capital funds for Carroll County farmers to invest in installing a total of 131 conservation projects on their farms to control soil erosion, to reduce nutrient runoff, and to improve water quality. In FY 2019 and 2020, Carroll County farmers completed the highest number of projects *and* received the greatest amount of funding of all Maryland counties in FY 2021 and FY 2022.

Cover Crops: Farmers who plant certain cover crops on harvested crop fields in the fall help to recycle residual plant nutrients, to protect against wind and water erosion, and to improve soil for next year's crop. Cover crops help to prevent nitrogen and phosphorus from reaching the Bay. In FY 2021 and FY 2022, through participating in MACS alone, Carroll County farms planted cover crops totaling over 29,294 and 22,640 acres, respectively.

Environmental Quality Incentives Program (EQIP): EQIP helps agricultural producers promote agricultural production and environmental quality as compatible goals. Through EQIP, farmers receive financial and technical assistance to implement structural and management conservation practices that optimize environmental benefits on working agricultural land. Priorities include reducing nonpoint source pollution; conserving ground and surface water resources; reducing emissions and ozone precursors and depleters; reducing soil erosion and sedimentation; promoting at-risk species habitat conservation; energy conservation; and biological carbon storage and sequestration.

Maryland has identified the following additional priorities:

1. Livestock Management
2. Grazing Management
3. Erosion Control
4. Nutrient Management
5. Pest Management
6. Wildlife Habitat Enhancement

(National Resources Conservation Service. *https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives*)

Panora Acres in the Gunpowder and Patapsco Watersheds provides an example of how **EQIP** funds are used **in Carroll County**. The Sellers family had 300 head of dairy cattle eroding the streambanks and increasing nutrient concentrations in runoff. Through EQIP, the family installed stream crossings to allow safe passage and avoid erosion and nutrients in the stream. They fenced their cattle out of 2½ miles of the stream and planted buffers to stabilize the banks.

Agricultural Management Assistance Program (AMA): AMA provides cost-share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Producers may construct or improve water management structures or irrigation structures; plant trees for windbreaks or to improve water quality; and mitigate risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. Assistance is also available for constructing seasonal high tunnels and associated practices.

It is clear that the combination of the Carroll County Agricultural Land Preservation Program in conjunction with the programs of the local Conservation Partnership provides a state-leading effort to control and reduce agricultural NPS loading. The sustained efforts of the Partnership, along with continued support of the Board of County Commissioners, ensures that the County will lead the state in the restoration, enhancement, and protection of soil and water resources via agricultural conservation measures.

26.3 Forest Conservation Enhancement

The County and its municipalities have adopted several enhancements to the State's Forest Conservation Act (FCA) requirements which provide support to water quality goals. Since the adoption of the Carroll County Forest Conservation ordinance in the early 1990s, all forest areas remaining on developed sites have been retained via a perpetual protection easement.

In 2023, the State of Maryland adopted legislation that encourages the retention and sustainable management of forest lands by legislating a no net loss of forest, thus endeavoring to achieve an increase in land covered by tree canopy and forest both inside and outside an urban area. The FCA also modifies multiple definitions.

The County has also pioneered the use of forest banking. Banking is a process where a landowner agrees to reforest property, places a permanent protection easement on the new woodlands, and then sells acreage from the planted area to developers in need of mitigation. This process is between private entities. The County approves the sites, ensures the recordation of easements, and tracks bank status. The County directs reforestation banking on priority areas where water quality benefits are maximized. There have been hundreds of acres established using this specific mitigation option. The ability to target sensitive areas through the bank approval process has allowed the County to maximize water quality benefit associated with mitigation. In many cases, areas which were once productive agricultural lands or exhausted pastures have now become revitalized forest lands.

26.4 Stream Buffer Preservation

In order to mitigate the impacts of development on surface water resources, the County implemented stream buffer requirements in 1993. The initial effort required the preservation, via a perpetual easement, of all lands within 100 feet of a stream when property was subdivided for land development. In 2004, the Board of County Commissioners formally adopted stream buffer regulations as part of a comprehensive Water Resource Management Ordinance (Chapter 154). The enhanced requirements use a variable width calculation to delineate the buffer boundary. This buffer is required on all development projects (not just subdivision) and provides a permanent easement dedicated to the Board of County Commissioners. The new variable width buffer calculation incorporates site-specific features, including wetlands and steep slopes.

The delineation and permanent preservation of stream buffers provides one of the very best techniques for the mitigation/restoration of NPS pollution associated with land development. The County and municipalities have permanently preserved 2,267 acres of riparian stream buffers associated with land development activities.

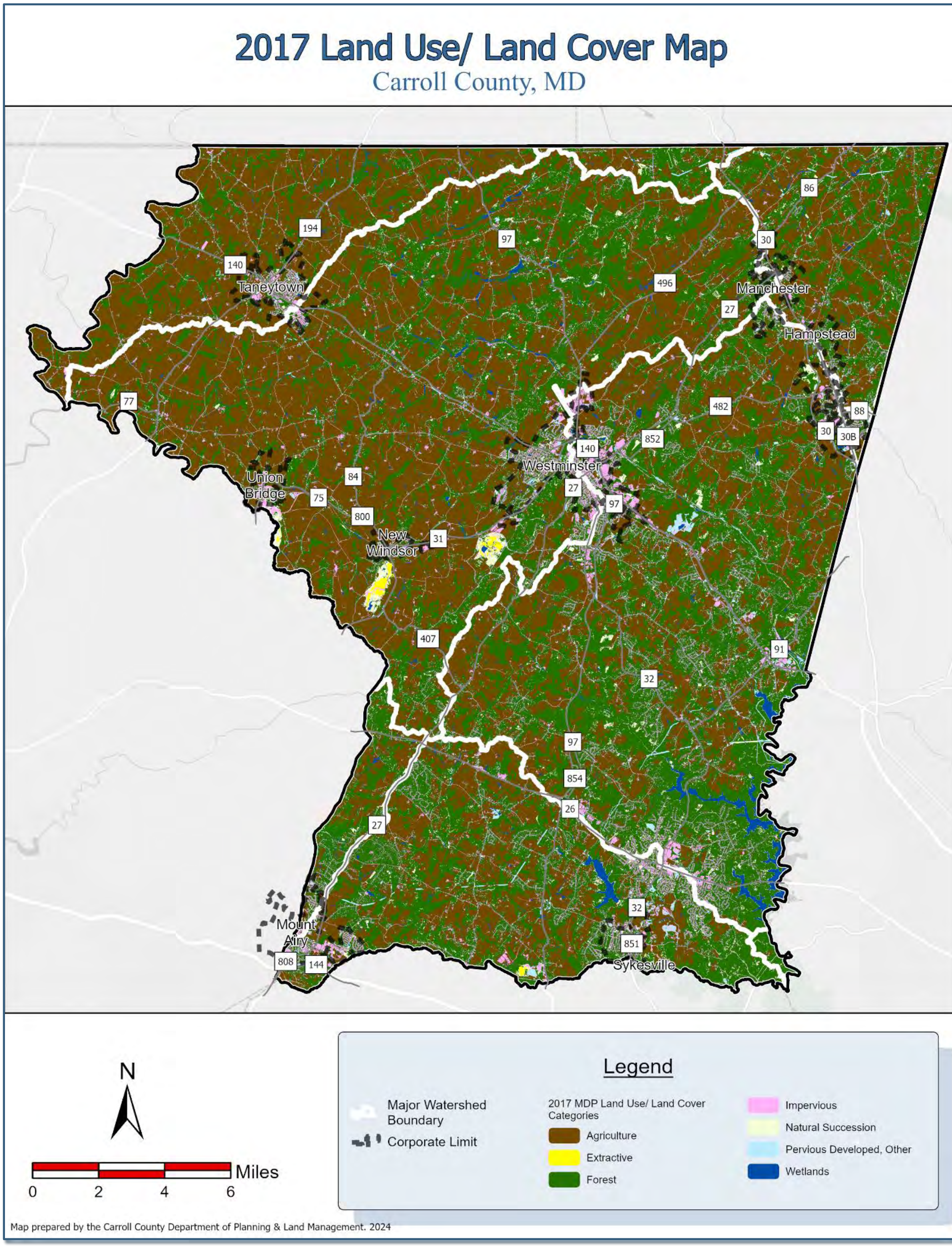
27.0 Total Maximum Daily Loads (TMDLs) by Watershed

27.1 Nonpoint Source Spreadsheet: 2010 WRE

The Nonpoint Source Spreadsheet (NPSS) was a loading analysis model used to assess the nonpoint source pollution loadings entering receiving waters for the 2010 WRE. The methodology used in the NPSS was provided by the State and was intended to allow for a consistent comparison of current and future stormwater and other nonpoint source loads. Stormwater pollutants in the model reflected estimated nitrogen and phosphorus entering receiving waters from stormwater runoff and septic systems. The NPSS was used to estimate the amount of nitrogen and phosphorus (or nutrients) in pounds/year by watershed. The load estimates were determined by assigning different loading rates for each type of land use and for septic systems. This tool produced “ballpark” results that allowed the user to compare the relative change in loadings between different land use scenarios. The NPSS also estimated the amount of impervious cover and open space.

The NPSS was a collaborative effort by MDE, MDP, and Carroll County Government. MDP supplied the Land Use/Land Cover (LULC) data by water basin for 2002 and 2007 and projected the future LULC data scenarios. The Land Use/Land Cover data indicated how the land was actually being used or what type of vegetation or agricultural use was in place at the time the data was assembled. MDE tailored the NPSS to Carroll County and assigned loading rates and impervious cover ratios to each MDP LULC category at the MDE 6-digit watershed level. MDE obtained the loading rates from the Chesapeake Bay Program (CBP) Watershed Model (WSM) Phase 4.3. The CBP Watershed Model estimates nutrient and sediment loads delivered to the Chesapeake Bay and has been in use since 1982. The model uses rainfall, evaporation, and meteorological data to estimate runoff and subsurface flow for all the watershed land uses. As of spring 2024, Phase 7 of the WSM was under development. The land use/land cover data was updated by the Chesapeake Conservancy, in cooperation with local jurisdictions, for use in the Phase 6 Watershed Model. The map – **2017 Land Use Land Cover** – shows the updated LULC for Carroll County.

The County and its municipalities have historically developed and adopted programs and methods related to managing stormwater loadings. In fact, as was highlighted via the Builders for the Bay effort, the County’s stormwater management program is considered to be one of the leaders in the state. This effort will be continued and strengthened with the future adoption of the revised Stormwater Management Act of 2007 requirements and other A-StoRM initiatives. The County and its municipalities are also currently exploring techniques, programs, and methods through land use planning and zoning to reduce stormwater loadings. High on the priority list is reducing development outside DGAs (reduction in potential septic systems loadings) while promoting growth in the municipalities within water and sewer capacities.



27.2 MapShed Tool: NPDES MS4 and TMDL Progress and Reporting

During the initial development of the County's SW-WLA TMDL implementation plans, the County used the MapShed tool (version 1.3.0; MapShed, 2015), developed by Penn State University, to document progress towards meeting the stormwater WLAs. This modeling approach was approved by MDE and allowed for specific local data (streams, topology, and land use) to be used as the basis for TN, TP, and TSS reductions.

MapShed is a customized GIS interface that is used to create input data for the enhanced version of the Generalized Watershed Loading Function (GWLF-E) watershed model. The MapShed tool uses hydrology, land cover, soils, topography, weather, pollutant discharges, and other critical environmental data to develop an input file for the GWLF-E model. The basic process when using MapShed is: 1) select an area of interest, 2) create GWLF-E model input files, 3) run the GWLF-E simulation model, and 4) view the output. The MapShed geospatial evaluator and the GWLF-E models have been used for TMDL studies in Pennsylvania (Betz & Evans, 2015), New York (Cadmus, 2009), and New England (Penn State, 2016).

27.3 TMDL Implementation Progress and Planning (TIPP) Spreadsheets: NPDES MS4 and TMDL Progress and Reporting

For the 2024 reporting year, the County moved to using the online TMDL Implementation Project and Planning (TIPP) spreadsheets developed by MDE for tracking and reporting.

The TIPP spreadsheet tool is meant to accompany the submission of Stormwater Wasteload Allocation (SW-WLA) Implementation Plans to MDE. It estimates load reductions at various points in the watershed planning process, allowing users to assess current progress and future BMP implementation for both the local and Bay TMDLs. Local jurisdictions are not required to use this spreadsheet; however it is provided to simplify the county planning process. The spreadsheet uses Chesapeake Bay Phase 6 CAST-2017d Watershed Model No Action (No BMP) scenario loading rates with disaggregated Stream Bed and Bank (STB) loads at the county-8 digit and Chesapeake Bay Segment watershed scale.

Supplemental information about model inputs and BMP assumptions can be found in Appendix B of the *Carroll County 2023 Countywide TMDL Stormwater Implementation Plan*.

28.0 Restoration Progress

Carroll County continues to aggressively and consistently pursue measures to improve water quality and work towards meeting the county's SW-WLAs. The County fully supports achieving pollutant load reductions through strong fiscal commitments, staff resources to implement the stormwater and water quality improvements program, and coordination between co-permittees. The County's fiscal expenditures and capital budgeting – historical, current, and planned – demonstrate the implementation of this commitment.

28.1 Chesapeake Bay Restoration Progress

Chesapeake Bay TMDL baseline loads and required reductions for Carroll County were obtained from MDE and used in conjunction with the 2020 MDE Guidance document, *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated.* Impervious acre restoration progress is tracked using the 2020 accounting manual guidelines. Loads and load reductions of total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) are calculated using TIPP spreadsheets..

A delivered load is the amount of pollutant delivered to the tidal waters of the Chesapeake Bay or its tidal tributaries from an upstream point. Delivery factors differ by land-river segment and are based upon the estimated amount of attenuation that occurs in the tributaries before it reaches the mainstem of the Chesapeake Bay due to natural in-stream processes.

Chesapeake Bay TMDL progress is summarized for each of the County's three land-river segment in the table – **Chesapeake Bay TMDL Benchmarks for Carroll County Watersheds by Land-River Segment**. The table provides the Chesapeake Bay TMDLs, progress achieved through implemented BMPs, and future CIP-planned projects for each portion of the land-river segment watersheds within the County.

The baseline and reductions represent a combination of the County Phase I and Municipal Phase II values, based on the MOA between the County and each of the municipalities that combines the jurisdictions into one MS4 permit. The aggregated load allocations for municipalities within all land-river segment were added to the County load allocations obtained from the TMDL Data Center to determine the combined baseline loads and reductions.

Chesapeake Bay TMDL Benchmarks for Carroll County Watersheds by Land-River Segment

TMDL Watershed ID	6-Digit Watershed	8-Digit Watershed	Pollutant	Current Progress (FY2024)	CIP-Planned Progress (FY2031)	TMDL End Date
G1036	Patapsco River Segment	S. Branch (Baltimore Harbor) (2130908)	TP	28%	33%	2064
		Liberty Reservoir (2130907)	TP	-	-	-
		S. Branch (Baltimore Harbor) (2130908)	TN	52%	62%	2050
		Liberty Reservoir (2130907)	TN	-	-	-
G1050	Potomac River Segment	Double Pipe Creek (2140304)	TP	31%	40%	2061
		Upper Monocacy River (2140303)	TP	46%	49%	2056
		Lower Monocacy River (2140302)	TP	4%	31%	2066
		Double Pipe Creek (2140304)	TN	64%	78%	2042
		Upper Monocacy River (2140303)	TN	72%	80%	2041
		Lower Monocacy River (2140302)	TN	9%	46%	2058
G1024	Gunpowder River Segment	Loch Raven (2130805)	TP	20%	100%	2030
		Prettyboy Reservoir (2130806)	TP	23%	40%	2061
		Loch Raven (2130805)	TN	33%	100%	2030
		Prettyboy Reservoir (2130806)	TN	36%	64%	2049

Source: *Carroll County TMDL Stormwater Implementation Plan*, 2024

28.2 NPDES MS4 Permit

Carroll County and its co-permittees have aggressively and consistently pursued measures to improve water quality and work towards compliance with its NPDES Phase I MS4 permit, effectively prohibiting pollutants in stormwater discharges or other unauthorized discharges into the MS4.

The overall NPDES MS4 permit for Carroll County and its municipalities is administered through the County's Department of Planning & Land Management (PLM). Programmatic oversight and reporting, monitoring, inspection, enforcement, and restoration efforts are a function of the Department's Bureau of Resource Management (BRM). The County's municipalities became co-permittees on the County's NPDES MS4 permit with the fourth-generation permit, which was issued on December 29, 2014.

The County and its co-permittees fully support its stormwater program through strong fiscal commitments, adequate staffing resources, and interjurisdictional cooperation. The County has successfully met and exceeded ambitious impervious reduction goals, provided extensive annual public outreach, and coordinated among a diverse group of jurisdictions to strive for compliance with the NPDES MS4 permit.

The County's and municipalities' management programs and program funding demonstrate that the programmatic structure is in place to develop and implement restoration plans to address WLAs and approved TMDLs for all county watersheds with a TMDL requirement.

The resources needed to support the operating expenses of this program and permit administration, as well as the funding necessary to address the impervious restoration requirement, are planned and budgeted by permit term. Fiscal expenditures and capital budgeting – past, present, and planned – demonstrate the continual commitment to this program. Carroll County continues to determinedly pursue its watershed restoration efforts through impervious surface mitigation and water quality improvements. Projects are designed, managed, implemented, and inspected by Bureau of Resource Management staff through a capital improvement program, titled "Watershed Assessment and Improvement (NPDES)" in the Carroll County Community Investment Plan (CIP). Funding for operating (administrative and technical) and capital (engineering and construction functions) are provided in Carroll County's NPDES MS4 Annual Report.

This commitment is further reinforced by the Memorandum of Agreement (MOA) signed by all co-permittees, which obligates funding for the capital costs of the permit's impervious surface restoration requirements and defines overall administrative support responsibilities. The municipalities are included in the County's annual reporting. In addition, they share in funding for County positions responsible for implementation and enforcement of the NPDES permit compliance. The municipalities continue to participate as co-permittees on the fifth-generation permit, issued on December 30, 2022.

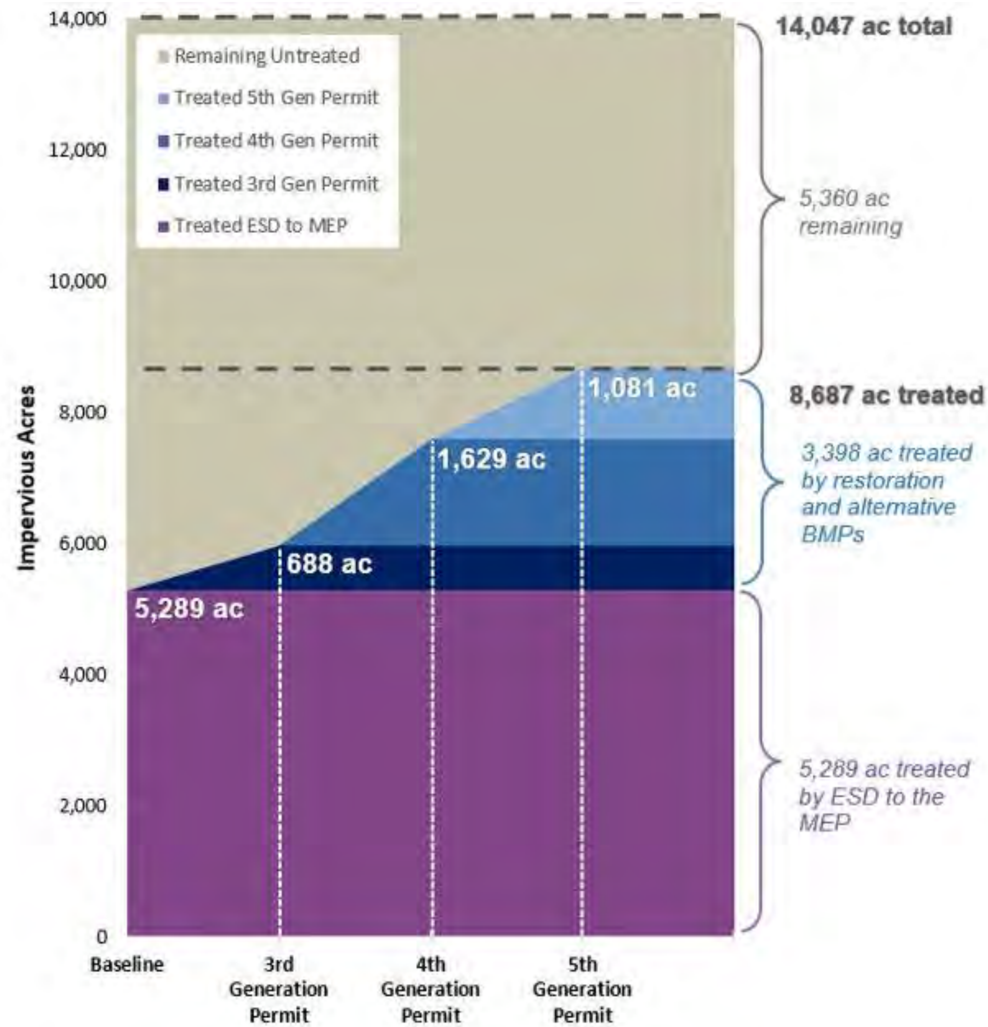
The MS4 permit requires Carroll County to restore impervious acres that have not been treated to the maximum extent practicable (MEP) by implementing stormwater BMPs, programmatic initiatives, or alternative control practices. Carroll County continues to implement an aggressive program of watershed restoration projects. Carroll's impervious area baseline restoration acreage in the fifth-generation permit is 8,758 acres. As of June 30, 2024, restoration efforts have provided the following impervious treatment to comply with permit requirements:

- 688 acres of impervious treatment to address the initial 10% impervious area restoration requirement of the third-generation permit,
- 1,629 acres of impervious treatment to comply with the 20% restoration requirement of the fourth-generation permit, which ended in December 2019, and
- 1,081 acres of impervious treatment resulting from projects completed between January 1, 2020, and June 30, 2024, and as part of the County's current fifth-generation permit requirements to restore 1,217 impervious acres that have not been treated to the MEP.

Projects to achieve an additional 698 acres of impervious area credit are planned from 2025 to 2030. Projects are evaluated and added as needed to the sixth year of the CIP.

The graph – **2024 Carroll County Impervious Area Treatment Progress** – shows the impervious acreage baseline and progress each permit term thus far toward impervious area treatment, including progress on the fifth-generation permit as of June 30, 2024. The map that follows – **Stormwater BMP Locations** – shows the location of best management practices (BMPs) implemented to meet restoration requirements and improve water quality in Carroll County and the Chesapeake Bay.

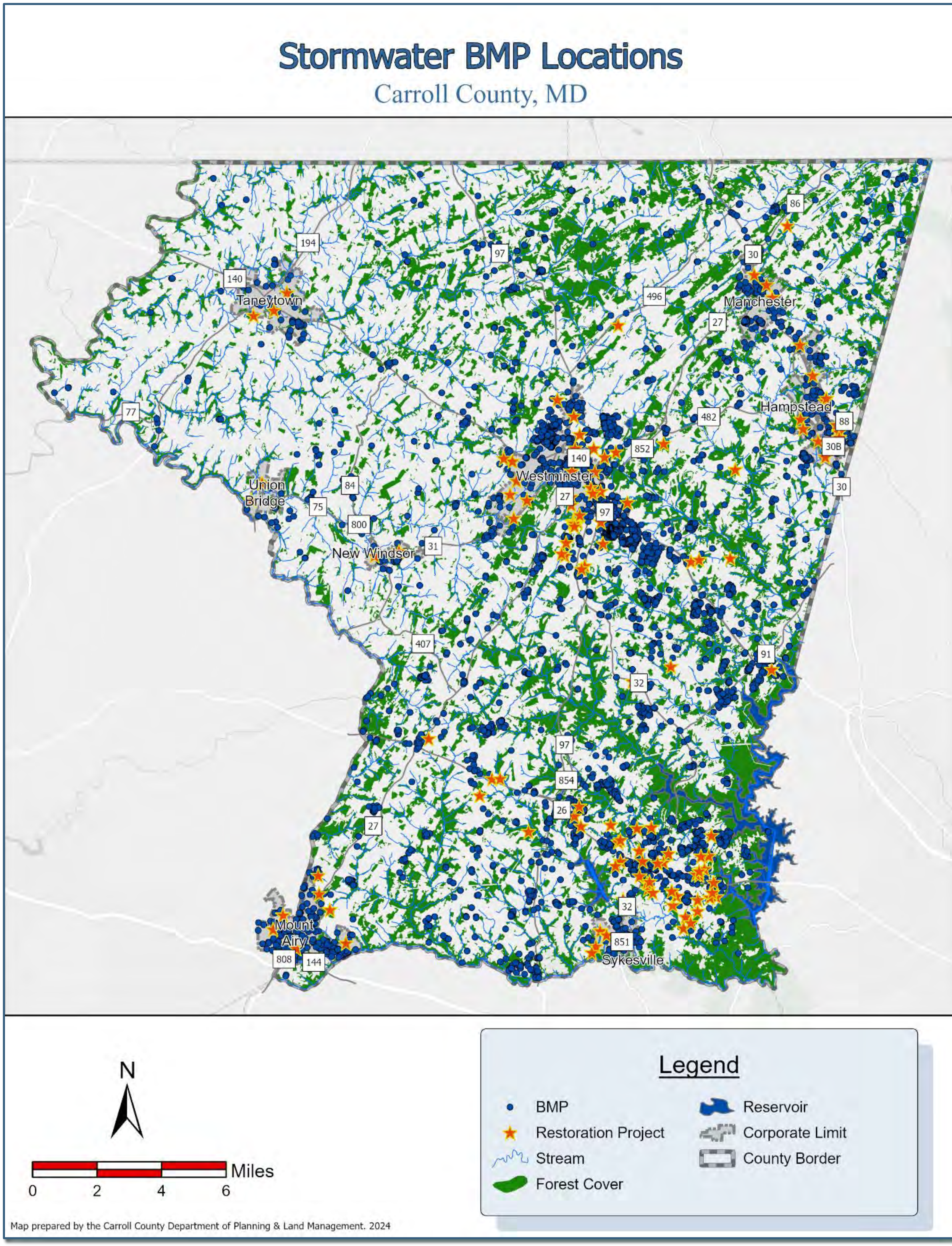
2024 Carroll County Impervious Area Treatment Progress



The County continues to plan, design, and implement restoration projects, including the following:

- rehabilitating and upgrading older stormwater management facilities to current standards or greater,
- implementing BMPs to manage existing untreated impervious areas,
- planting stream buffers, and
- restoring stream systems through natural channel design and floodplain reconnection projects.

A listing of completed and planned projects, as well as staffing, can be found in the Carroll County NPDES MS4 Annual Report, which is available on the *Protecting Carroll County Waters* website.


Stormwater BMP Locations
Carroll County, MD
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Mount Airy
Sykesville
140
194
97
496
86
30
27
77
482
88
30B
852
84
75
800
31
407
32
91
854
26
808
144
851
N
Miles
0
2
4
6
Legend
BMP
Restoration Project
Stream
Forest Cover
Reservoir
Corporate Limit
County Border
Map prepared by the Carroll County Department of Planning & Land Management. 2024

28.3 Countywide TMDL Stormwater Implementation Plan

The *Countywide TMDL Stormwater Implementation Plan* is updated each year to track and summarize progress toward meeting all applicable TMDLs for each 8-digit watershed with an approved SW-WLA TMDL. For yearly progress, see the *Countywide TMDL Stormwater Implementation Plan* (*https://www.carrollcountymd.gov/government/directory/planning-land-management/protecting-carroll-county-waters-npdes/annual-reports/)*.

The County tracks and documents pollution load reductions from all completed structural and nonstructural water quality improvement projects, enhanced stormwater management programs, and alternative stormwater control initiatives. Project information is maintained within a geodatabase to track implementation data over time, such as location, drainage area, impervious area, runoff depth treated, project type, project location, and inspections.

To address remaining TMDL requirements, the County utilizes a mix of techniques and practice types for locations identified in future Community Investment Program (CIP) budgets to progress towards fully attaining all approved SW-WLA TMDLs. It is not feasible, nor fiscally possible, to identify or specify the exact projects, locations, or costs beyond the current approved CIP. The following are some examples of restoration implementation.

- Stormwater Management Facilities
- Storm Drain Outfalls
- Tree Planting and Restoration
- Stream Restoration
- Streambank Regeneration
- Road Maintenance Projects
- Septic System Upgrades
- Bacteria Load Reduction

Load reductions for nutrients and sediment associated with completed projects since the TMDL baseline year, as well as future projects planned through the County's current CIP, are shown in table – **2024 Total Nutrient Load Reductions by 8-Digit Watershed**. The total percentage of TMDL reductions listed in the following table includes all completed and planned CIP projects as of June 30, 2024. The CIP captures a six-year planning period. Since the TMDL Plan is updated annually, planned projects will be forecasted out an additional year each year.

2024 Total Nutrient Load Reductions by 8-Digit Watershed

Watershed	TMDL Pollutant	Modeled Baseline Load (lbs/yr)	% Required Reduction from TMDL	Required Load Reduction* (lbs/yr)	Reduction from Current BMPs (lbs/yr)	Reduction from Planned Strategies (lbs/yr)	Total % Reduction (Achieved + Planned)
Liberty Reservoir	TP	24,827.67	50%	12,413.84	2,286.78	932.93	12.97%
	TSS	86,400,136.72	37%	31,968,050.59	7,249,738.56	3,760,600.09	12.74%
Prettyboy Reservoir	TP	5739.14	15%	860.87	271.10	168.77	7.66%
Loch Raven Reservoir	TP	509.38	15%	76.41	72.24	335.75	80.10%
Upper Monocacy	TP	5,266.70	5%	263.33	537.41	35.16	10.87%
	TSS	10,329,690.67	43.5%	4,493,415.44	1,089,793.02	135,778.94	11.86%
Lower Monocacy	TP	1,069.46	30%	320.84	10.14	62.14	6.76%
Double Pipe Creek	TP	20,192.76	72.5%	14,639.75	1,395.9	373.72	8.76%
	TSS	48,380,760.84	33.8%	16,352,697.16	3,624,798.69	916,822.45	9.39%
South Branch Patapsco	TN	154,556.17	15%	23183.43	13,673.93	2,167.38	10.25%
	TP	17,814.38	15%	2,672.16	2,020.25	286.77	12.95%

Source: *Carroll County TMDL Stormwater Implementation Plan*, 2024

28.4 TMDL Benchmarks

Through the continued implementation of stormwater management projects and alternative BMPs, Carroll County continues to make progress toward TMDL attainment at both the local and Bay levels. To develop a timeline for those attainments, benchmark tables were created to provide current progress, CIP-approved planned progress, and the estimated year that TMDL attainment is projected to be reached (i.e. the year in which 100% of the required reductions will be met).

To estimate the TMDL end date, the percentage completed since the baseline year for each TMDL was determined with an assumption that progress will continue at that percent reduction per year. To achieve these goals, the County will continue to focus primarily on stormwater retrofits, streamside buffer plantings, street sweeping and inlet cleaning, and stream restoration opportunities.

The "TMDL Benchmarks**"** table lists the current progress through the 2024 permit year, the expected progress from CIP-approved projects through 2030, and the projected end date of full implementation for each TMDL within Carroll County. These figures can be found in the *Countywide TMDL Stormwater Implementation Plan* (TMDL Plan). This plan was prepared in compliance with the County's fifth-generation NPDES MS4 permit. This plan is not part of the *Water Resources Element*; however, the TMDL Plan is updated annually and can be found on the *Protecting Carroll County Waters* website. The projected TMDL end date is an estimate and subject to change based on many factors and conditions, such as budget, water quality standards, and stormwater regulation changes.

The table – **2024 Local TMDL Benchmarks for Carroll County HUC-8 Watersheds** – lists the current progress through the 2024 permit year, the expected progress from CIP-approved projects through 2031, and the projected end date of full implementation for each TMDL within Carroll County.

2024 Local TMDL Benchmarks for Carroll County HUC-8 Watersheds

Watershed HUC-8	TMDL Pollutant	Current Progress (FY2024)	CIP-Planned Progress (FY2031)	Projected TMDL End Date
Liberty Reservoir*	Phosphorus	18%	26%	2068
	Sediment	23%	34%	2064
Prettyboy Reservoir*	Phosphorus	31%	51%	2055
Loch Raven Reservoir*	Phosphorus	95%	100%	2030
Upper Monocacy River*	Phosphorus	100%	100%	Complete
	Sediment	24%	27%	2067
Lower Monocacy River*	Phosphorus	3%	23%	2070
Double Pipe Creek*	Phosphorus	9%	12%	2075
	Sediment	22%	28%	2067
South Branch Patapsco River*	Phosphorus	75%	86%	2038
	Nitrogen	59%	68%	2047

**Assumes 2.00% reduction rate/year*

Source: *Carroll County TMDL Stormwater Implementation Plan*, 2024

Stormwater management *is not* anticipated to be a limiting factor in achieving buildout of the 2023 Water & Sewer Service Areas. Stormwater management *is not* expected to limit the amount and location of future development.

Stormwater management for new development is addressed through County Code Ch. 151. Stormwater management for existing, untreated impervious areas and stormwater management facilities constructed prior to current standards is addressed by the County's and municipalities' National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit, for which the County and municipalities are co-permittees. This permit requires a certain percentage restoration of untreated impervious area, as well as progress toward achieving the Total Maximum Daily Loads (TMDLs). Progress is reported annually to Maryland Department of the Environment (MDE). The Countywide TMDL Implementation Plan addresses achieving the TMDLs.

29.0 Potential Effects Related to Climate Change: Stormwater

Increased storm intensity attributed to climate change will lead to greater flow velocities in streams and higher rates of streambed and streambank erosion. This may lead to higher turbidity in streams. Increased stream erosion and resulting bank instability can also lead to higher flood risks, compounding the potential challenges of climate change.

Flooding is the primary water-related hazard in Carroll County associated with climate change. Flooding is a known, disruptive issue in Carroll County that can result in structural damage, erosion, roadway obstruction, public safety impacts, and water quality concerns. For example, many locations in Carroll County already experience flooding, and some areas (e.g., Union Bridge) expect regular flooding during and after precipitation events. These instances of flooding are likely to become more frequent, more severe, and/or more widespread with climate change.

The major potential impact from road inundation is the loss of transportation access that affects residents and first responders in times of emergencies. As such, future growth and development in the county should minimize the occurrences and the potential impacts of flood blockages of roads, especially because road closures due to flooding already occur in Carroll County, and it is likely this issue will be exacerbated by future storms that bring more intense precipitation and higher stream flows.

Undersized stormwater structures or bridges tend to be the cause of 33.6% of the reported flooding events, based on a review of known causes of flooding. Of these, 49% occurred in DGAs. These undersized structures are primarily bridges or culverts associated with roads that have caused, or potentially will cause, further damage and road closures.

High hazard dams are not a major component of water-resource infrastructure in Carroll County because most of the municipalities use groundwater entirely. However, Cranberry Reservoir and Liberty Reservoir are part of the water supply portfolio, and it is possible that other reservoirs (e.g., Piney Run) may play a larger role in Carroll County water supplies in the future. In addition, dam failure, which may be more likely to occur from high flows or other pressures associated with climate change, may pose a major flooding threat to some sections of the county.

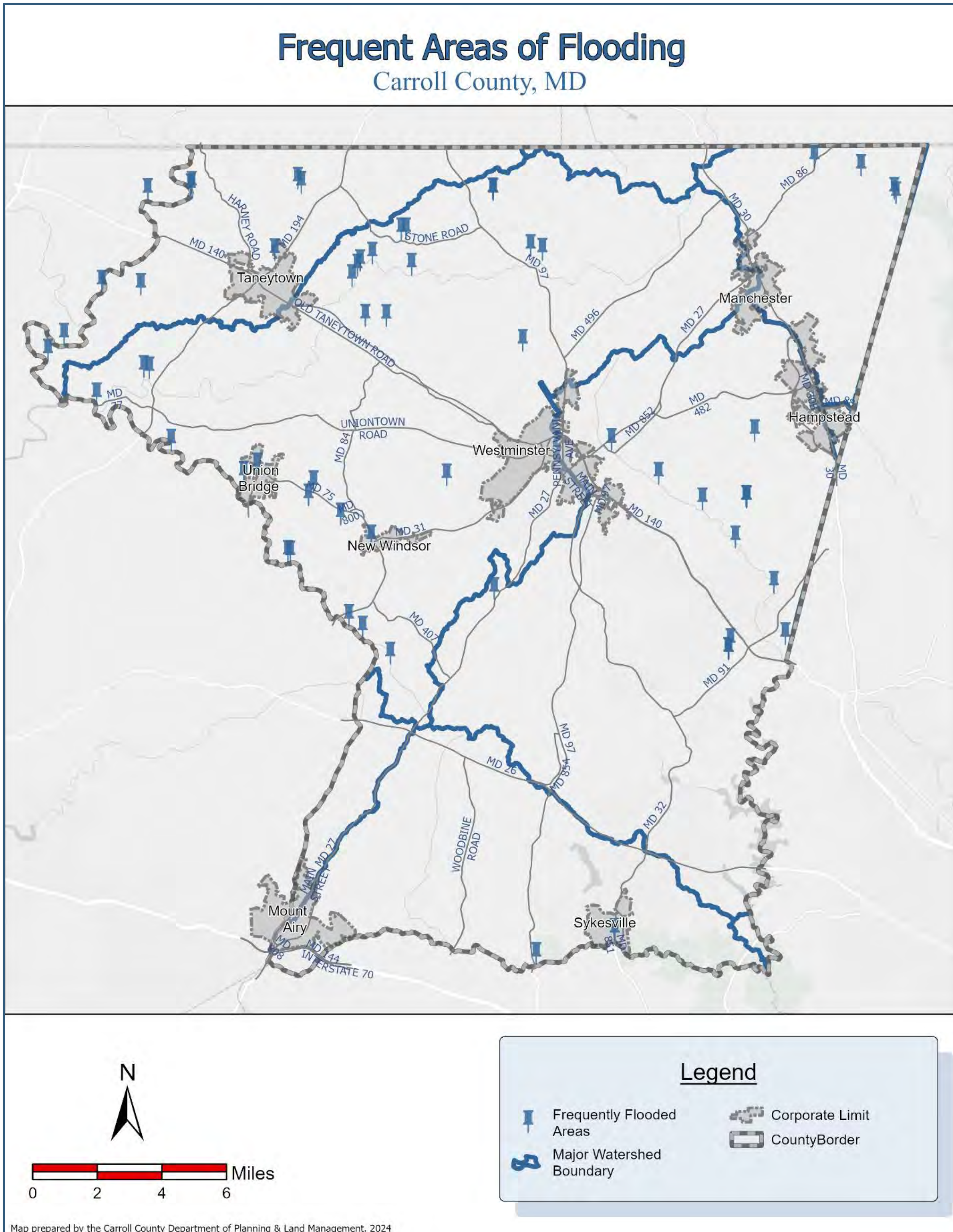
Another potential consideration is the transport of nutrients and other potential contaminants from increased runoff and higher stream velocities. High rates of nutrient export from the landscape are a concern in Carroll County because so much of the county is dedicated to agriculture. Nutrient export from agricultural lands tends to be higher than other land cover types. Exacerbating this issue, high nutrient inputs and warm temperatures are ideal conditions for algae growth in reservoirs and lakes. These blooms can cause aesthetic and water quality issues that can require expensive treatment to address taste and odor issues and potential toxins that pose a threat to human and animal health. Surface water monitoring to detect conditions that are favorable for the development of algal blooms and monitoring for cyanobacteria is can help to better understand and track this potential water quality issue.

<u>Advancing Stormwater Resiliency in Maryland or "A-StoRM"</u>: Maryland worked to address these flooding issues in 2020 by updating Maryland's stormwater management law that became effective on June 1, 2021. Senate Bill 227 (SB 227) tasked MDE with developing plans to evaluate current flooding risks and update regulations to improve urban stormwater flood management. The State's Stormwater Management Law, Environment Article 4-201.1, requires MDE to report on the most recent precipitation data available, investigate flooding events since 2000, and update Maryland's stormwater quantity management standards for flood control. MDE released a report, "Advancing Stormwater Resiliency in Maryland," that provides a roadmap towards modernizing stormwater management in Maryland. It also gives local jurisdictions some insight into future directions that can be expected from MDE.

MDE formed a Stakeholder Consultation Group, as well as a few technical work groups, to provide feedback as MDE develops proposed revisions to the stormwater regulations as a result of SB 227 and the A-StoRM report recommendations.

As a result of A-StoRM, as of 2024, MDE was conducting a new state-wide study of probable maximum precipitation (PMP). Changes to dam classifications and/or requirements to mitigate or account for climate change may result.

Although, as of December 2024, MDE is still developing updates to stormwater regulations as well as guidance for watershed studies and subsequent flood management plans, in anticipation, County staff took the step to identify and map areas of frequent flooding. This was a cooperative effort between the Carroll County Departments of Planning & Land Management and Public Works and the municipalities.


Frequent Areas of Flooding
Carroll County, MD
Taneytown
Manchester
Hampstead
Westminster
Union Bridge
New Windsor
Mount Airy
Sykesville
MD 140
MD 194
HARNEY ROAD
STONE ROAD
MD 97
MD 30
MD 86
MD 496
MD 27
OLD TANEYTOWN ROAD
MD 482
MD 852
UNIONTOWN ROAD
MD 84
MD 75
MD 800
MD 31
MD 407
MD 91
MD 26
MD 854
MD 32
WOODBINE ROAD
INTERSTATE 70
N
Miles
0
2
4
6
Legend
Frequently Flooded Areas
Major Watershed Boundary
Corporate Limit
CountyBorder
Map prepared by the Carroll County Department of Planning & Land Management. 2024

30.0 Potential Effects of Emerging Contaminants of Concern: Stormwater

There are several contaminant emerging of concern (CEC or "emerging contaminants") that were not yet on the County's radar when the 2010 WRE was developed. Among these new concerns are Per- and Polyfluoroalkyl Substances (PFAS), lithium, manganese, pharmaceuticals and endocrine disruptors, algal issues or cyanotoxins, and even tire-wear particles. They are "emerging" because they are newly recognized as a problem, or because of the discovery of a new source or pathway to humans.

By polluting water bodies, emerging contaminants may pose risks to human health, wildlife and aquatic life, or the environment. When these substances come into contact with stormwater from rainfall or snowmelt, they can dissolve into the stormwater or stick to sediments in the stormwater. Stormwater can then transport emerging contaminants and discharge them into nearby waterways.

Contaminants can be picked up in stormwater runoff across impervious surfaces, such as parking lots, streets, and roofs, as well as industrial and agricultural areas. Many of the existing stormwater management practices already address and/or reduce these pollutants in addition to the pollutants that stormwater practices were meant to reduce. However, these new concerns have resulted in the need to evaluate where new or redesigned stormwater practices are needed to reduce these pollutants prior to the stormwater runoff entering waterways. Ongoing monitoring and research are needed to better understand the presence and impacts of emerging contaminants and to identify the best practices to implement to address them in the future.

Countywide Strategies

Countywide Strategies: Objectives & Action Items for All

This chapter contains the individual Strategies and specific Action Items that could be put in place for all nine jurisdictions as a means of implementing the plan and moving the entire county on a path toward achieving the goals of the plan.

In the context of the WRE, a Strategy is an overall direction or outcome that can be addressed or implemented by a set of one or more Action Items. Each jurisdiction should be striving to implement the strategies in pursuit of the overall plan goals.

The Strategies that follow generally apply to all of the eight municipal water supply and wastewater systems in the county. Under each strategy, action items are already completed or being done by *some* of the municipalities or systems. However, if it would still apply to most of the systems, it was included in this section. Action items that are very specific, or would only apply to a particular system, are included in relevant sections in the Overview of Municipal Systems in this plan document.

Similarly, Action Items within the WRE are individual specific activities that, as a whole, are intended to address or implement one or more strategies. Inclusion of individual Action Items ***does not represent a commitment*** to implement that Action Item. They are activities that *could* be pursued to help move the County or municipality toward the desired direction or outcome.

Specific capital improvements need to be incorporated to the *Water & Sewer Master Plan* and approved by MDE for public water and wastewater. Specific activities to address TMDLs need to be included in the *Countywide TMDL Implementation Plan*, which is approved by MDE, and progress reported through the *NPDES MS4 Annual Report*.

31.0 Potential Future Scenarios for Consideration

The importance of diversifying the County's water supply becomes even more clear when considering the uncertainties that exist when trying to plan for multiple possible future scenarios. Various uncertainties exist for each of the County's water supply options with respect to future regulations, water quality conditions, and county growth. The concept of "Scenario Planning" provides a framework that encompasses such uncertainties and can help preserve the flexibility that the County needs to ensure that its options remain open and that implementable solutions are found.

Considering and planning for possible future scenarios that might evolve in the key areas of water supply, water quality, and the local political environment allows a flexible course of action. Many of the regional and/or countywide alternatives and options reflected in the plan an intended to provide a course of action for the County and the municipalities if one or more of these scenarios become more probable.

There are several future scenarios that could be considered plausible and would affect recommended water supply or wastewater alternatives for Carroll County. Below are some possible future scenarios and water supply and wastewater directions that might best fit those scenarios.

Regulatory Procedures Become More Stringent: If future regulatory procedures and evaluations for groundwater withdrawals become more stringent, this would result in lower ratings for groundwater alternatives. Planning for this scenario could favor selection of larger surface water options that are able to provide greater yield to satisfy larger water supply deficits in the county. Conversely, if required environmental flow regimes increase, or if Tier II stream designations expand to cover more of the county and the associated regulations are highly protective of surface waters, this could result in higher ratings for alternatives that do not involve new stream intakes or surface storage impoundments. Recent indications from MDE suggest that a scenario with more stringent surface water quality regulations is more likely than a shift toward a more stringent groundwater appropriation process.

Future Service Area Boundaries Expand to a Far Larger Extent than Currently Envisioned: It is possible that future population growth pressures could result in larger service areas within the county and involve much larger municipal water supply and wastewater capacity needs than currently envisioned. Under such a future, larger surface water supply options and/or large regional system interconnections may be more favorable because most municipalities already face challenges serving customers on the outskirts of municipal boundaries.

Climate Change Leads to More Intense Hydrologic Conditions and Warmer Wetter Winters: A climate change scenario is among the most likely scenarios considered here and has the potential to significantly change Carroll County water resources conditions. Climate change is already affecting conditions in Carroll County and may lead to more extreme precipitation events; more frequent and intense flooding, longer growing seasons; higher evapotranspiration rates; higher water demands for domestic, industrial, and agricultural users, especially in the summer; and lower groundwater infiltration from snowmelt.

In Carroll County, climate change is predicted to cause warmer temperatures and drier conditions in the summer, potentially stressing water supply availability during a time when demands already tend to be high. Planning for climate change could favor selection of larger surface water options that are able to provide greater yield to satisfy larger water supply deficits in the county. However, surface water sources are also more susceptible to negative effects of climate change, such as evaporative loss and water quality issues such as algal blooms from increased nutrient loads in runoff. Therefore, a diverse portfolio of water supply sources is recommended to provide backup options should one source be compromised in the future.

The effects of climate change on groundwater are not yet well known because there has been relatively little research on this topic (most water resources climate change research has focused on surface waters). In general, in Maryland, over pumping and/or overallocation are generally a greater threat to well levels than climate change, and it can be challenging to disentangle climate-related trends in well levels from other groundwater drivers. Still, long-term trends in well levels should continue to be tracked moving forward, especially in the Piedmont area, where over pumping is not often observed.

Lastly, to address climate change concerns, in 2023, Carroll County began participating in a regional effort with the Baltimore Metropolitan Council to develop a Climate Change Action Plan (CCAP). Importantly, in addition to the air quality and energy issues that are being discussed, the CCAP should examine water and non-water related considerations as well. The analysis conducted for the 2024 WRE update focused on water-related impacts only, but it is well known that climate change is a 'compounding stressor' that will affect most, if not all, aspects of life in Carroll County. Baltimore County and Montgomery County have recently adopted climate action plans that could serve as templates for a Carroll County CCAP. A central focus of this CCAP should be mitigation and adaptation strategies to address high-priority climate change impacts, such as flooding on high volume roads and critical infrastructure located in floodplains. An important uncertainty for flood-related planning is the future expansion of floodplains into locations that are not yet included in designated flood-prone areas but may be in the future. Maryland has developed a database of floodplain expansion in coastal areas; this database has not yet been formally extended to riverine locations, but this is something Carroll County could monitor in the coming years.

<u>New Regulations on Emerging Water Quality Contaminants Restrict Use of Water Supply Sources</u>: New regulations for emerging or high-priority contaminants have recently been released (e.g., PFAS), made more stringent (e.g., Lead and Copper Rule Revisions and/or Lead and Copper Rule Improvements), or are expected (e.g., manganese), and may lead to costly treatment requirements or the need to seek out new water supplies with lower levels of contamination. Planning for this scenario includes selection of larger surface water alternatives that are less likely to have groundwater water quality issues. More broadly, a varied set of water supply options is recommended because this approach provides resiliency and redundancy should one supply source be compromised or shut down.

32.0 Drinking Water Supply Strategies: Countywide

Specific "To Do" Action Items under each strategy in this plan are grouped by timeframe into short-term and long-term action items. Short-term action items are intended to refer to actions that are recommended to occur within the ten-year timeframe before the plan will need to be updated again. Items listed as long-term are anticipated to occur more than ten years after the adoption of the plan.

In July 2021, the strategies and action items within the 2010 WRE were reviewed. The purpose of this review was to recognize the 10-year mark since the adoption of the WRE by providing a status of the strategies and action items contained within the WRE. In addition, it also was in anticipation of MDP in the near future pushing for the plan document to be updated and releasing updated guidance. Identifying the status of the strategies and action items provided a head start on the process to update the WRE plan document.

During the 2023-2024 WRE plan document update process, action items were further updated, and new action items were added. Strategies and action items were added to address impacts of climate change and emerging contaminants. In addition, information Hazen provided through the updated supporting documents was used to help determine new and revised action items. The *WRE Update: Carroll County Alternatives Evaluation*, dated May 14, 2024, prepared by Hazen, included an update to the evaluation of water supply alternatives.

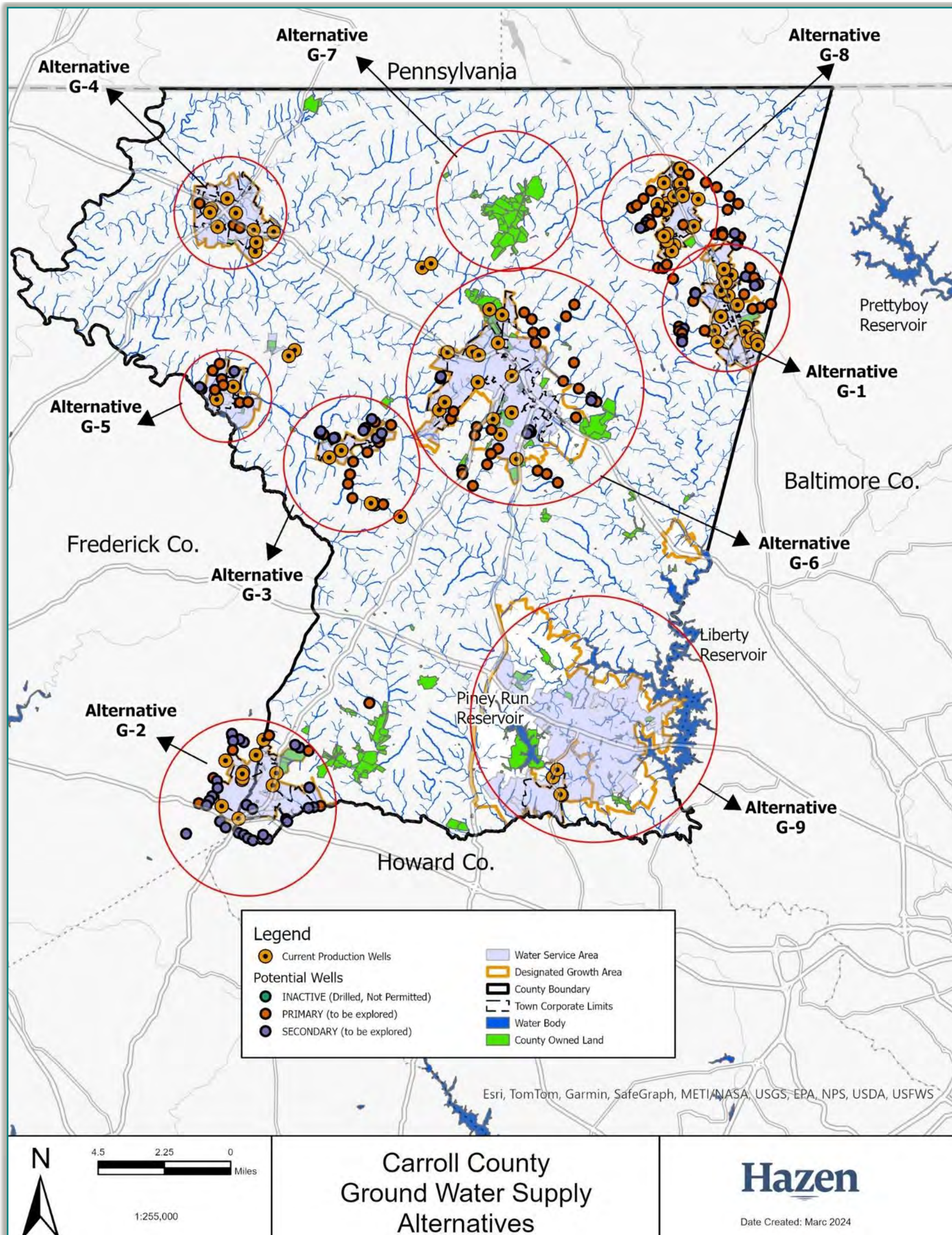
32.1 Water Supply Alternatives

The table – **Water Supply Alternatives** – lists the options/alternatives available. The Alternative No. shown corresponds with the Alternative No. shown on the maps that follow – **Carroll County Surface Water Alternatives** and **Carroll County Groundwater Alternatives**.

Water Supply Alternatives

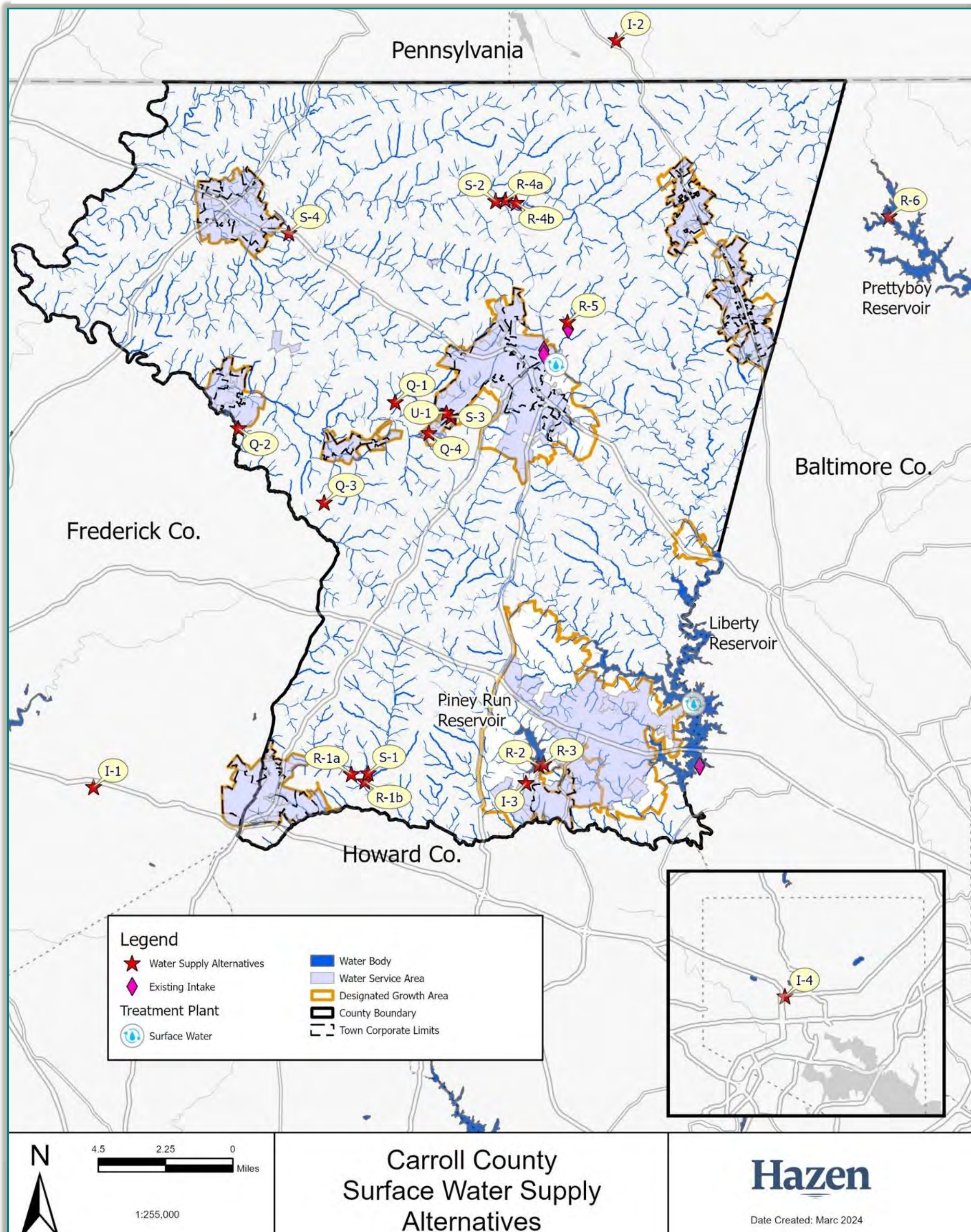
Alternative No.	Alternative Description
Reservoirs	
R-1a	Gillis Falls Reservoir (Proposed – Elev 610)
R-1b	Gillis Falls Reservoir (Expanded – Elev 630)
R-2	Piney Run Reservoir – Use as Water Source
R-4a	Union Mills Reservoir (Proposed – Elev 610)
R-4b	Union Mills Reservoir (Expanded – Elev 630)
R-5	Increase Capacity of Cranberry Reservoir
R-6	Prettyboy Reservoir
Surface Water Intake	
S-1	New Surface Water Intake in Gillis Falls Area
S-3	New Intake on Little Pipe Creek for Westminster
S-2	New Intake on Big Pipe Creek in Union Mills Area (Westminster)
S-4	New Intake on Big Pipe Creek for Taneytown
Quarries	
Q-1	Hyde's Quarry – New Raw Water Reservoir
Q-2	Lehigh Quarry – Union Bridge
Q-3	Lehigh Quarry – New Windsor
Q-4	Medford Quarry – Use as Permanent Supply
Groundwater	
G-1	Hampstead Wells
G-2	Mount Airy Wells
G-3	New Windsor Wells
G-4	Taneytown Wells
G-5	Union Bridge Wells
G-6	Westminster Wells
G-7	Union Mills Area Wells
G-8	Manchester Wells
G-9	Freedom Wells
Interconnection	
I-1	Mount Airy Interconnection with Frederick County
I-2	Interconnection with the York Water Company
I-3	Freedom to Supply Mount Airy Using Existing Sources
I-4	Treated Water Purchase from Baltimore City
Reuse	
U-1	Reuse

Carroll County Groundwater Supply Alternatives



Note: For more information on the evaluation of each of these options, please refer to the report *WRE Update: Carroll County Alternatives Evaluation*, dated May 14, 2024, prepared by Hazen.

Carroll County Surface Water Supply Alternatives



Note: For more information on the evaluation of each of these options, please refer to the report *WRE Update: Carroll County Alternatives Evaluation*, dated May 14, 2024, prepared by Hazen.

32.2 Protect and sustain existing drinking water supplies serving existing development

Specific Action Items Already in Place:

- ✓ Continue to implement Chapter 154, Water Resource Management, which provides programmatic and management practices, such as buffering and setbacks, as well as watershed and wellhead protection around existing water supply sources, which are needed to protect water resources from the impacts of development [*from 2007 Guidance doc*] [*2010 WRE*]
- ✓ Promote and assist municipalities in the adoption of water resource management ordinances: Manchester, New Windsor, Mount Airy, Sykesville *[2010 WRE]*
- ✓ Well sites are identified within and outside the DGA for future groundwater development potential *[2010 WRE]*
- ✓ Protect existing and potential sources from development, via implementation of stormwater management regulations and water resources management code *[2010 WRE]*
- ✓ Delineate and phase municipal and community water service areas in the land use element consistent with the ability of the water resource to support development based on population growth and development capacity analysis [*from 2007 Guidance doc*]
- ✓ Examine source water protection opportunities and threats to drinking water supplies, including streams and their buffers, from development, runoff, pollution, and other causes. Identify private or government actions that can be effective in protecting drinking water supplies [*from 2007 Guidance doc*]
- ✓ Identify private or government actions that can be effective in protecting drinking water supplies [*from 2007 Guidance doc*]: Accomplished via the implementation of stormwater management regulations, a water resource management code, public outreach initiatives, floodplain management, and implementation of the NPDES MS4 permit requirements [*2024 WRE*]

Ongoing Action Items:

- Continue to deny allocations and/or connections to any system that would cause system capacity to exceed a set percentage of maximum capacity in conformance with each jurisdiction's Adequate Public Facilities Ordinance [*from 2007 Guidance doc*] [*2010 WRE*]
- Incorporate the county's open space and land preservation program measures that will support water protection requirements [*from 2007 Guidance doc*] [*2010 WRE*]
- Use interjurisdictional/regional approaches as necessary and adopt or amend ordinances as necessary to protect water resources [*from 2007 Guidance doc*]
- Identify existing older water pipes in need of repair or replacement and program improvements into the Community Investment Plan / capital improvement plans (CIPs) and implement the Lead & Copper Rule Improvements (LCRI) requirements [*2024 WRE*]
- Track long-term trends in well levels [*2024 WRE*]
- Support the Reservoir Watershed Protection Agreement [*2010 WRE*]
- Continue to participate in the BMC's Reservoir Technical Group (RTG) activities [*2010 WRE*]
- Continue compliance monitoring at new sample sites, which started in November 2024, per the Lead & Copper Rule (LCRI) requirements [*2024 WRE*]

Specific "To Do" Action Items:

Short-term Action Items

- ❑ Promote and assist municipalities in the adoption of water resource management ordinances: Hampstead, Taneytown, Union Bridge, Westminster *[2010 WRE]*
- ❑ Assess operational regimes for water supply sources, adjusting as conditions necessitate, and developing assessment and rehabilitation plans for water supply sources [*2024 WRE*]
- ❑ Identify potential industrial/manufacturing users for which water reuse in operations may be pursued [*2024 WRE*]
- ❑ Move toward diversified water supply development (e.g., not placing all your reliance on a singular supply source or supply type), which is a key component of integrated water resources planning and can ensure that options still exist to meet water supply needs even if the continued use of one water source becomes severely constrained [*2024 WRE*]
- ❑ Evaluate the water user rate structure to determine the system's ability to balance affordability with potential needs to upgrade *or* expand, address disadvantaged communities, and maintain over*all* system viability. Consider revising rate structure, if needed, to address these factors. [*2024 WRE*]

Long-term Action Items

- ❑ n/a

32.3 Identify and develop, as needed, new water supplies adequate to support planned future growth without over-allocating available sources

Specific Action Items Already in Place:

- ✓ Included provisions in the subdivision/development regulations that require that site plan/subdivision plat submittals have documentation from an engineer or official notification from the appropriate municipal or county agency(ies) stating that adequate water supplies either presently exist or will exist for all development approved *[2010 WRE]*
- ✓ Ensure new development pays for the cost of providing water needed to serve that new development [*from 2007 Guidance doc*]
- ✓ Amended the *Carroll County Water & Sewer Master Plan* to incorporate the projects that have been identified in the 2010 WRE to address needs within the next 10 years *[2024 WRE]*
- ✓ Evaluated the benefit of using Brinkley Bill methodology and process, using Westminster as a case study, for additional groundwater allocation. This process remains an option for some municipalities but may not be helpful for all the county's municipalities. *[2024 WRE]*
- ✓ Examined the feasibility of re-using water pumped from area quarries: [*2024 WRE*]
  - ☑ Westminster explored use of Hydes Quarry
  - ☑ Medford Quarry has been established as an emergency supply
  - ☑ The County and City also explored the feasibility of an increased daily use appropriation from Medford. MDE was onboard with the findings of our evaluation, but a finalized agreement with Medford has not been reached.

Ongoing Action Items:

- Continue to deny allocations and/or connections to any system that would cause system capacity to exceed a set percentage of maximum capacity in conformance with each jurisdiction's Adequate Public Facilities Ordinance [*from 2007 Guidance doc*]
- Continue collaboration efforts between the County and municipalities in the development and protection of water resources throughout the county, such as participation in the Water Resource Coordination Council *[2010 WRE]*
- Continue preserving future reservoir or watershed areas with the appropriate restrictions and/or protections to ensure water supply development can proceed in the designated future time period *[2024 WRE]*
- Monitor properties within future reservoir areas for acquisition opportunities [*since 2020*]
- Continue to track demand for all known and potential development projects through Accela (Development Review Bureau) and other County and municipal tracking systems [2024 WRE]
- Explore additional sources for future water supply to prepare for policy changes or other changes that would result in the need for additional available water capacity, even in areas where current planned sources are enough to meet projected demand [*2024 WRE*]
- Evaluate regional solutions to future water supply capacity planning for large projects to ensure collaborative implementation of comprehensive plans and use of water supplies to meet future demands [*from 2007 Guidance doc*] [*2024 WRE*]
- Work with MDE to develop regulations that would appropriately permit the use of reclaimed water technology in Maryland to enable the implementation of this infrastructure in Carroll County: Westminster *[2024 WRE]*

Specific "To Do" Action Items:

Short-term Action Items

- [ ] Amend the *2023 Carroll County Water & Sewer Master Plan* to incorporate the projects that have been identified in the 2024 WRE to address needs within the next 10 years [*2024 WRE*]
- [ ] Coordinate with MDE to update the *Water & Sewer Master Plan* regulations so the method to calculate water supply demand and capacity is consistent with MDE's methodology in the WRE Guidance Document [*2024 WRE*]
- [ ] Access the USGS research related to Pesticides in Groundwater of Central and Western Maryland (USGS Fact Sheet 2008-3068) to determine if and where in Carroll County pesticides were detected in groundwater samples [*2024 WRE*, *Hazen*]
- [ ] Consider compiling and mapping information on well yields measured since the 1988 RE Wright study, both to revise well yield estimates and evaluate spatial/geologic patterns in well yields to provide additional monitoring data that could be used to help the County/municipalities petition MDE for a change in groundwater allocation methodology and to show the sustainability of groundwater resources under different pumping regimes *[2024 WRE, Hazen]*
- [ ] Revisit well yield projections for different hydrologic units, both to incorporate information from wells drilled since 1988, and to address MDE's more conservative methods for estimating well yield *[2024 WRE, Hazen]*
- [ ] Require water reuse for industrial process and cooling and onsite non-potable reuse where feasible [*2024 WRE*]
- [ ] Encourage MDE to complete and adopt regulations to govern the installation, operation, and use of residential graywater systems, as authorized by Maryland Senate Bill 496 in 2018; adopt local measures to implement MDE's residential graywater regulations once they are adopted [*2024 WRE*]

- ❑ Ensure source water protection measures are in place for reuse projects and control wastewater discharge from homes and businesses [*2024 WRE*]
- ❑ Consider the implications of public water supply availability when updating the County Master Plan and municipal comprehensive plans and identify proposed land uses that balance the need for additional growth and development, particularly to meet State requirements, with the availability of public drinking water supplies to accommodate the projected development in the short (~up to 10 years) and long terms (~>10 years)
- ❑ When identifying new water sources, include identifying if planned growth or development in or adjacent to a drinking water reservoir watershed, source water protection area, karst geology, or area served by shallow drinking water wells will potentially impact water sources that serve disadvantaged communities or a historically disadvantaged area with water resource or infrastructure problems [*2024 WRE*]
- ❑ Where planned growth and development is occurring in disadvantaged areas, take care in the comprehensive plan to avoid, minimize, and mitigate water resource and infrastructure impacts that exacerbate or otherwise fail to address continued inequities in the communities of concern [*2024 WRE*]
- ❑ Align and plan water infrastructure improvement projects in disadvantaged communities with the proposed new development to leverage related opportunities, public-private partnerships, and explore more cost-effective solutions for creating equitable and sustainable communities [*2024 WRE*]

Long-Term Action Items

- ❑ Investigate the feasibility of pursuing some method of water reuse to provide additional water supply
  - ❑ Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather and for which systems may be more feasible due to availability of surface water storage for treated, reclaimed water [*2024 WRE*]
  - ❑ Improve outreach and communication to elected officials and the public to build interest and potential support for potable water reuse, where appropriate, as a future option for adding additional capacity to the public water supply system to meet projected future demand and provide water security [*2024 WRE*]
  - ❑ Identify potential funding sources to assist with water reuse systems development [*2024 WRE*]
  - ❑ Identify areas where limitations on water supply capacity to serve existing or future development demand could be mitigated by reusing water for appropriate uses, as needed [*2024 WRE*]
- ❑ Use GIS to identify potential sources of surface contamination and groundwater vulnerability and to track potential water quality issues, improve the efficiency of exploratory well drilling efforts, and improve the consistency of groundwater information across municipalities [*2024 WRE*]
- ❑ Maximize the use of recycled water for appropriate applications, as needed and where PFAS is not problematic, including outdoor irrigation, toilet flushing, and commercial and industrial processes [*2024 WRE*]
- ❑ Evaluate the feasibility of establishing a regional raw water transmission main that would allow water from area quarries to interconnect the water systems of Westminster, New Windsor, and Union Bridge [*2024 WRE*]

32.4 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

Specific Action Items Already in Place:

- ✓ Implemented the recommendations of the “Carroll County Comprehensive Water Conservation Recommendations” report prepared by the WRCC and Environmental Advisory Council (EAC) *[2010 WRE]*
- ✓ Established water use tracking methods that will allow the County and municipalities to better quantify the effect of demand management efforts already in place *[2010 WRE]*
- ✓ Implemented a zone/conservation pricing system for the County’s public water supply and sewerage systems to create an incentive for water conservation *[2010 WRE]*
- ✓ Created natural landscaping demonstration projects on public grounds and parks to reduce the amount of irrigation needed for landscaping *[2010 WRE]*
- ✓ Evaluated and adopted policies requiring high-efficiency plumbing fixtures in all new construction *[2010 WRE]*
- ✓ Provided incentives for businesses and homeowners to retrofit existing structures using high-efficiency fixtures and appliances: Westminster *[2024 WRE]*
- ✓ Developed programs and modified regulations/policies that promote water conservation and reduced water demand by individual consumers (homeowners and business owners) of the public water supply systems: Hampstead *[2024 WRE]*
- ✓ Developed public outreach materials to promote rain barrel use *[2024 WRE]*
- ✓ Developed formal drought management plans, procedures, and/or requirements to help navigate low water levels during drought events or other events such as infrastructure outages that temporarily limit water supply availability: Hampstead, Manchester, Mount Airy, Westminster [*from 2007 Guidance doc*, *since 2010*]
- ✓ Replaced meters with “smart” meter technology to track water loss and immediate notice of excessive water use: Mount Airy, Westminster (in progress) [2024 WRE]
- ✓ Developed a water conservation plan per MDE guidance, which is required for all water systems serving a population greater than 10,000 and producing more than 100 gallons of water per day per capita and for systems awarded financial assistance by the State for infrastructure improvements: Hampstead, Westminster [2024 WRE]
- ✓ Require non-potable water reuse for industrial processes/cooling, where appropriate, to conserve water: Westminster (PFG) [2024 WRE]

Ongoing Action Items:

- Continue to facilitate interjurisdictional coordination/collaboration by supporting the efforts of the Carroll County WRCC *[2024 WRE]*
- Foster water conservation habits, by placing an emphasis on major components like behavioral change, technology, or an improved design through outreach programs in order to reduce water loss, waste, or use *[2024 WRE]*
- Encourage water conservation and efficiency to reduce long-term system costs and encourage additional societal benefits *[2010 WRE]*
- Continue to implement programs educating water customers about the importance of, and methods to, conserve water *[2010 WRE]*
- Adopt and implement policies requiring water conservation from all users to promote more efficient use of available treatment capacity, as needed *[2010 WRE]*

- Develop programs and modify regulations/policies that promote water conservation and reduced water demand by individual consumers (homeowners and business owners) of the public water supply systems *[2010 WRE]*
- Design and implement a rigorous water conservation program including routine water audits, water accounting and loss-control procedures, water reuse initiatives, conservation rate structures, and outreach programs *[2010 WRE]*
- Hold public workshops for homeowners that include information on rain gardens and minimizing water leaving the property *[2024 WRE]*
- Reduce the amount of water wasted through leakage (I & I) by targeting, improving, and/or replacing aging infrastructure *[2010 WRE]*
- Maximize the use of recycled water for appropriate applications including outdoor irrigation, toilet flushing, and commercial and industrial processes: Westminster [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Develop and adopt formal drought management and water use reduction plans to help navigate low water levels during drought events or other events such as infrastructure outages that temporarily limit water supply availability: Freedom, New Windsor, Taneytown, Union Bridge [*2024 WRE, Hazen*]
- ❑ Discuss how to provide some consistency across the county regarding actions drought procedures [*2024 WRE*]
- ❑ Establish and maintain water use tracking methods that will allow the County and municipalities to better quantify the effect of demand management efforts already being taken and use this data in support of permit applications required to implement new water supply projects. The Town of Hampstead implemented a demand management tracking project, per MDE, "Water Audit and Water Loss Reduction Plan," which may potentially serve as a template for other municipalities to follow. [*2024 WRE, Hazen*]
- ❑ Use "smart" meter and AMI (Advanced Metering Infrastructure) technology to track water loss and immediate notice of excessive water use [*2024 WRE*]
- ❑ Develop and implement individual water conservation plans per MDE guidance, which are required for all water systems serving a population greater than 10,000 and producing more than 100 gallons of water per day per capita and for systems awarded financial assistance by the State for infrastructure improvements, for the systems that have not yet done so [*2024 WRE*]
- ❑ Provide incentives for businesses and homeowners to retrofit existing structures using high-efficiency fixtures and appliances [*2024 WRE*]
- ❑ Identify areas where limitations on water supply capacity to serve existing or future development demand could be mitigated by reusing water for appropriate uses, as needed [*2024 WRE*]
- ❑ Maximize the use of recycled water for appropriate applications, as needed and where PFAS is not problematic, including outdoor irrigation, toilet flushing, and commercial and industrial processes [*2024 WRE*]
- ❑ Require non-potable water reuse for industrial processes/cooling, where appropriate, to conserve water [*2024 WRE*]
- ❑ Provide incentives for development projects that take steps that go beyond what is required to reduce water usage [*2024 WRE*]
- ❑ Adopt local measures to implement MDE's residential graywater regulations once they are adopted [*2024 WRE*]

- ❑ Evaluate the benefit of quantifying groundwater recharge from stormwater infiltration facilities to pursue credit for water allocability or to enhance stream baseflow [*2024 WRE*]
- ❑ Evaluate if planned growth or development result in any changes or augmentation to drinking water sources that could impact vulnerable populations, such as those with lead service lines or fixtures [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

32.5 Develop emergency supply plans and measures

Specific Action Items Already in Place:

- ✓ Completed Risk & Resilience Assessments and Emergency Response Plans required by Section 2013 of America's Water Infrastructure Act of 2018 for community water systems, and submitted certifications to U.S. EPA in 2020-2021 [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Identify the emergency supply measures or plans that are already in place beyond those identified for the Risk & Resilience Assessments and Emergency Response Plans [*2024 WRE*]
- ❑ Coordinate with appropriate jurisdictions and agencies to update or develop emergency supply plans that bring the various existing measures together and identify any additional options [*2024 WRE*]
- ❑ For water systems that have lead and/or GRR service lines, make publicly accessible and include a location identifier (such as a street address, block, intersection, or landmark) associated with each lead and GRR service line [*2024 WRE*]
- ❑ For water systems with no lead, GRR, or lead status unknown service lines in their inventory, declare that the distribution system has no lead service lines or GRR service lines [*2024 WRE*]
- ❑ Establish formal shared services agreements between the WRCC partners to address emergency supply issues [*2024 WRE*]

Long-Term Action Items

- ❑ Implement the emergency supply plans as needed [*2024 WRE*]

33.0 Wastewater Strategies: Countywide

33.1 General Wastewater Trends

"In addition to providing a dependable, locally controlled water supply, water recycling provides tremendous environmental benefits. By providing an additional source of water, water recycling can help us find ways to decrease the diversion of water from sensitive ecosystems. Other benefits include decreasing wastewater discharges and reducing and preventing pollution. Recycled water can also be used to create or enhance wetlands and riparian habitats." **(***Source: http://www.epa.gov/region09/water/recycling/index.html*)

33.1.1 Water Reuse

According to the *Carroll County Alternatives Evaluation* (December 2023), the recycling and reuse of WWTP effluent (or "reclaimed water") is a viable long-term strategy to help overcome wastewater disposal limitations in the county. As of 2023, the reuse option with the most potential to address water limitations in the county is the development of indirect potable reuse systems in which treated wastewater effluent is discharged into surface waters to be treated at water treatment plants. This reuse option is new since the 2010 WRE but has the potential to meet some municipality needs and support future growth and development.

As of 2023, Westminster is the only municipality that has pursued reclaimed water as a supply source. In fact, Westminster is the leader in Maryland for this type of system. As such, Westminster has worked hand-in-hand with MDE to establish a pilot program to test the water purification system and ensure that treated wastewater effluent can be safely discharged into a drinking water reservoir. Westminster has paved the way for other communities in Maryland to assess and develop indirect potable reuse systems.

Indirect potable reuse is not the only reuse system in the county, as Manchester operates a limited reuse system through spray irrigation of wastewater effluent. This irrigation approach is not a common reuse strategy in the county, and it is *unlikely* that other municipalities will begin spray irrigation systems in the coming years because spray irrigation requires that a significant amount of land be set aside to receive effluent. Two additional factors that dissuade municipalities from starting new spray irrigation systems are complex permitting requirements and the fact that spray irrigation is not a year-round solution to manage wastewater effluent. However, spray irrigation has been an active management strategy in Manchester for many years. The *Carroll County Alternatives Evaluation* (December 2023) indicated the following results:

- All of the municipalities have irrigable land to potentially accept 50% of the projected build-out flow for water reuse, with the exception of Freedom.
- Taneytown and Manchester both had sufficient land available within a one-mile radius of their respective WWTPs to potentially reuse 50% of their projected build-out wastewater flows.
- Westminster, Mount Airy, and Hampstead had sufficient land available within a two-mile radius of their respective WWTPs to potentially reuse 50% of their projected build-out wastewater flows.

Under Maryland's policy, application rates for new systems are limited by the *most* restrictive of either soil infiltration capacity or crop nitrogen requirements. Due to the prevalence of clay soils in the Piedmont, many parcels in Carroll County will not be suitable for reclaimed water irrigation. However, the restriction associated with the crop nitrogen requirement can actually be more limiting in many situations unless the WWTP employs nitrogen removal technology. Generally, application rates would be no greater than two inches per week, depending upon soil type, and can conservatively be estimated at one inch per week for planning purposes. This is equivalent to approximately 1.0 mgd per 260 acres of irrigated area, not including buffer zones.

Seasonal reuse of treated effluent can benefit those localities whose discharge to surface water is limited by loading caps or other water quality parameters such as temperature. Because a high level of treatment is still required, it does not provide relief for facilities that are primarily limited by treatment capacity. However, irrigative reuse is expected to be especially beneficial for major

WWTPs that would be limited by nutrient loading caps even after installation of ENR technology. In most cases, it would still be necessary to discharge to surface water in the winter, or in other seasons, if the demand/land area for reused water is less than the total effluent generated. Facilities that have concentration-based nutrient limits would still be required to attain those limits when discharging to surface water.

33.1.3 Infiltration and Inflow (I&I) Reduction

I&I represents a significant portion of the total inflows at WWTPs in Carroll County and accounts for a significant proportion of the total WWTP capacity. Most, but not all, of the municipalities in Carroll County have ongoing programs to reduce I&I, and many have achieved significant reductions in I&I that indirectly provide additional wastewater capacity and support future growth and development. In addition to preserving treatment capacity for sanitary wastewater, I&I reduction also prevents sanitary sewer overflows (by reducing the amount of 'extra' flows during storm events), protects public health, reduces WWTP operating and maintenance costs, and improves the treatment process. I&I reduction programs, in many of the systems, can be the single most cost-effective means to increase capacity.

33.2 Sustain existing wastewater treatment capacity

Specific Action Items Already in Place:

✓ Completed I&I investigations or studies for each system to determine where improvements can be made to reduce capacity losses due to water entering the wastewater system [*from 2007 Guidance doc*] and, thereby, potentially regain some capacity (studies: Manchester, Mount Airy)

✓ Amended the *Carroll County Water & Sewer Master Plan* to incorporate the projects that have been identified in the 2010 WRE to address needs within the next 10 years *[2024 WRE]*

✓ Evaluated if nutrient offsets (point-nonpoint source nutrient credit trading) such as converting septic system connections to a public sewerage system [*from 2007 Guidance doc*]

✓ Upgraded major WWTPs to ENR treatment level, enabling the current facility to operate at the limits of technology in terms of nitrogen and phosphorus removal and reducing the limitation on capacity that the caps might present: Freedom, Hampstead, Manchester, Mount Airy, Taneytown, Westminster *[2024 WRE]*

Ongoing Action Items:

- Limit allocations and connections that would not cause a system capacity to exceed a set level under maximum capacity *[2010 WRE]*
- Identify I&I issues and make system improvements to reduce I&I, thereby potentially regain some flow capacity *[2010 WRE]*
- Budget funds annually for I&I identification and improvements: Westminster [*2024 WRE*]
- Connect individual private septic systems to public sewer systems where capacity is available [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

❑ Explore water reuse and zero discharge WWTP systems for existing and/or new systems to maintain nutrient loading caps in water bodies that have been deemed impaired by the State *[2010 WRE* Budget funds annually for I&I identification and improvements: Freedom, Hampstead, Manchester, Mount Airy, New Windsor, Taneytown, Union Bridge [*2024 WRE*]

- ❑ Identify external funding sources (e.g., community development block grants, revolving loans) to assist resource-limited communities with I&I reduction [*2024 WRE*]
- ❑ Evaluate the sewer user rate structure to determine the system's ability to balance affordability with potential needs to upgrade or expand, address disadvantaged communities and maintain overall system viability. Consider revising rate structure, if needed, to address these factors. [*2024 WRE*]
- ❑ Amend the *Carroll County Water & Sewer Master Plan* to incorporate the projects that have been identified in the 2024 WRE to address needs within the next 10 years [*2024 WRE*]
- ❑ Ensure planned projects and recommendations in future updates to the *Carroll County Water & Sewer Master Plan* are consistent with the WRE [*2024 WRE*]
- ❑ Develop educational programs or materials for homeowners and businesses to raise awareness on what can and cannot be flushed down the toilet or put in the sewer system [*2024 WRE*]

Inventory equipment among the County and municipalities that can be used to help detect I&I and share equipment among the jurisdictions to lower costs of this activity [*2010, 2024 WRE*]

Long-Term Action Items

- ❑ Coordinate among the municipal systems on I&I reduction activities and identification of external funding sources to take advantage of economies of scale, thereby lowering costs to resource-limited communities [*2024 WRE*]
- ❑ Enhance wastewater source control through local pretreatment programs to support water reuse opportunities for municipal wastewater [*2024 WRE*]
- ❑ Investigate the possibility of spray irrigation at the landfill to reduce the amount of leachate needing to be hauled [*2024 WRE*]
- ❑ Upgrade minor WWTPs (New Windsor, Union Bridge) to ENR treatment level, enabling the current facility to operate at the limits of technology in terms of nitrogen and phosphorus removal and reducing the limitation on capacity that the caps might present *[2024 WRE]*
- ❑ Identify areas that could be suitable for spray irrigation as an alternative to discharging wastewater effluent to streams where a WWTP would otherwise exceed caps to meet demand, as needed [*2024 WRE*]

33.3 Develop new public wastewater treatment and disposal capacity

Specific Action Items Already in Place:

- ✔ n/a

Ongoing Action Items:

- n/a

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Identify if any WWTPs do not have sufficient allocations of raw water supply to operate at higher capacities and quantify the impacts of these conditions [*2024 WRE, Hazen*]
- ❑ Identify WWTPs that may have limitations due to potential PFAS regulations [*2024 WRE, Hazen*]
- ❑ Proceed with planned improvements identified in the *Carroll County Water & Sewer Master Plan* to ensure capacity is available to meet demand where the WWTP is not already exceeding nutrient caps *[2010 WRE]*

- ❑ Evaluate feasibility of developing a public wastewater system to serve the Finksburg area; in 2024, the County began study in cooperation with the University of Maryland Environmental Finance Center [*2024 WRE*]
- ❑ Evaluate feasibility, potential benefits, and cost of the County and municipalities jointly contracting to identify I&I and implement repairs and improvements to regain flow capacity for all municipal wastewater systems in the county [*2024 WRE*]
- ❑ Consider the implications of wastewater system capacity when updating the County Master Plan and municipal comprehensive plans and identify proposed land uses that balance the need for additional growth and development, particularly to meet State requirements, with the availability of public drinking water supplies to accommodate the projected development in the short (~up to 10 years) and long terms (~>10 years)

Long-Term Action Items

- ❑ Should the total loads approach the permitted limits prior to completion of the planned upgrades, evaluate options for spray irrigation and onsite treatment/reclamation of industrial effluent to divert flow from the WWTP, as needed and where there is not a concern with PFAS in the effluent [*2010, 2024 WRE*]
- ❑ Further evaluate land available for irrigation using reclaimed water through a GIS analysis of potential land use constraints; identify and prioritize land areas that should be pursued for water reuse opportunities, as needed, as an alternative to discharging directly to streams for wastewater treatment plant capacity expansion, and where PFAS contamination will not be a concern [*2024 WRE*]
- ❑ Evaluate regional solutions to ensure future wastewater capacity and adequate management planning, as needed *[2010 WRE]*
- ❑ Encourage/work with MDE to update the *Water & Sewer Master Plan* regulations so the method to calculate wastewater demand and capacity is consistent with MDE's methodology in the WRE Guidance Document [*2024 WRE*]

34.0 Stormwater Strategies: Countywide

34.1 General Stormwater Trends

34.1.1 Costs and Funding

Implementation of the Chesapeake Bay TMDL has significantly increased financial burdens on all pollutant source sectors. Enhanced Nutrient Removal (ENR) upgrades at WWTPs have largely been funded by Maryland's Chesapeake Bay Restoration Fund. On the other hand, implementation for stormwater, agricultural, and other non-point sectors requires a combination of funding sources, including local tax revenue and utility fees, state grants and cost-share programs (e.g., Maryland's Bay Restoration Fund), federal grant and cost-share programs (e.g., 319 nonpoint source implementation grants, the Conservation Reserve Enhancement Program, the Environmental Quality Incentives Program), and out-of-pocket landowner costs. The financial burden of TMDL-related mandates is thus a major element of the planning process, especially for the stormwater sector.

Climate change adaptation and mitigation strategies are also a potentially significant and challenging cost for the County and municipalities to bear, especially when the effects of climate change are harder to conceptualize and may be easier to put off than regulatory requirements or prominent issues that affect day to day operations.

34.1.2 Climate Change

Flooding is already a known hazard in the County and is expected to worsen with extreme precipitation events that are anticipated to occur with climate change. Flooding most often occurs in known floodplains but can also occur in urban areas that have a high degree of impervious land. The most impactful floods are those that cause blockages and/or closures on roadways that disrupt the flow of traffic through the County. Road closures during and after storms are also a risk to emergency services if emergency response providers cannot access certain roads.

The County has begun to develop an inventory of flooding-related road closures. Development of this dataset is a collaborative effort among the County, municipalities, and local residents, though level of engagement with the reporting process has varied among contributors. Another complication is that MDE has not provided a consistent definition of flood-related issues, so the dataset has some inconsistency among municipalities.

MDE's Dam Safety Program conducts safety inspections of dams based on their "hazard classification," evaluating downstream hazard conditions, issuing permits for new construction and repairs to existing structures; and conducting construction inspections. The Hazard Classification of a dam is based on the downstream damage that would result if the dam were to fail. The hazard classification has no relationship to the condition of the dam, its structural integrity, operational status, or flood storage capability. In general accordance with dam safety practices nationally, Maryland uses three categories to classify dams: High, Significant, and Low Hazard. Piney Run Reservoir dam is classified as a High Hazard dam and is the only High Hazard dam the County owns. The City of Westminster's Cranberry Reservoir was recently reclassified as High Hazard. The presence of these dams is not an indication of an area of frequent flooding.

34.2 Protect and restore water quality and make progress toward any applicable TMDLs

Specific Action Items Already in Place:

- ✓ Completed the planning, design, and construction of ENR upgrades at all major WWTPs in the county: Freedom, Hampstead, Manchester, Mount Airy, Taneytown, Westminster [*2024 WRE*]
- ✓ Explored water reuse and zero discharge treatment plant systems to maintain nutrient loading caps in water bodies that have been deemed impaired by the State: PUREWater Westminster, anticipated to be operational in 2027 [*2024 WRE*]

- ✓ Developed and submitted to MDE a *Countywide TMDL Stormwater Implementation Plan* per the NPDES MS4 permit requirements, beginning with the 5th-generation permit issued in December 2022, that identifies additional measures to reduce nutrient loads and achieve the required percentage reductions [*2024 WRE*]
- ✓ Shifted from using MapShed to using TIPP for tracking and estimating restoration progress with the 2024 NPDES MS4 Annual Report [*2024 WRE*]
- ✓ Guide developers in Tier II watersheds to coordinate with MDE on MDE's Tier II review process early in the process to increase efficiency and decrease costs for developers by encouraging them to submit applicable projects to MDE for review earlier in the process [*2024 WRE*]
- ✓ Provide municipalities with Tier II review process information via presentation from MDE staff to WRCC [*2024 WRE*]
- ✓ Applied for and received National Fish & Wildlife Foundation (NFWF) grant for $100,545 for improving Green Stormwater Infrastructure in the Prettyboy Reservoir Watershed [*2024 WRE*]

TMDL stands for "Total Maximum Daily Load." The load refers to the amount of a specific pollutant found in a body of water coming from all sources. Simply put, the TMDL is the highest amount of foreign substance that a body of water can accept from all sources without exceeding water quality standards. Once a TMDL is set and approved by the US EPA, requirements are imposed that are intended to correct existing impairments. New federal and state regulations for meeting TMDLs also mean planning to prevent activities that may add pollutants in the future. Changes to land use or the amount of planned development may be necessary to address the requirements of the TMDL.

Please refer to the table in Appendix D entitled "MDE Documented TMDL Impairments for Carroll County" for a status of each of the pending and completed TMDLs for Carroll County.

Ongoing Action Items:

- Develop educational materials and programs to raise public and individual awareness of water quality measures, how our actions impact water quality, and what individuals can do *[2010 WRE]*
- Collect/monitor water quality data on pollutant loads in local stream basins – Piney Run Reservoir, BMP effectiveness monitoring, watershed-wide assessment and trends monitoring [*2024 WRE*]
- Develop a program to systematically re-establish forested stream buffers in the municipalities – Stream Buffer Initiative [*2024 WRE*]
- Increase the frequency of municipal storm drain cleanouts to prevent storm drain clogging and reduce the amount of stormwater runoff that bypasses existing stormwater management practices – Inlet Inspection & Cleaning, Reducing Untreated Stormwater Runoff [*2024 WRE*]
- Preserve or restore riparian stream buffers with native vegetation that can be attained and/or maintained throughout the municipal plan review, construction, and occupancy stages of development *[2010 WRE]*
- Conserve and enhance trees and other vegetation at a site by planting additional vegetation, clustering tree areas, and promoting the use of native plants *[2010 WRE]*
- Connect existing, unserved development within DGAs to public sewer systems, via the proper municipal process, to reduce nutrient loading to groundwater and to be eligible for offset credits *[2010 WRE]*
- Ensure adequacy of wastewater treatment operations in terms of quantity and quality, while maintaining compliance with regulatory requirements *[2010 WRE]*
- Work toward compliance with the NDPES MS4 permit restoration requirements [*2024 WRE*]

- Develop educational materials and programs to raise public and individual awareness of water quality measures, how our actions impact water quality, and what individuals can do *[2010 WRE]*
- Implement, update, and provide progress on the *Countywide TMDL Stormwater Implementation Plan* per the NPDES MS4 permit requirements [*2024 WRE*]
- Update regularly the TMDL Implementation Progress and Planning (TIPP) spreadsheet tool developed by MDE to assess current progress and future BMP implementation toward achieving TMDLs [*2024 WRE*]
- Promote education of staff and local developers on MDE's review process for development in Tier II High Quality watersheds [*2024 WRE*]
- Continue to support work toward applicable TMDLs through participation in and coordination with the County and the WRCC to comply and improve water quality (NPDES Permit) [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Implement measures to increase the urban tree canopy, thereby increasing the interception of rainfall [*2024 WRE*]
- [ ] If/When a temperature TMDL is set for the Prettyboy Reservoir watershed, develop and implement a small/farm pond decommissioning program in the Prettyboy Reservoir watershed to reduce temperatures of water discharging to streams from these ponds [*2024 WRE*]
- [ ] Work with the Center for Watershed Protection to develop a comprehensive watershed assessment that evaluates the needs and opportunities for green stormwater infrastructure projects to improve water quality in the Georges/Murphy Run subwatershed of the Prettyboy Reservoir Watershed. The study will also develop a program to perform target outreach to businesses in the watershed to reduce incidents of stormwater pollution. [*2024 WRE*]
- [ ] Investigate Maryland's database of grant opportunities related to hazard mitigation, floodplain management, water quality improvements, and other similar projects to identify possible grants Carroll County may be able to pursue, possibly evaluating on co-benefits that may provide an opportunity to leverage other funding sources (https://md-resiliency-partnership-maryland.hub.arcgis.com/pages/grants) [*2024 WRE, Hazen*]
- [ ] Identify BMPs intended to protect water quality that also provide net benefits to greenhouse gas (GHG) emissions, energy usage, wildlife habitat, flood risks, baseflow protection, etc. [*2024, WRE, Hazen*]

There are six existing or planned water supply ***reservoirs*** whose watersheds extend partially or entirely within Carroll County: Loch Raven, Prettyboy, Liberty, Piney Run, Gillis Falls, and Union Mills. Combined, these existing and planned reservoirs could potentially provide high-quality water for nearly 2 million people in Baltimore City and the five surrounding counties.

Most of the watersheds for these reservoirs are on the State's list of "impaired" waters (the 303(d) list), and a TMDL will ultimately be set for the impairing substance. A TMDL for phosphorus has already been set for Prettyboy Reservoir. A TMDL for phosphorus and sediments has been set for Loch Raven Reservoir. Liberty Reservoir is listed as impaired, which indicates that a TMDL will eventually be set for it as well. While no TMDL has been set for Piney Run Reservoir, a watershed management plan is being developed to ensure continued maintenance of its water quality. To ensure the future quality of water provided by these reservoirs, the County needs to take measures both to address the TMDLs as well as make certain that future development does not further negatively impact the watersheds that drain to these reservoirs.

The Board of County Commissioners signed a new Reservoir Watershed Management Agreement in 2005. This was an updated agreement whose beginnings date to 1984.

- ❑ Enhance GIS-based analysis of watersheds to track and "take credit" for all implementation activities, including those already accomplished [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

34.3 Enhance stormwater management programs

Specific Action Items Already in Place:

- ✓ Modernized subdivision ordinances to promote innovative site design techniques [*from 2007 Guidance doc*]
- ✓ Incorporated the use of nonstructural BMPs such as natural conservation areas, roof and non-roof top disconnection, vegetated swales, sheet flow to buffer, reduced impervious cover to the maximum extent practicable and promote ESD or LID techniques, as required by State regulations and Carroll County local laws *[2010 WRE]*
- ✓ Required permanent protection of existing forest on development sites and promoted the enhancement of existing contiguous and creation of new forest areas *[2010 WRE]*
- ✓ Revised and adopted local stormwater regulations to incorporate and implement Maryland's Stormwater Management Act of 2007 *[2010 WRE]*
- ✓ Evaluated and adopted policies requiring increased bioretention of stormwater and onsite infiltration of stormwater, i.e., bioretention areas *[2010 WRE]*
- ✓ Established a County Watershed Restoration and Protection Program (WPRP) and Fund, per the requirements of § 4-202.1(j)(7), Environment Article, Annotated Code of Maryland, to provide a dedicated fund for enhanced inspection, maintenance, and restoration activities for stormwater *[2024 WRE]*
- ✓ Established maintenance program and associated funding for stormwater management facilities to be maintained, updated, and/or upgraded *[2024 WRE]*
- ✓ Became NPDES MS4 co-permittees with the County, effective with the fourth-generation permit December 29, 2014, to cooperatively and more efficiently and cost effectively address permit requirements across jurisdictional boundaries [*2024 WRE*]
- ✓ Developed a Memorandum of Agreement (MOA) between the County and all eight municipalities to address the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) requirements, to address how cost-sharing of stormwater mitigation/restoration projects will take place, and to delegate the administrative responsibilities of the Permit. It was signed by the County Commissioners and Mayors on October 23, 2014. This is a perpetual agreement. [*2024 WRE*]

Ongoing Action Items:

- Continue the County's strong support and implementation of erosion and sediment control and stormwater management regulations *[2010 WRE]*

- Provide staff and funding to the Soil Conservation District (SCD) for technical assistance to farmers and landowners for the implementation of BMPs *[2010 WRE]*
- Support SCD in providing technical assistance and guidance on programs available to farmers and landowners for the implementation of BMPs and coordinate activities and funding between district, State, and federal programs *[2010 WRE]*
- Retrofit existing municipal stormwater management facilities that do not meet existing stormwater management requirements to meet the impervious area restoration requirements of the joint NPDES MS4 permit *[2024 WRE]*
- Continue to ensure that current stormwater management facility designs are resilient (e.g., they safely pass these intense rainfall events without overtopping or failing), which will be further supported through adoption of revisions to Code Chapter 153, Stormwater Management, to comply with revisions to the State's stormwater management regulations per the A-StoRM initiative [*2024 WRE*]

Impervious surfaces are mainly constructed surfaces - rooftops, sidewalks, roads, and parking lots - covered by impenetrable materials such as asphalt, concrete, brick, and stone. These materials seal surfaces, repel water, and prevent precipitation from infiltrating soils. Soils compacted by urban development are also highly impervious. By decreasing infiltration, impervious surfaces increase stormwater runoff.

Impervious surfaces allow many types of pollutants, derived from a variety of sources, to accumulate upon them. Many of these pollutants are subsequently washed into waterbodies by stormwater runoff, severely degrading water quality. This type of pollution is known as nonpoint source water pollution and is linked to land use activities. Water quality problems increase with greater levels of imperviousness and intensity of land use. Carroll County currently has a number of streams on Maryland's list of impaired waters.

- Continue to aggressively promote Carroll County's land preservation programs, such as the Maryland Agricultural Land Preservation Foundation (MALPF), Carroll County Easement Purchase Program, Rural Legacy, Critical Farms, and the Leveraged Installment Purchase Agreement (IPA) program [*2024 WRE*]
- Prepare and submit to MDE the required Watershed Restoration and Protection Program (WPRP) Annual Report *[2024 WRE]*
- Prepare and submit to MDE biennially the required Financial Assurance Plan (FAP), which indicate how stormwater runoff will be treated and paid for over the next five years and will provide the financial roadmap for complying with the TMDLs *[2024 WRE]*
- Continue to facilitate the Water Resource Coordination Council (WRCC) as the forum for joint coordination of stormwater management projects required by the NPDES MS4 permit [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Participate on MDE's advisory groups for development of new stormwater management regulations as a result of Maryland's A-StoRM effort [*2024 WRE*]
- [ ] Revise local stormwater management regulations to incorporate the revisions made to the State's Stormwater Management Act as a result of the A-StoRM initiative, which is anticipated to address both stormwater runoff quantity and quality changes due to climate change [*2024 WRE*]

Long-Term Action Items

- [ ] n/a

34.4 Identify changes to planned land use patterns and land development requirements to help achieve the needed reduction in pollutant loads

Specific Action Items Already in Place:

- ✔ Adopted zoning and land use changes to severely limit development in sensitive areas such as stream and wetland buffers, floodplains, areas underlain by carbonate rock, and steep slopes [*2010 WRE*]
- ✔ Evaluated the specific impervious cover rates for each land use category in Carroll County based on existing and projected development. [*2024 WRE*]
- ✔ Developed and applied a new model (MapShed) through the NPDES program, which takes this into account. This model was then replaced as of the 2024 reporting year with MDE's TIPP spreadsheets for progress tracking and reporting. [*2024 WRE*]
- ✔ Completed a true land cover layer for the county based on latest available orthophotography and using the same land cover categories as the Chesapeake Bay Program Model 5.0 MidPoint assessment. The County worked with the Conservation Conservancy to update land cover. It was incorporated to the Bay Program Model 6.0. [*2024 WRE*]
- ✔ Worked with the municipalities, where applicable, to incorporate in their road standards measures that reduce the required street width and that allow for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency vehicle access [*2010 WRE*]
- ✔ Implemented 2007 State stormwater management regulations, which are designed to reduce impervious surface associated with new construction [*2010 WRE*]
- ✔ Evaluated and adopted, where needed, amendments to parking requirements, imposing limits on the surface area of a site devoted to parking [*2010 WRE*]
- ✔ Required in the Landscape Manual the use of landscaped islands in parking lots and certain types of roadways to decrease the amount of impervious area and capture additional stormwater runoff [*2010 WRE*]
- ✔ Incorporated stormwater conveyance and treatment features, such as grass channels, stormwater curb extensions, and linear stormwater tree pits, into closed-section roadways [*2010 WRE*]
- ✔ Encouraged the use of alternative, permeable sidewalk, and trail surfaces [*2010 WRE*]
- ✔ Removed all SHA-owned properties from the impervious baseline acreage/GIS layer/data, as these areas fall under SHA's NPDES permit *[2024 WRE]*

Ongoing Action Items:

- Continue to promote and direct growth to PFAs, which will resolve conflicting and competing requirements [*2010 WRE*]
- Retrofit stormwater management facilities into existing subdivisions where there are no stormwater facilities in order to help meet the NPDES MS4 permit requirements of reducing impervious cover [*2024 WRE*]

- Continue to update the BLI data to derive future land use scenario acreages, estimate water and sewer demand, and other use for other relevant applications [*2024 WRE*]
- Update and maintain data for annual submission to MDE of the TMDL Implementation Progress and BMP implementation toward achieving TMDLs [*2024 WRE*]
- Reduce nutrient pollution resulting from septic systems [*2024 WRE*]
  - Coordinate with the Carroll County Health Department to track new septic approvals to input and keep up to date. The County coordinates with the Health Department to track upgrades from conventional to BAT for NPDES MS4 compliance credit [*2024 WRE*]
  - Identify failing septic systems, prioritize the systems that should be either connected to public sewer or upgraded or replaced using best available technology (BAT), and leverage funds to pay for such improvements. Fees charged to public sewer and private septic system users goes into the Bay Restoration Fund, which is used to upgrade septic systems with BAT systems. These funds are administered through the Carroll County Health Department. [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ During the update of the comprehensive/master plan, evaluate if buildout of the land use plan and transportation element ensure safe travel between critical services and the locations where those services are needed [*2024 WRE*]
- ❑ During the update of the comprehensive/master plan, evaluate if buildout of the land use plan and transportation element ensure reliable water and energy supply to support the seven critical lifeline assets and services [*2024 WRE*]
- ❑ When updating the Sensitive Areas Element, build in strategies that help provide a strong connection between the Sensitive Areas Element and the WRE [*2024 WRE*]
- ❑ Include projects in the Land Preservation, Park, and Recreation Plan (LPPRP) that could support hazard mitigation and climate change adaption [*2024 WRE*]
- ❑ Adopt changes to the Landscape Ordinance to require the use of xeriscaping principles exclusively with native plants that protect the environment and support wildlife [*2010 WRE]*
- ❑ Evaluate and implement changes to the land use designation and/or zoning of certain areas to promote development in areas not environmentally sensitive and in locations with appropriate infrastructure as part of the *next* comprehensive plan update process [*2010 WRE*]
- ❑ Evaluate and adopt, where appropriate, parking requirements to determine if opportunities exist to reduce required parking for new development, which would result in a decrease in the amount of new impervious area [*2010 WRE*]
- ❑ Decrease allowable residential densities in rural areas outside DGAs to reduce the number of future residential septics that could be added, thereby reducing some of the potential increase in nitrogen loads [*2010 WRE*]
- ❑ Avoid planning for additional development near Maryland's high quality (Tier II) waters, coldwater streams, and other sensitive waters [*2024 WRE*]
- ❑ Reduce nutrients from failing septic systems while also protecting public health: [*2024 WRE*]
  - ❑ Coordinate with the Health Department to identify communities with failing septic systems and communities with aging systems that could benefit from community systems. The Health Department, which is a State agency, oversees septic systems and determines when, where, and why septic systems fail.
  - ❑ Evaluate the feasibility and cost benefit of developing community systems for communities identified as having failing or aging systems

Long-Term Action Items

- ❑ n/a

34.5 Reduce flood event impacts to water quality and mitigate effects of climate change

Specific Action Items Already in Place:

- ✓ Identified areas in each watershed where frequent flooding has occurred on or after January 1, 2000, as well as noted potential reasons for flooding, such as floodplain encroachment, under-sized conveyance system(s), etc. [*2024 WRE*]
- ✓ Developed an updated and consistent database of known flooding areas**,** including riverine floodplain expansion areas [*2024 WRE*]

Ongoing Action Items:

- n/a

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Work with MDE to help define "flooding event," including a classification system to categorize the severity of flooding and flood impacts to help the County and municipalities identify where flood-mitigation projects should be prioritized [*from 2021 A-StoRM Report; Hazen*]
- ❑ Prioritize identified areas of frequent flooding for more detailed study, possibly as part of the watershed-specific flood management plans [*2024 WRE*]
- ❑ Coordinate with MDE on appropriate and feasible measures that could be implemented as the State works to increase its capacity to provide more technical guidance and modeling regarding the potential impacts from extreme events including impacts to temperature and the hydrologic regime, as well as possible changes to pollutant impacts due to climate change [*2024 WRE*]
- ❑ Identify critical infrastructure located in floodplains and develop mitigation and adaption strategies to address flooding and other climate change impacts [*2024 WRE, Hazen*]
- ❑ Develop comprehensive watershed-specific flood management plans for each watershed in which recurring flooding event impacts are known to occur [*from 2021 A-StoRM Report*]
- ❑ Identify if planned development is in or adjacent to a watershed where downstream and disadvantaged communities experience chronic or repeat flooding and, if so, identify mitigation measures or alternatives [*2024 WRE*]
- ❑ Identify areas above and below drinking water reservoir dams and other high, significant, and low hazard dams. Consider restrictions in these areas regarding new development unless dam safety storm capacity issues are adequate or expected to be addressed as part of a development project. [*2024 WRE*]
- ❑ Consider policies to prevent affordable housing from being located in areas at greater risk of flooding [*2024 WRE*]
- ❑ Take advantage of opportunities to secure funding from the Comprehensive Flood Management Grant Program (CFMGP) to support watershed studies and related model development, as needed [*2024 WRE*]
- ❑ Take advantage of opportunities to secure funding from the Comprehensive Flood Management Grant Program (CFMGP) for relocation or elevation of affected and planned infrastructure, where financially and logistically feasible [*2024 WRE*]

- ❑ Expand Rural Legacy Areas in the county to provide a greater level of preservation/conservation to natural resource lands and wetlands and riparian buffers and access to funding for easements on land to protect vulnerable areas and provide infiltration and flood/storm surge attenuation benefits in water hazard/flood prone areas [*2024 WRE*]
- ❑ Actively participate in Carroll County's five-year update to the Multi-Jurisdictional Hazard Mitigation Plan, and adopt the plan once approved by FEMA [*2024 WRE*]
- ❑ Investigate the use of Maryland Department of Natural Resources' (DNR) Ecosystem Service, which assigns a dollar range on resource lands for their ability to perform carbon sequestration, nitrogen removal, stormwater mitigation and flood prevention, wildlife habitat and biodiversity, air pollutant removal, groundwater recharge, and surface water protection, as a tool for grant writing and when identifying and prioritizing practices that may be effective and financially feasible for flood mitigation and water quality projects [*2024 WRE*]

Long-Term Action Items

- ❑ Integrate comprehensive watershed studies and model development into the local growth and development planning process [*from 2021 A-StoRM Report*]
- ❑ Continue to work with MDE to identify, document, and implement comprehensive solutions to flood prone areas [*from 2021 A-StoRM Report*]

35.0 Emerging Contaminants: Countywide

Some examples of emerging contaminants that may be present in drinking water supplies, wastewater, and/or stormwater runoff are per-and polyfluoroalkyl substances (PFAS), polycyclic aromatic hydrocarbons (PAHs), microplastics, rubber anti-degradants (6PPD and 6PPD-quinone), pharmaceuticals and personal care products (PPCPs), chloride (road salt), and lithium. EPA is evaluating and/or will likely address these contaminants in the future with MCLs and/or additional regulations. Others are continually being identified.

35.1 Mitigate, or prevent where possible, impacts of emerging contaminants in water supply, wastewater, or stormwater

Specific Action Items Already in Place:

- ✓ Monitored evolving PFAS regulatory actions *[2024 WRE]*
- ✓ Tested municipal/public water supply wells to determine current PFAS levels and potential need for treatment; accomplished through EPA's UCMR 5, as well as study by MDE [*2024 WRE*]
- ✓ Followed EPA/MDE guidance regarding documentation and notification requirements [*2024 WRE*]
- ✓ Initiated public outreach on salt management through publications and social media to share salt management information and practices for residents and businesses [*2024 WRE*]
- ✓ Completed lead service lines inventory, which were submitted by October 2024, as required by the federal Lead and Copper Rule Revisions, effective December 2021 *[2024 WRE]*

Ongoing Action Items:

- Identify public drinking water supply wells with PFAS amount above the MCL [*2024 WRE*]
- Evaluate action required to mitigate PFAS issues [*2024 WRE*]

- Implement outreach programs to raise awareness of emerging contaminants, their impacts on water resources, and best practices residents and property owners can implement to help mitigate those impacts [*2024 WRE*]
- Monitor EPA's Contaminant Candidate List (CCL) and other evolving policies, regulations, and practices regarding emerging contaminants for which EPA has not yet set MCLs and associated requirements [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Identify PFAS source locations and minimize potential water supply contamination [*2024 WRE*]
- ❑ Engage with MDE regarding Maryland drinking water standards for PFAS and implement mitigation programs as required [*2024 WRE*]
- ❑ Develop and implement a PFAS Mitigation Plan to address and remediate impacts of PFAS in drinking water, wastewater, and stormwater and to assist in seeking funding [*2024 WRE*]
- ❑ Bring systems into compliance by the regulatory deadline [*2024 WRE*]
- ❑ Allocate resources to implement the PFAS Mitigation Plan [*2024 WRE*]
- ❑ Expand monitoring activities to collect data on other constituents included in the Fifth Unregulated Contaminant Monitoring Rule (UCMR 5) [*2024 WRE*]
- ❑ Begin additional lithium monitoring, especially in groundwater, to be prepared for anticipated additional drinking water regulations [*2024 WRE, Hazen*]
- ❑ Develop or update Salt Management Plans to submit to MDE per requirements of the NPDES MS4 permit [*2024 WRE*]
- ❑ Evaluate whether any of the systems in the county are eligible for and could benefit from EPA's Emerging Contaminants in Small or Disadvantaged Communities grant program and Water Technical Assistance (WaterTA) program to help assess and implement solutions for their emerging contaminants in drinking water and/or wastewater [*2024 WRE*]

Long-Term Action Items

- ❑ Establish funding and other resources for future operational needs to address other emerging contaminants beyond PFAS [*2024 WRE*]

Overview by Municipal System

36.0 Carroll County

(in support of individual municipal systems & focusing growth in DGAs)

The countywide strategies included in the previous section of this plan apply to all nine jurisdictions. System-specific strategies for the Freedom water and sewer systems and the Hampstead sewer system are included in this section of the plan. However, there also are strategies that are specific to the County that do not fall into either of these categories. The County undertakes many separate, County-specific actions in its support of individual systems, as well as continued focus of development into DGAs. This section describes those County-specific water supply, wastewater, and stormwater projects and individual action items to help achieve the goals and land use plans of the County's and the municipalities' adopted comprehensive plans. These projects could address some of the various plausible scenarios that might occur, as described in 31.0 Potential Future Scenarios for Consideration.

The County continues to be committed to working proactively with the municipalities to provide public water supply capacity to accommodate planned development in the DGAs. Therefore, the County continues to evaluate and support regional water supply projects to meet those needs.

The following projects are County projects that are considered for regional water supply options. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploration of additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes, climate change, or other changes that would result in the need for additional available water capacity or other future scenario.

36.1 Regional Water Supply Alternatives

Hazen reevaluated safe yield analyses because USGS flow data are now available through 2023, but there are no anticipated changes to the safe yield values calculated in 2009 because the decade since the Malcolm Pirnie safe yield analyses were conducted did not include a new drought of record. Moreover, there have not been any infrastructure changes at the reservoirs in the past decade that significantly affect safe yield, nor any major change in plans to proposed reservoirs. However, it is important to note that reservoir safe yield should be recalculated if the County or a municipality begins to seriously consider bringing a reservoir online. Absent any infrastructure upgrades or more formal planning for reservoirs, it is assumed in this 2023 update that all information developed and reported by Malcolm Pirnie is unchanged. ***For all reservoir options, all assumptions would need to be re-evaluated and more detailed study made to develop more accurate design/engineering needs and associated costs before moving forward***.

<u>Key permits required</u>: With the exception of the Prettyboy Reservoir, all reservoir alternatives included would require securing one or more of the key permits listed below.

- USACE Section 404 permit
- Water appropriation and use permit
- Water and sewerage construction permit
- Non-tidal wetland and waterways permit
- Dam safety permit

Relative Cost Estimate: Based on cost information available in 2009 from prior studies for the County and municipalities, as well as cost estimates prepared by Malcolm Pirnie and Schnabel Engineering, alternatives were evaluated based on the Unit Capital Cost of the project ($/gallon). Cost estimates were not re-calculated as part of the 2023 update of the Malcolm Pirnie documents for two reasons. First, the 2023 Water & Sewer Master Plan indicates that none of the new alternatives evaluated in this report will be implemented in at least the next 10 years. Detailed cost estimates will change significantly in 10 years and updated cost estimates will be needed before any of these alternatives can be implemented. Costs should be determined during project planning and design phases once the need for an alternative is more pressing. Second, the relative costs of alternatives have not changed since 2009 and are still applicable for alternative analysis and ranking. In other words, the absolute value of alternative costs may be outdated, but the relative cost needed for alternative evaluation has not changed. (*Hazen*) *Note: Estimated cost is the total of cost plus 40% contingency.*

Climate Change Resiliency: The climate change resiliency of each alternative was evaluated in terms of susceptibility to flooding, potential water quality degradation, and other possible climate change impacts. In general, alternatives that rely on surface water are more susceptible to climate change than groundwater-based alternatives because surface water sources experience more evaporative loss during warm periods, are more susceptible to temperature change, and receive more direct surface inputs (e.g., runoff) that can lead to water quality challenges such as algal issues.

36.1.1 Piney Run Reservoir

Piney Run Reservoir remains a viable long-term water supply reservoir, but the reservoir no longer has an active appropriation permit, and local opposition has stymied efforts to develop this resource because many local residents consider the reservoir to be a recreational resource rather than a supply option for raw drinking water.

In June 3, 2009, discussions with MDE, it was clear that the State views moving forward with developing Piney Run Reservoir as a water supply as a prerequisite for successfully permitting another reservoir project in Carroll County. Consequently, it is recommended that the conceptual facilities defined for Piney Run Reservoir as part of the Alternatives Evaluation be further developed so that a plan can be put in place for making eventual use of Piney Run Reservoir to serve communities in the southern half of Carroll County. One way to accomplish this would be to commission a preliminary design report for such facilities that would also include detailed consideration of all permitting requirements. This design report must also consider local opinions about the plan and an outreach strategy because Piney Run will not be successfully developed until local communities are on board with this plan.

In 2020, AECOM conducted a watershed study (AECOM, 2020a) and sediment evaluation (AECOM, 2002b) for Piney Run Reservoir and Dam. These studies confirmed that Piney Run could be a long-term supply option for Mount Airy and Freedom. However, results from these reports indicate that sedimentation has led to capacity loss in Piney Run Reservoir. Future efforts to develop this site into a drinking water reservoir would, therefore, also need to address reservoir sedimentation. For Piney Run to be a long-term supply option for Mount Airy and Freedom, the reservoir pool would either need to be raised by 2.3 feet or the sediment would need to be removed. Raising the pool would require re-construction of the Piney Run Dam control structure, which would require a temporary draining of the reservoir. Removal of the sediment would either require dredging, or a temporary lowering of the reservoir. A cost comparison of re-construction of the control structure versus removal of 725 acre-feet of sediment would need to be performed to determine the optimal solution. Note that unless significant restoration work is performed in the watershed, it is estimated that additional sediment removal of approximately 320 acre-feet will be required in 20 years.

Piney Run Reservoir (as built):

Piney Run Reservoir is located in the southern portion of the county, about one mile north of Sykesville. The dam was constructed by Carroll County primarily as a drinking water supply for the southeastern portion of the county. It also provides flood control and recreation for local citizens. The reservoir was built in 1975 by the County under the Watershed Protection and Flood Prevention act with the assistance of the US Department of Agriculture.

- Convert existing reservoir to water supply source
- Safe yield 3.65 mgd with normal pool elevation of 524 ft.; would require either dredging or raising the dam to attain this safe yield
- Construct new intake tower that feeds water by gravity into WTP
- Construct new 2.0 mgd water treatment plant (WTP) on Hollenberry Road and 1.0 mg storage facility
- Approximately 1,000 feet of 16-inch diameter raw water transmission main
- Approximately 10.5 miles of 16-inch diameter treated water transmission main to connect to Mount Airy service area
- 2 pump stations – one at WTP, one booster pump station near Woodbine
- 2.0 mg storage tank (located near Woodbine)
- To serve as regional source of water supply for Sykesville/Freedom and Mount Airy Service Areas

Estimated Capital Cost to Serve Freedom only = ~$18.15 Million
Estimated Capital Cost for Additional Infrastructure to Serve Mount Airy As Well = ~$15.47 Million

Justification: While the Alternatives Evaluation indicates that the Freedom system has adequate water supply sources available to serve planned development within the planned Water Service Area, additional water supply sources may be needed if the DGA is expanded in the future or if additional redundancy is needed in the system. The Piney Run Reservoir was intended to also serve as a regional water supply that includes the Mount Airy community.

Piney Run Reservoir (expanded):

The 2010 WRE also indicated the expansion of Piney Run Reservoir was an additional alternative. The Piney Run Reservoir was intended to serve as a regional water supply, including the Mount Airy community. Expanding the capacity of the existing reservoir would provide the County with additional supply in the event another source is no longer available or needs to be supplemented. The State will view moving forward with developing Piney Run Reservoir as a water supply as a prerequisite for successfully permitting another reservoir project in Carroll County.

However, based on an AECOM study in 2020, for Piney Run to be a long-term supply option for Mount Airy and Freedom, the County will need to address capacity loss due to reservoir sedimentation. This would likely require either sediment removal (dredging) or rehabilitation of the Piney Run Dam control structure, which would require the reservoir to be temporarily drained. The concept of expanding the Piney Run Reservoir capacity for additional yield has, therefore, been removed from consideration.

36.1.2 Union Mills Reservoir:

Union Mills is a proposed water supply reservoir site in the northern part of Carroll County. The site was envisioned as early as 1970 in the Carroll County Master Plan. The site is located about 4,000 feet upstream of the confluence of Deep Run with Big Pipe Creek.

Previous plans noted in the 2010 WRE envisioned well development and direct withdrawal from the stream as a step prior to reservoir development. However, the wells were since drilled and determined to not be a viable option. In addition, the amount of water that could be withdrawn from the stream alone would not be enough to justify the infrastructure costs to transmit the water to one or more municipalities. Therefore, the Union Mills Reservoir alternative was revised from the 2010 WRE to integrate all remaining components of the three phases that are necessary for full reservoir development into one regional water supply project that would move forward.

- Planned reservoir (adopted *Carroll County Water & Sewer Master Plan*)
- Pump stations, transmission mains, water treatment plant, dam
- To serve as regional source of supply for Hampstead, Manchester, Westminster, and/or Taneytown (to be served through flow augmentation of Big Pipe Creek and downstream withdrawal) water systems. With the development of the PUREWater system, Westminster would consider this a low priority source.
- Environmental surveys may include wetland/stream delineation, cultural resources survey, and possibly a freshwater mussel survey

Justification: For the municipalities to be served by the planned Union Mills reservoir, projected demand was compared to the potential future water supply capacity that could reasonably be achieved based on water availability. The evaluation indicates that enough water supply is available through groundwater and other existing or in progress regional water supply options to serve the projected demand at buildout of the entire Water Service Area with the DGA for all four municipalities. However, several other factors could influence the need to continue to evaluate the feasibility of and make progress toward installing infrastructure for the planned Union Mills reservoir. Among these influences are the potential for administrative changes at MDE, changes in regulatory procedures or policy at the state and/or federal level, and climate change. The ability to justify need and administrative issues regarding land acquisition may present major challenges to full reservoir development. This phased project facilitates the diversification, regionalization, and redundancy of water supply sources for Carroll County's jurisdictions.

- Conduct environmental surveys
- Safe yield 3.76 mgd with normal pool elevation of 610 ft.
- Install water transmission main to connect to Hampstead and Manchester Water Service Areas
- 3 pump stations
- Construct new WTP at reservoir

Estimated Capital Costs: ~$84.22 Million

A key component of the Union Mills Reservoir alternatives is flow augmentation of Big Pipe Creek through reservoir releases that could be recaptured about 11 river miles downstream to serve Taneytown. In meeting discussions on June 3, 2009, MDE made it clear that flow augmentation was acceptable to consider, especially since it is done on a much larger scale on the Potomac River through upstream releases from Jennings Randolph and Little Seneca Reservoirs. However, it will still be necessary to confirm with MDE that if a specific quantity of flow is released into the creek, that same quantity could be withdrawn downstream at Taneytown even when streamflow drops below levels prescribed as desired minimum flows. Otherwise, Taneytown's future water supply needs could not be met without some additional local raw water storage or other supplies.

In addition, most of the environmental information available for this alternative dates back to the 1970s when the Watershed Plan and Environmental Impact Statement for the Big Pipe Creek Watershed was prepared by the USDA-SCS (now known as the National Resource Conservation Service, or NRCS) (June 1976). Given the age of that information, new environmental surveys conducted under modern standards will be required to move this project through the permitting phase.

36.1.3 Gillis Falls Reservoir:

The proposed Gillis Falls reservoir site is in the southern part of Carroll County. The site is just downstream of the confluence of Gillis Falls and Middle Run. The streams are tributaries of the South Branch Patapsco River, which drains to the Chesapeake Bay. The project was proposed in 1967, following a severe drought, and progressed in the 1970s and 1980s, when land was purchased as it became available. Since the early 1990s, the project has stalled due to environmental restrictions.

- Planned reservoir (*2023 Carroll County Water and Sewer Master Plan*)
- Safe yield 3.85 mgd with normal pool elevation of 610 ft.
- 1 pump station
- To serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas
- Potential alternative use as mitigation site for wetlands and stream impacts resulting from the Union Mills reservoir

Estimated Capital Cost: $104.4 Million (excluding additional land acquisition costs)

Justification: While the Alternatives Evaluation indicates that the Freedom system has adequate water available to serve planned development within the Water Service Area as of 2023, additional water supply sources are needed for the Mount Airy water system. Additional supply is needed to serve existing and planned growth in the Water Service Area (including Long-Range), particularly if Mount Airy's planned commercial and industrial areas are to develop to their potential.

The Gillis Falls reservoir has long been included in the *Carroll County Water & Sewer Master Plan* as a planned public water supply source. However, despite the challenges that would be faced by moving forward with this project, it remains an option on the table. It will be considered and evaluated, along with the other options, in the event that additional water supply is needed as a result of changes in regulatory procedures or policy at the state and/or federal level, future expansion of DGAs not currently contemplated in adopted community comprehensive plans, or climate change. It is, however, considered a low-priority project. If the project is deemed at some point in the future to be infeasible, the area will also be evaluated as a potential wetland and stream impacts mitigation site if the Union Mills reservoir project moves forward.

36.1.4 Prettyboy Reservoir:

Prettyboy Reservoir is a 1,500-acre reservoir in the Hereford Zone of northern Baltimore County, Maryland, close to the Carroll County border. While the reservoir is in Baltimore County, the City of Baltimore owns the reservoir and the surrounding land.

- Baltimore had previously considered developing a 120 mgd treatment plant for its intake on the Susquehanna River to significantly increase the reliability of the City's supply; however, the City currently has no plans to build a new water treatment plant or expand the treatment capacity at the existing treatment plants. If Baltimore City does expand its treatment system, purchase of excess capacity from Prettyboy Reservoir may be practicable for Carroll County and/or its municipalities.
- Conceptual plans for a 3.0 mgd intake and 7.5-mile long, 16-inch diameter raw water pipeline from Prettyboy Reservoir to a new 3.0 mgd water treatment plant in Hampstead
- Requires one high-service pump station located at the intake on Prettyboy Reservoir, and two pump stations for the Manchester and Westminster interconnections
- Regional approach includes an interconnection with the Manchester (3.0-mile transmission main) and Westminster (6.7-mile transmission main) Service Areas to help supply future demands

Estimated Capital Cost: $38.8 Million

Justification: The capacity and demand estimates indicate that the Westminster will have adequate water supply available as potential sources to serve currently planned development within the DGAs with the implementation of PUREWater Westminster. The estimates show, however, that Hampstead and Manchester will need additional water sources/supply. Therefore, this option will remain on the list of alternatives in the event that changes in regulatory procedures or policy at the state and/or federal level, future expansion of DGAs not currently contemplated in adopted community comprehensive plans, or climate change necessitate implementation of additional public water supply sources. This option will be considered and evaluated, along with the other options, in the event that additional water supply is needed. It is considered a low-priority project, as the development of the phased Union Mills project remains a higher priority, and this project is contingent on Baltimore City moving forward with construction of a WTP.

37.0 Specific Strategies: Carroll County

Action Items within the WRE are individual specific activities that, as a whole, are intended to address or implement one or more strategies. Inclusion of individual Action Items ***does not represent a commitment*** to implement that Action Item. They are activities that *could* be pursued to help move the County or municipality toward the desired direction or outcome.

Specific capital improvements need to be incorporated to the *Water & Sewer Master Plan* and approved by MDE for public water and wastewater. Specific activities to address TMDLs need to be included in the *Countywide TMDL Implementation Plan*, which is approved by MDE, and progress reported through the *NPDES MS4 Annual Report*.

37.1 Water Supply

37.1.1 Protect and sustain existing drinking water supplies serving existing development

Specific Action Items Already in Place:

- ✔ Incorporated the commitments and strategies within the Reservoir Watershed Agreement into the County's planning, zoning, and decision-making process; [*2010 WRE*] updated Reservoir Watershed Management Agreement Action Strategy in 2019 [*2024 WRE*]
- ✔ Incorporated the Rural Legacy Program into the County Agricultural Land Preservation Program, which expanded the focus and scope of the County's program beyond agricultural land to encompass other types of easements and land preservation mechanisms that address forest land, natural system and sensitive environmental areas, open space, and features contributing to the county's heritage [*2010 WRE*]
- ✔ Adopted County Code Chapter 154 Water Resource Management in 2004 to protect the quality and quantity of ground and surface water resources in the county by establishing management standards and design criteria for land use subsequent to review; standards for review of development activities; enforcement procedures for pollution violations, and requirements for the protection of existing and future water resources (*from 2007 Guidance doc*) [*2010 WRE*]
- ✔ Worked with the municipalities to adopt County Code Chapter 154 Water Resource Management to provide greater levels of protection to water supply sources – Manchester, Mount Airy, New Windsor, Sykesville. County incorporated to its process reviews in accordance with County standards and provides recommendations to municipalities who have not adopted this Code chapter – Hampstead, Taneytown, Westminster. [*2010 WRE*]

Ongoing Action Items:

- Participate as a member of the BMC's Reservoir Technical Group (RTG), which is intended to address emerging reservoir issues, coordinate program work efforts, review technical work, and prepare reports called for in the Action Strategy [*2024 WRE*]
- Continue to stay up to date with regulation changes related to protection go water quality from emerging contaminants and address and incorporate new requirements as needed [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate existing water user rate structure for the Bark Hill **and** Pleasant Valley Water Service Areas to determine if the existing rates are adequate compared to the operational costs [*2024 WRE*]
- ❑ Work with the municipalities that do not have a water resource management ordinance to adopt the County's Code Chapter 154 or craft related municipal codes with similar or greater levels of protection for water supply sources – Hampstead, Taneytown, Union Bridge, Westminster [*2010 WRE*]
- ❑ Collaborate between PLM and DPW to develop consensus on a consistent methodology to determine capacity; consider WSCMP methodology for consistency with MDE and WRE [*2024 WRE*]

Long-Term Action Items

- ❑ Identify and develop additional funding and implementation mechanisms for preserving land and protecting reservoir watersheds [*2010 WRE*]

37.1.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources or provide redundant capacity for existing development

Specific Action Items Already in Place:

- ✔ Adopted County Code Chapter 156 Adequate Public Facilities and Concurrency Management in 1998 to require development plan approval be contingent upon a demonstration that water supplies are adequate to meet requested demands, or plan and phase the development based on the planned provision of needed water supply (from 2007 Guidance doc) [*2010/2024 WRE*]
- ✔ Included provisions in the subdivision/development regulations that require that site plan/subdivision plat submittals have documentation from an engineer or official notification from the appropriate municipal or county agency(ies) stating that adequate water supply either presently exists or will exist for all development depicted (from 2007 Guidance doc) [*2010 WRE*]
- ✔ Created open space and land preservation program measures that support water protection requirements (from 2007 Guidance doc) [*2010 WRE*]

Ongoing Action Items:

- Incorporate the acquisition of water recharge areas into land preservation easements acquired through the Carroll County Easement Purchase Program to secure recharge credits that could be used to help municipalities obtain additional water allocations [*2010 WRE*]
- As comprehensive plans are updated, rezone areas outside the DGA to be consistent with rural areas of the county to reflect desired densities that would help protect or improve water quality [*2010 WRE*]
- Protect and develop potential wellsite locations outside municipal boundaries. These sites were identified by R.E. Wright and others in the 1980s and are preserved by Chapter 154, which was adopted in 2004. [*2010 WRE*]
- Provide staff assistance to the municipalities to identify and/or secure new groundwater sources [*2024 WRE*]
- Continue to acquire parcels in the areas of the proposed reservoirs as they become available [*2024 WRE*]

- Continue to stay up to date with regulation changes related to emerging contaminants in water supplies and address and incorporate new requirements as needed [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Determine the need for redundant capacity at County-owned systems, such as Bark Hill and Pleasant Valley, and identify well sites as needed [*2024 WRE*]
- ❑ Evaluate potential additional sources to create redundant capacity and provide diversity in sources (i.e. surface vs groundwater) in all public systems as a measure to mitigate for the impacts of climate change (drought) as well as to ensure supply is available when one source is unavailable [*2024 WRE*]
- ❑ Update cost estimates and figures for use of Piney Run Reservoir for drinking water supply and develop concept plans ready to move forward as needed [*2024 WRE*]
- ❑ Update cost estimates and figures for development of Union Mills reservoir and develop concept plans ready to move forward as needed [*2024 WRE*]
- ❑ Assistance to municipalities:
  - ❑ Evaluate where potable reuse, both direct and indirect, may be an option for providing redundancy or increasing capacity where needed [*2024 WRE*]
  - ❑ Help municipalities compile data and documentation needed by MDE for permits and approvals, as well as with relevant negotiations
  - ❑ *Funding*: As most of limiting factors are constraints due to available funding, explore options for supporting municipalities through funding assistance, such as: [*2024 WRE*]
    - ❑ Direct financial assistance
    - ❑ Adjusting the Town/County Agreements
    - ❑ Assistance finding and applying for grants or State/federal funding

Long-Term Action Items

As development of one of the reservoirs becomes more imminent…

- ❑ Pursue actions needed for aquatic habitat mitigation. Under current Maryland policies for acreage replacement, most wetlands must be mitigated for at a ratio of 2:1 (i.e., mitigation to impact area ratio). MDE prefers in-ground, on-site mitigation projects. When that option is not feasible, MDE evaluates off-site options, mitigation banks, and, lastly, payment into the State's Nontidal Wetland Compensation Fund, a state in-lieu fee program that conducts mitigation projects statewide. [*2024 WRE*]
  - ❑ Given the difficulty in securing adequate quantities of wetland and stream mitigation for a large reservoir project, identify how to provide the required quantity and type of mitigation for aquatic habitat impacts.
  - ❑ Track availability of credits in commercial mitigation banks serving this region of Maryland.
  - ❑ Pursue credit for Carroll County's aggressive program for agricultural preservation easements that might be located in a reservoir project area.
- ❑ Work with MDE to determine minimum releases for planned reservoir development that will maximize the safe yield and assess how these compare to releases under drought conditions. Even with using the lesser of either natural runoff or calculated Maryland Most Common Flows, the average reservoir release is greater than the estimated safe yield for both Union Mills and Gillis Falls Reservoirs. [*2024 WRE*]

Long-Term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity.

- ❑ Piney Run Reservoir (as built): [*2010 WRE*]
  - ❑ Re-secure Water Appropriation Permit from MDE
  - ❑ Obtain key permit required – Water and Sewerage Construction Permit
  - ❑ Complete land easement/acquisition for WTP and pipeline
  - ❑ Complete engineering for pipeline, storage, and pump station
- ❑ Union Mills Reservoir (planned): [*2010 WRE*]
  - ❑ Continue County purchase of approximately 781 acres total of land
  - ❑ Conduct more detailed design and engineering studies
  - ❑ Assess whether other County-owned lands are available to use as habitat preservation and enhancement areas to mitigate for aquatic habitat losses that would be incurred with the Union Mills Reservoir alternative
  - ❑ Given the age of environmental information put together by NRCS in the 1970s, conduct new environmental surveys under modern standards to move this project through the permitting phase [*2024 WRE*]
  - ❑ Conduct a field delineation of impacted wetlands and streams be conducted since existing estimates of impacted aquatic habitat may differ significantly from ground-truthed values to determine the required level and cost of mitigation and, if still deemed appropriate, be able to start designing a mitigation plan to offset those impacts. Include a Phase 1 cultural resources survey and a rare species review to ensure that other potential environmental impacts of the project are manageable before proceeding further with the project. [*2024 WRE*]
  - ❑ Confirm with MDE that flow augmentation credit would be an option for a specific quantity of flow is released from the reservoir into Big Pipe Creek, then that same quantity could be withdrawn 11 river miles downstream at Taneytown, even when streamflow drops below levels prescribed as desired minimum flows. (This is done at Jennings Randolph and Little Seneca reservoirs.)
- ❑ Gillis Falls Reservoir (planned): [*2010 WRE*]
  - ❑ Continue County purchase of approximately 587 total acres of land
  - ❑ Investigate less restrictive minimum reservoir releases with MDE to increase project safe yield
  - ❑ Address any State requirements associated with Tier II stream designations extending upstream of the north arm from Gillis Road crossing and extending downstream from just upstream of the dam site
- ❑ Prettyboy Reservoir: [*2010 WRE*]
  - ❑ Pursue discussions with the City of Baltimore to purchase raw water from Prettyboy Reservoir
  - ❑ Evaluate treatment capacity of Manchester and/or Hampstead WTPs to treat additional water

37.1.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

For other action items related to this strategy, please see this same strategy under the Freedom System-Specific section, which lists specific action items for the Freedom water supply systems.

Ongoing Action Items:

- Collect bi-weekly data on well levels throughout the county [*2024 WRE*]
- Provide the WRCC with monthly updates on hydrologic conditions for water supply planning purposes [*2024 WRE*]
- Provide staff assistance to the municipalities to develop drought management plans and to optimize how sources are utilized or operated [*2024 WRE*]
- Assist municipalities with MDE-mandated target reductions under certain drought conditions [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Identify drought sustainable yield of sources to identify systems that may need additional capacity to serve demand during times of drought [*2024 WRE*]
- ❑ Identify potential storage solutions (quarries, etc.) during times of plenty to plan ahead for and mitigate times of extreme drought [*2024 WRE*]

37.2 Wastewater

37.2.1 Sustain existing wastewater treatment capacity

For action items related to this strategy, please see this same strategy under the Freedom System-Specific and the Hampstead System-Specific sections, which lists action items for the Freedom and Hampstead wastewater treatment systems.

Ongoing Action Items:

- Continue to stay up to date with regulation changes related to protection go water quality from emerging contaminants and address and incorporate new requirements as needed [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate existing sewer user rate structure for the Pleasant Valley Sewer Service Area to determine if the existing rates are adequate compared to the operational costs [*2024 WRE*]
- ❑ Pursue through the University of Maryland Environmental Finance Center (UM EFC) an assessment of the Rural Villages, which are also designated as PFAs, to identify where a community wastewater system may be needed and prioritize those that do have failing septic issues that may warrant a small WW system. The EFC was awarded funds to provide technical

assistance to help rural communities to address critical wastewater challenges by identifying their water infrastructure needs and guiding them toward appropriate funding options. [*2024 WRE*]

37.2.2 Develop new public wastewater treatment and disposal capacity

For action items related to this strategy, please see this same strategy under the Freedom System-Specific and the Hampstead System-Specific sections, which lists action items for the Freedom and Hampstead wastewater treatment systems.

***Specific Action Items Already in Place*:**

✔ Complete a sewer feasibility study for the Finksburg area, in coordination with the UM EFC, to determine is a community wastewater treatment system could be constructed to serve the area, providing nutrient treatment while also potentially serving planned growth for the county's gateway [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Determine if there is support to move forward with a more detailed sewer study for the Finksburg area should be pursued for a community wastewater treatment system, including evaluating the financial implications as well as if MDE would support it [*2024 WRE*]
- ❑ Assistance to municipalities:
  - ❑ Help municipalities compile data and documentation needed by MDE for permits and approvals, as well as with relevant negotiations
  - ❑ Partner with municipalities to plan for, design, & construct needed improvements, such as:
    - ❑ Access to County's term contractor services
    - ❑ Lend staff expertise
  - ❑ As most of limiting factors are constraints due to available funding, explore options for supporting municipalities through funding assistance, such as: [*2024 WRE*]
    - ❑ Direct financial assistance
    - ❑ Adjusting the Town/County Agreements
    - ❑ Assistance finding and applying for grants or State/federal funding
  - ❑ Weigh advantages and disadvantages of developing Public Private Partnerships (P3s) to implement and fund certain projects

37.3 Stormwater

37.3.1 Protect and restore water quality and make progress toward any applicable TMDLs

***Specific Action Items Already in Place*:**

✔ Implemented erosion and sediment control and stormwater management measures and requirements [*2010 WRE*]

✔ Developed a tree planting program to systematically re-establish forested stream buffers and uplands in the county [*2024 WRE*]

✔ Increased the frequency of storm drain cleanouts to prevent storm drain clogging and reduce the amount of stormwater runoff that bypasses existing stormwater management practices [*2010 WRE*]

- ✔ Worked with the municipalities to adopt County Code Chapter 154 Water Resource Management to provide greater levels of protection to water quality – Manchester, New Windsor, Mount Airy, Sykesville. County incorporated to its process reviews in accordance with County standards and provides recommendations to municipalities who have not adopted this Code chapter – Hampstead, Taneytown, Westminster. [*2010 WRE*]
- ✔ Provided strong leadership on joint planning of point and NPS pollutant reduction activities to help ensure that Watershed Improvements Plans (WIPs) and two-year milestones, developed as a result of the completion of the Bay TMDL, are reasonably attainable, cost-effective, and property targeted; and achieve ancillary public benefits [*2010 WRE*]
- ✔ Facilitated the WRCC to act as a Watershed Implementation Plan (WIP) Work Group to take the leadership by developing local Two-Year Milestones, to plan specific pollutant reduction activities, and to communicate with MDE (For more information on the Two-Year Milestones, see the BayStat website at http://www.baystat.maryland.gov/). [*2024 WRE*]
- ✔ Conducted watershed assessments that included a stream corridor assessment for each of the nine watersheds in the county to identify current impairments within each watershed, as well as identify locations to implement restoration practices; completed in 2014 [*2024 WRE*]
- ✔ Developed a characterization plan for each of the nine watersheds in the county to provide a background on the hydrological, biological, and other natural characteristics of the watershed as well as discuss human related characteristics that may have an impact within the watershed; completed in 2018 [*2024 WRE*]

- ✔ Prepared watershed restoration plans for seven of the county's watersheds summarizing proposed and potential restoration strategies to meet local total maximum daily load (TMDL) requirements associated with the urban wasteload allocation (WLA); completed in 2019 [*2024 WRE*]
- ✔ Developed initial *Countywide TMDL Stormwater Implementation Plan* in 2023, per the requirements of the fifth-generation NPDES MS4 permit, which summarizes completed, proposed, and potential restoration strategies to meet local and Chesapeake Bay TMDLs requirements associated with the urban WLA for watersheds within the county; submitted to MDE with the 2023 NPDES MS4 Annual Report [*2024 WRE*]
- ✔ Incorporated notification of developers in Tier II watersheds of the MDE review process [*2024 WRE*]
- ✔ Developed public outreach and education materials (BRM and EAC) to raise awareness of specific emerging contaminants and best practices for property owners and residents to mitigate their impacts to water quality at their properties [*2024 WRE*]
- ✔ In 2022 and 2023, the County requested MDE conduct public hearings for several new biosolids applications in Carroll County. The issue of potential PFAS contamination (municipal and domestic) was raised. As a result, MDE agreed not to issue new permits until more studies were completed. Carroll County Senator Ready subsequently sponsored legislation in 2024 to address; the bill passed. [*2024 WRE*]

Ongoing Action Items:

- Promote and direct growth to PFAs to resolve conflicting and competing requirements [*2010 WRE*]
- Provide staff and funding to the Soil Conservation District (SCD) for technical assistance to farmers and landowners for the implementation of agricultural BMPs to reduce nutrients and protect water quality [*2010 WRE*]
- Provide funding to University of Maryland Extension for technical assistance to homeowners through the Master Gardeners' and BayWise programs [*2024 WRE*]
- Provide technical assistance and guidance on programs available to farmers (SCD) and landowners (CCG) for the implementation of BMPs and coordinate activities and funding among district, State, and federal programs [*2010 WRE*]
- Continually assess opportunities for restoration and implementing restoration projects to meet the NPDES MS4 permit requirements toward achieving the TMDLs. Complete projects are reported in the NPDES MS4 Annual Report. [*2024 WRE*]
- Implement an illicit discharge detection and elimination program to identify, respond to, and eliminate pollutants entering waterways [*2024 WRE*]
- Update the *Countywide TMDL Stormwater Implementation Plan* annually to track implementation of structural and nonstructural projects, alternative Best Management Practices (BMPs), and program enhancements that assist in meeting EPA-approved TMDL stormwater WLAs. Updates will evaluate the success of Carroll County's watershed restoration efforts and document progress towards meeting approved stormwater WLAs. [*2024 WRE*]
- Reduce flood event impacts to water quality and to mitigate climate change impacts: [*2024 WRE*]
  - Participate (CC DPW) in a regional effort to develop a climate change action plan through an effort coordinated by BMC
  - Cooperate in regional assessments related to PFAS
- Continue to stay up to date with regulation changes related to protection go water quality from emerging contaminants and address and incorporate new requirements as needed [*2024 WRE*]

***Specific "To Do" Action Items*:**

Short-Term Action Items

- [ ] Revise County Code Chapter 151 Stormwater Management to incorporate the requirements of Maryland's A-StoRM effort and updated stormwater management regulations, which include updated precipitation estimates and is intended to capture increased stormwater runoff volume. Coordinate with municipalities that have their own stormwater codes to update as well. [*2024 WRE*]
- [ ] Work with the municipalities that do not have a water resource management ordinance to adopt the County's ordinance or craft related municipal codes with similar or greater levels of protection – Hampstead, Taneytown, Union Bridge, Westminster [*2010 WRE*]

Long-Term Action Items

- [ ] Explore opportunities for restoration activities that correct or mitigate documented water quality issues [*2010 WRE*]

37.3.2 Enhance stormwater management program

***Specific Action Items Already in Place*:**

- ✓ Incorporated the use of nonstructural BMPs, such as natural conservation areas, roof and non-roof top disconnection, vegetated swales, sheet flow to buffer, and reduced impervious cover to the maximum extent practical and promote ESD or LID techniques, as required in Carroll County local laws since 2004 (from 2007 Guidance doc) [*2010 WRE*]

- ✓ Adopted original forest conservation code (County Code Chapter 150 Forest Conservation as of 2024) in 1992 to require permanent protection of existing forest on development sites and promote the enhancement and creation of contiguous forest areas (from 2007 Guidance doc) [*2010 WRE*]
- ✓ Participated in a countywide review of individual programs and ordinances in 2008 via Builders for the Bay, in partnership with the Center for Watershed Protection, Alliance for the Chesapeake Bay and Homebuilders Association of Maryland [*2010 WRE*]
- ✓ Performed studies of enhanced filter media for improved pollutant removal [*2024 WRE*]

Ongoing Action Items:

- Ensure appropriate selection of BMPs in Tier II watersheds [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ☐ Update the Forest Conservation Code Chapter 150 to incorporate new requirements adopted by legislation in 2023 and revised in 2024 [*2024 WRE*]

37.3.3 Identify changes to planned land use patterns and land development requirements to help achieve the needed reduction in pollutant loads

Specific Action Items Already in Place:

- ✓ Created a Geographic Information System (GIS) impervious cover data layer to help track impervious surfaces and NPDES MS4 permit restoration requirement progress; the data was updated in 2023 as part of the State's orthophotography flight [*2010/2024 WRE*]
- ✓ Encourage, via Chapter 155 Development and Subdivision of Land, the use of sidewalks on one side of the street where safety and pedestrian circulation are not a concern and where pedestrian alternatives are provided [*2010 WRE*]
- ✓ Expanded the Installment Purchase Agreement (IPA) program outside of DGAs to offer leveraged IPA options that provide tax incentives to interested property owners as a means of accelerating the preservation of farmland (Leveraged IPAs could significantly accelerate easement acquisition while simultaneously decreasing acquisition costs.) [*2010 WRE*]
- ✓ Decreased allowable residential densities in rural areas outside DGAs to reduce the number of future residential septics that could be added, thereby reducing some of the potential increase in nitrogen loads. Carroll County did not adopt Growth Tiers, which limited the number of subdivision lots not served by public sewer to seven. [*2024 WRE*]
- ✓ Joined the Community Rating System (CRS) as a Class 8 in 2006; improved to a Class 7 in May 2018; upgraded to Class 6 in October 2023; and upgraded to Class 5 in October 2024. As a result, eligible policyholders within the county received a 25% discount on their flood insurance policies. [*2024 WRE*]
- ✓ As of 2023, 251.85 acres of trees have been planted in stream buffers in Carroll County since 2013 on both private landowner properties, as well as municipal-owned land. Forested riparian areas help to reduce nutrients and sediment to stream and mitigate runoff/flows, which reduces channel scour/incision and turbidity [*2024 WRE*]
- ✓ As of 2023, 838 acres of forest have been created by forest conservation banks since the inception of the Maryland Forest Conservation Act in 1991 [*2024 WRE*]

Ongoing Action Items:

- Promote Carroll County's land preservation programs, such as the MALPF, Rural Legacy, Critical Farms, and the Leveraged IPA program (from 2007 Guidance doc) [*2010 WRE*]
- Participate in MDE's stakeholder advisory groups, created for consultation on the proposed stormwater regulations. PLM staff participate in the Stakeholder Advisory Group, the Stormwater Regulation Technical Advisory Group (TAG), the Watershed Studies TAG, and the GIS TAG. [*2024 WRE*]
- Continue to strive for a higher class level within FEMA's Community Rating System to provide a greater flood insurance discount to Carroll property owners, which is achieved through increasing flood and floodplain protections. [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate and implement changes to the land use designation and/or zoning of certain areas to promote development in areas not environmentally sensitive and in locations with appropriate infrastructures, or suitable for redevelopment of underutilized properties [*2010 WRE*]
- ❑ Worked (CC DPW) with the municipalities, where applicable, to incorporate to their road standards measures that reduce the allowable street width while still allowing for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency vehicle access [*2010 WRE*]
- ❑ Identify properties within the municipalities that are good candidates for tree plantings
- ❑ Mitigate septic failures to reduce nitrogen loading and improve water quality through more effective treatment
    - ❑ Work with the University of Maryland Environmental Finance Center (UMEFC) to evaluate the feasibility of service the Finksburg corridor with public sewer either by connecting to an existing public WWTP, constructing a new WWTP, or via beneficial partial or concentrated hookups by neighborhood or quadrant [*2024 WRE*]
    - ❑ Work with the Health Department to develop a program to proactively identify where multiple septic failures have occurred in Rural Villages or larger "neighborhoods" in rural areas and evaluate potential and feasibility for planning to construct community wastewater systems to address the failures and reduce nitrogen loading [*2024 WRE*]
    - ❑ Explore availability of grant funding and options for collaboration between private property owners, the County, the Health Department, municipalities (where applicable), and MDE to address failing systems, whether on an individual basis or via a community/municipal system [*2024 WRE*]
    - ❑ Encourage the repair of a failing septic system by private property owners, or where appropriate and feasible, the connection to a municipal sewer system [*2010 WRE*]

38.0 Freedom

38.1 Water Supply

38.1.1 Source Water Assessment

Water is provided from both surface and groundwater sources in the Freedom Designated Growth Area (DGA), which serves the Freedom area, including the Town of Sykesville. The unconfined fractured rock aquifer in the Sykesville Formation is the source of groundwater supply for the Freedom DGA. This system is comprised of nine permitted groundwater supply wells, only three of which have been connected to the water system. The Fairhaven well is located within the Piney Run Watershed, and RC-1 is drilled to approximately 600 feet. The Raincliffe wells are approximately .6 mile south of the Fairhaven well and was drilled to approximately 500 feet. The Freedom DGA groundwater supply is susceptible to volatile organic compounds (VOCs) and radionuclides, but not susceptible to synthetic organic compounds (SOCs), nitrates, other regulated inorganic compounds, or microbiological contaminants. RC-1, RC-2, and Fairhaven wells were offline as of 2024.

Carroll County owns a water treatment plant (WTP) on the western shore of Liberty Reservoir, but leases the property from the City of Baltimore. The reservoir was constructed in 1954 on the North Branch of the Patapsco River and is owned by the City of Baltimore. Carroll County, under agreement with Baltimore City, purchases raw water from this source. The original treatment plant was replaced in 2009 and has a treatment capacity of 4 MGD.

Per the April 2003 Liberty Reservoir Watershed Assessment completed by Gannett Fleming, Inc., potential sources of contamination for the Liberty Reservoir include point and non-point sources, including industrial sites, transportation (e.g., highways), a railroad, a petroleum product pipeline, agriculture, and septic tanks in rural portions of the watershed. The majority of point sources are located in the North Branch and Liberty subwatersheds.

The City of Baltimore maintains an extensive water quality monitoring program for Liberty Reservoir and its tributaries, as well as the Ashburton Water Filtration Plant. Routine sampling is performed at the City's water treatment plant, six tributaries of Liberty Reservoir, and four in-reservoir locations in an effort to monitor and improve the water quality conditions of the Liberty Reservoir water supply.

38.1.2 Water Supply Demand

For purposes of the background assessments and this plan document, the total future water demand assumes that everything within a Water Service Area (WSA) in the *2023 Water & Sewer Master Plan* (includes Existing/Final, Priority, Future, & Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Freedom system would be 2,924,538 gpd. A significant portion of the land within the DGA but outside the planned water service area is designated for agriculture, conservation, or low-density residential growth. These lower-density areas are not typically planned to be served by public water service.

In addition, the numbers in the "2023 Freedom Future Water Supply Demand" table are based strictly on *Buildable Land Inventory* (BLI) calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Freedom Water Supply Capacity Available for Existing and Future Growth."

Freedom Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Community	2023 Existing Demand[1]	Planned Future Demand[2]		Other Potential Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Freedom	1,877,200	672,311	369,027	6,000	2,924,538

Community	2023 Existing Demand[1]	Additional Demand by Land Use		Total Buildout Demand
		Residential	Non-Residential	
Freedom	1,877,200	608,750	438,588	2,924,538

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.

Source: WRE Capacity & Demand Workbook: CC PLM + CC DPW, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area" within the DGA. The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year *Water & Sewer Master Plan* horizon.

38.1.3 Water Supply Capacity

If Freedom were to build out according to the zoning in place in 2022 within the 2023 WSA, the current capacity of the water supply system would be adequate to serve the additional demand. An additional capacity of 887,742 gpd would still be available to accommodate unserved demand based on the most limiting factor for the water supply system under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity (4.0 mgd), pump capacity (4.0 mgd), largest well out of service (Fairhaven), and safe yield (4.2 mgd). Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Freedom Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Freedom	4,427,000	4,000,000	2,064,920	1,935,080	1,047,338	887,742

[1] Average Day Drought Demand here includes an additional 10% for drought demand
[2] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.
Source: WRE Capacity & Demand Workbook: CC PLM + CC DPW, 2023

Construction of the current Freedom Water Treatment Plant was completed in 2009 with a capacity of 4.0 MGD. This plant replaced the original water plant. The water source for the plant is Liberty Reservoir. There is an agreement with Baltimore City, originally signed in 1969 and most recently updated in 2023, which provides for a 4.0 mgd withdrawal for the average day and 180 million gallons total during the month of maximum use. In addition, the system has nine wells with an average day withdrawal allocation of 0.695 mgd. This provides the Freedom water system with a 4.695 mgd average day capacity, once all wells are connected to the system.

38.1.4 Water Supply Limitations

As of 2023, Freedom is not supply-limited and is not anticipated to be supply-limited over the planning horizon. However, Freedom relies predominantly on Liberty Reservoir, and the existing water supply is, therefore, entirely dependent upon renewal of the existing allocation agreement, potential future water supply issues, and water quality in one reservoir. In addition, although Freedom has a surplus of water, there was no supply redundancy in this system in 2023.

Based on the Freedom water supply system permitted capacity of 4 mgd, the system should have adequate capacity to serve existing and planned demand. There is, however, no supply redundancy in the system if the WTP were should not be operating for some reason. Should *additional* water supply be needed beyond this demand, the *only limitation for the Freedom system would be the agreement with Baltimore City to allow for withdrawal from Liberty Reservoir*.

Summary of 2023 Buildout Capacity and Limitations for Freedom Water Supply System							
Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing [1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
●	4,427,000	4,000,000	2,064,920	3,112,257	0	-	▪ No limitations, but needs redundancy

● *Water supply system will have capacity remaining at buildout of 2023 Water Service Area, including Long-Range.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

38.1.5 Water Demand Management

The County does not currently have a policy for restrictions on residential water use due to drought.

38.2 Wastewater

The wastewater treatment plant (WWTP) serving the Freedom/Sykesville area is owned by the State of Maryland and operated by the Maryland Environmental Service (MES). The Bureau of Utilities pays 87% of operating cost of plant to MES. The 3.5-mgd plant upgraded to ENR treatment technology in 2018 and uses an activated sludge treatment process with phosphorus removal. The plant consists of a screen and grit removal facility, an equalization basin, primary clarifier, aeration basins with aerobic and anoxic units, secondary clarifiers, filters, ultraviolet disinfection, and cascade aeration. Effluent is discharged to the South Branch of the Patapsco River.

Of the 3.5 mgd design capacity, MES is allocated 0.76 mgd for use by State institutions (primarily the Springfield Complex), and Carroll County is allocated the remaining 2.74 mgd. According to the *2023 Carroll County Water & Sewer Master Plan*, plant expansion may be triggered when the WWTP reaches 80% of its capacity. Coordination and discussion to determine roles and responsibilities between the County and State are necessary for long-term capacity planning.

There are existing water customers who are not served by the Freedom public sewer system.

38.2.1 Wastewater Demand

For purposes of the background assessments and this plan document, the total future sewer demand assumes that everything within a Sewer Service Area in the *2023 Water & Sewer Master Plan* (includes Existing/Final, Priority, Future, & Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Freedom District WWTP would be 2,533,301 gpd.

It should be noted that the numbers in the “2023 Freedom Future Wastewater Demand” table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next two tables, “2023 Freedom Wastewater Capacity Available for Existing and Future Growth.”

Freedom Future Wastewater Demand at Buildout of 2023 Sewer Service Area
(in Gallons per Day)

Community	2023 Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Demand[4]
		Infill Demand	Future Demand		
Freedom	1,530,000	513,348	384,568	105,385	*2,533,301*
Community	**2023 Demand[1]**	**Additional Demand by Land Use[2]**			**Total Demand**
		Residential		**Non-Residential**	
Freedom	1,530,000	567,750		435,551	*2,533,301*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.
[4] It should be noted that the County is only allocated 2.74 mgd of the 3.5 mgd design capacity of the WWTP.

Source: Carroll County Department of Planning & Land Management, 2023

38.2.2 Wastewater Capacity

If Freedom were to build out according to the zoning in place in 2022 within the *2023 Water & Sewer Master Plan* Sewer Service Area (SSA), the system would be able to accommodate the planned growth within the existing capacity. An additional 336,699 gpd remaining capacity would be available.

2023 Freedom Wastewater Capacity Available for Existing and Future Growth – FULL CAPACITY
(in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at Buildout
	Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Freedom	3,500,000	630,000	2,870,000	1,530,000	513,348	384,568	105,385	336,699

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.

Source: WRE Capacity & Demand Workbook – CC PLM + CC DPW, 2023

It should be noted that the Freedom WWTP is owned by the State and operated by MES. The table above does not reflect that 0.76 mgd of the WWTP capacity is allocated to the State. Therefore, the full 3.5 mgd is not available to serve Freedom demand. If the County has 78% of the WWTP capacity available for us, this represents 2.74 mgd of the 3.5 mgd permitted capacity. If this same 78% is applied to I&I and Remaining Capacity, the table below shows the capacity figures that would apply to the County's portion of the Freedom WWTP capacity. In this case, *the County would need an additional 87,601 gpd in capacity to meet project future demand. Therefore, the percentage of the WWTP capacity allocated to the County could represent a limiting factor*.

2023 Freedom Wastewater Capacity Available for Existing and Future Growth
at Buildout of 2023 Sewer Service Area – COUNTY ALLOCATION
(in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at Buildout
	Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Freedom	2,740,000	493,200	2,246,800	1,331,100	513,348	384,568	105,385	**(87,601)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.

Source: WRE Capacity & Demand Workbook – CC PLM + CC DPW, 2023

For the Freedom SSA, the Carroll County Bureau of Utilities (BoU) allocates capacity set aside to accommodate development that has already paid its area connection charges. These are typically sites for which building permits have already been issued, a site plan has been approved, or a minor subdivision has been approved. Once area connection charges are paid, BoU removes the capacity from the capacity available for allocation immediately. This is regardless of whether the development is completed or not. At that point, those allocations belong to the property.

Reservations represent a capacity that is unofficially 'reserved' for development that is in the pipeline and represents a known quantity. However, the area connection charges have not yet been paid. Both allocations and reservations are likely double-counting capacity demand. However, these numbers were included in the demand and capacity calculations knowing that it would provide very conservative numbers for the Freedom system but ensures the demand is accounted for.

The 2018 enhanced nutrient removal (ENR) upgrade allows the WWTP to comply with the Bay-related nutrient caps. However, the upgrade did not provide additional design capacity. Discharge is still limited to approximately 3.5 mgd total.

38.2.3 Limitations Based on Design Capacity

Average wastewater flows over the past three years are below the design capacity of the Freedom District WWTP. The C&D Workbook data indicate that the current design capacity can accommodate the projected wastewater demands for Priority + Future (3.06 mgd, which includes Existing and Infill plus I&I) and Long-Range buildout (3.16 mgd), but these projected flows will exceed 80% of the plant design capacity, and State will be required to complete a Wastewater Capacity Management Plan (WWCMP) and submit it to MDE. Space is not a limitation to expansion. However, any long-term capacity conversations will require coordination with the State.

Calculations based on the methodology result in an estimated average I&I flow of about 0.63 mgd, approximately 24% of the plant influent. The County has an ongoing program to identify and reduce I&I via video inspections and liner repairs or replacement.

38.2.4 Limitations Based on Local Water Quality

The Freedom District WWTP NPDES permit includes limits for conventional pollutants and parameters such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard limits for secondary treatment facilities and are considered fully protective of receiving waters. Limits for parameters such as ammonia were derived for local water quality protection and are expected to remain achievable even under higher effluent flows.

The WWTP is not expected to be a cause of biological impairment. Maryland's Integrated Report (IR) list cites "1st through 4th order streams" in the South Branch of the Patapsco River watershed as impaired based on combined fish/macroinvertebrate bioassessments. The source is cited as "unknown," and a TMDL has not been developed. Non-tidal segments are impaired for temperature, but the tributary is not a Use class III stream. The plant stays in compliance with water-quality based permit limits, and, therefore, is not expected to be a limiting factor.

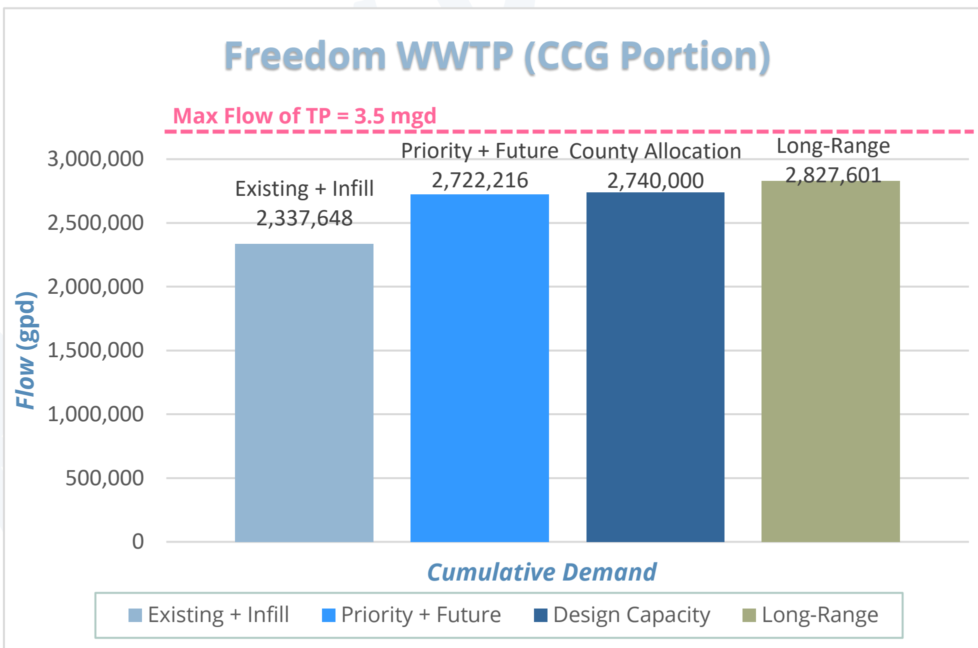
38.2.5 Limitations Based on Bay Nutrient Caps

The Freedom WWTP is considered a "major" facility under the 2010 Chesapeake Bay TMDL and has been assigned nutrient loading caps for both total nitrogen and total phosphorus. The nutrient caps were based on a design capacity of 3.5 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps are enforceable NPDES permit limits.

The ENR upgrade is designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR caps is 3.5 mgd. The maximum daily flow to remain below the ENR nitrogen cap is 4.66 mgd. Through ENR, it is expected that the plant will be able to achieve lower effluent phosphorus concentrations, which may afford the facility flexibility to operate up to 4.66 mgd without violating ENR caps. The projected Priority + Future flow (3.06 mgd, which includes Existing and Infill plus I&I) and Long-Range flow (3.16 mgd) are lower than the maximum flows above which nutrient caps would be exceeded. Therefore, nutrient caps are not anticipated to be a primary limitation for the Freedom WWTP, although the TP cap limits the option to expand the plant.

38.2.6 Summary of Wastewater Limitations

Though the existing, overall design capacity (3.5 mgd) of the Freedom WWTP meets both Priority + Future and Long-Range wastewater demands, it represents the controlling limitation, especially as flows exceed the 80% MDE threshold. If expansion was considered, the Bay-related phosphorus loading cap represents a 3.5 mgd limit to surface water discharges. However, based on the County's allocation of the total WWTP capacity, the County's limitation is the allocation of plant capacity.



The Long-Range demand projection exceeds the County's allocation of treatment capacity.

Summary of 2023 Buildout Capacity and Limitations for Freedom Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor* Design Capacity	Site Limitation	TN Cap	TP Cap	Other	Limitation (mgd)	Actions Under Consideration to Increase Capacity
S. Branch Patapsco	◍	2,740,000	2,337,648	2,827,601	87,601	✓			✓	✓	**2.740**	Negotiate allocation

◍ *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, but limitations can more easily be overcome.*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.
TP = Total Phosphorus; TN = Total Nitrogen

38.3 System-Specific Strategies: Freedom

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

38.3.1 Protect and sustain existing drinking water supplies serving existing development

Specific Action Items Already in Place:

✓ Amended the *Freedom Community Comprehensive Plan* in 2018 to reduce the size of the Freedom DGA by 9,441 acres to more closely reflect the area planned for public water service [*2024 WRE*]

✓ Installed backup generator at the Freedom WTP to provide redundancy in power supply. Redundancy in treatment is already available. [*2024 WRE*]

✓ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information for long-term planning use and comparisons

System-Specific "To Do" Action Items:

Short-Term Action Items

- ☐ Secure spare pump to have on hand for redundancy in the event the single existing pump is out of service [*2024 WRE*]
- ☐ Evaluate existing water user rate structure for the Freedom Water Service Area to determine for the existing rates are adequate compared to the operational costs [*2024 WRE*]
- ☐ Fairhaven Wells Treatment: Install treatment for the Fairhaven wells in order to bring them online and provide additional redundancy for the water supply system [*2024 WRE*]

Long-Term Action Items

- ☐ n/a

38.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

Specific Action Items Already in Place:

✓ Redundancy within WTP for surface water with generator for emergency power [*2024 WRE*]
✓ Finished water pump improvements were underway at the Freedom WTP in 2024. [*2024 WRE*]

Ongoing Action Items:

n/a

Short-Term Action Items

- ❑ Add backup pump capability at WTP [*2024 WRE*]
- ❑ Pursue radionuclide treatment at the Fairhaven well [*2024 WRE*]

Long-Term Action Items

- ❑ Establish an independent WSA for the Hoods Mills industrial area to address water supply needs in the *Water & Sewer Master Plan,* since this area is technically outside of the Freedom DGA and WSA [*2024 WRE*]
- ❑ Evaluate the feasibility and benefit of using water from the Marriottsville (Jones) Quarry on Marriottsville Road in Baltimore County as an emergency supply if drought conditions due to climate change results in recurring low water levels in Liberty Reservoir [*2024 WRE*]

Short-term Water Supply Options

- ❑ Groundwater Wells: Drill and develop and/or connect existing additional groundwater wells to meet projected demand requirements. Freedom has three groundwater appropriations – Fairhaven, Springfield, and Raincliffe – and up to nine permitted wells potentially available that could be used to connect existing wells to the Freedom system to support future growth and develop a backup water supply/redundancy in the area. [*2024 WRE*]
    - ❑ Springfield Well Connection & Treatment: Pipe water from the Springfield wells to the Fairhaven and Raincliffe treatment plants
    - ❑ Merge Well Permits: Pursue with MDE merging the Springfield, Fairhaven, and Raincliffe appropriations into one permit OR making them supplemental to each other

Long-term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather and with Piney Run Reservoir used as storage for treated, reclaimed water [*2024 WRE*]
- ❑ Piney Run Reservoir (as built): Safe yield 3.65 mgd with normal pool elevation of 524 ft.; existing reservoir; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas. However, sedimentation has caused capacity loss in the reservoir. Regaining reservoir capacity would require removal of 725 acre-feet of sediment and would likely require another

round of sediment removal (approximately 320 acre-feet) in ~20 years. This will require securing a new water appropriation permit. [*2010 WRE*]

- ❑ Direct pumping of raw water from Piney Run to Liberty to augment 'flows' at Liberty Reservoir accompanied by an increase in withdrawal from Liberty OR
- ❑ Water treatment plant at Piney Run

38.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

Specific Action Items Already in Place: ("Continue to…")

- ✓ Public Education Measures: Produce and distribute brochures on water-saving measures through Bureau of Utilities
- ✓ Water Loss Management: Routinely check all schools in the Freedom District for leaks
- ✓ Drought Management Measures: Water conservation outreach materials available
- ✓ Water Use Rate Schedule: Progressive rate schedule
- ✓ Billing Cycle: Quarterly billing cycle

Ongoing Action Items:

- Upgrade water valves from cast iron to stainless to prevent water loss due to valve breakages [*2024 WRE*]
- Continue to implement meter replacement program until replacements are complete on ~500 remaining homes [*2024 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Move toward system-wide AMI (antenna system for reading meters) in Freedom, to start ~2026-2027 [*2024 WRE*]
- ❑ Develop a drought management plan and the requisite authority to restrict or limit water use in Freedom when needed. This item will require approval by the Board of County Commissioners before moving forward. [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

38.3.4 Sustain existing wastewater treatment capacity

Specific Action Items Already in Place:

- ✓ Amended the *Freedom Community Comprehensive Plan* in 2018 to reduce the size of the Freedom DGA by 9,441 acres, thereby reducing demand to a level below what the WWTP could accommodate based on the limits imposed by the nitrogen caps; eliminated areas planned for rural residential densities in the No Planned Service areas [*2024 WRE*]
- ✓ Completed ENR upgrade in 2018, enabling the current facility to operate at the limits of technology for nitrogen and phosphorus removal [*2024 WRE*]
- ✓ Conducted an inflow & infiltration (I&I) study to determine the current level of inflows from I&I to potentially regain some capacity [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information [*2024 WRE*]
- Make system improvements to reduce I&I [*2010 WRE*]

Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate existing sewer user rate structure for the Freedom Sewer Service Area to determine for the existing rates are adequate compared to the operational costs [*2024 WRE*]

Long-Term Action Items

- ❑ Investigate requiring commercial and/or industrial/manufacturing high-water users implement water reuse in operations, as needed [*2024 WRE*]

38.3.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

- ✔ n/a

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Negotiate with the State for additional allocation of capacity from the WWTP to accommodate the projected unserved demand [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

38.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

39.0 Hampstead

Data was collected for the Hampstead water supply system, operated by the Town of Hampstead, and the wastewater treatment system, operated by the Carroll County Bureau of Utilities. MDE's Water Supply Capacity Management Plan Worksheet, along with MDE's Guidance Document: *Water Supply Capacity Management Plans* (Revised 2013), were used as a template and guide for collecting this data. A capacity and demand (C&D) workbook was prepared for each system to capture a snapshot of the current (2023) capacity and projected demand, based on existing zoning, ordinances, and policies in place in 2022 and the Water and Sewer Service Areas in the *2023 Carroll County Water & Sewer Master Plan*. Some demand numbers for residential, commercial, and industrial demand were modified by the Town rather than strictly using the BLI data.

39.1 Water Supply

The Town of Hampstead owns and operates the municipal water supply system. There are approximately 2,223 customers receiving Town water. Approximately 86 dwelling units and seven commercial, industrial, and institutional buildings outside the municipal limits receive public water service. Some are on Town water because they were connected to the system before an in-town only policy was adopted by the Town in 1962. Others outside the municipal limits have received water connections by petitioning the Hampstead Town Council. Some of the factors the Council examines before granting an exemption to the Town's policy include the following:

- whether granting the petition will serve the Town's interests,
- whether granting the petition will provide a vital improvement or enhancement of the water production or distribution system or will enhance the operation or efficiency of the water production or distribution system,
- whether the Town has sufficient water capacity to service the property that is the subject of the petition, and
- whether provision of water service to the property, without annexation into the Town, would be an impediment to the natural growth of the Town by annexation, among others.

The planned Water Service Area within the 2023 *Carroll County Water & Sewer Master Plan* covers approximately 2,555 acres.

The system, which was built by the Town in 1936, is currently supplied by 21 wells. Of the 21 wells in the Town's inventory, 14 are operational. Wells 24 and 25 were disconnected from the system due to PFAS level exceeding EPA Health Advisory Levels, and Well 15 has been removed from active status. Nitrate levels exceeding the maximum contaminant level (MCL) were found in Wells 20 and 21. The Town is working with several engineering firms to improve the pump facility to remove the nitrates and bring these wells back to active pumping status. All sources pump directly into the Hampstead system following chlorination and pH adjustment using soda ash and caustic soda. The operation and production of the pumps in the wells are controlled and monitored by a combination of time clocks and a Supervisory Control And Data Acquisition (SCADA) system. The Town currently has SCADA controls on 5 of the operational wells in addition to the Panther Drive and North Hampstead water storage tanks.

A 100,000-gallon storage tank was constructed on Hillcrest Street on the central-eastern side of the Town as part of the original water system built in the 1930s. The Hillcrest Street tank served the Town until its removal in 2021. In 1975, the Town built a 500,000-gallon storage tank on Panther Drive near Coppermine PantherPlex. In 2001, the Town built a 400,000-gallon storage tank near the North Carroll Shopping Center. The 2 tanks provide water storage of 900,000 gallons, well above the current daily usage. This is substantially more than the industry standard of one-days' worth of consumption in storage. As of 2024, the Town holds 3 groundwater appropriation permits, for a total average daily water allocation of 630,000 gpd.

The Town has completed many projects since 2015, including the replacement of all the 1936 water mains and connections. In addition to the entire Main Street water main, the Town has replaced the 1970s water main along Lower Beckleysville Road from Main Street to Dogwood Drive. This section of 8-inch water main has been plagued by many breaks, disrupting service to a day care facility, shopping center, and a senior living complex. In 2023, the Town replaced 2,880 linear feet of Asbestos Cement Pipe along Gill Avenue, Shiloh Avenue, and South Carroll Street with ductile iron pipe.

39.1.1 Source Water Assessment

The unconfined fractured rock aquifer in the Prettyboy Schist and Gillis Group (phyllitic to schistose, and sometimes called the Marburg Formation) is the source of Hampstead's water supply, which as of 2024, is comprised of 21 groundwater wells. Of the 21 wells, 14 are routinely utilized. Two unused wells have historically had elevated nitrate concentrations, and the Town plans to incorporate these two wells into one of three new centralized water treatment plants in the coming years. Two other wells that are now unused were taken offline in late 2020 due to elevated per- and polyfluoroalkyl substances (PFAS) concentrations. The remaining offline wells exhibit elevated turbidity and manganese concentrations and are unused for these reasons.

As of the October 2002 MDE Source Water Assessment, all of Hampstead's wells were determined susceptible to contamination by nitrates, volatile organic compounds (VOCs), synthetic organic compounds (SOCs), and radionuclides, but not to other inorganic compounds. Hampstead's wells were determined not to be susceptible to protozoans, but four wells were identified as susceptible to total coliform. The MDE assessment was completed when the Town's supply consisted of fourteen wells, though not all of those relied upon in 2002 were being utilized as of 2024.

39.1.2 Water Supply Demand

In 2009, reported withdrawals in the Hampstead Designated Growth Area (DGA) were growing at a nearly linear rate over the previous 20 years but were anticipated to remain relatively constant moving forward. As of 2023, Hampstead had significantly decreased pumping demands due to repairs in water mains that reduce water loss. System demand in Hampstead is now more than 100,000 gpd lower than it was in 2009. However, over a long-range planning horizon, Hampstead will need to develop additional water supplies to meet anticipated growth and development.

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) (including Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Hampstead system would be 800,185 gpd.

The numbers in the "2023 Hampstead Future Water Supply Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Hampstead Water Supply Capacity Available for Existing and Future Growth." Actual demand projections may vary if the Town is aware of proposed development for which more accurate estimates may be made.

Hampstead Future Water Supply Demand at 2023 Buildout of Water Service Area (Gallons per Day)

Municipal System	2023 Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Demand
		Infill Demand	Future Demand		
Hampstead	343,593	114,583	288,022	53,987	800,185

Municipal System	2023 Demand[1]	Additional Demand by Land Use[4]		Total Demand
		Residential	Non-Residential	
Hampstead	343,593	181,000	275,592	800,185

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Hampstead, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area." The Long-Range Demand reflects areas designated as a Long-Range Water Service Area, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

With the 2010 WRE process, the findings of the WRE and related technical assessments and the research provided by County Planning & Land Management staff directly informed decisions related to the Town's draft update of the *Hampstead Community Comprehensive Plan*. After careful consideration, the Town's Planning and Zoning Commission recommended a substantive reduction in the Municipal Growth Area (MGA). Specifically, the draft DGA strives for a sustainable "buildout" footprint for future growth which: 1) recognizes the current limitations to water system capacity including the regulatory bottleneck in groundwater appropriations; 2) maintains adequate land for groundwater recharge; 3) preserves the ability of the Town to slowly and carefully grow within the limits of public infrastructure; 4) preserves to the extent possible the option of annexing and extending municipal water service to nearby properties currently dependent on private wells in the event of unforeseen circumstances like groundwater contamination. The *Hampstead Community Comprehensive Plan* was adopted in 2010 and last amended in 2017. As of 2024, the Town was working on an update to the comprehensive plan.

39.1.3 Water Supply Capacity

If Hampstead were to build out according to the zoning in place in 2022 within the 2023 WSA, the Town would need to expand beyond its current capacity to make available another 291,425 gpd to accommodate unserved demand based on the most limiting factor for the water supply system under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Hampstead Water Supply Capacity Available for Existing and Future Growth at 2023 Buildout of Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at 2023 Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Hampstead	630,000	543,120	377,953	165,167	456,592	**(291,425)**

[1] Average Day Drought Demand here includes an additional 10% for drought demand.
[2] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.
Note: Changes & new situations since 2023 may be reflected in the Action Items if they result in differences in capacity needs.
Source: WRE Capacity & Demand Workbook: CC PLM + Town of Hampstead, 2023

The system, which was built by the Town in 1936, is currently supplied by 21 wells. Of the 21 wells in the Town's inventory, 14 are operational; Wells 24 and 25 were disconnected from the system due to PFAS level exceeding EPA Health Advisory Levels, and Well 15 has been removed from active status. Nitrate levels exceeding the maximum contaminant level (MCL) were found in Wells 20 and 21. The Town is working with several engineering firms to improve the pump facility to remove the nitrates and bring these wells back to active pumping status. All sources pump directly into the Hampstead system following chlorination and pH adjustment using soda ash and caustic soda. The operation and production of the pumps in the wells are controlled and monitored by a combination of time clocks and a Supervisory Control And Data Acquisition (SCADA) system. The Town currently has SCADA controls on 5 of the operational wells in addition to the Panther Drive and North Hampstead water storage tanks.

A 100,000-gallon storage tank was constructed on Hillcrest Street on the central-eastern side of the Town as part of the original water system built in the 1930s. The Hillcrest Street tank served the Town until its removal in 2021. In 1975, the Town built a 500,000-gallon storage tank on Panther Drive near North Carroll High School. The Panther Drive water tank was repainted in the spring of 2005 and again in 2019. In 2001, the Town built a 400,000-gallon storage tank near the North Carroll Shopping Center. In 2024, the Town accepted bids to clean and paint the exterior and interior of the North Carroll Shopping Center tank. The two tanks provide water storage of about 900,000 gallons, well above the current daily usage. This is substantially more than the industry standard of one-days' worth of consumption in storage. The Town currently holds three groundwater appropriation permits for a total average daily water allocation of 630,000 gpd. (*Town*)

39.1.4 Water Supply Limitations

Locating large water production wells is challenging in the Piedmont Plateau. The yield of any given well depends on intercepting water-bearing fractures in the bedrock of the aquifer. While surface topography and features can guide water exploration efforts, locating high yield wells can be difficult.

In response to anticipated future impacts to the water system related to PFAS, the Town has initiated several projects. The first project is an exploration program to find and develop additional groundwater supply. The goal of the effort is to augment as well as supplement the Town's existing supply system. The second is a system-wide centralization project which will combine treatment facilities while incorporating technologies to address PFAS in the water supply. The centralization project will reduce the number of supply point-of-entries and allow for modernization/efficiency improvements to the current water treatment processes. The presence of PFAS and the system improvements to address it do not present a limiting factor in developing additional water sources. However, they do represent a significant cost to the Town to construct and implement, followed by operation and maintenance.

The Hampstead area provides significant habitat for bog turtles — a threatened species. The turtles live in emerging bogs. Groundwater withdrawal is a concern in these areas due to the groundwater-fed nature of the wetland areas.

Summary of 2023 Buildout Capacity and Limitations for Hampstead Water Supply System

Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing [1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
● (yellow)	630,000	543,120	377,953	834,545	291,425	System Capacity	▪ Addn'l water sources ▪ ↗ appropriations

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

39.1.5 Water Demand Management

Hampstead does not have quantitative thresholds to implement water use restrictions but has seen significant improvements in demand management over the past decades and demand is lower for this 2023 update (average day demand was 342,000 gpd in 2022) than when the WRE was developed in 2009 (average day demand in 2009 was ~480,000 gpd). In fact, since 1996, Hampstead population has doubled but pumping needs remain the same.

The most significant improvements in Hampstead's demand management have been related to replacement of leaking pipes. Many of the replaced pipes were old (some from as far back as 1936. As of December 2023, Hampstead has replaced approximately one third of the water system. Future pipe replacements will focus on asbestos cement water mains.

The Town imposes both voluntary and mandatory restrictions as conditions warrant. The Council enacts a resolution when these measures are necessary. Residents may be fined if they fail to implement restrictions. More information can be found in the Town Code §§132-37 to 132-39. Residents are notified of restrictions via local newspaper, social media, and the Town of Hampstead website.

39.2 Wastewater

Carroll County owns and operates the public sewerage system that serves both the Town of Hampstead and adjoining areas in the county. The planned Sewer Service Area (SSA) within the *2023 Carroll County Water & Sewer Master Plan* covers approximately 1,490 acres.

The existing system, constructed in 1970, consists of a collection system, six pumping stations, and a sewage treatment plant. The Hampstead Wastewater Treatment Plant (WWTP), located off of North Woods Trail and outside of municipal boundaries, provides advanced secondary treatment of domestic wastes using an activated sludge treatment process. The treatment plant consists of bar screen with a grinder and screw conveyor system, oxidation ditches, secondary clarifiers, sand filters, and an ultraviolet disinfection system. Phosphorus is removed by chemical addition. The plant has a split discharge with approximately 50% of effluent diverting to BTR Hampstead's Outfall 001A, which mixes with groundwater and discharges into Deep Run upstream of Liberty Reservoir. The remaining effluent from the Hampstead WWTP discharges to Piney Run, a Use Class III stream upstream of the Loch Raven Reservoir. There is no direct discharge into a Tier II waters segment.

The plant has a permitted capacity of 0.900 mgd and is served by over 35 miles of collection lines including seven sewer pumping stations. In 2021, the WWTP an Enhanced Nutrient Removal (ENR) Upgrade project was completed and provides reductions in the overall nitrogen and phosphorus levels of the effluent discharge into Deep Run and Piney Run.

Improvements to the Shiloh Pump Station were under way in 2024, with construction anticipated to begin in 2027. The project expands capacity and includes replacement pumps, controls, grinder, and a generator, as well as new roofing, bypass valving, fencing, and paving repairs.

The Hampstead WWTP no longer operates under an MDE Consent Judgment Agreement related to the effluent temperature limit. An agreement is in place for the Hampstead WWTP to receive all the sanitary sewage from BTR Hampstead that at one time was treated by the BTR WWTP. The BTR WWTP is offline. In exchange, Deep Run can receive up to 600,000 gpd of treated effluent from the Hampstead WWTP. ENR upgrades were completed in 2021 without a capacity increase.

39.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the 2023 SSA builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Hampstead WWTP would be 719,107 gpd. The numbers in the "2023 Hampstead Future Wastewater Demand" table are based strictly on BLI calculations. Actual demand projections may vary if the Town or County is aware of proposed development for which more accurate estimates may be made.

Hampstead Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Hampstead	246,333	209,489	261,535	1,750	*719,107*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]		Total Buildout Demand
		Residential	Non-Residential	
Hampstead	246,333	178,750	294,024	*719,107*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.
Source: WRE Capacity & Demand Workbook: CC PLM + CC DPW, 2023

39.2.2 Wastewater Capacity

If Hampstead were to build out according to the zoning in place in 2022 within the 2023 SSA, the County would need to expand beyond its current capacity to make available an additional 50,107 gpd in wastewater flows.

2023 Hampstead Wastewater Capacity Available for Existing and Future Growth (in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at 2023 Buildout[2]
	2023 Permitted	I&I[2]	Remaining Capacity		Infill	Priority + Future	Long-Range	
Hampstead	900,000	231,000	669,000	246,333	209,489	261,535	1,750	**(50,107)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.
[2] It should be noted that several I&I fixes have been made. Therefore, the standard formula subtracting the 2002 drought year from the 2003 wet year produces an inflated I&I number. More capacity is likely available at buildout than shown.
Source: WRE Capacity & Demand Workbook: CC PLM + CC DPW, 2023

It should be noted that because the planned water service area does not match the planned sewer service area, the projected wastewater demand numbers will not match the projected water demand numbers.

For the Hampstead Sewer Service Area, the Carroll County Bureau of Utilities allocates capacity and sets it aside to accommodate development that has already paid its area connection charges. These are typically sites for which building permits have already been issued, a site plan has been approved, or a minor subdivision has been approved. The sewer capacity is "set aside" after the area connections charges are paid.

According to MDE's methodology for estimating inflow & infiltration (I&I) in the C&D Workbook, I&I flows averaged about .230 mgd, which is about a third of the total average plant influent. I&I flows take away capacity that might otherwise be available to wastewater demand. Based on the average daily flows at the WWTP in the table above (I&I + Existing Flows), this would imply that I&I represents almost half of the daily flows. In reality, many improvements have been made to reduce the actual I&I number, which would result in more capacity available at buildout than shown in the table.

39.2.3 Limitations Based on Design Capacity

The 0.9-mgd design capacity of the Hampstead WWTP is slightly lower than estimated wastewater demand as calculated by the C&D Workbook. MDE's default method of subtracting the 2002 drought year from the 2003 wet year to estimate I&I would result in the plant needing to be expanded by approximately 0.05 mgd to meet the projected wastewater demand of 0.95 mgd for both Priority + Future and Long-Range buildout scenarios. This likely has produced a substantially inflated I&I figure, as several I&I improvements have been made that would reduce that number. Therefore, in reality, the demand may not actually exceed the plant design capacity. Current flow is below 80% of the plant design capacity. If future flows exceed the 80% threshold, a Wastewater Capacity Management Plan (WWCMP) will need to be developed and submitted to MDE.

According to the C&D Workbook, I&I flows average about 0.23 mgd and account for 33% of total average plant influent at that time. The County has an ongoing program to identify and reduce I&I via video inspections and liner repairs or replacement.

39.2.4 Limitations Based on Local Water Quality

Like other publicly operated treatment works (POTWs) in Carroll County, the Hampstead WWTP is capable of meeting technology-based limits for conventional pollutants and water quality-based limits for constituents such as ammonia. Though EPA's ECHO website did not have Discharge Monitoring Report (DMR) data, the Bureau of Utilities confirmed the plant operates within permit limits.

The plant is successfully meeting a 0.3 mg/L total phosphorus limit required by the Loch Raven Reservoir phosphorus total maximum daily load (TMDL). This facility previously did not meet a very stringent effluent temperature limit during summer months. Temperature issues in Piney Run are now resolved by shading the plant to reduce solar radiation and mixing at Deep Run. Installation and operation of chillers to reduce the effluent temperature was considered but would have been very costly, energy-intensive, and require complicated management. Piney Run is considered Use Class III.

The Hampstead WWTP discharges into Piney Run approximately 8 river miles upstream of its confluence with a Tier II segment of Western Run in Baltimore County. Given the high levels of treatment and large distance to the segment, the Hampstead WWTP is not expected to have a measurable effect on the water quality of this segment. Therefore, the Tier II designation is not expected to represent a controlling limitation of the Hampstead WWTP discharge.

39.2.5 Limitations Based on Bay Nutrient Caps

The Hampstead WWTP is considered a "major" facility under the 2010 Chesapeake Bay TMDL and has been assigned nutrient loading goals for both total nitrogen and total phosphorus. The nutrient caps were based on a design capacity of 0.9 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps are enforceable NPDES permit limits.

The enhanced nutrient removal (ENR) upgrade is designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR caps is 0.90 mgd. The maximum daily flow to remain below the ENR nitrogen cap is 1.2 mgd. The projected Priority + Future and Long-Range flows are greater than the maximum phosphorus flow above which nutrient caps would be exceeded. Therefore, the phosphorus nutrient cap is anticipated to be a primary limitation for the WWTP.

39.2.6 Limitations Based on 2005 Reservoir Watershed Management Agreement (WMA)

Point source management provisions pertaining to the Hampstead WWTP are currently tied to limitations set through the plant's NPDES permit and existing MDE programs, including limiting phosphorus effluent concentrations to below 0.3 mg/l and capping total phosphorus loads using the TMDL programs. The WMA by itself is not a limiting factor on the operation of the Hampstead WWTP. This is with the understanding that the WWTP is owned and operated by the County.

39.2.7 Summary of Wastewater Limitations

The current design capacity of 0.90 mgd will remain the controlling limitation. In the longer term, the Bay-related phosphorus loading cap represents a 0.90 mgd limit to surface water discharges.

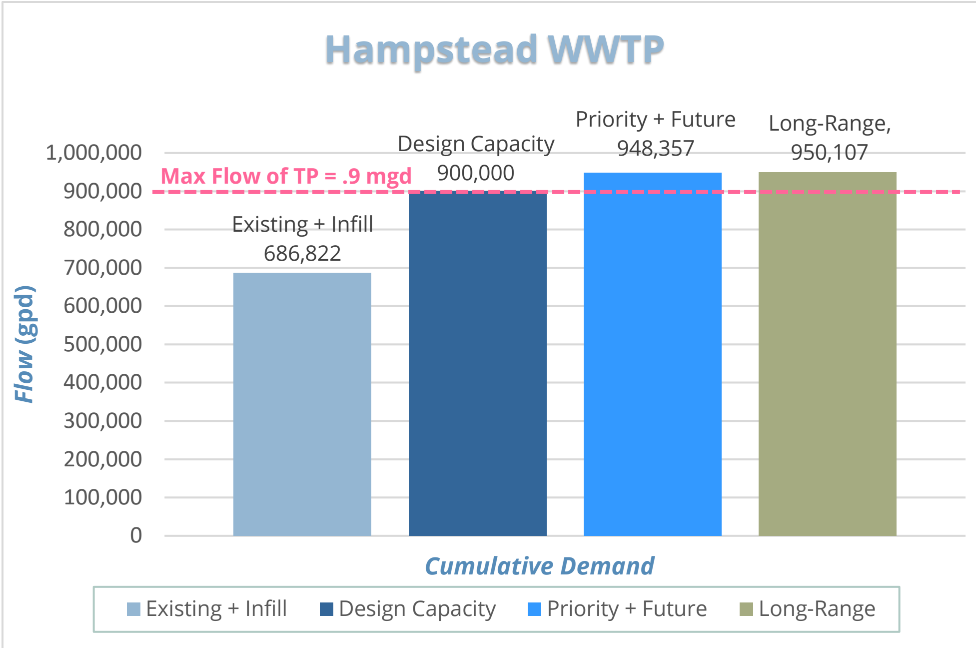
Summary of 2023 Buildout Capacity and Limitations for Hampstead Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*					Limitation (mgd)	Actions Under Consideration to Increase Capacity
						Design Capacity	Site Limitation	TN Cap	TP Cap	Other		
Loch Raven		900,000	686,822	950,107	50,107	✓			✓		**0.900**	I&I improvements

WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, but limitations can more easily be overcome.

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.
TP = Total Phosphorus; TN = Total Nitrogen



39.3 System-Specific Strategies: Hampstead

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County and all of the municipal systems are included in the Countywide Strategies section of this plan, listed under the same strategies.

39.3.1 Protect and sustain existing drinking water supplies serving existing development [Town]

System-Specific Action Items Already in Place:

- ✓ Adopted a Groundwater Conservation Zoning District (July 2008), which replaces the General Industrial Zoning District and allows a mix of environmentally sensitive commercial and industrial uses while limiting water use [*2010 WRE*]
- ✓ Amended the *Hampstead Community Comprehensive Plan* in 2010 to reduce the size of the Hampstead DGA to more closely reflect a balance between future water demand and potential water supply capacity. Land use designation and DGA changes proposed in the draft Hampstead comprehensive plan could reduce unserved demand from 981,700 gpd to about 503,612 mgd, thereby reducing the projected capacity deficit to 303,386 gpd. [*2024 WRE*]
- ✓ Amended the Municipal Growth Element of the *Hampstead Community Comprehensive Plan* and associated annexation areas, as needed, to reflect the changes recommended in this plan [*2024 WRE]*
- ✓ Applied the Groundwater Conservation Zoning District in appropriate locations as identified in the *Hampstead Community Comprehensive* Plan [*2024 WRE*]
- ✓ Requires the developer of any new residential development to furnish additional water necessary for the proposed development. If the developer is unable to supply water for the development, the Commission may grant approval only if the Hampstead Town Manager, through an engineering study, certifies that the existing water system of the Town has the

excess capacity to service the proposed development. Under such a circumstance, the developer shall be required to pay the water replacement fee. [*2024 WRE*]

- ✔ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. [*2024 WRE*]
- ✔ Secured loan/grant funding for system improvements related to emerging contaminants [*2024 WRE*]
- ✔ Completed preliminary designs for systemwide improvements to treat PFAS issues [*2024 WRE*]

Ongoing Action Items:

- Update the Water Supply Capacity Management Plan (WSCMP) worksheets developed as background data for this plan document to reflect the most current information, then complete and submit a full WSCMP to MDE for review, as needed [*2010 WRE*]
- Continue to provide development plans to County to review and offer comments to Town regarding Water Resource Management [*2010 WRE*]
- Continue to engage in and support hydrogeologic research in the Piedmont Plateau [*2010 WRE*]
- As of 2024, completing final approvals for PFAS project construction [*2024 WRE*]
- As of 2024, completing request for additional funding for PFAS project [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Work to reach a clear, well-defined, and scientifically-sound understanding with MDE on how capacity is calculated in a groundwater system [*2024 WRE*]
- ❑ Complete a system-wide centralization project which will combine treatment facilities while incorporating technologies to address PFAS in the water supply to reduce the number of supply point-of-entries and allow for modernization/efficiency improvements to the current water treatment processes [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

39.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources [Town]

Specific Action Items Already in Place:

- ✔ Hampstead drilled five news wells in 2022, but none had sufficient water quantity to be viable production wells [*2024 WRE*]

Ongoing Action Items:

- Optimize system operations [*2024 WRE*]
- Work cooperatively with MDE to develop a more reasonable approach to appropriating groundwater, calculating well yields, and giving credit for recharge [*2024 WRE*]
- Hampstead continues to seek out additional groundwater wells. A challenge for well exploration in Hampstead is property ownership (e.g., private property) that limits where wells can be explored, drilled, developed, and connected to municipal supplies. [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-term Action Items

- ❑ Develop exploration program to find and develop additional groundwater supply to augment as well as supplement the Town's existing supply system [*2024 WRE*]
- ❑ Acquire existing high-capacity wells when possible [*2024 WRE*]
- ❑ Incorporate graywater reuse options in the plan review and approval process for industrial water needs [*2024 WRE*]

Short-term Water Supply Solutions:

- ❑ Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand requirements [*2024 WRE*]

Long-term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source or a source for an industrial / commercial process(es) that is independent of climate or weather and for which an option is available for surface water storage for treated, reclaimed water [*2024 WRE*]
- ❑ Union Mills Reservoir: Safe yield 3.76 mgd with normal pool elevation of 610 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, and Taneytown Service Areas. This likely will only be a considered a feasible option once all other options are exhausted. [*2010 WRE*]
- ❑ Union Mills Reservoir (Expanded): Safe yield 7.93 mgd with normal pool elevation of 630 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, Manchester, and Taneytown Service Areas. This likely will only be a considered a feasible option once all other options are exhausted. [*2010 WRE*]

39.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development [Town]

System-Specific Action Items Already in Place:

It should be noted: [*2024 WRE*]

- The amount of water pumped vs the amount billed is now a negative number. This is in part due to using a quarterly pumped number and reading meters over a three- to five-day period. The timing does not necessarily correspond for the two numbers.
- The Town has not needed to invoke drought restrictions for many years.
- The car wash is on the water system, but it uses its own well when necessary.

✓ Public Education: Water quality and quantity awareness at festivals, newsletters, e-newsletters, materials at town hall

- ✓ Water Loss Management: Give out dye tablets and give credits for fixing leaks; leak detection program significantly improved and helped with recent water demand reductions; listening devices used twice each year to locate potential leaks
- ✓ Low-Flow Devices: Gave out free or reduced cost low-flow devices, but now water efficient appliances are industry standard
- ✓ Drought Management: Maintain the ability to limit use during drought period; §132-39 of Hampstead code gives the Council power to impose water use restrictions during drought
- ✓ High Water Use Notification: Provide a written notice to users where water use is 20% higher than the seasonal average for the property
- ✓ Maintain System Integrity: Difference between water pumped and water billed in Hampstead runs between 3-5%
- ✓ Outdoor Water Use: Limit discretionary outdoor water use
- ✓ Water Use Rate Schedule: Progressive water rate schedule
- ✓ Billing Cycle: Quarterly billing cycle
- ✓ Other: §132-37 and §132-38 of Hampstead code establish year-round policies to avoid water waste

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Require any development where the cumulative gross floor area of the structure(s) exceeds 25,000 square feet to include with the site plan a water conservation plan to include an evaluation of potential water reuse options and requirements for mandatory water use reductions during drought emergencies imposed by the local governing body or State [*2024 WRE*]

Long-Term Action Items

- ❑ Develop criteria for non-potable water reuses in the site plan review and approval process [*2024 WRE*]

39.3.4 Sustain existing wastewater treatment capacity [County]

System-Specific Action Items Already in Place:

- ✓ Evaluated I&I in 2018 to identify where reductions in I&I could result in regaining capacity, reducing the 231,000 gpd estimate based on the difference in flows from 2003 to 2002. This information is used for planning purposes to prioritize, rehabilitate, and budget for problem areas, including relining projects. [*2024 WRE*]
- ✓ Amended the *Hampstead Community Comprehensive Plan* in 2010 to reduce the size of the Hampstead DGA to more closely reflect a balance between future demand and potential wastewater capacity [*2024 WRE*]
- ✓ Secured a split discharge permit for the Hampstead WWTP facility to split the WWTP discharge between Deep Run and Piney Run to further protect water quality in both watersheds [effective October 2017 with ENR improvements finalized May 2021] [*2024 WRE*]
- ✓ Reuse cooling water from BTR by mixing discharge with the Hampstead WWTP effluent to cool the temperature of the discharge to Deep Run [*2024 WRE*]
- ✓ Lined sewer manhole structures to reduce I&I [*2024 WRE*]

✓ Installed new sewer main that diverts majority of flow in older lines on Main Street directly to the WWTP [*2024 WRE*]
✓ Signed agreement with BTR for, and implementation of, wastewater dilution to reduce the temperature of wastewater discharge [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information, then complete and submit a full WWCMP to MDE for review when the plant reaches 80% capacity [*2010 WRE*]
- Continue with sewer manhole and sanitary mains lining projects to reduce I&I and, thereby, regain some flow capacity [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ Require water reuse for high-water industrial and manufacturing users [*2024 WRE*]
❑ Investigate and implement – as needed, effective, and financially feasible – additional technologies to mitigate temperature issues if future temperature TMDL requirements are approved [*2024 WRE*]
❑ Evaluate (County) existing sewer user rate structure for the Hampstead Sewer Service Area to determine for the existing rates are adequate compared to the operational costs [*2024 WRE*]

Long-Term Action Items

❑ n/a

39.3.5 Develop new public wastewater treatment and disposal capacity [County]

There are currently no plans to expand design capacity at the WWTP.

System-Specific Action Items Already in Place:

✓ An agreement is in place for the Hampstead WWTP to receive all the sanitary sewage from BTR Hampstead that at one time was treated by the BTR WWTP. The BTR WWTP is offline. In exchange, Deep Run can receive up to 600,000 gpd of treated effluent from the Hampstead WWTP.

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ n/a

39.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

40.0 Manchester

Information provided in this section is based on data in the Capacity & Demand (C&D) Workbook and planned development projected for the adopted zoning in effect at the time the C&D Workbook was developed and the *2018 Manchester Comprehensive Plan*.

40.1 Water Supply

40.1.1 Source Water Assessment

The unconfined fractured rock aquifer in the Marburg Formation is the source of water supply for the Town of Manchester.

As of the January 2004 MDE Source Water Assessment, all of Manchester's wells were determined susceptible to contamination by nitrates and volatile organic compounds (VOCs), but not to synthetic organic compounds (SOCs), radionuclides, or other inorganic compounds. None of Manchester's water supply sources were determined susceptible to protozoan contamination, except for the Walnut Street well and Crossroads Well 1. In addition, the Bachman Road, Patricia Court, and Walnut Street wells were determined susceptible to total coliform. The 2004 MDE assessment was completed when the Town's supply consisted of only 17 groundwater wells and two springs. There has been no additional identification of contamination since that time, with the exception of the Walnut Street spring, which had coliform. The Hoffman spring is no longer tied into the system.

As of 2024, the system included 19 groundwater wells, though not all of these sources were utilized to obtain the Town's drinking water. The Patricia Court well is temporarily offline until per- and polyfluoroalkyl substances (PFAS) treatment is installed. The Walnut Street spring is offline but could be incorporated back into the system if adequate treatment was installed. System operators have indicated that the Bachman Road and Patricia Court wells have not had a positive coliform detection since the 2004 MDE source water assessment was completed.

40.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) (including Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Manchester system would be 425,322 gpd. The demand numbers in the "2023 Manchester Future Water Supply Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system or additional factors in the MDE Capacity Management Plan methodology that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Manchester Water Supply Capacity Available for Existing and Future Growth."

Manchester Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand[5]
		Infill Demand	Future Demand		
Manchester	277,096	99,087	44,928	4,210	425,322

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand[5]
		Residential	Non-Residential	
Manchester	277,096	124,500	23,726	425,322

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned WSA. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned WSA: Existing/Final, Priority, Future, and Long-Range.
[5] The figures in this table are based on the BLI. The Town provided its own estimates for the demand from properties that are within a service area but not served. The total demand @ 250 gpd was estimated at 45,650 gpd. This would result in a total demand of 322,746 gpd.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Manchester, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area" within the DGA. The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

40.1.3 Water Supply Capacity

If Manchester were to build out the 2023 WSA according to the zoning in place in 2022, the Town would need to expand beyond its current capacity to make available another 61,493 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Manchester Water Supply Capacity Available for Existing & Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Community	Current			Remaining Capacity	Unserved Demand[2, 3]	Net Avg Day Capacity Available at Buildout
	Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Manchester	581,000	403,200	316,466	86,734	148,226	**(61,493)**

[1] Average Day Drought Demand here includes an additional 10% for drought demand
[2] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.
*[3] The figures in this table are based on the BLI. The Town provided its own estimates for the demand from properties that are within a service area but not served. The total demand @ 250 gpd was estimated at 49,150 gpd. This would result in an **additional** capacity of 37,584 gpd **available** to accommodate additional demand.*

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Manchester, 2023

40.1.4 Water Supply Limitations

The total water appropriation for the Town of Manchester Water Supply System is 581,000 gallons per day (gpd). The total future demand of 425,322 gpd (from the Manchester Future Water Supply Demand table) appropriation is adequate. However, well capacity would be a limiting factor to serving total future demand.

State policy requires that an additional 10% be added to the current average amount of water used on any given day to accommodate potential drought conditions. When the current daily usage, including the drought factor was subtracted from the pump capacity, or average day capacity limitation, 86,734 gpd remained to serve future unserved demand. In addition, if 10% were added to the unserved demand of 148,226 gpd, the total supply needed would be 163,048 gpd, which would push the demand farther over the total permitted amount. Therefore, a limiting factor to serving existing and planned (unserved demand) growth today is the amount of water currently available, which indicates a need for new sources.

While the Town is permitted to use 581,000 gallons of water per day, the current pump capacity is 403,200 gpd, which becomes the average day capacity limitation. The figures for unserved demand indicate that the Town would fall 61,493 gpd short of being able to meet unserved demand with the current remaining supply capacity (without considering the 10% needed for drought demand). Since the Town is permitted to use 581,000 gpd, increasing pump capacity would address a significant portion of the capacity limitation, allowing the Town to add wells to access the water the Town already has appropriated.

It should be noted that the Town capped the wastewater treatment system at 500,000 gpd. Therefore, the Town should not plan to accommodate water demand above 500,000 gpd. Currently, the current projected total future demand will not exceed the 500,000 gpd capacity cap of the wastewater treatment plant (WWTP).

Additional sources should be explored. Even if demand is decreased, changing policies at the State and federal level for water supply and environmental protections, effects of climate change, and need for system redundancy will eventually dictate the need for at least additional backup sources. Additional sources should be explored to solve the projected deficit at buildout.

Summary of 2023 Buildout Capacity and Limitations for Manchester Water Supply System

Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing [1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
●	581,000	403,200	316,466	464,692	61,493	System Capacity	▪ Addn'l water source ▪ ↗ pump capacity

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

40.1.5 Water Demand Management

Manchester adopted a drought management plan in 2007 and has an unofficial management policy that seeks to maintain at least 40% of capacity in reserve.

The Mayor can implement mandatory water use reductions with enforcement through fines if needed. The Town imposes conservation measures and/or drought restrictions for residents when there is a drought. Some measures are voluntary and some mandatory, according to the policies set in the Town's drought management plan. These restrictions are lifted when water levels return to a pre-determined state.

40.2 Wastewater

The Manchester wastewater treatment plant (WWTP) is owned and operated by the Town of Manchester. The 500,000 gpd plant provides advanced secondary level treatment using an activated sludge treatment process consisting of mechanical screens, grit removal, two stabilization tanks, and an ultraviolet disinfection system. Phosphorus is removed by chemical addition. The plant effluent is pumped to a 5-million-gallon storage lagoon. Most of the year (March-November) the effluent is spray-irrigated on to Town-owned fields growing reed canary grass and sludge cake is disposed in a landfill. From December to February, wastewater effluent is discharged to George's Run, a Use Class III tributary of Prettyboy Reservoir. Manchester's WWTP NPDES permit allows discharge to George's Run in March, but this is normally only done when the soil conditions are unsuitable for spray irrigation. There is discharge into Tier II waters. The Town is in the design phase to install ENR technology and is working on process improvements including new headworks facility and sewer improvements.

40.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the 2023 Sewer Service Area (SSA) builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Manchester WWTP would be 412,298 gpd. It should be noted that there are numerous properties within corporate limits that are served by public water but not served by public sewer.

The numbers in the "2023 Manchester Future Wastewater Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system or additional factors in the MDE Capacity Management Plan methodology that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Manchester Wastewater Capacity Available for Existing and Future Growth."

2023 Manchester Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand[4]
		Infill Demand	Future Demand		
Manchester	268,000	81,854	52,178	10,266	*412,298*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]		Total Buildout Demand[4]
		Residential	Non-Residential	
Manchester	268,000	121,250	23,048	*412,298*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.
[4] The figures in this table are based on the BLI. The Town provided its own estimates for the demand from properties that are within a SSA but not served. The total demand @ 250 gpd was estimated at 110,900 gpd as of June 2024. This would result in a total demand of 378,900 gpd. This demand estimate is higher than the water demand estimate due to properties with existing septics that are anticipated to be served by sewer but not water.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Manchester, 2023

40.2.2 Wastewater Capacity

If Manchester were to build out according to the zoning in place in 2022 within the 2023 SSA, the Town would be able to serve the additional demand with its current capacity of 500,000 gpd. Additional capacity would still be available.

Manchester Wastewater Capacity Available for Existing and Future Growth[2] at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at Buildout
	2023 Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Manchester	500,000	22,250	477,750	268,000	81,854	52,178	10,266	65,452

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.
[2] The figures in this table are based on the BLI. The Town provided its own estimates for the demand from properties that are within a service area but not served. The total demand @ 250 gpd was estimated at 110,900 gpd as of June 2024. This would result in a total demand of 378,900 gpd.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Manchester, 2023

40.2.3 Limitations Based on Design Capacity

The projected total future wastewater demands would be 412,298 gpd. These future flows can be met by the current plant design capacity without expansion, and, therefore, would not be considered a limitation at this time.

Currently, average flow through the plant is below 80% of the design capacity. Looking forward, plant expansion is physically impossible due to private property adjacent to the plant site. The Town acknowledges that, if private residents on septic connect to the municipal sewer system, it could lead to capacity issues in the future.

According to the C&D workbook, inflow & infiltration (I&I) estimated flows averaged about 22,250 gpd and accounts for approximately 6% of plant influent.

40.2.4 Limitations Based on Local Water Quality

The Manchester WWTP NPDES permit includes limits for conventional pollutants and parameters, such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard limits for secondary treatment facilities, and MDE has determined that they are fully protective of receiving waters. Limits for parameters, such as ammonia, were derived for local water quality protection and will be achievable with nitrification. Prettyboy Reservoir is considered impaired for temperature and requires a total maximum daily load (TMDL). Since wastewater is spray irrigated nine months out of the year, and only discharged directly to the stream during the coldest months, the Town does not foresee a direct thermal impact to this TMDL, pending MDE concurrence.

The EPA ECHO DMR (Discharge Monitoring Report) indicates that the Manchester WWTP has successfully complied with a 506 lbs/yr total phosphorus limit related to the Prettyboy Reservoir phosphorus TMDL. ECHO DMR records show violations related to fecal coliform and ammonia nitrogen, and recent compliance issues have prompted an enhanced nutrient removal (ENR) upgrade. Per the 2020 WWTP NPDES fact sheet, the facility was required to submit a "Facility Improvement Plan" to address effluent compliance and potential upgrades within six months of the permit effective date. For this reason, conventional pollutants including fecal coliform, ammonia, and total phosphorus are not expected to cause limitations.

40.2.5 Limitations Based on Bay Nutrient Caps

The Manchester WWTP is considered a "minor" facility under the 2010 Chesapeake Bay TMDL and has been assigned nutrient loading caps as *goals* for total nitrogen and total phosphorus. The nutrient caps are based on a design capacity of 500,000 gpd with seasonal discharge for 120 days/year. A total nitrogen goal of 5,642 lbs/yr and a total phosphorus goal of 196 lbs/yr converted to concentrations for comparison are 4 mg/L and 0.1 mg/L, respectively. These caps will remain as goals rather than permit limits until/unless the WWTP expands or elects to trade nutrient credits to another point source facility.

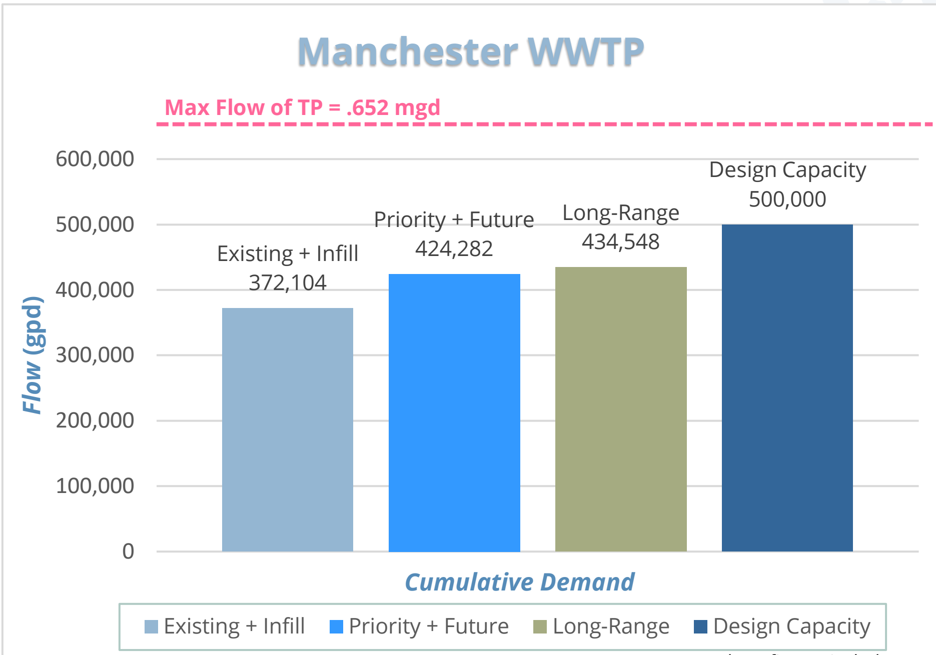
The ENR upgrade is designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR caps is 652,000 gpd. Maximum daily flow to remain below the ENR nitrogen cap is 1.82 million gallons per day (mgd). The projected total future demand of 412,298 gpd, or 434,798 gpd if you include the 22,250 gpd of I&I, is lower than the maximum flows above which nutrient caps would be exceeded. Therefore, nutrient caps are not anticipated to be a primary limitation for the Manchester WWTP.

40.2.6 Limitations Based on 2005 Reservoir Watershed Management Agreement (WMA)

Point source management provisions pertaining to the Manchester WWTP are currently tied to limitations set through the plant's WWTP NPDES permit and existing MDE programs, including limiting total phosphorus loads using the TMDL for Prettyboy Reservoir. The WMA by itself is not a limiting factor on the operation of the Manchester WWTP. Manchester is not currently a signatory to the Agreement.

40.2.7 Summary of Wastewater Limitations

Given that the unserved infill, projected future (priority + future), and long-range flows are less than the existing design capacity (500,000 gpd), the Manchester WWTP design capacity is not expected to be a wastewater limitation. The approximate phosphorus-based capacity limitation of 652,000 gpd is greater than the projected priority + future and long-range flow scenarios and is not anticipated to be a controlling limitation. An uncertainty is future septic systems that could potentially tie into municipal sewer service systems and require capacity. Therefore, the only potential future limitation may be private residences on septic systems that want or need to connect to the sewer system.



Note: These figures include I&I.

Summary of 2023 Buildout Capacity and Limitations for Manchester Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*: Design Capacity	Limiting Factor*: Site Limitatio	Limiting Factor*: TN Cap	Limiting Factor*: TP Cap	Limiting Factor*: Other	Limitation (mgd)	Actions Under Consideration to Increase Capacity
Prettyboy	●	500,000	372,104	434,548	0	✓	✓				**0.500**	n/a

● *WWTP will have capacity remaining at buildout of 2023 Sewer Service Area, including Long-Range.*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor.*

TP = Total Phosphorus; TN = Total Nitrogen

40.3 System-Specific Strategies: Manchester

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

40.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

- ✔ Amended the *Manchester Community Comprehensive Plan* in 2009 to reduce the size of the Manchester DGA to more closely reflect a balance between future demand and potential water supply capacity. Land use designation and DGA changes adopted in the Manchester comprehensive plan reduced unserved demand by 12,000 gpd from 513,130 gpd to about 501,130 gpd, which did not exceed the Town's water appropriation. [*2010 WRE*]
- ✔ Adopted the Carroll County Water Resource Management Code, Chapter 154, which provides source water protection regulations [*2010 WRE*]
- ✔ Supported 2021 rezoning by the County of areas outside the Town's future annexation line/municipal growth area to be consistent with other areas of the county that are not within a DGA to reflect desired future buildout scenario for Manchester [*2024 WRE*]
- ✔ Amended the Municipal Growth Element of the *Manchester Community Comprehensive Plan* and associated annexation areas in 2023 to remove properties no longer planned to be served or part of the DGA [*2024 WRE*]
- ✔ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act.

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information, then use to complete and submit a full WSCMP to MDE for review, as needed [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate options for and implement mitigation and treatment for water supply wells that don't meet the maximum contaminant level (MCL) set by the EPA for PFAS to make available for re-connection to the public water supply system [*2024 WRE*]
- ❑ Implement project to treat water from three wellhouses for PFAS at one centralized location (total of five wells) [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

40.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

System-Specific Action Items Already in Place:

✓ Since 2010, three wells were added to the water supply system at Manchester Valley High School [*2024 WRE*]

Ongoing Action Items:

n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ n/a

Short-term Water Supply Solutions

❑ n/a

Long-term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

❑ Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand needs, while remaining below Manchester's optimal operational threshold (average daily use < 60% of capacity) [*2010/2024 WRE*]

❑ Refurbishment of Walnut Street Wellhouse: Well is online but would need refurbishment of the wellhouse itself to bring the springs back online. Will require reverse osmosis as part of the treatment process. Refurbishment of this well may be considered if growth and development necessitate additional water supplies, and other groundwater exploration options do not yield sufficient supplies. [*2024 WRE*]Union Mills Reservoir Extended: Safe yield 9.73 mgd with normal pool elevation of 630 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, Taneytown, and Manchester Service Areas. This will likely only be considered once all other feasible and more economical options are exhausted. [*2010 WRE*]

40.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place: [*2024 WRE*]

✓ Public Education: Website postings; public service announcements (PSAs); newspapers; brochures/flyers; e-newsletters

✓ Water Loss Management: Current UAW at 7%; meter replacement program; Town owns its own leak detection equipment; leaks on property owner side require fix within 3 days

✓ Drought Management: Three-staged drought management plan adopted

✓ Low-Flow Devices: Promote the use of low-flow devices by customers

✔ Water Use Rate Schedule: Connection-based rate schedule
✔ Billing Cycle: Quarterly billing cycle

Ongoing Action Items:

- Use the Town's production well data to track water levels to use as an indicator for when to implement water conservation restrictions due to drought [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Reach out to Carroll County Public Schools (CCPS) for data from observation well at Manchester Valley High School to use for drought monitoring [*2024 WRE*]
- [ ] Investigate billing water customers based on a progressive billing rate structure [*2024 WRE*]

Long-Term Action Items

- [ ] n/a

40.3.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

✔ Amended the *Manchester Community Comprehensive Plan* in January 2009 to reduce the size of the Manchester DGA to more closely reflect a balance between future demand and potential water supply capacity. Land use designation and DGA changes adopted in the Manchester comprehensive plan reduced unserved demand by 13,500 gpd from 513,130 gpd to about 499,630 mgd, thereby eliminating the projected capacity deficit. [*2010 WRE*]
✔ Monitor areas within the corporate limits that are currently served by public water but not public sewer as a tool for planning for their future service [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current data, then complete and submit a full Wastewater Capacity Management Plan (WWCMP) to MDE for review, as needed [*2010 WRE*]
- Continue to conduct an I&I study to determine level of inflows from I&I [*2024 WRE*]
- Make system improvements to reduce I&I; periodically check I&I by using Town's own inspection cameras to identify and control any problems [*2024 WRE*]
- Continue to budget annually funds to address I&I [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Design and construct an ENR upgrade to the WWTP in early 2026 along with a plant modernization [*2024 WRE*]
- [ ] Revise demand figures for the Water Service Area to reflect the fall 2023 *Water & Sewer Master Plan* amendment for Manchester [*2024 WRE*]

Long-Term Action Items

- [ ] n/a

40.3.5 Develop new public wastewater treatment and disposal capacity

As of 2024, the Town continues to implement a long-standing policy of capping its WWTP at 500,000 gpd. Therefore, the Town has no plans to expand the design capacity of the WWTP.

40.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

System-Specific Action Items Already in Place:

✓ Installed pervious pavement at multiple properties, including, but not limited to, Manchester Valley High School, Town Hall, and Sheetz, to reduce stormwater runoff and promote infiltration and groundwater recharge [*2024 WRE*]

Ongoing Action Items:

- Manchester East: In process of acquiring property for a stormwater management facility to increase capture of stormwater and treatment [*2024 WRE*]
- Implement spray irrigation for nine months of year, which addresses the need to mitigate temperature [*2024 WRE*]
- Perform regular stormwater facility repair and rehabilitation [*2024 WRE*]
- Perform periodic street sweeping [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ Investigate requiring new development to incorporate pervious pavement [*2024 WRE*]

Long-Term Action Items

❑ n/a

41.0 Mount Airy

41.1 Water Supply

41.1.1 Source Water Assessment

The unconfined fractured rock aquifer within the Ijamsville Formation and Marburg Schist is the source of water supply for the Town of Mount Airy. As of 2024, the system uses 11 wells to obtain its drinking water. As of the September 2000 MDE Source Water Assessment, the Mount Airy water supply was determined to be susceptible to contamination by nitrates, volatile organic compounds (VOCs) (except one well), synthetic organic compounds (SOCs), and radionuclides, but not susceptible to protozoans. Further, 2 of the wells were determined to be susceptible to bacteria and viruses. The MDE assessment was completed when the Town's supply consisted of 7 seven active wells and 1 standby well, all of which were being utilized in 2024.

41.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) (including Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Mount Airy system would be 1,141,628 gallons per day (gpd).

2023 Mount Airy Future Water Supply Demand[5] at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Mount Airy	703,534	60,394	275,700	102,000	1,141,628

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand
		Residential	Non-Residential	
Mount Airy	703,534	301,050	137,044	1,141,628

[1] These data are the greatest annual average daily demand for the five-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.
5 Capacity Needed for Mount Airy does not use the BLI Demand estimates. BLI numbers for residential, commercial, and industrial demand were modified by the to reflect the Town's figures from the draft 2024 comprehensive plan. In addition, Mount Airy capacity and demand numbers may not match the BLI estimates, as the County does not have BLI information for the portion of Mount Airy that lies within Frederick County. Therefore, the Town used their own calculations to capture its entire area.

Source: Town of Mount Airy, 2023

Calculations for future water demand were provided by the Town. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, areas that are designated in the "No Planned Water Service Area" within the DGA were not included in the calculations. The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

41.1.3 Water Supply Capacity

If Mount Airy were to build out according to the zoning in place in 2022 within the 2023 WSA, the Town would need to expand beyond its current capacity to make available another 1,489 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Mount Airy Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Mount Airy	927,000	927,000	787,958	139,042	438,094	**(299,052)**

[1] Average Day Drought Demand here includes an additional 12% for drought demand as required by the Town's APFO.
[2] These data relate to areas located within the planned WSA. This includes WSAs.

Source: Town of Mount Airy, 2023

41.1.4 Water Supply Limitations

The Town of Mount Airy has historically utilized groundwater wells for its primary water supply. The emphasis on groundwater supply has served the Town well over the last thirty years. The Town currently has control over 11 production wells (four wells in Carroll County and seven wells in Frederick County). Beyond the original water station located on Prospect Road, additional Town wells have been added and funded through the development process.

The Town would like to continue this trend to rely primarily on groundwater resources within the municipal boundaries. Ultimately, the water supply demand cannot exceed the design capacity of the wastewater treatment plant (WWTP), permitted at 1.2 mgd processing as of 2024.

With increased attention to per- and polyfluoroalkyl substances (PFAS) levels in drinking water systems by the EPA, the Mount Airy water system was tested at all five stations' points of entry to the system and on all raw water points at all 11 individual wells. Several stations/wells were found to PFAS levels above the MCL (maximum contaminant level) set by EPA in April 2024. The Town is required to install PFAS treatment at several water treatment plants (WTP).

Considering existing pipeline projects, the Town's water system is beyond 80%, but not exceeding 88% of its appropriations and is, therefore, in accordance with Town Code, approaching inadequate capacity.

Summary of 2023 Buildout Capacity and Limitations for Mount Airy Water Supply System							
Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
●	927,000	927,000	787,958	1,226,052	299,052	▪ System Capacity ▪ Allocability	▪ Addn'l water sources ▪ ↗ appropriations ▪ WWTP expansion

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

41.1.5 Water Demand Management

Mount Airy does not have quantitative thresholds to implement water use restrictions. The Mayor issues an executive order when water restrictions are imposed. The decision is based on state drought status, groundwater levels, precipitation, and input from water supply staff. The measures may be voluntary or mandatory, depending on the severity of the drought. The Town website, social media, e-newsletters, and notes on the water bills provide information. Additional measures in place are listed under the water conservation and demand management strategy in this section.

41.2 Wastewater

The Town completed an enhanced nutrient removal (ENR) upgrade in 2011 that fulfills removal requirements of 3.0 mg/L TN (total nitrogen) and 0.3 mg/L TP (total phosphorus). In 2022, the Town proactively evaluated possible capacity expansion alternatives to 1.5 and 1.8 million gallons per day (mgd) in response to the possibility of large development in the future or annexation.

The WWTP serving the Mount Airy area is owned and operated by the Town of Mount Airy. The 1.2-mgd plant consists of mechanical bar screen, grit removal, five-stage bardenpho process, phosphorus removal, filtration system, clarifiers, UV disinfection, and aeration. Solid sludge is dewatered, treated with lime, and land applied through a contractor. The Town has permits necessary for sludge disposal at a landfill in the event conditions are not suitable for land application. The plant discharges to the South Branch of the Patapsco River, which is designated Use Class III, and Tier II water.

Additionally, Mount Airy provided wastewater demand projections for the C&D Workbook using an independent, manual method that combined all future demands into one category. Therefore, analysis of limitations for Mount Airy are not categorized into the same growth categories (Priority + Future and Long-Range) as the other municipalities in the County. The demand projections have been labeled as Priority + Future + Long-Range to reflect demand projections that occur at a similar time as the other municipalities and the County. In addition to the separate projection method Mount Airy uses to categorize growth, Mount Airy assumes that that I&I is 10% of their current flow and combines projected flows.

41.2.1 Wastewater Demand

The total future sewer demand assumes that everything within the 2023 Sewer Service Area (SSA) (including Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Mount Airy WWTP would be 1,119,219 gpd. The estimates do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations.

2023 Mount Airy Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Mount Airy	681,125	60,394	275,700	102,000	*1,119,219*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand
		Residential	Non-Residential	
Mount Airy	681,125	301,050	137,044	*1,119,219*

[1] These data represent, in general, the annual average daily demand over the 2-year period of 2022-2023 including I&I (rather than the 3-year period minus I&I used by the other systems).
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned SSA.
Source: Town of Mount Airy, 2023

41.2.2 Wastewater Capacity

If everything within the 2023 SSA (including Long-Range) builds out according to the zoning in place in 2022, the Town would not have sufficient capacity available with current wastewater flows.

Mount Airy Wastewater Capacity Available for Existing and Future Growth at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	Current			Existing Flows[2]	Capacity Needed[3]			Capacity Available at Buildout
	2023 Permitted	I&I[1]	Remaining Capacity		Infill	Priority + Future	Long-Range	
Mount Airy	1,200,000	70,000	1,130,000	681,125	60,394	275,700	102,000	**10,781**

[1] I&I flows are estimated by the Town to be ~10% of the total average plant influent.
[2] The amounts for the Town's Existing Flows includes I&I.
[3] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.
Source: Town of Mount Airy, 2023

41.2.3 Limitations Based on Design Capacity

The projected future wastewater demand of 1.119 mgd is below the 1.2-mgd design capacity of the Mount Airy WWTP. However, it exceeds the Capacity Available at Buildout where the I&I reserve is considered. The two-year average wastewater flow is less than 80% of the design capacity. The Town's expansion study concluded that land is available to expand the plant to 1.8 mgd, utilizing an alternative process with the existing tanks.

According to the Town, estimated I&I flows averaged about 0.07 mgd, assumed to be ~10% of the total average plant influent. Recent American Rescue Plan Act (ARPA) funding covered the installation of cure-in-place (CIP) liners and replacements, resulting in significant decreases in I&I. The Town continues to seek out locations with high inflow & infiltration (I&I) to prioritize I&I reduction projects.

41.2.4 Limitations Based on Local Water Quality

The Mount Airy WWTP NPDES permit includes limits for conventional pollutants and parameters such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard for secondary treatment facilities and are considered fully protective of receiving waters. Limits for parameters such as ammonia were derived for local water quality protection and are expected to remain achievable even under higher effluent flows.

The plant complies with water quality-based permit limits. Non-tidal segments are impaired for temperature. As a Use class III designated stream, a possible future temperature TMDL could be considered for the South Branch of the Patapsco River. However, the WWTP NPDES permit imposes temperature requirements including the submission of an "Effluent Temperature Management Plan." In addition, the WWTP has an agreement with MDE to reduce temperature concerns.

The Mount Airy WWTP discharges approximately three river miles upstream of a Tier II segment of the South Branch of the Patapsco River. Given the high levels of treatment and large distance to the segment, the Tier II designation is not expected to represent a controlling limitation on the Mount Airy WWTP discharge.

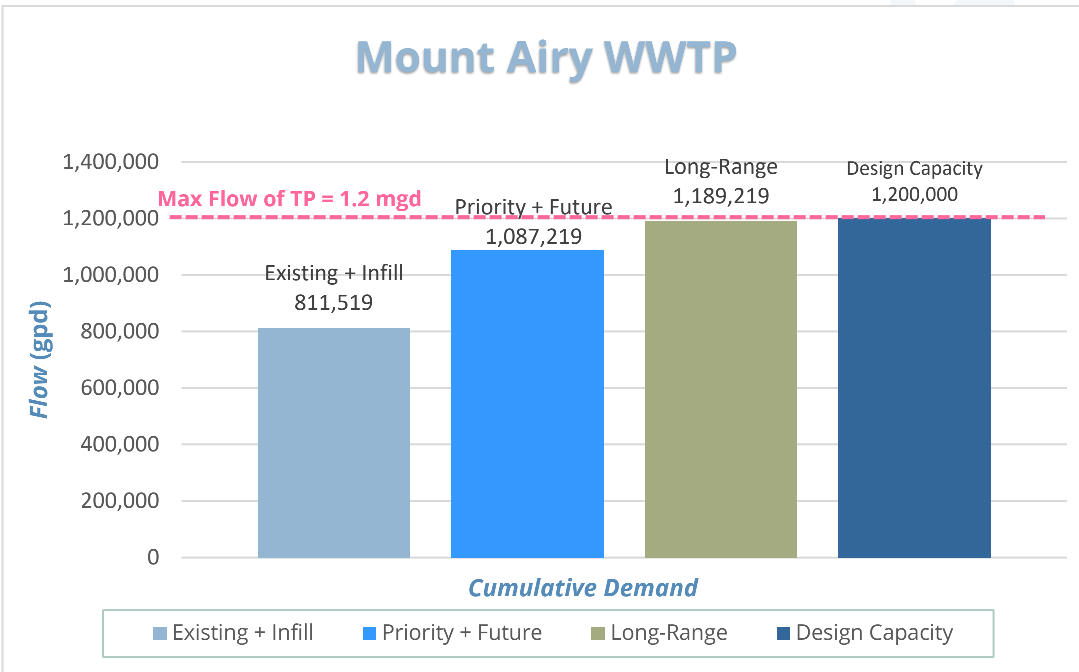
41.2.5 Limitations Based on Bay Nutrient Caps

The WWTP is considered a "major" facility under the 2010 Chesapeake Bay TMDLs and has been assigned nutrient loading caps for both total nitrogen and total phosphorus. The nutrient caps were based on a design capacity of 1.2 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps are enforceable NPDES permit limits.

The ENR upgrade is designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR caps is 1.2 mgd. The maximum daily flow to remain below the ENR nitrogen cap is 1.6 mgd. Through ENR, it is expected that the plant will be able achieve lower effluent phosphorus concentrations, which may afford the facility flexibility to operate up to 1.6 mgd without violating ENR caps. Nutrient caps are not anticipated to be a primary limitation for the Mount Airy WWTP. Note that Mount Airy has evaluated a WWTP expansion up to 1.8 mgd, but nutrient effluent concentrations need to be evaluated for this expansion.

41.2.6 Summary of Wastewater Limitations

The maximum projected demand based on BLI figures (1.119 mgd, or 1.189 mgd with I&I included) is only 10,781 gpd below the existing design capacity. The plant may need to expand in the future to accommodate future development and/or annexation if additional demand is projected. The approximate phosphorus-based capacity limitation of 1.2 mgd is a controlling limitation at the 2023 design capacity. However, if a plant expansion to 1.8 mgd is pursued, the nutrient limitations will need to be evaluated (TN cap is 1.6 mgd) and considered, as both would be lower than the expanded design capacity.



Summary of 2023 Buildout Capacity and Limitations for Mount Airy Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*					Limitation (mgd)	Actions Under Consideration to Increase Capacity
						Design Capacity	Site Limitatio	TN Cap	TP Cap	Other		
S. Branch Patapsco		1,200,000	811,519	1,189,219	0	✓			✓		**1.200**	WWTP expansion

WWTP will have capacity remaining at buildout of 2023 Sewer Service Area, including Long-Range.

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.
TP = Total Phosphorus; TN = Total Nitrogen

41.3 System-Specific Strategies: Mount Airy

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

With the support of Carroll County, the Town completed an exploratory groundwater drilling program in 2007 in the Gillis Falls area. Up to 28 drilling attempts were made; some boreholes were abandoned and sealed, while others were properly cased and converted to permanent wells. A long-term aquifer test was performed on a well that was found to have a marginal sustained yield. While other wells were found to have similar but lesser yields, the Town determined that the drilled wells would not have an adequate cumulative yield to justify the cost to treat the water and install and maintain an extended pipeline network to convey water to the Town.

Additionally, the Town tested and currently has a pending groundwater appropriation permit request with the MDE for Wells #1, #3, #12, and #18, which are located on the Harrison and Leishear properties. The parcels on which the wells are located were developer-owned land when the original testing was performed, and the parcels were later purchased by Carroll County. The four wells underwent renewed long-term testing (30-day duration) in late 2017. Over 8,800,000 gallons were pumped from the wellfield over the 30-day period, equivalent to a withdrawal rate of 295,000 gpd, which was greater than the appropriation amount (200,000 gpd annualized) being considered at the time. The wells are situated in the Middle Run Stream sub-watershed and are adjacent to the Town's Water Station #2.

The County owns numerous proximal parcels in the Middle Run watershed, which could be utilized as recharge credits in support of larger, sustainable withdrawal from these four wells in an MDE water appropriation permit.

41.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

- ✓ Submitted to MDE a Water Supply Capacity Management Plan (WSCMP) as background data for this plan document to reflect the most current capacity [*2010 WRE*]
- ✓ Adopted the Carroll County Water Resource Management Code, Chapter 154, which provides source water protection regulations [*2010 WRE*]
- ✓ Adopted Wellhead Protection article into the Town Code [*2010 WRE*]
- ✓ Adopted Water Supply Protection requirements into the Town Code (Provides regulations related to recharge management) [*2010 WRE*]
- ✓ Adopted an Adequate Public Facilities Ordinance (APFO) [*2010 WRE*]
- ✓ Amended the Municipal Growth Element of the *Mount Airy Comprehensive Plan* and associated annexation areas, as needed, to reflect the water supply limitations identified in 2010 WRE [*2010 WRE*]
- ✓ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. [*2024 WRE*]

- ✓ Quarterly PFAS well testing has been implemented [2024 WRE]
- ✓ Submit a Drinking Water State Revolving Fund (DWSRF) grant application for funding assistance to install PFAS treatment [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information; use as a mechanism to continue to track, monitor, and evaluate available capacity; use to complete and submit a full Water Supply Capacity Management Plan (WSCMP) to MDE for review, if needed [*2010/2024 WRE*]
- Ensure that the *Mount Airy Comprehensive Master Plan* reflects a balance between future demand and potential water supply capacity [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Connect Twin Arch Mobile Home Park to Town water supply system; work with MDE to increase appropriations to accommodate the additional demand [*2024 WRE*]
- ❑ Re-engage with the Carroll County Department of Economic Development to discuss future plans for the Harrison-Leishear property [*2024 WRE*]
- ❑ Complete Brinkley Bill evaluation on Well #9 to increase appropriation [*2024 WRE*]
- ❑ Install granular activated carbon (GAC) PFAS treatment at four of the five water stations [*2024 WRE*]
- ❑ Acquire funding for replacement of all galvanized (GRR) lines in town, per the EPA's Lead and Copper Rule, and explore test bits for unknown lines [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

41.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

System-Specific Action Items Already in Place:

- ✓ Middle Run Branch (Harrison/Leishear) Wells: Anticipated yield 0.150 mgd. The water appropriation permit application (CL2017G002) was filed with the State in June 2017. [*2024 WRE*]
- ✓ Amended the 2013 *Mount Airy Comprehensive Plan* to reduce the size of the Mount Airy Municipal Growth Area (MGA)/Designated Growth Area (DGA) to more closely reflect a balance between future demand and potential water supply capacity [*2024 WRE*]

Ongoing Action Items:

- Ensure that the *Mount Airy Comprehensive Plan* closely reflects a balance between future demand and potential water supply capacity [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate options to bring source and operational flexibility to the current system to provide overall reliability, security, and protection for current users [*2024 WRE*]
- ❑ Explore additional sources for future water supply to prepare for policy changes or other changes that would result in the need for additional available water capacity [*2024 WRE*]

- ❑ Work with the County to acquire wells at the Harrison and Leishear properties and be granted water recharge easements within the Middle Run Stream subwatershed to provide several years of manageable water to be used towards implementation of Mount Airy's comprehensive master plan [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

Short-Term Water Supply Solutions

- ❑ Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand needs, staying below 80% of supply capacity limitations to meet projected additional demand. [*2024 WRE*]

Long-Term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather, including whether surface water storage is available for treated, reclaimed water [*2024 WRE*]
- ❑ Gillis Falls Reservoir: Safe yield 3.85 mgd with normal pool elevation of 610 ft.; planned reservoir; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas [*2024 WRE*]
- ❑ Interconnection with Freedom: Interconnect with the Sykesville/Freedom water system and purchase agreement to supply approximately 0.85 mgd; 9.7 miles [*2024 WRE*]
    - Piney Run Reservoir (as built): Safe yield 3.65 mgd with normal pool elevation of 524 ft.; existing reservoir; to serve as regional source of supply for Mount Airy and Sykesville/Freedom Service Areas
- ❑ Interconnection with Frederick County: Interconnection with Frederick County water system and purchase agreement to supply approximately 0.85 mgd (with a maximum agreement of 1.2 mgd) [*2024 WRE*]

41.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place:

- ✓ Public Education: Website postings, water conservation brochures, posters available at town hall
- ✓ Water Loss Management: Annually locate and repair leaks in distribution system; all meters replaced in 2006, but in 2023 smart water meter replacement project again underway; perform quarterly water loss audits

- ✓ Drought Management: three-tiered system in place to impose water use restrictions
- ✓ Low-Flow Devices: Gave out free low-flow devices
- ✓ Water Use Rate Schedule: Progressive water rate structure
- ✓ Billing Cycle: Quarterly billing cycle
- ✓ Other Measures: Provided rain barrels to residents at discounted price

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Amend Town Code to prohibit "once-through" cooling (OTC) systems and evaporative chilling cooling systems [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

41.3.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

- ✓ Performed I&I inspection of entire 1971 original sewer system in 2007 [*2010 WRE*]
- ✓ Completed ENR upgrade, enabling the current facility to operate at the limits of technology for nitrogen and phosphorus removal [*2024 WRE*]
- ✓ Amended the *Mount Airy Comprehensive Plan* to reduce the size of the Mount Airy MGA/DGA to more closely reflect a balance between future demand and potential wastewater capacity, reducing the future demand to bring it under the 1.2 mgd WWTP capacity [*2024 WRE*]
- ✓ Lined roughly seven miles have been lined with CIPP (cured in place plastics) in 2022 [*2024 WRE*]

Ongoing Action Items:

- I&I improvements are ongoing each year to minimize unwanted flows to the WWTP [*2010 WRE*]
- On a regular basis, or as actions are taken or completed that would change the capacity calculation, update the C&D Workbook developed as background data for this plan document to reflect the most current information; complete and submit a full Wastewater Capacity Management Plan (WWCMP) to MDE for review, as needed [*2010/2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ n/a

Long-Term Action Items

- ❑ n/a

41.3.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

✓ Completed study to determine feasibility of expanding design capacity of existing WWTP [*2024 WRE*]

Ongoing Action Items:

n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ Design and construct expansion of WWTP from 1.2 mgd to 1.8 mgd [*2024 WRE*]

41.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

42.0 New Windsor

42.1 Water Supply

42.1.1 Source Water Assessment

The Town of New Windsor relies upon groundwater for its potable supply. The unconfined fractured rock aquifer within the Wakefield Marble, Sam's Creek Formation, Marburg Formation, and Ijamsville Phyllite provides the source of water supply for the Town. While 6 sources are included in water appropriation permits (4 wells and 2 springs), only 3 groundwater wells and one spring were actively being utilized in 2024. One permitted groundwater well could be connected to a large transmission main originating from Main Spring Farm, while the unutilized spring was determined groundwater under the influence of surface water (GWUDI) and would require advanced treatment for bacteriologicals in accordance with the Surface Water Treatment Rule.

The Hillside wellfield consists of two wells completed in the phyllite (and possibly Silver Run Limestone), while the Main Spring system is located near a geologic contact between the Sam's Creek and Marburg Formations. The Denning's Well is located upgradient of the Main Spring and is completed in the Marburg Formation. As of the February 2001 MDE Source Water Assessment, the Hillside wells were determined to be susceptible to contamination from volatile organic compounds (VOCs) associated with commercial enterprises, as well as radionuclides. The Main Spring system was determined to be susceptible to contamination by nitrates, viruses, and bacteria associated with surface sources.

As of 2024, the Town was working with MDE to seek incorporation of the Atlee well into the water supply system. If approved after MDE required aquifer and water quality testing, the well would be added to the Town's existing appropriation permit for the two Hillside wells. The Town's other groundwater appropriation permit lists the Dennings Well, MSF-5, Main Spring, and Roop's Meadow Spring. For well MSF-5 to remain on that second groundwater appropriation permit, MDE will require the Town to connect that well to the water supply system, secure a certificate of potability, and keep the well capable of operation. The Town was also evaluating several potential groundwater supply development projects within and near Town in order to provide redundant water supply capacity, particularly while the Town considers options for rehabilitation of the long-serving approximately 3.5-mile water transmission line that provides water from Main Spring Farm and the Dennings Well to the Town.

42.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) (including Long-Range) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the New Windsor system would be 225,215 gallons per day (gpd). The numbers in the "2023 New Windsor Future Water Supply Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this individual municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 New Windsor Water Supply Capacity Available for Existing and Future Growth."

New Windsor Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
New Windsor	97,481	60,436	26,679	40,619	225,215

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand
		Residential	Non-Residential	
New Windsor	97,481	35,750	91,985	225,215

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.
Source: WRE Capacity & Demand Workbook: CC PLM + Town of New Windsor, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area" within the DGA. The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

42.1.3 Water Supply Capacity

If New Windsor were to build out the 2023 WSA according to the zoning in place in 2022, the Town would need to expand beyond its current capacity to make available another 164,954 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

New Windsor Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
New Windsor	196,000	70,000	107,229	(37,229)	127,735	(164,954)

[1] Average Day Drought Demand here includes an additional 10% for drought demand
[2] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.
[3] Two wells at the Dennings property flow through the pipe to the Town. Hazen's figures show 54,000 gpd, which assumes both wells are out. If only the Main Spring well is out of service, 15,000 gpd would need to be added back to the Avg Day Capacity Limitation.
Source: WRE Capacity & Demand Workbook: CC PLM + Town of New Windsor, 2023

42.1.4 Water Supply Limitations

Town budget and user-pay (rate) limitations for funding the operation and improvement of a public water system and a public sewerage system impose a significant limiting factor for the Town of New Windsor. Additionally, competing State-imposed policies regarding land use (e.g. smart growth priority funding areas and future municipal growth area planning) on one hand, and severe water appropriation permit limitations (to accommodate worst case drought conditions) on the other, cause the former to be impeded by the latter. State administrative parameters and policy also significantly increases groundwater development costs and system uses fees, while currently not providing grants or cost sharing to mitigate capital costs resulting from State and federally imposed mandates.

Summary of 2023 Buildout Capacity and Limitations for New Windsor Water Supply System							
Buildout Demand Status	**2022 Appropriated Capacity (gpd)**	**Average Day Capacity Limitation (gpd)**	**2022 Existing [1] (gpd)**	**Buildout Demand (gpd)**	**Additional Capacity Needed (gpd)**	**Critical Limiting Factor (mgd)**	**Actions to Consider for Increasing Capacity as Needed**
🔴	196,100	70,000	107,229	234,964	164,954	▪ System Capacity ▪ WWTP Capacity	▪ New WWTP ▪ Addn'l water sources ▪ ↗ appropriations

🔴 *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, and limitations would be very difficult to overcome*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

42.1.5 Water Demand Management

New Windsor does not have formal quantitative thresholds to implement water use restrictions or a formal water use restriction policy, but Town code provides rights to restrict water use for a number of reasons. New Windsor developed a drought management plan in 2023, but it hasn't yet been recorded in the Town's water and sewer code.

The Town Director of Public Works determines when water restrictions are imposed. They are voluntary unless mandated by the Maryland Department of the Environment (MDE). The decision is based on, among other things, monitoring reports, well levels, and recharge rates. Information about water restrictions can be found on the Town's website, social media, and via door hangers.

42.2 Wastewater

The New Windsor wastewater treatment plant (WWTP) is owned by the Town of New Windsor and operated by the Maryland Environmental Service (MES). The plant was upgraded in July 2011 to a 0.115 million gallons per day (mgd) continuous sequential batch reactor (CSBR) system to replace the lagoon system. Effluent is injected with hydrated lime and then passes through a grinder and a comminutor. Screened influent is injected with alum solution and sent to a splitter box to be separated to two CSBRs. After biological nutrient removal (BNR) treatment, effluent undergoes UV disinfection followed by post-aeration. The plant discharges to Dickenson Run and then flows into Little Pipe Creek, which is not a Tier II or Use Class III stream. Because there is State funding available for plants <1 mgd, the Town is currently evaluating a possible upgrade from BNR to enhanced nutrient removal (ENR) standards. Any consideration for capacity expansion with an ENR upgrade would also result in a cost to the Town, but without an expansion, future growth would be limited by fewer available sewer connections for large commercial properties.

42.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the 2023 Sewer Service Area (SSA) builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the New Windsor WWTP would be 169,489 gpd.

The numbers in the "2023 New Windsor Future Wastewater Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system or additional factors in the MDE Capacity Management Plan methodology that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 New Windsor Wastewater Capacity Available for Existing and Future Growth."

New Windsor Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
New Windsor	41,716	30,345	56,514	40,914	*169,489*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]		Total Buildout Demand
		Residential	Non-Residential	
New Windsor	41,716	35,750	92,023	*169,489*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of New Windsor, 2023

42.2.2 Wastewater Capacity

If New Windsor were to build out according to the zoning in place in 2022 within the 2023 SSA, the Town would need to expand its WWTP beyond its current capacity to make available an additional 87,115 gpd in wastewater flows.

New Windsor Wastewater Capacity Available for Existing and Future Growth at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at Buildout
	2023 Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
New Windsor	115,000	16,000	90,000	58,342	30,345	56,514	40,914	**(87,115)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of New Windsor, 2023

42.2.3 Limitations Based on Design Capacity

The 115,000 gpd plant will have to increase capacity to meet projected future demands for Priority + Future and Long-Range. Capacity is anticipated to be an issue for both Priority + Future and Long-Range conditions. The WWTP experiences operational challenges with high flow and the need for an equalizer tank to handle capacity. The rated design capacity is likely to remain the controlling limitation to discharge as long as advanced nutrient removal technology is used. Once the WWTP reaches 80% of capacity, a Wastewater Treatment Capacity Management Plan (WWCMP) will need to be completed and submitted to MDE.

According to the C&D Workbook, inflow & infiltration (I&I) flows average 16,000 gpd and account for 21.5% of the total average plant influent. The Town continues to implement I&I sewer lining projects, similar to those in 2013 and 2015.

42.2.4 Limitations Based on Local Water Quality

The New Windsor WWTP NPDES permit includes limits for conventional pollutants and parameters such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard limits for secondary treatment facilities, and MDE has determined that they are fully protective of receiving waters. Limits for parameters, such as ammonia, were derived for local water quality protection and will be achievable with nitrification even at expanded flows, after the plant expansion is complete.

The plant performance concentrations (monthly average) in the most recent NPDES permit fact sheet for the facility indicate that it appears to be operating well below the proposed limits (monthly average) for fecal coliform and TSS (total suspended solids). As such, it is reasonable to assume the total maximum daily loads (TMDLs) for Double Pipe Creek for fecal coliform and TSS are not controlling limitations to discharge. Any future TMDL for biological impairments in the Double Pipe Creek watershed is also not expected to impose the controlling limitation on discharge rates. The phosphorus TMDL for Double Pipe Creek does not impose phosphorus limits that are more stringent than the Bay-related nutrient caps

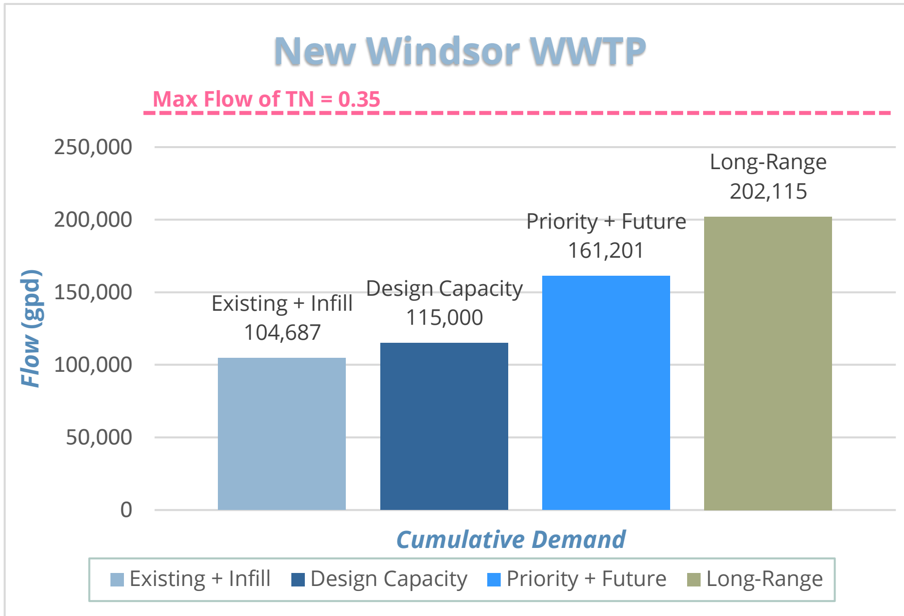
42.2.5 Limitations Based on Bay Nutrient Caps

Though the WWTP is considered a “minor” facility under the 2010 Chesapeake Bay TMDL, Bay Restoration Funds (BRF) were utilized during the 2011 expansion from secondary treatment to a BNR process, and the plant was assigned nutrient loading caps for both total nitrogen and total phosphorus. These nutrient caps were based on a projected 2020 flow of 0.058 mgd, a total nitrogen (TN) concentration of 18.0 mg/L, and a total phosphorus (TP) concentration of 3.0 mg/L, which correspond to a maximum annual load of 3,178 lbs/yr of TN and 530 lbs/yr of TP.

If the plant ultimately upgraded to full ENR, the maximum average daily flow at which the facility could operate without exceeding the nitrogen ENR caps is 0.35 mgd. Maximum daily flow to remain below the ENR phosphorus cap is 0.58 mgd. The projected Priority + Future flow (0.16 mgd) and Long-Range flow (0.19 mgd) are lower than the maximum flows above which nutrient caps would be exceeded. Therefore, nutrient caps are not anticipated to be a primary limitation for the New Windsor WWTP.

42.2.6 Summary of Wastewater Limitations

The existing design capacity (0.115 mgd) of the New Windsor WWTP is a controlling limitation under Priority + Future and Long-Range conditions. As the plant expands and upgrades, the rated design capacity is likely to remain the controlling limitation to discharge as long as advanced nutrient removal technology is employed. Neither the nitrogen nor phosphorus max flows are expected to be limitations.



Summary of 2023 Buildout Capacity and Limitations for New Windsor Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*					Limitation (mgd)	Actions Under Consideration to Increase Capacity
						Design Capacity	Site Limitatio	TN Cap	TP Cap	Other		
Double Pipe Creek	🛑	115,000	104,687	202,115	87,115	✓					**0.115**	WWTP expansion

🛑 *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, and limitations would be very difficult to overcome*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.
TP = Total Phosphorus; TN = Total Nitrogen

42.3 System-Specific Strategies: New Windsor

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

42.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

✓ Adopted the Carroll County Water Resource Management Code, Chapter 154, which provides source water protection regulations [*2010/2024 WRE*]

✓ Amended the Municipal Growth Area (MGA) within the Municipal Growth Element of the *New Windsor Community Comprehensive Plan* and associated annexation areas in 2010 to reflect the changes recommended in the 2010 WRE [*2024 WRE*]

Ongoing Action Items:

- Support the rezoning by the County of areas outside the Town's MGA to be consistent with other areas of the county that are not within a Designated Growth Area (DGA) to reflect desired future buildout scenario for New Windsor [*2010 WRE*]
- Coordinate with MDE regularly to monitor water quality in Town wells [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Update the C&D Workbook developed as background data for this plan document to reflect the most current information; use as a mechanism to continue to track, monitor, and evaluate available capacity; use to complete and submit a full Water Supply Capacity Management Plan (WSCMP) to MDE for review, if needed [*2010 WRE*]
- ❑ Evaluate additional water supply options for redundant capacity, with an additional objective being to bring sources closer to Town [*2024 WRE*]

Long-Term Action Items

- ❑ Identify potential industrial/manufacturing users for which water reuse in operations may be pursued to reduce consumption of potable water, as needed [*2024 WRE*]

42.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

System-Specific Action Items Already in Place:

✓ Developed and finalized an agreement with Lehigh Portland Cement Company in March 2014 to use water pumped from the Lehigh New Windsor quarry [*2024 WRE*]

✓ Hillside Wells 1 & 2: Redeveloped wells and optimized operational cycles to meet 2023 permit limits; average yield reportedly >0.053 mgd but awaiting MDE concurrence [*2024 WRE*]

Ongoing Action Items:

- Continue with exploration Exploratory test drilling at various sites for additional groundwater sources [*2010/2024 WRE*]

System-Specific "To Do" Action Items:

Short-term Strategies

- ❑ Remove Trudy Snader property from Water Service Area since more dense development is not feasible and follow up with removing that projected demand for that property from the total future long-term demand [*2024 WRE*]
- ❑ Work with County staff to facilitate conversations between the Town and Springdale Preparatory School regarding a memorandum of understanding (MOU) and access agreement for test drilling, potential acquisition of a portion of the property, easements for distribution lines, and subsequent permitting and drilling of well if successful [*2024 WRE*]
- ❑ Assess a cycled approach to well operation in lieu of continuous pumping if this will allow for a greater withdrawal under existing appropriation permit(s) [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

Short-term Water Supply Solutions

- ❑ Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand needs [*2010/2024 WRE*]
- ❑ Atlee Ridge Well: [*2024 WRE*]
  - ❑ Conduct testing for sustainability and potability
  - ❑ Submit results to MDE
  - ❑ If tests are successful, proceed with steps to connect the Atlee Well to the Town's water supply system. Begin MDE water appropriation permitting process.
- ❑ Hillside Well Testing & Pump Optimization: [*2024 WRE*]
  - ❑ Lower the pump to increase production capacity if operationally possible
  - ❑ Test Hillside Well for performance and sustainability
  - ❑ Submit a report to MDE
- ❑ Increase Water Appropriations & Usage Permits: [*2024 WRE*]
  - ❑ Pursue permit amendments to increase water appropriation limits for CL1992G049/04 and CL1978G022(06)
  - ❑ Secure MDE approval of the permit modification for operational flexibility to meet current and future water demand for the Town
- ❑ New Drilling Locations – Identify alternative drilling locations near town: [*2024 WRE*]
  - ❑ Explore potential well drilling sites closer to Town using easements, rights of way, or property acquisition options
  - ❑ Develop a plan to secure the required access or ownership of suitable land for drilling
- ❑ Main Spring Farm Well 5 – Assess and prepare MSF-5 (Main Spring Farm) well for connection to the raw water line: [*2024 WRE*]
  - ❑ Conduct a detailed assessment of the MSF-5 Well
  - ❑ Initiate planning for the connection, including obtaining cost estimates from the Town Engineer and contractors for necessary infrastructure adjustments
  - ❑ Notify MDE of progress and schedule design meetings, ensuring the ability to isolate per the Town's cross-connection plan requirements
- ❑ SCADA System Upgrades for Enhanced Water Management: [*2024 WRE*]
  - ❑ Upgrade the Supervisory Control And Data Acquisition (SCADA) system to improve monitoring and control of water infrastructure Allready done in 2023/2024
  - ❑ Integrate tools for real-time leak detection and automated reporting to reduce water loss and improve response times
  - ❑ Enhance operational functionality to support efficient water management, including data-driven decisions for well performance and distribution system reliability.

Long-term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Lehigh Quarry: Use Lehigh Quarry near New Windsor as a raw-water reservoir to supply approximately 0.25 mgd to New Windsor; preferred method of transferring water to the water treatment plant (WTP) is via a release to the nearby stream, and a subsequent withdrawal at the treatment plant [*2010 WRE*]

- ❑ Hyde's Quarry: Connection to Hyde's Quarry as a raw-water reservoir to supply additional water to the Town system; previous testing indicates a sustainable yield of approximately 0.500 mgd [*2024 WRE*]
- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather, including whether surface water storage is available for treated, reclaimed water [*2024 WRE*]
- ❑ Regional Connection to Westminster: approximately 2 miles to raw water or 3 miles to treated water [*2010 WRE*]
- ❑ Regional Connection to Union Bridge: Subsequent to any use of the Union Bridge Lehigh Quarry water [*2010 WRE*]

42.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place:

- ✓ Public Education: Trying to shift attitude toward constant conservation, not just for emergencies; newsletters; education program; posts water conservation information to Facebook
- ✓ Water Loss Management: SCADA system and VFDs for operational controls and adjustments for water control
- ✓ Drought Management: Drafted a three-stage drought management plan in 2023

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Incorporate appropriate drought management plan requirements to Town Code
- ❑ Investigate implementing a low-flow device program for Town water customers
- ❑ Develop and adopt formal drought management and water use reduction plans to help navigate low water levels during drought events or other events such as infrastructure outages that temporarily limit water supply availability; present to the Council the draft drought management plan and revise the Town's water and sewer code accordingly

Long-Term Action Items

- ❑ n/a

42.3.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

- ✓ Completed planned construction of SBR plant (2 tanks)

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current then complete; use to develop and submit a full WWCMP to MDE for review, as needed
- Pursue re-rating of the WWTP capacity upon completion of the SBR construction to recognize additional capacity gained through operational upgrade

- Continue lining sewer pipes to reduce I&I and potentially regain some flow capacity
- Complete further expansion of the SBR plant (filtering and 4 tanks)

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Develop and submit a WWCMP to MDE since flows as of 2023 exceed 80% *[2010 WRE]*
- ❑ Upgrade minor WWTP to ENR treatment level, enabling the current facility to operate at the limits of technology in terms of nitrogen and phosphorus removal and reducing the limitation on capacity that the caps might present (in progress) [2024 WRE]

Long-term Action Items

- ❑ Identify potential industrial/manufacturing users for which water reuse in operations may be pursued
- ❑ Evaluate the feasibility of a regional connection to Westminster's wastewater treatment system
- ❑ Investigate reuse of Town's gray water through spray irrigation at ballfields, for firefighting, industrial operations, or other appropriate uses

42.3.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

- ✓ n/a

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Consider additional WWTP Plant capacity to serve projected demand to the extent that is economically feasible for the sewer user base [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

42.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

43.0 Sykesville

43.1 Water Supply

43.1.1 Source Water Assessment

The Town of Sykesville is served by the Freedom water supply system.

43.1.2 Water Supply Demand

The existing demand for water within the Town limits is included within the total annual average daily demand for the Freedom water supply system. Assuming that everything within the area on the Town's adopted land use plan builds out, additional residential demand to the Freedom water supply system from Sykesville would be 31,250 gpd (125 DU) based strictly on BLI calculations. Additional future non-residential demand is estimated at 177,400 gpd.

43.1.3 Water Supply Capacity

The Town of Sykesville has an adopted Adequate Public Facilities Ordinance. The Town is served by the Freedom water supply system. Therefore, capacity issues are discussed and addressed under the Freedom system section.

43.1.4 Water Supply Limitations

The Town of Sykesville is served by the Freedom water supply system. Therefore, limiting factors are discussed under the Freedom system section. Reliance on the capacity of the Freedom system is a limitation for the Town.

43.2 Wastewater

43.2.1 Wastewater Demand

The existing demand for wastewater within the Town limits is included within the current demand for the Freedom sewerage system. Assuming that everything within the Town builds out according to the adopted land use plan, additional residential demand to the Freedom wastewater system from Sykesville would be 30,750 gpd (123 DU) based strictly on BLI calculations. Additional future non-residential demand is estimated at 159,660 gpd.

43.2.2 Wastewater Capacity

The Town of Sykesville has an adopted Adequate Public Facilities Ordinance. The Town is served by the Freedom wastewater system. Therefore, capacity issues are discussed and addressed under the Freedom system section.

43.2.3 Limitation Based on Design Capacity

The Town of Sykesville is served by the Freedom wastewater system. Therefore, the design capacity limitations are discussed under the Freedom system section.

43.2.4 Limitations Based on Local Water Quality

The Town of Sykesville is served by the Freedom wastewater system. Therefore, the local water quality limitations specific to the system's infrastructure are discussed under the Freedom system section.

43.2.5 Limitations Based on Bay Nutrient Caps

The Town of Sykesville is served by the Freedom wastewater system. Therefore, the Bay nutrient cap limitations specific to the infrastructure itself are discussed under the Freedom system section.

43.2.6 Summary of Wastewater Limitations

The Town of Sykesville is served by the Freedom wastewater system. Therefore, the limitations specific to the infrastructure fall under the Freedom system section. Reliance on the capacity of the Freedom system is a limitation for the Town.

43.3 System-Specific Strategies: Sykesville

Note: Action items included below are additional to the action items under the Countywide Strategies that apply to the County as well as all of the municipal systems.

43.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

✓ Adopted an adequate public facilities certification requirements as part of the Town's subdivision regulations, which were adopted in 1981, to ensure adequate water supply is available to serve planned development before it proceeds

Ongoing Action Items:

- When updating the land use plan in the Town's master plan, coordinate with the County to ensure that the Freedom water supply system can adequately accommodate projected additional water supply demand

System-Specific "To Do" Action Items:

- [ ] n/a

43.1.2 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

✔ Adopted an adequate public facilities ordinance to ensure adequate wastewater capacity is available to serve planned development before it proceeds

Ongoing Action Items:

- When updating the land use plan in the Town's master plan, coordinate with the County to ensure that the Freedom WWTP can adequately accommodate projected additional wastewater demand

System-Specific "To Do" Action Items:

❑ n/a

43.1.3 Develop new public wastewater treatment and disposal capacity

The Town is served by the Freedom wastewater system. Strategies and Action items related to developing wastewater treatment and disposal capacity can be found in the Freedom section of the Municipal System-Specific section of this plan.

43.1.4 Protect and restore water quality and make progress toward any applicable TMDLs

System-Specific Action Items Already in Place:

✔ Received designation as a Sustainable Maryland community to improve access to funding for green and sustainability practices [*2024 WRE*]

Ongoing Action Items:

- Remain committed to conservation and environmental stewardship through the Town's ordinances [*2024 WRE*]
- Continue to work with the Maryland Department of transportation (MDOT) to identify and advance stormwater management solutions that mitigate flooding impacts to Springfield Road and affected properties [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ Integrate green infrastructure into the downtown streetscape and infill development projects as a way to help reduce the quantity of and improve the quality of stormwater runoff, which could include curbside green infrastructure, green walls, bioswales, rain gardens, planter boxes, and/or permeable pavement [*2024 WRE*]

❑ Establish a policy to evaluate and prioritize green infrastructure, where feasible, for all Town-related projects [*2024 WRE*]

❑ Ensure the Town's priority flood and stormwater mitigation projects are included in the Hazard Mitigation Plan to make them eligible for hazard mitigation assistance funding [*2024 WRE*]

❑ Update Sykesville's zoning and subdivision and land development regulations to include riparian buffer and stormwater management regulations that include best management practices and lo impact development (LID) design [*2024 WRE*]

- ❑ Continue participation in the National Flood Insurance Program (NFIP) by adopting and enforcing floodplain management regulations that meet or exceed the minimum NFIP standards and requirements, which are intended to prevent loss of life and property, as well as economic and social hardships that result from flooding [*2024 WRE*]
- ❑ Update Sykesville's zoning regulations to incorporate the floodplain management regulations as a floodplain overlay district [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

44.0 Taneytown

44.1 Water Supply

44.1.1 Source Water Assessment

The unconfined fractured rock aquifer in the New Oxford Formation is the source of water supply for the City of Taneytown system, which is comprised of five wells in the Piney Creek drainage area and three wells in the Big Pipe Creek drainage area.

As of 2024, Well No. 11, which is located in the Piney Creek watershed, was offline due to elevated PFAS concentrations.

44.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Taneytown system would be 774,209 gpd. The numbers in the "2023 Taneytown Future Water Supply Demand" table are based strictly on Buildable Land Inventory (BLI) calculations.

Taneytown Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Taneytown	384,915	127,124	27,547	234,623	774,209

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand
		Residential	Non-Residential	
Taneytown	384,915	138,500	250,794	774,209

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Taneytown, 2023

44.1.3 Water Supply Capacity

If Taneytown were to build out according to the zoning in place in 2022 within the 2023 Water Service Area, the City would need to expand beyond its current capacity to make available another 355,598 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Taneytown Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Taneytown	552,100	457,103	423,407	33,696	389,294	**(355,598)**

[1] *Average Day Drought Demand here includes an additional 10% for drought demand*
[2] *These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.*
Source: WRE Capacity & Demand Workbook: CC PLM + City of Taneytown, 2023

44.1.4 Water Supply Limitations

A primary water supply limitation to meeting the future demand is acquisition and/or control of recharge lands. There is significant upland (up-watershed) open space for recharge and well development. However, water rights and land acquisition by the City will be costly. A secondary limitation is site specific constraints and environmental features for the acquisition and construction of water supply systems.

Another component of the City's water supply program is a planned expansion to include a surface water system including development of a City stream intake, reservoir, and water treatment plant, or participation in a County or multi-municipal project.

Summary of 2023 Buildout Capacity and Limitations for Taneytown Water Supply System

Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
● (yellow)	552,100	457,103	423,407	812,701	355,598	▪ System Capacity ▪ Allocability	▪ Water recharge easements ▪ Addn'l water sources ▪ ↗ appropriations

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

44.1.5 Water Demand Management

Taneytown does not have quantitative thresholds to implement water use restrictions. The City imposes restrictions for residents via an executive order of the Mayor, based on recommendations from the City Department of Public Works. The City has three phases of restrictions, with Phase 1 being voluntary and Phases 2 and 3 being mandatory. Residents are notified of restrictions via the City newsletter, social media, press releases, and Taneytown Connect.

44.2 Wastewater

In 2016, the City upgraded the plant to ENR but has no current plans for expansion. The WWTP serving the Taneytown area is owned and operated by the City of Taneytown. The 1.10 mgd plant treatment consists of a sequence batch reaction process, where dried sludge is contracted to Synagro for farmland application. The plant discharges into Piney Creek, which flows into the Upper Monocacy River. Neither of these water bodies are Tier II waters nor Use Class III

44.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the 2023 Sewer Service Area builds out according to the zoning in place in 2022. If this were to occur, the future wastewater demand for the Taneytown WWTP would be 870,832 gpd and includes flows from infiltration and inflow of surface water.

Taneytown Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]: Infill Demand	Planned Future Demand[2]: Future Demand	Long-Range Demand[3]	Total Buildout Demand
Taneytown	502,333	126,123	6,500	235,876	*870,832*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]: Residential	Additional Demand by Land Use[2]: Non-Residential	Total Buildout Demand
Taneytown	502,333	138,750	229,749	*870,832*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Taneytown, 2023

44.2.2 Wastewater Capacity

The total future wastewater demand assumes that everything within the 2023 Sewer Service Area builds out according to the zoning in place in 2022. The City would need to expand beyond its current capacity to make available an additional 121,832 gpd in wastewater flows.

Taneytown Wastewater Capacity Available for Existing and Future Growth at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Community	Current: 2023 Permitted	Current: I&I	Current: Remaining Capacity	Existing Flows	Capacity Needed[1]: Infill	Capacity Needed[1]: Priority + Future	Capacity Needed[1]: Long-Range	Capacity Available at Buildout
Taneytown	1,100,000	351,000	749,000	502,333	126,123	6,500	235,876	**(121,832)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Taneytown, 2023

44.2.3 Limitations Based on Design Capacity

As tabulated in the C&D Workbook, the facility would have to expand by 0.12 mgd in order to accommodate the projected long-range wastewater flow of 1.22 mgd. The existing wastewater flow is approaching the 1.1 mgd design capacity of the Taneytown WWTP. Though estimates indicate the existing flow exceeds the 80% MDE threshold, recoveries from I&I are decreasing flows to such a degree that the plant did not have to write a WWCMP for 2023. Even so, overallocation is anticipated to be an issue for both Priority + Future and Long-Range conditions regardless. If the plant were to consider expansion to accommodate projected flows, land availability would need further consideration.

I&I is a major component of the existing influent flow. I&I flows averaged about 0.35 mgd, approximately 36% of the average plant influent. The City has an ongoing program to identify locations of high I&I and to reduce I&I by pipe replacement and lining. These programs have had significant success, decreasing I&I from ~5 mgd to ~1 mgd during a 2-inch rain event.

44.2.4 Limitations Based on Local Water Quality

The Taneytown WWTP NPDES permit includes limits for conventional pollutants and parameters such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard for secondary treatment facilities and are considered fully protective of receiving waters. Limits for parameters, such as ammonia, were derived for local water quality protection and are expected to remain achievable even under higher effluent flows.

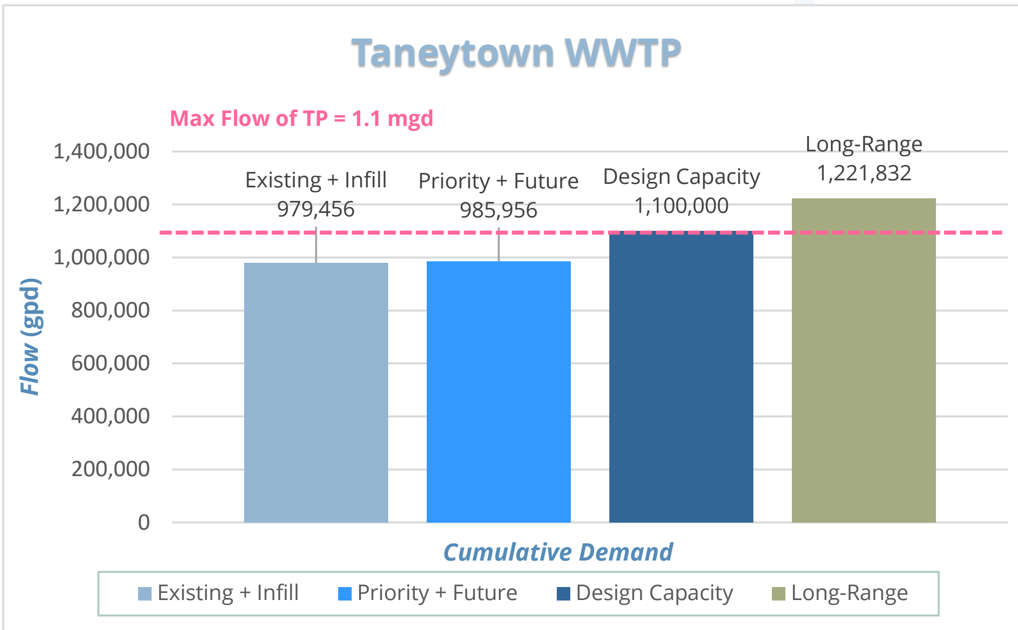
The plant performance concentrations (monthly average) in the most recent NPDES permit fact sheet for the facility indicate that it appears to be operating below the proposed limits (monthly average) for fecal coliforms and TSS. As such, it is reasonable to assume the TMDLs for Upper Monocacy River for fecal coliforms and TSS will not represent the controlling limitations to discharge. Despite the City reporting multiple WWTP violations over the last 10 years related to nutrient limits during the ENR upgrade, it is reasonable to assume the plant will be able to comply with nutrient TMDLs moving forward. Similarly, any future TMDL for biological impairments in the Upper Monocacy watershed is also not expected to impose the controlling limitation on discharge rates.

44.2.5 Limitations Based on Bay Nutrient Caps

The Taneytown WWTP's NPDES permit has concentration limits that in compliance with nutrient reductions set forth by the 2010 Chesapeake Bay TMDL. The WWTP is considered a “major” facility and has been assigned nutrient loading caps for both total nitrogen and total phosphorus. The nutrient caps were based on a design capacity of 1.1 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps are enforceable NPDES permit limits.

The ENR upgrade is designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR cap is 1.1 mgd. Maximum daily flow to remain below the ENR nitrogen cap is 1.47 mgd. Through ENR, it is expected that the plant will be able to achieve lower effluent phosphorus concentrations, which may afford the facility flexibility to operate up to 1.47 mgd without violating ENR caps. The projected Priority + Future flow (0.99 mgd) is lower than the maximum flows above which nutrient caps would be exceeded but is greater than 80% of the plant design capacity. Long-Range flow (1.22 mgd) exceeds the phosphorus cap. Therefore, nutrient caps are anticipated to be a limitation for the Taneytown WWTP.

44.2.6 Summary of Wastewater Limitations



The existing design capacity (1.1 mgd) of the Taneytown WWTP represents the controlling limitation under current and long-range conditions. Longer term, the ENR-related phosphorus loading cap represents a 1.1-mgd limit to surface water discharges. WWCMPs required for future scenarios should also be considered a limitation to growth.

Summary of Buildout Capacity and Limitations for Taneytown Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*: Design Capacity	Site Limitatio	TN Cap	TP Cap	Other	Limitation (mgd)	Actions Under Consideration to Increase Capacity
Upper Monocacy	◍	1,100,000	979,456	1,221,832	121,832	✓			✓		**1.100**	I&I improvements

◍ *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, but limitations can more easily be overcome.*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

TP = Total Phosphorus; TN = Total Nitrogen

44.3 System-Specific Strategies: Taneytown

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

44.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

- ✔ Amended the *Taneytown Community Comprehensive Plan* in 2010 to reduce the size of the Taneytown DGA to more closely reflect a balance between future demand and potential water supply capacity [*2024 WRE*]
- ✔ Procedural Improvements: Implementing and enforcing Adequate Public Facilities Ordinance
- ✔ Developed a water policy to guide and govern the materials and methods to be employed by developers and the City to guide the City when making technical and hydrogeological decisions for the provision of an adequate water supply system [*2024 WRE*]
- ✔ Performed several annual water audits including professional leak detection surveys to identify sources of unaccounted water usage, significantly reducing water loss [*2024 WRE*]
- ✔ Completed a WSCMP as a valuable resource in the future management of water supply [*2024 WRE*]
- ✔ Replaced deteriorating water main in Baltimore Street (11,000-LF) including all service laterals, as part of the City's Streetscape project to realize further reduction in water loss through leakage [*2024 WRE*]
- ✔ Increased security by installing security cameras at wellheads and pump houses *[*2024 WRE*]*
- ✔ Installed a new control system to operate all wells and alarms for pump failures; 2 wells have backup generators to address power failures [*2024 WRE*]
- ✔ Continue to monitor emerging contaminants such as PFAS & PFOA evaluating treatment options as detection warrants and re-mediating as budgets allow through the Capital Improvement Program [*2024 WRE*]
- ✔ Investigate measures to reduce PFAS levels in water supply to reduce the PFAS levels in the wastewater effluent [*2024 WRE*]
- ✔ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information, then use to complete and submit a full WSCMP to MDE for review, as needed [*2010/2024 WRE*]
- Update water audit annually and perform monthly leak detection surveys to identify sources of unaccounted water usage, significantly reducing water loss in house [*2024 WRE*]
- Instituted a priority system for water allocation to projects that promote economic development [*2024 WRE*]
- Perform monthly leak detection surveys to identify sources of unaccounted water usage to reduce water loss [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ☐ Modify the DGA/MGA with the next City review of the *Taneytown Community Comprehensive Plan* to more closely reflect the capacity of the public water supply system to accommodate additional demand from growth [*2024 WRE*]

- ❑ Update the Water Supply Capacity Management Plan (WSCMP) to reflect the most current data and usage and be prepared to submit as needed [*2010 WRE*]
- ❑ Amend Water chapter of City Code to reflect shift in City policy to control well exploration, rather than the developer, and develop approach for cost distribution [*2024 WRE*]

Long-Term Action Items

- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather, including whether surface water storage is available for treated, reclaimed water [*2024 WRE*]

44.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

System-Specific Action Items Already in Place:

- ✓ Well No. 9 – The City constructed granular activated carbon contactors to adsorb PCE, because levels had reached the MCL action level. As part of the project, the well was videoed, and the well pump and piping were replaced yielding a 20-gpm increase in production.
- ✓ Well No. 12 – In efforts to develop additional production capacity to offset the loss of Well No. 13, Well No. 12 was deepened, yielding a 30-gpm increase in production.
- ✓ Well No. 13 – Radionuclide (Adjusted Gross Alpha) levels in Well No. 13 have risen to the MCL action level, and after consideration of alternatives, the City has taken the well out of service.
- ✓ Well No. 14 / Fringer Wells – The City increased the appropriated production capacity of Well No. 14, which was limited by MDE due to impact to local private wells. This was accomplished by drilling new wells on Fringer Road. This project was needed to increase the City's production capabilities to meet the drought year month of maximum use demand.
- ✓ Well Nos. 15 & 16 – The County, with concurrence from the MDE, transferred recharge credit associated with a property in the County's Agricultural Land Preservation Program to allow for a greater withdrawal from these wells. This was memorialized via Memorandum of Understanding between the County, the City, and the MDE in 2011. *[*2024 WRE*]*
- ✓ Well No. 17 – The Baptist Church well was drilled in early 2009 and permitted for 19,100 gpd in 2011. [*2024 WRE*]
- ✓ Completed and adopted the City water policy to serve as a uniform guidance document for projects in the City [*2024 WRE*]
- ✓ Completed City Code updates to address new water requirements [*2024 WRE*]

Ongoing Action Items:

- Secure the recharge land needed to increase water appropriations in the Big Pipe Creek and Piney Creek basins. This strategy could include potentially securing additional recharge credit from the County. [*2024 WRE*]
- Explore additional sources for future water supply and prepare policy changes that would result in the need for additional available water capacity and to meet the projected total water demand of 870,832 gpd [*2024 WRE*]
- Well No. 17 (Taneytown Baptist Church Well) – As of 2024, this well was still permitted for 19,100 gpd and is equipped with a variable frequency drive (VFD) set to the lowest setting. This well is completed in the same watershed as Well Nos. 15 and 16 and is currently recharge limited, but has a documented greater sustainable yield. A 2009 hydrogeological assessment completed by Groundwater Sciences Corporation indicated that the well has a sustainable yield of 270,000 gpd

under normal conditions. The hydrogeologist who completed the assessment provided a drought yield rating of 162,000 gpd on an annualized basis, with a month of maximum use rating of 202,500 gpd. As a short-term strategy, the MDE has indicated that it may be willing to allow the City to pump more water from this well while PFAS treatment is installed in other wells to avoid trucking water to the City. In the interim, the City, with assistance from the County, continues to work toward securing additional recharge acreage to support a greater long-term appropriation from this well. [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Perform pump testing on Well No. 14 to determine if more water can be pumped without impacting private wells on Fringer Road [*2024 WRE*]

Short-term Water Supply Solutions

- ❑ Well No. 17 Allocation: Work with the MDE to increase allocation for Well No. 17 [*2024 WRE*]
- ❑ New Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand needs [*2010/2024 WRE*]
- ❑ Sewell Well: Taneytown prefers to pump existing wells with sufficient yields rather than develop new wells due to cost considerations. If additional wells are needed to support future development, the Sewell well on the northwest edge of Taneytown may be an option. Recharge may be a limitation because the Sewell well is in an area that MDE has deemed to be overallocated. [*2024 WRE*]

Long-term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather, including whether surface water storage is available for treated, reclaimed water [*2024 WRE*]
- ❑ Big Pipe Creek Intake: Develop new surface water intake on Big Pipe Creek; safe yield 0.4 mgd; with 2.0 mgd intake and 125 mgd storage impoundment [*2010 WRE*]
- ❑ Union Mills Reservoir: Safe yield 3.76 mgd with normal pool elevation of 610 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, and Taneytown Service Areas. This likely will only be a considered a feasible option once all other options are exhausted. [*2010 WRE*]
- ❑ Flow Augmentation: Coordinate a Flow Augmentation program from planned Union Mills Reservoir to Big Pipe Creek with Downstream Withdrawal. Would include construction of a new 1.8 mgd WTP in Taneytown. Installation of approximately 1.0 mile of raw water transmission mains in Taneytown to connect intake to new WTP. [*2010/2024 WRE*]
- ❑ Union Mills Reservoir Expanded: Safe yield 7.93 mgd with normal pool elevation of 630 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, Manchester, and Taneytown Service Areas. This likely will only be a considered a feasible option once all other options are exhausted. [*2010 WRE*]

44.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place:

- ✓ Public Education: City talks to residents when they see them watering their grass to encourage reduction in outdoor use.
- ✓ Water Loss Management: Leak detection across the whole system twice a month and can identify the location of a leak to within 1 foot.
- ✓ Drought Management: Three-phased water conservation program, which restricts use during drought conditions; voluntary use restrictions
- ✓ Water Use Rate Schedule: Static billing structure
- ✓ Billing Cycle: Quarterly billing cycle

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Investigate re-implementing a low-flow device program for City water customers [*2024 WRE*]
- ❑ Develop and implement quantitative thresholds for water use restrictions [*2024 WRE*]
- ❑ Enforce repair of leaks detected on the residential side to ensure they happen more quickly [*2024 WRE*]
- ❑ Expand water conservation public outreach measures [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

44.3.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

- ✓ Amended the *Taneytown Community Comprehensive Plan* in 2010 to reduce the size of the Taneytown DGA to more closely reflect a balance between future demand and potential water supply capacity [*2024 WRE*]
- ✓ Completed the ENR upgrade at the WWTP in 2016 to operate at the limits of technology for nitrogen and phosphorus removal [*2024 WRE*]
- ✓ Completed I&I study in 2020 to identify sewer lines needing replacement or repair that could reduce I&I and regain capacity. CCTV was completed in 2022 for all terra cotta lines. [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current data, then complete and submit a full WWCMP to MDE for review, as needed [*2010/2024 WRE*]
- Replace or repair pipes identified as having I&I issues to prevent water from entering the system [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Modify the DGA/MGA with the next City review of the *Taneytown Community Comprehensive Plan* to more closely reflect the capacity of the wastewater system to accommodate additional demand from growth [*2024 WRE*]

Long-Term Action Items

- ❑ Investigate treatment technologies to allow the City to comply with Bay-nutrient caps [*2024 WRE*]

44.3.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

- ✓ n/a

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Identify plant expansion improvements needed to increase the design capacity of the WWTP to accommodate the project future demand of 0.122 [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

44.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

System-Specific Action Items Already in Place:

- ✓ Adopted Carroll County Floodplain Management ordinance [*2010 WRE*]

45.0 Union Bridge

45.1 Water Supply

45.1.1 Source Water Assessment

The unconfined fractured rock aquifer in the Wakefield Marble is the source of water for the Town of Union Bridge. As of 2024, the system uses two wells (Locust and Whyte Street) to obtain its drinking water. As of the June 2005 MDE Source Water Assessment, all water supply sources for Union Bridge were determined to be susceptible to contamination by nitrates and protozoans. The water supply was not determined to be susceptible to organic compounds, radionuclides, or other inorganic compounds.

45.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Union Bridge system would be 461,815 gallons per day (gpd). The numbers in the "2023 Union Bridge Future Water Supply Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Union Bridge Water Supply Capacity Available for Existing and Future Growth."

Union Bridge Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand[5]
		Infill Demand	Future Demand		
Union Bridge	85,135	43,126	45,750	287,804	461,815

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand[5]
		Residential	Non-Residential	
Union Bridge	85,135	193,500	183,180	461,815

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.
***[5] As of 2024, Union Bridge was actively updating the Town's comprehensive plan, which included shrinking the DGA. Future demand numbers will likely be significantly lower**.*

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Union Bridge, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area" within the Designated Growth Area (DGA). The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

45.1.3 Water Supply Capacity

If Union Bridge were to build out according to the zoning in place in 2022 within the 2023 WSA, the Town would need to expand its system beyond its current capacity to make available another 369,529 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Union Bridge Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity	Unserved Demand[2]	Net Avg Day Capacity Available at Buildout[3]
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Union Bridge	208,300	100,800	93,649	7,151	376,680	**(369,529)**

[1] Average Day Drought Demand here includes an additional 10% for drought demand
[2] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.
[3] As of 2024, Union Bridge was actively updating the Town's comprehensive plan, which included shrinking the DGA. Future demand numbers are projected to be significantly lower.
Source: WRE Capacity & Demand Workbook: CC PLM + Town of Union Bridge, 2023

45.1.4 Water Supply Limitations

Hazen's 2023 present level of analysis indicated that water resources in the Double Pipe Creek watershed are available in sufficient quantities to be able to be developed to meet projected buildout demands if appropriations can be obtained.

Groundwater availability is not a limiting factor; however, the Town still faces other limitations with respect to water supply. The Town budget and user-pay (rate) limitations for funding the operation and improvement of the public water systems and the public sewer system impose a significant limiting factor for the Town of Union Bridge. In addition, while the Phillips well was connected to the system in the 1990s, it was never put into service. At this point, the well would have to undergo water quality testing to ensure it complies with current regulations and requirements. It is likely that the equipment, such as vessels for filtering, nitrate removal, and softening, may need replacing due to its condition and the fact that the manufacturer no longer supports it.

The Town can meet current and projected demands up until the permitted amount of 208,300 gpd is reached. Thereafter, the Town will need to seek alterations to appropriation permits, which will require evaluations related to recharge area(s) and sustainable well yields. It is possible that additional recharge acreage and/or new water supply sources would need to be developed, which could have financial implications for the Town.

Even with developer funding as new development projects are proposed, the wastewater treatment plant (WWTP) would also be a limiting factor. Until capacity limitations associated with the WWTP are increased, the capacity of the water supply system would be limited to the current design WWTP capacity of 200,000 gpd (without water reuse measures in place). The timefame for new development projects, including the Phillips and former Bowman properties, is unknown.

Summary of 2023 Buildout Capacity and Limitations for Union Bridge Water Supply System							
Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
●	208,300	100,800	93,649	470,330	369,530	▪ System Capacity ▪ WWTP Capacity	▪ New WWTP ▪ Addn'l water sources ▪ ↗ appropriations

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, and limitations would be very difficult to overcome*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

45.1.5 Water Demand Management

The Mayor and the Council Person who oversees the water system determine when water restrictions go into effect. These measures are voluntary and include no watering of lawns or washing cars, houses, or sidewalks. Residents are notified of restrictions via the Town newsletter and website, as well as public notices around town.

45.2 Wastewater

The Union Bridge WWTP is owned and operated by the Town of Union Bridge. The 200,000 gpd plant consists of a rotary screen, activated sludge processing with two extended aeration basins, settling basins, secondary clarifiers, aerated chlorine contact chamber, and a sulfur dioxide gas feeder system for dechlorination. Sludge is transported to the Westminster WWTP. The plant discharges to Little Pipe Creek, which flows into Double Pipe Creek at a three-year (2020-2022) average flow of approximately 150,033 gpd.

To prevent planning to capacity limits, as of 2024, Town policy proactively triggers action towards system improvements once remaining capacity falls within 20,000 gpd of the current design capacity. MDE has determined any new capacity will be in the form of a new plant replacing the old plant built in 1962. The Town Engineer, GHD, completed a revised PER-ENR Report submitted to MDE, which includes ENR technology using an oxidation ditch for treatment as the cost-effective option. While funding arrangements remain uncertain, funding is critical to be able to move forward (not only for capital construction but for O & M costs) for the existing users to be able to handle user rates of a new plant.

45.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the 2023 Sewer Service Area (SSA) builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Union Bridge WWTP would be 476,227 gpd. The numbers in the "2023

Union Bridge Future Wastewater Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Union Bridge Wastewater Capacity Available for Existing and Future Growth."

Union Bridge Future Wastewater Demand at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Union Bridge	99,433	43,997	141,750	191,047	*476,227*

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[2]		Total Buildout Demand
		Residential	Non-Residential	
Union Bridge	99,433	193,500	183,294	*476,227*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Union Bridge, 2023

45.2.2 Wastewater Capacity

If Union Bridge were to build out according to the zoning in place in 2022 within the 2023 SSA, the Town would need to expand the system beyond its current capacity to make available an additional 326,827 gpd in wastewater flows.

Union Bridge Wastewater Capacity Available for Existing and Future Growth at Buildout of 2023 Sewer Service Area (in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1 + 2]			Capacity Available at Buildout
	2023 Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Union Bridge	200,000	50,600	149,400	99,433	43,997	141,750	191,047	**(326,827)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.
*[2] **As of 2024, Union Bridge was actively updating the Town's comprehensive plan, which included shrinking the DGA. Future capacity needed numbers will likely be significantly lower**.*

Source: WRE Capacity & Demand Workbook: CC PLM + Town of Union Bridge, 2023

45.2.3 Limitations Based on Design Capacity

Capacity limitations are a concern for the Union Bridge WWTP. The three-year (2020-2022) average plant effluent is nearing 80% of the plant's design capacity (200,000 gpd); a Wastewater Capacity Management Plan (WWCMP) will be required to be developed and submitted to MDE if flows exceed 80% of design capacity. Projected total future flows to the Union Bridge WWTP are 526,827 gpd, well above the existing design capacity.

Previous interviews from Malcolm Pirnie indicated that it would be most cost-effective to build a bigger new plant at another nearby location rather than expand the current plant. However, as of 2024, the Town was evaluating ENR for possible expansion and a decision regarding the best course of action. MDE determined that expanding the WWTP capacity is contingent on relocation and rebuilding a new plant on a new site. GHD, the Town Engineering Consultant, completed and submitted a Preliminary Engineering Report (PER) to MDE for its approval. Capital and operational funding, sources and arrangements remain to be determined. Separately, the Town has an 'option to purchase land' for a new WWTP site with funding programmed in its CIP.

According to the C&D Workbook, inflow & infiltration (I&I) flows average about 50,600 gpd and account for ~33% of the total average plant influent. The Town received funding in 2017 to perform an I&I study that prompted further investigation using CCTV and smoke testing. As of November 2023, completed reports were being finalized.

The Union Bridge plant is within a FEMA floodplain and has known flooding issues that have prompted a proposed plan to relocate the WWTP outside of the floodplain. The current ENR study has several scenarios that propose relocating the plant out of the floodplain. Increased influent flow from runoff and I&I related to extreme precipitation events can cause temporary design capacity exceedances and possible damages or malfunctions to treatment equipment that reduce removal of nutrient and other contaminant loads. Quantifying hydraulic impacts is a challenge since historical conditions do not represent future flows.

45.2.4 Limitations Based on Local Water Quality

The Union Bridge WWTP NPDES permit includes limits for conventional pollutants and parameters such as BOD5, fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard limits for secondary treatment facilities. Limits for parameters such as ammonia were developed for local water quality protection and will be achievable with nitrification even at high flow rates.

Plant effluent concentrations (averaged by quarter) in the most recent NPDES permit fact sheet for the facility show that it appears to be operating well below the proposed limits (monthly average) for fecal coliforms and TSS (total suspended solids). The quarterly average plant performance and monthly average plant limits generally show that the wastewater plant complies with permit limits, and there are no known permit violations. As such, it is reasonable to assume the total maximum daily loads (TMDLs) for Double Pipe Creek for fecal coliform and TSS will not represent the controlling limitations to discharge.

Any future TMDL for biological impairments is not expected to impose limits on discharge. Phosphorus in the Double Pipe Creek TMDL also does not impose controlling limitations on discharge rates. The Union Bridge WWTP is not upstream of a Tier II stream segment.

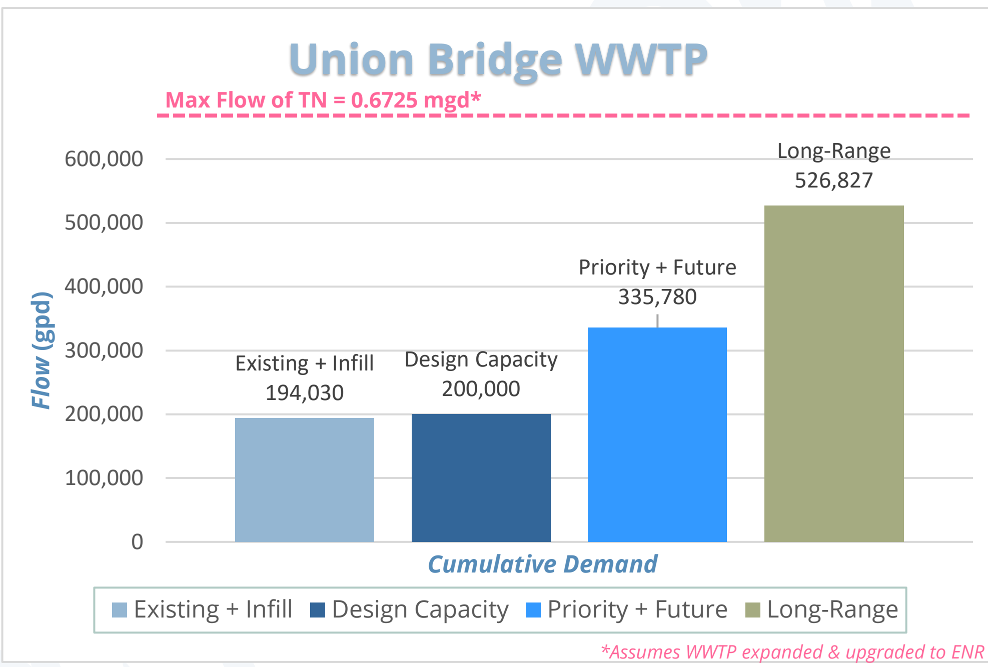
45.2.5 Limitations Based on Bay Nutrient Caps

The Union Bridge WWTP NPDES permit has ENR limits for total nitrogen and total phosphorus. As a minor facility, the WWTP has been assigned maximum wasteload allocation (WLA) as goals for both total nitrogen (TN) (6,140 lbs/yr) and total phosphorus (TP) (1,023 lbs/yr). Though historical DMR (discharge monitoring report) data show TN regularly exceeds the nitrogen goal, the TP loads are regularly under the 1,023 lbs/yr goal. Therefore, it is reasonable to conclude that the plant cannot readily meet current TN goals; any future, enforceable, limitations would need to be considered if expansion were to occur without upgrading to ENR.

If the Union Bridge WWTP were expanded and upgraded to ENR, the maximum average daily flow at which this facility could operate without exceeding the nitrogen ENR caps is 671,500 gpd. The maximum daily flow to remain below the ENR phosphorus cap is 1.12 million gallons per day (mgd). The projected priority + future flow (141,750 gpd) and long-range flow (191,047 gpd) are lower than the maximum flows above which nutrient caps would be exceeded. Therefore, nutrient caps are not anticipated to be a primary limitation for the Union Bridge WWTP if an ENR upgrade is implemented.

45.2.6 Summary of Wastewater Limitations

The existing design capacity (200,000 gpd) of the Union Bridge WWTP represents the controlling limitation under current conditions. Neither the nitrogen nor phosphorus loading caps pose limitations to the existing, priority + future, and long-range conditions if the WWTP is upgraded to ENR. However, limits related to decreased capacity related to flooding should be considered in future planning. A new location for the WWTP would likely need to be considered if expansion is pursued, particularly due to flooding issues.



Summary of Buildout Capacity and Limitations for Union Bridge Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*					Limitation (mgd)	Actions Under Consideration to Increase Capacity
						Design Capacity	Site Limitatio	TN Cap	TP Cap	Other		
Double Pipe Creek		200,000	194,030	526,827	326,827	✓	✓				**0.200**	Construct new WWTP

WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, and limitations would be very difficult to overcome

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.
TP = Total Phosphorus; TN = Total Nitrogen

45.3 System-Specific Strategies: Union Bridge

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

45.3.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place:

✓ Amended the DGA/Municipal Growth Area (MGA) of the *Union Bridge Community Comprehensive Plan* and associated annexation areas in 2014 to reflect the changes recommended in this plan [*2010/2024 WRE*]

✓ Decreased size of DGA/MGA with Town's 2024 update of the *Union Bridge & Environs Community Comprehensive Plan* to more closely reflect the capacity of the public water supply system to accommodate additional demand from growth [*2024 WRE*]

✓ Revise the water service areas for Union Bridge shown in the *2023 Water & Sewer Master Plan* to more closely reflect demand that the water supply capacity can accommodate within the Priority and Future Service Areas; revise the Long-Range Service Area to reflect long-term demand that water supply capacity can accommodate, including planned improvements, as well as reductions in the DGA/MGA shown in the Town's 2024 comprehensive plan update (in process with spring 2024 *Water & Sewer Master Plan* amendments) [*2024 WRE*]

✓ Locust and Whyte Street wells were sampled for per- and polyfluoroalkyl substances (PFAS). Both were above the maximum contaminant level (MCL) set by the EPA for PFAS. Town Engineer prepared a proposal for a Pilot Study involving lab work and a principal forgiveness loan, pending award by Council. [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current information, which can be used to complete and submit a full Water Supply Capacity Management Plan (WSCMP) to MDE for review if needed [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Amend the Town Code to codify the authority and process for water resource management review [*2024 WRE*]

Long-Term Action Items

- [ ] n/a

45.3.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

System-Specific Action Items Already in Place:

✓ Wormald Property Well (formerly Bowman property): Although this well does not have an appropriation from MDE as of 2024, it has already been drilled. Anticipated appropriation 0.065 mgd; still under developer control [*2010 WRE*]

✓ Phillips Property (Jackson Ridge) Well: Appropriation 0.0423 mgd (CL-93-0124/CL1979G148(05)) [*2010 WRE*]

Ongoing Action Items:

- Phillips Property (Jackson Ridge) Well: Annually renew existing bond from Woodhaven [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- [ ] Evaluate options for increasing redundant capacity on the water supply system to ensure adequate capacity should the Locust (Town Hall) well be out of commission for various reasons [*2024 WRE*]

Long-Term Action Items

- [ ] Explore additional sources for future water supply to prepare for policy changes or other changes that would result in the need for additional available water capacity [*2010 WRE*]
- [ ] Investigate the administrative feasibility in developing access to quarry discharge water for direct use or reuse [*2010 WRE*]

Short-term Water Supply Solutions

- [ ] Groundwater Wells: Drill and develop groundwater wells to meet projected additional demand needs [*2010/2024 WRE*]
- [ ] Phillips Well: Pursue bringing of Phillips well online as an additional source to serve new development. Well is available for service subject to necessary restoration of existing facilities and bringing a new WWTP online with capacity and developer participation. This well is already located within the Priority WSA and within the Town limits and has an existing appropriation, which is included in the Town's total permitted capacity. [*2024 WRE*]
    - [ ] Undergo water quality testing to ensure it complies with current regulations and requirements.
    - [ ] Replace equipment, such as vessels for filtering, nitrate removal, and softening, as needed due to its condition and the fact that the manufacturer no longer supports it.

Long-Term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Wormald Property Well (former Bowman property): Pursue connection of the Bowman well to the Town water system as an additional source to serve new development. This well is located within the Long-Range WSA. Anticipated appropriation 0.065 mgd; still under developer control. The consultant that rated the well believed that its long-term sustainable yield exceeded the test rate of 130 gallons per minute (gpm). [*2024 WRE*]
- ❑ Indirect Potable Water Reuse: Evaluate the feasibility and benefit of using proven technology to purify recycled water to provide a safe drinking water source that is independent of climate or weather, including whether surface water storage is available for treated, reclaimed water [*2024 WRE*]
- ❑ Lehigh Portland Cement Company Quarry: Use of Lehigh Quarry in Union Bridge as a raw water reservoir to supply approximately 0.6 mgd to Union Bridge; due to contamination concerns, this option is more feasible once quarry options cease. [*2010 WRE*]

45.3.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place:

- ✓ Public Education: Pamphlets regarding water use available at Town office
- ✓ Water Loss Management: Locate and repair leaks in distribution system (contractor); all meters were replaced ~2005
- ✓ Billing Cycle: Quarterly billing cycle

Ongoing Action Items:

- Leak detection is onling as needed [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Codify water conservation and drought management restrictions and associated processes to provide legal structure and enforcement authority [*2024 WRE*]

Short-Term Action Items

- ❑ Develop a drought management plan to help navigate low water levels during drought events or other events such as infrastructure outages that temporarily limit water supply availability [*2024 WRE*]

45.3.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

- ✓ Evaluated areas that may be removed from the DGA with the 2014 update of the Town's comprehensive plan to help reduce projected demand to correlate with the Town's ability to provide wastewater capacity [*2024 WRE*]

Ongoing Action Items:

- Update the C&D Workbook developed as background data for this plan document to reflect the most current data, then complete and submit a full WWCMP to MDE for review if needed [*2010/2024 WRE*]
- Study the upgrades needed to remain in compliance at existing flows, subject to MDE oversight [*2010 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Conduct an I&I study to determine current level of inflows from I&I to potentially regain some capacity until a new wastewater treatment plant (WWTP) can be constructed and operational; make system improvements to reduce I&I; adjust the capacity on the C&D Workbook to update available capacity [*2024 WRE*]
- ❑ Modify the size of DGA/MGA with the 2024 Town plan review of the *Union Bridge & Environs Community Comprehensive Plan* to more closely reflect the Town's future plans for the WWTP to accommodate additional demand from growth [*2024 WRE*]
- ❑ Revise the SSA for Union Bridge shown in the *2023 Water & Sewer Master Plan* to reflect the modifications made to the DGA/MGA with the 2024 Town plan review of the *Union Bridge & Environs Community Comprehensive Plan* [*2024 WRE*]

Long-Term Action Items

- ❑ If a new WWTP is not approved by MDE, upgrade minor WWTP to ENR treatment level, enabling the current facility to operate at the limits of technology in terms of nitrogen and phosphorus removal and reducing the limitation on capacity that the caps might present [*2024 WRE*]

45.3.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

- ✔ Completed a Preliminary Engineering Report (PER) for the construction of a new WWTP, including ENR treatment, and submitted to MDE for review and final approval as of 2024 [*2024 WRE*]

Ongoing Action Items:

- n/a

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Evaluate funding alternatives for the construction of a new WWTP [*2010 WRE*]

Long-Term Action Items

- ❑ Construct a new WWTP that not only will accommodate anticipated growth shown in the Town's comprehensive plan, but also addresses the frequent and recurring flooding issues associated with the WWTP [2024 WRE]

45.3.6 Protect and restore water quality and make progress toward any applicable TMDLs

For action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

46.0 Westminster

46.1 Water Supply

The City is divided into two watersheds by the northeast-to-southwest running Parr's Ridge. The western portion of the City falls into the Double Pipe Creek watershed, part of the Potomac Tributary basin area. The City's Wakefield Valley water system is located in this watershed. Also, in this watershed are nine of the City's supply wells, the Medford Quarry emergency water supply, and the wastewater treatment plant (WWTP), which discharges into Little Pipe Creek. A future project in this watershed includes PUREWater Westminster (operational by 2027).

The eastern part of the City falls into the Liberty Reservoir watershed and the North Branch Patapsco River 6-digit watersheds, which are part of the Patapsco/Back River Tributary basin. The City withdraws water from surface intakes on Cranberry Branch and Hull Creek in this watershed. Both creeks are tributaries of the West Branch of the Potomac. Water withdrawn from Cranberry Branch is stored in the raw water reservoir north of Lucabaugh Mill Road. Also, in this watershed are three supply wells and one streamflow augmentation well. Portions of the Hampstead and Freedom water and sewer systems are located within this watershed.

46.1.1 Source Water Assessment

The City of Westminster relies upon both ground and surface water for its potable supply. The unconfined fractured rock aquifer within the Wakefield Marble, Sam's Creek Formation, Marburg Formation, Ijamsville Phyllite, and Wissahickon Formation (with some of these formation names since reclassified and incorporated into the Sam's Creek, Marburg, and Prettyboy Groups) provide the source of water supply for 15 groundwater wells. Of the 15 wells, only 12 were routinely relied upon for potable supply in 2024. Two wells are unused, and another is used for stream augmentation purposes only. Four of the City's wells are completed in the Wakefield Marble, though at least one other well is completed within a carbonate rock unit classified as part of the Sam's Creek Formation. The remaining wells are within the other various crystalline bedrock formations.

The City also withdraws water from the Cranberry Run Reservoir. The Source Water Assessment (SWA) was delineated by a consultant in accordance with the 1999 MDE SWAP guidance document. A January 2004 SWA completed by the MDE for the City's surface water source indicated that nutrient enrichment, sedimentation, and contamination by pathogenic organisms were the major concerns at that time. Cranberry Branch was determined to be susceptible to nitrate contamination, and the MDE indicated that the surface supply was "particularly susceptible to contamination by protozoa, as demonstrated by the high fecal concentration." While the surface water source wasn't susceptible to synthetic organic compounds (SOCs) based on a review of water quality, the MDE indicated that intakes were susceptible to spills of such compounds. The water system was determined to be susceptible to disinfection byproducts (DBPs), which are formed by the chlorination of organic matter.

In October 2013, S.S. Papadopulos & Associates Inc., completed a Source Water Protection Plan (a step beyond a SWA) for the City of Westminster's groundwater supply sources. The October 2013 report referenced a 2005 SWA completed by Advanced Land and Water, Inc. (ALWI) for the groundwater supply sources; that report found that most of the City's wells were susceptible to nitrate. The October 2013 report concluded that the City's "groundwater and surface water sources are potentially susceptible to surface contamination, including volatile organic compounds (VOCs), IOCs and SOCs".

46.1.2 Water Supply Demand

The total future water demand assumes that everything within the 2023 Water Service Area (WSA) builds out according to the zoning in place in 2022. If this were to occur, the total future water supply demand for the Westminster system would be 3,176,489 gallons per day (gpd).

The numbers in the "2023 Westminster Future Water Supply Demand" table are based strictly on BLI calculations. They do not reflect factors unique to the municipal system that may have been considered in the Capacity & Demand (C&D) Workbook calculations and figures presented in the next table, "2023 Westminster Water Supply Capacity Available for Existing and Future Growth."

Westminster Future Water Supply Demand at Buildout of 2023 Water Service Area (Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Westminster	2,361,296	524,832	290,362	0	3,176,489

Municipal System	2023 Existing Demand[1]	Additional Demand by Land Use[4]		Total Buildout Demand
		Residential	Non-Residential	
Westminster	2,361,296	400,250	414,943	3,176,489

[1] These data are the greatest annual average daily demand for the 5-year period from 2018 through 2022.
[2] These data relate to areas located within the designated planned water service area. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] These data relate to areas designated in the "Long-Range Service Area" but located within the DGA.
[4] Additional Demand is based on estimated demand from land not yet served in the planned water service areas: Existing/Final, Priority, Future, and Long-Range.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Westminster, 2023

Calculations for future water demand used the C&D data. This demand is reflected under "Infill" and "Future" (Priority + Future WSAs), as well as the Long-Range WSA. However, the C&D data do not account for additional demand that might occur within the area that is designated in the "No Planned Water Service Area" within the DGA. The Long-Range Demand reflects areas designated as a Long-Range WSA, which are areas anticipated to be served in the future, but beyond the 10-year Water & Sewer Master Plan horizon.

46.1.3 Water Supply Capacity

If Westminster were to build out according to the zoning in place in 2022 within the 2023 WSA, the City would need to expand the system beyond its current capacity to make available another 662,619 gpd to accommodate unserved demand based on the daily most limiting water supply system factor under drought conditions.

The Average Day Capacity Limitation represents the most limiting factor of the following: treatment capacity, pump capacity, largest well out of service, and safe yield. Average Day Drought Demand is based on MDE's planning formula of adding 10% to account for drought conditions. Therefore, Remaining Capacity is the amount that would be available for Unserved Demand after subtracting the Average Day Drought Demand from the Average Day Capacity Limitation. The Net Average Day Capacity Available at Buildout figure indicates whether additional capacity is needed.

Westminster Water Supply Capacity Available for Existing and Future Growth at Buildout of 2023 Water Service Area (in Gallons per Day)

Municipal System	Current			Remaining Capacity[2]	Unserved Demand[3]	Net Avg Day Capacity Available at Buildout
	2023 Permitted	Avg Day Capacity Limitation	Avg Day Drought Demand[1]			
Westminster	3,824,000	2,750,000	2,597,426	152,574	815,193	**(662,619)**

[1] Average Day Drought Demand here includes an additional 10% for drought demand
[2] Remaining Capacity equals the Avg Day Capacity Limitation minus the Avg Day Drought Demand.
[3] These data relate to areas located within the planned water service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Water Service Areas.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Westminster, 2023

46.1.4 Water Supply Limitations

While the demand estimates were calculated based on MDE's standard 250 gpd per household, the City calculates the average water usage per residential connection at 235 gpd per connection based on the existing connections and associated water usage. The buildout development for residential connections in the service area is projected to be complete in the year 2042; however, approximately 62% of the development is anticipated by 2027.

A linear growth rate has been used to estimate available industrial and commercial development (421 acres) between 2010 and 2027. An assumed 800 gpd per acre for commercial and industrial development was used to estimate the future water demand.

The water allocation to residential, industrial, and commercial users is controlled by the City's Department of Community Planning and Development through the Water and Sewer Allocation Policy. Additional growth beyond the allocated water will be dependent upon new water sources.

Westminster is currently not pursuing additional groundwater wells and has recently begun designing and construction of a new indirect potable reuse system. This system is the first of its kind in Maryland and will purify wastewater effluent and discharge water into Cranberry Reservoir. The reuse system is currently permitted for 0.5 million gallons per day (mgd) and will be built as a 1 mgd facility. Design of the facility accommodates for an expansion if additional supply needs arise. Westminster anticipates being able to meet future supply needs through indirect potable reuse.

Summary of 2023 Buildout Capacity and Limitations for Westminster Water Supply System							
Buildout Demand Status	2022 Appropriated Capacity (gpd)	Average Day Capacity Limitation (gpd)	2022 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Critical Limiting Factor (mgd)	Actions to Consider for Increasing Capacity as Needed
●	3,824,000	2,750,000	2,597,426	3,412,619	662,619 162,619[2]	System Capacity	▪ .5 mgd permitted via PUREWater indirect potable reuse system (online 2027) ▪ 1 mgd design ➞↗ permitted

● *Water supply system does not have enough capacity to serve projected demand in 2023 Water Service Area, but limitations can more easily be overcome.*

[1] 2022 Existing = existing pumped and unserved demand in the Existing Water Service Area. Includes drought demand.
[2] Additional capacity needed once the PUREWater plant comes online
**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

46.1.5 Water Demand Management

Westminster uses reservoir levels (not groundwater levels) to make decisions about low-flow operations and water use reductions because reservoir levels fluctuate more than groundwater levels.

The City's Drought Management Plan identifies what the water restrictions are, when they are imposed, and why. Check the City's website, social media, drought hotline, etc. for restrictions.

Additional water conservation and demand management measures in place are listed under that strategy in this system's section.

46.2 Wastewater

The wastewater treatment plant (WWTP) serving the Westminster area is owned and operated by the City of Westminster. The 5.0-mgd plant is an activated sludge facility consisting of bar screens, grit and grease removal facility, aeration tanks with anaerobic, aerobic, and switch zones, secondary clarifiers, denitrification, and liquid chlorination/dechlorination. Phosphorus is also removed by chemical addition. The plant discharges to Little Pipe Creek, a Use IV-P stream, which flowed into Double Pipe Creek at an average rate of 4.066 mgd between 2021-2023.

The upgrade from biological nutrient removal (BNR) to enhanced nutrient removal (ENR) technology does not include plant expansion. There are, however, future plans to expand the plant from 5.0 mgd to 6.5 mgd, if needed. Analysis in this section assumes that the plant capacity expansion to 6.5 mgd will not be implemented within the next 10 years.

46.2.1 Wastewater Demand

The total future wastewater demand assumes that everything within the *2023 Water & Sewer Master Plan* Sewer Service Area (SSA), including the Long-Range Service Area, builds out according to the zoning in place in 2022. If this were to occur, the total future wastewater demand for the Westminster WWTP would be 3,628,445 gpd. The numbers in the "2023 Westminster Future Wastewater Demand" table are based strictly on BLI calculations. They do not reflect factors unique to this municipal system that may have been considered in the C&D Workbook calculations and figures presented in the next table, "2023 Westminster Wastewater Capacity Available for Existing and Future Growth."

Westminster Future Wastewater Demand at Buildout of 2023 Sewer Service Area
(in Gallons per Day)

Municipal System	2023 Existing Demand[1]	Planned Future Demand[2]		Long-Range Demand[3]	Total Buildout Demand
		Infill Demand	Future Demand		
Westminster	2,323000	663,923	277,522	0	*3,264,445*
Municipal System	**2023 Existing Demand[1]**	**Additional Demand by Land Use[2]**			**Total Buildout Demand**
		Residential	**Non-Residential**		
Westminster	2,323,000	499,500	441,945		*3,264,445*

[1] These data represent, in general, the annual average daily demand over the 3-year period 2020-2022 minus I&I.
[2] Planned Future Demand and Additional Demand by Land Use are based on estimated demand from land not yet served in the planned sewer service areas. Infill demand is calculated for areas classified in the "Existing/Final Planning" service category; Future demand is calculated for the combined area classified in the "Priority" or "Future" service category.
[3] Long-Range Demand is based on estimated demand from land not yet served in the Long-Range Planned Sewer Service Area.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Westminster, 2023

46.2.2 Wastewater Capacity

If Westminster were to build out according to the zoning in place in 2022 within the 2023 SSA, the Town would need to expand the system beyond its current capacity to make available an additional 371,445 gpd in wastewater flows.

Westminster Wastewater Capacity Available
for Existing and Future Growth at Buildout of 2023 Sewer Service Area
(in Gallons per Day)

Municipal System	Current			Existing Flows	Capacity Needed[1]			Capacity Available at Buildout
	2023 Permitted	I&I	Remaining Capacity		Infill	Priority + Future	Long-Range	
Westminster	5,000,000	1,743,000	3,257,000	2,323,000	663,923	277,522	0	**(-7,445)**

[1] These data represent unserved areas located within the planned sewer service area. This includes infill (unserved in "Existing/Final Planning" service category), as well as projected demand in the Priority, Future, and Long-Range Sewer Service Areas.

Source: WRE Capacity & Demand Workbook: CC PLM + City of Westminster, 2023

46.2.3 Limitations Based on Design Capacity

The 5.0-mgd facility will be capable of accommodating all projected wastewater flows under Priority + Future conditions without requiring a Wastewater Capacity Management Plan (WWCMP). The estimated total flow for Priority + Future capacity of 3.63 mgd (including inflow & infiltration, or I&I), as calculated in the C&D Workbook, is projected to leave an excess treatment capacity of about 1.37 mgd. Despite projected excess capacity, the plant lacks raw water supply to use the full capacity due to limitations in appropriations.

According to the C&D Workbook, I&I flows average about 1.7 mgd, which represents an average of 52% of plant influent. The City has an ongoing program to identify locations of high I&I and to reduce I&I by pipe joint injections, replacement, or pipe-lining. As I&I is reduced over time, it is possible that future usable capacity will increase. However, the Westminster plant is within the FEMA floodplain, making it more susceptible to increased influent flow from runoff and I&I related to extreme precipitation events. In addition to the potential to exceed design capacity, the plant could experience damage or malfunctions to treatment equipment that reduce nutrient and other contaminant loads. Quantifying hydraulic impacts is a challenge because historical conditions may not represent future flows.

46.2.4 Limitations Based on Local Water Quality

The Westminster WWTP NPDES permit includes limits for conventional pollutants and parameters such as five-day biological oxygen demand (BOD5), fecal coliform, pH, total suspended solids, and dissolved oxygen. These limits are standard limits for secondary treatment facilities and the most recent NPDES permit fact sheet for the facility states that they are fully protective of receiving waters. Limits for parameters such as ammonia and total Kjeldahl nitrogen (TKN) were derived for local water quality protection and are expected to remain achievable even under projected buildout flows.

The plant performance concentrations (averaged by quarter) in the most recent NPDES permit fact sheet show the facility operates well below the proposed limits (monthly average) for fecal coliform and TSS (total suspended solids). It is reasonable to assume the Westminster WWTP can readily comply with fecal coliform and TSS limits, thus the total maximum daily loads (TMDLs) for Double Pipe Creek for fecal coliform and TSS will not represent the controlling limitations to discharge.

The phosphorus TMDL for Double Pipe Creek does not impose phosphorus limits that are more stringent than the Bay-related nutrient caps. The Westminster WWTP is not upstream of a Tier II stream segment, nor does it discharge into a Use Class III stream. Therefore, temperature is not a limiting factor.

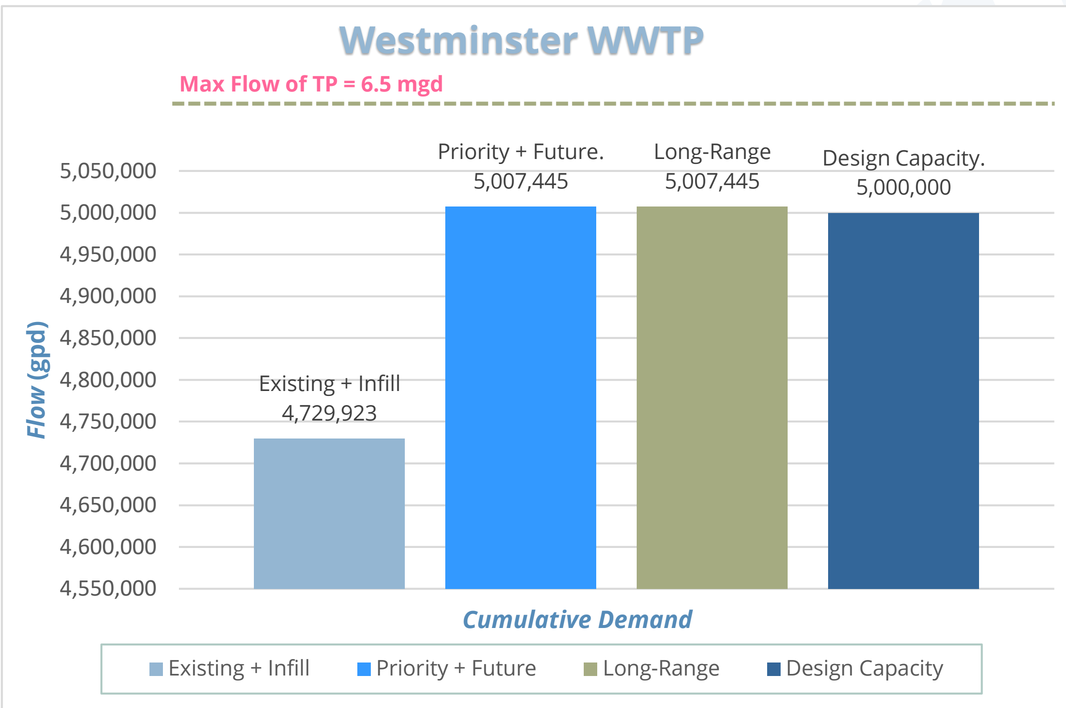
46.2.5 Limitations Based on Bay Nutrient Caps

The WWTP is considered a “major” facility under the 2010 Chesapeake Bay TMDL and has been assigned nutrient loading caps for both total nitrogen and total phosphorus. The nutrient caps were based on a design capacity of 5.0 mgd, a total nitrogen concentration of 4.0 mg/L, and a total phosphorus concentration of 0.3 mg/L. As with other major facilities, these nutrient caps are enforceable NPDES permit limits.

Completion of the City’s planned ENR upgrade project was expected in 2024. The ENR upgrade will be designed to achieve 3.0 mg/L total nitrogen and at least 0.3 mg/L total phosphorus. The maximum average daily flow at which this facility can operate without exceeding the phosphorus ENR caps is 5.0 mgd. City staff have indicated that addition of alum makes phosphorus less of a limiting condition that the nitrogen cap. The maximum daily flow to remain below the ENR nitrogen cap is 6.66 mgd. Through ENR, it is expected that the plant will be able to achieve lower effluent phosphorus concentrations, which may afford the facility flexibility to operate up to 6.66 mgd without violating ENR caps. The projected Priority + Future flow (3.63 mgd) is lower than the maximum flows above which nutrient caps would be exceeded. Therefore, nutrient caps are not anticipated to be a primary limitation for the WWTP. However, if expansion to 6.5 mgd is considered, it will require further investigation into limitations imposed by nutrient effluent concentrations.

46.2.6 Summary of Wastewater Limitations

The design capacity is the limitation as of 2023. If the plant is expanded to 6.5 mgd, the additional design capacity would accommodate the projected demand. Operations need to be evaluated and modified to address any projected exceedance of the phosphorus cap if the plant is expanded. It should be noted that climate change may lead to reduced capacity due to flooding and excess I&I. Climate change impacts should be further evaluated to assess capacity impacts from hydrologic extremes.



Note: The Existing + Infill appears to exceed the Design Capacity. This is only due to the standard estimate of I&I used in the estimates, which is likely much less than the default calculation for I&I.

Summary of 2023 Buildout Capacity and Limitations for Westminster Wastewater System

Watershed	Buildout Demand Status	2023 Design Capacity (gpd)	2023 Existing[1] (gpd)	Buildout Demand (gpd)	Additional Capacity Needed (gpd)	Limiting Factor*: Design Capacity	Site Limitation	TN Cap	TP Cap	Other	Limitation (mgd)	Actions Under Consideration to Increase Capacity
Double Pipe Creek	(yellow circle)	5,000,000	4,729,923	5,007,445	7,445	✓			✓		**5.000**	I&I improvements

(yellow circle) *WWTP does not have enough capacity to serve projected demand in 2023 Sewer Service Area, but limitations can more easily be overcome.*

[1] 2023 Existing = existing flows and unserved demand in the Existing Sewer Service Area.

**This table does not include cost in the limitations, but funding is always a consideration and a possible limiting factor*.

TP = Total Phosphorus; TN = Total Nitrogen

46.3 System-Specific Strategies: Westminster

Note: Action items included below are those that apply specifically and uniquely to this system. Action item for these strategies that apply to the County and all of the municipal systems are included in the Countywide Strategies section of this plan.

46.3.1 System-Specific Action Items Already in Place: Current Protections, Practices, and Polices

✓ Services to Areas Outside City Boundaries

The City's WSA currently extends outside the corporate limits to serve approximately 3,600 of the total 10,350 connections. In other words, 38% of the City's treated water serves unincorporated properties. In August 2002, the Mayor and Common Council adopted Good Cause Waiver Criteria for the extension of public water and sewerage service beyond the corporate limits of Westminster. That legislation requires new or redevelopment projects to comply with the City/County Agreement, which stipulates that if the property is contiguous to the corporate limits, the project must initiate annexation into the City of Westminster if it is to be served with public water and sewer service. If the property does not meet the legal test for annexation, its owner must file a Good Cause Waiver with the Mayor and Common Council. If approved, the applicant must execute an "Intent to Annex" agreement with the City of Westminster which is recorded in the Carroll County Land Records. This procedure provides control over the extension of City utilities outside of its corporate limits.

✓ Water Allocation Policy

In April 2007, the City entered into a Consent Order with MDE to allow the City to meet existing water needs while remedial measures are developed and put on-line, accommodate a limited amount of interim growth, and establish an effective system for managing future capacity in accordance with MDE guidelines and regulatory capacities of the City's water sources by MDE. Regulatory capacities are critically important in providing adequate resources in times of drought emergencies as well as for everyday use. Subsequently in 2007, the City adopted a Water and Sewer Allocation Policy regulating water and sewer allocation by creating a prioritized "waiting list" for available water and sewer supplies for properties inside and outside the City that are or may be served by City utilities. The City continues to evaluate options for more efficient use of existing resources, as well as development of new water sources to accommodate projected growth.

The Policy has been amended several times, with the most recent amendment to the Policy occurring in January 2025. The Policy has maintained its primary purpose of water and sewer allocation which allows the City control over new connections and additional allocations on a project-by-project and location-by-location basis to ensure regulatory capacities are not exceeded by monitoring City recognized established, daily, and anticipated consumption. The Policy contains three sections: I. Water Allocations, II. Sewer Allocations, and III. Allocation Process. Sections I. and II. highlights the unique aspects of each water and sewer resource and addresses current conditions and desired approaches for the allocation these resources. Section III. addresses the overall allocation process and establishes the Master Distribution Chart, the guiding factor of the allocation process. The Master Distribution Chart apportions remaining allocatable resources to City allocation categories (Food and Beverage; Commercial and Industrial; Public Projects; Not-for-Public Projects; Single Family Residential; Multiple-Family Residential; Emergency Reserve; General Water Fund; and General Sewer Fund) and County allocation categories (Commercial, Industrial, Food and Beverage; Public Projects; Not-for-Public Projects; Infill Single Family Residential).

✓ Drought Management Plan

During the summer of 2002, the State of Maryland experienced a severe drought, which required the City to take extensive emergency measures to ensure adequate water was in the system to serve the entire service area. In response to the drought, the Mayor and Common Council adopted a "Drought Management Plan," which provides for a series of water restrictions once drought conditions have been met. By the adoption of this plan, it is not necessary to seek legislative approval to impose water restrictions on all users of the system. This plan also authorizes all police personnel and Westminster Code Officials to issue citations against any person who violates water restrictions. As a result of the drought, The Mayor and Common Council made it a priority to find alternative sources of water.

✓ Cranberry Water Treatment Plant

The US EPA has taken an aggressive approach to ensure that surface water treatment plants (WTPs) serving over 10,000 persons comply with the *Disinfection By-Product Rule* and the *Long Term 2 Enhanced Surface Water Rule*. The City constructed a water treatment plant utilizing membrane filtration. The Cranberry Water Treatment Plant opened in April 2009. By incorporating the membrane filtration technology into the City's water treatment system, the City is able to handle current regulations.

✓ Union Mills Area Wells

In 2012, Golder Associates, Inc. was engaged to perform geophysical services across the Union Mills property and adjacent properties for which an access agreement was established. The purpose of the geophysical investigation was to identify and optimize potential exploratory test well sites within three designated groundwater development areas. A total of 23 potential exploratory test well sites were identified and ranked in descending order of favorability by Golder Associates, Inc.

In 2013, Hydro-Terra Group and Alexander's Well Drilling (as a sub-contractor of Hydro-Terra Group) were engaged by the County to complete drilling and logging of proposed test wells. At least seven test wells were attempted, though none exhibited yields sufficient to justify conversion to production well status or installation of the transmission main to the City of Westminster. Therefore, due to the cost, testing, and permitting involved, this source could be considered a Long-Term option.

✓ *PureWater*

Westminster, like other cities across the United States, is experiencing increased, recurring drought conditions. In response, the City has been proactive in its water supply planning to ensure local water reliability now and for the future. One forward-thinking approach the City is actively pursuing is the PUREWater Westminster project, which will use proven technology to purify reclaimed water to provide a safe, sustainable, and drought-resistant drinking water supply. This initiative will help Westminster keep local control of its water supply and costs and provide a pathway for economic growth, business and commercial development, and continued community vitality. It is anticipated that this project will be complete by 2027. The additional capacity added to the system through this project would be .500 mgd with the ability to expand to 1.0 mgd.

46.4 Additional Recommended Strategies

Note: Action items included below are those that apply specifically and uniquely to this system. Action items for these strategies that apply to the County as well as all of the municipal systems are included in the Countywide Strategies section of this plan.

46.4.1 Protect and sustain existing drinking water supplies serving existing development

System-Specific Action Items Already in Place: ("Continue to…")

- ✓ Implemented programs educating water customers about the importance of, and methods to, conserve water [*2010 WRE*]
- ✓ Implemented a system to track water demand for all known and potential development projects by modifying the allocation plan to include allocation of wastewater capacity and to give priority allocation status to projects that demonstrate significantly reduced demand through the use of water conservation measures [*2010 WRE*]
- ✓ Gesell Well: Brought online in 2018 at .165 mgd and was approved in 2022 for an increased appropriation of .258 mgd [*2024 WRE*]
- ✓ Wells sampled, as required by Unregulated Contaminant Monitoring Rule 5 (UCMR5), for 30 chemical contaminants including PFAS and lithium. The EPA uses the UCMR to gather information for contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. [*2024 WRE*]
- ✓ Implemented ion exchange for PFAS treatment at the Vo-Tech well in 2022; the well is online again as of 2024 [*2024 WRE*]

Ongoing Action Items:

- Support the rezoning of areas outside the City's Designated Growth Area (DGA) to be consistent with other areas of the county that are not within a DGA to reflect the desired future buildout scenario for Westminster (2017) [*2024 WRE*]
- Periodically review and update the Water Supply Capacity Management Plan (WSCMP) as a mechanism to continue to track, monitor, and evaluate available capacity [*2010 WRE*]
- Identify potential industrial/manufacturing users for which water reuse in operations may be pursued [*2010 WRE*]
- Provide development plans to the County to review and offer comments to the City regarding Water Resource Management [*2010 WRE*]

- Evaluate existing wells and identify any measures needed to remain in compliance with maximum contaminant limits (MCLs) [*2024 WRE*]
- Develop indirect potable water reuse facility (PUREWater Westminster) to mitigate impact of climate change on water availability; design and construction in progress in 2024; anticipated to be operational in 2027 [*2024 WRE*]
- Site facilities using State funds outside of the 100-year floodplain to avoid flooding impacts [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Investigate if the Greenvale Mews well is still a viable addition to the water system [*2024 WRE*]
- ❑ Evaluate improvements needed as a result of reclassification of Cranberry Reservoir from a significant hazard to high hazard dam [*2024 WRE*]
- ❑ Amend Water Service Area map to show the missing WTPs [*2024 WRE*]

Long-Term Action Items

- ❑ n/a

46.4.2 Identify and develop, as needed, new drinking water supplies adequate to support planned future growth without over-allocating available sources

MDE's goal is to ensure that the water quality and quantity at all public water systems meet the needs of the public and comply with federal and State regulations. The City of Westminster will adhere to the guidelines of its allocation policy for the foreseeable future. The inclusion of Action Items and/or projects here does not indicate a commitment or obligation to move with or implement the Action Item or project.

System-Specific Action Items Already in Place:

- ✓ Roops Mill Well: permitted for .120 gpd, completed late summer 2009 [*2010 WRE*]
- ✓ Gesell Property Well: Permitted at .258 mgd (2022) [*2024 WRE*]
- ✓ Continue to implement and refine the Allocation Plan, which ensures the adequacy of water supplies for each project [*2024 WRE*]
- ✓ Groundwater Development: With the Gesell well in place and operational, at this time, Westminster is not looking into new well development. The City will most likely look to other supply sources rather than develop new groundwater wells. [*2024 WRE*]
- ✓ Cellular Water Meter: In place to report back daily to indicate if there is significant use over normal or any indication of leaks [*2024 WRE*]
- ✓ PUREWater Westminster: Evaluated feasibility of indirect potable water reuse as pilot project with MDE, then designed and began construction of PUREWater Westminster potable water reuse treatment project, anticipated to be operational in 2027, initially set for 0.5 mgd with future expansion possibilities [*2024 WRE*]
- ✓ Examined the feasibility of re-using water pumped from area quarries: [*2024 WRE*]
  - ☑ Hyde's Quarry: Westminster completed a long-term aquifer test between fall 2014 and spring 2015. The quarry appears capable of sustaining a yield of 500,000 gpd.
  - ☑ Medford Quarry – Emergency Supply: In response to the severe drought from 2001 to 2002, the City, in cooperation with Medford Quarry and MDE, established an intake for an emergency water supply source from the quarry. As of 2024, the MDE permit allows for a withdrawal of 482,000 gpd (750,000 gpd MMU) under emergency conditions.

- ☑ Medford Quarry – Additional Daily Use: In 2018, the County, in cooperation with the City, Medford Quarry, and MDE, completed an evaluation of the amount of additional water sustainably available for daily use. All parties agreed that 400,000 gpd were available for immediate use at that time, but a finalized agreement was never reached, and the original emergency permit is all that is active as of 2024.

Ongoing Action Items:

- Evaluate and adopt land use policies that promote higher densities and clustering [*2010/2024 WRE*]
- Coordinate with efforts by the Carroll County Government to develop nearby water sources that are outside City limits [*2010/2024 WRE*]
- Coordinate with Carroll County Government to obtain recharge credit for applicable wells [*2010/2024 WRE*]
- Evaluate and implement measures to ensure adequate recharge for each existing and future water supply source, such as through easements, preservation programs, or purchase [*2010/2024 WRE*]
- Continue to reduce unaccounted for water by continuing ongoing efforts to detect and repair leaks, resolve accounting errors, and reduce water that is unaccounted for to an acceptable range [*2010 WRE*]
- Continue to replace existing meter with cellular meters; replacing at a rate of ~1,200/year as of 2024 [*2024 WRE*]
- Groundwater Wells: Continue to monitor existing groundwater wells for additional capacity. [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ n/a

Long-Term Action Items

- ❑ n/a

Short-Term Water Supply Solutions

- ❑ Cranberry Water Treatment Plant: Expand Cranberry WTP to accommodate additional treatment needed as a result of PUREWater facility [*2024 WRE*]
- ❑ Water Reuse – PUREWater Water Reuse Treatment Facility: Construct the PUREWater Westminster water reuse treatment facility with capacity of 0.5 mgd of indirect potable water. [*2024 WRE*]

Long-Term Water Supply Options

Note: These are options that will be considered for long-term supply. However, inclusion here does not imply that there is a definite plan to move forward with an option. Exploring additional sources, even for those systems that currently project enough capacity to meet demand, is included in order to be prepared for policy changes or other changes that would result in the need for additional available water capacity. ***The long-term water supply options, beyond further groundwater exploration, may not be financially feasible and may be severely limited due to wastewater capacity.***

- ❑ Hyde's & Medford Quarries: Reinitiate conversations with applicable parties to finalize agreements and plans [*2024 WRE*]
- ❑ Surface Water Sources: Continue to evaluate and develop, as needed [*2010 WRE*]

- ❑ Union Mills Reservoir: Safe yield 3.76 mgd with normal pool elevation of 610 ft.; planned reservoir; to serve as regional source of supply for Westminster, Hampstead, Taneytown, and Manchester Service Areas [*2010/2024 WRE*]Water purchase from City of Baltimore: Baltimore City could supply water to Westminster using surplus supply from the Baltimore City water system. Conceptual plans for this alternative have not been developed because this is an undesirable, but technically feasible, alternative for Westminster. Piping water from the Baltimore City treatment plants would require a significant amount of infrastructure that would likely pass through private property. Piping of raw water could also be considered and may be a more feasible alternative. A contractual agreement would be needed between Baltimore and Westminster. [*2010/2024 WRE*]
- ❑ Water Reuse – PUREWater Water Reuse Treatment Facility: Expand the PUREWater Westminster water reuse treatment facility capacity as additional capacity is needed [*2024 WRE*]

46.4.3 Promote water conservation measures and manage demand for potable water to ensure adequate supplies are available for planned development

System-Specific Action Items Already in Place:

- ✓ Public Education: Community conservation education and outreach activities; website; newsletter; door hangers; public outreach materials developed in cooperation with Carroll County Environmental Advisory Council
- ✓ Water Loss Management: Water Conservation Plan; testing and replacing, as needed, water meters, leak monitoring, and water use audits; City owns its own leak detection equipment. City replaced all meters ~10 years ago and is now starting to replace meter heads to cellular systems.
- ✓ Drought Management: Three-staged drought management plan adopted
- ✓ Water Use Rate Schedule: Progressive water-rate schedule
- ✓ Billing Cycle: Quarterly billing cycle
- ✓ Xeriscaping: Design Preference Manual, Section 164-131.2 of the City Code, adopted in May 2016, requires use of xeriscaping principles [*2024 WRE*]

Ongoing Action Items:

- Coordinate with the County government to promote and educate about water conservation [*2024 WRE*]
- Seek grant funding to supplement City contributions to programs which promote conservation and implement demand management recommendations [*2024 WRE*]
- Evaluate and enforce the City's Drought Management Plan to require reductions in water use during times of drought; update as needed [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

- ❑ Encourage water reuse, where feasible, such as Performance Food Group using WWTP effluent for refrigeration [*2024 WRE*]
- ❑ Develop a water loss prevention plan

Long-Term Action Items

- ❑ n/a

46.4.4 Sustain existing wastewater treatment capacity

System-Specific Action Items Already in Place:

✓ Upgraded WWTP to ENR, completed in 2025, enabling the current facility to operate at the limits of technology in terms of nitrogen and phosphorus removal [*2024 WRE*]

Ongoing Action Items:

- Evaluate I&I to determine current level of inflows and infiltration to potentially regain some capacity; make system improvements to reduce I&I; continue to televise lines as needed [*2024 WRE*]
- Adjust the capacity on the Wastewater Capacity Management Plan (WWCMP) worksheets to update available capacity, as needed [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ n/a

Short-Term Wastewater Solutions:

❑ Further investigate climate change conditions to evaluate the potential for design capacity to be reached or exceeded due to extreme hydrologic conditions [*2024 WRE*]

Long-Term Wastewater Solutions:

❑ n/a

46.4.5 Develop new public wastewater treatment and disposal capacity

System-Specific Action Items Already in Place:

✓ n/a

Ongoing Action Items:

- Continue to plan for and implement the specific expansion projects described or included in the adopted *2023 Carroll County Water & Sewer Master Plan* [*2010/2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ n/a

Long-term Wastewater Solutions:

❑ Expand WWTP to 6.5 mgd capacity to accommodate increase in flows from PUREWater and other additional demand/flows [*2024 WRE*]

46.4.6 Protect and restore water quality and make progress toward any applicable TMDLs

For additional action items related to this strategy, please see this same strategy under the Countywide Strategies section, which lists action items for all nine jurisdictions in the county.

System-Specific Action Items Already in Place:

✓ Implemented recommendations from the December 2004 *Source Water Assessment and Wellhead Protection* report, prepared by Advanced Land and Water, Inc. [*2010/2024 WRE*]

Ongoing Action Items:

- Reduce the amount of impervious surface that could result from new development [*2024 WRE*]

System-Specific "To Do" Action Items:

Short-Term Action Items

❑ n/a

Long-Term Action Items

❑ n/a