FINAL

Maryland
Department of the Environment

MARYLAND'S RE-INVIGORATED STRATEGIES TO REDUCE NUTRIENTS IN WASTEWATER

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Executive Summary

Construction and operation of Maryland's wastewater treatment plants (WWTPs) to enhanced nutrient removal (ENR) technology is a priority strategy for meeting Maryland's Chesapeake Bay restoration goals. ENR can reduce wastewater nutrient concentrations to 3 mg/l total nitrogen and 0.3 mg/l total phosphorus. In 2004, Maryland codified the Chesapeake Bay Restoration Fund (BRF) in State law (Env. Article §9–1605.2), creating a dedicated fund for ENR upgrades, operations and maintenance.

In 2022 and to offset the increased nutrient pollution estimated to result from climate change, Maryland adopted a more stringent goal to achieve an average nitrogen concentration of 2.85 mg/L across its major WWTPs. During that same year MDE had to direct Maryland Environmental Service (MES) to take over operations at Baltimore City's Back River WWTP to ensure ENR performance while discharges from the Patapsco River WWTP had also slipped into noncompliance. The performance failures at these two large WWTPs severely compromised Maryland's ability to meet our Chesapeake Bay restoration goals. As a result of these challenges, MDE performed a comprehensive evaluation of the treatment plant failures and the Department's regulatory assistance and oversight tools.

This report "MARYLAND'S RE-INVIGORATED STRATEGIES TO REDUCE NUTRIENTS IN WASTEWATER" provides the results of that evaluation and identifies strategic improvements to prevent these performance issues from occurring at any major WWTP in Maryland. While MDE permits, inspections, and enforcement are critical to accountability and transparency, WWTP owners and operators must also have effective management, an adequate staff of trained operators, and be implementing preventative maintenance plans to ensure WWTP compliance. Strategic improvements in MDE's comprehensive wastewater compliance framework will enhance oversight at WWTPs, prevent performance failures through early detection of WWTPs with operation issues, provide timely compliance assistance and enforcement, reduce significant non-compliance (SNC) rates, and specifically ensure Back River and Patapsco WWTP return to full compliance. Key strategies include the following:

1. Enhanced Permits Conditions:
    - New requirement for facility operations and maintenance evaluations to be included in the application process.
    - New requirement for independent engineering evaluations of operations and maintenance when a facility is in significant noncompliance, followed by a Facility Improvement Action Plan to address identified deficiencies.
    - Improving the treatment capacity of wastewater plants to handle maximum flows during peak usage and storm surges, in addition to ensuring average flows do not exceed plant design capacity.
    - Increasing permitting staff to improve timeliness in issuing permits.
2. Compliance/Enforcement Actions:

- Implementing an early detection and notification system to analyze monthly Discharge Monitoring Reports (DMRs) and notify facilities not achieving expected ENR concentrations. Increasing inspection frequency by conducting monthly inspections at permitted sites that are in Significant Non-Compliance (SNC).
- Increase compliance staff for inspections and doubling staff in a newly centralized WWTP compliance division.
- Resolving violations at all WWTPs through timely corrective actions and enforcement .
- Finalizing the consent order and penalties for Patapsco and Back River WWTPs to ensure sustained system improvement.

3. Funding:
    - Continued performance incentives through Bay Restoration Fund Operation and Maintenance grants.
4. Backstop Measures:
    - Permit modification
    - Disapproving permits and water and sewer plans
    - Secretary orders to alter, extend or replace wastewater systems to protect public health, as well as directives for Maryland Environmental Service to operate and install WWTP controls.
5. Other Strategies:
    - Operator certification and workforce development
    - ENR needs assessment and asset renewal funding to maintain and upgrade aging wastewater facilities
    - Reducing cybersecurity vulnerabilities

MDE's wastewater oversight role consists of routine compliance inspections, compliance assistance activities, enforcement, and permitting decisions that are happening monthly, quarterly, annually and every 5 years during permit renewal. This is a cyclical and iterative process where multiple permitting, compliance, and backstop measures co-occur during a permit's term or renewal. The cycle also includes opportunities for public participation in the permitting process, which is a critical component of Maryland's overall wastewater strategy. MDE will continue providing public transparency in wastewater oversight and collaborate with stakeholders on the wastewater performance improvement solutions implemented to make sure they are feasible, effective, and targeted.

Background

On December 29, 2010, the U.S. Environmental Protection Agency (EPA) established the Chesapeake Bay Total Maximum Daily Load (TMDL). TMDLs are planning tools that provide estimates of the maximum amount of pollution that a water body can receive and still meet regulatory water quality standards. EPA, Bay watershed states, and the District of Columbia (Chesapeake Bay Program Partnership, or Partnership) agreed to the overall goal of having all practices in place to restore the Bay by 2025. The Partnership used a three-phase adaptive planning process for Watershed Implementation Plans (WIPs) to achieve the TMDL.

Maryland's Phase I WIP in 2010 focused on the allocation of loads across source sectors, including wastewater treatment plants, agriculture, urban and suburban stormwater, and septic systems. The Phase II WIP had three key outcomes: (1) load reduction strategies, to describe what can be done to achieve load reductions, including best management practices (BMPs); (2) narrative strategies, to describe how the implementation of BMPs can be achieved; and, (3) implementing 2-Year Milestones. In 2019 and for the final Phase III WIP, Maryland adopted a locally-driven, balanced, and achievable approach to reach 2025 targets that included regulations and incentives. In 2022, Maryland also developed an addendum to the Phase III WIP to reduce climate driven increases in pollution loads needed to meet the 2025 restoration goals. Because wastewater and agriculture are the two highest loading sectors, the Phase III WIP included accelerated reductions in these sectors.

Introduction

Primary wastewater treatment typically involves removing solids through settling and with filters. Secondary treatment purifies wastewater through biofiltration, aeration, or oxidation ponds. Tertiary treatment further reduces organics, turbidity, nitrogen, phosphorus, metals, and pathogens. Biological nutrient removal (BNR) uses microorganisms to remove nitrogen and phosphorus. A combination of BNR, chemical additions, and filtration are typically used to accomplish Enhanced Nutrient Removal (ENR). ENR, as defined in Maryland Code, is a technology capable of reducing nitrogen to 3 mg/L and phosphorus to 0.3 mg/L. This is more effective than previous technologies like secondary treatment and Biological Nutrient Removal (BNR), which are expected to achieve nitrogen concentrations of 18 mg/L and 8 mg/L, respectively.

Bay Restoration Fund

In 2004, the Bay Restoration Fund (BRF) was established to upgrade major wastewater treatment plants to ENR technology. Funds are generated by an annual charge to wastewater

treatment plant and onsite sewage disposal system users in the Bay watershed. Over $1.7 billion in BRF fees have been collected since 2004. Fees are used to upgrade onsite sewage disposal systems, plant cover crops, and provide for operations and maintenance.

BRF funds to upgrade Maryland's 67 major (>0.5 MGD) wastewater treatment plants to ENR have been fully obligated. Sixty-five of the 67 major wastewater treatment plants have been upgraded, one is under construction, and one is in the planning phase. The BRF also funds performance incentive programs, such as a Wastewater Operations and Maintenance (O&M) Grant for plants that perform better than their permits require. Of funds collected from onsite sewage disposal system users, 60% are used for septic system upgrades, and the remaining 40% are used for planting cover crops.

Upgraded major, minor and federal wastewater facilities achieved a reduction of 11.2 million pounds of nitrogen in 2020. In 2021, Maryland farmers planted 433,116 acres of cover crops, attaining an estimated nutrient reduction of 3 million pounds of nitrogen. As of June 30, 2021, the BRF has funded 13,635 septic system upgrades throughout Maryland. In addition, 1,134 homes have been connected to public sewers using BRF.

Maryland is now focusing on upgrading the minor WWTPs through funding from the BRF. So far, 12 have been upgraded, five are under construction, seven are in design, and 11 are in planning. BRF O&M grant awards continue to incentivize WWTPs to achieve lower nutrient discharge concentrations. BRF funds have also been awarded to address combined sewer overflows (CSOs), sanitary sewer overflows (SSOs) and system inflow and infiltration (I/I).

Maryland's Phase III WIP Goals

A statewide nitrogen reduction analysis showed that by achieving an average nitrogen concentration of 3.25 mg/L on average across all major WWTPS, the State will be able to meet its overall 2025 Phase III WIP statewide target. With the Phase III WIP climate addendum, Maryland has reduced the wastewater treatment plant statewide average total nitrogen concentration goal from 3.25 mg/l to a new goal of 2.85 mg/l. Many ENR plants are already achieving concentrations lower than 3 mg/l of total nitrogen.

Back River and Patapsco Wastewater Treatment Plants

In 2021, Maryland identified significant noncompliance at both the Patapsco and Back River WWTPs due to improper maintenance and related operational challenges impacting water treatment effectiveness. The performance failures at these two large WWTPs severely compromised Maryland's ability to meet our Chesapeake Bay restoration goals. In January 2022, MDE filed suit against Baltimore City seeking civil penalties and an order requiring the city to take all steps necessary for the city's Back River and Patapsco wastewater treatment plants to come into permanent and consistent compliance and stop unauthorized discharges of

pollution. By mid-2022, total nitrogen concentrations discharged from Back River and Patapsco WWTPs were as high as approximately 12 and 25 mg/L, respectively.

On June 10, 2022, MDE and Baltimore City leadership reached an agreement that charts a course for continued progress at the Back River WWTP. A revised order requires the city to cooperate with the Maryland Environmental Service (MES) in order to prevent or correct water pollution and ensure the Back River facility is operated in a manner that will protect public health.

Due to continued noncompliance, MDE is currently pursuing similar agreements with the City for the Patapsco WWTP to ensure that both facilities have a clear path to achieving compliance with their permit limitations. Progress has been made, and MDE continues to pursue full and sustained compliance as a top priority.

Key Wastewater Performance Strategies

To bring Patapsco and Back River WWTPs back into full compliance and prevent similar problems from occurring at other major ENR plants, MDE conducted a comprehensive review of its permit structure, compliance and enforcement procedures, funding programs and staffing. This assessment resulted in enhanced wastewater performance strategies that complement MDE's existing regulatory oversight tools. These strategies are grouped below for ease of presentation, but it is important to understand that these strategies are interrelated, iterative, and, depending on the particular facility, can be co-occurring.

Permit Strategies

The National Pollution Discharge Elimination System (NPDES) permit program, created in 1972 by the Clean Water Act (CWA), regulates point source discharges of pollution to waters of the United States. The permit provides two levels of control: technology-based limits and water quality-based limits (if technology-based limits are not sufficient to provide protection of the water body).

Under the CWA, EPA authorizes the NPDES permit program to be implemented by state, tribal, and territorial governments, enabling them to perform many of the permitting, administrative, and enforcement aspects of the NPDES program. Maryland Department of the Environment is the authorizing agency that issues NPDES permits in Maryland. An NPDES permit allows WWTPs to discharge a specified amount of a pollutant into a receiving water under certain conditions. Permits may also authorize facilities to process, incinerate, landfill, or beneficially use sewage sludge.

The two basic types of NPDES permits issued are individual and general permits. A general permit covers a group of dischargers with similar qualities within a given geographical location. An individual permit is a permit specifically tailored to an individual facility. MDE permits WWTPs under facility-specific individual permits. For individual permits and once a facility submits a complete permit application, MDE develops a permit for that particular facility based on our confirmation of the information contained in the permit application (e.g., type of activity, nature of discharge, receiving water quality). MDE issues permits to facilities for a specific time period (not to exceed five years) with a requirement that the facility reapply prior to the expiration date.

MDE's NPDES permits give the Department broad legal authority to ensure compliance. For example, a permit can be modified, suspended or revoked by the Department, in the event of a violation of the terms or conditions of the permit, or of State or federal laws and regulations (per COMAR 26.08.04.10). MDE can also issue fines or penalties, orders, and pursue civil and criminal litigation when necessary. When a permit is up for renewal, MDE takes into account the facility's compliance history before reissuing that permit. MDE will then include additional specific or general conditions as permit requirements, when necessary, to ensure water quality or technology based permits limits are met. Permits also allow MDE the right to enter a facility at any time to evaluate permit compliance, respond to complaints, or pursue other permit-related concerns.

The Back River and Patapsco failures highlighted the need for more proactive measures to prevent performance problems before they occur, as well created an opportunity to employ additional measures once performance problems are identified. Based upon a re-evaluation of MDE's permitting and compliance authorities, the following enhancements are being implemented to assure WWTP compliance.

1. Enhanced Permit Conditions for Operations and Maintenance

MDE is implementing a new Operation and Maintenance Checklist (Appendix A), modified from a checklist developed by the State of Wisconsin for their clean water loan program, to be completed during the permit renewal process by all WWTPs with Enhanced Nutrient Removal (ENR) process funded by the Bay Restoration Fund (BRF) This checklist will require WWTPs to regularly self-assess their record keeping, sampling and laboratory techniques, safety, utilities and electrical systems, and operations, control, and maintenance processes that assist in plant performance.

Furthermore, when significant non-compliance (SNC) has occurred due to inadequate operation and maintenance, MDE requires that an independent or third-party engineering evaluation be conducted to determine the root cause(s) of the non-compliance. In this instance, SNC is defined by EPA's SNC criteria for NPDES Violations as outlined in the September 21, 1995 memo. Only criteria 1, 2 ,3 and 4 will apply to this requirement. The memo can be found here for your reference. In addition, a new special condition for a Facility Improvement Action Plan (FIAP) will be required for facilities under the following scenarios:

- Scenario 1: For facilities with pending permit renewal:
    - If recurring (two or more) SNC associated with equipment malfunction/operational malpractice happens within any rolling 12-month period during the permit cycle prior to the permit renewal; and,
    - If insufficient or no corrective action has been taken by the facility to correct the issues prior to the discharge permit renewal.

- Scenario 2: For facilities with renewed and current permits:
    - The Department may reopen the existing discharge permit to incorporate additional requirements if, within any rolling 12-month period, a facility experiences two or more SNC incidents due to operational issues and fails to implement timely corrective actions.

Below are the new FIAP permit conditions that will then be included in the non-compliant facility's permit:

- No later than 6 months after the effective date of the discharge permit (for scenario 1 above) or upon the receipt of notification from MDE (for scenario 2 above), the permittee will be required to conduct a comprehensive engineering evaluation (through a third party approved by MDE) on the root causes for the discharge permit violations and recommend necessary improvement/correction measures to be taken by the permittee to stay in compliance with the permit requirements.

- With consideration of the recommendations, the permittee shall submit a Facility Improvement Action Plan (FIAP) to MDE for concurrence within 12 months the permit's effective date (scenario 1) or the receipt of notification from MDE (scenario 2). The FIAP document should include specific milestones and projected completion dates to achieve full compliance.

- The permittee shall begin implementing the FIAP immediately upon receipt of concurrence from MDE and provide quarterly progress reports to the Department. The permittee shall provide a final progress report no later than 6 (six) months after FIAP implementation. The Department may, through a public participation process, revise the discharge permit and incorporate additional requirements to address any compliance deficiency identified in the final FIAP report. ensuring the permittee achieves full compliance.

2. Capacity Management Requirement for Peak Flows

In addition to the current requirement for capacity management plans when average WWTP flows exceed 80% of their design capacity, capacity management plans must now also account for maximum flows (i.e. peak flows). All NPDES discharge permits for municipal WWTPs include special conditions requiring facilities to develop capacity management plans when they reach

80% of their capacity, as well as when the maximum flows (i.e., “peak flows”) from those plants exceed certain thresholds. These capacity and peak flow management requirements help prevent the overloading of WWTPs that impact a plant’s ability to effectively remove pollution from their discharges.

3. Increased Staffing to Ensure Timely Permit Renewals

In FY24, program staff will be increased by 14 new positions to help ensure timely permit renewals and reduce the number of permits that have to be administratively extended. Permits are administratively extended when there are insufficient staff to handle both the new permit applications coming into the Department on top of permit renewals. During permit renewal MDE staff perform a detailed permit review and analysis, including review of the facility’s compliance history and any change in their processes that may result in new discharges. At this time, new permit conditions, limits or other requirements are also added, as necessary, to modernize permits and ensure water quality standards will continue to be achieved under the renewed permit.

In the next four years nearly 350 individual permits, out of a total of approximately 600 permits, are set to expire. Those 600 total permits also include about 150 permits that are already administratively extended and are in the process of being renewed. In addition and every year, the Wastewater Program also has to process an average of 10 permits that are either new permits or existing permits requiring modification.

Compliance and Enforcement Strategies

As discussed above there is an interplay and mutually reinforcing relationship between the permits and compliance. In other words, compliance problems are grounds for changing a permit and changes to the permit provide the Department with additional measures to assure compliance. Below are the key existing and new measures MDE is implementing to assure Back River and Patapsco specifically are brought into full compliance, as well as to bring other plants into full compliance.

1. New WWTP Early Detection System

As an additional proactive and preventive measure, MDE is implementing an early detection system to ensure all major WWTPs (flow > 0.5 MGD) are operating at ENR levels. The early tracking and notification process consists of analyzing monthly facility Discharge Monitoring Reports (DMRs) and identifying facilities not achieving expected TN and TP concentrations on both a monthly and quarterly basis. Performance will be evaluated using an average monthly

concentration internal benchmark of 4.0 mg/l (5 mg/L during winter months) for total nitrogen and 0.3 mg/l of total phosphorus.

Owners/operators of facilities identified as underperforming will receive quarterly letters (Appendix B) notifying them of their specific results, and requesting they respond to the Department regarding reasons for their underperformance. Early notification provides WWTP operators the opportunity to identify any operational or technical problems the facility may be facing and adjust their current treatment process to meet their NPDES permit limits and receive O&M Grants. The letters also provide the facilities with information about where they can obtain technical assistance to resolve technical and operational challenges. This process is a compliance assistance and preventive maintenance approach that identifies performance challenges as early as possible to prevent problems from cascading or building in severity.

The early detection system is in effect and analyzing 2023 data monthly. The first quarterly assessment (January - March 2023) is complete and letters are being sent out to underperforming facilities.

2. Increased Staffing and Frequency of Compliance Inspections

During regular compliance inspections, MDE classifies WWTPs as in compliance, noncompliance or significant noncompliance. Significant noncompliance (SNC) means a plant is not meeting its discharge permit limits or has not submitted data for a certain period of time. Based on Oct to Dec 2022 data submitted to EPA's Integrated Compliance and Enforcement System (ICIS), a total of 11 WWTPs are in SNC, where three are due to missing data and eight have permit limit violations. This indicates that 84% (55 of 67 plants) of Maryland's major WWTPs are operating within their discharge limits.

In the 2022 legislative session HB 649 was codified in Maryland Environment Article § 9.328.1. This law has several major requirements that will enhance WWTP oversight, including:

- Beginning on July 1, 2022, the Department shall inspect at least once a month each facility or site that the Department or EPA has determined to be in Significant Non-Compliance (SNC).
- Beginning on July 1, 2023 at least once every 90 days, the Department shall inspect each facility or site that has been operating under an administratively continued permit for longer than 365 days.
- If a permit holder remains in SNC for the same condition after 2 consecutive months of inspections, the permit holder shall be subject to an administrative penalty.

The resource needs to implement HB649 will be in part from 18 new inspection and enforcement positions included in the FY24 budget. Some of those new positions will be used to double the current size of engineering staff dedicated to WWTP compliance inspections. Increased staffing will allow the Compliance Program to have better inspection coverage to SNC

sites. The Compliance Program creates reports to indicate SNC sites, the last time they were inspected, and is prioritizing effluent violations at individually permitted facilities.

Next steps are to include development of the enforcement process for penalties under this statute and enhanced data tools to identify facilities that are overdue for routine inspection. Per Env. Article § 9.328.1, after 2 months of consecutive violations an administrative penalty is required if the same violation is observed on the next inspection. Subsequently the administrative penalties are increased each time that violation has not been resolved in the follow-up inspections.

3. Annual Compliance Evaluations

Starting in February of every year, the Enforcement Division reviews DMR data for all discharge permits that include an annual limit for total nitrogen and total phosphorus. This analysis includes calculation of the concentration-based limit for each facility, the facility's wasteload allocation limit and compares it with their reported annual loading totals for nitrogen and phosphorus, respectively.

After the analysis has been completed for all facilities, any facility that exceeded either the nutrient concentration or allocation limits are assigned to an enforcement coordinator. For first time offenders, penalty assessment letters are sent to the permittees. WSA's current penalty policy is $10 dollars per pound of exceeded nitrogen or phosphorus load (e.g., 100 pounds over the limit is a $1,000 penalty). Repeat offenders are referred to the Office of the Attorneys General to ensure that corrective actions are completed.

4. Resolving Violations at all WWTPs through Timely Corrective Actions and Enforcement

Prescribing and enforcing timely corrective actions for WWTP non-compliance is critical to prevent operational or maintenance challenges from cascading into more intractable WWTP problems. Increases in compliance staffing will provide more timely inspections, increase compliance assistance, and provide for earlier identification of any corrective actions needed to address WWTP non-compliance. Corrective actions can include engineering evaluations, facility improvement plans, related timeframes, and other appropriate measures tailored to site-specific findings.

The focus of the Compliance Program is to expeditiously correct instances of non-compliance through technical assistance and working with the regulated facility to identify and implement timely corrective actions. This includes effectively allocating staffing resources to high priority compliance cases that have greater impacts on public health and the environment. When

voluntary compliance is not achieved, the Department's goal is to initiate enforcement action within 180 days from the initial documentation of the violation.

5. Consent Orders for Back River and Patapsco WWTPs

Both facilities had major issues resulting from a lack of maintenance and staffing which negatively impacted their ability to meet ENR limits established in their NPDES Permits. MDE, Blue Water Baltimore and Baltimore city are currently negotiating Consent Decrees to ensure compliance at both facilities. As part of the agreement, the Department is requiring that several projects be completed at both facilities. These include but are not limited to repairs of the primary settling tanks, gravity belt thickeners, grit facility rehab and solid waste digesters. WSA has also requested a Staffing Report to ensure the facilities are staffed appropriately to meet permit requirements.

Funding Strategies

Funding is critical to ensuring that WWTPs have the necessary resources to achieve and sustain full compliance. This section identifies Maryland's primary funding strategy to assist with plant operations and maintenance. Local operations funding from plant owners is also critical as well as other competitive grant and loan programs that assist with capital improvements.

1. O & M grants

The O&M grants are being provided under the original ENR agreement, which obligates the grantee to optimize the treatment process after construction completion. Grantees can use the O&M grant toward anything related to optimizing the operation such as staffing, equipment improvements, and supplies. After changing the regulations to pay for ENR outperformance, some WWTPs are getting over $1M in annual grants, which can have a significant positive impact on their operational budget.

BRF O&M grants will continue to be provided in a manner that encourages optimized ENR facilities to make best efforts to achieve 3 mg/l total nitrogen (TN) and 0.3 mg/l total phosphorus (TP) on an annual averaged basis. Grant payments are allocated to the facilities based on their approved design capacity at the time of the ENR upgrade. The base grant amount is determined as follows:

Approved Design Capacity	Base Grant Amount
Less than 1.0 MGD	Fixed annual grant amount of $30,000
Between 1.0 and 10.0 MGD	Annual grant is calculated at $30,000 per MGD
More than 10.0 MGD	Fixed annual grant amount of $300,000

The Department may offer additional operation and maintenance grants for facilities achieving better than ENR based on the additional load reductions achieved from overperformance.

For minor WWTPs (small systems), MDE funds the engineering studies with 100% BRF grants. The studies include full evaluation of the WWTP processes, which is what the strategy asks for. The study should evaluate all the options including correcting issues without ENR. While ENR upgrade options must be part of the studies, the town is not obligated to continue to ENR upgrade unless the town decides that it is a good option for them.

Backstop Measures

In cases where the above strategies are not successful in achieving performance improvement and permit compliance, the Department has more stringent regulatory backstop measures that can be employed. These include but are not limited to:

1. Permit Modification

Maryland regulations (COMAR 26.08.04.10) allow the Department to modify, suspend, or revoke a permit when there are violations of its terms or conditions. When plants are not performing as expected, their permit can be modified to include new special or general conditions that require specific performance actions, standards, or other measures to prevent pollution discharges. In extreme cases where it is necessary to provide public health and safety, the Department also has the authority to suspend or revoke the permit so that a facility can no longer discharge and will have to either change its processes and reapply for permit coverage, or cease operations. Municipal facilities can have large volumes of sewage flow to their treatment works and may require alternative corrective measures to properly treat and manage sewage discharges.

2. Permit and Plan Disapprovals

Local governments (Environment Article §9–505 through 507) are required to develop water and sewer plans that are consistent with their comprehensive development plans. The water and sewer plans should include those parts of the jurisdiction that are expected to receive water and sewer over the next ten year period. In addition, local jurisdictions are required to submit progress reports to MDE every two years regarding the development of those plans. MDE has the authority to approve, deny, approve or disapprove in part, or otherwise modify the water and sewer plan. The law allows MDE to deny water and sewer plans, or amendments thereto, where the receiving sewage treatment facilities are not sufficient "to prevent the discharge of any inadequately treated sewage" or otherwise provide for "safe and sanitary treatment of sewage and other liquid waste".

MDE also issues a number of construction permits related to treatment works and stormwater discharges. Environment Article §9–512 specifies that a State or local authority may not issue a building permit unless "the water supply system and sewerage system is adequate to serve the proposed construction, taking into account all existing and approved developments in the service area."

In situations where wastewater treatment plants are not functioning or otherwise not being appropriately maintained or operated, MDE can disapprove planned connections to those failing systems and permits for new construction that will tie into that system. MDE's approval authority effectively serves as an additional adequate public facilities mechanism to complement local authorities and protect public health and the environment.

3. Secretary Orders and Directives

The Environment Article §9-252 provides the Secretary of the Environment the authority to adopt and enforce regulations, as well as order work to be executed to prevent or correct pollution to Maryland waters. This includes requiring any public water supply, sewerage, or refuse disposal system to be operated in a manner that will protect "public health and comfort". The Environment Secretary can also order the alteration, extension, or replacement of any public wastewater system. When a person or municipality fails to comply with such orders, the Natural Resource Article §3–109 allows MDE's Secretary to direct the Maryland Environmental Service to operate or install wastewater system pollution controls to satisfy the requirements of the order.

Wastewater Performance Cycle and Timing

As discussed above, MDE's wastewater oversight role consists of routine compliance checks, compliance assistance activities, and permitting determinations that are happening monthly, quarterly, annually and every 5 years during permit renewal. There are also backstop and other permit measures that can be implemented at any time based upon facility performance and compliance. This can be visualized (Figure 1) as a cyclical and iterative process where multiple permitting, compliance, and backstop measures can be co-occurring during a given permit's term or renewal. The cycle also provides repetition and redundancies to help ensure sustained wastewater facility compliance.

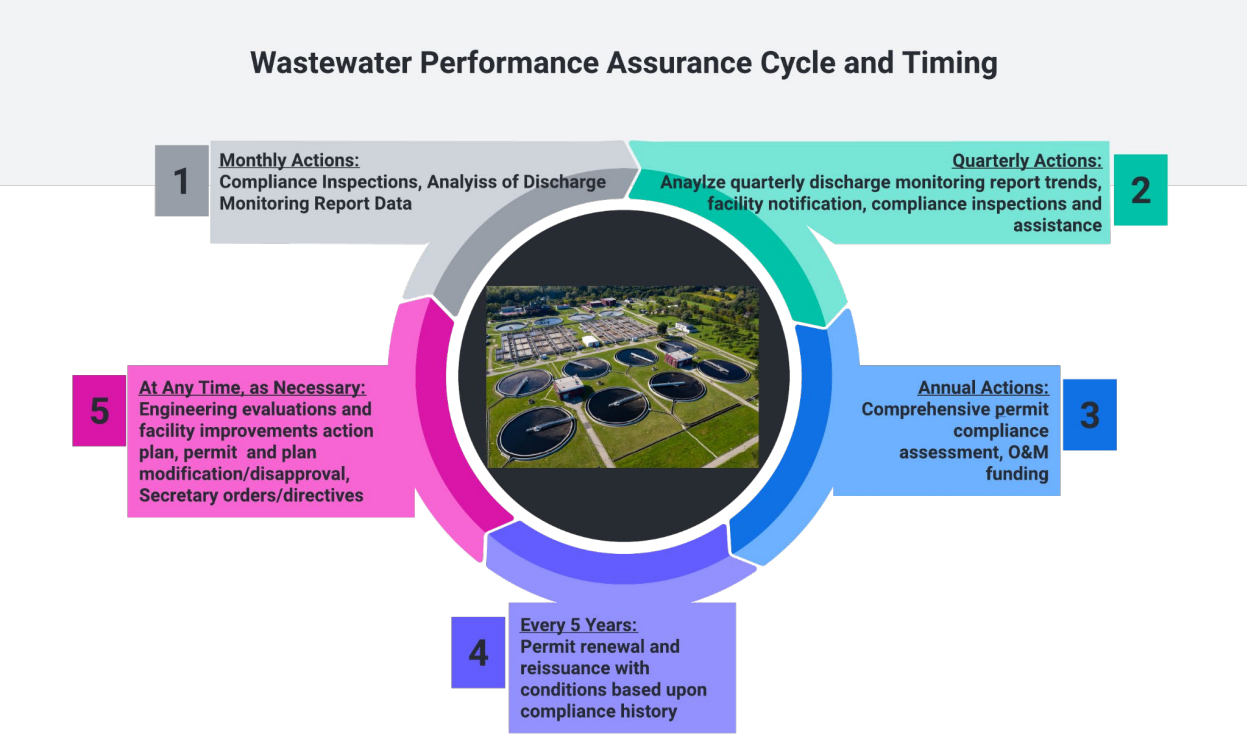

Figure 1: Wastewater Performance Assurance Cycle

It is also important to understand that this cycle includes opportunities for public participation in the permitting process. MDE's wastewater website HERE advertises permits of significant public interest as well as includes a portal where the public can search for permits by facility name, location, permit number, and/or permit type. Communicating WWTP performance and progress

to the public and interested stakeholders is also a critical component of Maryland's wastewater strategy. MDE will continue providing transparency through Open MDE, a process that makes available online all inspection reports and permitting information. MDE also collaborates with stakeholders on the wastewater performance improvement solutions implemented to make sure they are feasible, effective, and targeted.

Other Strategies Under Development

Operator Certification and Workforce Development

MDE runs the Board of Waterworks and Waste Systems Operators in Maryland. The Board establishes the education, experience and examination standards that must be satisfied by operators and superintendents of water and wastewater treatment systems in the State, and issues and renews certificates based upon these standards. To help ensure that there is a robust pool of certified operators to oversee wastewater facilities in Maryland, the Department is partnering with other agencies and non-governmental organizations on training and certification, including:

- Maryland Environmental Service (MES) is a quasi-state agency that has an Operator in Training Program that develops certified operators who can, independently and efficiently, monitor and troubleshoot the facilities where they are assigned. MES has also been focusing on recruiting high school students and incorporating water-based educational programs at vocational schools;
- The Maryland Rural Water Association (MRWA) is an on-site water/ wastewater technical assistance partner that is establishing an apprenticeship program with EPA funding. The program is based upon a National model currently used in 30+ states. MRWA assists communities serving less than 10,000 people; and,
- The Maryland Center for Environmental Training (MCET) has provided career readiness (classroom) training since 2013 (based upon funding availability) under the Maryland Department of Labor, Licensing and Regulation EARN Maryland initiative. This training is available to new operators of 25 participating employing utilities (county & municipal). Based on their successful EARN program, MCET is establishing an operator apprenticeship program, with potential college credits for interested parties; they are working with Baltimore City for apprenticeship training.

ENR Asset Renewal

In 2026, ENR upgrades at major WWTPs will start reaching their expected useful life of 20 years. As a result, there may be significant capital improvements necessary to ensure plants can continue to achieve ENR levels of wastewater treatment. The Department is developing an approach for a needs analysis that will assess the capital, operations and maintenance, and staffing needs for priority WWTPs. Once the needs analysis is complete, a funding strategy will be developed to fund ENR asset renewal at these WWTPs to prevent performance from declining.

The results of this needs analysis can be rolled into a similar State Revolving Fund needs assessment process as one way to allot funding towards WWTP asset renewal. The Department will also work with State legislators to identify needs assessment funding opportunities and gaps. Needs assessments for large WWTPs are estimated to cost up to several hundred thousand dollars, while smaller plants could cost as little as $50,000. The total cost to assess needs at all the major and minor WWTPs may approach $20-million.

Cyber-Security Strategies

In 2022, the Maryland General Assembly enacted the Modernize Maryland Act, requiring by December 1, 2023, that a public or private water or wastewater system in Maryland having: A. 10,000 or more users, and B. receives financial assistance from the state must:

(1) assess its vulnerability to a cyberattack;

(2) if appropriate, develop a cybersecurity plan; and

(3) submit a report to the General Assembly on the findings of the assessment and any recommendations for statutory changes needed for the system to appropriately address its cybersecurity.

MDE developed guidance in coordination with EPA's cybersecurity team, has begun reaching out to water and wastewater utilities with this guidance, and will be following up with the impacted systems to make sure they're doing their assessment and submitting appropriate forms to the Maryland legislature. MDE is also coordinating cybersecurity training exercises with EPA and Maryland water systems.

As many of our critical water systems are monitored and operated through internet capability, cyber-security is an increasingly important measure to ensure these systems reduce their vulnerabilities. Effective cybersecurity will require more Departmental resources, better collaboration with the Department of Homeland Security and local law enforcement.

APPENDIX A - OPERATIONS CHECKLIST

Operations and Maintenance (O&M) Guidance Checklist for Facilities with Enhanced Nutrient Removal (ENR) Systems

The Maryland Department of Environment (MDE) requires that an Operations and Maintenance (O&M) Guidance checklist be submitted for review as part of the permit renewal application. The following checklist is specifically designed for facilities with Enhanced Nutrient Removal systems (ENR). A signed checklist should be submitted to the Department at the address specified at the end of the document.

Utility:	
Facility:	
State Number / NPDES Number:	
Reference (Please List the Documents Below)	**Document Reference Code (DRC)**
	A
	B
	C
	D
	E
	F
	G
	H
	I
	J

I. GENERAL FACILITY INFORMATION					
Checklist Item	**Yes**	**No**	**NA**	**DRC**	**Page #**
1. Type of treatment described?	☐	☐	☐		
2. Principal design criteria listed?	☐	☐	☐		
3. Flow diagram included?	☐	☐	☐		
4. Hydraulic profile included?	☐	☐	☐		
5. Characterization of wastewater included?	☐	☐	☐		
6. Description for sources of industrial & non-domestic waste included?	☐	☐	☐		
7. Pretreatment of industrial waste described?	☐	☐	☐		
8. List of unit operations given?	☐	☐	☐		
9. Overall treatment efficiency (for each unit) described?	☐	☐	☐		

II. OPERATION & UNIT PROCESS					
Checklist Item	**Yes**	**No**	**NA**	**DRC**	**Page #**
1. Description of process included?	☐	☐	☐		
2. Function of process explained?	☐	☐	☐		
3. Normal operation or control of process (valve position, flow rate, sludge depth, etc.) described?	☐	☐	☐		
4. Major components and mechanical equipment listed?	☐	☐	☐		
5. Relationship to adjacent treatment units described?	☐	☐	☐		
6. Schematic diagram of each unit included?	☐	☐	☐		
7. Special features (if any) explained?	☐	☐	☐		
8. Discussion of common operating problems included?	☐	☐	☐		

9. Emergency operation or alternate operation explained?	☐	☐	☐		
10. Bypassing unit described?	☐	☐	☐		
11. Laboratory tests of unit control discussed?	☐	☐	☐		
12. Winterization/Startup procedures for equipment and unit processes	☐	☐	☐		
13. Brief operation instructions included for each piece of equipment, with reference to the manufacturer's O&M manual?	☐	☐	☐		

III. SLUDGE-HANDLING FACILITY

Checklist Item	Yes	No	NA	DRC	Page #
1. Detailed discussion of the process included?	☐	☐	☐		
2. Major components and mechanical equipment listed?	☐	☐	☐		
3. Schematic diagram of process included?	☐	☐	☐		
4. Relationship to adjacent units described?	☐	☐	☐		
5. Normal operation for control parameters for process	☐	☐	☐		
6. Common operating problems discussed?	☐	☐	☐		
7. Emergency or alternative operation described?	☐	☐	☐		

IV. OPERATOR RESPONSIBILITY

Checklist Item	Yes	No	NA	DRC	Page #
1. Manager's responsibilities explained?	☐	☐	☐		
2. Owner's responsibilities explained?	☐	☐	☐		
3. Training requirements for operator(s) listed?	☐	☐	☐		
4. List of Standard reference publications operator(s) may consult?	☐	☐	☐		

V. PERSONNEL

Checklist Item	Yes	No	NA	DRC	Page #

1. Manpower requirements given?	☐	☐	☐		
2. Qualifications of personnel given?	☐	☐	☐		
3. Licensure of personnel explained?	☐	☐	☐		

VI. LABORATORY TESTING

Checklist Item	Yes	No	NA	DRC	Page #
1. Sampling and testing program outlined?	☐	☐	☐		
2. Sampling location, time, and method identified?	☐	☐	☐		
3. List of laboratory references included?	☐	☐	☐		
4. Permit monitoring requirements explained?	☐	☐	☐		
5. Interpretation and significance of expected ranges of lab results given?	☐	☐	☐		

VII. EQUIPMENT MAINTENANCE

Checklist Item	Yes	No	NA	DRC	Page #
1. Purpose of maintenance discussed?	☐	☐	☐		
2. General maintenance information included?	☐	☐	☐		
3. Sample maintenance information included?	☐	☐	☐		
4. Preventative maintenance schedule given?	☐	☐	☐		
5. Troubleshooting charts or guides included which reference	☐	☐	☐		
6. Housekeeping requirements included?	☐	☐	☐		
7. Equipment record system explained for each type of equipment or machinery?	☐	☐	☐		
a. Equipment numbering system explained?	☐	☐	☐		
b. Equipment catalog available?	☐	☐	☐		
c. Name plate data cards available?	☐	☐	☐		
d. Maintenance record cards available?	☐	☐	☐		

e. Manufacturer's maintenance schedule summarized for routine adjustment, lubrication, etc., with reference to page numbers in the manufacturer's O&M manual?	☐	☐	☐		
f. Work order system described?	☐	☐	☐		
8. Sample forms provided?	☐	☐	☐		

VIII. RECORDS & REPORTS

Checklist Item	Yes	No	NA	DRC	Page #
1. Identification and location of records and reports, including record drawings, described?	☐	☐	☐		
2. Daily operating log described, with sample format provided?	☐	☐	☐		
3. Maintenance records described, with examples given?	☐	☐	☐		
4. Laboratory records and reports described, with samples provided?	☐	☐	☐		
5. Monthly report described, with format/example shown?	☐	☐	☐		
6. Requirements of MOR/DMR explained, with examples given?	☐	☐	☐		
7. Annual report explained, with format/example provided?	☐	☐	☐		
8. Record keeping system for operation explained?	☐	☐	☐		
9. Record keeping system for personnel explained?	☐	☐	☐		
10. Method for reporting permit violations, system problems, etc. explained?	☐	☐	☐		
11. Method for the accident report explained?	☐	☐	☐		

IX. INVENTORY SYSTEM

Checklist Item	Yes	No	NA	DRC	Page #
1. List of spare parts recommended and identified?	☐	☐	☐		
2. Inventory sample forms and records included?	☐	☐	☐		
3. Special tools list included?	☐	☐	☐		
4. Cross-reference lubricant list included?	☐	☐	☐		

5. List of warranted equipment and warranty provisions included?	☐	☐	☐		
6. List of outside contract maintenance tasks included?	☐	☐	☐		
7. List of manufacturers of equipment included?	☐	☐	☐		

X. EMERGENCY OPERATING PLAN

Checklist Item	Yes	No	NA	DRC	Page #
1. Vulnerability analysis included?	☐	☐	☐		
2. Emergency equipment list given?	☐	☐	☐		
3. Police/fire departments coordination explained?	☐	☐	☐		
4. Mutual aid list included?	☐	☐	☐		
5. Chemicals used and their potential hazards explained?	☐	☐	☐		
6. Procedures outlined to follow in case of electrical emergency?	☐	☐	☐		
7. Detailed list included of jobs each person must carry out during an emergency?	☐	☐	☐		

XI. SAFETY PROGRAM

Checklist Item	Yes	No	NA	DRC	Page #
1. Emergency phone list included?	☐	☐	☐		
2. Safety equipment list included?	☐	☐	☐		
3. Sewer hazards and precautions explained?	☐	☐	☐		
4. Mechanical equipment hazards described?	☐	☐	☐		
5. Electrical hazards described?	☐	☐	☐		
6. Explosion and fire hazards described?	☐	☐	☐		
7. Health hazards described?	☐	☐	☐		
8. Oxygen deficiency hazards described?	☐	☐	☐		
9. Laboratory hazards described?	☐	☐	☐		

10. Chemical hazards described?	☐	☐	☐		
XII. UTILITIES					
Checklist Item	**Yes**	**No**	**NA**	**DRC**	**Page #**
1. Description of utilities included?	☐	☐	☐		
2. Distribution system described?	☐	☐	☐		
3. Diagrams and manufacturers' drawings included?	☐	☐	☐		
4. Electrical emergency procedures described?	☐	☐	☐		
5. Gas and/or water capacities and limitations of responsibility described?	☐	☐	☐		
6. Head described?	☐	☐	☐		
7. Telephone services described?	☐	☐	☐		
8. Emergency procedures described?	☐	☐	☐		
APPENDIX					
Checklist Item	**Yes**	**No**	**NA**	**DRC**	**Page #**
1. Detailed design criteria included?	☐	☐	☐		
2. Schematics included?	☐	☐	☐		
3. Sample forms provided?	☐	☐	☐		
4. List of lab chemicals included?	☐	☐	☐		
5. Manufacturer's manuals referenced?	☐	☐	☐		
6. Warranties included?	☐	☐	☐		
7. Current Discharge permit included?	☐	☐	☐		
8. Sewer ordinance included?	☐	☐	☐		
9. As-built drawings included?	☐	☐	☐		

Facility Superintendent:

_____	_____
(Name & Date)	***(Signature)***

SUBMITTAL OF O&M GUIDANCE CHECKLIST

Submit one signed original to:

Attention: Yen-Der Cheng, Chief
Municipal Surface Discharge Permits Division
Maryland Department of the Environment
1800 Washington Boulevard, STE 455
Baltimore, MD 21230-1708

Retain a copy of this checklist for your records.

APPENDIX B - EARLY NOTIFICATION LETTER TEMPLATE

CERTIFIED MAIL / ELECTRONIC MAIL
Name
Organization
Street
City, Maryland Zip

Re: "Facility", AI #XXXXX, Permit #MDXXXXX
Advanced Notification - Information Request
[*Response Requested within 14 days*]

Dear Permittee:

The Maryland Department of the Environment, Water and Science Administration (Department) has developed a new early detection tool to identify wastewater treatment plants that are currently not operating at Enhanced Nutrient Reduction (ENR) levels. Ensuring compliance with ENR standards at Maryland's upgraded WWTPs is the Department's main strategy to achieve the State's Chesapeake Bay Watershed Implementation Plan goals for nitrogen and phosphorus pollution.

The Department is concerned about the recent performance of the *Facility Name* (Facility), located at *Facility Address* and currently operating under NPDES Discharge Permit *Permit Number* (Permit). Specifically, the Department is concerned about the Facility's ability to meet its permitted ENR limits for total nitrogen and total phosphorus. The Permit establishes Tributary Strategy-based annual loading rates for total nitrogen (TN) and total phosphorus (TP) based on TMDL Waste Load Allocations, as well as concentration-based annual loading rates based on annual total discharged flow. The Facility must comply with whichever limits are lower. The concentration based limits are calculated using 4.0 mg/l and 0.3 mg/l for TN and TP, respectively.

The Department has reviewed the Facility's Discharge Monitoring Reports (DMRs) for the "Quarter number" quarter of *Calendar Years* and has identified a quarterly weighted average concentration greater than 4.0 mg/l for TN and/or a quarterly weighted average concentration greater than 0.3 mg/l for TP. Below is a table that displays this information:

Parameter	Quarterly Average (mg/L)
Total Nitrogen	
Total Phosphorus	

The values in this table are **not** considered violations of the Permit. However continuing to operate at these levels may lead to noncompliance with the permitted annual loading rates.

Furthermore, noncompliance with ENR standards will disqualify the Facility from receiving Operation and Maintenance (O&M) Grant funding through the Bay Restoration Fund (BRF). The Department provides O&M grants for treatment plants that operate at or below 3.0 mg/l for TN and 0.3 mg/l for TP on an annual average basis. This notice is intended to facilitate the identification of operational or technical problems at the Facility, allow for adjustments to the current treatment process to meet the Permit limits, and maintain your eligibility to receive O&M Grants. For information on BRF O&M Grant funding eligibility, please contact Mr. Walid Saffouri at walid.saffouri@maryland.gov.

Please be advised, you may also seek free technical assistance from one of the following organizations:

Organization	Contact
EPA-Region 3 https://www.epa.gov/water-infrastructure/water-technical-assistance	Higgins.Walter@epa.gov 215-814-5476
SERCAP, Inc https://sercap.org/	Jean Holloway, State Lead jholloway@sercap.org 410-422-4337 Amanda Kelley, Director, Regional Programs akelley@sercap.org
Maryland Center for Environmental Training (MCET) https://www.mcet.org/technical-assistance/	info@mcet.org 301-934-7500

The Department requests that, **within 14 days of receipt of this notice,** you provide a written explanation for the elevated TN and TP at the Facility for the Department's consideration. The Department will review the information provided to determine what factors are impeding performance at this Facility and what additional actions may be necessary to ensure compliance with the TN and TP annual loading rates. Please be advised that this is not a comprehensive compliance assessment and that any permit non-compliance will be addressed in a separate manner.

The Department appreciates your cooperation in this matter. If you have additional questions, please contact me at (410) 537-3510 or by email at *arno.laud@maryland.gov*.

Sincerely,

Arno Laud, Chief
Enforcement Division
Compliance Program
Water and Science Administration

cc: Gregorio Sandi, Chief, Watershed Restoration Division, WSA
Yen-Der Cheng, Chief, Municipal Wastewater Permits Division, WSA
Walid Saffouri, Program Administrator, Engineering and Capital Projects Program