CHESAPEAKE ACCOUNTABILITY PROJECT

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Re: Comments on Tentative Determination Renewal of the General Permit for Discharges from Stormwater Associated with Industrial Activities - 20-SW / MDR000.

Dear Mr. Hlavinka,

The Chesapeake Accountability Project ("CAP") and the 23 other stakeholders listed below submit these comments on the Maryland Department of Environment (the "Department") tentative determination to renew the General Permit for Discharges from Stormwater Associated with Industrial Activities, Permit No. 20-SW / MDR000 ("Permit", "Draft Permit", or "20-SW"). We appreciate your efforts in drafting this tentative determination and thank you for the opportunity to comment.

CAP is a coalition of environmental organizations committed to reducing pollution throughout the Chesapeake Bay watershed. The project is a partnership of five nonprofit organizations, including the Center for Progressive Reform ("CPR"), Chesapeake Bay Foundation ("CBF"), Chesapeake Legal Alliance ("CLA"), Choose Clean Water Coalition ("CCWC"), and the Environmental Integrity Project ("EIP"). Weak Clean Water Act ("CWA") and state pollution control permits and lack of enforcement result in millions of pounds of pollution entering our communities and waters and have major implications for public health, water quality, and overall Bay restoration. By contrast, strong CWA implementation and enforcement lead to efficient pollution reduction and more equitable outcomes.

The CWA and Maryland's Water Pollution Control statutes and regulations rely on permits to achieve and maintain water quality standards ("WQS"). The 20-SW Permit is an important opportunity to create clear, specific, measurable, and enforceable requirements to reduce polluted industrial stormwater runoff, which can be particularly toxic and hazardous to human health and aquatic biota, and which poses a unique threat to our common goal to promote environmental justice in Maryland.

CAP and the undersigned Commenters would like to reiterate an overarching concern CAP members and other Commenters expressed to the Department last year prior to the release of the Draft Permit regarding the abrupt change in the timeframe for the reissuance of this Permit. While Commenters acknowledge that the reissuance of the Permit is long overdue, Commenters also believe that the sudden acceleration of the permit renewal process last spring reflects a potentially serious problem. A permit as lengthy and complex as this general permit requires substantial staff time and attention in order to fully review and evaluate deficiencies with the expired 12-SW permit and craft effective improvements, especially in light of the overwhelming degree of noncompliance and evidence that the 12-SW Permit has not effectively reduced pollution. With the federal Multi-Sector General Permit (MSGP) undergoing its own reissuance process, following the release of the report on industrial stormwater by the National Academies of Sciences, Engineering, and Medicine's National Research Council (NRC), the Department should have begun to engage in a dialogue with EPA and national experts about how best to incorporate NRC recommendations and new changes proposed by EPA to the MSGP. Instead, the Department - acting at the urging of EPA during the previous federal administration - rushed the reissuance of this Permit. Issuing the Permit as proposed would pose substantial risks to Maryland's efforts to restore the Chesapeake Bay and to the health of local communities and waterways; and it would violate several laws.

**We do not believe that current leadership at EPA under the Biden Administration would have tolerated such an expedited process, particularly given the Administration's heightened concerns with restoring the Chesapeake Bay, promoting climate resilience, and attacking environmental injustices, all of which are affected by the reissuance of the Permit. Commenters therefore urge the Department to consider slowing down the process of developing the Permit at this time and return to the timeframe previously expressed. We urge the Department to take the time to fully evaluate reforms proposed by the NRC, incorporated in the MSGP, expressed in these comments, and/or uncovered following a campaign of robust and proactive outreach to State and community leaders. Following the Department's evaluation of all the recommended reforms, we urge the Department to reopen the comment period to allow the public to review and provide input on the changes to the Permit. The Department should solicit meaningful feedback from affected communities, the CEJSC, EPA, and other stakeholders at every stage of the development of the Permit.**

In addition to the other written and verbal correspondence shared with the Department to date, some of which is attached, we submit the following comments and recommendations to ensure that the Permit complies with applicable state and federal laws and protects and restores water quality.

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# Executive Summary

Stormwater pollution is increasing in Maryland, and the best available data, including as described in the fact sheet for this Permit, show that discharges of many different pollutants are not meeting relevant pollutant benchmarks or water quality standards ("WQS"). Industrial runoff will continue to worsen in the coming years due to the rapidly increasing severity of precipitation owing to climate change. Noncompliance from permittees covered under the expired permit is rampant in Maryland - averaging about 70 percent year after year, according to Department inspection reports. Enforcement of permit noncompliance is low: the Department took only 14 formal enforcement actions against industrial stormwater permittees from 2017 to 2020, although approximately 75 percent of permittees overall were in noncompliance. Such lack of enforcement makes noncompliance all the more likely.

Industrial stormwater contamination disproportionately harms Maryland's vulnerable communities, including communities of color, which are already overburdened by pollution. Commenters' analysis shows that of 300 industrial stormwater facilities in Baltimore City and Baltimore County, 41 percent were located in census tracts in the top 25 percent of the state with respect to cumulative pollution burden. Additionally, the census tracts where industrial stormwater permittees are located are more overburdened by cumulative pollution impacts than the state overall. In light of these disproportionate impacts, the Department should complete an environmental justice assessment, consult with the Maryland Commission on Environmental Justice and Sustainable Communities ("CEJSC"), and solicit input from affected communities before reissuing the Permit. Improving signage requirements could also give community members an opportunity to report any pollution they see and sound the alarm for potential noncompliance.

The fact that so many of the facilities contributing to significant stormwater pollution are located in communities of color is a concern to CAP and other Commenters. The Department should consider carefully whether the fact that communities of color have less ability to voice concern and advocate for more protective permits and improved enforcement could be contributing to why the Department hasn't put enough emphasis on strengthening this permit; a general permit that has enormous impact on the health of those living near discharges (i.e., subsistence fishermen, children who will recreate in waters, regardless of signage, and potential for frequent contact with pollutants resulting from too much pavement) as well as overall Chesapeake Bay water quality

The Permit continues to include unenforceable language, which also results in a disparate impact on overburdened communities. The Department must establish, and clearly identify, enforceable obligations in the Permit; otherwise, the Permit is ineffective and unlawful because a permittee cannot be made to comply. Enforceability should be improved through clearer, more measurable standards and explicit statements of enforceable provisions, avoiding permittee self-regulation, increased monitoring requirements, strengthened corrective action provisions, and improved transparency and public accessibility of information.

The Department's decision to roll back one of the key water quality and public health protections under the Permit, the 20 percent impervious surface restoration ("ISR") requirement for facilities in the Chesapeake Bay watershed, will also further exacerbate the disproportionate impacts faced by communities of color. If the Department decides to finalize the proposal to roll back the ISR requirement, Commenters strongly urge the Department not to do so without a robust campaign of outreach to policymakers, the public and public interest representatives, leaders and representatives of communities that will be disproportionately impacted by the Permit, and the U.S. Environmental Protection Agency ("EPA") and our partners under the 2014 Chesapeake Bay Watershed Agreement (the "Bay Agreement").

The Permit does not adequately account for climate change, relying on outdated precipitation data and failing to adequately analyze the water quality impact of increases in precipitation intensity, duration, and frequency. The Permit should include a process for incorporating new reports, data, and analyses as they are developed.
We call upon the Department to review these comments; reinitiate a dialogue with EPA under its new leadership to facilitate a fresh review of the Permit for consistency with state and federal law; undertake extensive and appropriate consultations with the CEJSC and those communities that are, and have been, particularly affected by industrial stormwater; reassess the climate change implications on the Permit; and significantly improve permit enforceability.

In its current form, the Permit is unlawful, unenforceable, and fails to protect Maryland's most vulnerable communities. We urge the Department to rewrite the Permit, for the following reasons:

<u>**In its current form, the Permit as proposed is unenforceable, unlawful, and must be thoroughly rewritten, for the following reasons:**</u>

***The Permit Lacks Adequate Consideration of Environmental Justice and Contributes to Disproportionate Harm to the Health of Overburdened Marylanders.***

- The Permit fails to adequately control contaminants that threaten the health and safety of vulnerable Marylanders and resolve the disproportionate impacts of this pollution on overburdened communities.
- The Department should complete an Environmental Justice Assessment before reissuance of the Permit.
- The Department should consult with the Maryland CEJSC before reissuance of the Permit.
- In order to remediate the systematic noncompliance seen under the expired permit, the Department must use its full authority to issue deterrent penalties, at the maximum legally allowable amount if necessary, and pursue legal action against non-compliant permittees. At a very minimum, any permittee who has not yet complied with the Chesapeake Bay restoration requirement under the expired permit should not be eligible for coverage under the reissued Permit until they have met this

requirement. Likewise, penalties for repeat offenders should increase for each repeat offense, and penalties should increase when permit violations occur near environmental justice communities or when illegal discharges occur to sources of drinking water, or impaired or Tier 2 waterways.

- Our review of data found that, of 300 facilities in Baltimore City and Baltimore County, 40 percent were located in overburdened census tracts. In Baltimore City, 69 percent of facilities were in overburdened tracts and 8 facilities were located in the top 10 percent of census tracts most burdened by environmental justice factors. Commenters further found that census tracts with a large number of industrial facilities were flagged in the EPA environmental justice data screening tool as having an extremely elevated risk of exposure to environmental threats.

***Permit Terms Must Be Enforceable as Required by Law.***

- Lack of enforceability enables the perpetuation of environmental injustices. The Department must improve Permit enforceability to avoid exacerbating inequities.
- The Permit lacks conditions sufficient to ensure compliance with WQS. The Department must establish, and clearly identify, enforceable obligations, to inform the permittee and public which provisions are subject to enforcement. This unenforceable permit violates the Clean Water Act ("CWA") and Maryland law.
- The Department must remove impermissibly vague language throughout the Permit, and use numeric standards, or clear, specific, and measurable narrative standards, including the use of examples, where appropriate.
- The Permit does not provide for sufficient Department oversight or review and approval, instead relying on the permittee itself to determine its own compliance.

***The Permit Proposes to Roll Back the Chesapeake Bay Restoration Standard Contrary to the Clean Water Act Prohibition on Backsliding.***

- The Permit eliminates the 20 percent ISR requirement that serves to restore the Chesapeake, the Permit's primary means of reducing pollution.
- This rollback violates the CWA and the Department has offered no reasoned explanation for backsliding of the Permit's most important requirement despite admitting that the expired permit has failed to adequately control pollution levels.
- The decision to roll back the ISR was not undertaken with sufficient input and engagement from policymakers, the public, or particularly impacted communities.
- The Permit must, at the very least, reinstate the 20 percent ISR requirement.

***The Permit Does Not Contain Adequate Protections for Either Impaired or Healthy Waterways and Ignores the State's Water Quality Standards.***

- In addition to reinstating the 20 percent ISR standard, the Department should begin to expand the standard to protect additional waterways and communities from toxic runoff.
- Overwhelming evidence shows a lack of progress in reducing runoff and meeting Chesapeake Bay and other water quality goals and standards. This can almost surely

be explained by a lack of the clear, specific, and enforceable pollution limitations required by the CWA.

- Pollution trading should not be allowed under the Permit for many reasons, including that it sanctions continued violation of local WQS.
- Rather than relying on undue discretion, we strongly urge the Department to specify what considerations would dictate whether, and which, additional control measures are needed on a particular site.
- The Department should provide clear guidance that ensures investments in control measures that protect local water quality where the previous permit has clearly failed.
- The conclusory language that "compliance with the other conditions in this permit will control discharges as necessary to meet applicable water quality standards" is not backed by any data or other evidence.
- The Department must revise the Permit to be consistent with the antidegradation procedures in state regulations and guidance to protect high quality healthy waters.
- Due to the failures of TBELs and the narrative WQBEL to protect water quality, the Department must establish numeric, enforceable WQBELs.

***The Permit Fails to Adequately Account for a Rapidly Changing Climate.***

- The Permit relies on outdated precipitation data to inform storm design standards.
- The Department did not adequately analyze the impact that increases in precipitation intensity, duration, and frequency will have on industrial stormwater runoff and how that will impact water quality and stream health.
- The ISR requirement should remain in place and be expanded to control potential increases in stormwater loads driven by more intense precipitation events.
- The Department must ensure climate change impacts do not increase the harm to overburdened communities.
- The Permit's climate provisions are vague and permissive and do not give permittees and the public fair notice of requirements.
- Maryland commitments under the Bay Agreement require that Maryland focus on adapting to our changing climate when issuing this Permit.
- The Department must evaluate climate impacts on the Permit's ability to meet state WQS and the Bay Agreement.
- The Permit must provide for a mechanism to adapt the Permit as state agencies and partners release new data and impact assessments.

***The Permit Conditions Applicable to Control Measures Are Not Sufficient.***

- The record lacks evidence demonstrating the current permitting approach is working to bring pollution levels in line with WQS; therefore, it is not rational to maintain the same approach in this Permit.
- Maryland is home to some of the nation's best stormwater management experts and to one of the world's most sophisticated watershed restoration programs; it is, therefore, surprising and disappointing that the Permit does not reflect this expertise.
- Proposing a major rollback and failing to address nutrient, sediment, and toxic pollution, failing to promote climate resilience, and failing to promote environmental

justice is fundamentally inconsistent with Maryland's special obligations under the law and to other Chesapeake Bay partners.

***The Department Must Require Benchmark Monitoring for all Permit-Holders and throughout the Entire Permit Term.***

- The Permit requires benchmark monitoring as an indicator of the performance of a facility's stormwater control measures, but the monitoring cannot serve this purpose effectively when it may be suspended after only four quarters. Benchmark monitoring must be required throughout the entire permit term in order to ensure that permit-holders are complying with narrative effluent limitations and that control measures are adequate and effective.
- The Department must adopt universal benchmark monitoring provisions for all covered sectors. The Department should adopt universal benchmark monitoring for already established Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), pH, phosphorus, and nitrogen benchmark thresholds. MDE should also require calculation and reporting of flow-rate during benchmark sampling in order to support determination of actual pollutant loadings.
- The Department must require more frequent sampling for benchmark monitoring and sampling methodologies that produce data that are representative of industrial stormwater discharges.
- The Department should adopt additional benchmark monitoring requirements for landfills, given the broad array of toxic contaminants found in landfills and their runoff and leachate discharges.
- The Department should retain its aluminum and iron benchmarks and adopt a revised benchmark for selenium.

***The Department Must Revise the Corrective Action Provisions to Strengthen Triggering Events, Improve Enforceability, Avoid Impermissible Self-Regulation, and Increase Clarity.***

- The Department's failure to adopt a single benchmark exceedance as a trigger for additional implementation measures (AIM) is arbitrary and capricious in light of the stated justifications for benchmarks, the no-action option in the AIM Level 1 Response, and the egregiously lax schedule that would result from the proposed approach.
- Nationally recognized stormwater management expert Dr. Richard Horner supports quicker action triggers and earlier qualified professional involvement in the AIM provisions.
- The Department must revoke permit coverage if corrective action or completing the AIM requirements are unsuccessful. Revocation should be permanent.
- To avoid impermissible self-regulation by the permittee, the Permit must require, through NetDMR, publicly-accessible submission of timely written notification of triggering events and written, objective justifications for any time extensions.
- The AIM Exceptions for natural background and run-on in the Draft Permit are inconsistent with the MSGP and the CWA and must be revised or eliminated.

- The Department should correct and clarify inconsistencies, illogical timing and confusing messaging related to the AIM triggers and the deadlines in AIM Level 4.

***Permit Coverage is Overly Broad and Permissive, Denying Adequate Attention on a Large Source of Stormwater Pollution.***

- The Department should require advance notice to the Department and the public for sites that present specified, clearly enumerated risks (e.g., where there are compliance issues or where a facility is a significant contributor of pollutants), to evaluate whether additional controls and/or an individual permit are necessary.
- The Department should require individual permits for all new facilities, including a requirement to offset any new loads, preferably through onsite pollution control projects.
- It is impossible and inconsistent with the Bay TMDL and Maryland law to presume that stormwater pollution will not be discharged via the No Exposure Certification without full runoff retention; thus, some degree of regulatory protection is required.

***The Permit Should Be Accompanied by Greater Transparency and Accessibility.***

- It is critical to provide the public with greater access to information about the implementation and enforcement of this Permit.
- Public and non-confidential information required to be documented in a Stormwater Pollution Prevention Plan is of high interest to the public and is something that the surrounding community has a right to know about.
- Commenters applaud the Department's decision to require standardized signs to be posted at permitted sites, but signage requirements should be further improved to include non-English translations and a hotline or web link for reporting pollution concerns.

***Permit Fees Are Not Sufficient to Address Concerning Resource Constraints.***

- The Department does not have the resources to assure compliance with permit terms, WQS, or state and federal law.
- The Department must fill vacant positions and add as many staff as is necessary to adequately carry out the terms of this Permit and to enforce violations of the Permit.
- It is arbitrary and capricious to issue a permit the Department does not have the resources to effectively enforce, which is contrary to the CWA, Maryland laws, and Maryland's delegated CWA authority.

## Factual Background

***Stormwater Loads in Maryland Have Been Increasing, Which Means that the Department Must Redouble its Efforts to Bring this Sector Under Control.***

As explained in more detail in recent comments on MS4 permits in Maryland,[1] Commenters are concerned that the Department has effectively given up on making reductions in stormwater pollution, including industrial stormwater pollution, and is content to accept stagnation or even increases in pollution load. As far as the Chesapeake Bay TMDL is concerned, our concerns with respect to industrial stormwater mirror our concerns with respect to municipal stormwater, both of which are frequently lumped together as pollution from impervious developed land.

Between 2009 and 2019, the loads of nitrogen, phosphorus, and sediment delivered to the tidal Bay via urban stormwater runoff increased by 2 to 5 percent. This was explored in detail in a recent report by the Environmental Integrity Project, which is attached to these comments.[2]

An increase in the level of regulatory effort is required where a source of pollution is growing when it should be declining. Yet in Maryland the opposite is the case. Maryland's Phase III Watershed Implementation Plan ("WIP") revised the 2025 targets for the stormwater loads that Maryland hopes to achieve by 2025. The new targets are 20 to 40 percent higher than the previous Phase II targets, meaning that Maryland is now planning to accept 20 to 40 percent more pollution than it was willing to accept a few years ago. The following table summarizes the change in target loads between the two WIPs. As a point of comparison, Commenters also provide the same estimates for Virginia, where planning targets have become more stringent.

[1] CAP Comments re Tentative Determination for the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Discharge Permit for Baltimore City (Jan. 21, 2021), attached as Appendix A.
[2] Environmental Integrity Project, *Stormwater Backup in the Chesapeake Region* (Aug. 17, 2020), https://environmentalintegrity.org/wp-content/uploads/2020/08/EIP-Bay-Stormwater-and-Climate-Change-Report-8.17.2020.pdf, attached as Appendix B.

Table 1: Stormwater pollution targets for 2025 in Phase II and Phase III WIPs (millions of Edge of Tide (EOT) pounds from the "developed" sector).[3]

| | Maryland | | | Virginia | | |
|---|---|---|---|---|---|---|
| | Phase II WIP | Phase III WIP | change | Phase II WIP | Phase III WIP | change |
| Nitrogen | 7.8 | 9.3 | +19% | 10.3 | 9.7 | -6% |
| Phosphorus | 0.48 | 0.66 | +37% | 1.24 | 1.19 | -4% |
| Sediment | 289 | 394 | +36% | 514 | 476 | -7% |

As discussed in detail in the above-cited EIP report, the Phase III WIP targets for nitrogen and sediment are even higher than the TMDL baseline loads from 2009. This is a stunning policy failure. The Bay TMDL is a groundbreaking pollution reduction program, yet the nitrogen and sediment loads from developed land in Maryland will be higher at the end of the TMDL than they were at the beginning.

In light of these trends, the Department should increase the level of effort committed to reducing industrial stormwater pollution and work to ensure that every permit condition is enforceable; this includes expressly stating in the Permit that all pollution controls and limitations are enforceable. The Permit unfortunately moves in the opposite direction, which is not just legally impermissible backsliding, as discussed further below, but also a retreat from Chesapeake Bay TMDL commitments.

***Industrial Stormwater Discharges Are Likely Contributing to Failures to Meet Water Quality Standards.***

Due to the deficiency of monitoring requirements under the 12-SW Permit and prior iterations, it is difficult to directly link industrial discharges and water quality impairments in specific waterways. However, the data that are available demonstrate the likelihood that the stormwater discharges of industrial facilities are contributing to failures to meet WQS, and, in particular, strongly suggest that industrial discharges are contributing to impairments associated with nitrogen and phosphorus.

A few of the parameters for which data were provided in Table 1 of the 20-SW Fact Sheet have Maryland WQS: zinc, copper, and lead. For reference, a table of the aquatic life WQS for these parameters is shown below:

[3] Data from Chesapeake Assessment Scenario Tool (CAST, https://cast.chesapeakebay.net/), version CAST-2019, scenarios "2025 WIP2" and "WIP 3 Official Version."

Table 2: Maryland Aquatic Life Water Quality Standards[4] for Parameters in Benchmark Monitoring Data

| Substance | Aquatic Life (mg/L) | | | | |
|---|---|---|---|---|---|
| | Fresh Water | | Estuarine | Salt Water | |
| | Acute | Chronic | Acute | Acute | Chronic |
| Zinc | 0.12 | 0.12 | n/a | 0.09 | 0.081 |
| Copper | 0.013 | 0.009 | 0.0061 | 0.0048 | 0.0031 |
| Lead | 0.065 | 0.0025 | n/a | 0.21 | 0.0081 |

The data provided in Table 1 of the 20-SW Fact Sheet show that industrial stormwater discharges exceed WQS for all three of these parameters.[5]

**Zinc:** The annual average zinc concentrations exceeded fresh water criteria (and the zinc benchmark concentration) in every year between 2016 and 2019. According to Maryland's Searchable Integrated Report Database,[6] there are 25 zinc-related impairments in Maryland, including 4 that involve zinc in sediment. Given the widespread industrial stormwater discharges of zinc, it stands to reason that industrial stormwater is contributing to many of these impairments.

**Copper:** Annual average copper concentrations in Maryland's benchmark monitoring database routinely exceed the highest WQS for aquatic life (0.013 mg/L) by orders of magnitude. The highest annual average was in 2015, with an average concentration of 1.9 mg/L, over 100 times higher than the WQS (and the copper benchmark). As with zinc, there are numerous copper-related impairments in Maryland (23), and industrial stormwater is likely to be contributing to many of these.

**Lead:** As with zinc and copper, lead routinely exceeds both the applicable WQS and the lead benchmark, and is likely contributing to the many lead-related impairments in Maryland (22), including one impairment related to lead in sediment).

Because no monitoring is required in the receiving water body to establish definitively if the discharges are controlled adequately to meet WQS, the Department and the public must rely on the available data reported. **At a minimum, these data indicate that many**

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[4] Standards from COMAR 26.08.02.03-2.G(1).
[5] 20-SW Fact Sheet, at 10-11.
[6] MDE, *Maryland's Searchable Integrated Report Database [Combined 303(d)/305(b) List]* https://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/303d.aspx (last accessed Mar. 25, 2021).

**permittees are violating technology-based effluent limitations (TBELs) and that the Permit fails to adequately protect water quality or ensure compliance with WQS.**

Additional analysis strongly suggests that industrial stormwater is contributing to the ubiquitous nutrient-related impairments in the Chesapeake Bay and its tributaries. According to the Chesapeake Bay Program, an "estimated 38% of the Chesapeake Bay and its tidal tributaries met WQS during the 2016-2018 assessment period."[7] In other words, 62% of these waterways continue to suffer from nutrient- and/or sediment-related impairments. According to Maryland's searchable integrated report, there are 146 nitrogen-related impairments in Maryland alone, and 210 phosphorus-related impairments.

Nitrogen and phosphorus – like zinc, copper and lead – are routinely discharged at levels well above the applicable benchmarks in industrial stormwater. **According to Table 1 of the 20-SW fact sheet, average nitrogen concentrations are at least ten times greater than the nitrogen benchmark every year. Average phosphorus concentrations also exceed the phosphorus benchmark every year. It is virtually impossible that none of these discharges are contributing to nitrogen- or phosphorus-related impairments.** In all likelihood, most or even all of these discharges are contributing to impairments, either in the receiving waterways or downstream.

It is also worth considering the aluminum problem. Maryland does not have generally-applicable WQS for aluminum, so it is difficult to determine how many waterways have unsafe levels of aluminum. However, it is known anecdotally to the public and to the Department, that many Maryland waterways have aluminum levels that exceed the U.S. EPA's recommended water quality criteria for aluminum. It is also established that MDE's benchmark monitoring database shows aluminum levels in industrial stormwater that exceed the benchmark every year, by 2- to 9-fold. I**ndustrial stormwater is almost certainly contributing to unsafe levels of aluminum in some waterways in Maryland.**

Lastly, based on a review of data from Maryland's Searchable Integrated Report Database, 67 water bodies were added to the impaired list in 2016 and 2018.[8] Of these 67 water bodies, 41 were listed with a "Source Unknown." These impairments, together with the evidence that monitored pollutants are consistently exceeding benchmarks, further support the likelihood that industrial stormwater discharge is contributing to a failure to meet WQS. Moreover, the Anacostia and Patapsco Rivers are the only two waterways in the 64,000 square mile Chesapeake Bay watershed identified by the Chesapeake Bay Program as impaired by metals, polychlorinated biphenyls (PCBs), and toxic organic compounds.

These examples more than demonstrate, as a general matter, that the 12-SW Permit was neither complied with nor enforced.

[7] Chesapeake Progress, Water Quality Standards Attainment and Monitoring (2021), https://www.chesapeakeprogress.com/clean-water/water-quality.
[8] MDE, Maryland's Searchable Integrated Report Database [Combined 303(d)/305(b) List] (last accessed Mar. 25, 2021).

***The Draft Permit Fails to Adequately Account for a Rapidly Changing Climate.***

As a threshold issue it must be noted that the Department has wholly failed to properly consider climate change and its unique impacts on the effectiveness of the stormwater controls in the permit. Agency records indicate that the Department has neither considered nor quantitatively addressed the impacts of climate change and other meteorological changes in the development of the Permit.

On July 24, 2020, Commenters submitted a Maryland Public Information Act (PIA) request to the Department for climatological and meteorological data, analysis, and other information relied upon by the Department in its implementation and development of the Permit. On November 17, 2020, the Department released three (3) records in response to the PIA records request. As of the date of this letter, the Department has not released any additional records responsive to our request.

The transmitted records do not include, nor even reference, relevant data or analysis of climate impacts or changed meteorological conditions, nor how such factors relate to or are addressed by the design and renewal of this Permit. Included among the three responsive records is the Department's own 2020 Accounting Guidance, titled "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for National Pollutant Discharge Elimination System Stormwater Permits (June 3, 2020 Draft)." The 2020 Accounting Guidance explicitly relies upon the 2000 Maryland Stormwater Design Manual (revised 2009), which does not consider changed climate and meteorological conditions over the last thirty-year period or longer. Furthermore, the 2020 Accounting Guidance was not used to develop any enforceable requirements in this Permit. The second responsive record is the U.S. EPA's fact sheet for the proposed 2020 MSGP, which is presumably the basis for MDE's adoption at Part II.F.1 in the Permit of the EPA's own proposed provision requiring permittees merely to consider climate or extreme weather risks in the selection and design of control measures. The third responsive record is a hyperlink to a collection of presentation slide-shows that do not address climate and meteorological conditions and industrial stormwater in any discernible manner.[9] In sum, the records indicate that the Department has not undertaken any analysis or technical consideration of already-changed and assuredly worsening climate and meteorological conditions that are likely to undermine the purpose and design of the Permit and its ability to ensure compliance with WQS.

*<u>The Permit is grounded in outdated information and data pertaining to precipitation trends and projections for Maryland.</u>*

Recent studies have indicated that throughout most of the United States storm control infrastructure is under-designed for the increasing frequency and severity of extreme rainstorms.[10] One such study indicates that the increase in extreme storms paired with

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[9] https://www.mcet.org/Assets/mcet/MDE/swppp/MDE Stormwater Management 6-4-2019.pdf

[10] Daniel Wright, et al. U.S. Hydrologic Design Standards Insufficient Due to Large Increases in Frequency of Rainfall Extremes, Geophysical Research Letters, Volume 46, Issue 14 (July 28, 2019),

under-designed stormwater control systems will lead to the failure of many stormwater systems throughout the country.[11] The study also indicates that the eastern United States is experiencing extreme rain events 85 percent more often in 2017 than in 1950.[12] The lead author of this study stated in a press release “that infrastructure in most parts of the country is no longer performing at the level that it’s supposed to, because of the big changes that we’ve seen in extreme rainfall.”[13] Additionally, on a more regional scale the Phase III WIP indicates the same, that “increasingly frequent and severe extreme weather events will damage best management practices (BMPs) and necessitate more inspections, maintenance, or replacement and that more BMPs need to be installed to compensate for an anticipated loss of BMP pollution reduction efficiency.”[14]

Given the studies above, numerous entities have updated storm design standards based on more recent data and current trends and projections. These examples will be discussed in the recommendation section below as well as attached in the appendix to this comment. Also, of note is the recent passage of SB 227/HB 295 by the Maryland legislature, this bill requires the Department to regularly update stormwater management regulations and incorporate updated precipitation data into the regulatory update.[15] This new law will be discussed further in the recommendation section.

The trend of identifying climate changes to weather and precipitation and then changing metrics and best practices based on that has resulted in NOAA updating their new “Normals” to display a 15 year.[16] This update was done to bolster well-established scientific acceptance of today’s changed precipitation (and broader weather) patterns, and underscore the availability of more recent data and the new normals will be based on a 15-year period that more closely represents the weather and precipitation of today.[17] These updates and guidance is also wanted by industry so they can better predict and plan and build resilient infrastructure.[18]

*<u>Increased flooding and extreme weather are increasing stormwater pollution and negatively impacting water quality.</u>*

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available at https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019GL083235; Abigail Eisenstadt, U.S. Infrastructure Unprepared for Increasing Frequency of Extreme Storms, American Geophysical Union (Aug. 1, 2019), available at https://news.agu.org/press-release/us-infrastructure-unprepared-for-increasing-frequency-of-extreme-storms/.

[11] *Id*.

[12] *Id*.

[13] *Id.*

[14] *Id*. at 146.

[15] https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/SB0227

[16] U.S. National Oceanic and Atmospheric Administration, NOAA’s Updated U.S. Cliamte Data Will Establish “New Normal”. https://www.ncei.noaa.gov/news/Upcoming-NOAA-2020-Climate-Normals Last accessed April 8, 2021.

[17] Id.

[18] National Public Radio, Why There is a Change Coming To Your Local Weather Forecast https://www.npr.org/2021/04/05/984353193/why-there-is-a-change-coming-to-your-local-weather-forecast. Last Accessed April 8. 2021.

Climate change and its associated increase in flooding and extreme weather events will increase stormwater pollution in the Chesapeake Bay watershed and hinder progress toward achieving water quality improvements required by state and federal law, including the Clean Water Act and the Chesapeake Bay TMDL. These effects must be considered in the Permit.

The Chesapeake Bay region is already experiencing flooding from sea level rise, and flooding will only continue to get worse. The pace of sea level rise is expected to increase dramatically in Maryland. According to NOAA tide gauges, sea levels have risen about 13 inches over the last 100 years,[19] and the likely range of sea level rise in Maryland between 2000 and 2050 is 0.8 to 1.6 feet, with a one-in-twenty chance of sea level rise exceeding 2.0 feet.[20] If greenhouse gas emissions continue to grow unchecked, the likely range of sea level rise in Maryland is 2.0 to 4.2 feet over the next century, two to four times the rise experienced in the prior century.[21] In fact, the pace of inundation could actually be far worse in some areas, as other factors like land subsidence accelerate the rising water levels.[22]

As a result of sea level rise, coastal cities and towns around Maryland are regularly experiencing flooding simply from high tide. The National Oceanic and Atmospheric Administration projects that under a low sea level rise scenario (0.5 meter global rise by 2100), by 2100 "high tide flooding will occur 'every other day' (182 days/year) or more often within the Northeast and Southeast Atlantic."[23] Under an intermediate sea level rise scenario (1.0 meter global rise), "high tide flooding will become 'daily' flooding (365 days/year with high tide flooding)."[24]

Climate change is also increasing the frequency of extreme weather, producing stronger and wetter storms. In 2016 and 2018, two intense storms hit historic Ellicott City, Maryland, producing a one in one thousand years rainfall event.[25] That amounts to a 0.1% probability storm per year, hitting the same city twice in only two years.[26] The cost of such extreme weather events is staggering. In six of the last ten years, the damage caused by the average number of storms exceeded $1 billion per year.[27] In 2017, 16 storms

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[19] Center for Operational Oceanic Services and Products, Sea Level Rise, U.S. National Oceanic and Atmospheric Administration. Available at https://tidesandcurrents.noaa.gov/sltrends/. Last accessed Jan. 12, 2021.

[20] Donald F. Boesch, et. al, University of Maryland Center for Environmental Science, *Sea-level Rise Projections for Maryland 2018*, iii (2018). https://mde.maryland.gov/programs/Air/ClimateChange/MCCC/Documents/Sea-LevelRiseProjectionsMaryland2018.pdf.

[21] *Id.*

[22] Maryland Geological Survey, Land Subsidence Monitoring Network, http://www.mgs.md.gov/groundwater/current/land_subsidence.html (last accessed Dec. 7, 2020).

[23] NOAA, Patterns and Projections of High Tide Flooding Along the U.S. Coastline Using a Common Impact Threshold, NOAA Technical Report NOS CO-OPS 086, ix (2018), https://tidesandcurrents.noaa.gov/publications/techrpt86_PaP_of_HTFlooding.pdf.

[24] *Id.*

[25] Phase III WIP at 42.

[26] *Id.*

[27] *Id.* at 43–44.

individually cost over $1 billion, and the overall storm cost for the year was a record-breaking $306.2 billion.[28] The rising costs associated with storm damage necessitate factoring climate change and increased precipitation directly in the 20-SW permit, especially for facilities located in the coastal areas most susceptible to the risks of climate change, i.e., the areas already experiencing sea level rise and flooding during heavy rainfall events.

*Changing precipitation is worsening stormwater pollution and water quality.*

Precipitation frequency, duration, and intensity have all been increasing in Maryland, and will continue to increase for the foreseeable future. These trends will have significant impacts on stormwater quantity and quality. The Department must consider these impacts.

The Congressionally-mandated Fourth National Climate Assessment[29] clearly shows that precipitation intensity - meaning the amount of precipitation falling during storm events of a certain size or duration - is trending upward in the Mid-Atlantic and Northeastern United States, and is increasing faster than anywhere else in the U.S.[30] The authors of an earlier Climate Assessment noted that "water quality [was] diminishing in many areas, particularly due to increasing sediment and contaminant concentrations after heavy downpours."[31] The increase in precipitation volume and intensity has well-documented direct negative impacts on water quality and aquatic ecosystem health because more intense rain events causes increased soil erosion and runoff.[32] As of December 2020, the Chesapeake Bay Program has allocated an additional reduction of 1.143 million pounds of nitrogen to Maryland to meet the Bay TMDL's 2025 deadline.[33] This additional reduction is needed to account for increased loads driven by climate impacts with the watershed.[34]

These indisputable trends make it all the more important that the Department focus on industrial stormwater practices that control volume, including retention and infiltration practices, as discussed elsewhere in these comments. After all, industrial stormwater is not just a source of toxic pollutants from industrial land, it is also a direct cause of erosion.

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[28] *Id.* at 44.
[29] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018, https://nca2018.globalchange.gov/.
[30] See id., Chapter 18, Northeast, https://nca2018.globalchange.gov/chapter/18/.
[31] National Climate Assessment: Key Findings - Water Supply (2014), https://nca2014.globalchange.gov/highlights/report-findings/water-supply.
[32] Fourth National Climate Assessment, Chapter 18, Key Message Number 1, Intense Precipitation. https://nca2018.globalchange.gov/chapter/18/ (last visited Jan. 17, 2021).
[33] The Chesapeake Bay Program, Requesting Final Partnership Decisions on 2025 Climate Change Impacts, pg.4, https://www.chesapeakebay.net/channel_files/41853/climatechangefinaldecisions_psc_(002).pdf
[34] *Id*.

*Extreme heat is worsening stormwater pollution and water quality.*

Studies show that Maryland's freshwater aquatic resources are directly threatened by higher water temperature.[35] Higher water temperatures are caused by the combination of climate change, deforestation, increases in rain events, and high percentages of impervious surfaces.[36] This results in higher ambient water temperatures as well as more and higher-temperature stormwater runoff.[37] This combination has negative impacts on the biological health of Maryland's water resources.[38] The lack of PIA records suggest that the Department has not considered how industrial stormwater, thermal pollution and receiving water quality are related and how the Permit could be designed to address the potential negative impacts. Additionally, thermal pollution should be strictly regulated for any 20-SW facility that has potential to discharge to a use class III, III-P, IV, and IV-P, as all of these use classes support cold water stream habitats and thus are very sensitive to increases in temperature pollution.[39] The Permit should incorporate such temperature requirements as enforceable conditions for those facilities. More generally, the lack of enforceability, highlighted throughout this comment, will only exacerbate the already experienced and expected worsening of climate-related stormwater impacts.

***Load Reduction Data Should Be Disaggregated, and Impervious Surface Requirements Maintained to Meet Expectations from Set by 12SW Permit and the WIP.***

When the Department released the prior 12-SW general permit, the Department included as a special condition the 20 percent impervious surface restoration ("ISR") requirement. This ISR requirement was introduced to the industrial stormwater general permit consistent with the WIP's "equitable principles" that called for a distribution of load reduction responsibilities "regardless of cost consideration." Thus, permittees of more than 5 acres within the Chesapeake Bay watershed were subject to the ISR requirements in the same manner as the Phase I municipal stormwater (MS4) permittees and regardless of the acknowledged higher cost per pound of nutrients removed compared with other sectors.

In Maryland's Phase I WIP, industrial stormwater permit holders were treated as part of a broader "urban regulated" sector. EPA expressed its expectations that Maryland and the other Bay jurisdictions submit WIPs that "identify the amount and location of loads from individual (where possible) or, as necessary, aggregate point sources" and "include information for permit writers to issue permits for point sources that are consistent with

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[35] *See, e.g.,* N. LeRoy Poff et al., *Aquatic Ecosystems and Global Climate Change, Pew Center on Global Climate Change (Jan. 2002), available at https://www.pewtrusts.org/-/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/protecting_ocean_life/envclimateaquaticecosystemspdf.pdf.*

[36] Russell Jones et al, *Climate change impacts on freshwater recreational fishing in the United States, Mitig Adapt Strateg Glob Change 18, 731–758 (2013), https://doi.org/10.1007/s11027-012-9385-3.*

[37] *Id.*

[38] *Fourth National Climate Assessment, Chapter 18, https://nca2018.globalchange.gov/chapter/18/ (last visited Jan. 17, 2021).*

[39] COMAR 26.08.02.03-03.

individual, aggregated, or gross wasteload allocations." Thus, the Phase I WIP listed all known industrial stormwater permittees at the time, but did not disaggregate the allocated load to individual facilities. In the Phase I WIP, the Department acknowledged that, "[l]ooking beyond Phase I to the Phase II Watershed Implementation Plan … the disaggregation of aggregate stormwater loads for distribution to the various NPDES-regulated stormwater permit categories may be accomplished as part of the State's Phase II Plan." Indeed, in the Phase II WIP, released in 2012, the Department noted that it "disaggregated the overall NPDES-regulated stormwater reduction target for each local area into separate allocations by permit type."

The ISR was specifically designed to help achieve the waste load allocation for the "urban regulated" sector in the Phase II WIP. **In 2018, regarding load reduction requirements and the ISR under the 12SW, the Department stated that data indicates that "59% of the benefit to the Bay is coming from 13% of the facilities subject to restoration."[40] This indicates that the ISR standard is by far the most effective way of reducing stormwater pollution and addressing cumulative impacts of aggregate point sources**

The Department calculated the aggregate reductions in nitrogen and phosphorus for all industrial stormwater dischargers to achieve by 2025 as 86,846 pounds per year, and 5,713 pounds per year, respectively. Again, these reduction targets were solely attributable to the Chesapeake Bay ISR condition applicable to a minority of permittees and based on average nutrient removal efficiencies and event-mean concentrations developed from Phase I MS4 monitoring data (2.0 mg/l N; 0.27 mg/l P). This all makes clear that the ISR requirement is demonstrated to be one of the most effective permit conditions at reducing stormwater runoff thereby protecting water quality and public health.

The importance of impervious surface restoration was also noted by Dr. Robert Roseen in his analysis and expert report on the Permit, which is attached to these comments as Appendix C. Dr. Roseen emphasized the substantial impact of ESD practices in reducing pollutants of all types, but also described the significant lack of control of polluted runoff that would result if the current ISR requirement is not retained in the Permit for those facilities previously subject to it and expanded for an additional segment of the regulated universe. For example, in an analysis of one watershed, the Gwynns Falls in Baltimore City and Baltimore County, Dr. Roseen demonstrated that the projected sediment reductions from the current ISR implementation represented less than one-fifth of one percent (0.16%) of the total sediment load from industrial property in the watershed.

Dr. Roseen's assessment is that "very little reduction from industrial facilities is being achieved in relation to the total load and the reduction potential" that would be possible if

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[40] MDE Permit Modification Fact Sheet for the General Permit for Discharges from Stormwater Associated with Industrial Activities Discharge Permit Number 12-SW-A, NPDES Permit Number MDR00. Pg.3. https://mde.maryland.gov/programs/Permits/WaterManagementPermits/Documents/GDP%20Stormwater/Modification%20A%20%282018%29/12SW%20ModA%20FactSheet.pdf

the ISR requirement is both retained across permit cycles and slowly expanded to include additional facilities regulated under the Permit.[41,42] If the 20% ISR standard is retained and if a separate ISR standard is developed for additional facilities, even at amounts less than 20% per permit cycle, the cumulative amount of pollution reduction after several permit cycles is potentially enormous, including tens of thousands of pounds of sediment and, depending on the stringency of the expanded ISR standard for newly covered facilities, a nitrogen reduction of several thousand pounds,[43] which would represent a nitrogen reduction roughly equivalent in scale to the upgrade of a mid-sized wastewater treatment plant. More importantly, Dr. Roseen's analysis demonstrates that more than three-quarters of a ton of lead, and and more than 300 pounds of toxic heavy metals, such as Aluminum, Copper, and Zinc per year would be controlled and kept away from those living in the surrounding communities in the Gwynns Falls through infiltration and retention practices that the literature demonstrate are highly effective at reducing the toxicity of discharges.[44] If the standard is retained for multiple permit cycles and expanded to a broader scope of permittees the ISR requirement would eventually reduce tens of thousands of pounds of highly toxic lead and other metals per year, thus providing a significant public health benefit for surrounding communities.

Dr. Roseen also described the need to broaden the definition of an "impervious surface" subject to the ISR requirement, as many sites contain compacted dirt and/or gravel that generate comparable amounts of runoff as a paved surface and, in fact, can contribute orders of magnitude greater amounts of sediment resulting from exposed soil and dust.[45] As noted in his report, what matters in the context of whether a site is discharging to waters of the State is whether stormwater infiltrates, not whether a surface is paved. Dr. Roseen analyzed a particular site with a large expanse of unpaved dirt and notes that the application of an appropriate methodology that is scientifically supported and consistent with the relevant NRCS engineering standards would result in almost a 50 percent increase in the area subject to the 20 percent ISR requirement.[46] Expanded statewide, this means an appropriately designed ISR standard that includes highly compacted dirt and gravel surfaces would result in a much greater area and volume of polluted runoff being controlled. This would greatly enhance the prevention of turbid flows from permitted sites covered in dirt and gravel and would make the dust suppression protections in the Permit more effective in reducing air and water pollution.

Dr. Roseen's analysis also emphasizes the need for a much greater focus on practices that infiltrate and filter runoff to address both the quantity and quality of runoff. This superior approach would not only reduce runoff from the site but also the contribution to nutrient and sediment pollution from streambank erosion caused by the unnatural and

[41] Dr. Robert Roseen, Concerns Regarding the Draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities Discharge Permit (April 15, 2021). Page 21.
[42] *Id.* at 16. Dr. Roseen notes that several governments and EPA have used or are exploring various acreage thresholds for triggering certain permit requirements, including a 2-acre and 3-acre trigger.
[43] *Id.* at 26-27.
[44] *Id.* at 22-24.
[45] *Id*. at 15-20.
[46] *Id.* at 18-19.

elevated flows from these impervious surfaces.[47] Such an approach would also strongly counsel against allowing for either pollution trading or alternative practices in the Permit that do nothing to reduce runoff.

Finally, as climate change continues to cause an increase in the frequency of intense precipitation events, a perpetuation of the ISR standard also results in millions of gallons of stormwater being retained on site and not flowing into the surrounding communities, where it causes property damage, delivers toxic pollutants into homes, and overwhelms storm sewers and small waterways. Those living in the Gwynns Falls watershed know these impacts all too well. Devastating flooding in the Frederick Avenue Corridor caused significant damage and disruption to many residents after a summer rain in 2018. These flashy storms wreak havoc in areas with too much untreated impervious surface, and industrial toxins only add to the hazards of local communities.

[47] *Id.* at 32.

## The Permit Lacks Adequate Consideration of Environmental Justice and Contributes to Disproportionate Harm to the Health of Overburdened Marylanders

***Inadequate Regulation of Industrial Stormwater Threatens the Health and Safety of Vulnerable Marylanders.***

Maryland law requires the Department to address human health threats posed by industrial stormwater dischargers through development of CWA NPDES permitting and other regulations. “The Secretary shall investigate all nuisances that affect the public health and devise means for the control of these nuisances;” and “[…] may adopt rules and regulations necessary to prevent and control occupational diseases.” MD Env Code § 10-102; MD Env Code § 6-701. “[B]ecause pollution is a menace to public health and welfare, [and] creates public nuisances, [...] it is the policy of this State: (1) To provide that no waste is discharged into any waters of this State without first receiving necessary treatment or other corrective action to protect the legitimate beneficial uses of the waters of this State; [and] (4) Through innovative and alternative methods of waste and wastewater treatment, to provide and promote prevention, abatement, and control of new or existing water pollution[...]” MD Env Code § 9-302. That is, the Department has the authority to include provisions in this Permit designed to prevent public and occupational exposures to industrial stormwater contaminants.[48]

The Department has the authority to deny permit coverage to applicants whose facility operations impose undue risks of hazardous pollution. Maryland Regulation 26.08.04.09(B)(4) requires general industrial stormwater permittees to comply with, among other things, Md. Code, Environment Article, Title 7, Subtitle 2, which covers “Controlled Hazardous Substances.” Environment Article § 7-240 provides that the Department “may deny an application for a facility permit if [the Department] finds,” that the “controlled hazardous substance facility cannot handle, treat, store, or dispose of a particular controlled hazardous substance without imposing an undue risk to the environment.”

The Department’s duties and authorities to address the public health and water quality impacts of regulated industrial stormwater dischargers are also not limited to pollutant discharges in water media only. “For the purposes of [Water Management] subtitle, the Department of the Environment shall have and may exercise […] every incidental power

[48] The Department has consistently recognized the dual purpose and benefit of industrial stormwater regulations for environmental quality and human health. At page 56 of 20-SW Fact Sheet, the Department recognizes that the control measures required to “minimize generation of dust and off-site tracking of raw, final or waste materials” address, in part, the threat that airborne particulate matter poses to human health. At page 49 of the 20-SW Fact Sheet, the Department recognizes that the control measures required for compliance with technology-based effluent limitations also serve a purpose for worker health and safety. Lastly, at page 84 of the 20-SW Fact sheet, the Department asserts that benchmark monitoring thresholds represent a level of concern above which industrial stormwater pollution could “affect human health from ingestion of water or fish.” https://mde.maryland.gov/programs/Permits/WaterManagementPermits/Documents/GDP%20Stormwater/20SW/20SW-TD-FactSheet.pdf.

necessary to carry out the purposes of this subtitle." MD Env Code § 4-405. "It is the purpose of this subtitle to provide additional and cumulative remedies to prevent, abate, and control the pollution of the waters of the State." MD Env Code § 4-403. Indeed, where point-sources emit non-theoretical, concrete and measurable pollutants that contaminate state waters, the Department is "obligated to regulate [those discharges] in accordance with their responsibility to properly administer the CWA." *In Re Petition of Assateague Coastal Trust*, Case No: 482915-V (finding that Maryland law required the Department to regulate air emissions of ammonia in a NPDES permit). "Acquiring a permit does not enable a point source to dump pollutants indiscriminately." *Id*.

The Department has acknowledged that "[n]ational studies show that Environmental Justice (EJ) Communities bear a disproportionate share of the negative environmental consequences resulting from industrial activities, land-use planning and zoning, municipal and commercial operations or the execution of federal, state, local programs and policies."[49] The Department has committed the Department in its Environmental Justice Policy and Implementation Plan to, by July, 2021, "reduce current and future inequities, [and] develop a plan to expand outreach and communication efforts in EJ Communities for MDE permit-related actions."[50] Further, the Department also commits by July, 2021, to "increase the level of communication among the agency, the permit applicant, and EJ Communities."[51] The Department defines EJ Communities as "a community with a low-income or minority population greater than twice the statewide average."

The Department is also authorized to work with the Maryland Commission on Environmental Justice and Sustainable Communities (CEJSC) and communities disproportionately burdened by industrial pollution to resolve the environmental justice impacts of the issuance and implementation of the Permit. The Department has the authority and duty to "[a]dvise, consult, and cooperate with other units of the State [...] [and] affected groups [...] to further the purposes:" of the Water Management subtitle of the Code of Maryland. MD Env Code § 4-405(a). "'[E]nvironmental justice' means equal protection from environmental and public health hazards for all people regardless of race, income, culture, and social status." MD Env Code § 1-701.

Public participation must be central to the Department's regulatory process. "In the exercise of its responsibilities to improve, conserve, and manage the quality of the waters of the State, the Department recognizes and shall utilize the general principles set forth in this regulation for decision making and action." Md. Code Regs. 26.08.01.02.A. "The Department shall made [sic] a maximum effort to seek out and involve the interested public both at the preliminary stage and throughout the process of development of regulations, plans, and other program actions." Md. Code Regs. 26.08.01.02.E(2). "The major objectives of public participation include greater responsiveness of governmental actions to public concerns and priorities . . . ." Md. Code Regs. 26.08.01.02.E(4).

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[49] Maryland Department of Environment. Maryland Department of the Environment Environmental Justice Policy and Implementation Plan (Dec. 31, 2020) at 1. Available at https://mde.maryland.gov/Documents/MDE_EJ_Env%20Justice%20Policy_Final_Dec2020.pdf.
[50] *Id.* at 3.
[51] *Id.*

As discussed throughout this comment, the Permit does not adequately control industrial stormwater contamination to protect water quality, designated uses, and public health. Water quality based effluent limitations are not as stringent as necessary to restore impaired waters and are not consistent with waste load allocations, notwithstanding the Department's conclusory statements to the contrary unsupported by technical analysis. Corrective action and benchmark monitoring requirements, taken together, also fail to ensure that impermissible pollution, the effectiveness of stormwater control measures, and compliance with other effluent limitations in the Permit are even detected by dischargers and, therefore, the Department, let alone timely resolved within the permit term. Permit terms are not expressly enforceable; this sends a clear signal to permit holders that compliance and "good faith effort" is requested but not required. Such an approach to compliance assurance is impermissible and must be rectified. The lack of enforceability of the Permit—demonstrated both by its terms and by the Department's history of failing to pursue violations and require compliance, simply compounds the rate of noncompliance. It is a pattern that must be reversed. In short, **this Permit fails to adequately control contaminants that threaten the health and safety of vulnerable Marylanders and resolve the disproportionate impacts of this pollution on overburdened communities.**

The Department should implement policies to align decision making with Executive Order 12898 and ensure Department decision making in the industrial stormwater context is not perpetuating and continuing disproportionate human health and environmental effects on minority and low-income populations.[52] The Department should also develop a strategy for implementing environmental justice in industrial stormwater and promoting nondiscrimination in this context. Additionally, given that the Department receives federal funding to implement environmental programs in Maryland, Title VI of the Civil Rights Act of 1964 is applicable to Departmental decision making pertaining to the Permit and Industrial Stormwater.[53] The EPA has already determined that the Department receives federal financial assistance in a prior proceeding[54] and as such the Department must ensure that decision making regarding this Permit's renewal is not continuing to discriminate on the basis of race, color, and national origin.[55]

The Department should undertake thorough technical analysis, consultation, and consideration of reforms to address the human health impacts, disproportionate burden, and widespread noncompliance with Permit 12-SW before its reissuance. Toxic and hazardous contaminants discharged and emitted from industrial stormwater permittees

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[52] https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf and https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice#:~:text=Executive%20Order%20(E.O.)&text=for%20all%20communities.-,E.O.,practicable%20and%20permitted%20by%20law.
[53] https://www.justice.gov/crt/fcs/TitleVI
[54] EPA External Civil Rights Compliance Office, Information Resolution Agreement (Jan 30, 2019) pg. 4. https://www.epa.gov/sites/production/files/2019-02/documents/2019-01-30_final_resolution_letter_and_agreement_to_md_recipients_-_case_28_29_and_30_r-16-r3.pdf Last Accessed April 9, 2021.
[55] https://www.justice.gov/crt/fcs/TitleVI

threaten the health and safety of workers and other vulnerable populations. Ongoing violations and noncompliance with the current permit are widespread, persistent, and result in a substantial burden on water quality and public health. The Department's posture towards enforcement, compliance assistance, has failed throughout the permit term to resolve or otherwise reduce noncompliance and substantial contamination. The Department's failures to develop an enforceable permit that addresses human health harms and to implement an enforcement regime that prevents widespread noncompliance perpetuate, and inevitably worsen, the disproportionate pollution burden imposed on Maryland's marginalized communities who live and work near industrial facilities. In other words, because there already is so much pollution in marginalized communities due to a high concentration of industrial facilities in these areas, these communities are hit even harder by a failure of the Department to enforce the permit, which allows rampant noncompliance and increased community exposure to harmful pollutants. **To remedy these failings, the Department should (1) conduct a cumulative impacts assessment and tailor action on the reissuance of the Permit in response to the assessment's findings; and (2) undertake the maximum effort to seek out and involve the CEJSC and affected communities in (a) contributing data and other information to the design and implementation of the cumulative impacts assessment and (b) tailoring action on the permit reissuance to correct enforceability deficiencies and respond to community needs, concerns, and priorities.**

***Pollution from Industrial Stormwater Dischargers is a Public Health Threat.***

Industries regulated under the permit, such as scrap metal recycling facilities, auto salvage yards, and landfills, pose a variety of hazards to nearby communities. Metal torch cutting and welding, practices often employed at metal recycling facilities, can generate heavy metal-containing particle emissions and fumes, which may be inhaled. Fenceline air monitoring of these facilities in Houston, Texas detected concentrations of carcinogenic metals, such as nickel compounds, that contributed to increased cancer risk among nearby residents, even for facilities operating within legal limits.[56] Metal recyclers that operate auto shredders also generate a waste residue known as auto fluff, which may contain contaminants such as petroleum hydrocarbons, lead, and cadmium. Auto fluff qualifies for treatment as a hazardous waste and has been detected in dust over a half mile from shredding facilities.[57]

Workers at auto salvage and metal recycling facilities are regularly exposed to elevated levels of toxic metals such as arsenic, beryllium, hexavalent chromium, and cadmium.[58]

[56] Symanski E, et al. Metal Air Pollution Partnership Solutions: Building an Academic-Government-Community-Industry Collaboration to Improve Air Quality and Health in Environmental Justice Communities in Houston. *Environ Health.* 2020;19:39.
[57] Geertsma M. *What's the Problem with a Facility that "Recycles" Cars?.* Natural Resources Defense Council. August 8, 2018. Available at https://www.nrdc.org/experts/meleah-geertsma/whats-problem-facility-recycles-cars.
[58] OSHA. *Guidance for the Identification and Control of Safety and Health Hazards in Metal Scrap Recycling.* Occupational Safety and Health Administration, U.S. Department of Labor. OSHA 3348-05, 2008.

Chronic occupational exposure to these toxins is linked to increased rates of heart and lung disease, lung cancer, kidney damage, brain dysfunction, and suppression of the immune system. Studies of U.S. electronic scrap recycling facilities have found heavy metal-laden dust on workers' skin and clothes, and elevated blood lead levels among workers.[59] The harms may also be immediate. Since 2010, at least three metal recycling facilities in the United States have experienced accidental chlorine gas releases, injuring more than 30 workers (in one case, fatally).[60]

In addition to occupational exposures, heavy metal-laden dust can be brought home by workers or blown off-site by wind, which can contaminate nearby soil and homes, exposing children, pregnant women, and others. Short- and long-term exposure to lead through inhalation or ingestion can cause abdominal pain, fatigue, headaches, irritability, and memory loss in adults.[61] There is no safe level of lead exposure in children, and exposure can cause permanent brain and nervous system damage, delayed growth and development, learning and behavioral issues, and speech problems.[62]

Hazards and health impacts associated with working and living in close proximity to landfills are well documented. Landfills can produce gases such as methane, ammonia, hydrogen sulfide, and NMOCs, like benzene, which may combust if in excess amounts.[63] The Agency for Toxic Substances and Disease Registry has recommended investigation of storm sewers on or adjacent to landfills, which may convey landfill gases that could pose a risk of asphyxiation for utility workers in confined spaces.[64] Fungi and bacteria, like Staphylococcus and E. coli, have also been detected above recommended levels in the air at landfill sites.[65] These chemical compounds and bacteria, as well as disposal of certain types of waste (like manure) may produce noxious odors that cause headaches, nausea, respiratory issues, and stress in nearby communities.[66] One study in Cecil County, Maryland found that hydrogen sulfide emitted by a landfill was the source of a "rotten egg" odor detected by residents.[67] Particulates can also trigger respiratory health

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[59] Ceballos D, et al. Metal Exposures at Three U.S. Electronic Scrap Recycling Facilities. *J Occup Environ Hyg.* 2017;14(6):401-408; Ceballos D, et al. A Pilot Assessment of Occupational Health Hazards in the US Electronic Scrap Recycling Industry. J Occup Environ Hyg. 2015;12(7):482-488.
[60] Harvey RR, et al. Fatal Chlorine Gas Exposure at a Metal Recycling Facility: Case Report. *Am J Ind Med.* 2018;61(6):538-542.
[61] CDC. *Lead: Information for Workers.* Centers for Disease Control and Prevention, The National Institute for Occupational Safety and Health. Available at https://www.cdc.gov/niosh/topics/lead/health.html.
[62] CDC. *Health Effects of Lead Exposure.* Centers for Disease Control and Prevention. Available at https://www.cdc.gov/nceh/lead/prevention/health-effects.htm.
[63] ATSDR. *Landfill Gas Primer, Chapter 3: Landfill Gas Safety and Health Issues.* Agency for Toxic Substances and Disease Registry. 2001. Available at https://www.atsdr.cdc.gov/HAC/landfill/PDFs/Landfill_2001_ch3.pdf.
[64] ATSDR, 2001.
[65] Odonkor ST and Mahami T. Microbial Air Quality in Neighborhoods near Landfill Sites: Implications for Public Health. *J Environ Public Health.* 2020;2020:4609164.
[66] Malakar A, et al. Nanomaterials in the Environment, Human Exposure Pathway, and Health Effects: A Review. *Sci Total Environ.* 2021;759:143470.
[67] Tagaris E, et al. A Methodology to Estimate Odors Around Landfill Sites: The Use of Methane as an Odor Index and Its Utility in Landfill Siting. *J Air Waste Manag Assoc.* 2003;53:629-634.

issues, especially for sensitive populations. One study of Staten Island, New York showed an increase in self-reported wheezing among people with asthma living near a landfill.[68] These effects may be amplified for workers. Landfill workers face an increased risk of various degenerative diseases, infections, and other illnesses through regular exposure to toxic, dust-based metals, particulates, bacteria, and fungi.[69] Furthermore, proximity to landfills has been linked to adverse birth outcomes. Research shows an increased risk of congenital malformations and low birth weight in communities near landfills, especially those containing hazardous waste.[70]

Whenever it rains or snows, heavy metals and other contaminants on impervious surfaces may be redistributed throughout a community. In this way, stormwater acts as a vehicle for transporting toxic contaminants released into the air and soils into nearby communities and waterways, compounding the existing hazards associated with living near these facilities. In Maryland, stormwater is the fastest-growing source of pollution to local streams and rivers and jeopardizes progress to restore the Chesapeake Bay. The Anacostia and Patapsco Rivers are the only two waterways in the 64,000 square mile Chesapeake Bay watershed identified by the Chesapeake Bay Program as impaired by metals, polychlorinated biphenyls (PCBs), and toxic organic compounds.[71] Chemical pollutants can be toxic to aquatic life, disrupting growth, reproduction, and survival of fish and other creatures. While not the only source, industrial stormwater runoff may contribute to chemical bioaccumulation in fish tissue, which may be harmful to humans who consume contaminated fish. Mercury has been detected at hazardous levels in freshwater fish of the Chesapeake Bay watershed, particularly in the Potomac and Susquehanna rivers.[72] Furthermore, the Gunpowder and Bird rivers continue to have fish consumption advisories due to elevated concentrations of PCBs.[73] Overall, as Department staff are aware, the National Stormwater Quality Database clearly shows elevated concentrations of metals and more hazardous pollutants from samples taken near urban industrial sites, providing overwhelming evidence to the regulatory community of the need for exceedingly strict controls at industrial stormwater sites to protect urban communities and waterways from a variety of toxic and carcinogenic substances.

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[68] ATSDR, 2001.
[69] Chalvatzaki E, et al. A Case Study of Landfill Workers Exposure and Dose to Particulate Matter-Bound Metals. *Water Air Soil Pollut.* 2014;225:1782.
[70] Porta D, et al. Systematic Review of Epidemiological Studies on Health Effects Associated with Management of Solid Waste. *Environ Health.* 2009;8:60; Goldberg MS, et al. Low Birth Weight and Preterm Births Among Infants Born to Women Living Near a Municipal Solid Waste Landfill Site in Montreal, Quebec. *Environ Res.* 1995;69(1):37-50; Kihal-Talantikite W, et al. Systematic Literature Review of Reproductive Outcome Associated with Residential Proximity to Polluted Sites. *Int J Health Geog.* 2017;16(1):20.
[71] MDE, Maryland's Searchable Integrated Report Database [Combined 303(d)/305(b) List] https://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/303d.aspx (last accessed Mar. 25, 2021).
[72] Willacker JJ, et al. Mercury Bioaccumulation in Freshwater Fishes of the Chesapeake Bay Watershed. *Ecotoxicology.* 2020;29(4):459-484.
[73] Wheeler TB. *PCB Cleanup Makes Uneven Progress.* Bay Journal. August 5, 2020. Available at https://www.bayjournal.com/news/pollution/pcb-cleanup-makes-uneven-progress/article_e4f8c850-d33f-11ea-bd0d-4313697cd6e2.html.

In urban areas where impervious surfaces dominate the landscape, contaminated runoff from rainfall or snowmelt can be particularly harmful to nearby communities. In 2016, for example, stormwater runoff from Baltimore Scrap, a metal recycling facility, was found to have excess levels of heavy metals.[74] One study of 20 industrial sites in the United States (encompassing 10 activities, including landfilling, junkyards, and scrap/recycling) found elevated levels of copper, zinc, nickel, and other contaminants in stormwater runoff from these facilities, in some instances exceeding concentrations in landfill leachate.[75] This can be especially hazardous to children due to their increased likelihood of exposure and susceptibility to contaminants in soil.[76] Elevated blood lead levels have been detected in children who live near landfills due to soil exposure.[77] Runoff of toxic contaminants may also pollute drinking water sources. A 2008 study of drinking water at a federal facility found detectable levels of some industrial contaminants (including manufacturing additives, industrial solvents, petroleum byproducts, and pavement- and combustion-derived compounds) in both water supplies from the Potomac River and in samples of the facility's treated drinking water.[78] Contamination of groundwater used for drinking water by landfill leachate has been linked to increased cancer mortality rates, especially from bladder cancer.[79] Nanomaterials, such as titanium dioxide and zinc oxide, have also been detected in water sources and soil around landfills, industrial discharges, and municipal wastewater.[80] While still an emerging field of study, evidence suggests that exposure to certain nanomaterials through ingestion, inhalation, or skin penetration may be toxic to humans.

The Quarantine Road Landfill site (State Permit 12SW0257, NPDES Permit MDR000257), located in Baltimore City, demonstrates the importance of requiring universal monitoring for flow under the General Permit, and additional sector specific parameters for landfills, to ensure WQS will be met. The 12-SW Permit applicable to the Quarantine Road Landfill required stormwater benchmark monitoring for iron and TSS, but these parameters are insufficient to evaluate whether the stormwater control measures are adequate to prevent exceedance of WQS. Because of ongoing concerns about this site, the Department requires semi-annual monitoring reports to be provided, which include groundwater and other monitoring results. The first semi-annual 2019

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[74] Wheeler TB. *Investigation: Baltimore Scrapyard Violations Raise Questions about MD Pollution Enforcement.* Bay Journal. November 7, 2017. Available at http://marylandreporter.com/2017/11/02/baltimore-scrapyard-violations-raise-questions-about-state-pollution-enforcement/.

[75] Marques M and Hogland W. Stormwater Run-Off and Pollutant Transport Related to the Activities Carried Out in a Modern Waste Management Park. *Waste Manag Res.* 2001;19(1):20-34.

[76] Schachter AE, et al. Mechanisms of Children's Soil Exposure. *Curr Prob Pediatr Adolesc Health Care.* 2020;50(1):100742.

[77] Kim MA and Williams KA. Lead Levels in Landfill Areas and Childhood Exposure: An Integrative Review. *Public Health Nurs.* 2017;34(1):87-97.

[78] Brayton MJ, et al. *Organic Compounds in Potomac River Water Used for Public Supply near Washington, D.C., 2003–05*. U.S. Geological Survey Fact Sheet 2007–3085. 2008.; Kingsbury, JA, et al. Anthropogenic Organic Compounds in Source Water of Nine Community Water Systems that Withdraw from Streams, 2002–05. U.S. Geological Survey Scientific Investigations Report 2008–5208. 2008.

[79] Vrijheid M. Health Effects of Residence Near Hazardous Waste Landfill Sites: A Review of Epidemiologic Literature. Environ Health Perspect. 2000;108(Suppl 1):101-112.

[80] Malakar, 2021.

Monitoring Report for the Quarantine Road Landfill, submitted to the Department by SCS Engineers, shows several parameters in exceedance or equal to their respective MCLs: antimony, arsenic, beryllium, cadmium, chromium, lead, mercury, nitrate, and selenium. Additional general chemistry parameters were also detected at elevated levels: ammonia, calcium, hardness, iron, magnesium, manganese, sodium, specific conductance, total dissolved solids, sulfates, and chlorides.[81]

Because the only benchmark monitoring requirements for landfills are for iron and TSS, the Department and the public have no way of knowing whether the stormwater discharged pursuant to the General Permit contains any of the numerous pollutants that are exceeding MCLs for groundwater. Particularly, it is important to know whether corrective action or additional implementation measures are warranted for additional key pollutants, like ammonia, cadmium, calcium, chloride, magnesium, mercury, lead, and sulfates, which were elevated in the groundwater monitoring results at the site and are also associated with landfill leachate.[82]

Additionally, the risk the site poses to the receiving water body cannot be fully captured without stormwater flow measurement. The quarterly benchmark monitoring data from the last quarter in 2020 show benchmark exceedances for both iron and TSS. But, without measurements for flow, the Department and the public cannot calculate pollutant loads from the site to evaluate the potential harm.

The public health burden of toxic industrial stormwater runoff and other fugitive emissions is not equally distributed. The Center for Progressive Reform and Environmental Integrity Project's 2017 analysis found that many of the industrial facilities covered under the industrial stormwater permit are clustered in and around low-income neighborhoods.[83] This includes areas such as eastern and south Baltimore, northern Anne Arundel County, Prince George's County bordering the District of Columbia, and Salisbury on the Eastern Shore. These same communities are plagued by a variety of polluting industries, according to EPA data, and are also where most of the state's public drinking water violations occur.[84] Many of these areas score in the top 25$^{th}$ percentile on the Maryland EJ SCREEN tool (discussed in more detail later in this letter), meaning that communities

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81 Memorandum from Brenda Keister, MDE, to Andrew Grenzer, MDE, at 2 (Aug. 28, 2019) (referencing DPW, 1st Semi-Annual 2019 Environmental Monitoring Report (June 29, 2019)), attached as Appendix D.

82 *Id.*; Peter Kjeldsen, et al., Present and Long-Term Composition of MSW Landfill Leachate: A Review, Critical Reviews in Environmental Science and Technology (2002) 32:4, 297-336, 302, DOI: 10.1080/10643380290813462.

83 EIP-CPR, *Toxic Runoff from Maryland Industry: Inadequate Stormwater Discharge Protections Threaten Marylanders' Health and the Environment* (Nov. 2017), 9, 14-15, available at https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Industrial-Stormwater.pdf 2017 ("EIP-CPR Report").

84 Tobler A. *Maryland Water Systems Found to Contain Worrying Levels of Nitrate, Arsenic, Other Chemicals, According to Environmental Working Group.* Capital News Service. December 4, 2019. Available at https://cnsmaryland.org/2019/12/04/maryland-water-systems-found-to-contain-worrying-levels-of-nitrate-arsenic-and-other-chemicals-according-to-environmental-working-group/.

experience a higher cumulative burden of pollution exposure and socioeconomic and health stressors compared to at least three-quarters of census tracts in the state.[85]

Particularly in Baltimore and Prince George's county, these communities are also home to a higher percentage of Black residents compared to the state overall. The disproportionate proximity of lower income communities and communities of color to industrial facilities is not by chance, but the result of structural racism and discriminatory housing and zoning practices. The high concentration of polluting facilities in these communities also contributes to growing health disparities. For example, residents of South Baltimore, an area of significant industrial activity, experience higher rates of asthma emergency room visits and hospitalizations, cancer, and heart attacks compared to the state, on average.[86] As a result, the Department must act with a heightened sense of urgency to ameliorate these disparities by reducing pollution sanctioned by this Permit.

Considering the known environmental health burden associated with pollution from industrial stormwater permittees in Maryland, as well as the existing socioeconomic and health stressors in communities adjacent to these facilities, the Permit must be reformed before its reissuance to limit hazardous emissions that harm workers and nearby residents. Without proactive efforts to better account for and control pollution from these facilities, including by strengthening permit enforceability to hold permittees accountable for complying with permit terms, Maryland families will continue to be the ones that bear the cost.

***Widespread Noncompliance with 12-SW Has Not Been Adequately Addressed.***

The number of actions taken by the Department to enforce the CWA and state water pollution control laws has declined substantially in recent years. Over the last two decades, the Department has lost funding for over 13 percent of its staff positions.[87] These reductions, coupled with permits like the 12-SW that are incredibly difficult to enforce[88] and other policy changes at the state and federal levels have limited the ability of agency staff to adequately hold industrial polluters accountable. The Department's 2020 Enforcement & Compliance report shows evidence of this with record lows in enforcement actions for a number of the agency's clean water programs.[89] This includes record lows from surface water dischargers and stormwater management, with 22 and 4

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[85] University of Maryland School of Public Health. *Maryland EJSCREEN Mapper.* Available at https://p1.cgis.umd.edu/mdejscreen/.

[86] Maryland Environmental Public Health Tracking, available at: https://maps.health.maryland.gov/epht/.

[87] In 2001, MDE's budget was $45,787,852 with a total staff size of 1,053.6. MDE's 2021 budget is $36,777,182 with a total staff of 964. See Maryland State Archives, Maryland Manual Online, Department of the Environment Budget, Available at https://msa.maryland.gov/msa/mdmanual/14doe/html/doeb.html.

[88] In the case of the 12-SW, the permit 'requirements' are more so vague suggestions. When they are not adhered to, they trigger noncompliance but MDE lacks the information required to prove any violation, or does not have the time and resources to conduct a significant site investigation or other resource intensive efforts. For instance, the only quantitative reporting required of permittees under the 12-SW, benchmark monitoring, is not directly enforceable.

[89] Maryland Department of the Environment, Annual Enforcement and Compliance Report, Fiscal Year 2020. Available at https://mde.maryland.gov/Documents/AECR_FY20.pdf.

enforcement actions for each program, respectively. Likewise, from 2017 through 2020, the Department only took 14 formal enforcement actions against industrial stormwater permittees, despite widespread findings of noncompliance – with approximately 75 percent of permittees found in some form of noncompliance by Department inspectors. The health of the Bay and communities across Maryland have suffered as a result of this dynamic.

The language and implementation of the 20-SW offers the Department a golden opportunity to change this failing dynamic and restore accountability for industrial polluters in Maryland. Put simply, the Department must incorporate enforceable permit requirements into the 20-SW, clearly state in the Permit that such requirements are enforceable, and aggressively enforce them. **But prior to the reissuance of the Permit, the Department must first address the widespread failure to comply with the 12-SW and the ISR requirement.** Generally speaking, in order for a permit to effectively accomplish its goals, the Department must implement a compliance and enforcement program designed to achieve compliance from the majority of permittees. If there is widespread noncompliance and the state does not reduce those levels through individual enforcement actions, which also have a deterrent effect that encourages compliance throughout the entire regulated community, the permit becomes fairly meaningless and does not faithfully implement or ensure compliance with the CWA. **Maryland regulations require that the Department only reissue a discharge permit when "[t]he discharge or proposed discharge specified in the application is or will be in compliance with all applicable requirements."**[90] As demonstrated below, the noncompliance levels under the 12-SW are too high to ignore, bringing into question the effectiveness of the permit. To comply with Maryland regulations, the Department must require industrial permittees to achieve compliance prior to the reissuance of the 20-SW. This will also send a strong signal to permittees that the Department is taking permit noncompliance seriously, setting the Department on the right path for ensuring greater compliance with the 20-SW.

*Findings of 12-SW permit noncompliance and notable exceedances (2014-2017)*

Approximately 1,000 facilities are covered by the 12-SW permit statewide, and this permit sector is remarkably diverse. However, as mentioned above, many permittees that discharge toxic materials off-site, such as auto salvage, scrap metal, and landfills, are densely concentrated in places like Baltimore and Prince George's County. By the nature of these operations, one can find leaking car batteries at auto salvage yards, deteriorating metal parts at scrap recyclers, and eroding trash incineration ash waste at landfills, which, for example, Department inspectors discovered at Baltimore's Quarantine Road Landfill.[91]

The 2017 report from the Center for Progressive Reform and Environmental Integrity Project found that there was a widespread failure by facilities under the 12-SW Permit to test, report on, and stay within their allowable stormwater pollution limits between January

[90] COMAR 26.08.04.02.
[91] EIP-CPR Report at 1.

2014 and March 2017.[92] From July 2016 through June 2017, the Department conducted onsite inspections at 292 facilities covered under the industrial stormwater permit and found noncompliance or violations during 70 percent of these inspections. This compliance rate is the second lowest among all permit classes by the Department's Water and Science Administration during this time period. It is important to note that the Permit covered more than 900 facilities during this period, so these inspections only scratch the surface of noncompliance. Although the Department cannot inspect facilities covered by the Permit at the same rate as it would facilities covered by individual NPDES permits, the inspection rate should be sufficiently high to ensure compliance. Out of the 228 permittees required to test and report on their stormwater pollution discharge levels during this time period, only 180 of them provided their quarterly sampling reports to the Department. Forty percent of these (72 of 180) only submitted partial data. Because the Permit is self-implementing, and regulators rely heavily on permittee reporting, the Department should take action in response to any failures to report. The Department should have sent a notice of violation and brought an administrative action for each of the facilities referenced above that failed to report.

Of the 180 sites that reported their discharge levels, 36 percent exceeded their benchmarks. These facilities exceeded their allotted pollution levels for four consecutive quarters, on average. The exceedances included discharges of copper, aluminum, zinc, and lead, among other toxic pollutants.

The 2017 report found that stormwater discharge sampled from Salisbury Scrap Metal, Inc. in Salisbury exceeded the 0.014 mg/L permissible level of copper by an average of 1,564 percent. Meanwhile, on average, Cambridge Iron and Metal Company in East Baltimore discharged stormwater that exceeded the 0.082 mg/L permissible level of lead by 717 percent, and the Southern States agricultural supply facility in Cumberland discharged stormwater that exceeded the 0.12 mg/L permissible level of zinc by 1,378 percent.

In all, almost half of the 228 permittees either discharged above allowable levels or failed to test their stormwater, as required.[93] Further, MDE inspectors only visited 54 percent of the facilities that reported pollution exceedances, and they inspected fewer than half of the facilities (42 percent) that failed to report, as required. Despite this level of noncompliance, the Department and the Office of the Attorney General only acted against 13 facilities covered by the 12-SW from 2014 through 2017. In at least nine of these cases, it is unclear whether the enforcement was directly related to violations of the industrial stormwater permit. It is imperative that these facilities come into compliance, with inspection verification from the Department, prior to reissuance of coverage under the 20-SW.[94]

Although the 20-SW Fact Sheet indicates that the Department considered the 2017 report in the development of the 20-SW Permit, it does not indicate that the Permit remedies

[92] *Id.*
[93] *Id.*
[94] COMAR 26.08.04.02

any of the issues raised in the report. In fact, the Fact Sheet appears to even misconstrue the data that it cites from the 2017 report. As noted above, the 2017 report states that out of 228 permittees required to test and report on their stormwater pollution discharge levels, only 180 of them provided quarterly sampling reports to the Department.[95] The 20-SW Fact Sheet incorrectly interprets these data, stating that the 2017 report "found that of these [228] sites, 180 qualified for benchmarks, and of those 180, 65 exceeded acceptable pollution levels in four consecutive quarters."[96] The Department completely missed the conclusion that the 65 sites that exceeded benchmarks were only those from within the group of permittees that actually submitted data. This ignores the significant reporting problems with the 12-SW Permit, including both the discrepancy between facilities required to submit benchmark monitoring data and those that actually did (228 vs. 180) and the frequent submission of only partial data, as noted above (40 percent). The Department's oversight of these data in the Fact Sheet reflects the greater problems that this Draft Permit, and its supporting analyses, were rushed; that the Department has overlooked the many ways permittees failed to comply with the 12-SW permit; and that the monitoring data are insufficient to fully evaluate permit compliance. These deficiencies underscore the need for greater permit enforceability that establishes concrete standards with which the permittee must comply, and accordingly, increased enforcement of noncompliance to hold permittee accountable for meeting such requirements.

*Inspection-driven findings of 12-SW permit noncompliance and related enforcement actions (2017-2020)*

As a follow-up to the 2017 report referenced in the section above, Commenters reviewed inspection data[97] related to overall compliance with the 12-SW Permit from January 1, 2017 to December 1, 2020. These data only scratch the surface of noncompliance in Maryland as they only reflect what inspections found for industrial polluters; there likely are more noncompliance issues that go unnoticed, unreported, or are underreported. That said, Commenters' review of inspection data demonstrate how noncompliance with the 12-SW Permit continues to be widespread while enforcement efforts continue to lag by comparison.

For instance, **only 24 percent (475 of 1,979) of inspections found that industrial stormwater permittees were in compliance with their permit terms**. The Department found direct noncompliance in almost two-thirds (1,305) of its inspections.[98] An additional 185 inspections found some form of noncompliance, as the inspections resulted in compliance assistance rendered, required corrective actions, or additional investigations.

**Despite finding some form of noncompliance in 76 percent (1,504 of 1,979) of its inspections, the Department only took formal enforcement actions against 0.3**

[95] EIP-CPR at 17.
[96] 20-SW Fact Sheet, at 23.
[97] Commenters received this inspection data through a Public information Act request.
[98] By "direct noncompliance," Commenters are referring to inspection reports that state "noncompliance" as the condition of the permitted site. No information was included on the type of noncompliance the inspection found (i.e. exactly what type of permit violations occurred).

**percent (6 of 1,979) of the sites found in noncompliance.** The Department took an additional eight formal enforcement actions,[99] unrelated to inspections, against industrial permittees from 2017 through 2020. Only five of these enforcement actions were against the top 55 repeat offenders – facilities with the highest number of findings of noncompliance during this time period. For more than half (711) of the inspections that found noncompliance, the Department simply recommended that the inspection continue with no further action.[100] For another 429 inspections that found noncompliance, the Department recommended an additional investigation; however, the Department's records do not indicate whether additional investigation even occurred. For five inspections that found noncompliance, the Department's recommended action was to "close file" even though four of the inspection sites were marked as "active." For 81 inspections that found noncompliance, the Department's recommended action was to "refer to others." Whether or not the Department took the recommended action from each inspection is unclear, but whatever action (or inaction) the Department took, it was not enough to deter future noncompliance, as demonstrated in the paragraph below. **Commenters strongly urge the Department to provide an explanation of both the nature of these violations and how it has applied its enforcement prioritization criteria to this sector. If the lack of enforcement is due to unenforceable permit terms, this must be corrected in the 20-SW; if there is another cause, it must be addressed.**

Inspection data show that numerous facilities were in noncompliance repeatedly, and many times consecutively. **Of the 1,305 inspections that resulted in direct findings of noncompliance, 617 of the inspected facilities were repeat offenders.[101]** In other words, nearly half of inspections were for facilities that were previously inspected (from 2017-2020) and found to be in noncompliance. There were 55 facilities with five or more inspection findings of noncompliance. In this group, there are a large number of manufacturers of plastic, metals, concrete, and other materials. Nine of the 55 permittees are landfills or waste processing operations, and an additional nine operations process medical waste, waste oil, metal, tire, and other materials. The remaining top offenders under the 12-SW permit are made up of auto salvage yards, major construction operations, transportation facilities, wastewater treatment plants, a food processing facility, a lumberyard, and a number of other entities. The largest concentration of repeat offenders was in Prince George's County (13 facilities). Baltimore City and Baltimore County also had a large number of repeat offenders (7 each).

There were about five facilities with 10 or more inspection findings of noncompliance. The operation with the most inspection findings of noncompliance, LKQ Pick Your Part,[102] is

[99] By "formal enforcement action," Commenters are referring to actions such as entering a consent order, settlement agreement or penalty.
[100] The "Recommended Action" sections of the inspection reports state "Continue Routine Inspection" for 711 of the reports where noncompliance was found.
[101] An additional 199 inspections, beyond the 1,305 that resulted in direct findings of noncompliance, found some form of noncompliance or the compliance status was not identified. These inspections resulted in compliance assistance rendered, requiring corrective actions, or requiring additional investigations.
[102] Permit No. Reference: 12SR2262, MDR002262

an auto salvage yard in Howard County that had thirteen findings of noncompliance from 2017 through 2020. At one point, the Department required the company to take some form of corrective action, but ten follow-up inspections showed continued noncompliance. This company owns auto salvage yards across the state responsible for 26 inspection findings of noncompliance during the same time period. This example demonstrates that corrective action requirements must be concrete and enforceable and, if corrective action fails to result in permit compliance, the Department must enforce the Permit to protect water quality.

Another operation that processes waste, Lawrence Street Industry, LLC[103] in Prince George's County, had twelve findings of noncompliance. Another facility in Prince George's County, Brown Station Road Sanitary Road Landfill,[104] had eleven findings of noncompliance in just over two years. Another auto salvage yard, Bank Auto Recyclers,[105] and waste oil recycler, Storm Oil, LLC,[106] both had ten findings of noncompliance from inspections. The remaining repeat offenders and their number of findings of noncompliance are captured in the table below:

[103] Permit No. Reference: 12SW1093, MDR001093
[104] Permit No. Reference: 12SW0401, MDR000401
[105] Permit No. Reference: SW1287, MDR001287
[106] Permit No. Reference: 12SW3292, MDR003292

| No. of Inspection Findings of Noncompliance | No. of Repeat Offenders |
|---|---|
| 9 Findings | 3 Facilities |
| 8 Findings | 4 Facilities |
| 7 Findings | 8 Facilities |
| 6 Findings | 14 Facilities |
| 5 Findings | 23 Facilities |
| 4 Findings | 36 Facilities |
| 3 Findings | 66 Facilities |
| 2 Findings | 140 Facilities |

Although the primary purpose of inspections is to ensure compliance with important environmental requirements, that does not seem to be the case here in Maryland, especially for those facilities with the largest number of repeat offenses. When a facility repeatedly fails to comply with permit terms or legal requirements, as demonstrated here, those requirements become meaningless. And companies continue to violate those requirements because they do not suffer any consequences as a result. The lack of significant penalties, on-the-spot fines, or other consequences effective enough to deter noncompliance in Maryland have preserved the status quo for far too long. This systematic failure has given peace-of-mind to polluters to continue to violate environmental permits and laws. As discussed in the previous section, the health consequences and environmental injustices resulting from ineffective regulation of industrial stormwater pollution are far too severe to allow this policy to continue. **The Department must ensure that these facilities come into compliance prior to reissuing coverage under the 20-SW permit.**[107]

*Status of compliance with impervious surface restoration requirement*

Many facilities under the 12-SW permit that are required to restore 20 percent of untreated impervious surfaces in order to offset their discharges have failed to do so. Although the Department originally estimated that 299 facilities (29 percent) under the 12-SW permit were subject to the Chesapeake Bay restoration requirements,[108] ultimately 438 facilities

[107] COMAR 26.08.04.02
[108] Maryland Department of the Environment, 12SW Modification - General Permit for Industrial Stormwater Discharges Fact Sheet, *available at* https://mde.maryland.gov/programs/Permits/WaterManagementPermits/Documents/GDP%20Stormwater/Modification%20A%20(2018)/12SW%20ModA%20FactSheet.pdf.

(43 percent) have been required to comply with these effluent limitations. The 12-SW permit has a deadline of January 1, 2019 for existing permittees to fulfill this requirement. New permittees, however, have four years from the date of their submitted NOI. According to our review of data from the Department's Wastewater Permits Interactive Search Portal, **approximately 28 percent (125) of permittees have not completed their required restoration by their respective deadlines**,[109] and an additional 20 facilities may be in jeopardy of violating the requirement under the 12-SW Permit.[110] The Department must ensure that these facilities comply with this requirement prior to reissuing coverage under the 20-SW.[111] With more than a quarter of the permittees completely missing their deadline for impervious cover restoration, at least 236 acres of impervious surfaces were not treated, as required. The number of acres impacted is likely much greater, in reality, given that data were not submitted for close to a dozen permittees. Forty-three facilities still have time to complete their ISR requirements, but by the end of 2021, 14 of these facilities will have had to fulfill their ISR requirement or risk violating their permit terms. As the Chesapeake Bay restoration requirement targets large facilities (5+ acres) in urban areas located within the watershed, the combined impact of these facilities is something the state cannot ignore. To avoid ongoing noncompliance, the ISR requirements (which must be enforceable requirements in the 20-SW to avoid backsliding, as discussed in detail later in this letter) must be strengthened, including by explicitly stating that failure to comply with the requirement by the end of the permit term constitutes a permit violation.

***Industrial Stormwater Contamination Disproportionately Harms Overburdened Maryland Communities.***

Policymakers and researchers have increasingly recognized a need to integrate cumulative impacts analysis in environmental regulatory decision-making.[112] Environmental justice screening tools, such as EPA EJSCREEN, are one common and accessible method for assessing the combined burden of environmental exposures and social stressors in communities. Maryland (MD) EJ SCREEN is a statewide mapping tool developed by Dr. Sacoby Wilson and his colleagues at the University of Maryland School of Public Health. Similar to EPA EJ SCREEN, the tool integrates environmental pollution and demographic data at the census tract level. However, it improves on the federal tool by incorporating additional indicators that were identified by affected communities in Maryland, and calculates a combined Environmental Justice (EJ) Score (from 22 indicators in four categories: Exposure, Environmental Effects, Sensitive Populations, and Socioeconomic Factors) for each census tract to demonstrate the combined burden of pollution and social stressors on a community. The methodology used to calculate the EJ score is similar to that employed in CalEnviroScreen, California's statewide tool, which

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[109] Most permittees were required to complete their ISR by January 1, 2019; and newer permittees were allotted four years from their registration date. *Id.*
[110] These facilities were marked as 'N/A' or had missing data.
[111] COMAR 26.08.04.02.
[112] Morello-Frosch R, et al. Understanding the Cumulative Impacts of Inequalities in Environmental Health: Implications for Policy. *Health Aff.* 2011. Available at https://www.healthaffairs.org/doi/10.1377/hlthaff.2011.0153.

is widely regarded as the most well-developed environmental justice screening tool available to date. Dr. Wilson and his colleagues explain how the EJ score is calculated in a 2019 paper published in the *International Journal of Environmental Research and Public Health*.[113]

While environmental justice screening tools do not definitively identify an "environmental justice community", they serve as an important resource for screening areas that are heavily burdened, and where further investigation may be necessary. If used appropriately, employing MD EJ SCREEN or another methodology to assess cumulative impacts in the regulatory process would result in an industrial stormwater permit that is more protective of water quality and human health and wellbeing. These tools can also be used to help prioritize inspections and enforcement actions in overburdened communities.

To illustrate the value and need for this type of assessment, Commenters used MD EJ SCREEN to evaluate census tracts in Baltimore City and Baltimore County where industrial stormwater permittees are located. The Department's Wastewater Permits Portal yielded a list of 326 facilities across both jurisdictions covered by a 12-SW or 12-SR permit issued between 2014 to 2021. Commenters searched for the address associated with each facility in MD EJ SCREEN, noting the overall EJ score and the individual Exposure, Environmental Effects, Sensitive Populations, and Socioeconomic Factors scores for each census tract where the facilities were located. Twenty-six of the facilities were in census tracts where there was no data listed in MD EJ SCREEN, and, therefore, they were excluded from the analysis below. For the purpose of this evaluation, and in alignment with the methodology employed in CalEnviroScreen, we classified census tracts with a score greater than 0.75 as being "overburdened." A census tract with a score above 0.75 is in the top 25th percentile, meaning that it is more "overburdened" than 75 percent of census tracts in the state, and is therefore of greatest environmental justice concern.

**We found that of 300 facilities in Baltimore City and Baltimore County, 123 (41 percent) were located in overburdened census tracts (EJ score greater than 0.75). More than 100,000 Marylanders live in these tracts.[114] In Baltimore City, specifically, 106 (69 percent) facilities were in overburdened tracts and eight tracts had an EJ score of 0.91 or greater, meaning they are in the top 10 percent of environmental justice burden compared to the rest of Maryland's census tracts.**

**The data also reveal that census tracts where 12-SW and 12-SR permittees are located have higher EJ scores than other census tracts in that jurisdiction, on average.** As demonstrated in the table below, in Baltimore City, the total EJ score and the Exposure, Environmental Effects, and Socioeconomic Factors scores are greater in census tracts where industrial stormwater permittees are located compared to all tracts in Baltimore City, on average. **Of particular concern are the average Exposure and**

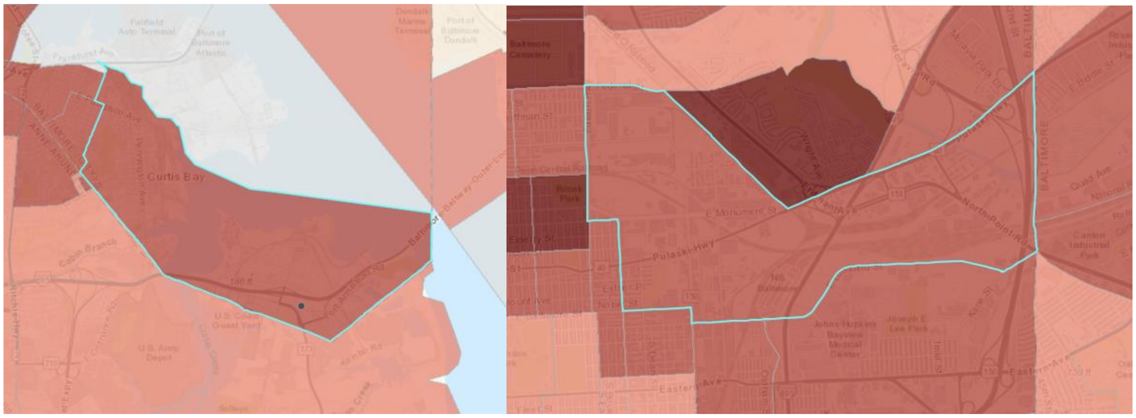
[113] Driver A, et al. Utilization of the Maryland Environmental Justice Screening Tool: A Bladensburg, Maryland Case Study. 2019. Int J Res Public Health. 2019;16(3):348.
[114] Based on American Community Survey, 2019 (5-Year Estimates).

**Environmental Effects scores (0.92 and 0.96, respectively), which are in the top 10 percent compared to all census tracts in Maryland.** These two categories include 12 indicators, including NATA Air Toxics Cancer Risks, NATA Respiratory Hazard Index, Watershed Failure, Proximity to Treatment and Disposal Facilities, and Proximity to Major Direct Water Discharges, among others. The Socioeconomic Factors category includes indicators that have been found to be strongly associated with levels of disease burden, such as percent low-income, percent non-white, and percent of households experiencing linguistic isolation, among others. The average scores also demonstrate that Baltimore City as a jurisdiction is more "overburdened" compared to the state overall. While Baltimore County has a lower combined burden of environmental and social stressors, the EJ, Exposure, and Environmental Effects scores were also greater in tracts with industrial stormwater permittees compared to all census tracts in Baltimore County, on average.

| | Average MD EJ SCREEN score for census tracts where 12-SW and 12-SR permittees are located (Average MD EJ SCREEN score for all census tracts in the jurisdiction)* | | | | |
|---|---|---|---|---|---|
| | EJ Score | Exposure Score | Environmental Effects Score | Sensitive Populations Score | Socioeconomic Factors Score |
| Baltimore City (153 facilities) | 0.79 (0.76) | 0.92 (0.80) | 0.96 (0.88) | 0.58 (0.61) | 0.75 (0.73) |
| Baltimore County (147 facilities) | 0.52 (0.51) | 0.60 (0.57) | 0.60 (0.55) | 0.45 (0.46) | 0.45 (0.45) |

*Scores in red show that the average score for census tracts where industrial stormwater permittees are located is greater than the average score for all census tracts in the jurisdiction.

Out of 99 census tracts with at least one industrial stormwater permittee, forty-two had two or more permittees, eight tracts had 10 or more, and three tracts had 20 or more. The two census tracts with the highest number of facilities were also among the most overburdened. Census tracts 24510250500 and 24510260404 are both located in Baltimore City and each have 24 facilities with 12-SW and 12-SR permits. Both tracts have an EJ score greater than 0.80, meaning that they rank in the top 20th percentile for environmental justice burden compared to all tracts in the state. Census tract 24510250500 encompasses residential parts of Curtis Bay, a community which has long grappled with environmental injustice, as well as Hawkins Point (tract population of more than 4,200). The sectors represented include landfill, land and water transportation, hazardous waste disposal, production of industrial inorganic chemicals, scrap recycling, auto salvage yards, and petroleum refining, among others. The tract has an Environmental Effects Score of 0.99 and a Sensitive Populations score of 0.96, indicating that proximity to pollution sources and the incidence of adverse health outcomes associated with pollution exposure are among the highest in the state. This tract is also home to two facilities—Curtis Bay Energy and Quarantine Road Municipal Landfill—which had five or more inspection findings of noncompliance with their 12-SW permits between 2017 to 2020. Therefore, not only is the tract an area already significantly burdened, but it is also home to facilities that are not properly employing required pollution controls. The census tract is also adjacent to two other overburdened residential tracts.



Census tract 24510250500 (left) and census tract 24510260404 (right)

Census tract 24510260404 encompasses the Pulaski and Orangeville Industrial Areas, as well as part of the Highlands residential neighborhood (tract population of more than 2,000). This tract has an Exposure score of 0.96, and Environmental Effects and Socioeconomic Factors scores of 1.0, meaning that they rank highest in the latter two indicators compared to all tracts in Maryland. This tract is also home to a scrap metal facility that has had five or more inspection findings of noncompliance—United Iron and Metal, LLC. Furthermore, nearly all of the adjacent tracts, which are largely residential areas, rank among the most overburdened in the state.

In both of these examples, the census tracts contained a high number of facilities with 12-SW and 12-SR permittees and a high EJ score. While it is difficult to know the extent to which any industrial stormwater permit holder causes a greater environmental justice burden, they are all likely contributors. Furthermore, permit noncompliance in these tracts may expose community members to additional harm. The incidence of repeat noncompliance appears to be more prevalent in communities with a greater number of industrial stormwater permittees. Of the 12 facilities in Baltimore City and Baltimore County with the most instances of non-compliance, nine are located in census tracts with eight or more facilities with 12-SW or 12-SR permits. These 12 facilities are also located in census tracts that rank in the top 25th percentile for Exposure and Environmental Effects scores, on average.

Our preliminary assessment reveals that census tracts in Baltimore City and Baltimore County with 12-SR and 12-SW permit holders tend to have a greater environmental justice burden, on average, compared to all census tracts in each jurisdiction and the state overall. Furthermore, it appears that census tracts with a large number of facilities may also experience a greater environmental justice burden, and in some instances are home to facilities that are among the worst offenders in regard to noncompliance with their permits. These assessments reflect the strong connection between lack of permit enforceability, and the lack of actual enforcement by the Department that naturally follows, and alarmingly high rates of noncompliance. This is an entrenched cycle (but fortunately, a reversible one) that disproportionately impacts overburdened communities.

***The Department Should Complete an Environmental Justice Assessment before Reissuance of the Permit.***

As demonstrated in the above analysis, the lack of thoughtful consideration of cumulative impacts has resulted in a scenario where certain communities with industrial stormwater permittees bear a disproportionate burden of pollution exposure and public health harm. Therefore, prior to reissuance of the permit, the Department should complete an environmental justice assessment that considers pollution-, social-, and health-related stressors to understand the existing cumulative burden in communities. While MD EJ SCREEN is a readily available, community-informed, and state-specific tool, the Department may consider other methodologies for assessing cumulative impacts, such as those pioneered by researchers in Massachusetts and California.[115] Whichever screening method the Department adopts, it must be based on a defined, systematic approach that is applied to all permit applications, and includes numerical variables that may be compared, rather than subjective measures. Otherwise, the Department cannot issue a permit consistent with its recently and contemporaneously developed Environmental Justice plan, or with its obligation under state law to protect human health.

Furthermore, after completing the assessment, the Department should review and revise the permit terms as necessary to ensure that dischargers will not contribute to or exacerbate existing burdens and disparities in the community. For example, if a discharger is located in a census tract or adjacent to census tracts that rank in the top 25th percentile for EJ Score and the Lead Paint and Individuals Under Five Years Old indicators (assuming use of MD EJ SCREEN), then the Department may consider imposing additional benchmark reporting requirements in order to limit additional exposure to sensitive populations. More thoughtful consideration and regulation of potential adverse impacts to communities can help remedy environmental injustice and address gaping health disparities in the state.

***The Department Should Consult with the Maryland Commission on Environmental Justice and Sustainable Communities before Reissuance of the Permit.***

Commenters are hopeful that the Department has already consulted with the Maryland CEJSC regarding this impending permit reissuance.[116] If not, we strongly urge the

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[115] Faber DR and Krieg EJ. Unequal Exposure to Ecological Hazards: Environmental Injustices in the Commonwealth of Massachusetts. Environ Health Perspect. 2002;110(Suppl 2):277-288; Huang G and London JK. Cumulative Environmental Vulnerability and Environmental Justice in California's San Joaquin Valley. Int J Environ Res Public Health. 2012;9(5):1593-1608.

[116] Commenters submitted a PIA request to the Department in August, 2020 for records evidencing such a consultation with the Commission regarding reissuance of this permit. At the time of MDE's response to the PIA request, no such records were responsive to our request. Letter from Evan Isaacson, Chesapeake Legal Alliance, to Amanda Redmiles, Maryland Department of Environment, "*Request for*

Department to contact the staff and chair of the Commission and request consultation regarding the Permit and the impacts of industrial stormwater on public health, particularly in areas of the state where clusters of permitted sites are located, and solicit input.[117] It is our hope that the Department would, at the very least, provide the CEJSC with ample time to make recommendations and, preferably, provide adequate staff or contractual resources to ensure any recommended analyses are undertaken.

As you know, the CEJSC exists to review and analyze the impact of state laws and policies on the issue of environmental injustice and to advise MDE and other agencies regarding how they can avoid, mitigate, or ameliorate these impacts.[118] The CEJSC cannot provide their input if they are not consulted, and we believe that few permits or Department policies present as clear and substantial risks to environmental justice communities as the industrial stormwater general permit.

Therefore, we strongly urge the Department to seek input from the commissioners on the permit reissuance on the record and invite the Commission to host an informal hearing following a meaningful attempt to engage the public, where the public can present their perspectives. Once again, we strongly urge the Department to cease processing this permit, and, among many other things, ensure that it has adequately consulted the CEJSC. The Department should not make a new tentative determination to issue this Permit until CEJSC is fully informed of the purpose, design, and expected outcomes for this Permit, and has the opportunity to present their concerns to the Department on the record.

***The Department Must Take Strong, Deterrent-Based Enforcement Actions Against Noncompliant Industrial Stormwater Permittees.***

To remediate the widespread and persistent noncompliance throughout the implementation of the 12-SW permit, the Department must use its full authority to undertake enforcement, including the issuance of appropriately deterrent-based penalties that also capture the economic benefit of noncompliance, and require appropriate injunctive relief against permit-holders seeking 20-SW renewal coverage. Those in noncompliance should not be afforded the opportunity to renew their permit until they can demonstrate a return to compliance or are under an enforceable schedule that will ensure timely return to compliance. Any permittee who has not yet complied with the ISR requirement under the 12-SW, for example, should not be eligible for coverage under the 20-SW until they have met this requirement. Likewise, penalties for repeat offenders

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*Records Regarding Industrial and Construction Permit Program Collaboration with the Commission on Environmental Justice and Sustainable Communities*," August 10, 2020.

[117] Indeed, the Department has the authority and duty to "[a]dvise, consult, and cooperate with other units of the State [...] to further the purposes of" the Water Management subtitle of the Code of Maryland. MD Env Code § 4-405(a).

[118] "The Commission shall: (1) Advise State government agencies on environmental justice and related community issues; (2) Review and analyze the impact of current State laws and policies on the issue of environmental justice and sustainable communities; (3) Assess the adequacy of State and local government laws to address the issue of environmental justice and sustainable communities[...]" MD Env Code § 1-701(h).

should increase for each repeat offense. Penalties should also increase for illegal discharges to vulnerable waterways, such as drinking water sources, impaired water bodies, and Tier 2 waterways. Strong, deterrence-based enforcement strategies, such as prosecuting noncompliant facilities and collecting significant monetary penalties (that include recouping the economic benefit of noncompliance), are especially vital to meeting the state's WQS and ensuring greater public health protections.

Similarly, enhanced penalties should be imposed on facilities that commit permit violations near environmental justice communities, or communities that are "overburdened" or "disadvantaged." Race and income remain the most significant predictors of environmental risk and burden in the United States. In identifying environmental justice communities in Maryland, the Department should consider a threshold for census tracts with at least 45 percent non-White population and a poverty rate at or above 10 percent of the federal poverty line.[119] Additionally, the Department should impose enhanced penalties for any illegal discharge in a tract that ranks in the top 25th percentile for the overall MD EJ SCREEN score or for the 'socioeconomic factors' category, which includes a number of indicators that measure social vulnerability.

We urge the Department to take these actions in order to send a strong message to industrial polluters that appropriate consequences follow from harming the environment or the health of communities, especially those that bear an unjust and disproportionate burden of pollution exposure and social stressors. This will also ensure the Department has sufficient funding for inspections and enforcement efforts to ensure greater oversight and, thereby compliance, among 20-SW permittees.

[119] Based on American Community Survey Estimates, 2012-2016, approximately 53 percent of the state's population identifies as non-White. Approximately 23 percent of people in Maryland live below 200 percent of the poverty line and 9.9 percent of the population lives below the poverty line.

## Permit Terms Must Be Enforceable as Required by Law

In light of the widespread noncompliance and low rates of enforcement of such noncompliance, the provisions of the Permit must be made more enforceable. An unenforceable permit will not incentivize compliance and cannot ensure WQS will be met, as required by the CWA. Unless the Department places enforcement pressure on permittees to comply with benchmark monitoring requirements, the Department and the public will not even be aware of potential noncompliance with TBELs and the narrative WQBEL, which benchmark monitoring data may indicate. Many of Commenters' recommendations throughout this letter urge the Department to use more enforceable language, require more documentation be made publicly available, provide clearer, objective standards, and explicitly state when failure to take a required action will result in a permit violation; these recommendations are critical because unless the Permit is enforceable, it is unable to serve its purpose. **An unenforceable permit is not a valid permit pursuant to the CWA and Maryland's authorization to implement the Act.**

***Lack of Enforceability is an Environmental Justice Issue.***

The Permit covers over 1,000 facilities across Maryland, elevating its potential environmental impact to orders of magnitude above that of an individual NPDES permit. The ability for the Department and the public to enforce the Permit is essential to discourage noncompliance and prevent water quality degradation. The lack of enforceability and resulting noncompliance built into this Permit furthers the inequities already suffered by the overburdened communities in which many of the facilities are located. Many of these facilities have been discharging pollutants at levels that exceed applicable benchmark thresholds. Because the Permit relies significantly on benchmark monitoring, rather than numeric effluent limitations, to evaluate the adequacy of control measures in ensuring water quality is protected, benchmark exceedances constitute a potential risk to water quality in these areas already disproportionately burdened. Unless the Department improves permit enforceability, the Permit will continue to contribute to these burdens.

***The Permit Lacks Limitations and Conditions Sufficient to Ensure Compliance with WQS.***

In addition to recommending that the Department reevaluate the potential impact of the Permit on marginalized communities and incorporate additional considerations into permit development, we recommend many specific substantive changes to the Permit, as discussed below and in the sections that follow.

Commenters continue to urge MDE to specifically identify each enforceable requirement of the permit, to identify for the regulated community and the public what requirement a facility must meet to avoid noncompliance and the resulting enforcement. **After each and every permit limitation or control, the Permit should clearly state that failure to meet the limitation constitutes a permit violation that is subject to enforcement.** For example, we recommend adding the following explicit statements after the corresponding permit requirement:

- Failure to select, design, install, and implement control measures in accordance with good engineering practices and manufacturer's specifications (unless deviation is justified and justification is documented) constitutes a permit violation.[120] Permit Part III.B.1.

- Failure to minimize the exposure of manufacturing, processing, and material storage areas to rain, snow, snowmelt, and runoff by either locating these industrial materials and activities inside or protecting them with storm resistant coverings constitutes a permit violation. Permit Part III.B.1.b.i.)

- Failure to regularly inspect, test, maintain, and repair all industrial equipment and systems constitutes a permit violation. Permit Part III.B.1.b.iii.)

- Failure to control your discharge as necessary to meet applicable water quality standards constitutes a permit violation. Permit Part III.B.2.a.

As highlighted in Dr. Horner's report, attached as Appendix E, the Washington state permit specifically states that each of the listed BMPs is "mandatory."[121] This kind of language strengthens the permit, making it more enforceable and more likely that a permittee would comply.

Additionally, the Permit should state that failure to comply with permit conditions could result in revocation of coverage in addition to enforcement. We appreciate where the Department has incorporated this language into certain sections of the Permit (e.g., stating that the Department will revoke coverage in the event that benchmark exceedances continue after following the entire corrective action process) and where the Department has included more precise definitions (e.g., defining "all reasonable steps").

The CWA and implementing regulations require permit conditions to ensure compliance with applicable CWA provisions and WQS.[122] Without clear statements of what constitute permit violations, the Permit is much more difficult to enforce, which contributes to widespread noncompliance. Because the available data indicate that the Permit likely fails to protect water quality, the Permit conditions are not sufficient to ensure compliance with the CWA. Unenforceable language, lack of concrete standards, and confusing or duplicative standards in the Permit are examples of deficient permit conditions and must be strengthened. Examples of problematic enforceability issues are set forth below, with proposed revisions shown in red text:

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[120] Red text is used to indicate language that Commenters recommend adding. Red text with a strikethrough indicates language Commenters recommend deleting from the Permit text.
[121] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 5.
[122] U.S.C. 1342(b)(1)(A); 40 C.F.R. 122.4(a), (d); 122.44(d)(1).

1) The Permit contains two different standards for an appropriate response when control measures need to be replaced or repaired.[123] The Department should clarify whether these are alternative requirements or two standards that both must be met to comply with the Permit. Of the two standards, Commenters prefer the second, as it is more specific and provides an example of what must be done to minimize pollutant discharges. The two standards as provided in the Permit are as follows:

- "If you find that your control measures need to be replaced or repaired, you must conduct the necessary maintenance immediately in order to minimize pollutant discharges." Permit pg. 17, Part III.B.1.b.iii.), lines 27-29.

- "If you find that your control measures need to be repaired or replaced, you must immediately take all reasonable steps to prevent or minimize the discharge of pollutants until the final repair or replacement is implemented, including cleaning up any contaminated surfaces so that the material will not be discharged during subsequent storm events". Permit pg. 17, Part III.B.1.b.iii.), lines 29-34.

2) The Permit contains two different standards for when monitoring for a pollutant may be discontinued when discharging to impaired waters without a TMDL.[124] One of these standards requires the permittee to document and maintain the support for its determination that the pollutant's presence is caused solely by natural background sources whereas the other requires a request be submitted to the Department with appropriate justification and that the request be granted.

- "If the monitored pollutant is not detected in your discharge for three consecutive years, or it is detected but you have determined that its presence is caused solely by natural background sources, you may discontinue monitoring for that pollutant. To support a determination that the pollutant's presence is caused solely by natural background sources, you must document and maintain with your SWPPP, as required by Part III.C.8 . . ." Permit, pg. 39, Part V.B.3.a.i.), lines 19-22.

- "If the monitored pollutant is not detected in your discharge for three consecutive years, or it is detected but you have determined that its presence is caused solely by natural background sources, you may discontinue monitoring for that pollutant only after submitting a request to MDE's Permitting Program with the appropriate justification and receiving verification that the request was granted." Permit, pg. 39, Part V.B.3.a.i.), lines 37-42.

Commenters support the second approach, which requires the permittee to submit a request to the Department and receive verification that the request was granted. Monitoring is critical to ensure that facilities discharging to impaired waters do not contribute to the impairment of the receiving waters and should not cease unless the Department confirms that the permittee is not responsible for the presence of the monitored pollutant.

[123] Draft Permit pg. 17, Part III.B.1.b.iii.).
[124] Draft Permit pg. 39, Part V.B.3.a.i.)

3) Any timeframes for completion of corrective actions or Additional Implementation Measures (AIM) provided to the agency under Part IV must be enforceable deadlines. This includes the completion date to be provided to the Department if the permittee seeks to exceed 45 days to complete the corrective action (IV.A.2.b) and the action plan with milestones, submitted under Part IV.B.4. For example:

a. IV.B.4.b.i.): Add the following to this section to ensure enforceability of deadlines and the action plan milestones: "The deadline for submittal of the action plan and the milestones contained in the action plan are enforceable obligations under this permit."

4) The Department should characterize the time intervals and schedules in Part IV as enforceable deadlines. For example:

a. IV.A.2.b: "These time intervals are not grace periods, but are enforceable deadlines, the violation of which constitutes a permit violation ~~schedules considered reasonable for documenting your findings and for making repairs and improvements~~."

b. IV.A.3: "~~Additionally,~~ Each failureing to take corrective action in accordance with this section and/or within the prescribed deadlines constitutes ~~is~~ an additional permit violation."

c. IV.B: Add to this section language comparable to IV.A.3: "Each failure to perform the required Additional Implementation Measures in accordance with this section and/or within the prescribed deadlines constitutes a permit violation."

d. As referenced in V.B.1: "Benchmark monitoring data are primarily for your use to determine the overall effectiveness of your control measures and to assist you in knowing when Additional Implementation Measures (AIM) may be necessary to comply with the effluent limitations in Part III.B. Failure to conduct any required measures within the timeframes set forth in Part IV, and/or the alternative timeframes provided by the permittee in a notification or action plan to the Department, would be a permit violation."

5) Notifications that a permittee intends to exceed corrective action or AIM deadlines, along with the rationale and proposed completion date, should be made publicly available through NetDMR, as discussed in more detail later in this letter. This is critical for the public to be able to ensure a permittee is meeting the self-assigned completion date for its corrective action.

6) Use mandatory language to create enforceable permit obligations, for example, using "must" or "shall" rather than "should" or "may":

a. III.B.1.b.iii.) "Final repairs/replacement of stormwater controls ~~should~~ must be completed as soon as feasible but must be no later than the timeframe established in Part IV.A.2 for corrective actions, i.e., within 14 days or, if that is infeasible, within 45 days."[125]

b. IV.B.5.b.i.): "After reviewing and revising your SWPPP, as appropriate, you ~~should~~ must notify the other facility or entity contributing run-on to your discharges and request that they abate their pollutant contribution."

c. IV.B.5.b.ii.): "If the other facility or entity fails to take action to address their discharges or sources of pollutants, you ~~should~~ must contact MDE's Compliance Program."

d. V.A.3: "These [quarterly stormwater] samples are not required to be collected consistent with 40 CFR 136 procedures but ~~should~~ must be collected in such a manner that the samples are representative of the stormwater discharge."

***The Department Must Remove Impermissibly Vague Language Throughout the Permit.***

The Department must remove vague language that is unnecessarily subjective, lacking in specificity or any discernible standards, or otherwise unenforceable. Such language presents due process concerns, invites arbitrary or absent enforcement, is unfair to both the public and the regulated community by failing to provide fair notice of prohibited conduct, runs counter to the purposes of the CWA and Maryland Water Pollution Control laws, and represents a waste of resources by inspectors, site operators, and the public. Vague language in the 12-SW is likely a significant reason why the Department data show such high noncompliance rates.

Commenters urge the Department to take a close look at the entirety of the permit for vague language and unenforceable standards. Vague terms are particularly prevalent and problematic in the sections of the Permit that establish control measures and effluent limits, which are too important to be controlled by unenforceable language. As just one example, Commenters urge the Department to clarify the meaning of the phrase "technologically available and economically practicable and achievable in light of best industry practice" found in section III.B, including by providing some illustrative examples for the benefit of the public and the regulated sector. The current language provides no direction to a permittee about what is, or is not, acceptable; no direction to an inspector about how to identify a violation; no way of allowing the public to understand whether a condition is an egregious violation or perfectly legal under this Permit. This could be contrasted with language in the similar permits from California and Washington, which were analyzed by Dr. Horner. In his assessment, Dr. Horner frequently relies on standards similar to "technologically available and economically practicable and achievable in light of best industry practice" but with more clear definitions and

[125] Note additionally that our comments with respect to the timeframe established in Part IV.A.2 for corrective actions also apply to this section and any other instance in the Draft Permit that references the timeframes in Part IV.A.2.

explanations of the standards and how to utilize them. Importantly the Permit needs to clearly articulate and emphasize the need for “stormwater management to rise to the BEST level found in industry practice."[126]

Another example of vague language that must be made more clear, specific, measurable, and enforceable are the provisions pertaining to the management of runoff. Specifically, subsection III.B.1 states that “[y]ou must divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff, to ***minimize*** pollutants in your discharges.” (Emphasis added). While Commenters recognize that the term “minimize” is defined in the permit, the definition is unhelpful for several reasons, including that, as noted above, it refers to the term “technologically available and economically practicable and achievable in light of best industry practice.” The term “minimize” used throughout this subsection is unenforceable in that it would be impossible for a permittee or member of the public to know whether or when a permittee has done enough of the referenced activities to have effectively “minimized” pollutants in their discharges. The term “minimize” is subjective, whereas “eliminate” - or some other numeric standard - is objective and clear. Wherever possible, the Department should remove subjective language from the Permit and replace it with objective language that is clear, specific, measurable, and enforceable as EPA has stated that it expects from CWA permits.

Similarly, Commenters urge the Department to enhance clarity in the provision in subsection III.B.1 regarding dust control and vehicle tracking, which only states “[y]ou must minimize generation of dust and offsite tracking of raw, final, or waste materials.” How is a permittee or member of the public to know whether or when a facility has established adequate controls? How could the Department possibly issue a sanction to a permittee for failure to control hazardous dust or off-site tracking of pollution if neither the inspector nor permittee knows whether these offsite emissions and flows are too large or sufficiently small? How could a court reviewing the issuance of a sanction for a violation of this permit uphold an enforcement action based on impermissibly vague language? These are unanswerable questions for anyone reading this permit as written. This provision is particularly important to strengthen in light of the need to protect fenceline communities from hazardous particulate pollution that become airborne due to vehicle traffic, other site operations, or wind. Commenters strongly urge the Department to include cognizable standards to minimize particulates and other industrial residues that accumulate during dry-weather conditions from discharging to receiving waterways.

**In sum, the Department must remove impermissibly vague, unenforceable language throughout the Permit, and use numeric standards, or clear, specific, and measurable narrative standards, including the use of examples, where appropriate.[127]** Effective permits must contain clear standards as it is irrational to prescribe terms and conditions that set vague or undetectable criteria.

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[126] Dr. Horner’s Report, Assessment of Maryland’s General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 6. (Emphasis in original).
[127] See, e.g., EPA recommendations in U.S. Environmental Protection Agency, Office of Water. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on LAs" (2014).

***The Permit Does Not Provide for Sufficient Department Oversight or Review and Approval, Instead Relying on the Permittee to Determine its Own Compliance.***

Certain aspects of the Permit are impossible to enforce. Any provision in the Permit that uses a standard that relies on the permittee's own judgment must be revised to use an objective criterion. For example: "***If you find*** that your control measures need to be replaced or repaired . . . " (III.B.1.b.iii.)) and "***If you find*** that your control measures are not achieving their intended effect of minimizing pollutant discharges . . ." (III.B.1) both rely on the permittee's own determination. There is no objective standard that the Department or the public could evaluate to determine whether control measures must be modified. The permittee is the decision-maker and judge under this standard, while also having an incentive to determine that there is not a problem with control measures. **This language, and all other instances where a requirement relies on the permittee's own determination, must be revised to use an objective standard to avoid impermissible self-regulation.** In these instances, the Department should use as the objective standard the best professional judgment (or best engineering judgment) of the permit writer.[128]

Additional examples of impermissible self-regulation are discussed in the section of this comment letter that concerns corrective action provisions of the Permit.

Page 5. Also note that courts have long disfavored impermissible vagueness, including in the regulatory context, which may be susceptible to irrational and selective patterns of enforcement.

[128] "When EPA has not promulgated effluent limitation guidelines for an industry, or if an operator is discharging a pollutant not covered by the effluent guideline, permit limitations may be based on the best professional judgment (BPJ, sometimes also referred to as "best engineering judgment") of the permit writer. 33 U.S.C. § 1342(a)(1); 40 CFR 125.3(c)." 20-SW Fact Sheet, at 46.

## The Permit Proposes to Roll Back the Chesapeake Bay Restoration Standard Contrary to the Clean Water Act Prohibition on Backsliding

The CWA is designed to continually reduce pollution over time. The "national goal" of the Act is that "the discharge of pollutants into the navigable waters be eliminated."[129] Thus, for permits that are not designed to achieve zero discharge of pollutants, the CWA envisions, among other things, water-quality based limits designed to ensure consistency with WQS and the "interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation."[130] In short, authorities issuing permits under the CWA's National Pollutant Discharge ***Elimination*** System must progressively tighten pollution limits until such time as the discharge of pollution is eliminated. This goal, passed nearly unanimously by Congress, is given effect through several provisions of the CWA and its implementing regulations, notably including the "anti-backsliding" provisions that generally serve to ensure that permits are continually improved and not weakened on the path toward eliminating pollution.[131]

Subsection 402(o) of the CWA contains this prohibition on weakening effluent limitations from one permit term to the next. As recently stated by the Maryland Court of Appeals, the twenty percent impervious surface restoration requirement expressed in the expired MS4 (municipal stormwater) permits, which is virtually identical in nature to the ISR requirement in the previous 12-SW permit, is a water quality-based effluent limitation.[132] This effluent limitation is contained in section III.A. of the Permit.

Subsection III.A.1 establishes the new standard for impervious surface restoration and broadly eliminates it, with narrow exceptions. The impervious surface baseline is maintained at January 1, 2006, the same as for the 12-SW permit, and paragraph c. states that "treatment of impervious surfaces added since January 1, 2006 may be counted towards meeting the 20% requirement" indicating that compliance with the previous permit will be all that is required for most facilities. Paragraph e. further clarifies that only facilities "with prior coverage under the 12-SW that were not previously subject to the Chesapeake Bay restoration requirements or facilities that are newly covered under 20-SW for the first time which are now subject to the Chesapeake Bay restoration requirements, must implement control measures within four (4) years from the date an NOI is filed." However, all that the relevant provision says for "existing facilities" is that "[t]his permit does not relieve such facilities from meeting those ***prior*** permit terms." (Emphasis added).

Thus, unless a facility failed to comply with the ISR requirement of the previous permit or is newly subject to the 20 percent ISR requirement for the first time, they will not be subject to any additional ISR requirement. The fact sheet confirms that, in lieu of a new 20 percent ISR requirement, the 20-SW permit intends to "build upon" the previous ISR requirement

[129] 33 USC §1251(a)(1).
[130] 33 USC §1252(a)(2).
[131] 33 USC § 1342(o).
[132] *See Md. Dep't of the Env't v. Cty. Comm'rs of Carroll Cty.*, 214 A.3d 61, 100 (Md. 2019).

by merely “[m]aintaining practices or measures implemented under the 12-SW,” and by “[p]roviding an incentive for facilities to increase their contribution of restoration through nutrient trading based on permit baseline.” **As drafted, Part III of the Permit broadly eliminates the 20 percent ISR requirement as an effluent limitation for most facilities that were subject to that standard in the 12-SW permit, which constitutes impermissible backsliding under the statute.**

In issuing the expired 12-SW permit, MDE’s fact sheet for that permit stated that achieving the nitrogen reduction target in the state’s watershed implementation plan “would require at least 28% of impervious surfaces area to be retrofitted ***each permit cycle***.”[133] (Emphasis added). MDE indicated that implementation of the 20 percent ISR standard over three permit cycles starting with the 12-SW permit “equates to 7% nitrogen reduction per permit cycle” that “represents reasonable progress” and “represents a pace of progress towards meeting Bay water quality standards that is reasonably achievable by industrial facilities.”[134] Thus, repealing the ISR standard represents a significant reversal in policy established to meet the Bay restoration work that the Department committed to. Notably, this elimination of the 20 percent ISR standard from the Permit has not been supported by any reasoned explanation or analysis by the Department of the impacts to WQS or on WLA attainment of relevant TMDLs. As previously discussed, the Chesapeake Bay Model and water quality data establish that, not only are WQS not being met, but that stormwater pollution continues to ***increase*** overall statewide and in many urban locations. **Moreover, the fact sheet issued with this Permit describes the failure of facilities regulated under the industrial stormwater permit to meet benchmarks for nearly every pollutant.[135]** The Department has not and cannot offer a reasoned explanation for its decision to reverse course on its prior decision to ensure each permit cycle includes the restoration of an additional twenty percent of impervious surfaces in the 20-SW permit. It is both illogical and legally impermissible to eliminate the 20 percent ISR standard rather than maintaining or increasing it.

The Department has repeatedly emphasized the importance of “adaptive management” and making “iterative progress” in implementing its programs designed to fulfill WIP commitment and TMDLs more broadly. All relevant data and information since the final determination was made to issue the previous permit indicates that ***more*** stormwater management BMPs, not fewer, are needed. This Permit has not only failed to continue gradually enhancing its effluent limitations, it is proposing to reverse course on the specific commitments made by the Department to EPA, our partners in the Bay restoration effort, and the public through the WIPs. **The Department must, at a minimum, retain the 20 percent ISR standard in the previous permit.**

**We are also disappointed and concerned that such a major policy decision to roll back the feature pollution reduction mechanism in the Permit was not undertaken with additional input and engagement.** As you are aware, many of the Commenters

[133] 12-SW Permit Final Comments Response Document, Page 7.

[134] 12-SW Permit Final Comments Response Document, Pages 7-8.

[135] Permit Fact Sheet for the General Discharge Permit For Stormwater Associated with Industrial Activity Maryland General Permit No. 20SW0000, NPDES Permit Number MDR00000, pages 11-12.

have been engaged with Department staff about the reissuance of this Permit for several years. Commenters have provided feedback prior to the tentative determination about the contours of what was understood to be in the Permit and had targeted discussions about the importance of retaining this important standard. At no time prior to the issuance of this Permit was the repeal of this standard discussed, and at no point did Commenters have any notion that the standard would be rolled back based on these discussions.

To the contrary, Commenters' focus in preparing to provide comments to the Department was on the need to ***expand*** the ISR standard to an additional segment of the regulated universe in order to provide greater protection to other waterways and to counteract the functional equivalent of backsliding resulting from climate change. The impervious surface restoration standard, like any WQBEL, is predicated on attainment of WQS. Water quality standards cannot be met through static limits. Rather a WQBEL must be calibrated to changing conditions, and for a stormwater permit, that means a recognition that stormwater pollution increases with a greater volume of water from more frequent and intense storms. As described above, the increase in precipitation in this region has resulted in greater generation of stormwater. Thus, expanding the ISR standard may be necessary to hold the line on the volume of stormwater generated from regulated sites and the amount of pollution discharged from them.

## The Permit Does Not Contain Adequate Protections for Either Impaired or Healthy Waterways and Appears to Ignore the State's Water Quality Standards

***The Permit Should Expand - Not Roll Back - Efforts to Restore Impervious Surfaces in Order to Protect Water Quality.***

As an initial matter, Commenters reiterate strong opposition to the rollback of the 20 percent ISR requirement, which serves as the most important WQBEL in the Permit. This rollback is inconsistent with the state's commitment to Bay restoration, with the Department's supposed renewed commitment to environmental justice, and with the spirit and letter of the CWA. The Department must reverse this proposed rollback and reinstate the 20 percent standard.

**In addition to reinstating the 20 percent standard, MDE must also begin to embark on an expansion of the ISR standard.** As described above, the 12-SW has clearly not resulted in meaningful progress in reducing loads, and certainly not in a manner consistent with benchmarks, waste load allocations (WLAs), or to the extent needed to restore impaired waters. Thus, in order to make iterative progress toward attainment of WQS, the Department should establish a new ISR standard for a broader subset of 20-SW permittees, in addition to maintaining the 20 percent ISR standard for those 12-SR permittees subject to the standard in the previous permit.

This expanded ISR standard could apply to additional facilities based on any of the following factors, or a combination of them: (1) an acre threshold lower than 5 acres; (2) for sectors with higher recognized event mean concentration for specified pollutants - especially those pollutants that are more hazardous to human health, such as lead; (3) for permittees covered by a local TMDL, regardless of whether a disaggregated WLA exists; (4) for facilities with repeated findings of noncompliance; and/or (5) for large facilities that do not have 5 acres of paved surfaces, but may have 5 or more acres of heavily compacted soils that generate comparable amounts of runoff.

While the Department should apply a new ISR requirement to a broader universe of facilities covered by the 20-SW based on these and other factors, it is obligated to continually strengthen the Permit until such time as WQS are met. At present, data from the Chesapeake Bay Program and the Department indicate that, overall, the Permit is not resulting in meaningful improving water quality, making the case even more compelling for developing new and more stringent limitations, including and especially an expansion of the ISR standard.

Commenters recognize that first steps are often small steps, by necessity. The Department may find it appropriate to establish an ISR requirement for some or all of those facilities that are newly covered under this Permit that restores less than 20 percent of untreated impervious areas and perhaps at varying levels between 5 percent and 15 percent based on certain factors. Regardless of the decisions made by the Department, the law and facts compel the Department to act now with this Permit reissuance to take additional steps to protect water quality.

Commenters believe that the ISR requirement - once reinstated - should be strengthened by limiting the ability of a permittee to comply through off site restoration requirements or through practices and policies such as street sweeping and pollution trading. We urge the Department to tighten language allowing for permittees to complete their ISR compliance projects off site. To control industrial runoff from permitted sites obviously requires on site projects to retain and treat runoff from industrial areas. Off site ISR projects should not be permissible unless an independent, third-party engineer certifies that it would be physically impossible to undertake restoration on the site or without substantial disruption to business operations or impacts to the health and safety of workers. Commenters also believe this same standard must apply to steering impervious restoration activities to the industrial areas of a permitted facility first, before moving to areas like parking lots that do not generate as much polluted industrial runoff. When off-site projects are allowed, the Permit should make clear that off-site ISR compliance projects are not equivalent to on-site projects and, as such, should be supplemented with the restoration of greater surface areas off site and/or additional non-structural pollution control projects or practices on site. The Permit should also include a provision that prioritizes ISR projects in outfall drainage areas that permittees have designated as having the potential to discharge spills or leaks (see III.C.2.c) and those that are "likely to be significant contributors of pollutants to stormwater discharges." (III.C.5.b).

Street sweeping should be expressly excluded as a practice that can take the place of any impervious surface reduction. While sweeping plays an important role in reducing pollution, it is already a requirement of the Permit via the Good Housekeeping requirement. To allow additional credit for sweeping would constitute double counting, making any claimed reductions illusory.

**Finally, Commenters also strongly object to the allowance of pollution trading in the Permit.** Nutrient trading, particularly as it has been implemented by Maryland, is a fundamentally flawed, mathematically unsound program that may prevent Maryland from reaching its TMDL goals and will result in "hot spots" that place yet more burdens on communities already suffering disproportional pollution impacts. Maryland's nutrient trading regulations prohibit trading in the context of this Permit. COMAR 26.08.11.09(D) states that "[c]redits may not be used for the purpose of complying with technology-based effluent limitations." Controlling runoff and promoting infiltration are part of the technology-based effluent limitation in the Permit (see, *e.g.*, the Management of Runoff and AIM Measures conditions).

Additionally, the Department appears to be double-counting pollutant reductions via trading in the context of how most trades have been executed in Maryland to date. When wastewater treatment plants make pollution control upgrades, they immediately begin to report lower pollutant loads through their discharge monitoring reports. The Chesapeake Bay Program uses these discharge monitoring reports to inform the model used to track progress toward the TMDL goals. If a wastewater treatment plant made upgrades in 2012, then those pollutant reductions have already been counted toward Maryland's total pollution load. An acre's worth of paper credits is not equal in value to an acre of restored impervious surface. The permitted activities will not meet the sector's waste load allocation, and the Permit will not protect water quality. Instead, the Permit is simply weaker, and this represents impermissible backsliding from previous requirements. The trading provisions, in addition to being contrary to regulatory mandate, will not produce pollutant reductions commensurate with what would have been achieved in their absence.

The trading provisions also ignore the substantial benefits to local communities that accompany real, on-the-ground pollution reduction practices on industrial facilities and can exacerbate disproportionate impacts of pollution on already vulnerable communities. When jurisdictions are encouraged to outsource their pollution reduction activities rather than invest in green infrastructure projects that allow stormwater to infiltrate, the local communities lose out on the numerous co-benefits that the Department has written extensively about. Nutrient and sediment credits cannot replace these benefits. As noted by nationally renowned stormwater experts such as Tom Schueler and Dr. Richard Horner, stormwater BMPs that capture and retain sediment-laden stormwater not only reduce TSS, but also a myriad other dangerous pollutants that bind to sediment. Nutrient and sediment credits cannot replace reductions in other pollutants, such as toxic metals, that come with on-the-ground pollution reduction practices. Nutrient and sediment credits are simply not equivalent to BMPs—they do nothing to reduce pollutants other than nutrients and sediment, nor do they reduce stormwater flow volume, which contributes to downstream effects such as riverbank erosion. This violates the purpose of the CWA, violates the technology-forcing mandate of the Act, and violates the Act's specific requirements.

***The Inadequacy of the Pollution Controls in this Permit Will Cause and Contribute to New and Ongoing Water Quality Impairments, and, therefore, the Permit Requires New or More Stringent WQBELs Before it Can be Reissued.***

Under state and federal law, permitting authorities are required to consider the impact of a proposed discharge on the receiving water.[136] A permit with the reasonable potential to cause or contribute to further impairment of a receiving water must include WQBELs. This Permit appropriately contains a section that makes reference to WQBELs in subsection III.C.2 (which is notable only because other permits issued by the Department fail to comply with this requirement[137]), but unlike the 20 percent ISR condition, this section of the current permit is virtually devoid of any actual limitations beyond a prohibition on visible oil sheens or foam that does not dissipate within half an hour of the discharge.

The narrative WQBEL in Part III.B, "Your discharge must be controlled as necessary to meet applicable water quality standards," provides permittees no guidance or specificity as to what is required to protect water quality. At what point is the discharge required to meet WQBELs? And is there a mixing zone? **There is considerable geographic**

[136] 40 C.F.R. § 122.44(d)(1)(i); Md. Code. Ann., Envir. § 9-326; COMAR 26.08.03.01.
[137] *See, e.g.*, *In Re Petition of Assateague Coastal Trust*, Case No: 482915-V.

**variability in the distribution of industrial stormwater dischargers and WQS are determined within the receiving waters, not at the facility. Lacking site-specific WQBELs suggests that the same level of treatment is sufficient to meet WQS where the applicant is the lone discharger or among dozens in a cluster discharging into the same receiving waterbody.**

The blanket narrative limitation is legally insufficient in that it fails to provide guidance to permittees as to what actions are required to comply with the Permit, particularly when TBELs are insufficient to protect water quality.[138] Here, the widespread noncompliance with TBELs indicates that water quality is not being adequately protected. Moreover, the narrative WQBEL is unenforceable based on the terms of the permit, which do not require enough monitoring from which to determine whether a permittee's discharge is being controlled as necessary to meet WQS. Based on the available data, the narrative TBELs and WQBELs have been insufficient to protect water quality. In light of the deficiencies of the effluent limitations, and the failures of the Permit to adequately protect water quality, Commenters urge the Department to develop numeric, enforceable WQBELs.

Commenters recognize that a short statement was added to subsection III.C.2, which is otherwise maintained in similar form from the expired 12-SW permit, that states "The Department may impose additional control measures (to meet narrative water quality-based effluent limit above in Part III.B)". This is virtually meaningless language as it is completely discretionary and provides no guidance to the permittees or public regarding whether and when the Department will actually impose new control measures. CWA and applicable regulations ***require*** a permit to ensure compliance with WQS. Yet, this statement in the Permit does not mandate action if the available information indicates that the discharge is not being controlled as necessary to meet WQS. The Permit should clearly state that if, after the permittee has implemented the required corrective action, the discharge still fails to meet WQS, the Department ***will*** require the permittee to obtain coverage under an individual permit.

The most recent guidance from EPA regarding what is required of stormwater permit writers is that an industrial stormwater permit "must contain WQBELs ***as stringent as necessary to meet any applicable water quality standard for that pollutant.*** EPA recommends that NPDES permitting authorities use the experience gained in developing WQBELs to design effective permit conditions to create ***objective and accountable means*** for controlling stormwater discharges." (Emphasis added).[139] This Permit does nothing of the sort. **Commenters strongly urge the Department to state with**

[138] Nat. Res. Def. Council v. U.S. E.P.A., 808 F.3d 556, 578 (2d Cir. 2015) (holding that blanket WQBEL requiring discharge to be "controlled as necessary to meet applicable water quality standards in the receiving water body or another water body impacted by [the] discharges" was arbitrary and capricious because it failed to give the permittee guidance as to what is expected or allow the agency to determine whether the permittee was violating WQS, and though EPA found WQBELs necessary to supplement the TBELs, the WQBEL included in fact added nothing).

[139] U.S. Environmental Protection Agency, Office of Water. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on LAs" (2014). Page 5.

**specificity what sorts of considerations would dictate whether additional control measures are needed and what some of those control measures might be.** Otherwise, the Permit will fail to meet relevant legal standards by controlling pollution sufficient to meet WQS.

EPA guidance for stormwater permits further states that "[t]he permitting authority's decision as to how to express the WQBEL(s), either as numeric effluent limitations or as BMPs, with clear, specific, and measurable elements, should be based on an analysis of the specific facts and circumstances surrounding the permit, and/or the underlying WLA, including the nature of the stormwater discharge, available data, modeling results, and other relevant information. As discussed in the 2002 memorandum, ***the permit's administrative record needs to provide an adequate demonstration*** that, where a BMP-based approach to permit limitations is selected, the BMPs required by the permit ***will be sufficient to implement applicable WLAs***." (Emphasis added). **The record clearly shows a lack of adequate progress, which can almost surely be explained by a lack of clear, specific, and enforceable WQBELs. The Department must correct this deficiency.**

Commenters also strongly object to the statement, without any factual support, that "[t]he Department expects that compliance with the other conditions in this permit ***will control discharges as necessary to meet applicable water quality standards***…" (Emphasis added). Not only is this more akin to a safe harbor provision and permit shield than an effluent limitation, it is also inconsistent with the Department's previous findings that each successive iteration of the Permit will need to contain a new 20 percent ISR requirement, which the Department has proposed to eliminate in this Permit. This statement also stands out as glaringly inconsistent with local TMDLs issued by the Department.

Beyond the 20 percent ISR requirement to help the state achieve the Bay TMDL targeted load reductions for nutrients and sediment, many permittees are also located in watersheds with ***local*** TMDLs and impairments. The Permit proposes no WQBELs designed specifically to achieve these other TMDLs or address locally impaired waters. Instead, subsection III.C.2 merely provides a generic statement that permittees "must implement all measures necessary to be consistent with an available wasteload allocation in an EPA established or approved TMDL, including the restoration requirements (Part III.A)." At the very least, where the Department has identified a 12-SW permittee as subject to a WLA, even an aggregate one, the Permit must require some sort of WQBEL, whether an impervious surface restoration requirement or some combination of additional or enhanced-level control measures, as are being increasingly utilized in other states with stronger permits, in order to ensure consistency with the TMDL.[140] This should be the bare minimum requirement before the Department makes a sweeping declaration that it expects compliance with the Permit "will control discharges as necessary to meet water quality standards." Given the extraordinarily high rate of noncompliance from industrial stormwater permittees throughout the 12-SW permit term, especially in watersheds with

[140] See the attached report by Dr. Richard Horner, which discusses the role of advanced treatment technologies being utilized on the West Coast under stronger permits.

clusters of 12-SW permittees, and given the lack of clarity provided in this subsection or elsewhere in the Permit, it is irrational for the Department to expect this statement to provide adequate direction to permittees about what WQBELs they are expected to adhere to or to assume this conclusory statement will suddenly generate pollution reductions where it has not in the past. **The Department should provide clear guidance in the Permit to permittees that gives confidence that the 20-SW will succeed in driving investments in control measures that protect local water quality where the 12-SW has clearly failed. The Department must also provide an adequate justification for this safe harbor language.**

**Moreover, unless the Department can provide an adequate factual justification for the conclusory language that "compliance with the other conditions in this permit will control discharges as necessary to meet applicable water quality standards" it must be removed.** The language as currently written provides what amounts to an affirmative defense to actual WQS violations. Since the issuance of the 12-SW permit, similar blanket statements have been struck down by courts as arbitrary and capricious and inconsistent with the CWA. Courts have logically held that a permit may not be issued that fails to give the permittee guidance as to what is expected or to allow the agency to determine whether the permittee was violating WQS. Commenters strongly urge the Department to replace the phrase "The Department will inform you if any additional monitoring, limits or controls are necessary" and similar phrases used in this Permit (including in the III.C.2.c regarding antidegradation), which, as noted, preserve total discretion for the Department.

Logically, if it is well-understood that previous controls have failed to meet WQS or make meaningful progress toward attainment of such standards, then it is irrational to merely authorize, but not require, additional measures. **The Department should instead replace this meaningless discretionary language with clear and specific direction to the permittees and public about what to expect** for those permittees discharging to impaired waters, with or without a TMDL in place. Otherwise, this discretionary language is an invitation to arbitrary decision making and, if history is any guide, inaction with respect to pollution problems from this sector.

Commenters also urge the Department to change the conditional statement in III.B.2.b.i. that begins "if you discharge to an impaired water with an EPA-Approved or Established TMDL..." Nearly all permittees in the state, except perhaps a few in the Westernmost portion of Garrett County or northeastern-most portion of Cecil County, or in the Coastal Bays watersheds, are subject to the Chesapeake Bay TMDL. If this term is applicable only to local TMDLs, it should be revised to state that.

Finally, the condition applicable to Tier 2 antidegradation requirements in paragraph III.C.2.c contains the same overly discretionary language that must be replaced with specific direction and guidance. Additionally, the Permit does not comply with antidegradation requirements of the CWA and is not consistent with the process set forth in Maryland regulations. **The Department must, at the very least, revise the**

**Permit to be consistent with the antidegradation procedures established in COMAR 26.08.02.04-1.**

## The Permit Fails to Adequately Account for a Rapidly Changing Climate

Climate change must be adequately considered and addressed by the Department in the development of the Permit before its reissuance, and climate impacts, as well, must be adequately addressed by covered facilities in the selection, design, and maintenance of BMPs and other stormwater controls necessary to ensure compliance. As discussed in the Factual Background to this comment, climate change is already impacting the intensity, duration, and frequency of precipitation events in Maryland and resulting impacts to BMP effectiveness, stormwater controls, water quality, and public health relevant to this Permit, which must be more responsive and adaptive to these developing trends and water quality challenges. Maryland water quality and public health cannot risk waiting another five years or longer before the general permit is updated to adequately address climate change and its impacts on stormwater runoff. The Permit contains three provisions[141] that discuss or address climate change. The comment and recommendations below will address some of these specific references in the Permit as well as make additional recommendations and raise other concerns.

***The Department Must Give Permittees and the Public Fair Notice of Climate Requirements.***

The Permit's climate-related provisions do not give permittees or the public fair notice of what is required.[142] This creates a risk that permittees will face arbitrary enforcement actions and it fails to notify the public about the protections and enforcement provisions in place to protect water quality and public health. More detail and information are required so that permittees will have fair notice of how to comply with the permit. For instance, Part III.B.1.a.viii requires permittees to "consider … adapting operations to address climate change impacts." In order to give permittees fair notice, this section of the Permit should detail the impacts the Department has in mind—i.e., increased precipitation, stronger floods, etc. To provide permittees and the public with clear notice about the permit requirements, the Department should adapt storm design standards to be responsive to updated IDF curves and analyses, these updated standards could also be informed by other states studies, nuisance flooding maps, sea level rise projections and Special Flood Hazard Area designations.[143] These updated design standards and updated data must be used to integrate climate change considerations into the BMPs required by the permit. Additionally, under Part II.F.1, the Permit urges permittees to consider climate adaptation measures, but the existing language indicates these steps are encouraged and not mandatory. The Department should strengthen the existing provision to require permittees to comply with these measures and specify how they have

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[141] Part II.F.1., Part III.B.1.a.viii., and Part VI.C.

[142] *F.C.C. v. Fox Television Stations, Inc.*, 567 U.S. 239, 253 (2012) ("A fundamental principle in our legal system is that laws which regulate persons or entities must give fair notice of conduct that is forbidden or required.").

[143] See Appendices F and G. Commenters provide several resources for review of updating storm design standards.

complied. This would allow the Department to track what measures are in place and their effectiveness.

Furthermore, the language of III.B on page 15 of the Permit defining "minimize" is also vague and seems to conflict with other permit requirements.[144] Particularly, the definition's constraint of economic practicability could undermine other permit requirements, such as the requirement to consider climate change (which could lead to potentially costlier BMPs).

The 2020 Accounting Guidance describes how additional impervious acre credits may be available to permittees that install BMPs designed to treat more than the required one inch of rainfall, recognizing that "[...]greater storage volume may be more resilient to changing weather patterns such as increasing annual precipitation and more frequent, intense short duration storms" and "helps reduce downstream flooding and channel erosion." Commenters agree that increasing the storage volume of stormwater BMPs is likely an important management strategy for permittees to adopt in order to adapt the design of BMPs to changing precipitation conditions, while producing additional co-benefits to mitigate downstream flooding. However, the additional prospective impervious acre credits offered by the Department do not alone address any change in the overall level of effort required of permittees to address increasing quantity and intensity of precipitation and flooding in Maryland, nor the watershed loads of nitrogen and phosphorus pollution attributable to climate change impacts that are not currently offset by Maryland's Phase III WIP for the Bay TMDL. The mere offer of potential credits for sizing up stormwater restoration BMPs is not alone an adequate approach to adapt the Permit to changed climate conditions.

***The Department Must Evaluate Climate Impacts on the Permit's Ability to Meet State WQS and the 2014 Chesapeake Bay Watershed Agreement.***

By signing the 2014 Chesapeake Bay Watershed Agreement, Maryland agreed to take measures to restore and support the resiliency of the Chesapeake Bay to a changing environment. Under this agreement, Maryland has specifically agreed to take measures to reduce pollutants and toxic contaminants, to improve water quality, and to increase climate resiliency of the Chesapeake Bay. For instance, the Agreement notes that "[c]hanging climatic and sea level conditions may alter the Bay ecosystem and human activities, requiring adjustment to policies, programs and projects to successfully achieve our restoration and protection goals for the Chesapeake Bay and its watershed." The Agreement further specifies that "[t]his challenge requires careful monitoring and assessment of these impacts and application of this knowledge to policies, programs and projects." The Permit in its current form does not have appropriate conditions or terms to properly monitor and assess climate impacts and meet the challenge of adjusting "policies, programs, and projects to successfully achieve"

[144] Permit Part III.B. "In the technology-based limits included in Part III.B.1 and in Appendix D, the term 'minimize' means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practice."

Maryland's restoration and protection goals under the 2014 Bay Watershed Agreement. At minimum this Permit renewal presents the Department with the opportunity to enhance the monitoring and data collection at 20-SW sites to gather more data that can be analyzed to assess the impact of increased extreme storm events on stormwater runoff, water quality and public health impacts from these sites. As stated above, PIA records indicate that the Department failed to adequately assess and consider climate change in developing the 20-SW and failed to assess how industrial stormwater discharges will contribute to the reduction of climate attributable Bay pollution loads.

Not only did the Department fail to make these considerations but this failure results in a Permit that the Department cannot ensure will be protective of water quality and public health. The permit is grounded in outdated information and data pertaining to precipitation trends and projections for Maryland.[145] Indeed, the Department's reliance on storm design standards based upon precipitation data from the early 1990s and earlier does not bear a rational relation to the Permit's purpose of ensuring compliance with WQS under present-day environmental conditions. This is also inconsistent with the goal and purpose of the CWA as a technology forcing statute requiring the continued updating of pollution reduction technologies and BMPs to further ratchet down water pollution towards the ultimate goal of elimination of that pollution to waters of the state.

The CWA requires the Department to consider climate change impacts because the impacts of climate change could affect whether the Permit, or activities conducted pursuant to the Permit, achieve the permit's purpose of attaining WQS or meeting the requirements of the Act. The CWA requires that the Department issue a permit that will maintain and meet WQS and criteria.[146] Inherent in the Department's assessment of this requirement is the consideration of how changes in precipitation in Maryland may impact the effectiveness of this Permit in maintaining water quality throughout the state. A reasonable consideration of climate change involves using, or requiring the use of, updated and climate-informed precipitation data, water quality information, technology, and stormwater management methods, among other practices. The Department has acknowledged this fact in a recent letter regarding Maryland Senate Bill 0227.[147]

Commenters have provided the Department with information pertaining to climate change considerations in the factual background above. The Department must consider the information cited and attached to this comment as well as other technical information and legal authorities and then make revisions to this draft permit that are consistent with the Department's CWA obligations to protect water quality. To issue the permit in its current form without evidence of any consideration of relevant climate information would be an arbitrary and capricious determination by the Department. The Permit is not adapted to present-day climate impacts and therefore fails to protect water quality as a matter of technical and legal sufficiency. To address these legal and technical insufficiencies, the

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[145] *Supra*. Section on Factual Background.

[146] Md. ENVIRONMENT Code Ann. § 9-322; 33 U.S.C. § 1311(a); COMAR 26.08.04.01.

[147] "The Department agrees that stormwater regulations should be updated to reflect the most recent precipitation data…" https://mgaleg.maryland.gov/cmte_testimony/2021/ehe/498_01192021_17312-433.pdf

Department must take the time to review the information we have provided as well as other resources and develop updates to storm design standards and BMPs required in the Permit. This effort should be undertaken immediately so that new standards are incorporated in their Permit or if promulgated after this permit is renewed then implemented into the Permit via a reopener clause.[148] Additionally, MDE should require that permittees updated their SWPPP's when new precipitation data becomes available, this would ensure that the new data and new stormwater control measures and designs would be implemented on a particular site as soon as possible and would not have to wait for the Department to reopen/renew the permit with the new data incorporated.

***The Department Must Review and Consider How Other Jurisdictions and Entities Have Used Current and Projected Data to Create Climate Adjusted Storm Design Standards and BMPs.***

The Department must review the following examples and determine if similar methods could be used to update the Permit's storm design standards and BMPs to be adaptive to climate induced changes in stormwater runoff.

● The Chesapeake Bay Program - A recent memo within the Program summarized five recent studies "that downscaled precipitation projections for local stormwater management application."[149] The memo also states that these downscaled precipitation projections are 'necessary to [] inform future stormwater design."[150] The summary of these studies indicates that Rainfall Intensity Projections will increase across the watershed with increases ranging from 1% to 44%.[151] The memo also states "that the use of IDF curves based on historic precipitation analysis are likely to underestimate future precipitation.[152] Lastly, the memo notes a recently completed study of Maryland with resulting downscaled precipitation projections.[153] Commenters urge the Department to track and communicate with the authors of this study and thoroughly analyze how the projected IDF curves that result may be implemented immediately into this Permit, through the use of a reopener, and/or updates to the storm design standards during the permit term.

● Chesapeake Bay Program Urban Stormwater Workgroup - This workgroup is developing a project to "develop future projected IDF curves for the entire Chesapeake Bay Watershed and host them on a web-based tool" with the goal "to design and build infrastructure assets to withstand anticipated future precipitation conditions, design

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148 See below for further discussion on reopener clause and permit adaptability.

149 David Wood, Chesapeake Stormwater Network, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed (*Oct 20, 2020), *available at https://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2020/10/Memo-3_Summary-of-Climate-Projections_FINAL_10.20.20-1.pdf Last Accessed April 8, 2021.*

150 *Id.* at 13.

151 *Id.* at 17.

152 *Id*. at 2.

153 Jonathan Butcher, Tetra Tech, *Climate Impacts to Restoration Practices - Project Report* (Sept 18, 2020) available at https://cbtrust.org/wp-content/uploads/Grant16928-Deliverable11-FinalProjectReport.pdf Last Accessed April 8, 2021).

standards should reflect future precipitation projections and not solely be based on historical precipitation records."[154] We urge the Department to track and collaborate with this workgroup as necessary to implement the appropriate standards into the MS4 and to implement similar goals and motivations into the design and implementation of the MS4.

● Virginia Beach, Virginia - The City of Virginia Beach updated its Public Works Design Standards Manual in June 2020.[155] These updates included the requirement that developers "plan for 20 percent more rainfall than current National Oceanic and Atmospheric Administration data calls for."[156] This change was driven by studies from the City that indicated that "actual rainfall frequency depths in Virginia Beach are approximately 10% greater than those specified in NOAA" and "in order to address the need for more accurate design rainfall data and to consider projected increases in rainfall frequency depths over the next 30 years, rainfall depth-duration values were increased by 20% over NOAA Atlas 14 values."[157] We urge the Department to conduct a similar analysis of Maryland as a whole, develop updated storm design standards applicable across the state and determine if any areas of the state require further enhancement of standards based on local/regional rainfall data.

● Virginia Department of Transportation - "The Virginia Department of Transportation (VDOT) has also revised its bridge design manual to account for climate change. VDOT has implemented a 20% increase in rainfall intensity and a 25% increase in discharge in design of bridges."[158]

● Maryland's Eastern Shore - The Eastern Shore Land Conservancy commissioned a study on extreme precipitation on Maryland's Eastern Shore. The conclusion of this study was that "extreme precipitation events are becoming more intense and bringing more rain, a trend which will continue and escalate in the coming decades.[159] One of the

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[154] Michelle Miro et al. *Piloting the Development of Probabilistic Intensity Duration Frequency (IDF) Curves for the Chesapeake Bay Watershed*, presentation to Chesapeake Bay Program Urban Stormwater Workgroup Meeting (June 16, 2020), *available at* https://www.chesapeakebay.net/channel_files/40321/urbanstormwaterworkgroup_16june2020.pdf.

[155] Virginia Beach Department of Public Works Engineering Group, *Design Standards Manual*, City of Virginia Beach, Virginia (June 2020), *available at* https://www.vbgov.com/government/departments/public-works/standards-specs/Documents/_June%202020%20Design%20Standards%20Manual.pdf.

[156] Brett Hall, *Starting this summer, developers must plan for more flooding in order to build in Virginia Beach*, WAVY-TV, (Aug. 12, 2020, 12:43 AM) https://www.wavy.com/weather/flooding/starting-this-summer-developers-must-plan-for-more-flooding-in-order-to-build-in-virginia-beach/.

[157] Virginia Beach Department of Public Works Engineering Group, *Design Standards Manual*, at 8–9; *see also* Dmitry Smirnov, et al., *Analysis of Historical and Future Heavy Precipitation*, Dewberry, Submitted to City of Virginia Beach Department of Public Works (Mar. 26, 2018), *available at* https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Documents/anaylsis-hist-and-future-hvy-precip-4-2-18.pdf.

[158] David Wood, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed*, at 12, 21; *see also* Virginia Department of Transportation. *Consideration of Climate Change and Coastal Storms*, (Feb. 14, 2020), *available at* http://www.virginiadot.org/business/resources/bridge/Manuals/Part2/Chapter33.pdf.

[159] Michelle Charochak and James Bass, *Preparing for Increases in Extreme Precipitation Events in Local Planning and Policy on Maryland's Eastern Shore*, 27 (Jan. 2020), *available at* https://www.eslc.org/wp-

key recommendations from the report was to "upgrade infrastructure to reflect future precipitation estimates".[160]

● Anne Arundel County, Maryland - Updated 1-year storm designation to 2.7 inches in 2017.[161]

● New Jersey - Executive Order 100 directs New Jersey Department of Environmental Protection ("NJDEP") to incorporate climate change in stormwater regulations, among other things.[162] NJDEP issued an administrative order that sets deadlines for meeting NJDEP's obligations under EO 100.[163] NJDEP also updated its Stormwater Best Practices Manual in March of 2021 to address climate change.[164]

● New York - Recently, the New York State Department of Transportation has revised its highway design manual to account for future projected peak flow in culvert design. The change was a 20% increase. Additionally, New York City has issued the "Climate Resiliency Design Guidelines" (NYC Mayor's Office of Recovery and Resiliency, 2019). Among the guidelines provided is the recommendation that the current 50-year IDF curve be used as a proxy for the future 5-year storm (projected for the 2080s). The guidelines suggest that designers plan to use on-site detention/retention systems to retain the volume associated with that size storm event though it is not yet a requirement.[165]

***The Permit Must Provide for a Mechanism to Adapt the Permit as State Agencies and Partners Release New Data and Impact Assessments.***

The Department must carefully review the recently enacted SB 227 / HB 295 of 2021, as this new law creates new obligations on the Department pertaining to stormwater management regulations and regular updates to those regulations that incorporate the most recent precipitation data available.[166] The Department's Industrial Stormwater division must be involved in this update process to determine how the required update and new data can be properly incorporated into this Permit going forward.

The Department should revise the Permit to include a reopener clause, committing to modify the Permit to address forthcoming climate change analyses, reports, and plans

content/uploads/2020/01/ExtremePrecipitationReport.pdf (a report prepared for the Eastern Shore Climate Adaptation Partnership by Eastern Shore Land Conservancy)
[160] *Id*. at 3.
[161] Rachel Pacella. *Tropical Storm Isaias highlights a familiar problem in Anne Arundel: Where does the rain go, and how fast?* The Baltimore Sun (Aug. 5, 2020, 9:00 AM), ttps://www.baltimoresun.com/news/environment/ac-cn-stormwater-management-0805-20200805-c4ic23hcrvesxequxaxpt6rsfm-story.html?outputType=amp.
[162] https://nj.gov/infobank/eo/056murphy/pdf/EO-100.pdf
[163] https://www.nj.gov/dep/njpact/docs/dep-ao-2020-01.pdf
[164] https://www.nj.gov/dep/stormwater/bmp_manual2.htm updates to chapters 9-11.
[165]*Supra* note 144 pg 18-19. Citing, Arthur DeGaetano and Christopher Castellano. *Downscaled Projections of Extreme Rainfall in New York State*, Northeast Regional Climate Center, Cornell University Ithaca, NY, 12, *available at* http://ny-idf-projections.nrcc.cornell.edu/idf_tech_document.pdf; David Wood, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed*, at 19.
[166] https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/SB0227

relevant to this Permit. Critically, the Department should ensure that reasonable modifications are made to this Permit no later than 2022 for the purpose of incorporating the state's commitment to address climate-attributable pollution loads to the Chesapeake Bay as part of the Bay TMDL mid-point assessment. Maryland committed to submit to EPA an addendum to its Phase III WIP that addresses previously unaccounted for loads of pollution attributable to climate change. Preliminary modeling of these loads by the Bay Program indicates that Maryland's share could amount to 2.19 million pounds of nitrogen per year by 2025 that are not currently accounted for by the state's WIP or in existing permitting programs. Maryland's climate addendum is due for submission in 2021, which is several years before this Permit will expire. The climate addendum is likely to consider new and revised commitments relevant to sources of climate-attributable pollution, including, for example, potential increases in stormwater discharges attributed to increasing intensity and quantity of precipitation within the region.[167] Maryland will soon also finalize several relevant climate studies, reports, and plans including, for example, a statewide plan to address nuisance flooding[168], an update to Maryland's modeling and mapping of 100-year flood-zones, and a water quality and climate change resiliency portfolio set to release in 2021. The Department must track these studies, reports, and plans and review them when they are available to determine if they will impact the terms, conditions, and design of this Permit.

To ensure new developments, data, information and experience with storms are properly addressed at any particular site, the Department should require regular SWPPP updates similar to that required in EPA's 2021 MSGP, part 6, which provides: "Facilities must keep their SWPPP up-to-date throughout their permit coverage, such as making revisions and improvements to their stormwater management program based on new information and experiences with major storm events."[169] MDE must include similar language in the Permit's SWPPP conditions.

In addition, it is imperative that the Department build appropriate assumptions into its planning models and require monitoring sufficient to characterize the dynamic pollution loads associated with industrial facilities and how climate is affecting those loads. So far, the Department has arbitrarily failed to conduct any analysis of how changing precipitation patterns will influence the impact of industrial stormwater on water quality, and how the Permit might be changed to adequately protect water quality. If the Department takes the position that there is not enough information to perform the necessary analysis, then the Department should require more monitoring with a specific focus on this issue.

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[167] Notably, in its Phase III Watershed Implementation Plan, Maryland specifically commits to continued research on the impact of increased precipitation on stormwater BMP performance, which would support the modification of stormwater design standards and other elements of this permit to account for the impacts of climate change.

[168]Maryland Department of Natural Resources Nuisance Flood Plan Development Guidance https://dnr.maryland.gov/ccs/Documents/NuisanceFloodPlan.pdf

[169] https://www.epa.gov/sites/production/files/2021-01/documents/2021_msgp_-_permit_parts_1-7.pdf pg. 55 Last Accessed April 4, 2019.

Furthermore, failing to model and account for increases in rainfall and to adequately update the Permit to that effect jeopardizes the permit holder's financial and other resource investment in their businesses and operations. A Permit that is not updated and does not contain complete information for permittees to properly design and implement stormwater control measures will also make this Permit difficult if not impossible to implement and comply with. This will increase permittees' legal liability to the Department and citizen enforcement. A Permit that is adequately updated and adaptable will be a benefit to all stakeholders involved with industrial stormwater.

Lastly, it should also go without saying that stormwater BMPs must be designed to accommodate the storms of the next five years, not the storms of twenty years ago. This is the only way to have any hope of achieving the results that the Permit is intended to achieve.

***The Department Must Ensure that the Impacts of Climate Change on Industrial Facilities Do Not Increase the Harm to Overburdened Communities.***

The Department and the State of Maryland have legal and regulatory duties to address the environmental inequities and environmental justice implications of this permit.[170] As also discussed above, this Permit does not adequately control industrial stormwater contamination to protect water quality, designated uses, and public health. Because of this, the Permit fails to adequately protect the health and safety of vulnerable Marylanders nor does it resolve or attempt to resolve the disproportionate impact of this source of pollution on overburdened communities. Given that changing precipitation trends and projections will likely result in increases of industrial stormwater runoff and the Department's failure to address this fact

This comment makes clear the environmental inequities and environmental injustices associated with this Permit, which result largely from a permit that fails to protect water quality, designated uses, and public health. This comment also makes clear that changing precipitation trends will likely have negative impacts on stormwater quality and quantity and our changing climate will result in increased vulnerability of industrial facilities and the communities around them. It is therefore imperative that the Department's cumulative impact assessment of the 20-SW include and factor in an assessment of how the climate impacts detailed in this section may result in continued outsized impacts on vulnerable populations in Maryland.

Oftentimes industrial facilities overburden communities with environmental harms and stormwater pollution. The Department must ensure that the Permit is stringent enough to cover the cumulative impact of the pollution it is permitting. Specifically, as the climate changes and precipitation increases, stormwater from industrial facilities will increase as well. Communities already overburdened with stormwater pollution will see an even further increase in this pollution, unless the Permit considers the cumulative impact of the permitted pollution. We also reiterate the above suggestion here that the Department

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[170] *See* pages 22-43 of this comment.

involve the CEJSC and affected communities in both (a) contributing data and other information to the design and implementation of the cumulative impacts assessment and (b) tailoring action on the reissuance of the Permit to respond to their environmental justice and health needs, concerns, and priorities. Climate change impacts on these facilities and their pollution must be factored into any environmental justice assessment of the Permit and its enforceability.[171]

***The Department Must Clarify that Good Engineering Practice Necessarily Requires Adaptation to Climate Impacts and Risks.***

The Permit at Part III.B.1 (pg.15) states that "[t]he selection, design, installation, and implementation of these control measures must be in accordance with good engineering practices." This is the Permit's only reference to "good engineering practices" and as such this statement leaves much up to interpretation. As discussed below, the Department must elaborate and provide more details and guidance to permittees regarding this provision.

Although "good engineering practices" is ambiguous and open-ended, as discussed below, at least one court and the EPA, in at least one instance, have stated that such practices include accounting for and adapting to climate change. In addition, "good engineering practices" reasonably refers to standards and practices articulated by leading professional engineering groups, the most prominent of which have recognized the importance of addressing climate change. The following are some illustrative examples for the Department to consider:

- In May 2016, EPA entered into a consent decree with the Town of Hull, Massachusetts to resolve alleged NPDES permit violations. Although the permit was for a wastewater treatment plant (not stormwater), the consent decree links "sound engineering practices" and climate change: "All work pursuant to this Order shall be performed using sound engineering practices to ensure that construction, management, operation and maintenance of the Town's Collection System complies with the CWA, including practices to improve the resilience of the sewer system to the impacts of climate change."[172]

- In Conservation Law Foundation v. ExxonMobil, the U.S. District Court for the District of Massachusetts concluded that (1) Exxon's individual industrial stormwater permit "requires Exxon to consider foreseeable severe weather events, including any climate change-induced weather events," and (2) "good engineering practices" include "consideration of foreseeable severe weather events, including any caused by climate change." 448 F.Supp.3d 7 n.4 (D. Mass. 2020).

- In City of New York v. Anglebrook Ltd. Partnership, the Southern District of New York interpreted a NPDES stormwater permit's guidelines for SWPPP preparation, including the directive to prepare SWPPPs in accordance with "good engineering

[171] *See Supra* Part III.E.
[172] See attached consent decree at Appendix F.

practices." The court did not define that phrase, but it held that the guidelines overall are "intended to be flexible rules which contemplate—and indeed require—applicants to exercise good engineering practices, informed by professional judgement and common sense."[173] This decision can be read to require consideration of climate change impacts on the design and implementation of stormwater control measures under the Permit.

● Numerous Industry Groups have also emphasized the importance of climate change in "good engineering practices". The American Society of Civil Engineers Sustainability Roadmap states:

> "[Integrating Sustainability] into professional practice is required to address changing environmental, social, and economic conditions ethically and responsibly. Although challenging issues such as climate change, urbanization, and the rapid pace of technological advancement create opportunities, they also require serious re-evaluation of current professional practice and standards."

and

> "Clearly, previously reliable standards and protocols no longer suffice. Current prescriptive standards may apply in conditions of stationarity. However, where nonstationarity (a condition where statistical properties, such as mean or variance, of a data set are not constant over time) is prevalent, we must develop new standards and protocols that are performance-based rather than prescriptive. Those standards must address sustainability and resiliency of infrastructure, to ensures communities safety and its ability to recover from natural and manmade disruptions."[174]

The Institution of Engineering and Technology has a Sustainability and Climate Change Position, which states: "It is essential that the longer-term impacts of any new technology and innovation are considered, that resilience and adaptation are built-in and that any view of the long term must consider the ethical implications on future generations and the impact on them by engineering decisions made today." [175] Lastly, the World Federation of Engineering Organizations, which includes the American Society of Civil Engineers, has written a Model Code of Practice: Principles of Climate Change Adaptation for Engineers.[176] This model code includes numerous references to climate change and that historical data and projections need to be adapted for future planning, some notable statements are found at pages 3, 7, 13, 15, 16, 17, 25.[177]

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[173] City of New York v. Anglebrook Ltd. Partnership, 891 F.Supp. 908, 915 (SDNY 1995).

[174] https://www.asce.org/sustainability-roadmap/

[175] https://www.theiet.org/ and https://www.theiet.org/impact-society/sustainability-and-climate-change/our-sustainability-and-climate-change-position/

[176] World Federation of Engineering Organizations, Model Code of Practice: Principles of Climate Change Adaptation for Engineers. (Dec. 2015), available at http://www.wfeo.org/wp-content/uploads/code-of-practice/WFEO_Model_Code_of_Practice_Principles_Climate_Change_Adaptation_Engineers.pdf, attached as Appendix G.

[177] *Id*. Pgs. 3, 7, 13. 15. 16. 17, 25. Appendix G.

These examples make clear that it is a good engineering practice to consider climate change in the design and implementation of stormwater control measures. Commenters recommend that the Department incorporate language that expressly includes climate impacts among the factors necessary to comply with good engineering practices. This should include proper preparation for future climate change events in the design, construction, and modification of industrial sites. In addition, permit reviewers should have climate change training to ensure they are accurately evaluating every permit for proper climate and precipitation changes. Currently, the state of Maryland, the Maryland Department of Natural Resources, and the Maryland Commission on Climate Change provide climate preparedness and infrastructure training through the Maryland Climate Leadership Academy. The Department, permit writers and permit reviewers must work with the Maryland Climate Leadership Academy to ensure their list of "good engineering practices" matches those of the Academy.

The Department should also:

- Include in the Permit a non-exhaustive list of what practices would fulfil the good engineering practice requirement, including a non-exhaustive list of present-day and future climate impacts that must be adapted to, as necessary, in the selection and design of SCMs to comply with the conditions and effluent limits of the Permit.

- Pursuant to the good engineering practices requirement of the Permit, provide permittees and the public with resources and other citations to professional engineering authorities that support consideration and adaptation of design based on climate impacts to precipitation and other climate impacts.[178]

[178] American Society of Civil Engineers' Sustainability Roadmap. https://www.asce.org/sustainability-roadmap/. Institution of Engineering and Technology, Our Sustainability and Climate Change Position. https://www.theiet.org/impact-society/sustainability-and-climate-change/our-sustainability-and-climate-change-position/.

## The Permit Conditions Applicable to Control Measures Are Not Sufficient

The CWA is predicated on the notion that iterative progress must be continued until WQS are attained and, eventually, until pollution is eliminated.[179] In the short term, this means that regulators must continually evaluate the effectiveness of control measures and best management practices (BMPs) and prescribe ever more effective measures to bring discharges in line with levels needed to meet WQS.[180]

Current BMPs and control measures relied upon to date have not reached the level of effectiveness needed to help attain WQS; in fact, benchmark exceedances are commonplace, impaired waters remain impaired, and Bay Model data show increasing loads from stormwater. As courts and the EPA have made clear, BMPs must be demonstrated to be "reasonably capable" of ensuring compliance with WQS.[181] After all, a permit cannot be issued consistent with CWA regulations "when imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected states."[182] **As long as the record is devoid of evidence demonstrating that the current permitting approach is working to bring pollution levels in line with WQS it is not rational to maintain the same approach in this Permit.** We cannot find any meaningful change to the BMPs required or even recommended in the Permit, nor a framework establishing how certain types of BMPs, or more advanced BMPs, will be required based on identified deficiencies.

As described in more detail in the accompanying report provided by Dr. Horner, a nationally recognized expert in stormwater management, Maryland's proposed Permit does little to stimulate the use of the sorts of reliable treatment technologies with known performance characteristics that are available and, indeed, in wide and growing use in jurisdictions with stronger industrial stormwater permits.[183] As Dr. Horner notes, the Department's own Permit and accompanying fact sheet spotlight "persistent and long-standing problems in meeting benchmarks" and acknowledge that "… the ultimate solution may be structural control such as a treatment system …" But like the Commenters, Dr. Horner is confused that statements in the Permit Fact Sheet "identify a problem, and a solution, that is not given the deserved attention by 20-SW itself." In the judgement of Dr. Horner, the permitting approach here is backward; a regulator is supposed to "first set goals, then impose means of meeting them." If the correct sequence and process were followed, by the Department's own judgments expressed in the Fact Sheet, numeric effluent limits designed to meet the capabilities of advanced treatment

[179] 33 USC §1251(a)(1).
[180] U.S. Environmental Protection Agency, Office of Water. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on LAs" (2014).
[181] See Gov't of the Dist. Of Columbia, MS4 System, 10 E.A.D. 323, 2002 WL 257698, *1 (2002) citing EPA regulations at 40 C.F.R. § 122.4(d)
[182] *See Arkansas v. Oklahoma,* 503 U.S. 91, 94, (1992) citing EPA regulations at 40 CFR § 122.4(d).
[183] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021).

technologies could be deployed, thus aligning the Permit with its statutorily imposed goals, which should be "first and foremost, a function of the protection and recovery needs of the affected environment."

Commenters recognize that iterative progress - and not full compliance within one permit term - is all that may be practicable. But maintaining the status quo is simply not acceptable as a matter of law and policy. EPA has been attempting to reconcile the reality of driving iterative progress toward attainment of WQS from stormwater permittees for decades. Generally, this approach has affirmed that, indeed, stormwater dischargers are point sources of pollution fully subject to CWA and NPDES requirements, but that WQBELs may be developed by permit writers in the form of BMPs. A reasonable approach, endorsed by Dr. Horner in his experience studying the way in which industrial stormwater permits have been implemented in other jurisdictions, is to begin to introduce numeric effluent limits into this Permit and expand upon their use in the next permit cycle.[184] Numeric effluent limits have the benefit of being concrete and measurable, making them significantly more enforceable than current permit standards.

Successive iterations of EPA guidance documents on this subject have continually demanded greater accountability of permits. The most recent guidance provided by the EPA Office of Water reiterated the appropriateness of relying on BMPs, but clarified that permit writers need to develop stormwater permits with a "***greater emphasis on clear, specific, and measurable permit requirements and, where feasible, numeric NPDES permit provisions***". (Emphasis added). EPA has begun pushing in this direction in recognition that "stormwater discharges remain a significant cause of water quality impairment in many places" and that "States and EPA have obtained considerable experience in developing TMDLs and WLAs that address stormwater sources." It would be wise for the Department to take to heart the observation of the NRC that industrial stormwater permitting needs to keep pace with the "rapid" improvement in the scientific understanding of industrial stormwater pollution.[185] Perhaps nowhere in the world has there been more "experience in developing TMDLs and WLAs that address stormwater sources" than right here in Maryland.

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[184] *Id.* "I believe that the experience is now sufficient that a permitting agency can develop NELs appropriate to environmental needs with confidence that BAT/BCT treatment practices can meet them. My opinion is that Maryland should initiate this effort in the current permit and bring it to full fruition in the next iteration."

[185] National Academy of Sciences. Improving the Next-Generation EPA Multi-Sector General Permit for Industrial Stormwater Discharges (2019). Hereinafter "NRC." "Technologies for water quality monitoring, stormwater treatment, and modeling are advancing at rapid rates, and new data can inform understanding of the performance of stormwater control measures. New tools are being developed to improve toxicological assessments and data management and visualization… In general, EPA has been slow to adopt new knowledge into its [Multi-Sector General Permit] permit revisions, but the [Multi-Sector General Permit] should not be a static enterprise. Both permitted facilities and the nation's waters would be best served by a progressive and continuously improving [Multi-Sector General Permit] based on analysis of new data and focused data gathering efforts, advances in industrial stormwater science and technology, and structured learning to develop and evaluate permit improvements."

The state of science with regard to watershed modeling and stormwater management has advanced tremendously in this region, due both to the incredible scientific and modeling/computing prowess of the Chesapeake Bay Program and the degree of expertise in developing and studying low impact development techniques. **Put simply, this is exactly the time and place where one could reasonably expect to see a highly advanced stormwater permit that leads the nation in the direction EPA has been pointing stormwater permit writers. Instead, the Permit largely maintains the status quo with respect to stormwater control measures, while proposing to roll back the most significant pollution control requirement of the 12-SW permit.**

The failure to make iterative progress is particularly glaring in light of the heightened expectations that flow from the Bay TMDL and the 2014 Chesapeake Bay Agreement signed by Maryland. As the Department and its lawyers know well, section 117(g) of the CWA require that:

> "management plans are developed and implementation is begun by signatories to the Chesapeake Bay Agreement to achieve and maintain … the nutrient goals of the Chesapeake Bay Agreement for the quantity of nitrogen and phosphorus entering the Chesapeake Bay and its watershed … the Chesapeake Bay Basinwide Toxins Reduction and Prevention Strategy goal of reducing or eliminating the input of chemical contaminants from all controllable sources to levels that result in no toxic or bioaccumulative impact on the living resources of the Chesapeake Bay ecosystem or on human health … [and] the restoration, protection, creation, and enhancement goals established by the Chesapeake Bay Agreement signatories for living resources associated with the Chesapeake Bay ecosystem."

The State is currently engaged in litigation based upon these requirements and has frequently been chair of the Executive Council of the Chesapeake Bay Program. Thus, **the Department is acutely aware of Maryland's special obligations under the law and to other Chesapeake Bay partners to address sources of pollution to the Bay. Proposing a major rollback and abdicating its responsibility to address nutrient, sediment, and toxic pollution, promote climate resilience, and promote environmental justice is fundamentally inconsistent with these obligations.**

This abdication also flies in the face of EPA assessments of Maryland's progress in attaining its WIP goals and progress toward the Bay TMDL 2025 target. Before the Trump Administration eliminated the graphical accountability tool on EPA's website showing the level of progress of each pollutant source sector in each state, EPA had long held out Maryland's stormwater sector as deficient in the "backstop" status - the lowest grade EPA gave. Even without this scoring mechanism, EPA has recently stated in its evaluation of Maryland's Phase III WIP strategy for the stormwater sector that the Department must "[p]rovide further information …. on how it will achieve, by 2025, ***implementation rates of those BMPs that are much higher than current rates*** [and p]rovide additional information on how implementation in the stormwater sector will increase over time to meet its pollutant load reduction goals. Maryland asserts that regulatory tools are backed by effective compliance and enforcement programs that can implement legal backstops to ensure restoration progress. EPA recommends that Maryland provide additional information on how these regulatory tools will be used in the future to ensure compliance." (Emphasis added). **The Department must recognize the failure to abide by the EPA and Bay Program heightened expectations under the Bay TMDL and Bay Agreement and the lack of progress made to date.** We strongly urge the Department to significantly revise the Permit to include a more stringent and specific framework for the establishment of control measures and BMPs and then reopen the comment period to allow stakeholders the opportunity to provide further input.

Finally, we reiterate that a number of important terms and conditions in the Control Measures and Effluent Limitations section are impermissibly vague and unenforceable. As just one example, the "management of runoff" condition, which will be the primary condition to control polluted runoff now that the Department is proposing to eliminate the impervious surface restoration standard, contains no standard at all. The condition only states that "[y]ou must divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff, to minimize pollutants in your discharges." This is one of many examples of language that must be made more enforceable. When is a permittee in compliance with this condition? How does a well-intentioned and conscientious permittee even measure their own compliance status? When would a facility be deemed in noncompliance with this critical provision? As noted by Dr. Richard Horner the Permit "gives no guidance or directions regarding where, when, or how these controls should be considered and implemented."

Dr. Horner also emphasized that the "Permit exceedingly shortchanges treatment controls." Dr. Horner notes that "[s]ome industries simply cannot fulfill all stormwater permit obligations with these techniques alone and can only do so by applying effective treatment controls." Other states are complying with the CWA and leading the way by ensuring iterative progress between permits. Washington State, for example, mandates both "Treatment BMPs" and "Stormwater peak runoff rate and volume control BMPs". The California permit similarly distinguishes between "minimum BMPs" and "advance BMPs", both of which are required.

As noted in Dr. Horner's attached report, leadership by other states is beginning to bring about the intended technology forcing effect envisioned by Congress in writing the CWA, causing industries to turn to a host of new "advanced, active treatment controls." Through direct outreach with a number of companies, Dr. Horner identified more than 100 sites that now have advanced industrial stormwater treatment systems. The Department has mentioned an interest in stimulating a "restoration economy" but actually doing so requires technology-forcing permits, rather than policies like nutrient trading that reduce the incentive for the private sector to develop innovative green technologies.

## The Department Must Require Benchmark Monitoring for all Permit-Holders and throughout the Entire Permit Term

The purpose of Title 9 of the Maryland Code is to "establish effective programs [...] to prevent, abate, and control pollution[...]" 9-302. "No permit may be issued […] (d) when the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 CFR 122.4(d). Each NPDES permit must control the discharge of all pollutants that have a "reasonable potential to cause or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i). "[E]ach NPDES permit shall include conditions meeting the following [...] monitoring requirements [...] to assure compliance with permit limitations." 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1). That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its compliance with the permit's effluent limitations.[186] "[T]he Clean Water Act requires every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit." Nat. Res. Def. Council, Inc. v. Cty. of Los Angeles, 725 F.3d 1194, 1207 (9th Cir. 2013). The proposed benchmark monitoring requirements fail to ensure that authorized discharges comply with the effluent limitations in the permit and that the discharges do not cause or contribute to violations of WQS.

The Permit requirements for discharge monitoring are technically inadequate and legally insufficient to ensure compliance with the requirements of the CWA and Maryland law. **The Permit does not require discharge monitoring throughout the permit term nor require discharge monitoring for all permit-holders.[187] Without requiring monitoring of all dischargers throughout the permit term, the Permit fails to ensure permittee compliance with effluent limitations and the effectiveness of control measures, and it fails to verify compliance with applicable WQS.**

**Maryland must require benchmark monitoring throughout the permit term and require discharge monitoring by all permit-holders in order to ensure compliance with effluent limitations, the effectiveness of other control measures, and to verify compliance with applicable WQS. Maryland must also require a frequency and methodologies for sampling that are technically sufficient for producing data representative of industrial stormwater discharges and for identifying excursions of benchmark thresholds and other compliance matters. Maryland should adopt universal benchmark monitoring requirements for nutrients and sediment in accordance with and to ensure compliance with the Chesapeake Bay TMDL. Further, Maryland should also adopt universal benchmark, or, at a minimum,**

[186] The 2014 guidance says ""NPDES permits must specify monitoring requirements necessary to determine compliance with effluent limitations. See CWA section 402(a)(2); 40 CFR 122.44(i). The permit could specify actions that the permittee must take if the BMPs are not performing properly or meeting expected load reductions.""

[187] Commenters incorporate by reference the discussion of the NRC's recommendations on benchmark monitoring from Commenters' comment letter for EPA's 2020 draft MSGP. Appendix H at pp. 14-19. Hereinafter "MSGP Comment."

**"report-only," monitoring requirements for Chemical Oxygen Demand (COD) and pH, in accordance with the 2021 U.S. EPA Multi-Sector General Permit. Maryland must also retain its aluminum and iron benchmark thresholds, while also adopting revised thresholds for the selenium benchmark. Lastly, Maryland must also adopt additional benchmarks for landfills.**

***The Department Must Require Benchmark Monitoring Throughout the Permit Term***

Benchmark monitoring must be required throughout the entire permit term in order to ensure that permit-holders are complying with effluent limitations and that control measures are adequate and effective. Without requiring benchmark monitoring throughout the permit-term, the permit conditions fail to detect and necessarily trigger any resolution of a violation of effluent limitations in the permit due to, for example, a change in a permit-holder's operations or in environmental conditions occurring after the first four required quarters of benchmark monitoring.[188] As Dr. Horner's report states, "A permittee could abandon all efforts at controlling pollutant discharges for as much as 80 percent of the Permit's coverage. Even without a concerted decision to forsake stormwater management efforts, bad habits could form with lack of practice."[189] The lack of this requirement also removes any enforcement authority on the Department's part in the absence of an on-site inspection.

Furthermore, continuous efforts to monitor discharges against benchmark thresholds are also important to identify where problematic changes to pollutant loadings at the watershed-scale threaten to violate WQS. **Above all, this failure to require benchmark monitoring through the entire permit term does not bear a rational connection to the Department's own stated purpose for benchmark monitoring; that is, to monitor the effectiveness of control measures and determine when corrective actions are warranted due to violations of effluent limitations in the permit.**[190] Without adequate monitoring, permit limitations are difficult, or impossible, to enforce, because compliance cannot be objectively evaluated. The Department must revise and issue a permit that requires benchmark monitoring throughout the entire permit term, irrespective of compliance with benchmark thresholds at any one time.

The NRC found in its 2019 study that data produced by benchmark monitoring over only one year of a five-year permit cycle are inadequate to characterize or describe the

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[188] Maryland's proposed benchmark monitoring is significantly less protective than the 2021 U.S. EPA Multi-Sector General Permit, which requires quarterly benchmark monitoring during at least the first and fourth years of coverage, irrespective of compliance with benchmark thresholds at any given time during the permit term.
[189] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 10.
[190] "Benchmark monitoring data are primarily for your use to determine the overall effectiveness of your control measures and to assist you in knowing when Additional Implementation Measures (AIM) may be necessary to comply with the effluent limitations in Part III.B. Failure to conduct any required measures would be a permit violation." 20-SW at Part V.B.1. pg. 38.

performance of control measures over the entire permit term.[191] Indeed, the Department itself acknowledges in the fact sheet for this proposed permit that its benchmark monitoring data are incomplete and therefore skewed due to the drop-off in monitoring by facilities that met benchmark thresholds throughout the first four required quarterly sampling events. Incomplete data prevent the Department from verifying compliance with applicable WQS and hamstrings its ability to acquire pollutant discharge data necessary to support future improvements to the permit.

***The Department Must Require Benchmark Monitoring for All Permit-Holders***

The Department must adopt universal benchmark monitoring provisions for all covered sectors. To remedy this legal insufficiency of the draft permit, Maryland should adopt universal benchmark monitoring for already established Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), pH, phosphorus, and nitrogen benchmark thresholds. Maryland should also require calculation and reporting of flow-rate during benchmark sampling in order to support determination of actual pollutant loadings. This monitoring and the resulting data are necessary to ensure detection of a given facility's violation of effluent limitations and the effectiveness of their control measures. The monitoring and data are also necessary to verify compliance with applicable WQS and WLAs, and to support future improvements to the permit.

*The Department should adopt universal benchmark monitoring for Chemical Oxygen Demand, Total Suspended Solids, and pH.*

The Department should require all permit-holders to conduct benchmark monitoring for the state's established COD, TSS, and pH benchmark thresholds. Maryland has many waterbodies impaired for pollutants that reduce dissolved oxygen or contribute to toxicity. For these waters, industrial stormwater discharges with high COD and excessively high or low pH may contribute to low dissolved oxygen levels and high toxicity. TSS is a low-cost surrogate for a broad array of both inorganic and organic industrial contaminants. However, there are few limitations on these pollutants in the current or proposed permit. Universal benchmark monitoring for COD, TSS, and pH are needed to ensure compliance with WQS for dissolved oxygen and toxicity-related impairments. 40 C.F.R. 122.4(d) ("No permit may be issued . . . (d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States").

The NRC recommends adoption of industry-wide monitoring for pH, TSS, and COD as "basic indicators of the effectiveness of stormwater control measures." The Department notes in the Fact Sheet that the state is *not* implementing a universal benchmark monitoring requirement because "the selection of these constituents can be considered arbitrary." However, the Department fails to explain how - or by whom - the selection of these indicators is arbitrary, as a legal or technical matter. Certainly, the Department's decision does not bear a rational connection to the technical consideration and weight

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[191] National Academies of Sciences, Engineering, and Medicine 2019. *Improving the EPA Multi-Sector General Permit for Industrial Stormwater Discharges*. ("NRC Study") Washington, DC: The National Academies Press. https://doi.org/10.17226/25355. pp. 5.

behind the NRC's analysis and recommendation for adoption of these universal benchmarks. Washington and California, for example, include universal benchmark monitoring in industrial stormwater general permits. In accordance with the NRC's analysis, the EPA initially proposed to adopt its recommendation and then subsequently issued a final permit that adopts the recommendation in part, reasoning that the data collected from this requirement would then be used to inform future consideration of universal benchmark monitoring.[192] Without requiring industry-wide monitoring for these indicators, the Department and permit-holders themselves, especially those not already required to conduct benchmark monitoring, lack critical information to assess the effectiveness of stormwater control measures, violations of effluent limitations. The Department also fails to acquire data from dischargers necessary to verify compliance with applicable WQS and WLAs and to support improvements to the permit.

*The Department should adopt universal monitoring for discharge flow-rate.*

Maryland should require industry-wide monitoring and reporting for discharge flow-rate, because without flow-rate data there is no way to determine pollution loadings from benchmark data with sufficient certainty. The NRC report states that a "pollutant concentration measured at a single time during a stormwater event cannot be considered to be representative of the [event mean concentration]," which is necessary for determining pollutant loads and therefore downstream water quality impacts. NRC further recommends additional monitoring to collect data sufficient to support evaluation of stormwater control measures, benchmark thresholds, and numeric effluent limitations.[193] These evaluations would necessarily require analysis of pollutant loadings predicated upon reliable discharge flow-rate data. Given that there are several low- to medium-cost monitoring technologies and methodologies for measuring flow-rates, requiring flow measurements industry-wide would not be a significant burden on permittees.[194]

The Kentucky Pollutant Discharge Elimination System Permit to discharge stormwater runoff associated with industrial activities includes flow, in addition to TSS, oil & grease, and pH, in its list of effluent monitoring requirements that must be reported twice each year for all point source discharges of stormwater runoff associated with industrial activity.[195] Delaware also requires flow measurements to be submitted for each representative sampled storm event, including: the date and duration of the storm event sampled; rainfall measurements or estimates of runoff of the storm event; the duration between the storm event sampled and the end of the previous measurable storm event; and an estimate of the total volume of the discharge sampled.[196] Maryland should adopt industry-wide benchmark monitoring for flow, to generate data on the quantity of

[192] The 2021 MSGP incorporates "report-only" monitoring for pH, TSS, and COD for 22 different sectors, instead of the universal monitoring requirement recommended by NRC for all covered sectors.
[193] NRC at 46.
[194] Burton, G. A., and R. E. Pitt. 2002. Pp. 357–377 in Stormwater effects handbook: A toolbox for watershed managers, scientists, and engineers, G. A. Burton and R. E. Pitt, eds. Boca Raton, FL: Lewis
[195] KPDES Permit, Section 2.1, pg. 10.
[196] Code Del. Regs. 7 7000 7201, 9.1.4.2.5, pg. 74-757.

stormwater and pollutants discharged by both individual sites and the industrial stormwater sector statewide.

*The Department should adopt universal benchmark monitoring for nutrients and sediment.*

The Department should require all permit-holders to conduct benchmark monitoring for established nitrogen, phosphorus, and sediment thresholds.[197] Monitoring for and controlling excess nutrients and sediment pollution from all permit-holders is necessary to ensure that Maryland meets its commitment to achieve nutrients and sediment reductions to restore the Chesapeake Bay by 2025 and to protect and restore the water quality of all Waters of the State. Furthermore, imposition of universal benchmark monitoring for sediment will provide the additional benefit of ensuring control of a broader segment of industrial stormwater contaminants for which TSS serves as surrogate.

Virginia has successfully implemented required quarterly nitrogen, phosphorus, and sediment monitoring for all facilities covered by the state's industrial stormwater general permit and for all five years of the permit's term. The data permitted Virginia to verify whether pollutant loading rates from the industrial stormwater sector are consistent with applicable WLAs as well as the Commonwealth's allocation under the Chesapeake Bay TMDL. In analyzing the data, the Chesapeake Bay Foundation found that roughly one-third of permitted facilities likely discharge nutrients and sediment pollution at rates that exceed the sector's WLA.[198] Because of the lack of nutrients and sediment industrial stormwater discharge monitoring data for nutrients and sediment in Maryland, the state is likely grossly underestimating this source as a contribution to the Bay TMDL.

A small subset of dischargers (<1%) demonstrate nutrient and sediment loading rates that substantially exceed (>10x) the applicable waste load allocations. This subset of dischargers, however, are not insignificant because their discharges represent very high nutrient and sediment loading rates relative to Virginia's overall targets to address Bay pollution from the broader stormwater sector. Significantly, the subset of dischargers, representing 20 different Standard Industrial Classification (SIC) codes across the state, would have not been identified as substantial sources of nutrients and sediment pollution had Virginia not required the nutrients and sediment monitoring in its permit.

***The Department Must Require More Frequent Sampling for Benchmark Monitoring and Sampling Methodologies that Produce Data that are Representative of Industrial Stormwater Discharges***

The Department's proposed requirements for the frequency and methodology of grab sampling of industrial stormwater discharges are technically and legally insufficient, because the resulting data are not representative of the quality of industrial stormwater

[197] i.e. Nitrate plus Nitrite Nitrogen at 0.68 mg/L; Phosphorus at 2.0 mg/L; Total Suspended Solids (TSS) at 100.0 mg/L.
[198] Letter from Joseph D. Wood, Ph.D. and Margaret L. Sanner to Matt Richardson, Virginia Department of Environmental Quality, (December 18, 2018).

discharges as a matter of statistical significance. At pages 28-30 of his report, Dr. Roseen discusses how the required quarterly grab sampling produces poor quality data that cannot be rationally relied upon for the purpose of evaluating excursions of benchmark thresholds and, therefore, whether a permittee has complied with required control measures and other technology-based effluent limitations and/or has caused or contributed to a downstream water quality impairment. Maryland must ensure that the required sampling frequency and methodologies for benchmark monitoring are technically sufficient for the stated purpose. That is, to monitor whether the permittee is complying with the effluent limitations and other requirements of the permit. Therefore, the Department must require a sampling frequency for benchmark monitoring that provides at least the minimum quality and quantity of data necessary to ensure compliance as a matter of statistical significance. Further, the Department should require low-cost alternatives to grab sampling, such as first flush samplers or passive diffusion samplers, to ensure benchmark monitoring data that are higher quality and more representative of industrial stormwater discharges.

***The Department Must Require Additional Benchmark Monitoring for Landfills***

Maryland must adopt additional benchmark monitoring requirements for landfills in order to ensure compliance with WQS. Given the broad array of toxic contaminants found in landfills and their runoff and leachate discharges. Maryland should consider adoption of benchmarks for cadmium, mercury, and lead, which are constituents associated with municipal solid waste leachate and incinerator ash residue.[199] Additionally, Maryland should also consider adoption of benchmarks for alkalinity, ammonia, calcium, COD, chloride, hardness, iron (total), magnesium (total), nitrate, potassium, sodium, and sulfate (all common leachate indicator parameters).[200] The Quarantine Road Landfill example discussed in the Factual Background demonstrates the need for more than only monitoring for TSS and iron at facilities with the opportunity for many harmful pollutants to contaminate the stormwater.

***The Department Must Retain its Aluminum Benchmark of 750 ug/L.***

The Department must retain an aluminum benchmark of 750 ug/L. As we explained in our comments on EPA's MSGP, the current recommended water quality criteria for aluminum do not support a benchmark any greater than 980 ug/L, and a benchmark that is truly protective of the environment would have to be even lower.[201]

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[199] Present and Long-Term Composition of MSW Landfill Leachate: A Review, pg. 7, https://www.tandfonline.com/doi/pdf/10.1080/10643380290813462?needAccess=true&; S. C. James, Metals in Municipal Landfill Leachate and Their Health Effects, 67 American Journal of Public Health 429-32 (May 1977); G. Okkenhaug, et al., The Presence and Leachability of Antimony in Different Wastes and Waste Handling Facilities in Norway, 17 Environ. Science: Processes and Impacts 1880 (Nov. 2015); International Pollutants Elimination Network, After Incineration: The Toxic Ash Problem, at 16 (Apr. 2005).
[200] *See* City of Baltimore, Department of Public Works, 2nd Semi-Annual 2018 Environmental Monitoring Report (Jan. 30, 2019), at 21 (listing common leachate indicator parameters as those to be analyzed).
[201] MSGP Comments at 33.

The 2018 aluminum criteria document does not provide single values for either the criteria maximum concentration (CMC) or the criterion continuous concentration (CCC). Instead, the new criteria document presents a calculator for deriving site-specific criteria based on pH, hardness, and dissolved organic carbon (DOC) conditions.[202] Both EPA and the NRC cited the 2017 draft criteria document as recommending an "acute criteri[on] of 1,400 µg/L based on a pH value of 7, hardness value of 100 mg/L, and DOC value of 1 mg/L."[203] This value now appears to be outdated.

We noted that EPA's past practice was to set the aluminum benchmark equal to the CMC. The NRC recommended adopting the draft aluminum criteria document approach.[204] With this approach, using the same default pH, hardness and DOC values cited in the draft document – pH of 7, hardness of 100 mg/L, and DOC of 1 mg/L – the new, final criteria calculator would yield a CMC (and benchmark) of 980 ug/L.

However, to select a fixed benchmark that will protect all receiving streams, it would make more sense to select a lower bound value. The aluminum criteria calculator states that "EPA aluminum criteria recommend staying within specified limits for pH (5.0-10.5), total hardness (0.01-430 mg/L as $CaCO_3$) and DOC (0.08-12.0 mg/L) for generating criteria." Applying these parameter ranges yields aluminum CMC values as low as 0.0014 µg/L.[205] These conditions are of course very unlikely to occur in the real world, but this example serves to demonstrate that a static value would have to be significantly lower than 1,400 µg/L to be protective of all or even most receiving streams.

To take a much more realistic example, at a pH of 6.5, hardness of 45 mg/L, and DOC level of 3 mg/L, the CMC would be 750 µg/L – equal to the current benchmark. The same result can be achieved by adjusting the three parameters to various levels near the middle of their recommended ranges. This means that the current benchmark is appropriate for ordinary, real-world scenarios. The aluminum criteria document therefore supports a decision to retain the existing benchmark. It should be noted, however, that neither the 750 µg/L benchmark nor a benchmark of 980 µg/L would be protective in all cases.

The Department provides additional support for a stringent aluminum benchmark in the Draft Permit fact sheet: When reviewing 12-SW benchmark monitoring data, "[t]he total aluminum benchmark of 0.75 mg/L was not met during a single year during the permit cycle."[206] Clearly aluminum is a widespread pollutant of concern at industrial facilities, and any action by the Department to weaken the benchmark threshold would not be rationally related to the technical authorities. It is also a pollutant of concern in receiving streams, which frequently exceed EPA's recommended water quality criteria.

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[202] U.S. EPA, Aluminum Criteria Calculator V2.0, https://www.epa.gov/sites/production/files/2018-12/aluminum-criteria-calculator-v20.xlsm (last accessed Apr. 7, 2020).
[203] Fact Sheet at 64, NRC at 33.
[204] NRC at 33.
[205] Where pH = 5, hardness = 0.01 mg/L, and DOC = 0.08 mg/L.
[206] Draft Permit fact sheet at 12.

Maryland has an aluminum problem. In order to better understand the problem and how to fix it, the Department needs better monitoring data, and must retain a benchmark that is truly protective of the environment. The Department must retain the 750-ug/L benchmark.

***The Department Must Retain an Iron Benchmark of 1 mg/L.***

We support the Department's decision to retain iron benchmark monitoring, but the Department should revert to a 1-mg/L benchmark for iron.

The NRC recommended removing the iron benchmark based on a lack of evidence showing acute toxicity.[207] EPA did so.[208] We opposed this part of the proposal because the scientific literature does in fact show evidence of iron toxicity, including evidence of acute toxicity at concentrations well below the current benchmark.

One recent study observed that "[i]n neutral waters, [iron] has been found to increase turbidity, reduce primary production, and reduce interstitial space in the benthic zone, which smothers invertebrates, periphyton, and eggs. Iron precipitates also physically clog and damage gills causing respiratory impairment."[209] That same study evaluated iron toxicity in several species over a period of 30 days. The authors found that iron was lethal in boreal toad tadpoles, and also caused a variety of sublethal effects, including "reduced growth for boreal toad tadpoles and mountain whitefish, reduced development for boreal toad tadpoles, and reduced reproduction for *Lumbriculus* [blackworm]."[210] Using the results of their study, combined with other chronic toxicity literature values, the authors derived a Final Chronic Value (FCV) of 499 µg/L. Although this result is not directly relevant to the question of acute iron toxicity, it does suggest that EPA's current chronic criterion for iron (1 mg/L) may be too high.

The same authors performed a separate, 10-day "mesocosm" experiment in which they exposed naturally colonized communities of benthic macroinvertebrates in experimental streams to various iron concentrations.[211] These experiments yielded $EC_{20}$ values as low as 234 µg/L, and the authors derived an FCV of 251 µg/L, again suggesting that EPA's current water quality criterion for iron may be too high.

In a study focused on acute effects, Shuhaimi-Othman et al. describe a series of four-day toxicity tests on eight freshwater aquatic species.[212] For iron, species-specific $LC_{50}$ values

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[207] NRC at 32.
[208] Fact Sheet at 66.
[209] P. Cadmus et al., Chronic Toxicity of Ferric Iron for North American Aquatic Organisms: Derivation of a Chronic Water Quality Criterion Using Single Species and Mesocosm Data, 74 Arch. of Envtl. Contamination and Toxicology 605, 611 (2018) (attached).
[210] *Id.*
[211] *Id.*; see also C.J. Kotalik et al., Indirect Effects of Iron Oxide on Stream Benthic Communities: Capturing Ecological Complexity with Controlled Mesocosm Experiments, 53 Envtl. Sci. Technol. 11532 (2019).
[212] M. Shuhaimi-Othman et al., Deriving Freshwater Quality Criteria for Iron, Lead, Nickel, and Zinc for Protection of Aquatic Life in Malaysia, Scientific World Journal (2012) (attached).

ranged from 0.12 to 8.49 mg/L. Following EPA guidance, the authors derived a Final Acute Value (FAV) of 74.5 µg/L, and a CMC of 37.2 µg/L. This is of course much lower than the current iron benchmark of 1 mg/L.

Dr. Horner's report, attached as Appendix E, also describes toxicity testing results for iron, noting that, for a variety of aquatic species the concentration lethal to 50 percent of the test organisms ($LC_{50}$) begins at less than 1.0 mg/L, with exposure times as short as 24 hours.[213]

It would be arbitrary and capricious to eliminate a benchmark where EPA has evidence of toxicity, including acute toxicity, at levels significantly lower than the current benchmark. To repeat EPA's reasoning with respect to arsenic, the Department should choose "not to weaken a discharge requirement unless good scientific evidence exists that a pollutant is less toxic than previously believed."[214] This reasoning applies with added force to iron. Not only is there a lack of evidence that iron is <u>less</u> toxic than previously believed, there is in fact evidence that iron is <u>more</u> toxic than previously believed.

In sum, the predicate for NRC's recommendation and EPA's proposed decision with respect to iron – that there is no evidence of acute or subchronic toxicity – is false and not rationally related to the prevailing science in the matter. In our comments on EPA's MSGP we cited and attached two studies showing iron toxicity over periods of 4 and 10 days at levels well below the current benchmark.[215] In light of this evidence, it would be irresponsible and unreasonable to remove or weaken the iron benchmark. <u>The Department must continue benchmark monitoring for iron, but with a benchmark of 1 mg/L.</u>

***The Department Must Adopt a Revised Selenium Benchmark Consistent with the MSGP.***

Our comments on EPA's proposed MSGP noted that the selenium benchmark for freshwater should be revised from 5 ug/L to 1.5 ug/L (for lentic waters) and 3.1 ug/L (for lotic waters). EPA agreed, and the freshwater selenium benchmark in the final MSGP is 1.5/3.1 ug/L.[216] The Permit includes a freshwater selenium benchmark of 5 ug/L.[217] This is inconsistent with the final MSGP. <u>The Department must revise the freshwater selenium benchmark to 1.5 ug/L (lentic) and 3.1 ug/L (lotic).</u>

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213 Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 12.
214 Fact sheet at 65.
215 MSGP Comments at 35.
216 See, e.g., Final MSGP fact sheet at 38.
217 See, e.g., Draft Permit Appendix D at 18; Draft Permit Fact Sheet at 94.

## The Department Must Revise the Corrective Action Provisions to Strengthen Triggering Events, Improve Enforceability, Avoid Impermissible Self-Regulation, and Increase Clarity

The corrective action section is a critical element of the Permit because it establishes the concrete requirements a permittee must follow when its control measures have proved inadequate to protect water quality. Although an exceedance of a benchmark threshold does not constitute a violation in the Permit, it does indicate that the existing control measures are not functioning as necessary to protect water quality. Commenters have provided the Department with significant feedback on how to improve the corrective action section over the past year. We appreciate where the Department has followed these recommendations, such as by stating that the Department will revoke permit coverage if benchmark exceedances continue after Additional Implementation Measures (AIM) Level 4. However, under the Permit, four years of benchmark violations would have already passed before the permittee must obtain an individual permit. To avoid such a prolonged period of benchmark exceedances before coverage is revoked, and to ensure compliance with WQS, the Department must accelerate the triggering events for corrective action to occur immediately upon the permittee reporting a benchmark exceedance. This would also be more consistent with CWA and the technical basis for benchmarks.

### *Any Exceedance of a Benchmark Threshold Must Trigger AIM.*[218]

For the 20-SW Permit to ensure water quality is protected and that the BMPs a permittee implements are operating as necessary, any exceedance of a benchmark threshold must trigger corrective action. **The triggering events for the AIM levels as set forth in the Draft Permit do not have a technical basis and are arbitrary and capricious.** Because the current triggering events for AIM fail to require immediate action upon benchmark exceedances, they are inadequate to protect water quality and ensure WQS are met, as required by the CWA.[219]

An exceedance of a benchmark threshold indicates that the control measures in place are ineffective to ensure that downstream WQS will be met.[220] Accordingly, the trigger for corrective action should not be greater than (i.e., weaker than) the benchmark thresholds.

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[218] We have raised this concern in prior correspondence relating to the general permit (see October 5, 2020 Letter to MDE regarding Feedback on Corrective Action Section of Pre-TD Draft General Permit for Discharges of Stormwater Associated with Industrial Activity, attached as Appendix I; see also Letter from Chesapeake Accountability Project to Paul Hlavinka and Ed Stone, Maryland Department of Environment, Re: Feedback on General Permit for Discharges of Stormwater Associated with Industrial Activity, (Jul. 7, 2020), attached as Appendix J), which is incorporated into these comments by reference.

[219] 33 U.S.C. § 1342(a)(2) (requiring agency to prescribe conditions for NPDES permits to assure compliance with CWA); 40 C.F.R.§ 122.4(a) ("No permit may be issued: (a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA").

[220] *See Santa Monica Baykeeper v. Int'l Metals Ekco, Ltd.*, 619 F. Supp. 2d 936 (C.D. Cal. 2009) (holding that the benchmarks were "relevant guidelines that should be used to evaluate the efficacy of a facility's BMPs" and reasoning that "[t]here can be no reasonable dispute that the Benchmarks are relevant to the inquiry as to whether a facility implemented BMPs"); *Waterkeepers Northern California v. AG Industrial*

Benchmarks are intended to serve as indicators of whether stormwater control measures are performing adequately and whether there is a potential for a water quality problem.[221] According to the 20-SW Fact Sheet, the "benchmark thresholds are the **pollutant concentrations above which represent a level of concern**. The level of concern is a **concentration at which a stormwater discharge could potentially impair or contribute to impairing water quality or affect human health** from ingestion of water or fish . . . As such, the **benchmarks provide an appropriate level to determine whether a facility's stormwater control measures are successfully implemented**."[222] The Fact Sheet references an additional way EPA interprets the purpose of benchmarks—that they are "designed to be as least burdensome as possible on operators while still providing the intended utility: a tool to for [sic] determining whether operators could have SWPPP/stormwater control measure deficiencies."[223] As the Fact Sheet states, a benchmark exceedance "does require the facility to evaluate the effectiveness of its control measures, with follow-up Additional implementation Measures (AIM) response where required per Part IV."[224]

Despite the statements in the Fact Sheet regarding the purpose of benchmarks, the Permit arbitrarily fails to use a benchmark exceedance as the trigger for AIM. **Given that pollutant concentrations above the benchmark thresholds represent a level of concern at which the discharge could potentially impair or contribute to impairing water quality, even one instance of a benchmark exceedance warrants corrective action.** Each benchmark exceedance represents a potential that the discharge is impairing water quality. The exceedance indicates that control measures must be adjusted to correct the problem that caused the exceedance. Each subsequent occurrence of a benchmark exceedance should then trigger the next AIM Level. The Department provides no technical support or justification for the AIM triggering events in the Permit, which would allow multiple benchmark exceedances without even requiring the minimal requirements of AIM Level 1. This in itself constitutes an express failure on the Department's part to ensure that WQS are not degraded. Without requiring immediate action to remedy benchmark exceedances, the Permit will continue to fail to adequately protect water quality and ensure compliance with WQS, as required by the CWA.

Adopting a single exceedance as a trigger for AIM is particularly appropriate given the response required by AIM Level 1 under the Draft Permit, which does not even necessarily require a change to the permittee's control measures. The AIM Level 1 Response in the Permit currently requires the permittee to review its control measures and determine if modifications are necessary to meet the benchmark threshold for the

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*Mfg. Inc.*, 375 F.3d 913, 919 n. 5 (9th Cir. 2004) (suggesting that the plaintiff appropriately pointed to EPA Benchmark values "as evidence to support its claim that [the defendant] failed to implement adequate BMPs").

221 20-SW Fact Sheet, at 84; MSGP Fact Sheet, at 78 ("This permit requires benchmark monitoring as a gauge of the performance of facilities' SCMs and to further ensure compliance with water quality standards.").

222 20-SW Fact Sheet at 84 (emphasis added).

223 20-SW Fact Sheet at 8; MSGP Fact Sheet, at 7.

224 20-SW Fact Sheet at 88.

applicable parameter.[225] If the permittee determines that no additional measures are necessary, the permittee must only document why it expects the existing control measures to bring the pollutant levels below the benchmark.[226] If the benchmark exceedance triggering AIM Level 1 resulted from a one-time problem or unexpected event, the AIM Level 1 Response already accounts for this by providing a no-action option.

In contrast, the current triggering event—an annual average exceeding the benchmark threshold—indicates consistent failure of the control measures, and the option to merely review control measures and document rationale would be an insufficiently lenient response. When a permittee has exceeded a benchmark more than once in a four quarter period, this is indicative of a more consistent problem, not an outlier or one-time occurrence. As noted in Dr. Horner's Report, under Maryland's approach, "a discharger with multiple pollutants over their benchmarks could go an entire year without having to take any corrective action, so long as no benchmark exceedance was as high as four times [the benchmark threshold]."[227] A permittee could go three full years without being required to consider permanent source control and treatment BMPs and four full years without having to consult a professional for guidance.[228] Dr. Horner states in his report: "This schedule is egregiously lax in my opinion."[229]

Commenters urge the Department to adopt more stringency in the AIM levels, as Dr. Horner recommends, and apply a "much quicker action trigger."[230] Specifically, the Permit must trigger corrective action upon a single quantitative benchmark exceedance. **Dr. Horner also advises that the Permit "specify the types of control measures that must be evaluated at each level, with treatment the ultimate recourse, and provide for earlier qualified professional involvement**."[231] The Maryland Permit as written would allow a permittee consistently discharging pollutants above benchmark thresholds to continue operating under the general permit for up to ***four years*** before the Department revokes coverage. This timeframe is approaching the entire permit term, despite the facility repeatedly demonstrating that its control measures are insufficient to meet benchmarks. Consistent benchmark exceedances demonstrate well before Year 4 that control measures are insufficient and that the site-specific analysis of an individual NPDES permit is necessary.

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[225] Draft Permit, Part IV.B.1.b.i.).
[226] Draft Permit, Part IV.B.1.b.ii.).
[227] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 25, 2021), at 8. "The discharger could proceed year after year without correction, so long as annual averages are beneath benchmarks, even if one or multiple pollutants sometimes surpass benchmarks by a margin of two or three times."
[228] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 8.
[229] *Id.* at 8. "I believe that the allowable timeframes are entirely too long and that professional engagement 'eventually' is much too delayed." *Id.* at 11.
[230] *Id.* at 8.
[231] *Id*.

Permits in other states serve as helpful examples of how benchmarks should be effectively used to trigger corrective action. In Washington's Industrial Stormwater General Permit, the first exceedance of a benchmark triggers the first level of corrective action.[232] Virginia's Industrial Stormwater General Permit also uses a single benchmark exceedance to trigger SWPPP review and implementation of additional control measures as necessary.[233]

If the benchmark levels are set to indicate when a permittee's control measures are deficient, there is no reason that a permittee must have an annual average over the benchmark, or mathematical certainty of such exceedance prior to the end of four quarters, to trigger corrective action. **The Department's failure to adopt a single benchmark exceedance as a trigger for AIM is arbitrary and capricious in light of the stated justifications for benchmarks, the no-action option in the AIM Level 1 Response, and the egregiously lax schedule that would result from the proposed approach. The approach in the Permit ignores the practical, technical, and legal basis for a benchmark exceedance to trigger corrective action based on the potential that the discharge will impair water quality and, consequently, fails to adequately protect water quality.**

***The Department Must Require an Individual Permit or Otherwise Deny Permit Coverage if Corrective Action or AIM Level 4 Response is Unsuccessful.***

If a permittee has gone through corrective action process or the AIM Levels and at the conclusion of the response actions continues to exceed applicable benchmarks or otherwise trigger the corrective action section, coverage under the Permit is not working and an individual permit or ceasing operations is necessary to protect water quality. The CWA requires NPDES permits to contain "any more stringent limitations . . . necessary to meet water quality standards."[234] With benchmark thresholds representing a level of concern above which the discharge could potentially impair water quality, the repeated benchmark exceedances that would result in AIM Level 4 signify a clear threat to water quality that must be remedied for the Permit to comply with the CWA. If the required AIM fail to bring the discharge to below benchmarks, the Permit cannot be relied upon to protect water quality and must be revoked.

Though the Permit contains language in AIM Level 4 that if a permittee continues to exceed the quarterly benchmark threshold for the same parameter after complying with the required AIM Level 4 Response, the Department will revoke coverage,[235] the messaging on this point in other materials has not been clear. It is critical that the

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[232] See Dr. Horner's Report for a detailed explanation of the corrective action levels in the Washington and California permits. *Id.* at 8.

[233] "If the benchmark monitoring result exceeds the benchmark concentration value for that parameter, the permittee shall review the SWPPP and modify it as necessary to address any deficiencies that caused the exceedance. . . ." 9 Va. Admin. Code 25-151-70, Part I.A.6.a.(1).

[234] 33 U.S.C. 1311(b)(1)(C).

[235] Draft Permit, Part IV.B.4.b.ii): "The Department will revoke coverage under this permit through the development of an individual permit to address site specific water quality limits, or a final determination to deny permit coverage. . ."

Department revoke coverage under the Permit if the corrective actions/AIMs fail to eliminate exceedances. Commenters support the current clear statement in the Permit that the Department ***will*** revoke coverage.

Language in the Fact Sheet and presented at the public hearing were troubling, and contrary to the Permit, on this issue. Page 76 of the Fact Sheet notes that the "permittee is put on notice that if they continue to exceed the benchmark threshold for the same parameter even after installation of structural source controls or treatment controls, the Department ***may*** revoke coverage under this permit, unless you are under a consent order or they have obtained an individual permit which considers site specific water quality based limits."[236] The use of permissive language rather than mandatory in the Fact Sheet is problematic and should be adjusted to be consistent with the Draft Permit language to avoid confusion. Immediately afterward, the Fact Sheet provides that after AIM Level 4 the permittee must continue benchmark monitoring but that, "the monitoring would be in a cycle of repeating Level 4, or installing controls or the alternatives as stated above."[237] Based on the Permit language that the Department will revoke coverage under the general permit if AIM proves unsuccessful, there cannot be a repeat of AIM Level 4 because coverage would cease at the conclusion of AIM Level 4 or monitoring must have indicated no further exceedances.

The public hearing for the Permit on March 3, 2021 raised similar concerns regarding revocation of permit coverage. The presentation noted that the Department is proposing "an option to revoke coverage under the permit." The idea of an "option" to revoke coverage is also permissive and is inconsistent with the current Permit language. **Commenters strongly support the mandatory language in Part IV.B.4.b.ii) of the Permit stating that the Department *will* revoke coverage if the permittee continues to exceed quarterly benchmark thresholds for the same parameter after following the AIM Level 4 response.**

The language in the Permit also does not specify at what point a permittee is deemed to "continue to exceed the benchmark threshold for the same parameter even after installation of structural source controls or treatment controls…" (Part IV.B.4.b.iii.) Is this based on the next 4 quarters of monitoring after the controls were installed pursuant to AIM Level 4? Based on one quarter? These points should be clarified.

The circumstances at one particularly concerning facility demonstrate the importance of revoking coverage under 20-SW once corrective actions have proved ineffective in preventing benchmark exceedances. This site was subject to an enforcement action and has been under a settlement agreement for a number of years. The owner attempted to install some control measures but the site continues to regularly exceed benchmarks. At this time, the State is unwilling to require an individual permit. Although the pollution continues to impact local waters, all indication is that the State will not require anything further because the 12-SW Permit only requires the permittee to implement control measures. In this instance, even when all conditions of the permit are met, pollution

[236] 20-SW Fact Sheet, at 76 (Emphasis added.)
[237] 20-SW Fact Sheet, 76-77.

continues and water quality is not protected. To avoid this outcome, the Permit must make clear that the State's next response to continued exceedances is to revoke the Permit, either prohibiting the facility from discharging through full on-site retention of stormwater or subjecting it to an individual permit that would take into account site-specific conditions in a reasonable potential analysis to determine water quality limitations.

**Similarly, the Permit must include non-discretionary language in Part IV.A providing that if corrective actions are unsuccessful in remedying the triggering events listed in Part IV.A.1 the Department will revoke coverage under this Permit.** Without this mandate, a permittee could continue operating under the Permit despite the fact that control measures are demonstrably failing to adequately protect water quality. Accordingly, the following language should be added to Part IV.A.3:

> "If your control measures are insufficient to prevent reoccurrence of a triggering event listed in Part IV.A.1 after you have followed the Corrective Action requirements of Part IV.A.2, the Department will revoke coverage under this permit through the development of an individual permit to address site specific water quality limits, or a final determination to deny permit coverage, unless you are under a consent order."

**The Department should not only require a permittee to obtain individual permit coverage upon failure to stay below benchmark thresholds after AIM Level 4 or upon reoccurrence of triggering events for corrective action, but also make the permittee ineligible to reapply for future iterations of the Permit**. A permittee that has failed to correct the problems that result in consistent benchmark exceedances or corrective action triggering events should not be allowed to avoid the heightened scrutiny of an individual permit in subsequent permit terms by simply applying for the next version of Permit 20-SW.

***Several Aspects of the Corrective Action Section Must be Strengthened to Avoid Impermissible Self-Regulation by the Permittee.***

The corrective action section does not involve sufficient Department or public oversight in the required documentation, extensions of deadlines, and rationale for any such extensions. Without Department oversight or requiring documentation be immediately available to the public, the permittee is the only entity that may hold itself accountable for complying with the corrective action and AIM requirements. The Permit terms also delay the timing of when the Department or the public would even become aware of a triggering event and any necessary corrective actions.

The delay in the Department's awareness, unenforceable deadlines that can be automatically extended, and lack of clear standards to justify additional extensions, as explained below, all contribute to making the corrective action and AIM provisions practically impossible to enforce. Because it is effectively unenforceable, the Permit provides no opportunity to ensure compliance with the Permit terms. Without enforceability and oversight to ensure compliance with the Permit terms, the conditions outlined below are insufficient to assure compliance with the CWA.[238]

***When a triggering event occurs, the permittee must be required to submit a notification through NetDMR within 24 hours of becoming aware of the condition.***

The Permit already requires the permittee to document the existence of any triggering events within 24 hours of becoming aware of the conditions, but the Permit must also require this documentation to be submitted by NetDMR to avoid impermissible self-regulation and enable Department and public oversight. A summary in the annual report at the conclusion of the AIM response, or at the end of the year for corrective actions under IV.A, is insufficient to inform the Department and the public that the facility is subject to the corrective action requirements and that it must be held accountable for meeting the provisions of Part IV.

Without timely documentation, enforceability of these sections is practically impossible, as the public may not even know that corrective action was required until reviewing the annual report much later. Given the length of time between the triggering event and notice to the Department in the annual report, permittees may be violating TBELs for up to 12 months before the Department is even aware of the benchmark exceedances. In the event that the benchmark exceedances would prompt the Department to inspect the facility, that would take additional time and postpone any necessary enforcement even further, none of which could begin until the Department has reviewed the annual report.

The Permit must explicitly state that failure to timely submit notice of triggering events, along with the documentation of any actions taken, constitutes a permit violation.

*The permittee must be required to justify any time extension with an "appropriate demonstration," which must exclude any impediments within the permittee's control.*

The corrective action and AIM deadlines for Levels 1 and 2 are 14 days, with an automatic extension to 45 days if the permittee documents that 14 days is infeasible.[239] For corrective actions, beyond the 45-day extension, the permittee may set its own completion date if completion of the corrective action will exceed the 45-day timeframe and the permittee notifies the Department Compliance program and provides a rationale. The permittee does not need Department authorization or approval to proceed with its extended timeframe, nor does its rationale need to meet some kind of threshold standard to justify the extension. Without a standard for an appropriate rationale for an extension or a requirement that the Department approve the extension, the Department and the public are left having to trust that the permittee makes an appropriate determination as to whether or not it needs an extension and that its proposed completion date is reasonable.

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[238] *See* 33 U.S.C. § 1342(a)(2) (requiring agency to prescribe conditions for NPDES permits to assure compliance with CWA); 40 C.F.R.§ 122.4(a) ("No permit may be issued: (a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA").
[239] Draft Permit Part IV.A.2.b; IV.B.1.c; IV.B.2.c.

**The Permit must require Department approval for an extension beyond the 45-day timeframe.**

The Fact Sheet justifies the automatic extensions stating: "While persistent high levels of pollutants should be mitigated as soon as possible, the Department acknowledges that operators may need more time for planning, designing, and funding purposes."[240] Simply put, the initial "deadlines" in the Permit are, in effect, merely unenforceable suggestions.

In the event that operators need more time than the initial time frame, which should be in the minority of circumstances, the Department and the public must have oversight over what circumstances warrant additional time. The Department's justification in the Fact Sheet recognizes that benchmark exceedances represent high levels of pollutants that should be mitigated as soon as possible, yet the Permit does not create a mechanism for any review or oversight of this process.

**Each time a rationale for a time extension is required, the Permit should require an appropriate demonstration as defined in Appendix E**.[241] **This definition should also be revised to exclude any impediments of the permittee's own creation or control**, for example: **"**Appropriate Demonstration – For purposes of this permit, this means that there is a clear impediment, outside of the permittee's control, to completing a task at hand, such as . . ." (red text is the recommended addition to existing Permit language).

The Permit must explicitly state that failure to timely submit justification for any time extension through NetDMR, along with any additional documentation of any actions taken, constitutes a permit violation.

*A permittee's rationale and schedule for implementing additional control measures must be made available to the public through NetDMR.*

The permittee's rationale and schedule for implementing additional control measures may not even be available to the public until the annual report, if at all, as IV.C.2 does not specify where the permittee must document its rationale and schedule.[242] While the permittee must summarize its corrective actions and/or AIM responses in the annual report, this does not necessarily include the justification for extensions. If the permittee notified the Department regarding an allowed extension of the timeframe, it must attach its documented rationale to its next DMR, but in most instances the permittee is not

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[240] Fact Sheet, at 75.

[241] Appendix E of the Permit defines appropriate demonstration as: "For purposes of this permit, this means that there is a clear impediment to completing a task at hand, such as "a required E&SC plan is required, and the process will take 3 weeks, which is longer than the time allotted", "we are out to bid for the work to be completed, and the actual vendor selection will take 2 weeks, which is longer than the time allotted", or "work on installing has been delayed to unforeseen issues on the site, but we expect no more than 2 weeks past the allotted time"."

[242] Permit Part IV.C.2 provides: "If infeasible to complete the necessary corrective actions and/or AIM responses within the specified timeframe, per Parts IV.A.2, IV.B.1.c, IV.B.2.c, IV.B.3.c and/or IV.B.4.c, you must document your rationale and schedule for installing the controls and making them operational as soon as practicable after the specified timeframe."

required to notify the Department regarding an allowed extension, so this requirement would not apply.[243] Consequently, the Department and the public would not be aware that the permittee planned to extend its deadline or any rationale provided for such extension.[244] The public should not have to trust the permittee; the Permit must hold the permittee accountable and require the permittee to make information publicly available, to allow the Department and the public to confirm compliance.

Confusingly, the documentation language for extensions beyond the original deadline changes for AIM Levels 3 and 4, compared with AIM Levels 1 and 2, and Corrective Actions in Part IV.A. AIM Levels 3 and 4 specify that if the initial deadline is not feasible, the permittee may take up to 90 days, *documenting in the facility's SWPPP why it was infeasible to meet the initial deadline*.[245] As discussed later in these comments, Commenters have significant concerns about the public's ability to timely access updated SWPPPs. On top of the need for updated SWPPPs to be readily available to the public, the inconsistency of documentation requirements from level to level of the AIM process would hinder the ability of both the Department and the public to track compliance and ensure accountability.

To avoid inconsistent documentation and to ensure that the Department and the public have the ability to hold a permittee accountable for meeting deadlines and providing reasonable justifications for any extensions, **the permittee must be required to document its rationale for any extensions through NetDMR, not only those for which the Department was notified.** This documentation must be submitted within 14 days.

As stated above, the Permit must explicitly state that failure to timely submit documentation of the rationale for any time extension through NetDMR, along with any additional documentation of any actions taken, constitutes a permit violation.

***The AIM Exceptions in the Permit are Inconsistent with the EPA MSGP and the CWA and Must be Revised or Eliminated.***

[243] The permittee must notify the Department under Part IV.A.2.b of an intention to exceed 45 days. The Department may also intend for this notification provision to apply where the permittee requests an extension beyond the initial extension "based on an appropriate demonstration" under Parts IV.B.2.c, IV.B.3.c, and IV.B.4.c, although this is not explicit.

[244] Note that although the AIM Levels require the permittee to attach its updated Comprehensive Annual Report to its next DMR after compliance with the AIM Level response requirements and this updated annual report should include the permittee's rationale for any extension of deadlines taken or completion date, by its terms the permit only requires this to be submitted upon completion of the additional measures. This documentation therefore could not be used to hold the permittee accountable for providing an appropriate rationale for the extension.

[245] Permit Part IV.B.3.c; IV.B.4.c. Note that although Part IV.C.2 provides that if infeasible to complete the AIM responses within the specified timeframe the permittee must document its rationale and schedule, and includes part IV.B.3.c and IV.B.4.c in the list of sections this applies to, this does not specify where the documentation is meant to occur. In accordance with the language of Parts IV.B.3.c and IV.B.4.c, a permittee might reasonably assume that this documentation is to be included in the SWPPP, rather than in the annual report or elsewhere. If the documentation in the SWPPP is meant to be in addition to documentation in the annual report, this must be clarified.

*The Permit is inconsistent with EPA's MSGP with respect to AIM exceptions for natural background, and must be revised.*

EPA's proposed MSGP included a new method for calculating AIM exceptions due to natural background, which it described as a "subtraction method." According to the proposed MSGP, the AIM exception would apply if [t]he four-quarter average concentration of your benchmark monitoring results minus the concentration of that pollutant in the natural background is less than or equal to the benchmark threshold.[246] This is this same language that the Department included in the Permit.[247] However, in our comments on EPA's draft MSGP, Commenters noted that EPA's draft language regarding AIM exceptions was legally and technically unsound.[248]

EPA agreed with our comments. Among other things, EPA noted that "the proposed subtraction method essentially would allow operators to contribute higher concentrations to receiving waters than previously allowed without triggering AIM. This is not EPA's intention with this exception."[249] As a result, EPA abandoned the flawed proposal and reverted to the language in the 2015 MSGP. The final MSGP states that the "natural background" exception only applies if [t]he four-quarter average concentration of your benchmark monitoring results (or fewer than four-quarters of data that trigger an exceedance) is less than or equal to the concentration of that pollutant in the natural background.[250]

The Department's Permit language - which tracks the proposed MSGP language - is therefore inconsistent with EPA's final MSGP and must be changed.

Independent of whether the Permit aligns with the final MSGP, the Department should revise its natural background exception language for all of the reasons that we provided in our comments on the MSGP: The language in the Permit does not only waive monitoring for pollutants whose benchmark exceedances are solely attributable to background, it actually waives monitoring unless the exceedances are solely attributable to the permittee. This would represent backsliding from the prior permit and be contrary to the CWA. As EPA stated in the fact sheet for its final MSGP, the proposed language was inconsistent "with existing EPA policy concerning the establishment of site-specific water quality criteria based on natural background conditions."[251]

**In sum, the Department must change the impermissible natural background AIM exception language to make the Permit consistent with the CWA and the final EPA MSGP.**

*The Department must not waive monitoring based on run-on from a neighboring source.*

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246 Draft MSGP at 49.
247 Draft Permit at 34, Section IV.C.5(a)(i).
248 MSGP Comment at 54-59.
249 Final MSGP Fact Sheet at 113.
250 Final MSGP Section 5.2.6.1(a).
251 MSGP Fact Sheet at 112.

The Department proposes to waive "AIM or additional benchmark monitoring" where "run-on from a neighboring source . . . is the cause of the exceedance."[252] For all of the reasons set forth in the preceding section, we object to this waiver.

It is not clear what the Department means by "the cause," but we suspect that the Department intends for this section to mirror the natural background exception, such that the Department would apply the same flawed logic with respect to exceedances "solely attributable" to natural background. Again, for all of the reasons set forth above - including the fact that EPA has disavowed the subtraction method being proposed by the Department – **The Department cannot waive monitoring just because run-on contributes to a benchmark exceedance**. If a permittee is causing or contributing to a benchmark exceedance, then that permittee must continue the AIM process and additional benchmark monitoring.

The only theoretical scenario in which a permittee might legitimately be exempt is where the pollutant load is entirely attributable to run-on (i.e., where the contribution from on-site industrial stormwater is zero). However, we question whether there is any value in a carve-out for this scenario. If a permittee is able to separately monitor run-on, then the permittee should be able to avoid commingling, and no net calculations should be necessary.

If the Department chooses to keep the run-on exception, Commenters urge the Department to incorporate Dr. Horner's recommendations from page 9 of his report related to the steps necessary to solve the problem from the run-on pollution. As Dr. Horner's report describes, the permittee's response to run-on from an external source should be to first determine if there is a potential solution that could be implemented at the permittee's own property, then to work cooperatively with the operator of the external source to identify a solution.[253] Finally, if those efforts fail, the permittee should be required to contact the Department. The Permit should then specify what actions the Department will take to pursue a solution and communicate to the permittee.[254] The permittee should be required to document all of the steps and actions it took in this process in an updated SWPPP and annual report.

***Several Elements of the Corrective Action Section Require Revision Due to Lack of Clarity, Illogical Timing, or Otherwise Confusing Messaging.***

*Language related to the timing of AIM triggers is inconsistent and confusing.*

Even if the Department does not revise the AIM triggering events as Commenters urge, it is critical for the regulated community and the public that the Department increase the clarity of this section and remove inconsistencies. The Permit should clarify when a

[252] Draft Permit Fact Sheet at 79.
[253] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 9.
[254] *Id.* at 9.

triggering event may occur to trigger each AIM level. Part IV.B of the Draft Permit briefly notes that in the context of the AIM parts, "year you are subject to benchmarks" means 4 quarters of monitoring. Most of the AIM triggering events rely on this definition of a "Year" to determine when a permittee would enter each AIM level. As Commenters understand it, a year the permittee is subject to benchmarks is based on the provision in Part V.B.2[255] that a permittee may discontinue benchmark monitoring after 4 quarters of monitoring if the annual average does not exceed the benchmark for a parameter. The connection to this separate Part is not explained in the AIM section.

AIM Levels 3 and 4 include as triggering events that "one single sampling event during your [third/fourth] year of coverage for a parameter is over 4 times the benchmark threshold,"[256] which throws into question how the triggering events are meant to be interpreted. Does each use of "year you are subject to benchmarks" or "Year #" actually refer to the year of coverage under the permit, as used in these triggering events under AIM Levels 3 and 4? Or do AIM Levels 3 and 4 have one triggering event based on the year of being consecutively subject to benchmarks due to an annual exceedance and one based on the year of permit coverage? This confusion is exacerbated by the Fact Sheet, which notes: "A difference in the Department's approach is that each escalating level is based strictly on time."[257] Assuming the Fact Sheet is referring to a difference from the EPA's approach in the proposed MSGP, the difference of each escalating level based "strictly on time" could refer to the "time", or year, in which the average annual benchmark exceedance occurred. The Fact Sheet does not explain the way the trigger is presumably meant to operate, that each level is based on whether the permittee has been subject to benchmarks for multiple four-quarter periods, meaning that you had at least one triggering event in the first four quarters of monitoring.

Although Commenters find the triggering events under the Permit to be arbitrary and capricious and urge the Department to revise the triggering events and require benchmark monitoring to continue beyond the first four quarters, **if the Department retains its current triggering events, it is imperative that it provide additional clarity.** The EPA webinar regarding the Final 2021 MSGP included a helpful flow chart graphic depicting how a permittee progresses from one AIM level to another.[258] The Department should consider creating a flow chart that reflects how it intends for the AIM Levels to progress.

*The deadlines in AIM Level 4 are illogical and inconsistent.*

AIM Level 4 Responses require the permittee to consult a professional to prepare an action plan for installing structural source controls and/or treatment controls. Part

[255] "If the annual average for any parameter does not exceed the benchmark threshold, you have fulfilled your benchmark monitoring requirements for that parameter for the permit term and you can request to discontinue benchmark monitoring for that parameter by 1) entering all data for the parameters in NetDMR, 2) requesting the Department's Permit Program to verify your calculation and 3) receiving confirmation from the Department." Draft Permit, Part V.B.2.
[256] Draft Permit, Part IV.B.3.a.ii); IV.B.4.a.ii).
[257] 20-SW Fact Sheet, at 70.
[258] EPA MSGP AIM Flow Chart, attached as Appendix K.

IV.B.4.b.i) allows the permittee to "take up to 30 days to select the professional, and an additional 30 days to prepare the action plan." Yet, the AIM Level 4 Deadlines provide that the permittee must install the appropriate structural source and/or treatment control measures within 60 days of the occurrence of the triggering event.[259] This means that the action plan for installing control measures is due to the Department the same day as the actual installation of the control measures. If the action plan is meant to have any functionality as a plan, as opposed to a summary of actions already taken, it must be due prior to the deadline for the corrective action itself. The Fact Sheet adds to the confusion of the AIM Level 4 deadlines, stating that under the Permit, the treatment control measures "would be required to be completed within 30 days of the Level 4 triggering event."[260] These deadlines must be revised to be consistent and logical, and the Permit must expressly state that failure to meet the deadlines constitutes a permit violation.

*The Department should clarify the deadlines for installing control measures and submitting the action plan.*

Although the Permit does not state that the Department must approve or reject the action plan submitted within 60 days of occurrence of a triggering event, it notes "If the Department does not reject the plan within the required 60 days or does not provide for an extension, you are obligated to proceed with plan implementation."[261] This adds further confusion to when the control measures must be implemented and whether the action plan is subject to Department review and approval. The provision suggests that the Department has the ability to reject the action plan within 60 days of receipt, similar to the approval or disapproval of the "adequate demonstration" that the discharge does not result in exceedance of WQS. If this is how the Department intends for this section to work, then **the Permit must include a deadline for submitting a revised action plan.** The Permit must explicitly state that failure to comply with the stated deadline constitutes a permit violation.

Additionally, **the deadline for submitting an action plan should be reduced to 14 days or, at most, 30 days.** The Permit already gives permittees significant leniency by allowing them to comply with a series of AIM requirements rather than immediately subjecting them to enforcement and potential penalties. Once a permittee has reached AIM Level 4, the deadlines for submitting documents and implementing corrective actions should be strict. By this point, the permittee has been exceeding benchmarks, possibly violating TBELs, and potentially impairing water quality for up to ***four years***,[262] based on the AIM triggering events of the Permit.

For the AIM Level 4 section to be enforceable, the action plan and the milestone dates it sets forth must also be enforceable (i.e., violations of the plan constitute enforceable

[259] Draft Permit, Part IV.B.4.c.
[260] 20-SW Fact Sheet, at 77.
[261] Draft Permit, Part IV.B.4.b.i.)
[262] Using Commenters' proposed revisions to the triggering events, this period would be up to four quarters, whereas using the triggering events of the Draft Permit this timeframe would be as much as four years.

violations of the Permit). All deadlines under the action plan must be within 60 days from the triggering event for AIM Level 4, as 60 days is the deadline for the entire AIM Level 4 Response. The action plan should be made available to the public online at the same time that it is submitted to the Department, allowing the public to review the plan and assess whether the permittee complies with the milestone dates set forth.

## Permit Coverage is Overly Broad and Permissive, Thus Denying Adequate Attention and Protections for Large Dischargers of Pollution

***Advance Notice to the Department and the Public Should be Required for Sites that Present Specified, Clearly Enumerated Risks, in order to Evaluate Whether Additional Controls and/or an Individual Permit Should be Required Instead.***

Stormwater general permits are not sufficiently protective or suitably tailored for all applicants. The NRC noted the greater ability of individual permits to regulate pollutants relative to a general permit.[263] Additionally, as stated in EPA stormwater permit guidance, "NPDES authorities may find it more appropriate where resources allow to issue ***individual permits that are better tailored to meeting water quality standards*** for large industrial stormwater discharges with more complex stormwater management features, such as multiple outfalls and multiple entities responsible for permit compliance."[264] Federal regulations discuss additional considerations for when an individual permit is more appropriate including, notably, compliance issues - which, as discussed, are widespread in Maryland - or where a facility is a significant contributor of pollutants.[265]

Thus, in many cases, whether due to the condition of the receiving water, proximity to a contaminated site designated for cleanup, current compliance status, or due to the nature of pollutants to be discharged, an individual permit should be used in place of a general permit. **We urge the Department to include in the Permit a requirement for applicants to provide advance notice to the agency, to EPA, and to the public if the site presents specified, clearly enumerated risks, in order to allow the Department to fully evaluate whether additional controls and/or an individual permit should be required instead**. The Department cannot make an informed decision to issue a more appropriate individual permit if it does not have the relevant information about the facility ahead of time. We note that the relative value of an individual permit also increases to the extent that the terms of a general permit are inadequate or insufficient, which is certainly a concern for this Permit based on the draft that the Department has tentatively determined should be issued.

A few circumstances that we believe warrant advance notice from applicants (as well as consideration of additional or enhanced controls) and/or individual permit coverage include: (1) ongoing noncompliance under the 12-SW permit, as identified by Department or EPA inspectors, especially for sites that are not in compliance with the ISR requirement; (2) new facilities that would discharge the same pollutant for which the local

[263] National Academies of Sciences, Engineering, and Medicine 2019. Improving the EPA Multi-Sector General Permit for Industrial Stormwater Discharges at 3, 42 (2019).
[264] U.S. Environmental Protection Agency, Office of Water. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on LAs" (2014). Page 5.
[265] 40 C.F.R. § 122.28(b)(3)(i).

receiving water is listed as impaired or new facilities that propose to discharge within a catchment that drains to a Tier II water body; (3) sites located immediately upstream and within close proximity (e.g. a half mile) of a site on the National Priority List or in the State's Voluntary Cleanup Program; (4) sites that have applied a coal tar or high-PAH sealant within the previous year and ones that plan to apply such sealants (unless otherwise affirmed in the permit application); (5) locations within a community affected by environmental injustices, which could include either census tracts above a certain threshold (e.g. top quartile) in the CDC Social Vulnerability Index, MD EJ SCREEN, or an EPA EJSCREEN block group with more than one environmental or demographic indicator with an index score in the top quintile; and (6) sites at greater risk of inundation, including those that have flooded within the previous decade and those within a FEMA 100-year flood zone.

An additional pre-authorization wait period, similar to the concept proposed by EPA for the federal MSGP, should also be added to this Permit. Given the extraordinarily high rates of noncompliance from this permitted sector and the duty of the Department under its regulations to evaluate compliance with existing permits prior to the renewal or reissuance of a permit[266], the Department will need to establish a separate track for facilities with compliance issues, particularly those recognized as in "significant noncompliance" and those that failed to achieve their ISR requirements either by the deadline or by the time this Permit is reissued.

We recognize the Department has made a change to the Alternative Coverage section (I.G.) to address some problematic language in the same section of the previous 12-SW permit, which stated that "*if* the Department determines that a discharge may cause water quality standards to be exceeded in the receiving water, then the Department *may* require you to take additional actions including getting an individual permit." Now, the provision begins with a clear statement that "[y]ou must meet applicable water quality standards." However, alternative coverage under an individual permit is not required unless "the Department *determines prior to your authorization* to discharge that your discharges will not meet an applicable water quality standard." **This language must be strengthened.** At present the language provides no guidance to permittees regarding whether they will be eligible for coverage under the Permit and it invites arbitrary decisions for the Department. **Moreover, the Department does not possess adequate staff to implement this provision and has not established any processes in the Permit or otherwise to give effect to this provision.** To comply with the CWA and Maryland Water Pollution Control statute and give fair guidance to regulated entities, the Department must establish a clear process that describes how it will make this determination without vagueness or overly discretionary language. If advance notification is required for certain classes of facilities in order to allow the Department to conduct pre-authorization inspections and evaluations, the Permit must be amended to include it.

We also note that the Department has continued to struggle to identify facilities that have evaded coverage under the Permit due both to a lack of staffing at the Department and

[266] COMAR 26.08.04.02

to a lack of programmatic initiative. Commenters and our partners are being relied upon to bring unregulated facilities to the attention of the Department. Failure to obtain coverage is, of course, a serious matter of noncompliance under the CWA, which is reliant on a permitting program to drive progress toward attainment of WQS. It is unacceptable for the regulator to have to rely on referrals from the public to ensure it has adequate regulatory coverage over the universe of facilities. The Department must advocate for additional resources to build a credible permitting program.

Finally, the NRC recently recommended that EPA extend MSGP classification to "nonindustrial facilities with activities similar to those currently covered." The EPA has previously determined that there is a large universe of facilities and activities that fall outside of the regular MSGP sectors, many of which could be subject to Sector AD. Commenters urge the Department to begin the process of identifying additional sectors for coverage for subsequent issuances of this permit, because there is no reasoned basis for continuing to ignore all nonindustrial facilities with activities similar to those currently covered.

***The Department Should Require Individual Permits for All New Facilities, Including a Requirement to Offset any New Loads, Preferably Through Onsite Pollution Control Projects.***

As discussed, Congress required industrial stormwater permits to be in strict compliance with WQS.[267] Along with that mandate comes additional requirements for permits issued for discharges to receiving waters with certain designations, such as impaired, subject to a TMDL, or high quality. The 20-SW, like the 12-SW, makes reference to these designations, for example, by requiring permittees to describe the receiving waters from their discharges, establishing the ISR standard designed to implement the Bay TMDL for some facilities, and requiring certain monitoring conditions for impaired waterways. However, the Permit does not go far enough in distinguishing between different classifications of facilities based on the status of the waters that receive discharges from those facilities.

Federal regulations prohibit the issuance of a permit in limited circumstances.[268] One of these circumstances pertains to "a new source or a new discharger, if the discharge from its construction or operation will cause or contribute to the violation of water quality standards."[269] This prohibition applies unless there are "sufficient remaining pollutant load allocations to allow for the discharge" and "existing dischargers into that segment are subject to compliance schedules designed to bring the segment into compliance with applicable water quality standards."[270] Commenters appreciate that the Permit references these important provisions that are ignored in other Permits issued by the Department; the process for handling coverage for new facilities in subsection I.C.5 is clear and prescriptive. However, Commenters are concerned that the provision, which is

[267] 33 USCS § 1342(p)(3)(A); Water Quality Act of 1987, P. L. 100-4
[268] 40 CFR 122.4
[269] 40 CFR 122.4(i)
[270] 40 CFR 122.4(i)

maintained from the 12-SW permit, fails to comport with the Bay TMDL and the well-recognized impact that impervious surfaces have on nutrient loading to surface waters. Thus, for example, subsection I.C.5 (where the Permit authorizes coverage to a new discharger if, among other things, it can "prevent all exposure to stormwater" or "document that the pollutant for which the waterbody is impaired is not present at your site") references a result that is physically impossible and untethered from the reality of permitting consistent with the Bay TMDL. Nitrogen deposition means that ***all*** new impervious surfaces are sources of nutrient pollution within the Bay watershed. Unless a new facility can ensure ***all*** stormwater is retained onsite or can generate offsets within the same subwatershed or catchment, paragraph I.C.5 cannot pass muster and must be revised. **Commenters urge the Department to require individual permits for all new facilities and to require no new loads, preferably through onsite BMPs.** At a minimum, Commenters would recommend that the Permit prescribe specific additional or expanded control measures and ISR requirements to ensure no increase in discharges.

***Additional Regulatory Protection for the No Exposure Certification Program is Required.***

Commenters urge the Department to address a broad deficiency with the "no exposure" certification. **As discussed, it is physically impossible and fundamentally inconsistent with the Bay TMDL and Maryland's Water Pollution Control Subtitle to establish a presumption that stormwater pollution will not be discharged from a site without full retention of stormwater onsite**. Thus, in section I.F. the statement that "there is no potential for the stormwater discharged from your facility to waters of this state to be exposed to pollutants" should be deleted. Technically, the Department should not continue to allow new certifications unless the applicant demonstrates that ***all*** stormwater is retained on-site and not discharged; otherwise, this certification is not taking into consideration the potential for discharge of pollutants from deposition or run-on. Further, the Department should also require applicants to identify and make certification contingent upon measures to prevent discharge of contaminated stormwater during extreme weather and flood conditions, including, for example, certification that any material that has the potential to contaminate floodwaters or stormwater discharges is securely stored outside of flood hazard zones. Whether or not a pollutant was ***generated*** on site is irrelevant to whether pollutants are actually discharged in stormwater from the site to waters of the State, which is what is relevant under Maryland law governing discharge permits. Thus, at the very least, the Department must correct the inaccurate statement that "there is no potential for the stormwater discharged from your facility to waters of this state to be exposed to pollutants" to add the words "generated on site" at the end of that statement.

Beyond correcting that specific statement applicable to the no exposure certification, Commenters believe the certification must amount to more than an exclusion from regulation and introduce at least some degree of regulatory protection given the role of deposition and run-on. These minimal regulatory requirements for lower risk facilities could include inspection, monitoring, and/or limited control measures, such as dust suppression, offsite vehicle tracking, and flow dissipation controls. Commenters recognize that this position represents a departure from current practice in Maryland and perhaps in most other jurisdictions. However, Commenters urge the Department at a minimum, to commit to moving away from this system whereby facilities can be fully excluded from regulation. Facilities granted this certification do, in fact, generate some stormwater pollution and discharge to waters of the state. Given this reality, it is perfectly reasonable, and arguably legally required, because the Department must ensure consistency with WQS, to establish a parallel regulatory process that would at least begin to mitigate discharges with this 20-SW permit cycle. Such state-based programs are consistent with the intent behind the Bay TMDL and Chesapeake Bay Agreements to establish a holistic and comprehensive approach to addressing pollutants from ***all*** sources.

We also note that both Dr. Horner and Dr. Roseen have expressed concern about the proposed no exposure certification provisions in the Permit. Dr. Roseen has observed a problematic trend whereby industrial sites attempt to skirt regulation under the Clean Water Act by employing crude engineering measures to simply retain all stormwater onsite with no regard to impact on groundwater. Commenters are not aware of this practice being utilized by no exposure certification applicants in Maryland, but request that MDE improve the Permit by prohibiting such methods and appropriately requiring any infiltration of runoff receives appropriate filtration and does not otherwise contaminate groundwater – a water of the State. Dr. Horner recommended that the Department review the more careful no exposure certification requirements in Washington's industrial stormwater permit, which include 11 specific questions that must be satisfactorily answered to receive the certification.[271]

Finally, Commenters also urge the Department to fully deny a "no exposure" certification to any ***new*** sources from newly established facilities, thus providing an incentive to fully retain stormwater and/or pre-treat runoff as a state-based new source performance standard built into the process of establishing new facilities with industrial stormwater discharges.

[271] Dr. Horner's Report, Assessment of Maryland's General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021), at 7

## The Permit Should Be Accompanied by Greater Transparency and Accessibility

The CWA was written with public involvement playing a central role. The very first section of the Act describes the need for agencies entrusted with administering the statute to facilitate public participation, a duty that flows to the Department via delegation of federal authority. Section 101 of the Act states that "[p]ublic participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter ***shall be provided for, encouraged, and assisted*** by the Administrator ***and the States***." (Emphasis added).[272] Moreover, after accepting delegated authority to implement the CWA from EPA, the Department charged itself with adhering to certain basic principles, including public participation. In furtherance of this important principle, the Department's regulations declared that "active public involvement throughout the intergovernmental decision-making process shall be encouraged and utilized to accomplish the objectives of State and federal laws and regulations" and that the "***Department shall make a maximum effort*** to seek out and involve the interested public."[273] (Emphasis added). Finally, the Maryland Environmental Policy Act requires all state agencies to ensure "the fullest practicable provision of timely public information."[274]

***The Department Must Provide the Public with Greater Access to Information About the Implementation and Enforcement of This Permit.***

Ideally, a single database should be created to allow for the collection, storage, analysis, and posting of information required to be submitted by 20-SW permittees. After all, as the Permit acknowledges "all submitted data, plans or reports prepared pursuant to this permit, including self-inspection information, must be available for public inspection". Thus, subject to specified exceptions under the Public Information Act, all data submitted under this Permit is public information and should be made accessible to the public in a way that the public actually consumes information; otherwise, the Department cannot argue that it is meeting its duty to make "maximum effort to seek out and involve" the public.

The e-Permit database for the construction stormwater general permit provides one potential template. Another particularly fruitful opportunity to integrate such data could be through the new Environmental Tracking System (ETS). Regardless of where the data is housed, it is important to collect, maintain, and distribute valuable environmental permitting and compliance data in an electronic format. For example, both the municipal stormwater and animal feeding operation permitting programs utilize Microsoft Access and/or ESRI ArcMap software to provide access to analyzable information via spreadsheets and geodatabases. These electronic sources of data enable Department staff and its partners at EPA and among academia, the private sector, and the public to

[272] 33 U.S. Code § 1251(e)
[273] COMAR 26.08.01.02
[274] Md. Code Ann., Nat. Res. §§1-303(3)

conduct important analytical research. Finally, Commenters would encourage the Department to look outside of Maryland for some other examples of functional and well-designed databases for housing SWPPPs and other permit data, including those used in California and Rhode Island.[275]

A few of the elements that Commenters urge the Department to include in whichever database is used would be: SWPPPs; annual reports; public notices; notices associated with corrective action; geospatial data, including for outfalls and monitoring points; and any additional information that the Department requires an applicant to submit. In the event that a unified database cannot be established in time for the next permit's issuance, Commenters urge the Department to simply consider adding layers to the state's already existing and well-known Open Data Portal until such time as the data can be integrated and migrated to the ETS or another database. The Open Data Portal is designed to be familiar to the public, user friendly, and supported by the state budget and state information technology professionals. Commenters see no reason not to use the Open Data portal as a temporary solution if necessary and Commenters see no reason why the Department should not comply with its duty to facilitate public access to public information by requiring electronic submission of data from permittees and posting such data online. EPA long ago led the way in data accessibility with the creation of the ECHO database and other transparency efforts associated with its Next Generation Compliance initiative.

In the event that the Department is unable to immediately make facilities' SWPPPs and annual reports available to the public through an electronic database, ***at the very least*** the Department should include a requirement that permittees make updated SWPPPs publically available within a definite time frame in order to ensure that they are available until such time as the Department can post them on the Department website. Washington State's permit, for example, requires permittees to provide access to, or a copy of, the SWPPP to the public when requested. The permittee must provide a copy of the SWPPP to the requestor within 14 days of receipt of the request, make the SWPPP available for viewing within 14 days of the request, or provide a URL in the NOI where a current SWPPP will be maintained.[276] In New York, the industrial stormwater general permit also requires the owner or operator to make a copy of the SWPPP available to the public within 14 days of receipt of a written request.[277]

The SWPPP is a particularly important document for the public to access because it describes the actions the site has pledged to take to comply with the Permit and protect surrounding waters. Public access to this information would allow the public to hold permittees accountable for taking the actions needed to comply with the Permit, making this an important process for ensuring permit enforceability.

[275] For more information, see EIP-CPR Report.
[276] Washington State Department of Ecology Industrial Stormwater General Permit. Condition S9.G, pg. 42.
[277] New York State Department of Environmental Conservation, Multi-Sector General Permit. Part III.C.2.c, Page 27.

Subsection II.A.3 of the Permit directs permittees to "not include any confidential information in your submitted SWPPP" before submitting it to the Department electronically. **Given that the SWPPP is provided electronically to the Department and devoid of confidential information, there is no logical reason not to post these important documents online for the public to access. Much of the information required to be documented in a SWPPP would be of high interest to the public such as documentation of the pollutants present on site, which the surrounding community has a right to know about, as well as information such as the corrective actions the site is subject to.** Moreover, it would be illogical not to migrate these electronic records to the Department's new ETS database for permitting and compliance data.

Regarding NOIs, the Department should also expand the scope of information required of applicants in subsection II.A.1. For example, Commenters urge the Department to include additional and more specific geographic information about the permit. Instead of an 8-digit watershed identifier, the applicant should include the 12-digit watershed code, which is much closer to the neighborhood level and a geographic scale relevant to peoples' lives. The Department should require the applicant to refer to the agency's interactive maps for Water Quality Assessments and TMDLs and for Tier II waters and to provide the name, GIS ID, and any other location information associated with the receiving water body, as well as the geographic coordinates of each discharge point on the site and for the storm drain collection point and outfall, if any.

Additionally, the NOI requirements and NOI form provided by the Department should be amended to include the latest sampling data from a site covered under the previous permit. This data provides important information to Department staff documenting whether the facility is conducting sampling on the required schedule and in compliance with proper sampling procedures and that any benchmarks are not being exceeded. Again, this information is critical to evaluating compliance and enabling the Department to take enforcement action if necessary. Such information is also a critical component of the permitting process because the Department is required by law to ensure compliance by the permitted entity with all state and federal requirements. The Department could consider exploring the NOI processes of other states. One state with robust reporting requirements is New York.

***The Department Should Require Public Notice for Certain Permit Applications Prior to Granting Facility Coverage.***

Requiring advance notice for some or all permit applicants is important in order to give effect to permit coverage and exclusion considerations. The process for gaining coverage under the 20-SW Permit should be similar to the process for gaining coverage from the Department's general permit for Animal Feeding Operations (AFO). Specifically, that permit provides for public participation prior to the coverage of an individual facility, which is important since the NOI takes the place of a permit application. This Permit is similar in many respects to the AFO general permit and, given the large number of Marylanders in close proximity to industrial stormwater permitted facilities, it would seem even more important to solicit public comment prior to granting coverage under the Permit.

At the very least, advance notice should be required to be provided to the Department along with posting of such information on the Department website. Even if a formal notice and comment period is not established - which Commenters believe should be provided - advance notice would alert the surrounding community of the application, give them the opportunity to provide feedback to the Department, and help the Department drive greater awareness of this Permit, which does not exist at the present time. Because of the critical deficiency in staff and budgeted resources for the implementation of this Permit it is even more important that the Department seek information from the public.

***The Department Should Further Strengthen Signage Requirements at Permitted Sites to Ensure Community Access to Facility Information.***

Commenters applaud the Department's decision to require applicants to post standardized signs on the exterior of their sites.[278] Signs are essential public health tools that protect and empower the residents living in communities surrounded by industrial facilities, especially communities disproportionately affected by environmental pollution. Because industrial facilities are concentrated in overburdened communities, these communities stand to benefit the most from adequate signage that can alert community members to potential harm. Commenters believe the Department benefits when the public knows that the agency is there to protect their health and wellbeing. The public likewise needs to know what pollutants are being discharged into their communities, and the Department has an obligation under the law to facilitate the dissemination of environmental information. To this end, Commenters urge the Department to consider the inclusion of at least a few key elements into the new signage requirement.

First and foremost, section II.G should include a requirement for signs to be translated into Spanish and any other non-English language known to be common in the surrounding community. Additionally, the requirement to post a phone number for the facility is helpful, but this would be strengthened by including a web link where the public can report any pollution concerns or a "hotline" to call.

Finally, while Commenters appreciate the new requirement that the sign be posted "at potentially impacted public access areas", Commenters believe this requirement could be strengthened by specifying that signs be posted near each primary discharge point. For sites with a large number of discharge points, the Permit could require the posting of one main sign that complies with section II.G. and then smaller warning signs or stenciling around the other discharge points. These signs can warn community members, and especially children, not to loiter or recreate on public property directly adjacent to these points during or after rain events. Such signs can also help educate members of the community about the nature of industrial stormwater runoff. For example, an average person not aware of the difference between stormwater and a hazardous spill may see a

[278] Permit, section II.G.

stream of water from an outfall or discharge point at an industrial facility and believe it to be either illegal or an extremely dangerous spill or leak, rather than stormwater deliberately channeled from the site. This education could reduce fear and mistrust and perhaps improve the usefulness and quantity of public complaints that the Department handles. Because permittees are already required to designate the location where potential spills and leaks would discharge,[279] Commenters believe this provision would be significantly enhanced by requiring permittees to place signage next to these outfalls to provide a basic warning to the public, including to children that may otherwise play nearby.

[279] Permit, subsection III.C.2.

## Permit Fees Are Not Sufficient to Address Substantial Resource Constraints for Implementing the Permit and Ensuring Compliance

One of the most common and frequent criticisms of nearly all Department programs is a lack of budgeted resources and staff. This deficiency has been documented by EPA, by state auditors, by nonpartisan legislative analysts, and by the Department itself. As EPA stated in its most recent review of the Department's stormwater permitting programs "Maryland has had its share of budget problems in recent years, which has had an effect on MDE's budget and that of its stormwater programs. ***Representatives of these programs cite budget limitations and reduced staffing levels as the biggest challenges they face***."[280] (Emphasis added). A two-year study of all executive agencies in Maryland found the Department to be one of the most chronically understaffed.[281] One need look no further than the extraordinary delays in the reissuance of this Permit, which has only gone through two iterations in the last two decades, for evidence of acute understaffing.

The Department is required by statute to "set a reasonable permit fee schedule for industrial users based on … the cost of monitoring and regulating the permitted facility … the flow of effluent discharge ... and … the anticipated needs for program development activities that relate to management of the discharge of pollutants into the waters of this State."[282] Thus, resource constraints should, in theory, never be an issue for the Department in writing permits or ensuring compliance associated with the industrial stormwater general permit. Yet, in working closely with staff in the Industrial Stormwater Permits Division, Commenters note that it has become glaringly obvious that the Department has nothing more than a skeleton crew in charge of this highly important permitting program.

Commenters applaud the competence and professionalism of the staff in this Division, but **as the Department itself has repeatedly acknowledged, it simply does not have the resources to assure compliance with the permit's terms, WQS, and state and federal law. Its obligation under the law is to ensure compliance with the CWA and state laws. The lack of resources is, thus, a legal violation that must be immediately corrected by filling vacant positions and adding as many staff as is necessary to adequately carry out the terms of this Permit and to enforce violations of the Permit. A failure to do so makes the very issuance of the Permit in this form irrational, as it would be arbitrary and capricious to develop permit terms the Department knows it cannot carry out.**

A handful of staff is wholly unacceptable given the complexity of this permit, the number of facilities, the egregiously high rate of noncompliance, and the hazardous nature of industrial runoff. Moreover, as described above, industrial stormwater pollution presents

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[280] U.S. Environmental Protection Agency. Maryland Stormwater Program Review (2014). Page 9.
[281] Maryland Department of Legislative Services. Executive Branch Staffing Adequacy Study (2018). Page 11.
[282] Md. ENVIRONMENT Code Ann. § 9-325

disproportionate harms to communities already suffering most from environmental injustices, making it an important issue of environmental justice for the Department to provide adequate permitting and compliance staff.

**Unless the Department can show that the current fee revenue is sufficient to enable the Department to fill vacant positions, Commenters strongly urge it to increase the fee to account for inflation and the cost of enhancing the agency's regulation of industrial stormwater.** And because "the flow of effluent discharge" is a mandatory consideration, Commenters urge the Department to establish a fee schedule that accounts for the volume and impacts of the pollutants from individual sectors and for sites of different sizes.

Commenters recognize that fees are set by regulation at COMAR 26.08.04.09-1, but there is no reason the Department could not introduce a new fee structure in this Permit along with a proposed regulatory amendment to section .09-1 to enhance the fee schedule associated with the Permit. In fact, it is our view that **the Department must enhance fees to comply with the Memorandum of Agreement it signed with EPA** to implement the federal NPDES program, including to "maintain the legal capability . . . ***and the resources required to carry out all aspects of the NPDES program***."[283] (Emphasis added).

[283] Memorandum of Agreement. Department of the Environment State of Maryland and the Regional Administrator, Region III of the United States Environmental Protection Agency (Sept. 30, 1991), at 2, available at https://www.epa.gov/sites/production/files/2013-09/documents/md-npdes-moa.pdf.

Thank you for your consideration of our comments. We look forward to your responses and, as always, welcome the opportunity to discuss further with you.

Sincerely,

*For the Chesapeake Accountability Project:*

David Flores
Katlyn Schmitt
Darya Minovi
*Center for Progressive Reform*

Mary Greene
Abel Russ
Natalia Cabrera
*Environmental Integrity Project*

Hannah Brubach
Patrick DeArmey
Evan Isaacson
David Reed
*Chesapeake Legal Alliance*

Jon Mueller
Doug Myers
Brittany Wright
*Chesapeake Bay Foundation*

*Other Stakeholders:*

Anacostia Riverkeeper

Arundel Rivers Federation

Assateague Coastal Trust

Audubon Naturalist Society

Blue Water Baltimore

Clean Water Action

Defensores de la Cuenca

Friends of the Chemung River Watershed

Gunpowder Riverkeeper

Lower Susquehanna Riverkeeper Association

Maryland Campaign for Environmental Human Rights

Maryland Conservation Council

Maryland League of Conservation Voters

Mattawoman Watershed Society

Montgomery Countryside Alliance

Patuxent Riverkeeper

Potomac Riverkeeper Network

Rachel Carson Council

Safe Healthy Playing Fields, Inc.

ShoreRivers

Southern Maryland Audubon Society

Upper Potomac Riverkeeper

Waterkeepers Chesapeake

# Appendices

Appendix A: “Comment of the Chesapeake Accountability Project, Re: Tentative Determination for the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Discharge Permit for Baltimore City (Jan. 21, 2021).”

Appendix B: “Environmental Integrity Project, Stormwater Backup in the Chesapeake Region (Aug. 17, 2020).”

Appendix C: “Robert Roseen, Ph.D., Concerns Regarding the Draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities Discharge Permit (April 15, 2021).”

Appendix D: “Memorandum from Brenda Keister, MDE, to Andrew Grenzer, MDE, (Aug. 28, 2019).”

Appendix E: “Richard Horner, Ph.D., Assessment of Maryland’s General Permit for Discharges from Stormwater Associated with Industrial Activities (March 24, 2021).”

Appendix F: “In the Matter of Town of Hull, Findings of Violation and Order for Compliance on Consent, Case 1:16-cv-11950-MLW, Docket No. CWA-AO-R01-FY16-90, filed 12/20/16.”

Appendix G: “World Federation of Engineering Organizations, Model Code of Practice: Principles of Climate Change Adaptation for Engineers. (Dec. 2015).”

Appendix H: “Comment of D. Flores, Center for Progressive Reform, et al., Re: United States Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System Proposed Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity (Jun. 1, 2020).”

Appendix I: “Letter from Chesapeake Accountability Project to Paul Hlavinka, Maryland Department of Environment, Re: Feedback on Corrective Action Section of Pre-TD Draft General Permit for Discharges of Stormwater Associated with Industrial Activity, (Oct. 5, 2020).

Appendix J: “Letter from Chesapeake Accountability Project to Paul Hlavinka and Ed Stone, Maryland Department of Environment, Re: Feedback on General Permit for Discharges of Stormwater Associated with Industrial Activity, (Jul. 7, 2020).”

Appendix K: “EPA MSGP AIM Flow Chart”

CHESAPEAKE ACCOUNTABILITY PROJECT

January 21, 2021

Raymond Bahr, Sediment, Stormwater and Dam Safety Program
Maryland Department of Environment
Water Science Administration
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Baltimore, MD 21230
*Via email to:* Raymond.Bahr@Maryland.gov

Re: Tentative Determination for the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Discharge Permit for Baltimore City (Permit No. 20-DP-3315, MD0068292)

Dr. Mr. Bahr:

The Chesapeake Accountability Project ("CAP") and other stakeholders listed below submit these comments on the Maryland Department of Environment ("the Department") tentative determination to renew the the National Pollutant Discharge Elimination System Separate Storm Sewer System Discharge Permit for Baltimore City, Permit No. 20-DP-3315, MD0068292 ("MS4 Permit," "Permit," or "Draft Permit"). We appreciate your efforts in drafting this tentative determination and thank you for the opportunity to comment.

CAP is a coalition of environmental organizations committed to reducing pollution throughout the Chesapeake Bay watershed. The project is a partnership of five nonprofit organizations, including the Center for Progressive Reform ("CPR"), Chesapeake Bay Foundation ("CBF"), Chesapeake Legal Alliance ("CLA"), Choose Clean Water Coalition ("CCWC"), and the Environmental Integrity Project ("EIP"). Weak Clean Water Act ("CWA") and state pollution control permits and lack of enforcement result in millions of pounds of pollution entering our waters and have major implications for water quality and overall Bay restoration. By contrast, strong CWA implementation and enforcement leads to efficient pollution reduction and equitable outcomes.

The CWA relies on permits to achieve and maintain water quality standards. The Baltimore City MS4 Permit is an important opportunity to create clear, specific, measurable, and enforceable requirements to reduce municipal stormwater runoff, which accounts for a significant portion of pollution entering our local waters and the Chesapeake Bay. We submit the following comments and recommendations to ensure that this MS4 Permit complies with applicable state and federal laws and protects and restores water quality.[1]

## Summary of Requested Permit Improvements

Below we have summarized some of the specific requests regarding improvements we urge the Department to adopt within the Draft Permit. This summary of the full comments is provided for convenience but should not be interpreted as an exhaustive list of suggested Permit improvements, which are described below in full and are supported by the documents referenced in footnotes and/or attached to these comments.

***Maryland's MS4 permits must require practices that reduce stormwater volume and pollution (Section I).***

- To date, the Total Maximum Daily Load (TMDL) process and the MS4 permits in Maryland have failed to reduce urban stormwater pollution. Data show pollution associated with stormwater worsening in many streams and stormwater loads have increased.
- The Draft MS4 Permits do not meet the strong mandate of CWA Section 117 to ensure that management plans are developed and implemented to achieve and maintain the goals and requirements of the Bay program as affirmed by the Third Circuit's ruling upholding the Bay TMDL.
- We urge the Department to dramatically increase the requirement for stormwater management practices that reduce volume and treat stormwater before it enters our waterways and to prevent additional pollution from stream bank erosion.
- The current practices are not keeping pace with climate change, a growing suburban population, and increased development, and that must be remedied in this Draft Permit.

***The Department should adopt a numeric approach to pollutant loads (Section II).***

- Commenters urge the Department to adopt a numeric approach to reducing pollutant loads to ensure that the MS4 Permit is actually consistent with the Bay TMDL and achieves water quality standards.
- Virginia MS4 permits specify targets for Chesapeake Bay pollutants, calculated precisely to be consistent with the Bay TMDL, and require the permittee to provide a plan for reaching those concrete, pollutant loading reduction goals.
- Public records show that the Department previously planned to take a more metric- and outcome- based approach to meeting the Bay TMDL but removed metrics besides the ISR requirement due to pressure from the regulated community.

[1] Please note that all comments in this letter and the references cited herein are submitted for the administrative record and that all references are immediately available upon request.

***The Impervious Surface Restoration ("ISR") Requirement must remain at least twenty percent to avoid backsliding (Section III).***

- We strongly urge the Department to retain the twenty percent restoration requirement in the previous permit if the ISR requirement is retained as the sole metric of reducing stormwater pollution.
- The CWA National Pollution Discharge Elimination System ("NPDES") is designed to progressively tighten pollution limits until such time as the discharge of pollution is eliminated.
- Reducing the restoration requirement in this MS4 Permit constitutes impermissible backsliding under the CWA.

***The Department should reconsider its reliance on the Maximum Extent Practicable analysis (Section IV).***

- We urge the Department to reject the inadequate MEP analysis it conducted in consultation with the regulated community.
- Further, after the Department determines the amount of ISR that is truly practicable, it must determine what additional ISR is necessary to meet water quality standards.
- If the Department develops an impervious surface restoration requirement beyond the twenty percent standard that we urge the Department to retain, this additional requirement should be based primarily on water quality and environmental analysis with less focus on financial capacity, especially in light of the Department findings in its prior Financial Assurance Plan evaluations that the jurisdictions do possess the capacity to meet the twenty percent standard.
- If the Department insists on retaining its current analysis, we strongly urge the Department to embark on an expansive effort to consult and engage with the public and particularly affected communities to discuss the implications of weakening a permit that represents one of the most important climate adaptation, flood control, and urban water infrastructure policies in the state.
- Moreover, in conducting any economic analysis associated with the renewal of the Permit, we strongly urge the Department to evaluate the fiscal and financial implications of delaying or deferring action to adapt Maryland to climate change, and the financial and social implications of foregoing greater green infrastructure investments in urban areas. We are confident that if the Department truly and holistically considered the full fiscal, financial, social, and environmental costs of weakening this permit it would choose a different course.

***Nutrient trading should not be allowed in MS4 Permits because it undermines protection of local water quality and is contrary to law (Section V).***

- We urge the Department to remove nutrient trading from the MS4 Permit.
- Maryland's nutrient trading in the context of the MS4 Permit is a fundamentally flawed, mathematically unsound program that may prevent Maryland from reaching its TMDL goals and will result in "hot spots" that place yet more burdens on vulnerable communities.

- Maryland's nutrient trading regulations prohibit trading in this context. COMAR 26.08.11.09(D) states that "credits may not be used for the purpose of complying with technology-based effluent limitations."
- The Department appears to be double-counting pollutant reductions, and the trading scheme would increase uncertainty and reduce transparency.
- Trading provisions ignore the substantial benefits to local communities that accompany real, on-the-ground pollution reduction practices and can exacerbate disproportionate impacts of pollution on already vulnerable communities.
- Nutrient and sediment credits do not replace reductions in other pollutants, such as toxic metals, that come with on-the-ground pollution reduction practices.
- The MS4 "trading" provisions will not produce pollutant reductions commensurate with what would have been achieved in their absence – through a more straightforward implementation of the ISR requirement – and thus the provisions represent impermissible backsliding from the prior water quality-based restoration requirements.

***Greater enforceability of the ISR requirement and emphasis on stormwater management are required to make the MS4 Permit consistent with Waste Load Allocations ("WLAs") or TMDLs (Section VI).***

- Although the fact sheet and the Draft MS4 Permit state that the Permit is consistent with the Phase III Watershed Implementation Plan ("WIP") and therefore the Bay TMDL, they do not support the Department's position that the permit requirements are sufficient to implement WLAs.
- The Draft Permit does not actually have specific nutrient pollutant load reductions, but rather only an impervious acre restoration standard, which can be met in a variety of ways, some of which are unrelated to stormwater.
- The lack of enforceability of the ISR requirement, the weakened iterative approach to implementing the ISR, and the fact that the Permit does not actually require stormwater controls, undermine the Department's conclusory statements that the Permit is consistent with the Bay TMDL. The Department must strengthen each of these aspects of the Permit for it to be consistent with stormwater WLAs.
- The Draft Permit does not actually require any stormwater or volumetric controls and creates no requirement or incentive to prioritize the most beneficial retentive practices that achieve water quantity control as well as water quality benefits.
- The Department must require permittees to be accountable for meeting benchmarks, not merely demonstrating progress toward meeting benchmarks, given that those benchmarks were purportedly designed to assess progress toward the ISR requirement or WLAs.
- The Department must return to the prior standard for when the permittee must make program modifications and add language specifying a standard for such modifications to achieve. We offer specific suggested edits below.
- We urge the Department to create a hierarchy of practices with a minimum for the most beneficial best management practices that actually reduce stormwater volume.

***The Draft Permit must be revised so that it does not rely on permittee self-regulation (Section VII).***

- Several aspects of the Draft MS4 Permit amount to impermissible self-regulation

- The benchmark framework and program modification provisions for implementing the ISR requirement fail to include sufficient Department oversight.
- The Draft Permit relies entirely on the permittee's own discretion to ensure consistency with applicable WLAs (including stormwater WLAs even though a permittee can choose to comply with the permit without installing any stormwater BMPs at all).
- The Illicit Discharge Detection and Elimination (IDDE) Program includes language that is insufficiently precise to assure proper compliance with the CWA.
- "Significant discharges" need to be defined or each permittee will establish a different definition or none at all.
- "Equivalent" county water quality analyses should not be allowed without further direction or guidance from the Department on what would constitute an "equivalent" analysis.

***The Draft Permit should actually account for growth as it claims to do (Section VIII).***

- The Chesapeake Bay TMDL includes the fundamental expectation that states account for future pollution growth as they work to reduce pollution from existing sources.
- The Draft Permit asserts that additional loads will be offset through Maryland's Aligning for Growth policies and procedures as articulated through Chesapeake Bay milestone achievement. However, Maryland has failed to adopt an Aligning for Growth policy or to develop WIPs consistent with EPA expectations with respect to accounting for pollution growth.
- Unless a thoughtful accounting for growth policy is adopted, this Draft Permit cannot have policies in place to deal with pollution from new or expanding sources.
- We strongly urge the Department to comment on the development of the accounting for growth policies and, if a deadline for policy adoption is not sufficiently soon, we recommend the final Permit contain new growth offset provisions.

***The Draft Permit must adequately account for climate change (Section IX).***

- We urge the Department to strengthen numeric storm design standards to account for changed precipitation conditions.
- Recent studies and the Phase III WIP make it clear that the effluent limitations, BMPs, and, by reference, storm design standards contained in the proposed Permit are likely under designed and must be reviewed by the Department to determine whether these practices and standards will perform as necessary in light of more-recently historic and projected precipitation intensity, duration, and frequency data.
- We urge the Department to limit credit eligibility for BMPs exposed to flooding.
- We strongly urge the Department to deny ISR credits for new, proposed BMPs that would be located in a FEMA flood zone (areas not determined to be an area of minimal flood hazard), in areas subject to potential inundation by storm surge from a Category 1 or 2 hurricane, and areas projected to be at risk of inundation from storm surge when sea levels increase by two feet or less.
- We urge the Department to consider climate impacts and changed meteorological conditions in designing provisions and requirements for technology-based effluent limitations.

- We urge the Department to consider revisions to the Draft Permit and future modifications to the reissued permit to account for forthcoming studies and planning processes.

***The Draft Permit must address the disproportionate impacts of stormwater (Section X).***

- We urge the Department to include provisions in this permit to eliminate the harmful impacts of polluted runoff, address infrastructure inadequacies, and equalize the distribution of benefits from restoration efforts.
- We urge the Department to incorporate actual stormwater restoration and not hollow efforts such as street sweeping that cannot reduce stormwater flow volumes at a rate sufficient to protect residents and their homes.
- We urge the Department to require permittees to include all affected communities in permit implementation through robust and inclusive public outreach efforts.
- We urge the Department to recognize and implement the Biden Administration's policy emphasis on addressing environmental justice inequalities.

## I. Maryland's MS4 Permits Have Failed to Reduce Urban Stormwater Pollution.

To date, the TMDL process and the MS4 Permits in Maryland have failed to make reductions in urban stormwater pollution. In fact, stormwater loads have increased. Specifically, between 2009 and 2019, the loads of nitrogen, phosphorus, and sediment delivered to the tidal Bay via urban stormwater runoff increased by 2 to 5 percent. This was explored in detail in a recent report by the Environmental Integrity Project, which is attached to these comments (**Appendix A**).[2] Maryland Counties have invested in a variety of stormwater reduction strategies, and these have had some impact, but progress has been more than offset by new growth in developed land, which increased by over 6 percent between 2009 and 2019.

An increase in the level of regulatory effort is required where a source of pollution is growing when it should be declining. Yet in Maryland we see the opposite. Maryland's Phase III Watershed Implementation Plan ("WIP") revised the 2025 targets - the stormwater loads that Maryland hopes to achieve by 2025. The new targets are 20 to 40 percent higher than the previous Phase II targets, meaning that Maryland is now planning to accept 20 to 40 percent more pollution than it was willing to accept a few years ago. The following table summarizes the change in target loads between the two WIPs. As a point of comparison, we also provide the same estimates for Virginia, where planning targets have become more stringent.

[2] Environmental Integrity Project, *Stormwater Backup in the Chesapeake Region* (Aug. 17, 2020), https://environmentalintegrity.org/wp-content/uploads/2020/08/EIP-Bay-Stormwater-and-Climate-Change-Report-8.17.2020.pdf. (**Appendix A**).

**Table 1**: **Stormwater pollution targets for 2025 in Phase II and Phase III WIPs (millions of Edge of Tide (EOT) pounds from the "developed" sector).**[3]

| | Maryland | | | Virginia | | |
|---|---|---|---|---|---|---|
| | Phase II WIP | Phase III WIP | change | Phase II WIP | Phase III WIP | change |
| Nitrogen | 7.8 | 9.3 | +19% | 10.3 | 9.7 | -6% |
| Phosphorus | 0.48 | 0.66 | +37% | 1.24 | 1.19 | -4% |
| Sediment | 289 | 394 | +36% | 514 | 476 | -7% |

As discussed in detail in the attached EIP report, the Phase III WIP targets for nitrogen and sediment are even higher than the TMDL baseline loads from 2009. This is a stunning policy failure. The Bay TMDL is a groundbreaking pollution reduction program, yet the nitrogen and sediment loads from developed land in Maryland will be higher at the end of the TMDL than they were at the beginning.

The Phase III WIP clearly shows Maryland backsliding on its stormwater reduction plans. As discussed in detail in this comment letter, the MS4 Permits are in keeping with the Phase III WIP by relaxing the ISR requirements. According to CAST, where the Department was once assuming 30,000 acres of restored impervious surface by 2025, the Department is now planning for just 199 acres.[4]

Another explanation for the increase in stormwater loads in Maryland is the failure of previous generations of MS4 permits to require green infrastructure and other structural BMPs to control stormwater. The unfettered discretion given to regulated jurisdictions to allow compliance through measures that do not actually address the source of stormwater pollution undermines the purpose of the Permit. If Maryland is to make the required progress under the CWA it must create a MS4 Permit that actually requires compliance obligations to come from structural controls that will reduce stormwater volume. The Permit's BMP prioritization and requirements "must reflect the fact that achieving the necessary pollutant load reduction for nutrients and sediments can only be accomplished with restoration of altered hydrology through the reduction of effective impervious areas."[5]

The Department has the authority to issue a stronger and more enforceable MS4 Permit. Indeed, compared to some MS4 Permits elsewhere in the country, Maryland's MS4 Permits are less detailed, less robust, and do less to actually reduce pollution. See, for example, Appendix C, which highlights the robust elements of two MS4 Permits on the West Coast as compared to this

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[3] Data from Chesapeake Assessment Scenario Tool (CAST, https://cast.chesapeakebay.net/), version CAST-2019, scenarios "2025 WIP2" and "WIP 3 Official Version."
[4] CAST-2019, BMP Summary Report.
[5] Dr. Robert Roseen, Expert Report Concerns Regarding The Draft 2020 MS4 Permits ("Dr. Roseen's Report") (Jan. 20, 2021) (attached as **Appendix B**).

Draft Permit.[6] We submit this comparison as an example of what can be done, and urge the Department to take seriously the opportunity to create an MS4 Permit that will truly protect our waterways.

Not strengthening the Draft Permit to ensure water quality is actually improved and protected undermines the strong Congressional mandate in Section 117 (g)(1) of the CWA that "[t]he Administrator, in coordination with other members of the Chesapeake Bay Executive Council ***shall ensure*** that management plans are developed and implementation is begun by the signatories to the Bay Agreement to achieve and maintain… (A) the nutrient goals of the Bay agreement for the quantity of nitrogen and phosphorus entering the Chesapeake Bay and its watershed.[7]

The Baltimore City MS4 Permit is crucial to restoring and preserving water quality in the Baltimore region. The Permit impacts water bodies such as the Jones Falls, Gwynns Falls, and Tidal Patapsco - the health of which is vital to local ecosystems, community, and economy. Nonprofit organizations have been working alongside local and state governments for over a decade to curb the unrelenting pollution coming from our built environment. Despite the significant effort and financial investment, we are not seeing the type of water quality improvement we can and should expect if a successful MS4 Permit reduced sufficient stormwater flowing across our streets and into our streams. Stormwater pollution impacts local residents in a myriad of ways including increasing flooding events and exacerbating sewage overflows. Unfortunately this is unsurprising, given that Baltimore City has been allowed to rely heavily on alternative practices such as street sweeping that do nothing to mitigate the flow and volume of stormwater. It is imperative that this iteration of the MS4 Permit address and reduce the flow of stormwater, particularly as we know precipitation is steadily increasing with climate change.

The sheer volume of stormwater that the City receives during storm events is overwhelming residents in its most vulnerable communities. In the Ednor-Gardens/Lakeside community, residents have suffered unprecedented levels of flooding following storm events. Most notably, a recent storm resulted in 4-5 feet of floodwaters filling the community, overwhelming an MTA bus with passengers on board.[8] Residents report experiencing these flood events for decades, with documentation showing extreme flooding in the area as far back as 1957. This flooding has resulted in property damage to homes and vehicles, and in one instance, a flood event left a woman trapped in her car. Residents have been told by Baltimore City DPW officials that small receiving pipes in the stormwater system are to blame for the extreme flooding events, and that is where the storm sewer infrastructure exists. The EPA's EJSCREEN tool indicates that the Ednor Gardens/Lakeside community has a population that is 87% minority and 25% elderly,[9] placing it in the 80th and 91st percentile respectively, for the state of Maryland.[10] The area also registers in

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[6] Dr. Richard Horner, Table Comparison of Three MS4 Permits (Dec. 7, 2020) (attached as **Appendix C**).
[7] 33 U.S.C. 1267(g)(1). *See also Am. Farm Bureau Fed'n v. EPA* 792 F.3d. 281, 308 (3d. Cir. 2016) (emphasis added).
[8] Kelsey Kushner, *Maryland Weather: MTA Bus Caught In Floodwater In NE Baltimore With Passengers On Board*, CBS BALTIMORE (July 22, 2020, 11:30 PM) https://baltimore.cbslocal.com/2020/07/22/maryland-weather-bus-caught-in-floodwater-northeast-baltimore/.
[9] Over 64 years of age.
[10] EJSCREEN Report (attached as **Appendix G**).

the 80th percentile or higher in U.S. Environmental Protection Agency (EPA) Region 3 for 10 out of 11 EJSCREEN EJ indices.[11]

The City's failure to properly manage its stormwater infrastructure places the financial burden on residents to recover from damage caused by urban flooding events. For low-income residents this is an increasingly implausible feat. Inefficient stormwater management puts the lives of Baltimore's most vulnerable residents at risk. Such a disservice is in direct contravention to the overtures the Department and the State have made regarding environmental justice as well as clear policy goals of the Biden Administration.[12]

**Importantly, data show that water quality is not improving as a result of the MS4 regime in Baltimore City and County.** Blue Water Baltimore ("BWB") conducts a long-term water quality monitoring effort that is regionally renowned as the most robust and scientifically rigorous non-governmental monitoring program in the Chesapeake region. The data are used by academic researchers, regulators, policy-makers, and Baltimore-area residents for a variety of purposes ranging from pollution modelling to making informed decisions about how and when to recreate in local waterways. The Baltimore Harbor Waterkeeper, a program of Blue Water Baltimore, began collecting bacteria data in the Inner Harbor in 2009 and expanded the suite of parameters in 2013. BWB now routinely collects scientifically rigorous water quality data for a full suite of parameters[13] at 49 stations throughout Baltimore City and County including the Jones Falls and Gwynns Falls watersheds, as well as the tidal Patapsco River and the tributaries that feed into it.[14] The parameters associated with stormwater in BWB's monitoring program were certified as "Tier II" by the U.S. EPA's Chesapeake Bay Program, allowing the data to be used to inform state, regional, and federal decision-making on water quality issues.

The 7-10 years of high-quality data for each site that BWB monitors in Baltimore City and County provides a dataset robust enough to track progress towards meeting water quality goals in state and federally issued permits, including the MS4 Permit. In April 2020, BWB conducted a statistical trends analysis on each of the 49 water quality monitoring stations. A simple linear regression analysis was performed on every water quality parameter at each monitoring site. Data was parsed by "wet" and "dry" weather to account for any influence by precipitation.[15] Based upon this analysis, statistically significant trends were identified where p-values were less than 0.05, and trends were categorized as "improving" or "worsening" over time based upon the coefficient variable of the resulting equation.

There were several key findings from BWB's data analyses. First, there were improving trends in *Enterococcus* bacteria at 34 of the 49 monitoring stations over a 7-10 year time frame. While we

[11] The area is in the 77th percentile of the EJ Index for wastewater discharge indicator, all other indices register in the 84th percentile or higher for 0.3 mile radius around the identified community. EJSCREEN Report Attachment.
[12] *See generally* Climate 21 Project Transition Memo *available at* https://climate21.org/documents/C21_Summary.pdf and https://climate21.org/documents/C21_EPA.pdf.
[13] With instrumentation, BWB collects readings for water temperature, pH, salinity, conductivity, water clarity, and dissolved oxygen. All water chemistry analyses (i.e. bacteria, nutrient, and chlorophyll a concentrations) are performed by an independent A2LA-certified laboratory.
[14] *See* Baltimore Water Watch, BLUE WATER BALTIMORE, https://baltimorewaterwatch.org/ (last visited Jan. 15, 2021).
[15] Wet weather is defined as the 48-hour period following rainfall of at least 0.5 inches, as recorded by the Maryland Science Center NWS station.

cannot definitively say why bacteria levels are improving, the trend could indicate that sewer replacement and relining projects are working to reduce the amount of sewage flowing into our waterways.

Unfortunately, the story is much different for stormwater. **For parameters associated with polluted stormwater runoff, BWB found statistically significant *worsening* trends at many stream stations.[16] In fact, 23 of the 27 nontidal stations (85%) are showing at least one worsening trend for Total Nitrogen (mg/L), Total Phosphorus (mg/L), Conductivity (uS/cm), or Turbidity (NTU) across all weather types over a 7-year time period**. Conversely, only one station is showing a statistically significant improvement for a single measurement of water health. The long-term trends for the 27 nontidal stations in the Gwynns Falls and Jones Falls streams are summarized in Table 2 below.

**Table 2**: **Summary of Blue Water Baltimore Statistical Analysis on Trends of Water Quality Parameters Associated with Stormwater at 27 nontidal monitoring stations in the Gwynns Falls and Jones Falls streams from 2013 to 2019.[17]**

| | **Worsening** | **Improving** | **No Change** |
|---|---|---|---|
| Total Nitrogen | 14 | 0 | 13 |
| Total Phosphorus | 6 | 1 | 20 |
| Conductivity | 11 | 0 | 16 |
| Turbidity | 7 | 0 | 20 |

Even at sites where key stormwater-related water quality metrics are not worsening over time, they also are not improving -- they are staying the same, showing no significant change in either direction. The conclusion is clear: while we are making progress in our efforts to curb the impacts of sewage pollution in Baltimore City and County, we are missing the mark in our regional approach to stormwater. This dataset covers the previous MS4 Permit term. If practices such as street sweeping, which made up most of Baltimore City's previous MS4 Permit, were a viable solution for reducing nitrogen, phosphorus, and sediment, then we should be seeing in-stream improvements in these water parameters. Simply put, we are not. These practices were not sufficient for the past permit term and they are not sufficient now.

The current practices are not keeping pace with climate change, a growing suburban population, and increased development. BWB's data underscores that we must dramatically increase meaningful stormwater management requirements that reduce stormwater volumes and treat stormwater before it enters our waterways.

[16] *See* Blue Water Baltimore presentation "An Afternoon with your Waterkeeper" (Apr. 2020), *available at* https://zoom.us/rec/play/vZUvI7_8_2k3H9SWtgSDUKB6W9W-Kvis0HVIrKcLmEmwASYEYAKhY-FEY-Re6Re9ZKk6cdy95QjkOymQ?startTime=1587585492000&_x_zm_rtaid=eCI5mJGlTZ2ee1AkyPrI9w.1587734087954.ce5727585e02a14f90dba4ba39ebb932&_x_zm_rhtaid=193

[17] Note that Blue Water Baltimore previously submitted its full water quality full data sets to Maryland Department of Environment. Additionally we attach as **Appendix H** maps to illustrate for each station the worsening, improving, or no change results from the regression analysis that Blue Water Baltimore performed.

## II. The Department Should Adopt a Numeric Approach to Reduce Pollutant Loads to Ensure that the MS4 Permit is Consistent with Local TMDLs and the Bay TMDL.

**Commenters urge the Department to adopt a numeric, concrete approach similar to that adopted by Virginia for implementing the Bay TMDL.** Though Commenters have recommended improvements to the ISR requirement throughout this letter, we continue to support a clearer, more enforceable, and more results-driven approach to permit requirements to meet WLAs that does not rely exclusively on ISR. Rather than taking a conclusory approach that relies on multiple levels of assumptions (stormwater practices will be undertaken, permittee will follow the benchmark schedule, permittee will appropriately modify its approach if its practices are noncompliant),[18] Maryland should adopt an approach similar to Virginia's, which specifies targets and then requires the permittee to provide a plan for reaching those concrete, pollutant loading reduction goals. We note that the Department had considered moving toward adopting such an approach early in the Permit renewal process, but apparently abandoned this approach after concerted pushback from the regulated community.[19] **We urge the Department to return the Permit to this prior posture which is both more rational and consistent with the letter and spirit of the CWA.**

**We also note that for purposes of remaining consistent with the Bay TMDL, the Biden Administration has flagged EPA's previous evaluation of the Maryland Phase III WIP as one of the items to be reviewed for consistency with President Biden's new Executive Order "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis."**[20]

The Virginia MS4 Permits include First Permit Cycle Required Reductions in Loading Rates, calculated in lbs/acre/year for each pollutant of concern from the Bay TMDL:

> "No later than 24-months after the effective date of this permit, the permittee shall develop and submit to the Department for its review and acceptance an approvable phased Chesapeake Bay TMDL Action Plan that includes: . . .
>
> > (e) A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing Table 2 by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate."[21]

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[18] *See* Section VI of this comment letter for further discussion of the weaknesses of the Draft Permit with respect to these assumptions.

[19] See the documents provided via Google Drive link including all responsive documents from the Public Information Act request to Baltimore City Department of Public Works at BC 0000076.

[20] Biden-Harris Transition. *Press Releases Fact Sheet: List Of Agency Actions For Review. Actions Address the COVID-19 Pandemic, Provide Economic Relief, Tackle Climate Change, and Advance Racial Equity* (Jan. 20, 2021), *available at* https://buildbackbetter.gov/press-releases/fact-sheet-list-of-agency-actions-for-review/.

[21] *See, e.g*, MS4 Permit No. VA0088579, Arlington County, 24–25 (June 26, 2013), *available at* https://environment.arlingtonva.us/wp-content/uploads/sites/13/2013/10/MS4-Permit.pdf; MS4 Permit No. VA0088587, Fairfax County, 24–25 (April 1, 2015), *available at* https://www.fairfaxcounty.gov/publicworks/sites/publicworks/files/assets/documents/pdf/reports/ms4/va0088587-fairfax-permit.pdf.

Table 2 in the Virginia MS4 Permits is a "Calculation Sheet for Determining Total POC Reductions Required During this Permit Cycle for the Potomac River Basin" (based on Chesapeake Bay Program Watershed Model Phase 5.3.2) and it provides a required reduction in loading rate for the first permit cycle. The reduction is given in pounds per acre per year, for nitrogen, phosphorus, and total suspended solids, for both regulated urban impervious and regulated urban pervious surfaces. The calculation sheet requires the permittee to input the Total Existing Acres Served by the MS4, which it then uses to calculate the Total Reduction Required During First Permit Cycle in pounds per year. This approach is much simpler than Maryland's ISR requirement because it simply allocates each jurisdiction a share of pollution to ensure it will meet the Bay TMDL WLA through compliance with the permit. **In contrast to the Virginia MS4 Permits, which are calculated precisely to be consistent with the Bay TMDL, Maryland's approach relies on an ISR requirement backed by conclusory statements and implemented by unenforceable standards.**

The Department appears to have considered metrics for Bay pollutants to include in these MS4 permits, to ensure significant progress toward Chesapeake Bay restoration and local water quality priorities, rather than relying solely on the ISR requirement. In a two-page document titled "Maryland Department of the Environment Municipal Separate Storm Sewer System (MS4) Permit Stormwater Restoration Accounting Principles," dated April 10, 2019, the Department outlined three "surrogate restoration metrics" to be included in the reissued MS4 permits: 1) an impervious acre metric to ensure the continued implementation of upland BMPs; 2) a total nitrogen (TN) metric to ensure significant progress toward Chesapeake Bay restoration; and 3) total suspended solids (TSS) or other locally chosen metrics to ensure progress toward local water quality priorities.[22] Including a separate metric for upland stormwater management BMPs would have ensured a certain level of implementation of these BMPs, as opposed to the Draft Permit, which includes no minimum stormwater management BMPs. The TN metric accounts for other BMPs that may impact Bay nutrients and sediments and the TSS metric focuses on improving local water quality through removal of TSS and associated pollutants.

Commenters find the use of these three surrogate restoration metrics preferable to the exclusive reliance on the ISR requirement, as this approach would be more consistent with the spirit and letter of the CWA and with the findings of two independent experts, Dr. Richard Horner and Dr. Robert Roseen. Dr. Richard R. Horner, an expert in stormwater management, reviewed the Draft Permit and the 2020 Accounting Guidance and assessed their adequacy with respect to protecting and recovering the Chesapeake Bay ecosystem. Dr. Horner produced a report, *Assessment of Maryland's Municipal Separate Storm Sewer System Discharge Permits and Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated*, summarizing his findings.[23] Dr. Robert Roseen, an expert in water resources engineering and stormwater management, reviewed the Permit, reports and data from the Chesapeake Bay Program, the Gwynns Falls TMDL, and the Bay TMDL loading report, among other materials, to evaluate the effectiveness of the permits, as summarized in his expert report (**Appendix B**).[24] Both experts concluded that

[22] Maryland Department of the Environment, MS4 Permit Stormwater Restoration Accounting Principles (April 10, 2019) (included via Google Drive link provided with these Comments, see pp. BC 0000664–665).
[23] Dr. Richard R. Horner, *Assessment of Maryland's Municipal Separate Storm Sewer System Discharge Permits and Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated* (Jan. 19, 2021) ("Dr. Horner's Report") (**Appendix D**).
[24] Appendix B, Dr. Roseen's Report, at 1, 2.

an ISR surrogate alone would be insufficient to reduce stormwater pollution to ensure adequate water quality protection.[25]

## III. The New Impervious Surface Restoration Requirement Constitutes Impermissible Backsliding and Must be at Least Twenty Percent.

The CWA is designed to continually reduce pollution over time. The "national goal" of the Act is that "the discharge of pollutants into the navigable waters be eliminated."[26] Thus, for permits that are not designed to achieve zero discharge of pollutants, the CWA envisions, among other things, water-quality based limits designed to ensure consistency with water quality standards and the "interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation."[27] In short, authorities issuing permits under the CWA's National Pollutant Discharge ***Elimination*** System must progressively tighten pollution limits until such time as the discharge of pollution is eliminated. This goal, passed nearly unanimously by Congress, is given effect through several provisions of the CWA and its implementing regulations, notably including the "anti-backsliding" provisions that generally serve to ensure that permits are continually improved and not weakened on the path toward eliminating pollution.[28] As drafted, the new ISR standard constitutes impermissible backsliding under the statute.

As stated by the Maryland Court of Appeals, the "twenty percent restoration requirement" expressed in the expired MS4 Permits was a water quality-based effluent limitation.[29] In issuing the previous permit, the Department stated that "fourth generation" MS4 Permits represented "another step ***forward***" for stormwater management, notably "increasing the impervious area treatment goal."[30] Not only has this Permit not continued the trend of gradually improving MS4 Permits in each subsequent generation,[31] it has instead proposed a rollback of this important water quality-based effluent limitation by eliminating the "twenty percent restoration requirement" and introducing a new lower ISR standard. Notably, the new lower standard was based not on an analysis of impacts to water quality standards or on WLA attainment of relevant TMDLs, but instead based on a dialogue with the regulated entities about how much they think they should have to spend on impervious restoration activities as discussed further below. And based on a review of public records associated with the Draft Permit development process obtained via a Public Information Act request, it is clear that the Department at least began the Permit renewal process with a guiding principle to "maintain impervious area restoration", a

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[25] *See* Appendix B, Dr. Roseen's Report, at 4, 19; Appendix D, Dr. Horner's Report, at 11.
[26] 33 USC §1251(a)(1).
[27] 33 USC §1252(a)(2).
[28] 33 USC §1342(o).
[29] *See Md. Dep't of the Env't v. Cty. Comm'rs of Carroll Cty.*, 214 A.3d 61, 100 (Md. 2019).
[30] *See, e.g.*, Baltimore County Fact Sheet, 11-DP-3317, MD0068314, 11 (emphasis added.).
[31] Each jurisdiction has a different number of impervious acres required to be restored and only the number of acres in Baltimore City's proposed permit is arguably greater than what would be required under a continuation of the twenty percent restoration standard. The 2,998 acres, 2,696 acres, and 1,814 acres proposed for Anne Arundel, Baltimore, and Montgomery counties, respectively, are 40%, 55%, and 46% smaller than the acreage required to be restored in the previous permits. Without knowing the new baseline of impervious acreage for each county, it is not possible to specify exactly what percentage of each jurisdiction's impervious surfaces are required to be restored under the proposed permits, but except for possibly Baltimore City, each jurisdiction is required to restore far less than 20%, even using a conservative adjustment to the baseline based on impervious restoration work completed during the previous permit term.

principle discussed in the context of the Department's understanding of the Clean Water Act prohibition against backsliding.[32] Additional records provided in response to this request that were generated at a later date detail how the Department acquiesced to the demands of the regulated MS4 jurisdictions to strike the twenty percent restoration requirement and follow an "MEP-driven" approach.[33]

In issuing the prior Permit, the Department indicated that "twenty percent impervious restoration" would be needed to make "adequate progress toward meeting water quality standards."[34] In its response to comments submitted along with one of the permits, the Department indicated that "compliance with the permit will result in a reduction of pollutant discharges from the County's storm drain system and a framework for achieving WQS."[35] **However, since the issuance of the Permit, the Chesapeake Bay Model, and local water quality monitoring have all established that not only are water quality standards not being met, but that stormwater pollution continues to *increase* overall statewide and in many urban locations**. EPA has also warned the Department in the past that it might formally object to the issuance of MS4 permits in Maryland due to backsliding concerns, based on permit conditions far less important than the twenty percent restoration requirement.[36] It is both illogical and legally impermissible to ***lower*** the ISR standard rather than maintaining or increasing it. The Permit requires the completion of 3,696 acres of impervious surface restoration, which is less than the 4,291 acres required to be restored for the expired permit.[37]

Further, the Department has repeatedly emphasized the importance of "adaptive management" and making "iterative progress" in implementing MS4 programs and TMDLs more broadly. All relevant data and information since the final determination was made to issue the previous permit indicates that ***more*** stormwater management BMPs, not fewer, are needed.

Commenters **strongly urge the Department, at a minimum, to retain the "twenty percent restoration requirement**" in the previous permit.[38] We note that if short-term flexibility is desired to be responsive to fiscal pressures associated with the COVID-19 crisis, there are appropriate ways of handling this challenge, both through Permit provisions and administrative actions. It is not appropriate, however, to codify short-term fiscal decisions into a Permit that will be in effect for at least five years (and likely longer if history is a guide).

## IV. The Department Should Reconsider Reliance on the Maximum Extent Practicable Analysis.

We are generally concerned that the primary analysis the Department conducted to determine the level of pollution control for the Permits was its MEP analysis developed in consultation with the

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32 See the Google Drive link including all responsive documents from the Public Information Act request to Baltimore City Department of Public Works at BC 0000033.
33 *Id* at BC 0000018; BC 0000769.
34 Draft Permit, Part V.C.2.d; Part III.
35 *See, e.g.,* Basis for Final Determination to Issue Howard County's National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit 11-DP-3318, MD0068322, 3 (Dec. 2014).
36 EPA, Specific Objection to Carroll County Phase I MS4 Permit MD0068331, 3–4 (September 20, 2012).
37 Maryland Department of the Environment, Annual Report on Financial Assurance Plans and the Watershed Protection and Restoration Program, 30 (2019).
38 Maryland Department Of The Environment, Municipal Separate Storm Sewer System Discharge Permit, Part V.C.2.d.

Environmental Finance Center and the regulated jurisdictions.[39] Besides the obvious procedural problem of asking a regulated entity how much regulation it would like to be subject to, we note that this fiscal analysis has been particularly opaque and raises significant concerns for the Commenters, especially when it appears to be undertaken with greater focus and attention than any analysis of water quality or environmental impacts. As an initial matter, we are confused about the purpose of the Department's MEP analysis.

The reason the water quality-based effluent limits are additive to the MEP programs is because the technology-based MEP standard may not be able to assure compliance with water quality standards .[40]

The Maryland Court of Appeals recently noted that the CWA "authorizes permitting agencies to include water quality based effluent limitations in MS4 permits ***without reference to the MEP standard***."[41] The Court of Appeals noted that the MEP standard is "analogous to a technology based effluent limitation" while the ISR standard was, at least in the prior permit, "a water quality based control," which "is a program ***in addition to the MEP level programs***."[42] The MEP standard represents the minimum amount of pollution reduction that the Department must require. If additional reductions are needed to meet water quality standards, including through TMDL implementation, then the Department must impose additional pollution reduction requirements, which could take the form of an additional ISR requirement. Given that the Department just finished defending its MS4 permit before the Court of Appeals on this basis, it is surprising, irrational, and counter to the Court's holding to now claim that the MEP standard controls and constrains the Department's water quality-based ISR condition in the Permit.

This issue is not merely legal quibbling or a distinction without a difference. The Department is seeking to significantly roll back the most important provision in the next generation of its MS4 permit and one of the most important state policies expressed in the Phase II WIP, and it is doing so based upon a misunderstanding of the MEP standard. If the ISR standard is allowed to be governed by the MEP analysis then the Department can rationalize its cost-cutting approach to addressing stormwater pollution and disconnect the ISR standard from the goal of the CWA,

[39] Commenters submitted Public Information Act requests to the Department and to various permittees seeking more information on how the Department was defining "maximum extent practicable." Although the Department explicitly refused to fulfill those requests prior to the deadline for these public comments (see **Appendix I**), and Baltimore County never responded at all, Baltimore City did fulfill the request. The public records provided in fulfillment of the request to the City detailed the collaboration between the Department, the Environmental Finance Center, and the regulated entities. We have submitted copies of that PIA fulfillment via Google Drive link with the submission of these comments.

[40] The legislative history of those amendments confirmed this, stating: "With respect to municipal separate stormwater discharges, the conference substitute temporarily prohibits the Environmental Protection Agency and States from requiring permits for certain municipal separate storm sewers for discharges composed entirely of stormwater, in order to provide a sufficient period of time to develop and implement methods for managing and controlling discharges from municipal storm sewers. The relief afforded by this provision extends to October 1, 1992. After that date, all municipal separate storm sewers are subject to the requirements of sections 301 and 402. H.R. Rep. No. 99-1004, at 38 (1987), *reprinted in* 1987 U.S.C.C.A.N. 5, 38. *See also Bldg. Indus. Ass'n of San Diego Cnty. v. State Water Res. Control Bd.,* 124 Cal. App. 4th 866, 880 (Cal. Ct. App. 2004) (rejecting arguments that "under federal law the 'maximum extent practicable' standard is the 'exclusive' measure that may be applied to municipal storm sewer discharges and [that] a regulatory agency may not require a Municipality to comply with a state water quality standard if the required controls exceed a 'maximum extent practicable' standard").

[41] *Md. Dep't of the Env't v. Cty. Comm'rs of Carroll Cty*, 214 A.3d 61, 94 (Md. 2019) (emphasis added).

[42] *Id.* at 87 (emphasis added).

Maryland's water pollution control laws, the WIP, and community efforts to restore water quality.

The rationale for ignoring or repudiating the interpretation of the MEP standard, as defended by the Department's lawyers and subsequently expressed by the Court of Appeals, appears evident in a review of documents obtained by Commenters via Public Information Act. Some documents from 2017 or 2018 included in the PIA response show that the regulated jurisdictions expressed a strong desire from the very beginning of the permit renewal process for this Permit to adopt a new approach in which the restoration requirement would be constrained by the MEP standard, despite the legally questionable grounds for doing so. Indeed, several records provided in the PIA response include presentations and other documents produced by lawyers representing the regulated community and other staff of MS4 jurisdictions that argue for this alternative and constrained interpretation of the MEP standard that only months later was reversed by the Court of Appeals.

Nevertheless, the PIA response documents detail how the Department chose to proceed with an approach consistent with this flawed interpretation of the MEP standard ***even after*** the Court of Appeals confirmed and clarified the appropriate interpretation of the law that directly conflicted with their prior view of the law that the MEP standard governs the permissible scope of water quality-based effluent limitations. In this way, the Department is proceeding in this Permit against its own prior interpretation of the law as well as the holding of the Maryland Court of Appeals in favor of an approach that has been pushed by the regulated community for several years. This represents a perversion of the permit writing process and is contrary to the Department's mission and statutory charge, which is to carry out the Clean Water Act, Maryland's water pollution control statute, and other state law through permits consistent with these laws.

We are not only concerned about the process the Department used to give effect to the MEP standard, but also the effect of that process. In reviewing the documents obtained via PIA, we were highly discouraged to see that various alternative permit conditions proposed by the Department at various points over the last four years that would have been more scientifically rigorous and protective of water quality were ultimately cast aside based on the objections of the regulated community and its desire for an "MEP-driven" Permit. It is unacceptable that the Department has allowed the tail to wag the dog. **Once again, we call on the Department to reinstate more protective provisions found in earlier versions of the Draft Permit that are consistent with the law and not limited by the MEP standard, especially where the standard serves to diminish the primary effluent limitation in the permit and opportunity to protect water quality.**

There are practical implications of this legal wrangling over the MEP standard. Lawyers representing municipalities seeking a small-budget MS4 program argue that an MS4 permit not "driven" or limited by the maximum extent ***practicable*** standard is necessarily ***impracticable***. This is an absurd proposition. The Department, EPA, and other permitting authorities around the country have issued millions of Clean Water Act permits, almost all of which were not subject to the MEP standard. The Department is capable and fully authorized to issue a permit that is both protective of water quality and practicable to implement, whether or not it conducts an MEP analysis. This is the reasonable approach and understanding of the Department's duty in issuing this Permit, and we are calling on the Department to do that now.

The Department is also not heeding a warning from EPA, which requested in a letter that was referenced by the Court of Appeals that the Department remove "the use of the phrase 'maximum extent practicable' or 'MEP' for several reasons: it is imprecise in its interpretation and thus makes enforcing the terms of the permit more difficult; it could lead to backsliding; and it rightfully is a determination to be made by the permitting authority in the permit's terms."[43]

Commenters are strongly opposed to the premise behind this MEP analysis the Department recently conducted. Under its organic statute, the Department "is responsible for the ***environmental interests*** of the people of the State."[44] The Department is also charged with implementing the policy of the state to "improve, conserve, and manage the quality of the waters of this State"[45] as well as carrying out the CWA's objective to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[46] It is therefore confusing and disconcerting to see Maryland's agency tasked with protecting our environmental interests relying so extensively on fiscal considerations to devise the principal pollution reduction condition in the MS4 permit, especially when such analysis is used to roll back a critical protection for water quality, public health, and climate resilience.[47]

It is neither within the Commenters' nor the Department's area of expertise to conduct fiscal analysis or make judgments about how much of a jurisdiction's budget should be devoted to stormwater management. After all, as the MS4 Permit rightly points out "[l]ack of funding does not constitute a justification for noncompliance with the terms of this permit."[48]

The Maryland General Assembly recently spoke to the need to provide adequate funding to support implementation of the ISR provision that is critical to meet the state's water quality goals for the Chesapeake Bay and urban waterways. In amending the law to provide more flexibility for jurisdictions regarding ***how*** they pay for stormwater permit implementation, Chapter 151 of 2015 nevertheless established an elaborate framework for ensuring that such funds ***would indeed be raised*** in order to meet the significant needs for reducing stormwater pollution in Maryland. The legislature in no way expressed a desire to retreat on the state's efforts to curb polluted urban runoff, reduce flooding, or begin adapting the state to the impacts of climate change. To the contrary, Chapter 151 required the Department to periodically report on the financial capacity

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[43] EPA, Specific Objection to Carroll County Phase I MS4 Permit MD0068331, 3–4 (September 20, 2012).
[44] Md. ENVIRONMENT Code Ann. § 1-402(b)(4) (emphasis added).
[45] Md. ENVIRONMENT Code Ann. § 9-302(b)(1).
[46] 33 U.S.C. § 1251(a).
[47] Commenters note that a document provided in response to a Public Information Act request to Baltimore City describes how the MEP analysis would "drive the development of a portfolio of planned projects to be implemented across the five years of the permit term. That portfolio of planned projects would, in turn, translate into specific metrics ... for (1) impervious area treatment, (2) reduction in total nitrogen, and (3) local water quality improvement that would reflect
progress toward local TMDLs (such as sediment reduction) or other goals as proposed by the permittee." (Referencing an email dated 4/9/2019 summarizing a meeting between the Department and "MS4 managers"). Commenters have attached the responsive documents to these comments via a Google Doc link and the referenced document is on page 498.
[48] Draft Permit, Part IV.H.2.

of permittees to meet the twenty percent restoration requirement; the Department has conducted these assessments and repeatedly found that the permittees do, in fact, have the fiscal capacity to meet the twenty percent restoration requirement. **Thus, Commenters urge the Department to reconsider how it relies upon the so-called "MEP" analysis it conducted in preparation for this permit**.

If the Department intended to embark on the consequential process of rolling back one of the most important water quality policies in Maryland it should have done so transparently and in a way that maximizes public participation. This is particularly important given the significant implications for spending on urban water infrastructure. Commenters note that the Department did not consult with the Commission on Environmental Justice and Sustainable Communities and the permit fact sheet does not indicate that any thought was given to the negative consequences on Maryland's most vulnerable communities that would result from this decision to disinvest in these areas.

Commenters also question which criteria the Department considered in determining what level of effort should constitute the maximum extent practicable. Beyond pointing out that most jurisdictions were deemed to have met the twenty percent restoration standard (and the implication that it is therefore feasible to do so and well within the ***maximum*** extent practicable), Commenters would also like to understand whether the Department considered fiscal criteria like tax capacity, tax effort, bond ratings, and the percentage of local budgets that local MS4 spending represents. These considerations should not be relevant to the issuance of this permit, but if the Department insists on inserting fiscal analysis into its process of establishing water quality-based effluent limitations, then we would urge the Department not to slash pollution control standards until it is absolutely certain that the standards exceed what most fiscal analysts would deem truly the "maximum extent practicable." Any analysis used to establish the primary effluent limitations in the Permit should be thoroughly described in the Permit's fact sheet and should have been subject to public review and comment.

Finally, we urge the Department to describe the extent to which the cost of meeting any additional requirements associated with the expired permit were factored into the MEP analysis it conducted for the issuance of this Permit. For example, subsection IV.E.9 of the proposed Anne Arundel County Permit requires the county to "replace" the "trading credits" associated with "2,607 equivalent impervious acres" because the county "acquired" that many trading credits during the previous permit term. We want to ensure that this additional ISR work to replace credits associated with a nutrient "trade" is ***in addition to***, and not a part of, the total ISR requirement that the Department deemed to represent the maximum extent practicable. Otherwise, those counties that chose to "buy" their way into compliance with the expired permits (we note that there was no actual "purchase" of credits at all for the most part and no actual pollution reductions) would be allowed to get away with investing in even less ISR pollution reduction projects in the current Permit as a result of carrying the previous permit's obligations forward. **We request the Department confirm that "trading credits" were not considered as part of the MEP analysis.**

So far, the Department has determined what it believes to be practicable, and set the ISR requirements accordingly. These technology-based permit conditions are only part of the

Department's responsibility. The Department must go further, and determine what additional requirements - ISR or otherwise - are necessary to meet water quality standards.

## V. Allowing Nutrient Trading In MS4 Permits Undermines the Goal of Improving Local Water Quality and Is Prohibited by Maryland's Regulations.

Nutrient trading, particularly as it has been implemented by Maryland in the context of MS4 Permits, is a fundamentally flawed, mathematically unsound program that may prevent Maryland from reaching its TMDL goals and will result in "hot spots" that place yet more burdens on communities already suffering disproportional pollution impacts. There are at least six major problems with the nutrient trading provisions of the MS4 permits, as discussed below.

First, and most fundamentally, Maryland's nutrient trading regulations prohibit trading in this context. COMAR 26.08.11.09(D) states that "[c]redits may not be used for the purpose of complying with technology-based effluent limitations." The Permit fact sheet explains that the Department calculated the ISR requirements based on the MEP analysis. MEP is a form of technology-based effluent limitation. As such, it represents the ***minimum*** amount of pollution reduction that each permittee must achieve, and it is meant to be technology-forcing, in order to generate the maximum possible pollution reductions from the permittees. The Department is prohibited from allowing trading to comply with the technology-based effluent limitations, including the new ISR requirement.

Second, the Department appears to be double-counting pollutant reductions. When wastewater treatment plants make pollution control upgrades, they immediately begin to report lower pollutant loads through their discharge monitoring reports. The Chesapeake Bay Program uses these discharge monitoring reports to inform the model used to track progress toward the TMDL goals. If a wastewater treatment plant made upgrades in 2012, then those pollutant reductions have already been counted toward Maryland's total pollution load. When Maryland allows a permittee to purchase credits from that plant, in lieu of ISR or any other obligation, it is counting the same pollutant reduction twice – once on behalf of the wastewater treatment plant, and again on behalf of the MS4. This is explained in more detail in the attached 2019 Environmental Integrity Project report (**Appendix E**).[49] This is a major mathematical error in the Department's approach, and it gets Maryland no closer to its TMDL goals. An acre's worth of paper credits is not equal in value to an acre of restored impervious surface. The permitted activities will not meet the sector's wasteload allocation, and the Permit will not protect water quality. Instead, the Permit is simply weaker, and this represents impermissible backsliding from previous requirements.

We appreciate that the Department established caps on trading with wastewater treatment plants, but this is not enough. The Department would have to require that any credits from wastewater treatment plants be generated by new pollution-control upgrades.

Third, the trading scheme would increase uncertainty and reduce transparency. The Draft Permit would allow Baltimore City to continue to buy credits to cover the impervious surface restoration shortfall from the last permit cycle. This requires each county to secure and purchase credits

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[49] *See, e.g.,* Environmental Integrity Project, *Pollution Trading in the Chesapeake Bay: Threat to Bay Cleanup Progress*, 14-18, Attachment B 23-25, *available at* https://environmentalintegrity.org/wp-content/uploads/2019/08/Pollution-Trading-in-the-Chesapeake-Bay.pdf (**Appendix E**).

every year, and requires the independent verification of these credits every year, until the county ultimately restores the impervious surface (or implements some other alternative). The Department has not indicated an end to this cycle, and the cycle has already been carried over from one permit term to another. This creates an ongoing, annual administrative burden for the permittees and for the Department with no corresponding on-the-ground benefit. Instead of tangible pollution control practices, the permittees will be securing credits for pollutant reductions that may not cover the underlying impervious surface obligation. With the data currently available to the public, it is difficult to see if the credits are adequately verified, and the BMPs supporting each credit may fail to generate the expected reductions.

Fourth, the Permit fails to account for uncertainty in the generation of nonpoint credits. As explained in much greater detail in the EIP report,[50] Maryland's nutrient trading regulations fail to require an uncertainty ratio for trades between nonpoint credit generators (such as farms) and MS4 credit purchasers, despite an EPA policy requiring the use of an uncertainty ratio for all trades involving nonpoint credits. The uncertainty ratio policy is based on the fact that nonpoint BMPs are likely to underperform. This problem is amplified by climate change, which causes more intense precipitation events that can overwhelm a BMP or otherwise reduce the ability of a BMP to mitigate pollution – a problem that the Department has recognized.[51]

**The MS4 "trading" provisions, in addition to being contrary to regulatory mandate, will not produce pollutant reductions commensurate with what would have been achieved in their absence—through a more straightforward implementation of the impervious surface restoration requirement or through a numeric load reduction approach—and thus the provisions represent impermissible backsliding from the prior water quality-based restoration requirements.**

Fifth, the trading provisions ignore the substantial benefits to local communities that accompany real, on-the-ground pollution reduction practices and can exacerbate disproportionate impacts of pollution on already vulnerable communities. When jurisdictions are encouraged to outsource their pollution reduction activities rather than invest in green infrastructure projects that allow stormwater to infiltrate, the local communities lose out on the numerous co-benefits that the Department has written extensively about. Nutrient and sediment credits cannot replace these benefits. We have repeatedly asked the Department to cap the amount of impervious restoration "credit" that a permitted jurisdiction can claim from nutrient trading or alternative practices or to set a minimum amount of reduction that must happen from green infrastructure. While we are pleased to see that the Department has set a cap on the amount of credits that MS4s can purchase from wastewater treatment plants, the permits do not put a cap on trading more generally.

Finally, as noted by nationally renowned stormwater experts such as Tom Schueler and Dr. Richard Horner, stormwater BMPs that capture and retain sediment-laden stormwater not only reduce TSS, but also a myriad other dangerous pollutants that bind to sediment.[52] Nutrient and

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[50] *See id.* at 18, Attachment B, 15-22.

[51] *See, e.g.*, Maryland Department of Environment, Maryland's Phase III Watershed Implementation Plan (WIP) to Restore Chesapeake Bay by 2025 ("Phase III WIP"), 56 (Aug. 23, 2019), *available at* https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Documents/Phase%20III%20WIP%20Report/Final%20Phase%20III%20WIP%20Package/Phase%20III%20WIP%20Document/Phase%20III%20WIP-Final_Maryland_8.23.2019.pdf.

[52] Appendix D, Dr. Horner's Report, at 11; *see also,* Chesapeake Stormwater Network, Tom Schuler, *Urban Toxic Contaminants: Removal by Urban Stormwater BMPs*, *available at*

sediment credits cannot replace reductions in other pollutants, such as toxic metals, that come with on-the-ground pollution reduction practices. This overlaps with the Department's obligation to ensure that permittees meet the technology-based MEP standard. MEP is designed to minimize all stormwater pollutants, not just nutrients and sediment. In the absence of trading, each permittee must minimize the discharge of all stormwater pollutants, including toxic metals and organic pollutants. Nutrient and sediment credits are simply not equivalent to BMPs—they do nothing to reduce pollutants other than nutrients and sediment, nor do they reduce stormwater flow volume, which contributes to downstream effects such as riverbank erosion. Allowing nutrient and sediment credits in lieu of real BMP implementation means that permittees will be implementing fewer BMPs. In other words, they will be making less of an effort to reduce stormwater, and plainly will not be reducing other pollutants to the Maximum Extent Practicable. This violates the purpose of the CWA, violates the technology-forcing mandate of the Act, and violates the Act's specific requirements. For all of the above reasons, the Department must eliminate the trading option in the MS4 permits.

## VI. The MS4 Permit Cannot be Consistent with WLAs/TMDLs Without Greater Enforceability of the ISR Requirement and Prioritization of Stormwater Management Practices.

The draft MS4 Permit relies entirely on the ISR requirement to meet the pollutant reductions necessary to be consistent with the Maryland Phase III WIP for the Chesapeake Bay TMDL and 2025 nutrient load targets, and for local TMDL implementation targets. But, the ISR provisions of the draft MS4 Permit cannot support the Department's conclusory statements that they comply with the law.

Under CWA regulations, BMPs and programs implemented pursuant to an MS4 permit must be consistent with the assumptions and requirements of applicable stormwater WLAs developed under EPA established or approved TMDLs.[53] Although the fact sheet and the Draft Permit conclude that the permit is consistent with the Phase III WIP and therefore the Bay TMDL,[54] they do not support the Department's position that the permit requirements are sufficient to implement the WLA. Indeed, the permit does not actually have specific nutrient pollutant load reductions, but only a 3,696 acre ISR standard, which can be met in a variety of ways, some of which are unrelated to stormwater.

Even assuming that 3,696 impervious acres of restoration were an appropriate standard to be consistent with the stormwater WLA, the permit conditions are not likely to result in compliance with this standard. Without holding the permittee accountable to actually meet the ISR requirement, the permit terms cannot be considered consistent with the assumptions and requirements of the WLAs. The Draft Permit makes unsupported conclusory statements that it is consistent with the Bay TMDL, but the lack of enforceability of the ISR requirement, the weakened iterative approach to implementing the ISR, and the fact that the permit does not

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https://www.chesapeakewea.org/docs/Session_1A_Tom_Schueler.pdf (last accessed January 13, 2021) (**Appendix F**).

[53] 40 CFR 122.44(d)(1)(vii)(B)("When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that:. . .(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7").

[54] Baltimore City Fact Sheet, 20-DP-3320, MD006829, 11.

actually require stormwater controls, undermine these statements. Additionally, the lack of actual stormwater management requirements allows a permittee complete discretion to undertake exclusively non-stormwater management BMPs.

In preparation for these comments, Commenters submitted a Public Information Act ("PIA") request to the Department in October 2020 (PIA No. 2020-02374) requesting more information to explain the analysis the Department used to come to the conclusion that the permit requirement meets local TMDL requirements. We requested this information specifically so that we could prepare meaningful comments on the draft tentative determination. To date, we have not received a fulfillment of our PIA request from the Department. Instead, we received a baffling email[55] containing circular logic from the Department staff indicating that they would not be providing a timely response to the PIA and that in fact they would provide no response prior to the January 21, 2021 due date for comments on this Permit. The rationale they provided was that they anticipated that whatever responses the Department will provide in response to the very comment letter that we are submitting now will answer the questions we posed in our PIA.

We submitted the same request to the Baltimore City Department of Public Works and received responsive documents that confirm that the primary water quality based-effluent limitation in the Permits - the ISR requirement - were based on an evaluation of fiscal and financial considerations, not based on water quality standards, TMDL targets, or waste load allocations. To use the term repeatedly emphasized by those in the regulated community, the development of the BMP portfolio to be implemented under the Permit was "MEP-driven" but definitely not TMDL-driven given that the vast majority of communications and analysis involved fiscal considerations rather than water quality factors.[56]

We submitted the same request to the Baltimore County Department of Public Works and have not received a response.

### A. The Draft Permit is not consistent with the Phase III WIP, and therefore the Bay WLAs, and local TMDLs because it does not hold the permittee accountable for meeting the ISR requirement.

The Draft Permit states that compliance with the permit conditions constitutes "adequate progress toward compliance" with EPA established or approved stormwater WLAs for this permit term.[57] Given that the ISR requirement is the only permit condition that addresses compliance with the Bay TMDL, the Draft Permit relies entirely upon this requirement to support its conclusion that the Permit satisfies adequate progress toward compliance with the

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[55] **Appendix I**, December 08, 2020 Email from Amanda Redmiles, Interdepartmental Information Liaison, the Department Office of Communications to Angela Haren, Senior Attorney, Chesapeake Legal Alliance.

[56] A number of documents sent by "MS4 managers" and the Maryland Association of Counties to the Department use the term "MEP-driven" to describe the "BMP portfolio" that the regulated entities insisted on being subjected to under the terms of the new permit. Neither consistency with TMDLs/WLAs, nor any consideration of water quality seems to have been contemplated based on a review of these documents, which have been transmitted to the Department as an attachment to these comments and which should be considered as part of the record associated with the issuance of this Permit.

[57] Draft Permit, Part III.3.

Bay TMDL. Accordingly, the ISR requirement for the permittee purports to be established at the level at which the Permit is consistent with the stormwater WLA of the Bay TMDL, as set forth in the Maryland Phase III WIP. Yet, the Draft Permit simultaneously allows a permittee to only achieve some portion of the ISR requirement, by using the "adequate progress" standard for meeting the Department's approved annual benchmarks and final stormwater WLA implementation dates. It is unlikely that a permittee will reach its ISR requirement when it is only expected to make *progress* toward the interim benchmark levels and the final stormwater WLA implementation dates. The unenforceable benchmark framework and weak iterative approach as written further decrease the likelihood of a permittee meeting the ISR requirement.

**1. The Department must hold permittees accountable for meeting benchmarks, not merely demonstrating progress toward meeting benchmarks.**

According to the Draft Permit, the annual benchmarks are quantifiable goals or targets "to be used to assess progress toward the impervious acre restoration requirement or WLAs, such as a numeric goal for stormwater control measure implementation."[58] If that is the case, then merely demonstrating progress toward meeting benchmarks is insufficient to ensure compliance with the CWA or regulations.[59] The permittee's Citywide Stormwater TMDL Implementation Plan, as required by the Permit, must provide an updated list of BMPs, programmatic initiatives, and alternative control practices, as necessary, "to demonstrate adequate progress toward meeting the Department's approved benchmarks and final stormwater WLA implementation dates."[60] Why must the permittee only describe practices necessary to demonstrate **progress** toward meeting goals that were set to keep the permittee on track toward achievement of the ISR requirement? If a permittee only demonstrates "adequate progress" toward the interim benchmarks, there is nothing to ensure that the permittee will ever actually meet the benchmarks or, consequently, the target for the permit term. Commenters recommend the following: ". . .as necessary, to demonstrate achievement of ~~adequate progress toward meeting~~ the Department's approved benchmarks and adequate progress toward meeting final stormwater WLA implementation dates; . . ."

Similarly, the permittee must submit annual reports of its progress, which must include "[t]he identification of water quality improvements and documentation of attainment and/or **progress toward attainment** of schedules, benchmarks, deadlines, and applicable stormwater WLAs developed under EPA established or approved TMDLs; and . . ."[61] When the MS4 Permit refers to interim deadlines, schedules, or benchmarks, as it does here, the reporting of progress should include documentation of **actual attainment**. Commenters propose the following revision— annual progress reports to include: "The identification of water quality improvements and documentation of attainment ~~and/or progress toward attainment~~ of schedules, benchmarks, deadlines, and adequate progress toward attainment of applicable stormwater WLAs developed under EPA established or approved TMDLs; . . ." Commenters also recommend that the Department require third-party certification of attainment of benchmarks and schedules, or

[58] Draft Permit, Part IV.E.4.
[59] *See* 40 C.F.R. 122.4(a) ("No permit may be issued: (a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA").
[60] Draft Permit, Part IV.F.3.c.
[61] Draft Permit, Part V.A.1.e (emphasis added.)

adequate progress toward attainment of stormwater WLAs, to include in the permittee's annual reports.

### 2. The Draft Permit's benchmark framework lacks all accountability, without any possibility of enforcement.

When the Department shared an early draft of the new Permit with Commenters, we were encouraged by the creation of an enforceable schedule for meeting the ISR requirement. However, we are equally discouraged now to see that this schedule in subsection IV.E.4 has been weakened to its current form, with the schedule deemed to be nothing more than unenforceable benchmarks. **We note that unenforceable language has sadly become a hallmark of permits issued by the Department and urge the Department to strike this new language introduced since the draft shared in July**. At the very least, if the Department chooses not to make annual progress levels enforceable, it ought to institute an enforceable corrective action sequence to give some effect to the benchmark levels in this subsection. Otherwise, what point is there to including these benchmarks at all? Without triggering some additional action to accelerate progress toward the ISR requirement in the permit, local jurisdictions will simply be allowed to fall further and further behind, almost guaranteeing noncompliance with the ISR requirement by the end of the permit term. At present, there is no accountability in this permit and little opportunity to enforce key provisions.

Benchmarks are intended to be quantifiable goals or targets, but there is no permittee accountability or enforceability built into the Draft Permit language. Rather, the benchmark framework undermines the Department's and the public's ability to hold permittees to the benchmark schedule. The Draft Permit explicitly states that benchmarks "generally are not considered to be enforceable" as they are intended to be an adaptive management aid. Without any specified, structured response for when a permittee fails to meet its benchmarks, the role of the benchmarks as an adaptive management aid is nearly useless. The Draft Permit provides that if a permittee fails to meet a benchmark for a particular year, the permittee "should take appropriate corrective action to improve progress toward meeting permit objectives."[62] This standard has no teeth. Dr. Richard Horner noted in his report that rigorous adaptive measures are a common feature of more protective MS4 permits.[63]

Commenters strongly recommend several revisions to strengthen these adaptive measures. First, we urge the Department to replace "should" with "must" to create a mandate for a response upon failure to meet a benchmark. Second, the standard "appropriate corrective action" must be defined. What constitutes an appropriate action and who determines what is appropriate? Finally, the stated goal of such corrective action—"to improve progress toward meeting permit objectives"—does not actually require the permittee to get back on track to meet the next benchmark but only to improve progress from its prior implementation level. Nothing in this standard would allow the Department or the public to hold the permittee accountable for meeting the benchmark goals or even for taking action upon failure to meet these goals. This weak standard in response to a failure to meet benchmarks allows the permittee to fall further and further behind, making permit compliance extremely unlikely.

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[62] Draft Permit, Part IV.E.4.
[63] Appendix D, Dr. Horner's Report, at 15.

Failure to meet a benchmark should trigger concrete corrective action steps with a specified, concrete goal and consequences for failure to meet that goal. Commenters recommend the following changes: "If a benchmark is not met, the County ~~should~~ must take appropriate corrective action to ensure that the County achieves the next scheduled benchmark~~to improve progress toward meeting permit objectives~~." Appropriate corrective action for purposes of this standard should be defined, setting forth specific steps to be taken to return the County to a position where it could meet the benchmarks and the ISR requirement by the end of the permit term.

To hold the permittee accountable for taking corrective action in the event that it fails to meet a benchmark, **Commenters recommend that the Department explicitly state that failure to take appropriate corrective action in these circumstances constitutes a permit violation.** Permittee failure to meet the next scheduled benchmark, whether or not corrective action was taken, should also constitute a permit violation.

### 3. The iterative approach to implementing the ISR requirement has been significantly weakened, is legally questionable, and is unlikely to result in program improvements.

The iterative approach in the Draft Permit to implementing the ISR requirement does not ensure that a permittee will comply with the permit terms that purportedly ensure consistency with TMDL WLAs. Specifically, section V.A.3 requires: "[w]here programs are determined by the City to be ineffective, modifications shall be made within 12 months that effectively show progress toward meeting stormwater WLAs developed under EPA approved TMDLs." This standard for when the permittee must make BMP and program modifications is significantly weaker than the language in the prior permit, and is problematic for several reasons, to the point of being ineffectual.

The prior Baltimore City 2013 MS4 Permit required the permittee to make modifications if its annual report did not both 1) demonstrate compliance with the permit and 2) show progress toward meeting WLAs.[64] The Maryland Court of Appeals found this standard sufficient to meet the requirement that effluent limits be consistent with approved WLAs, based in part on the "reporting, assessment, and adaptation to ensure that the Counties' BMPs will make progress to achieve WLAs."[65] The court contrasted these reporting requirements with the circumstances in *Environmental Defense Center, Inc. v. US EPA ("EDC")*, where the Ninth Circuit determined that the MS4 permitting scheme there did not prevent an operator of a small MS4 from "misunderstanding or misrepresenting its own stormwater situation."[66] In concluding that the permit effluent limits were consistent with approved WLAs, the Maryland Court of Appeals relied upon the iterative approach set forth in the prior Baltimore City 2013 MS4 Permit, which

[64] Maryland Department of the Environment, National Pollutant Discharge Elimination System, Municipal Separate Storm Sewer System Discharge Permit, Baltimore City 2013 MS4 Permit, IV.A.3. ("Because this permit uses an iterative approach to implementation, the City must evaluate the effectiveness of its programs in the Annual Report. BMP and program modifications shall be made if the City's Annual Report does not demonstrate compliance with this permit and show progress toward meeting WLAs developed under EPA approved TMDLs.")
[65] *Maryland Dep't of Env't v. Anacostia Riverkeeper*, 134 A.3d 892, 922 (Md. 2016).
[66] *Id.* at 922 (citing 344 F.3d 832, 858 (9th Cir. 2003)).

required program modifications if the annual report failed to demonstrate permit compliance and show progress toward meeting WLAs.

The Draft Permit removes the accountability that the Maryland Court of Appeals determined was distinct from the insufficient permitting scheme in *EDC*. Specifically, the court's finding that the reporting and adapting ensured the Counties would make progress to achieve WLAs is no longer applicable because the Draft Permit only requires modifications where programs are determined to be "ineffective," rather than where the report does not demonstrate permit compliance and show progress toward meeting WLAs. There is a large gap in deficiencies of a permittee's programs for which the permittee could not demonstrate permit compliance and show progress toward meeting WLAs but which the permittee will not consider "ineffective." Based on the reasoning of the Maryland Court of Appeals in *Maryland Department of the Environment v. Anacostia Riverkeeper*, it is unlikely that the new standard is consistent with approved WLAs.

Additionally, the revised language is imprecise and unclear and gives the permittee too much discretion. The Draft Permit explicitly authorizes the permittee to determine whether its programs are "ineffective." If the permittee does not determine its programs are ineffective, no modifications are required. A citizen could not contest whether these programs are ineffective because it is defined to be according to the City. Moreover, as noted above, the standard "ineffective" is far weaker than the standard of demonstrating permit compliance and showing progress. Rather than requiring modifications for the absence of successful implementation of permit requirements, the Draft Permit only requires modifications when the permittee's programs are wholly failing. Because ineffective is not defined, the permittee could interpret this to mean that the programs are not working to reduce stormwater pollution at all, which is in stark contrast to having to affirmatively demonstrate compliance. Whereas "[d]emonstrate compliance with the permit" is at least, in theory, a standard that the permittee, the Department, the public, or a judge could objectively gauge and evaluate, "ineffective" is vague and unenforceable.

The Department should return to the prior standard for when the permittee must make program modifications and should add language specifying a standard for such modifications to reach. Commenters recommend the following:

> ~~Where programs are determined by the County to be ineffective,~~ BMP and program modifications shall be made within 12 months if the City's Annual Report does not demonstrate compliance with this permit and show progress toward meeting WLAs developed under EPA approved TMDLs. Such modifications must be sufficient to demonstrate compliance with the permit and ~~that effectively~~ show progress toward meeting stormwater WLAs developed under EPA approved TMDLs.

**B. The Draft Permit is not consistent with stormwater WLAs because it does not require stormwater controls.**

The Draft Permit does not actually require any stormwater controls. First and foremost, this MS4 Permit must ensure compliance with water quality standards. In its 1999 stormwater rulemaking implementing the statutory MEP standard, EPA confirmed that under its existing regulations, "[40 C.F.R.] Sec 122.44(d) is a general requirement that each NPDES permit shall include conditions to meet water quality standards."[67] Using a numeric approach to reduce pollutant loads is the best way to ensure that the MS4 Permit is consistent with local TMDLs and the Bay TMDL.

The Draft Permit authorizes the permittee to decide how to comply with the Permit and the Department has deemed any way of meeting the ISR requirement to be adequate progress toward compliance with WLAs. This includes the stormwater WLA that is set forth in the Maryland Phase III WIP. A permittee may comply with the ISR requirement by "implementing stormwater BMPs, programmatic initiatives, or alternative control practices in accordance with the 2020 Accounting Guidance."[68] This is neither a condition nor even an approach capable of "meet[ing] water quality standards."

The 2020 Accounting Guidance includes several alternative best management practices that do not involve managing stormwater, including street sweeping, storm drain cleaning, and stream restoration.[69] The Department has assigned these practices equivalent impervious acre conversion factors, allowing a permittee to receive a certain amount of credit toward its total ISR requirement for implementing any of the practices in the 2020 Accounting Guidance. The Permit should be very clear that the Guidance should not be relied on for calculating credit for these alternative BMPs.

In effect, the 2020 Accounting Guidance authorizes a permittee to satisfy the ISR requirement solely by implementing street sweeping, stream restoration, or other practices that do not impact stormwater volume. Indeed, for BMPs implemented during the prior permit term (FY 2014-19), Baltimore City implemented mostly street sweeping, with 86% of its BMPs programmatic practices and only 11% upland BMPs.[70] If a permittee had chosen to implement exclusively non-stormwater BMPs, which it is authorized to do under the Draft Permit and 2020 Accounting Guidance, how would those practices make progress toward compliance with the stormwater WLA? It cannot be considered adequate progress to meet the stormwater WLA if the practices selected do not actually manage stormwater.

Dr. Horner's Report describes the practical effect of the lack of differentiation among the permissible BMPs.[71] **The Department's current approach creates no directive or incentive to**

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[67] *See* EPA, "National Pollutant Discharge Elimination System-Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges," 64 Fed. Reg. 68722, 68770 (Dec. 8, 1999).
[68]Maryland Department Of The Environment, Municipal Separate Storm Sewer System Discharge Permit, Baltimore City 20-DP-3315, MD0068292 ("Draft Permit or Permit,"), Part IV.E.3.
[69] Maryland Department of the Environment, Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits ("2020 Accounting Guidance"), 11, 22 (June 2020), *available at* https://mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/2020%20MS4%20Accounting%20Guidance.pdf.
[70] Maryland Department of the Environment, Annual Report on Financial Assurance Plans and the Watershed Protection and Restoration Program 2019, 10 (Feb. 2020), *available at* https://mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/FAP-2019/2019%20Stormwater%20Financial%20Assurance%20Plan%20Annual%20Report%20to%20GovernorMSAR10954.pdf. Programmatic Practices include street sweeping, inlet cleaning, and storm drain vacuuming, while Upland Practices include wet ponds, swales, infiltration, dry wells, rain gardens, green roofs, permeable pavement, rainwater harvesting, and submerged gravel wetlands. *Id.* at 3.
[71] Appendix D, Dr. Horner's Report, at 11.

**prioritize the most beneficial or efficient retentive practices that achieve water quantity control as well as water quality benefits.** For example, as Dr. Horner's report describes, the same credit would be awarded for "a bioretention cell with an impermeable liner and underdrain to a surface discharge as for open-bottom, fully infiltrating bioretention," although the "former device only fractionally reduces the runoff quantity and always still discharges pollutants to surface waters, while the latter completely attenuates both."[72] Dr. Horner points to an existing MS4 Permit that incorporates a standard designed to retain "91% of the entire runoff volume over a multi-decade period of record." This standard has been in place for years, thus signifying in his expert judgment the feasibility of such a standard in the regulatory context.[73]

In fact, Commenters submit that reliance on certain practices under the 2020 Accounting Guidance for calculating ISR is inconsistent with the mandate of Section 117 of the CWA and the Bay TMDL as upheld by the Third Circuit.[74] Nevertheless, if the Department insists on continuing to use practices in the 2020 Guidance, Commenters have a strong recommendation for improvement. The Department can avoid the problematic possibility of a permittee using all or mostly non-stormwater management practices, which are often less expensive than structural stormwater management practices, by creating guardrails around certain categories of practices as well as a hierarchy of practices with a minimum for the most beneficial BMPs. Dr. Horner's report describes this hierarchical approach in detail. Dr. Horner outlines his proposed Best Management Practices Hierarchy in Exhibit 1 to his expert report (**Appendix D**).[75] Similarly, Dr. Roseen found deficiencies associated with the lack of structural controls that actually retain and infiltrate stormwater, as summarized in his expert report (**Appendix B**).[76]

Commenters also note that paragraph IV.F.3.a of the Draft Permit requires a "summary of all completed BMPs, programmatic initiatives, alternative control practices, or other actions implemented for each TMDL ***stormwater WLA***." (Emphasis added). As noted, many BMPs included in the 2020 Accounting Guidance document do nothing to reduce ***stormwater*** pollution. As such we request clarity regarding how a jurisdiction can characterize the reductions associated with these non-stormwater practices selected by a jurisdiction in lieu of stormwater BMPs. Similarly, paragraph IV.F.3.c. uses the phrase "adequate progress toward meeting the Department's approved benchmarks and final stormwater WLA implementation dates." We urge the Department to change this language to reflect that much, if not most, of the load reductions associated with a jurisdiction's ISR compliance work may not be applicable to a stormwater WLA at all.

## VII. The Draft Permit Inappropriately Relies on Permittee Self-Regulation.

Several aspects of the Draft Permit amount to impermissible self-regulation. The Draft Permit allows the permittee discretion without sufficient Department oversight to ensure compliance with the CWA with respect to the benchmarks and program modification requirements of the ISR requirement. Further, the Draft Permit relies entirely on the permittee's own discretion to ensure consistency with applicable WLAs (including, as described above, stormwater WLAs

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[72] *Id.*
[73] *Id.* at 8.
[74] *See Am. Farm Bureau Fed'n v. EPA*, 792 F.3d. 281 (3rd. Cir. 2015, *cert. den.* Feb. 29, 2016).
[75] Appendix D, Dr. Horner's Report, at Exhibit 1, 1-1–1-2.
[76] Appendix B, Dr. Roseen's Report, at 3, 22.

even though a permittee can choose to comply with the permit without installing any stormwater BMPs at all). The Illicit Discharge Detection and Elimination (IDDE) Program also includes language that is insufficiently precise to assure proper compliance with the CWA.

Section 402 of the CWA, its implementing regulations, and federal case law construing the CWA prohibit self-regulation by a permittee. *See* 33 USC 1342(a)(2) ("The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate."); *see also Envtl. Def. Ctr., Inc. v. U.S. E.P.A.*, 344 F.3d 832, 856 (9th Cir. 2003) ("However, stormwater management programs that are designed by regulated parties must, in every instance, be subject to meaningful review by an appropriate regulating entity to ensure that each such program reduces the discharge of pollutants to the maximum extent practicable.")

### A. The benchmark framework and program modification provisions for implementing the ISR requirement fail to include sufficient Department oversight.

Because the annual benchmarks designed for a permittee to comply with the ISR requirement lack consequences of failing to meet those benchmarks, the Draft Permit does not hold the permittee accountable for actually meeting the ISR requirement. The Draft Permit states that the benchmarks are not enforceable, and the annual reporting required to ensure progress is being made toward achievement of the permit requirements only requires the permittee to demonstrate "adequate progress toward" the benchmarks, not actual achievement of the benchmarks.

If the permittee does not meet the benchmarks, the permit notes that the permittee "should take appropriate corrective action to improve progress toward meeting permit objectives."[77] Because there is no accountability or enforceability of the benchmarks or of the corrective actions to be taken if benchmarks are not met, as discussed in the prior section regarding consistency with WLAs, the Department has no ability to consider a permittee's progress and require additional corrective action measures—all the steps toward reaching the ISR requirement are left entirely to the permittee. This constitutes impermissible self-regulation, similar to the circumstances in *EDC v. EPA*, where the Ninth Circuit found the rule at issue did not require the permitting authority to review an operator's stormwater management program "to ensure that the measures that any given operator of a small MS4 has decided to undertake will *in fact* reduce discharges" to the extent required by law.[78] The Draft Permit similarly does not create sufficient accountability and agency review to ensure that what a permittee undertakes will actually comply with the law.

Additionally, the Draft Permit provides for no Department oversight for when a permittee determines a program to be ineffective, which would trigger the need for modifications. Section V.A.3 provides: "Where programs are determined by the County to be ineffective, modifications shall be made within 12 months that effectively show progress toward meeting stormwater WLAs developed under EPA approved TMDLs." As discussed in the prior section of this comment letter, this provision lacks enforcement procedures. Because the County is the entity

[77] Draft Permit, Part IV.E.4.
[78] *Envtl. Def. Ctr., Inc. v. U.S. E.P.A.*, 344 F.3d 832, 855 (9th Cir. 2003).

responsible for determining whether programs are ineffective, and the language provides no guidance, standards, or Department review of the determination, the permittee has complete discretion over when modifications are necessary. Modifications would add to a permittee's costs to comply with the MS4 permit; therefore, the permittee would not have an incentive to find its programs ineffective, and neither the Department nor the public would have authority to review or challenge the permittee's determination.

The lack of accountability of the ISR sections here distinguish the circumstances from those in *Maryland Dep't of Env't v. Anacostia Riverkeeper*, where the Court found the Department's program oversight sufficient. In its analysis, the Court considered the fact that the Department would review program implementation, annual reports, and periodic data submittal annually, and could require program modifications or additions if the report did not show progress toward meeting WLAs.[79] Without authorizing the Department to **require** program modifications, the Draft Permit does not maintain the level of oversight found acceptable in *Anacostia Riverkeeper.*

Even if a permittee did find it appropriate to make modifications, the standard for such modifications gives the permittee complete discretion. Absent definitions, guidance, and/or numeric standards for what constitutes "effectively show[ing] progress toward meeting stormwater WLAs," this standard also allows for impermissible self-regulation by the permittee.

### B. Draft Permit Part IV.D.3 lacks enforcement procedures and key definitions.

The Illicit Discharge Detection and Elimination Program is intended to ensure that all discharges into, through, or from the MS4 that are not composed entirely of stormwater are either issued a permit or eliminated. When a suspected illicit discharge discovered within the permittee's jurisdiction is either originating from or discharging to an adjacent MS4, the Draft Permit requires the permittee to "coordinate with that MS4 to resolve the investigation."[80] The Draft Permit does not describe what it means to "resolve the investigation" and provides no standard or guidance for when the suspected illicit discharge has been sufficiently investigated. This leaves the permittee and adjacent MS4 to determine when the suspected illicit discharge has been resolved.

Resolving the investigation could be interpreted as identifying the source of the problem, rather than remedying it. The permittee and adjacent MS4 should be required to resolve the *violation* and eliminate the illicit discharge, if any, discovered. By law, a permittee is required to prohibit non-stormwater discharges and other illicit discharges, and merely requiring the permittee and adjacent MS4 to resolve the *investigation* is insufficient if it does not eliminate the discharge.[81]

"Significant discharges" in Part IV.D.3 must be defined to avoid each permittee establishing a different definition or none at all. The Permit should include additional detail in paragraph IV.D.3.g to define or otherwise give effect to the term "significant discharges."This section

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[79] *See Maryland Dep't of Env't v. Anacostia Riverkeeper*, 134 A.3d 892, 922 (Md. 2016).

[80] Draft Permit, Part IV.D.3.g.

[81] *See* 33 U.S.C. § 1342(p)(3)(B)(ii) ("Permits for discharges from municipal storm sewers…(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers"); 40 C.F.R. 122.26(b)(2) ("Illicit discharge means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.")

requires that "[s]ignificant discharges" be reported to the Department for enforcement and/or permitting. The permit does not define significant discharges, which leaves the permittees to independently interpret what constitutes significant discharges for purposes of what to report to the Department. This would lead to inconsistent application of this requirement, with permittees reporting to the Department discharges of extremely varied severity and many discharges going unreported because permittees do not think they rise to the threshold level of significance. The Department should define "significant" in this context with a numeric or detailed narrative standard or metric. Commenters have been concerned in the past by instances of visible pollution flowing into MS4 storm drains and urge the Department to give effect to this seemingly important provision.

### C. "Equivalent" county water quality analyses must not be allowed without further direction or guidance from the Department on what would constitute an "equivalent" analysis.

Part IV.F.2 requires that "[t]he TMDL implementation plan shall be based on the Department's TMDL analyses, or equivalent and comparable . . . County water quality analyses. . . " Commenters request clarification about what constitutes "County water quality analyses"? The Permit should define what constitutes this "equivalent and comparable" standard, provide guidance about how a county can develop such analyses, or reference a document on the Department website. Otherwise, the Permit is providing blanket approval for any jurisdiction to create any sort of water quality analysis in lieu of the state's analyses. This sort of self-regulation is not acceptable and the Department could be inviting a situation where unacceptably deficient analyses cannot be challenged by the Department due to a lack of a clear definition or guidance as to what sort of local analyses would be deemed "equivalent or comparable."

## VIII. The Draft Permit Should Account for Growth.

We would like to acknowledge an important proposed addition to the Permit. After describing a number of existing state laws in Part IV, the Permit states that "[a]ny additional loads will be offset through Maryland's Aligning for Growth policies and procedures as articulated through Chesapeake Bay milestone achievement." As discussed below, Maryland has failed to adopt an Aligning for Growth policy or to develop WIPs consistent with EPA expectations to account for pollution growth. Unless a thoughtful accounting for growth policy is adopted, the Department cannot credibly claim in this Permit to have policies in place to deal with pollution from new or expanding sources.

When EPA devised the Chesapeake Bay TMDL it included the fundamental expectation that states account for ***future*** pollution growth as they work to reduce pollution from ***existing*** sources. Thus, growth offsets were incorporated as one of eight essential elements for states to include in their WIPs, consistent with the guidance provided in an appendix to the TMDL, as well as several guidance materials that EPA developed to help states understand what was needed to deal with growth. Included in these materials was EPA guidance urging "an explanation of how Bay jurisdictions will track and verify practices to … offset future loads," as well as a detailed numeric demonstration of "how they intend to account for any increases in loads from point and nonpoint sources of nitrogen, phosphorus, and sediment." In fact, for jurisdictions like Maryland that have fallen behind the pace of progress needed to meet the 2025 TMDL target (Maryland failed to meet the 2017 interim target), the guidance even suggested the creation of "net improvement offsets" that require "any new or increased nutrient and sediment loads to be compensated for" by an even larger amount in a way that "quickens the pace of implementing controls" in those lagging jurisdictions.

While policies such as "net improvement offsets" represented a nuanced and forward-thinking solution to deal with growth, the basic expectation EPA laid out for states was to either (1) develop programs or policies to control new sources of pollution as they arise, or (2) carve out and set aside some of the overall pollution loads allocated to the states to be used by new or increasing sources of pollution. Initially, Maryland seemed to take seriously its responsibility to adhere to EPA's expectation as it convened an "accounting for growth" workgroup for monthly meetings to develop recommendations and, ultimately, regulations for offsetting growth in various contexts including for stormwater. Regulations were also required by law (Chapter 149 of 2012) to include offsets for residential development in certain areas. Maryland even committed to EPA to develop the regulations with a final effective date of December 31, 2014. (see the *Maryland Sector Load Growth Demonstration* to EPA). Unfortunately, since that time, Maryland has done nothing more than change the name of the workgroup; after convening the newly named "Aligning for Growth" work group several times, the Department promptly disbanded it altogether. And while the workgroup has been on hiatus, the amount of impervious surface has only continued to expand, and along with it, innumerable sums of additional pollution and stormwater. As discussed in the factual background section above, the growth in new impervious acreage in Maryland since 2009 has more than offset any programmatic reductions in stormwater pollution, and as a result total stormwater pollution loads have increased. Maryland has not been able to offset new growth, much less make net reductions. It is deeply problematic for the Department, after failing at the task for a decade, to now be appealing to an accounting for growth policy that does not exist.

EPA has repeated its stance in recent milestones assessments that it "expects Maryland to continue to work with EPA to understand where growth is occurring, and where loads need to be offset, to offset these new loads within the appropriate time frame, and to continue to track and account for new or increased loads…" especially because of "increases in nitrogen in the Urban/Suburban Stormwater sector." Given EPA expectations, the state's prior commitments, unfulfilled state statutory requirements (Ch. 149 of 2012), and data showing the dire need for offsets to allow the stormwater sector to meet WLAs, it is unacceptable for the Permits to make the claim that "additional loads will be offset through Maryland's Aligning for Growth policies" without taking immediate and concrete steps to adopt such policies. **We strongly urge the Department to comment on the development of these policies and, if a deadline for policy adoption is not sufficiently soon, we recommend the final Permit contain new growth offset provisions. We also urge the Department to fully comply with their clear mandatory duty under Chapter 149 of 2012.**

## IX. The Draft MS4 Permit Fails to Appropriately Account for Climate Change.

We have a number of serious concerns about the Department's failure to account for the practical realities of climate change, as discussed in detail in the attached EIP report.[82] The MS4 permits operate on an underlying assumption that precipitation patterns over the next five years will resemble precipitation patterns of the past. Specifically, the Chesapeake Bay Program model that the Department ostensibly uses to inform the development of WIPs and the MS4 permits assumes precipitation patterns of the 1991-2000 time period. It is unreasonable to use these assumptions without at least applying a margin of safety. We know that rainfall volume and rainfall intensity are increasing, have increased since the 1990s, and will continue to increase.[83] According to the Department's own assessment in the Phase III WIP, "climate change impacts, including increased precipitation and storm events, are causing increased nutrient and sediment loads."[84] The WIP also acknowledges that climate change is likely to reduce the effectiveness of BMPs. For example, page 53 of the WIP states that "[t]he BMPs used to control water pollution will likely become less effective at controlling extreme storm events and be subject to damaging stresses of climate change." Yet the MS4 permits fail to account for the additional pollutant loads that climate change has already and will continue to cause, and do not make any adjustments to default assumptions about BMP effectiveness.

### A. Increased Flooding and Extreme Weather is Increasing Stormwater Pollution and Negatively Impacting Water Quality.

Climate change and its associated increase in flooding and extreme weather events will increase stormwater pollution in the Chesapeake Bay watershed and hinder progress towards achieving water quality improvements required by the Chesapeake Bay TMDL. These effects must be considered in the Permit.

The Chesapeake Bay region is already experiencing flooding from sea level rise, and flooding will only continue to get worse as the region experiences stronger, wetter storms. The pace of sea level rise is expected to increase dramatically in Maryland. According to NOAA tide gauges, sea levels have risen about 13 inches over the last 100 years,[85] and the likely range of sea level rise in Maryland between 2000 and 2050 is 0.8 to 1.6 feet, with a one-in-twenty chance of sea level rise exceeding 2.0 feet.[86] If greenhouse gas emissions continue to grow unchecked, the likely range of sea level rise in Maryland is 2.0 to 4.2 feet over the next century, two to four times the rise experienced in the prior century.[87] In fact, the pace of inundation could actually be far worse in some areas, as other factors like land subsidence accelerate the rising water levels.[88]

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[82] Appendix A, *Stormwater Backup in the Chesapeake Region*.
[83] *See, e.g., id.* at 9–11.
[84] Phase III WIP, at 9.
[85] Center for Operational Oceanic Services and Products, Sea Level Rise, U.S. National Oceanic and Atmospheric Administration. Available at https://tidesandcurrents.noaa.gov/sltrends/. Last accessed Jan. 12, 2021.
[86] Donald F. Boesch, et. al, University of Maryland Center for Environmental Science, *Sea-level Rise Projections for Maryland 2018*, iii (2018). https://mde.maryland.gov/programs/Air/ClimateChange/MCCC/Documents/Sea-LevelRiseProjectionsMaryland2018.pdf.
[87] *Id.*
[88] Maryland Geological Survey, Land Subsidence Monitoring Network, http://www.mgs.md.gov/groundwater/current/land_subsidence.html (last accessed Dec. 7, 2020).

As a result of sea level rise, coastal cities and towns around Maryland are regularly experiencing flooding simply from high tide. The National Oceanic and Atmospheric Administration projects that under a low sea level rise projection (0.5 meter global rise by 2100), by 2100 "high tide flooding will occur 'every other day' (182 days/year) or more often within the Northeast and Southeast Atlantic."[89] Under an intermediate sea level rise scenario (1.0 meter global rise), "high tide flooding will become 'daily' flooding (365 days/year with high tide flooding)."[90]

Climate change will also increase the frequency of extreme weather, producing stronger and wetter storms. In 2016 and 2018, two intense storms hit historic Ellicott City, Maryland, producing a one in one thousand years rainfall event.[91] That amounts to a 0.1% probability storm per year, hitting the same city twice in only two years.[92] The cost of such extreme weather events is staggering. In six of the last ten years, the damage caused by the average number of storms exceeded $1 billion per year.[93] In 2017, 16 storms individually cost over $1 billion, and the overall storm cost for the year was a record-breaking $306.2 billion.[94] The rising costs associated with storm damage necessitate factoring climate change and increased precipitation directly in the MS4 permits, especially for jurisdictions in the coastal areas most susceptible to the risks of climate change, i.e., the areas already experiencing sea level rise and flooding during heavy rainfall events.

### B. Changing Precipitation is Worsening Stormwater Pollution and Water Quality.

Along with sea level rise, flooding and extreme storms, Maryland faces many negative climate change impacts that stem from changing precipitation patterns in Maryland and the Mid-Atlantic. Specifically, recent trends indicate precipitation has increased in frequency, duration, and intensity and is trending towards further increases. This translates to more rain and more stormwater generated pollution. The congressionally mandated Fourth National Climate Assessment[95] indicates clearly that precipitation intensity is trending upward in the Mid-Atlantic and Northeastern United States at a faster rate than anywhere else in the U.S.[96] This was indicated in the 2014 National Climate Assessment that stated "water quality [was] diminishing in many areas, particularly due to increasing sediment and contaminant concentrations after heavy downpours."[97] The increase in precipitation amount, intensity, and persistence has

[89] NOAA, Patterns and Projections of High Tide Flooding Along the U.S. Coastline Using a Common Impact Threshold, NOAA Technical Report NOS CO-OPS 086, ix (2018), https://tidesandcurrents.noaa.gov/publications/techrpt86_PaP_of_HTFlooding.pdf.
[90] *Id.*
[91] Phase III WIP, at 42.
[92] *Id.*
[93] *Id.* at 43–44.
[94] *Id.* at 44.
[95] USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018, https://nca2018.globalchange.gov/.
[96] *See id.*, Chapter 18, Northeast, https://nca2018.globalchange.gov/chapter/18/.
[97] National Climate Assessment: Key Findings - Water Supply (2014), https://nca2014.globalchange.gov/highlights/report-findings/water-supply.

well-documented direct negative impacts on water quality and aquatic ecosystem health because more intense rain events causes increased soil erosion and runoff.[98]

The State must act with urgency to update and modernize policies to be reflective of current and future conditions. The health and quality of Maryland's waters cannot wait another five years for this permit to be renewed again without considerable update to control for climate-induced increases in stormwater runoff. We urge the Department to reissue the draft permit with climate reforms and considerations. The Phase III WIP acknowledges that "more intense storms are expected to change the effectiveness of BMPs to control pollution runoff."[99]

Considering that the MS4 permit is at its core a permit designed to control storm-generated pollution from impervious cover and diverse land uses, then the impacts that more intense storms have on urban and suburban site pollution control BMPs must be central to the design and considerations of the proposed permit. In its current form, the Permit is not adequately designed to effectively control pollution from climate change-induced increases in storm volume, intensity, and duration. The Permit will not protect water quality in Maryland and will not meet state and federal water quality standards.

### C. Extreme Heat is Worsening Stormwater Pollution and Water Quality.

Studies show that Maryland's freshwater aquatic resources are directly threatened by higher water temperature.[100] Higher water temperatures are caused by the combination of climate change, deforestation, increases in rain events, and high percentages of impervious surfaces.[101] This results in higher ambient water temperatures as well as more and higher temperature stormwater runoff.[102] This combination has negative impacts on the biological health of Maryland's water resources.[103]

### D. Recommended Improvements to Reflect Climate Change

Extrinsic agency records indicate that the Department has neither considered nor addressed the impacts of climate change and other meteorological changes in the development of the Permit. On July 24, 2020, Commenters submitted a Maryland Public Information Act (PIA) request to the Department for climatological and meteorological data, analysis, and other information relied

[98] Fourth National Climate Assessment, Chapter 18, Key Message Number 1, *Intense Precipitation.* https://nca2018.globalchange.gov/chapter/18/ (last visited Jan. 17, 2021).
[99] Phase III WIP, at 45.
[100] *See, e.g.*, N. LeRoy Poff et al., *Aquatic Ecosystems and Global Climate Change*, Pew Center on Global Climate Change (Jan. 2002), *available at* https://www.pewtrusts.org/-/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/protecting_ocean_life/envclimateaquaticecosystemspdf.pdf.
[101] Russell Jones et al, *Climate change impacts on freshwater recreational fishing in the United States*, Mitig Adapt Strateg Glob Change 18, 731–758 (2013), https://doi.org/10.1007/s11027-012-9385-3.
[102] *Id*.
[103] Fourth National Climate Assessment, Chapter 18, https://nca2018.globalchange.gov/chapter/18/ (last visited Jan. 17, 2021).

upon by the Department in its implementation and development of the Permit.[104] On November 17, 2020, the Department released two (2) records in response to the PIA records request.[105] As of January 21, 2021, the Department has neither released any additional records responsive to our request nor has the Department confirmed that the transmitted records constitute the entirety of records responsive to the PIA request.

The transmitted records do not include, or even reference, relevant data or analysis of climate impacts or changed meteorological conditions, nor how such factors relate to or are addressed by the design and renewal of this Permit and earlier Phase I MS4 permits, implementation of the Phase I MS4 permits, or, even, other permits and regulations for stormwater of any kind. Included among the two responsive records is the Department's own 2020 Accounting Guidance, titled "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for National Pollutant Discharge Elimination System Stormwater Permits (June 3, 2020 Draft)." The 2020 Accounting Guidance explicitly relies upon the 2000 Maryland Stormwater Design Manual (revised 2009), which does not consider changed climate and meteorological conditions over the last ten-year period, at the very least, or longer. Furthermore, the 2020 Accounting Guidance is not enforceable in this Permit. The record indicates that the Department has not undertaken any analysis or technical consideration of already-changed and assuredly worsening climate and meteorological conditions that are likely to undermine the purpose and design of the Permit.

The 2020 Accounting Guidance describes how additional impervious acre credits may be available to permittees that install BMPs designed to treat more than the required one inch of rainfall, recognizing that "[...]greater storage volume may be more resilient to changing weather patterns such as increasing annual precipitation and more frequent, intense short duration storms" and "helps reduce downstream flooding and channel erosion."[106] Commenters agree that increasing the storage volume of stormwater BMPs is likely an important management strategy for permittees to adopt in order to adapt the design of BMPs to changing precipitation conditions, while producing additional co-benefits to mitigate downstream flooding. However, the additional prospective impervious acre credits offered by the Department do not alone address any change in the overall level of effort required of Phase I MS4 permittees to address increasing quantity and intensity of precipitation and flooding in Maryland, nor the watershed loads of nitrogen and phosphorus pollution attributable to climate change impacts that are not currently offset by Maryland's Phase III WIP for the Bay TMDL. The mere offer of potential credits for sizing up stormwater restoration BMPs is not alone an adequate approach to adapt the Permit to changed climate conditions.

### 1. The Department Must Strengthen Numeric Storm Design Standards to Account for Changed Precipitation Conditions.

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[104] Email from David Flores, Center for Progressive Reform, to Amanda Redmiles, Maryland Department of Environment (July 23, 2020). Maryland Department of the Environment Public Information Act Request Tracking Number 2020-01665.

[105] PDF documents titled, "Fundamentals of Success slides 6-4-19.pdf" (available athttps://www.mcet.org/Assets/mcet/MDE/swppp/MDE%20Stormwater%20Management%206-4-2019.pdf) and "2020 MS4 Accounting Guidance Document-EPA-June_2020.pdf." the Department Public Information Act Request Tracking Number 2020-01665.

[106] 2020 Accounting Guidance, at 27-28.

Recent studies have indicated that throughout most of the United States storm control infrastructure is under-designed for the increasing frequency and severity of extreme rainstorms.[107] This study indicates that the increase in extreme storms paired with under designed stormwater control systems will lead to the failure of many stormwater systems throughout the country.[108] The study also indicates that the eastern United States is experiencing extreme rain events 85 percent more often in 2017 than in 1950.[109] The lead author of this study stated in a press release "that infrastructure in most parts of the country is no longer performing at the level that it's supposed to, because of the big changes that we've seen in extreme rainfall."[110] Additionally, on a more regional scale the Phase III WIP indicates the same, that "increasingly frequent and severe extreme weather events will damage BMPs and necessitate more inspections, maintenance, or replacement and that more BMPs need to be installed to compensate for an anticipated loss of BMP pollution reduction efficiency."[111] **Effluent limitations, BMPs, and, by reference, storm design standards contained in the Draft Permit are likely under-designed and *must* be reviewed by the Department to determine whether these practices and standards will perform as necessary in light of more-recently historic and projected precipitation intensity, duration, and frequency data.**

The Draft Permit in its current form does not take the above facts into consideration and maintains outdated storm design standards. The Permit relies heavily on the 2020 Accounting Guidance and long outdated numeric design standards in the 2000 Maryland Stormwater Design Manual. Climate considerations, such as accounting for new data and trends showing increases in the intensity, duration, and frequency of storms are inherent to the design and implementation of practices to control stormwater pollution. However, the Permit lacks any affirmative duty or requirement for the permittee to ensure that climate change impacts and meteorological changes are adequately considered, especially through its implementation of the required Stormwater Management and Assessment of Controls provisions.

The Department must research and analyze data regarding effectiveness of current BMPs and analyze and update numeric storm design standards to be reflective of recent data and current trends. As discussed above, Commenters requested records of the Department's consideration and analysis of these climate factors in the design and drafting of this Permit and disclosed records indicated that no such analysis or even discussion of such analysis was considered or undertaken by the Department. While accounting for already changed precipitation conditions, the Department should also consider downscaled climate models that can produce reliable estimates of near-future precipitation patterns (see **Appendix D**, Dr. Horner's Report, at page 16). This is the only way that the Department will be able to plan for the future (as it should), rather than for the past. The Department should also add a re-opener to the permit to allow for

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[107] Daniel Wright, et al. *U.S. Hydrologic Design Standards Insufficient Due to Large Increases in Frequency of Rainfall Extremes*, Geophysical Research Letters, Volume 46, Issue 14 (July 28, 2019), *available at* https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019GL083235; Abigail Eisenstadt, *U.S. Infrastructure Unprepared for Increasing Frequency of Extreme Storms*, American Geophysical Union (Aug. 1, 2019), *available at* https://news.agu.org/press-release/us-infrastructure-unprepared-for-increasing-frequency-of-extreme-storms/.
[108] *Id*.
[109] *Id*.
[110] *Id*.
[111] *Id.* at 46.

the permits to be modified in the event that the Department completes an analysis of climate change-related impacts that have not yet been incorporated and/or state legislation or other regulatory changes require updates to storm design standards and IDF curves.

In the meantime, the Department should adjust its expectations to fit the most recent available precipitation data, and/or incorporate a margin of safety. For example, the Department could, like Virginia Beach (discussed below), adjust its precipitation estimates upward by 20 percent. At a more granular level, the Department should consider prioritizing BMPs for "hot moments in hot spots."[112] Given what we know about climate change, the Department should identify a near-future peak storm flow or a suitable proxy (which might be, for example, the highest recorded 24-hour rainfall total over the past 10 years), and identify BMPs best suited for retaining that level of precipitation, particularly in locations that are uniquely susceptible to storm flooding. Assuming that precipitation patterns over the forthcoming permit cycle will resemble the precipitation patterns of 1991-2000, while simultaneously acknowledging that the assumption is invalid, is arbitrary and capricious. The Department must make an effort to adjust to the new normal and plan for increased precipitation volume and intensity.

The Department has an opportunity to make this Permit truly protective of State waters and be a ***true* climate leader on this front. Commenters urge the Department to take the time necessary to fully assess the factors and issues we have discussed** above to ensure that the new Permit is responsive to these trends and that the Department does not lag behind and wait until it is too late when this permit is renewed again in five years.

Numerous entities have begun similar updates and Commenters urge the Department to review, contact, and, if necessary, coordinate with any of the below entities that have updated IDF curves and storm design standards based on current rain data and trends regarding impacts from a changing climate.

- The Chesapeake Bay Program - A recent draft memo within the Program summarized five recent studies "that downscaled precipitation projections for local stormwater management application."[113] The memo also states that these downscaled precipitation projections are 'necessary to [] inform future stormwater design."[114] The summary of these studies indicates that Rainfall Intensity Projections will increase across the watershed with increases ranging from 1% to 44%.[115] The memo also states "that the use of IDF curves based on historic precipitation analysis are likely to underestimate future precipitation.[116] Lastly, the memo notes that a study of Maryland with resulting downscaled precipitation projections is currently underway with results pending. Commenters urge the Department to track and communicate with the authors of this

[112] See H.E. Preisendanz et al., *Temporal inequality of nutrient and sediment transport: A decision-making framework for temporal targeting of load reduction goals*, Environ. Res. Lett. 16 (2021).
[113] David Wood, Chesapeake Stormwater Network, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed*, 12 (Sept. 4, 2020), *available at* https://www.chesapeakebay.net/channel_files/40324/memo_3_summary_of_climate_projections_review_draft_9.4.20.pdf.
[114] *Id.* at 13.
[115] *Id.* at 17.
[116] *Id*. at 2.

study and thoroughly analyze how the projected IDF curves that result may be implemented immediately into this Permit, through the use of a reopener, and/or updates to the storm design standards during the permit term.

- Chesapeake Bay Program Urban Stormwater Workgroup - This workgroup is developing a project to "develop future projected IDF curves for the entire Chesapeake Bay Watershed and host them on a web-based tool" with the goal "to design and build infrastructure assets to withstand anticipated future precipitation conditions, design standards should reflect future precipitation projections and not solely be based on historical precipitation records."[117] We urge the Department to track and collaborate with this workgroup as necessary to implement the appropriate standards into the MS4 and to implement similar goals and motivations into the design and implementation of the MS4.

- Virginia Beach, Virginia - The City of Virginia Beach updated its Public Works Design Standards Manual in June 2020.[118] These updates included the requirement that developers "plan for 20 percent more rainfall than current National Oceanic and Atmospheric Administration data calls for."[119] This change was driven by studies from the City that indicated that "actual rainfall frequency depths in Virginia Beach are approximately 10% greater than those specified in NOAA" and "in order to address the need for more accurate design rainfall data and to consider projected increases in rainfall frequency depths over the next 30 years, rainfall depth-duration values were increased by 20% over NOAA Atlas 14 values."[120] We urge the Department to conduct a similar analysis of Maryland as a whole, develop updated storm design standards applicable across the state and determine if any areas of the state require further enhancement of standards based on local/regional rainfall data.

- Virginia Department of Transportation - "The Virginia Department of Transportation (VDOT) has also revised its bridge design manual to account for climate change. VDOT

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[117] Michelle Miro et al. *Piloting the Development of Probabilistic Intensity Duration Frequency (IDF) Curves for the Chesapeake Bay Watershed*, presentation to Chesapeake Bay Program Urban Stormwater Workgroup Meeting (June 16, 2020), *available at* https://www.chesapeakebay.net/channel_files/40321/urbanstormwaterworkgroup_16june2020.pdf.

[118] Virginia Beach Department of Public Works Engineering Group, *Design Standards Manual*, City of Virginia Beach, Virginia (June 2020), *available at* https://www.vbgov.com/government/departments/public-works/standards-specs/Documents/_June%202020%20Design%20Standards%20Manual.pdf.

[119] Brett Hall, *Starting this summer, developers must plan for more flooding in order to build in Virginia Beach*, WAVY-TV, (Aug. 12, 2020, 12:43 AM) https://www.wavy.com/weather/flooding/starting-this-summer-developers-must-plan-for-more-flooding-in-order-to-build-in-virginia-beach/.

[120] Virginia Beach Department of Public Works Engineering Group, *Design Standards Manual*, at 8–9; *see also* Dmitry Smirnov, et al., *Analysis of Historical and Future Heavy Precipitation*, Dewberry, Submitted to City of Virginia Beach Department of Public Works (Mar. 26, 2018), *available at* https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Documents/anaylsis-hist-and-future-hvy-precip-4-2-18.pdf.

has implemented a 20% increase in rainfall intensity and a 25% increase in discharge in design of bridges."[121]

- Maryland's Eastern Shore - The Eastern Shore Land Conservancy commissioned a study on extreme precipitation on Maryland's Eastern Shore. The conclusion of this study was that "extreme precipitation events are becoming more intense and bringing more rain, a trend which will continue and escalate in the coming decades.[122] One of the key recommendations from the report was to "upgrade infrastructure to reflect future precipitation estimates".[123]

- Anne Arundel County, Maryland - Updated 1-year storm designation to 2.7 inches in 2017.[124]

- New York - "The New York State Department of Transportation has revised their highway design manual to account for future projected peak flow in culvert design. The change was a 20% increase." and "as another example, New York City has not adjusted its design manual, but has issued the "Climate Resiliency Design Guidelines" (NYC Mayor's Office of Recovery and Resiliency, 2019). Among the guidelines provided is the recommendation that the current 50-year IDF curve be used as a proxy for the future 5-year storm (projected for the 2080s). The guidelines suggest that designers plan to use on-site detention/retention systems to retain the volume associated with that size storm event though it is not yet a requirement."[125]

**2. The Department Should Limit Credit Eligibility for BMPs Exposed to Flooding.**

In response to the overwhelming science demonstrating the effects of climate change on flooding, sea level rise, and extreme precipitation in the region, the Department should require more expansive reporting of flooding impacts on BMPs, and limit Stormwater Restoration and TMDL WLA credit eligibility for new, proposed BMPs exposed to flood risks.

Climate change poses a threat to the effectiveness of BMPs as the frequency of storms and the amount of precipitation increases. The Phase III WIP acknowledges that "more intense storms

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[121] David Wood, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed*, at 12, 21; *see also* Virginia Department of Transportation. *Consideration of Climate Change and Coastal Storms*, (Feb. 14, 2020), *available at* http://www.virginiadot.org/business/resources/bridge/Manuals/Part2/Chapter33.pdf.
[122] Michelle Charochak and James Bass, *Preparing for Increases in Extreme Precipitation Events in Local Planning and Policy on Maryland's Eastern Shore*, 27 (Jan. 2020), *available at* https://www.eslc.org/wp-content/uploads/2020/01/ExtremePrecipitationReport.pdf (a report prepared for the Eastern Shore Climate Adaptation Partnership by Eastern Shore Land Conservancy)
[123] *Id*. at 3.
[124] Rachel Pacella. *Tropical Storm Isaias highlights a familiar problem in Anne Arundel: Where does the rain go, and how fast?* The Baltimore Sun (Aug. 5, 2020, 9:00 AM), ttps://www.baltimoresun.com/news/environment/ac-cn-stormwater-management-0805-20200805-c4ic23hcrvesxequxaxpt6rsfm-story.html?outputType=amp.
[125] Arthur DeGaetano and Christopher Castellano. *Downscaled Projections of Extreme Rainfall in New York State*, Northeast Regional Climate Center, Cornell University Ithaca, NY, 12, *available at* http://ny-idf-projections.nrcc.cornell.edu/idf_tech_document.pdf; David Wood, *Review of Recent Research on Climate Projections for the Chesapeake Bay Watershed*, at 19.

are expected to change the effectiveness of BMPs to control pollution runoff."[126] The WIP states that:

> "[t]hese enormous costs are raising questions, nationally and in Maryland, whether building and rebuilding should continue in areas with repeat catastrophic weather events. As the State continues to invest in BMPs to restore the Bay, it must carefully consider their placement to avoid areas that are at risk from the most severe climate impacts."[127]

The writers of the WIP, including many Department staff who contributed to it, identified a number of reasons why doing nothing will force the state to incur additional costs later:

> "First, increasingly frequent, and severe extreme weather events will damage BMPs and necessitate more inspections, maintenance, or replacement. Second, more BMPs need to be installed to compensate for an anticipated loss of BMP pollution reduction efficiency. Third, additional BMPs are likely needed to address increased future pollution loads."[128]

Given the increasing likelihood of flooding within Phase I jurisdictions and impacts to public facilities and BMPs covered by the MS4 permit, the Department should revise the draft permit's reporting requirements in order to capture data for every incident of flooding that occurs at and impacts the operation of required BMPs. An all-encompassing requirement for reporting flooding incidents will be beneficial to MS4 jurisdictions and the Department in a number of ways. First, the requirement would ensure that any episode of BMP failure of any kind due to flooding is documented. Second, the documentation and reporting would also benefit the permittee and agency by providing site-specific flood data that could help with the design and implementation of future BMPs and/or flood mitigation measures. Lastly, the collection of this data would allow Maryland to begin creating a record of flooding and flood impacts on stormwater BMPs to support future permit-wide adaptation reforms.

Climate change has already increased the risk of flooding and the intensity and volume of precipitation in Maryland. Therefore, the Department should require the MS4 permittee to identify and consider present-day flood risks and precipitation conditions in the design and maintenance of stormwater control practices and in monitoring and reporting requirements. The Department should also pay particular attention to proposed BMPs in flood prone areas or areas susceptible to sea level rise. It is imperative for the protection of waters of the State that the Department establish siting standards to keep new BMPs out of areas of high risk of inundation now, or under near-future climate conditions taking into account the lifetime of designed BMPs.

At a minimum, **we strongly urge the Department to deny ISR credits for new, proposed BMPs that would be located in a FEMA flood zone (areas not determined to be an area of minimal flood hazard), in areas subject to potential inundation by storm surge from a Category 1 or 2 hurricane, and areas projected to be at risk of inundation from storm surge when sea levels increase by two feet or less.** Science shows that these areas are at the most risk from flooding in response to climate change in the present and near future, and the

[126] Phase III WIP, at 43.
[127] *Id.* at 44.
[128] *Id.* at 46.

costs associated with damage to facilities in these areas is already staggering. If permittees are insistent on building BMPs in these areas and acquiring ISR credits for these practices, then the Department should at least require the jurisdiction to undertake a thorough analysis of the flood risks and engineered solutions necessary to either assure BMP performance under flood conditions or discount ISR credits in proportion to the probability and extent of BMP failure under flood risks.

### 3. The Department Must Consider Climate Impacts and Changed Meteorological Conditions in Designing Provisions and Requirements for Technology-based Effluent Limitations

There is no indication that the required controls, practices, and effluent limitations in this permit are designed to adequately control or respond to the increasingly extreme precipitation, flood, and heat events occurring in Maryland. The increased threat of extreme rain, flood, and heat events in Maryland must be part of the Department's consideration and design of this draft permit. It is not sufficient to rely on outdated standards when the science is clear that Maryland and the Mid-Atlantic are experiencing extreme rain events at a greater frequency than any other part of the contiguous United States. The Stormwater Management, Erosion and Sediment Control, Illicit Discharge Detection and Elimination, Property Management and Maintenance, and Public Education provisions must be re-examined in light of current and projected precipitation, flooding, and extreme heat trends in Maryland to ensure that discharges will meet applicable water quality standards.

### 4. The Department should consider revisions to the Draft Permit and future modifications to the reissued permit to account for forthcoming studies and planning processes.

The Department should revise the draft permit to include a reopener clause, committing to modify the permit to address forthcoming climate change analyses, reports, and plans relevant to this permit. Critically, the Department should ensure that reasonable modifications are made to this permit no later than 2022 for the purpose of incorporating the state's commitment to address climate-attributable pollution loads to the Chesapeake Bay as part of the Bay TMDL mid-point assessment. Maryland committed to submit to EPA an addendum to its Phase III WIP that addresses previously unaccounted for loads of pollution attributable to climate change. Preliminary modeling of these loads by the Bay Program indicates that Maryland's share could amount to 2.19 million pounds of nitrogen per year by 2025 that are not currently accounted for by the state's WIP or in existing permitting programs. Maryland's climate addendum is due for submission in 2021, which is several years before this permit will expire.The climate addendum is likely to consider new and revised commitments relevant to sources of climate-attributable pollution, including, for example, potential increases in stormwater discharges attributed to increasing intensity and quantity of precipitation within the region.[129] Maryland will soon also finalize several relevant climate studies, reports, and plans including, for example, a statewide

[129] Notably, in its Phase III Watershed Implementation Plan, Maryland specifically commits to continued research on the impact of increased precipitation on stormwater BMP performance, which would support the modification of stormwater design standards and other elements of this permit to account for the impacts of climate change.

plan to address nuisance flooding, an update to Maryland's modeling and mapping of 100-year flood-zones, and a water quality and climate change resiliency portfolio set to release in 2021.

## X. The Draft Permit Fails to Address Environmental Justice Concerns of the Disproportionate Impacts of Stormwater Pollution.

The central tenets of environmental justice are meaningful involvement in decision making and equal protection from environmental health hazards.[130] Like many aspects of environmental management, stormwater pollution controls have failed to adequately account for and address impacts to vulnerable and marginalized communities. While contaminated stormwater poses risks for everyone, some communities are at greater risk because of past and current discrimination that has led to residential segregation, disinvestment, and lack of political power to shape land-use and stormwater management decisions. Low-income communities and communities of color have long been excluded from decisions about land use and forgotten as the regulators allocate resources. This system of partial management leads to land use decisions that exacerbate existing issues and lay the groundwork for new ones as climate change drives increased storm events.

The environmental injustice of stormwater management is often starkest in urban areas, such as Baltimore City. For example, although residents have suffered through increasingly frequent flood events for almost 65 years, the Baltimore Office of Sustainability only provides floodplain information for coastal areas.[131] The Ednor Gardens/Lakeside community and those along the Frederick Avenue corridor in West Baltimore, which have suffered from repeated flooding events, are decidedly inland. Over the years, residents have repeatedly reached out to City officials, detailing their concerns in a litany of emails and phone calls. Much to the disappointment of the community, the City has failed to provide a meaningful response. In failing to develop a plan that addresses the clear inadequacies and inequities in the City's stormwater infrastructure, Baltimore has once again left its most vulnerable residents to their own devices.

This disparity is also clear when comparing jurisdictions. For example, the Draft Permit allows Baltimore County, which is more affluent and whose population is a greater percent White to do less to curb actual pollution flows while sending its polluted stormwater downstream to Baltimore City, whose residents on the whole are predominantly low-income and African-American.[132]

Stormwater restoration is an equity issue. Marginalized communities are often paved over and lacking in green spaces that could absorb stormwater and filter contaminated urban runoff.[133]

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[130] People of Color Environmental Leadership Summit, *The Principles of Environmental Justice* (Oct. 1991), https://www.nrdc.org/sites/default/files/ej-principles.pdf.

[131] Baltimore Office of Sustainability, *Floodplain Management Program*, https://www.baltimoresustainability.org/floodplain-management-program/ (last visited Jan. 19, 2021).

[132] *QuickFacts Baltimore County, Maryland*, U.S. Census Bureau, https://www.census.gov/quickfacts/baltimorecountymaryland; *QuickFacts Baltimore City, Maryland (County)* U.S. Census Bureau, https://www.census.gov/quickfacts/baltimorecountymaryland.

[133] *See* Manal J. Aboelata & Elva Yañez, "Stormwater Management Is an Equity Issue," *Meeting of the Minds* (Feb. 25, 2020), https://meetingoftheminds.org/stormwater-management-is-an-equity-issue-33258.

Restoration practices like green infrastructure have the potential to alleviate the damage caused by years of lackadaisical environmental management in disenfranchised communities. Green infrastructure projects provide improved water quality and reduced urban flooding and lay the framework for larger scale benefits like cleaner air and reduced urban heat island effect.[134] Because many of these benefits are highly localized, the siting of green infrastructure and other stormwater BMPs will deepen environmental inequities if governments fail to implement restoration efforts in marginalized communities.

It is critical that the Department include provisions in this permit to eliminate the harmful impacts of polluted runoff, address infrastructure inadequacies, and equalize the distribution of environmental, public health, and economic benefits from restoration efforts. This permit must incorporate actual stormwater restoration and not hollow efforts such as street sweeping that cannot reduce stormwater flow volumes at a rate sufficient to protect residents and their homes. Moreover, the permittees must be required to include all affected communities in permit implementation through robust and inclusive public outreach efforts.

The Department recently stated that environmental justice, along with climate change, is a "paramount concern to the Maryland Department of the Environment."[135] We are concerned that this statement is not currently reflected in the actions of the Department. Commenters submitted a Public Information Act request to learn more about the level of coordination between those drafting the MS4 Permit and the Commission on Environmental Justice and Sustainable Communities ("CEJSC"), which is staffed by the Department. Similar to our findings with respect to other major permits and the Phase III WIP, there was no coordination or consultation between the Department and the CEJSC during the phase of deliberations over this permit, despite the obvious connections between the MS4 permit and environmental justice.

As recommended by the Maryland Senate President's Advisory Workgroup on Equity and Inclusion, the Department and other entities involved in environmental permitting or other decisions with environmental justice implications should be required to use accurate environmental justice-related data from government entities or other reliable sources to inform their decision making.[136] If nothing is done to prevent this backslide on the twenty percent restoration standard in the previous permit, it will surely amount to a continuation of the Department's campaign of disinvestment in Maryland's urban communities. We strongly urge the Department to reverse course on this proposed rollback and reissue Draft Permits that incorporate the recommendation of the Senate President's workgroup and any legislation to codify the recommendations.

Thank you for your consideration of our comments. We look forward to your responses and as always, welcome the opportunity to discuss further with you.

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[134] EPA, Benefits of Green Infrastructure, https://www.epa.gov/green-infrastructure/benefits-green-infrastructure.
[135] Jay Apperson, Maryland Department of the Environment, *eMDE: An Eastern Shore Home to Environmental Justice* (Dec. 16, 2020) https://news.maryland.gov/mde/2020/12/16/3342/.
[136] Report of the Senate President's Advisory Workgroup on Equity and Inclusion, January 2021. Available at: http://www.mgaleg.maryland.gov/pubs-current/SenatePresidentAdvisoryWorkgrouponEquityandInclusion.pdf.

Sincerely,

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# Stormwater Backup in the Chesapeake Region


## Hit by Increasing Rainfall, Pennsylvania and Maryland Retreat in their Plans to Control Stormwater Pollution

FOR RELEASE:
August 17, 2020

EIP ENVIRONMENTAL INTEGRITY PROJECT

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More information about EIP can be found at https://environmentalintegrity.org/


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## PHOTO CREDITS:


Cover image: Photo by Matt Rath/Chesapeake Bay Program of flooding in downtown Annapolis in 2010 after a heavy rain. Image on page 3 inside report from Libby Solomon/The Baltimore Sun, purchased from the Associated Press and used with permission. Image of rain on parking lot on page four from Wikimedia Commons. Stormwater culverts discharge into a marsh along Maryland's Avon River/Jane Hawkey, Flickr. Bay oyster restoration project/Virginia State Parks. Aerial view of Annapolis, MD/ Jane Thomas/Smithsonian. High water runs under Bay-area bridge during flooding/Aaron Skolnik/FEMA photo library. Crews clean-up stormwater culvert after Ellicott City flood/U.S. Army Corps of Engineers. Flood damage along Main Street in Ellicott City on August 10, 2016/Wikimedia Commons. Recovery efforts along Main Street in Old Ellicott City during the summer of 2016/Wikimedia Commons. DC Clean Rivers Project (Northeast Boundary Tunnel)/DC Water. The Kennedy Street revitalization project/Chesapeake Stormwater Network.

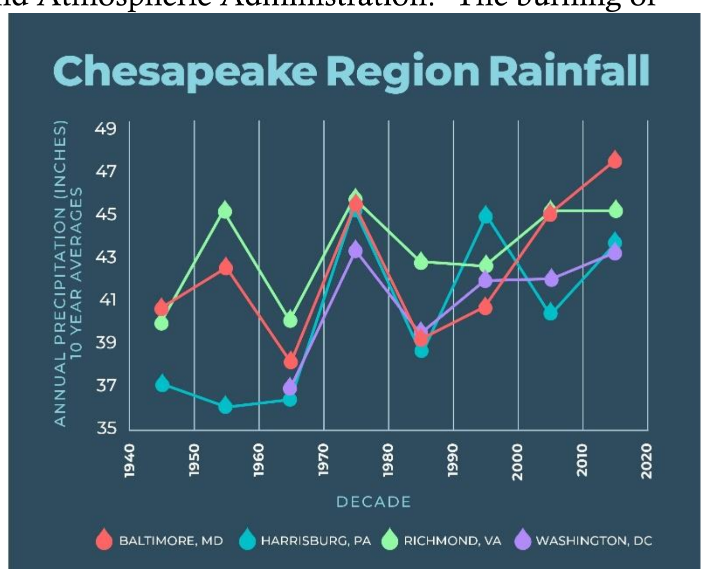
# Stormwater Backup:

## *Despite Increasing Rainfall, PA and MD Retreat in their Plans to Control Stormwater Pollution*

### Executive Summary

In 2018, record-setting amounts of rain drenched the Chesapeake Bay region, including 72 inches in Baltimore – which was 75 percent more than the annual average stretching back to the 1940s.[1] Another 67 inches deluged Washington, D.C., 64 inches pummeled Richmond, and 62 inches flooded Harrisburg, among other locations. The amount of fresh water pouring into the nation's largest estuary in 2019 was by far the highest ever recorded, averaging 130,750 cubic feet per second, according to U.S. Geological Survey.[2] While many people think of rain as a cleansing force, in our modern world, because of all the fertilizers on lawns and farms and the oil and antifreeze on our roads and parking lots, increased precipitation sweeps more pollution off of these surfaces and into our waterways. This results in more sediment clouding the Bay's waters and more nitrogen and phosphorus fueling algae blooms and fish-killing low-oxygen "dead zones."

Both of these recent high-water years dealt blows to Chesapeake cleanup efforts.[3] But they were not freakish events. In fact, the amount and intensity of rainfall across the whole region has been gradually creeping upward for the last century, according to data from the National Oceanic and Atmospheric Administration.[4] The burning of fossil fuels has wrapped an insulating blanket of greenhouse gases around the Earth, heating the atmosphere. Warmer air retains more moisture, leading to more precipitation in some areas, including the Chesapeake Bay watershed.




Ten year average rainfall totals from National Oceanic and Atmospheric Administration (NOAA).

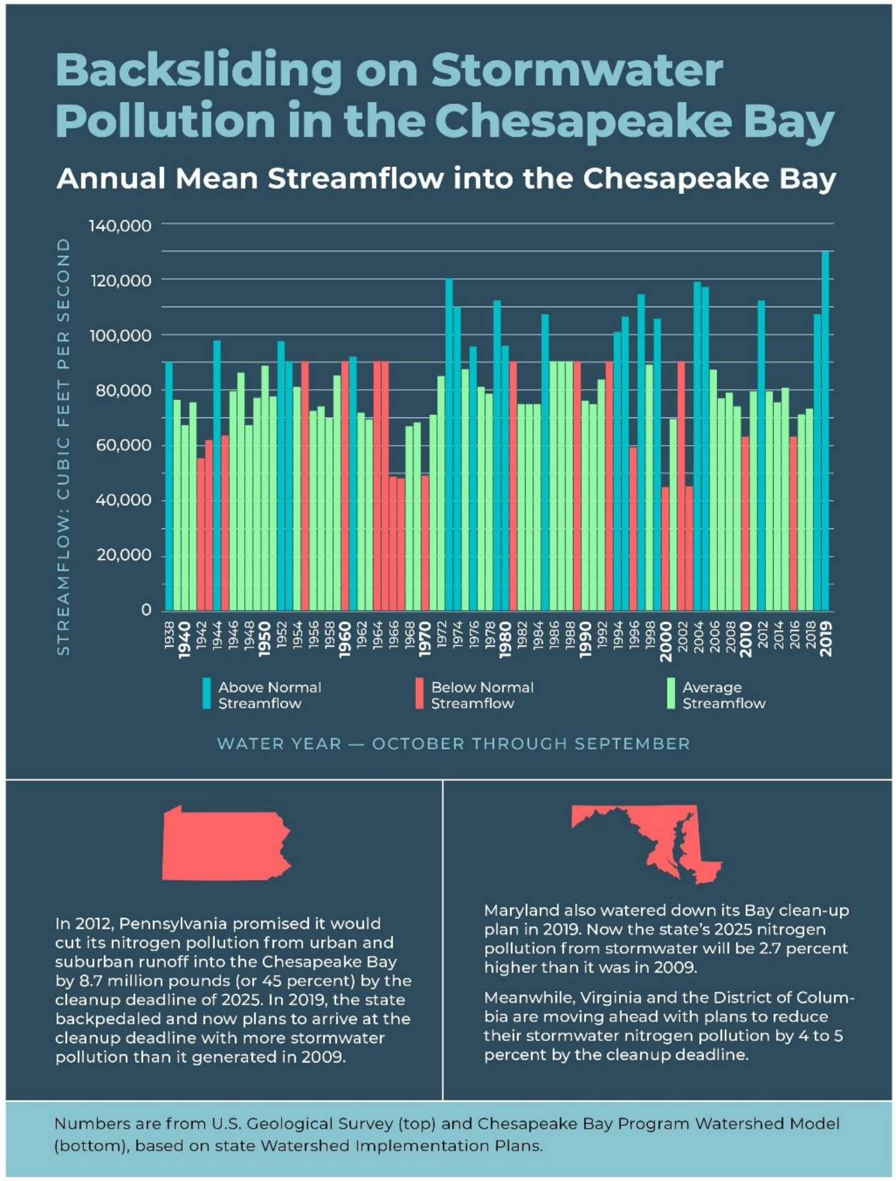
This increased runoff has created an additional challenge to the most recent Chesapeake Bay cleanup plan, launched by the U.S. Environmental Protection Agency and Bay region states in 2010, called the Bay Total Maximum Daily Load (or TMDL). The Bay TMDL requires states to implement plans by 2025 that will reduce nitrogen, phosphorus, and sediment flowing into the Bay by about a quarter. Cleanup progress has been erratic. Effluent from wastewater plants and some other sources has declined substantially. However, pollution from urban and suburban stormwater runoff has been increasing – up 5 percent for nitrogen between 2009 and 2019, up 3 percent for phosphorus and sediment over this time period, according to numbers from the EPA-led Chesapeake Bay Program.[5] In 2019, stormwater from developed land contributed 40 million pounds of nitrogen to the Bay (16 percent of the total nitrogen pollution), 2.6 million pounds of phosphorus (17 percent of total), and 1.7 billion pounds of sediment (9 percent of total).[6]

*The growth of suburban sprawl and parking lots have increased the amount of runoff pollution fouling the Chesapeake Bay.*

One reason for the increase in urban and suburban runoff pollution is continued real-estate development and suburban sprawl – and the failure of states to control this growth in impervious surfaces. Since 2009, the amount of developed land in the Bay watershed has increased by about 300,000 acres, or about 6 percent – an area six times the size of the District of Columbia -- adding more blacktop, roofs, and roads that accelerate runoff pollution.[7] But the other reason – as mentioned earlier – is the increase in rainfall from climate change. The Chesapeake Bay Program projects that climate change will increase annual nitrogen pollution in the Bay by 9 million pounds (or 3.6 percent) between 2018 and 2025, and increase annual phosphorus loads by 489,000 pounds (or 3 percent).[8]

Given those warnings of an increasing pollution load, the Bay region states should have incorporated more aggressive pollution control measures into their Bay cleanup plans, but two of the largest states did not. In their most recent pollution reduction plans submitted to EPA in August 2019—their Phase III "Watershed Implementation Plans" or WIPs – Pennsylvania and Maryland failed to incorporate the added pollution load attributable to climate change. Virginia, to its credit, has built the additional load from climate change into its plan and is moving forward with more projects to meet more stringent stormwater planning targets.

In contrast, Pennsylvania and Maryland retreated in their proposed efforts to reduce urban and suburban runoff. This is significant because Pennsylvania, Maryland and Virginia account for about 90 percent of the urban and suburban runoff pollution fouling the Bay. Overall, due largely to backsliding by Maryland and Pennsylvania, the Bay states' pollution reduction goals for 2025 have been scaled back significantly. The prior (Phase II) WIPs called for a watershed-wide stormwater nitrogen reduction of 7.9 million pounds by 2025, relative to the 2009 baseline. The current (Phase III) WIPs only call for a reduction of 0.5 million pounds.[9] In other words, the states have given up on 7.4 million pounds of nitrogen reductions from urban and suburban runoff. Similarly, the states have given up on 340,000 pounds of phosphorus pollution from stormwater and 382 million pounds of sediment.[10]




Meanwhile, at the local level, many cities and counties – like the states of Maryland and Pennsylvania – are not adequately planning for the increased volume of rainfall and stormwater already inundating their communities and causing flash flooding and erosion problems. As one planning consultant in Prince George's County warned: stormwater control projects "designed for current conditions will most likely fail to sufficiently treat and reduce runoff from the projected larger and more intense storm events."[11]

For this report, the Environmental Integrity Project (EIP) analyzed federal, state and county records and pollution control plans (including Phase II and III WIPs), as well as data from the Chesapeake Bay Program, U.S. Geological Survey, and other sources.

Among this report's conclusions are the following:

- Maryland and Pennsylvania's 2019 Bay cleanup plans (Phase III WIPs) set goals for nitrogen pollution entering the Bay from urban and suburban stormwater in 2025 that are *higher* than the loads back in 2009.This means these states are accepting increases in this pollution over this time period instead of planning reductions.

- Maryland's 2019 plan would allow an increase in the amount of nitrogen pollution flowing into the Bay from stormwater runoff by 249,000 pounds per year by 2025, compared to the 2009 baseline, according to the EPA-led Bay Program. Back in 2012, by contrast, Maryland had been planning for a 1.3 million-pound annual reduction.[12] Combined, that's a retreat of more than 1.5 million pounds of pollution per year.
- Compared to its 2012 plan, Maryland is now planning to build fewer stormwater-filtering projects called rain gardens (zero instead of 34,716 acres) by 2025. The state also plans to create less pavement permeable to water (zero acres instead of 350), and plant fewer forested acres along urban streams (zero instead of 26,430), among other retreats.[13]
- Pennsylvania's 2019 Bay cleanup plan will allow nearly 7 million more pounds of nitrogen pollution from urban and suburban runoff by the 2025 cleanup deadline than its 2012 plan. The new plan will increase the amount of nitrogen flowing into the bay from developed areas by 250,000 pounds by 2025, compared to the baseline of 2009, instead of decreasing it by 6.7 million pounds.


*Pennsylvania is dialing back its plans to build stormwater control ponds, wetlands, and permeable parking lots that would reduce flash flooding and stormwater pollution.*

- Among other changes, the Keystone state's new plan would include replacing only replacing 202 acres of parking lots and other "impervious surfaces" instead of the 2,300 acres planned by the state back in 2012. Pennsylvania's 2019 plan would create 203,265 acres of stormwater control ponds, wetlands and other projects by 2025, instead of the 1.5 million acres of stormwater control practices planned back in 2012.[14]
- By contrast, Virginia's most recent Bay cleanup plan (Phase III WIP) would reduce nitrogen pollution from urban and suburban stormwater by 408,000 pounds by 2025. Virginia would also reduce the amount of sediment flowing into the Bay from urban areas by 66 million pounds.
- To achieve these reductions, Virginia would plant 30,000 trees to absorb runoff (38 times more than the 799 trees in its last plan), and install 4,564 acres of pavement permeable to rain (instead of the 52 acres of permeable pavement proposed back in 2012), among other changes.

At the local level, EIP examined stormwater planning documents for 11 large counties in the Chesapeake Bay watershed – including Baltimore and Montgomery counties in MD; Lancaster and York counties in Pennsylvania; and Fairfax and Loudon counties in Virginia – and found all of them are planning for past rainfall averages, rather than for current and future rainfall volumes caused by climate change. We also scrutinized the plans of four cities with outdated combined sewage and stormwater systems that are planning upgrades to reduce sewage discharges and found that all of them are planning infrastructure based on outdated assumptions about rainfall. The worst case was in Cumberland, Maryland, which is planning on only 37 inches of annual rainfall as it designs an upgraded pipe system, when in reality 48 inches have been falling on that city each year over the last five years (a 27 percent difference). Washington, D.C., has a 21 percent gap between its planning for overflows and reality; Harrisburg, Pa., 15 percent; and Lynchburg, Va., 13 percent. Inadequate planning and infrastructure in some of these cities is contributing to severe local water quality problems. In Harrisburg, for example, bacteria monitoring by the Lower Susquehanna Riverkeeper in June and July of 2020 found *E. coli* bacteria concentrations in the river that averaged more than 2.5 times safe levels for swimming or water contact recreation, including just downstream from outfalls leading from the Governor's Residence and State Capitol Complex.[15]

This report looks briefly at all four of these cities, and then provides detailed case studies about what two communities – Washington, D.C., and Ellicott City, Maryland – are doing to manage increasing volumes of stormwater.

What are the solutions to the problem of rising runoff pollution and flash floods caused by climate change? EIP makes the following recommendations:

1) Broadly speaking, we should be planning for the future, not the past. There is no question that rainfall in the Bay region is increasing in both total volume and intensity. Planning at all levels – from the federal government down to the county and city level – must take these trends into account. All levels of government should start calibrating their planning and stormwater control projects and infrastructure to reflect likely future rainfall patterns, not historic averages from decades ago.
2) EPA must take a more active leadership role and require Pennsylvania and Maryland to strengthen their stormwater control plans and account for climate change. Instead of backtracking, Pennsylvania and Maryland should expand the stormwater pollution projects in their Phase III Watershed Implementation Plans.
3) EPA should require Pennsylvania to commit substantially more resources to its Bay cleanup effort, which has been far behind the other states. Federal actions could include the denial of permit approvals for major construction projects in Pennsylvania and a demand that the Commonwealth upgrade its leaky combined stormwater and sewage systems, including in Harrisburg.
4) States and municipalities across the Chesapeake region should invest more in stormwater control projects, such as the construction of artificial wetlands, ponds, rain gardens and the conversion of parking lots and other impervious surfaces to

green areas that absorb rain. These projects not only control runoff pollution, they also help address environmental justice issues by creating parks in urban areas that are often dominated by blacktop.
5) Because stormwater control projects are expensive, EPA and Congress should provide substantial federal funds to state and local governments to help pay for these projects, which create jobs. Such federal investments would be a healthy economic stimulus package to help the nation rebound from the COVID-19 recession.

With a problem as sweeping as climate change impacting all other environmental issues in the Bay watershed – from water pollution to flooding – it makes more sense to plan for their interconnectedness than to pretend they exist in isolation. Building more stormwater control infrastructure is also an ideal way to put American construction workers back to work during an economic downturn. Planting trees and building parks and green roofs on buildings to absorb rainwater also helps poorer neighborhoods in cities like Baltimore, Harrisburg, and the District of Columbia. These cities are often starved of green space and act as concrete frying pans in the summer, with temperatures several degrees hotter than wealthier and leafier suburban neighborhoods.[16] Adding greenspaces and trees will help alleviate environmental injustices, give urban neighborhoods more room to breathe, and help hold down temperatures in a warming world.

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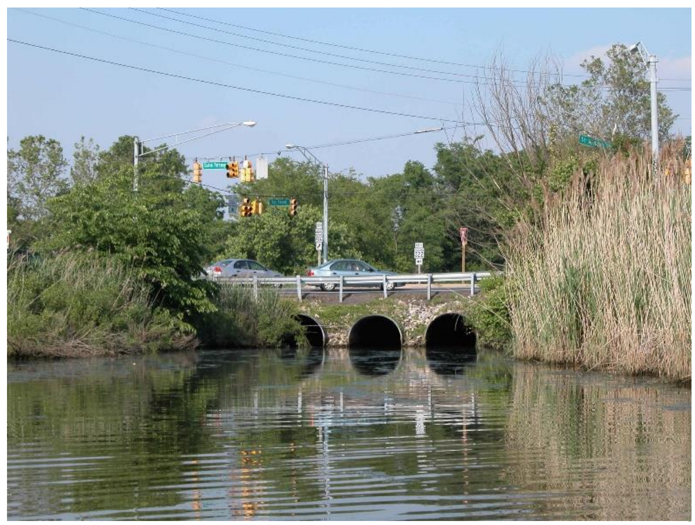
# I. Background: Growing Rainfall and Suburban Sprawl

Climate change is causing increases in both total precipitation *volume* and precipitation *intensity*, or high-rainfall events. This is largely because warmer air holds more moisture.[17] As described in more detail below, the Chesapeake Bay watershed is uniquely vulnerable to these trends for three reasons. First of all, the Bay is already impaired, so there is no "buffer" that could help absorb the adverse impacts of climate change. Second, the Bay watershed is located in the northeastern United States, where precipitation intensity is increasing faster than anywhere else in the country. Third, the overall impact of climate change on the Bay includes much more than precipitation and stormwater (the focus of this report). As noted in the most recent National Climate Assessment, "[t]he Chesapeake Bay watershed is experiencing stronger and more frequent storms, an increase in heavy precipitation events, increasing bay water temperatures, and a rise in sea level."[18]

The historical trends for the northeastern United States are clear. Since 1900, total annual precipitation in the region has increased by roughly 1 cm per decade – twice as fast as the country as a whole.[19] In the Chesapeake Bay region, record-setting amounts of rain fell in 2018 in Baltimore (72 inches), Harrisburg (62 inches), Richmond (64 inches), and Washington DC (67 inches), among other locations, according to data from the National Oceanic and Atmospheric Administration (NOAA) dating back to the 1940s.[20] The upward trend has been fairly consistent over the decades, suggesting that 2018 was not a freakish year but possibly a reflection of a new normal. For example, in Baltimore, the annual average precipitation from 2010 to 2019 was 47 inches – 24 percent higher than the 38 inches per year from 1960 to 1970.[21] In Harrisburg, the 2010-2019 average was 44 inches, 22 percent more than the 36-inch average during the 1960s.[22]


*Stormwater culverts discharge into a marsh along Maryland's Avon River, which empties into the Chesapeake Bay.*

Beyond the sheer amount of rainfall, trends in precipitation *intensity* have been described in a variety of ways. For example, one study observed that, in the northeastern United States between 1979 and 2013, the frequency of "very wet days," and the total annual volume of precipitation falling on very wet days, increased by about 10 percent per decade.[23] Another study observed that, in the northeastern United States between 1958 and 2016, the amount of precipitation falling on the wettest days increased by 55 percent.[24] It is also worth noting that precipitation intensity has been increasing faster in the northeastern United States than anywhere else in the country.[25]

As a result, the Chesapeake Bay has been experiencing unprecedented volumes of fresh water pouring into the estuary from streams and rivers. According to data from U.S. Geological Survey, 130,750 cubic feet per second of fresh water flowed into the Bay in 2019. This was by far the highest on record since monitoring began in the 1930s.[26]

All of this extra water is washing more pollutants off parking lots, roads, suburban lawns and farm fields into the Bay, harming the estuary's health. As the amount of runoff into the bay jumped in 2018 and 2019, for example, the overall health of the Bay, as measured by the University of Maryland Center for Environmental Science's annual report card, declined from a 54 out of 100 in 2017 to a 44 out of 100 in 2019. That was a lower health score than the 52 rating in 2009, before EPA and states launched the Bay pollution diet (the TMDL cleanup process) in 2010.[27] Not coincidentally, the year with the Bay's best health on record – 2002, when it rated a 55 out of 100 – was also the year with the lowest amount of fresh-water flow into the estuary on record.[28] The trends toward increased rainfall, stormflow and runoff are expected to continue or accelerate because of climate change. According to one set of climate models, the northeastern United States will experience a faster increase than any section of the country, with a four or five-fold increase in heavy precipitation events (more than one inch of precipitation) by 2100.[29] Perhaps most troubling is the fact that we will see many more very wet days, but also more very dry days, with fewer days that we would consider normal.[30] The new reality will be, quite literally, "when it rains, it pours" – with higher levels of pollution as a result.

The combined impact of growing rainfall and increased precipitation intensity on erosion and sediment runoff was succinctly summarized by a group of Bay-area scientists ten years ago:

> *Annual sediment loading to the Chesapeake Bay is a non-linear function of annual streamflow, indicating an increase in total suspended sediment concentration as flow increases, which likely results from enhanced erosion and resuspension of sediments in the streambed. Even if the mean discharge were to remain unchanged, erosion could increase if precipitation intensity were to increase, a projection that is more certain than annual streamflow discharges.*[31]

All of this is undisputed – the EPA-led Chesapeake Bay Program and the Bay states have readily acknowledged these trends in their respective planning documents.[32] In short, everyone knows that climate change is already causing increased pollution loads, and everyone knows that the problem is going to get worse.

On top of this problem is the challenge of the growing amount of blacktop and other impervious surfaces because of suburban sprawl. Every year, development spreads over an additional roughly 32,000 acres across the Chesapeake Bay watershed.[33] This means that every year an area of land about three quarters the size of Washington, D.C. is converted to parking lots, roofs, roads, lawns, and buildings from fields and forests.[34] That means less rain is being absorbed by natural land cover and filtered by trees, and more is being funneled into Bay tributaries.

These trends make the goals of the Chesapeake Bay cleanup (the TMDL) more difficult to attain. The Bay region states will have to adjust their targets and ramp up their levels of effort. This may be especially true for the stormwater sector, which is uniquely vulnerable to changes in precipitation intensity.

A 2018 EPA analysis provides a detailed illustration of how climate change and increased rainfall in the Chesapeake Bay watershed will require local governments to build significantly more stormwater control projects than they are currently planning. EPA's National Center for Environmental Assessment wanted to estimate how climate change-induced changes in precipitation would affect the performance of stormwater pollution control projects, also known as Best Management Practices (BMPs), such as stormwater detention basins, in a variety of settings. The 2018 analysis looked at five types of developed land use in five geographic locations, and modeled BMP performance under both current precipitation patterns and projected future (mid-21$^{st}$ century) scenarios. Overall, EPA found that "BMPs designed for current conditions will not mitigate increases in stormwater runoff and associated downstream channel erosion and flooding under projected future conditions."[35] To accommodate future precipitation, "current practices will need greater temporary volume storage and/or reconfiguration of outlet structures to mitigate flooding and channel erosion risk."[36]

One of EPA's case studies was a hypothetical 20-acre mixed-use development site in Harford County, Maryland. EPA first determined that precipitation in this region will change dramatically by mid-century. Total annual precipitation volume will increase by 12.8 percent compared to current conditions, and the hourly precipitation volume for large storm events will increase by roughly 50 percent.[37] Perhaps most vividly, storms that now happen every ten years, on average, will be recurring every two years under future conditions.[38] Today's "ten-year storm" will be tomorrow's "two-year storm." EPA next looked at how various combinations of stormwater BMPs would perform under present and future conditions at this Maryland site. Under future conditions, the runoff volume and pollution loads using "conventional" BMPs (sand filters and dry detention basins) would increase by 50-70 percent.[39] To accommodate the added precipitation, EPA estimated that this hypothetical 20-acre site would have to add 1-2 acres of additional pollution control projects (BMP space).[40]

The rest of this report looks at whether the Bay region states are making adequate course corrections at the state level, at the county level, and at the level of individual stormwater permits. The answers, unfortunately, are not reassuring.

## 1. Failing the "Pollution Diet."

The Chesapeake Bay Total Maximum Daily Load (TMDL) is often described as a "pollution diet" for the Bay. If this is a diet, then the urban stormwater sector is overweight and eating ice cream.

### A. TMDL Progress to Date

Since 2009, stormwater pollution loads have been increasing.[41] The Bay states have made a small amount of progress in reducing per-acre stormwater loads, but not enough to keep up with new growth and the expansion of developed acres. As a result, total stormwater nitrogen loads have increased by almost 5 percent since 2009, phosphorus has increased by about 3 percent, and sediment by almost 2 percent. The following table shows trends at the watershed scale.

**Table 1: Developed Land and Stormwater Pollution in the Chesapeake, 2009-2019**

| | 2009 | 2019 | Change (%) |
|---|---|---|---|
| Developed acres | 5,157,202 | 5,478,731 | +6.2% |
| Pollution Loading Rate (pounds per developed acre) | | | |
| Nitrogen | 7.36 | 7.26 | -1.3% |
| Phosphorus | 0.49 | 0.48 | -3.5% |
| Sediment | 326 | 315 | -3.5% |
| Delivered Load (millions of pounds) | | | |
| Nitrogen | 38.0 | 39.8 | +4.8% |
| Phosphorus | 2.5 | 2.6 | +2.5% |
| Sediment | 1,683 | 1,725 | +2.5% |

*NOTE: All pollution estimates are "edge of tide," or delivered loads of pollution into the tidal Chesapeake Bay.*

Appendix A shows state-level trends and reveals some state-to-state variability. For example, West Virginia has done more than enough to offset new growth, and the state's stormwater pollution loads have declined since 2009. Maryland, by contrast, has seen about the same level of growth in developed land as West Virginia (about 5 percent per year), but has also seen an increase in the per-acre loading of nitrogen and sediment. This means that nitrogen and sediment pollution in Maryland are increasing faster than new development. It is important to keep in mind that these estimates were generated using a model that assumes weather patterns from 1991-2000. See Section 3, Planning for Climate Change, below). Given changes in precipitation over the past twenty years, it's likely that the increase in stormwater loads has been even greater than the Bay program estimates.

We now turn to the Bay states' planning goals for the sector.

## B. Relaxing the Goals

As part of the TMDL, the states periodically complete "Watershed Implementation Plans," or WIPs, which lay out numeric pollution reduction targets and strategies. The "Phase II" WIPs were completed in 2012. The "Phase III" WIPs were completed in 2019.[42] Each WIP provides targets in the form of loads that the states expect to see in 2025.

The following Table (Table 2, below) compares the nitrogen reductions that would have been achieved under the Phase II WIPs to the reductions that the states are now aiming for under the Phase III WIPs. This table shows that the two of the largest sources of stormwater pollution – Maryland and Pennsylvania – are backsliding on their commitments and are now planning to end the TMDL process with stormwater loads that are *higher* than when they started. As a result, and despite the fact that the other states are setting slightly more ambitious targets, the total Bay-wide stormwater load in 2025 is now expected to be higher than it would have been under the states' 2012 plans, and only about 1 percent lower than it was in 2009.

Appendix A provides parallel tables for phosphorus and sediment, which show the same thing – Maryland and Pennsylvania have dramatically relaxed their planning goals, and as a result the Bay-wide stormwater pollution loads in 2025 are now expected to be greater than they would have been under the state's 2012 plans, and not much lower than they were in 2009.


*Since 2009, Bay states have made a small amount of progress in reducing per-acre stormwater loads, but not enough to keep up with new growth and the expansion of developed acres.*

**Table 2: Stormwater Nitrogen Pollution from Developed Land**

| State | 2009 pollution (millions of pounds) | 2025 targets (millions of pounds) | | Planned change in pollution, 2009-2025 | |
|---|---|---|---|---|---|
| | | *2012 plan* | *2019 plan* | *2012 plan* | *2019 plan* |
| DE | 0.66 | 0.70 | 0.65 | +6.9% | -1.3% |
| DC | 0.17 | 0.17 | 0.16 | -4.4% | -4.8% |
| MD | 9.01 | 7.69 | 9.26 | -14.6% | +2.7% |
| NY | 1.94 | 1.90 | 1.40 | -2.0% | -28.0% |
| PA | 14.76 | 8.06 | 15.06 | -45.4% | +2.0% |
| VA | 10.14 | 10.26 | 9.72 | +1.1% | -4.1% |
| WV | 1.23 | 1.23 | 1.17 | +0.1% | -4.7% |
| **TOTAL** | **37.92** | **30.01** | **37.43** | **-20.9%** | **-1.3%** |

*NOTE: Pink cells above indicate a reduced level of effort. All load estimates are "edge of tide," or delivered loads of pollution. "2012 plan" and "2019 plan" loads represent the loads associated with Phase II and Phase III WIP commitments, respectively, as shown by the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST).*[43]

The following subsections look more closely at the evolving stormwater pollution strategies in Maryland, Pennsylvania, and Virginia, which together account for roughly 90 percent of the urban stormwater pollution affecting the Bay.[44]

### i. Maryland's Implementation Plans

Maryland is effectively giving up and walking away from its stormwater commitments. According to the state's Phase III WIP:

> *The slower pace of restoration progress in the urban stormwater sector relative to wastewater and agriculture means that stormwater discharges will make up a larger proportion of the State's nutrient loads by 2025 - approximately 20% and 19% of the nitrogen and phosphorus loads, respectively. Reduction opportunities outside the stormwater sector will concurrently decrease, and stormwater management will become a more important part of Maryland's nutrient reduction portfolio. The result is that maintaining the statewide target pollution levels after 2025 will require continuing stormwater management implementation.*[45]

And:

> *The stormwater strategies described in this section rely on a sustained pace of implementation, recognizing that the arc of restoration will need to continue well beyond 2025 and a single permit cycle.*[46]

This language is far from clear, but reading between the lines one might conclude that Maryland is deferring action on the stormwater sector until <u>after</u> the TMDL process concludes, and potentially giving up altogether.

This is confirmed by the numbers in Maryland's WIPs. The following table compares the Phase II and Phase III WIPs with respect to (a) target pollution loads, and (b) stormwater treatment practice targets for 2025. This table shows that Maryland's planning targets have collapsed to less than 10 percent of what they once were, across the board. The reality is even worse than Maryland's Phase III WIP targets suggest. According to the EPA-led Chesapeake Bay Program, the strategies outlined in Maryland's Phase III WIP would actually lead to nitrogen and sediment load *increases* relative to 2009 loads.

### Table 3: Plans for Reducing Stormwater Pollution from Developed Land in MD[47]

| | 2012 Bay Cleanup Plan (Phase II WIP) | 2019 Bay Cleanup Plan (Phase III WIP) |
|---|---|---|
| **Changes in Annual Pollution 2009-2025, According to Maryland's Cleanup Plans[48]** | | |
| Nitrogen (lbs) | -2,200,000 | -200,000 |
| Phosphorus (lbs) | -232,000 | -10,000 |
| Sediment (lbs) | -205 million | -11 million |
| **Changes in Annual Pollution, 2009-2025, According to EPA-led Chesapeake Bay Program[49]** | | |
| Nitrogen (lbs) | -1,316,935 | **+247,238** |
| Phosphorus (lbs) | -218,847 | -26,625 |
| Sediment (lbs) | -104 million | **+5.5 million** |
| **Pollution Control Project Goals** | | |
| Abandoned Mine Reclamation (acres) | 1,843 | 425 |
| Bioretention/Rain Gardens (acres) | 34,716 | 0 |
| Bioswale (acres) | 15,518 | 15 |
| Dry Detention Ponds (acres) | 80,803 | 751 |
| Impervious Surface Reduction (acres) | 31,003 | 1,129[50] |
| Stormwater Treatment (acres) | 232,629[51] | 42,727[52] |
| Permeable Pavement (acres) | 350 | 0 |
| Urban Filtering Practices (acres) | 322,842 | 0 |
| Urban Forest Buffers (acres) | 26,430 | 0 |
| Urban Infiltration Practices (acres) | 33,872 | 0 |
| Urban Tree Planting acres (acres) | 15,000 | 1,592 |
| Vegetated Open Channels (acres) | 28,290 | 0 |
| Wet Ponds/Wetlands (acres) | 73,504 | 3,115 |
| Erosion and Sediment Control (acres/yr) | 42,642 | 0 |
| Forest Conservation (acres/yr) | 91,111 | 0 |
| Street Sweeping (acres/yr) | 9,033 | 37,286 |
| Urban Nutrient Management (acres/yr) | 504,053 | 5,700 |

| | | |
|---|---|---|
| Urban Stream Restoration (feet) | 818,473[53] | 1,060,015 |
| Urban Shoreline Erosion Control (feet) | 1,273,852 | 40,444[54] |

A closely related problem is that Maryland has changed its municipal stormwater control (MS4) permits. These permits used to require the restoration of twenty percent of a county's impervious surfaces. This requirement is still part of the permits, but with a big escape clause: counties can now buy credits for pollution load reductions as an alternative form of compliance. The restoration "requirement" is no longer a requirement at all, but simply one of two options. As the Environmental Integrity Project documented in a 2019 report,[55] pollution trading, particularly in Maryland, is a misguided shell game that often involves double-counting pollution reductions that have already been made – and credited to the state – by wastewater treatment plants. Pollution trading will not get Maryland any closer to its TMDL targets, and it will certainly not reduce urban stormwater pollution.

In response to questions from EIP, the Maryland Department of the Environment (MDE) defended "nutrient trading" as a legitimate pollution control strategy and said that Maryland is relying on runoff-control projects on farms and improvements to sewage treatment plants to achieve most of the state's pollution reduction goals for 2025.[56] "The Phase III WIP envisions that Wastewater Treatment Plant upgrades and agricultural Best Management Practices will be the primary nutrient reduction drivers to achieve 2025 goals," said MDE statement says (for the full text of Maryland's response, see Appendix B.) Unfortunately, many of these wastewater treatment plant upgrades have already occurred, and Maryland has already been credited with those reductions by the EPA-led Chesapeake Bay Program's computer modeling of progress. MDE's plans therefore amount to double-counting. Moreover, even in an ideal situation, trading does not generate additional pollution reductions – it only changes where planned reductions will come from. MDE asserted that it is not retreating or giving up on stormwater pollution controls, but said it is difficult to compare 2009 pollution levels in the Bay to the amount projected for 2025 because of changes in computer modeling used by the Chesapeake Bay Program. However, this is a problem that can easily be avoided. The model has changed over time, but each new version of the model re-calculates the 2009 baseline, the estimated loads for each year, and the 2025 targets of various state plans. The data the Environmental Integrity Project examined to calculate pollution loads for the Phase II and Phase III WIPs used the same version of model – and the data still shows significant backsliding.

### ii. Pennsylvania's Implementation Plans

Pennsylvania's stormwater planning is going in the same direction as Maryland's. Although Pennsylvania's WIPs are less transparent about pollution reduction goals and strategies, the Chesapeake Bay Program provides the relevant data by compiling Pennsylvania's planned implementation of BMPs and converting those plans into pollution reductions. The following Table compares BMP goals under the Phase II and Phase III WIPs. The goals for a few BMPs – urban tree planting, urban stream restoration, and storm drain cleanout – have increased, which is undeniably a good thing. On the other hand, the goals for major categories of BMPs have been slashed to a small fraction of what they once were:

- Acreage targets for the group of BMPs known as "stormwater management" (i.e., wetlands, detention ponds, and infiltration practices) have declined by 86 percent.
- Impervious surface restoration goals have declined by more than 90 percent.
- Urban forest and grass buffer goals are 88 percent lower.

The cumulative effect of these changes is that stormwater pollution loads in 2025 are likely to be much higher than they would have been under Pennsylvania's Phase II plan:

- In its Phase II plan, Pennsylvania was committed to reducing 6.7 million pounds of nitrogen from the urban stormwater sector by 2025. Under the Phase III Plan, there will be no nitrogen reduction at all – nitrogen loads will be higher in 2025 than they were in 2009.
- Phosphorus reductions under the new plan will be just 2 percent of what they would have been under the old plan.
- Sediment reductions under the Phase III WIP will be 11 percent of what they would have been under the Phase II WIP.

### Table 4: Plans for Reducing Stormwater Pollution from Developed Land in Pennsylvania[57]

| Target for 2025 | 2012 Bay Cleanup Plan (Phase II WIP) | 2019 Bay Cleanup Plan (Phase III WIP) |
|---|---|---|
| **Changes in Annual Pollution Load, 2009-2025** | | |
| Nitrogen (lbs) | -6,700,947 | **+301,360** |
| Phosphorus (lbs) | -248,648 | -5,797 |
| Sediment (lbs) | -388,413,228 | -43,139,243 |
| **Pollution Control Project Goals** | | |
| "Stormwater Management Composite" (includes wet ponds, wetlands, dry ponds, infiltration practices, etc.) (acres) | 1,470,001 | 203,265 |
| Erosion and Sediment Control (acres) | 5,411 | 5,417 |
| Impervious Surface Reduction (acres) | 2,300 | 202 |
| Urban Forest or Grass Buffers (acres) | 25,575 | 3,076 |
| Urban Tree Planting[58] (acres) | 1,444 | 4,089 |
| Urban Nutrient Management (acres) | 333,128 | 123,815 |

| | | |
|---|---|---|
| Urban Stream Restoration (feet) | 55,000 | 606,295 |
| Storm Drain Cleanout (pounds of sediment) | 0 | 121,269 |
| Street Sweeping (acres) | 36,200 | 1,016 |

In response to questions from EIP about the changes in their Bay cleanup plans, the Pennsylvania Department of Environmental Protection (DEP) said that the state's Phase III plan is more realistic.[59] The new plan reflects a shift, given the limited amount of money Pennsylvania has set aside for pollution control projects, toward more cost effective strategies, especially reducing runoff from farm fields instead of more expensive projects in suburban and urban areas. "Pennsylvania decided that moving forward, we need to focus our limited resources on the pollutant load sectors where nitrogen control (projects) will have the greatest impact, such as agriculture," Deborah Klenotic, Deputy Communications Director for DEP, said in an email to EIP. For DEP's full statement, see Appendix C).

It should be noted that Pennsylvania has been promising to reduce runoff from agriculture for more than a decade, with little success, in part because industrial-scale hog and poultry operations continue to grow and state regulations are weak.[60] The political influence of the farm lobby on the Pennsylvania General Assembly is strong, with state lawmakers, for example, making it illegal for the state to require farmers to fence cattle out of streams to reduce water pollution.[61]

### iii. Virginia's implementation plans

Virginia, in stark contrast to Maryland and Pennsylvania, is ramping up its commitments to stormwater pollution control. Virginia's Phase III WIP increases its planning goals for most urban BMPs, in some cases by dramatic margins (e.g., permeable pavement, with a Phase III goal of 4,564 acres, up from 52 acres in the Phase II WIP). Under its Phase II WIP, Virginia would have seen increased nitrogen and sediment loads in 2025, relative to the 2009 baseline. Under its newer Phase III WIP, both pollutants will decline, and sediment reductions will be significantly greater than they would have been under the 2012 plan.

**Table 5: Plans for Reducing Stormwater Pollution from Developed Land in Virginia[62]**

| Pollutant | 2012 Bay Cleanup Plan (Phase II WIP) | 2019 Bay Cleanup Plan (Phase III WIP) |
|---|---|---|
| **Change in Annual Pollution Load, 2009-2025** | | |
| Nitrogen (lbs) | *-111,902* | -419,336 |
| Phosphorus (lbs) | *-16,352* | -51,383 |
| Sediment (lbs) | -30 million | -67 million |
| **Pollution Control Project Goals** (in acres, unless otherwise noted) | | |
| Street Sweeping | 24,040 | 0 |

| | | |
|---|---|---|
| Urban Nutrient Management | 517,058 | 553,470 |
| E and S | 32,922 | 22,346 |
| Bioretention | 22,352 | 33,730 |
| Bioswale | 1,144 | 8,764 |
| Permeable Pavement | 52 | 4,564 |
| Vegetated Open Channel | 3,283 | 3,486 |
| Dirt and Gravel Road | 1,738 | 0 |
| Impervious Surface Reduction | 26,138 | 36,303 |
| Forest Buffer Urban | 4,115 | 9,982 |
| Forest Conservation | 14,128 | 18,871 |
| Urban Tree Planting | 799 | 30,000 |
| Urban Stream Restoration | 122,052 | n.a.[63] |
| Dry Ponds | 85,554 | 97,265 |
| Extended Dry Ponds | 160,081 | 159,030 |
| Wet Pond Wetland | 177,773 | 227,512 |
| Infiltration | 69,127 | 73,037 |
| Filtration | 65,868 | 58,112 |
| Storm Drain Cleaning (pounds of sediment) | 0 | 385,757 |
| Other BMPs not mentioned in Phase II WIP[64] | 0 | 39,580 |

## 3. Planning for Climate Change

As discussed in the background section of this report, there is no question that climate change is going to make it harder to meet the goals of the Bay TMDL. Yet the EPA, the Chesapeake Bay Program, and the Bay states are still in the early stages of planning for climate change impacts.

*Climate change will increase rainfall and flooding across the Chesapeake Bay region, creating new stormwater management challenges for cities like Annapolis, MD.*

The Bay Program and the Bay states measure TMDL progress using a set of models, including a "watershed model," which estimates nitrogen, phosphorus and sediment loads to the Bay.[65] The watershed model is based on a set of input data and assumptions. One critical set of assumptions relates to weather patterns. When the Bay Program is using the model to assess progress, it wants to know how various land use changes and pollution control strategies will affect pollution load. In order to isolate that signal, weather patterns are held constant. Regardless of the model year (i.e., a simulation of 2009 loads, 2018 loads, or 2025 loads), the model assumes weather conditions from 1991-2000.[66]

The Bay Program recognizes that weather has changed since the 1990s and will change even more between now and 2025.[67] In 2018, the Bay Program's Principles' Staff Committee provided numeric estimates of the additional pollution loads that could be expected by 2025 as a result of climate change:

### Table 6: Additional Annual Pollution Attributable to Climate Change, 2018 to 2025[68]

| | Nitrogen (millions of pounds) | Phosphorus (millions of pounds) |
|---|---|---|
| DC | 0.01 | 0.001 |
| DE | 0.40 | 0.006 |
| MD | 2.19 | 0.114 |
| NY | 0.40 | 0.014 |
| PA | 4.14 | 0.141 |
| VA | 1.72 | 0.193 |
| WV | 0.24 | 0.019 |
| Total | 9.09 | 0.489 |

The numbers in Table 6 reflect the additional amounts of nitrogen and phosphorus (in millions of pounds) that climate change is expected to bring to the Chesapeake Bay each year between 2018 and 2025, from all sources in each state. From the perspective of planning for TMDL compliance, these numbers represent additional reductions that each state will have to make in order to reach its TMDL targets.

For the Phase III WIP planning process, the Bay Program required "a narrative strategy describing the jurisdictions' current action plans and strategies to address climate change." The Bay Program strongly encouraged, but did not require, the states to build the additional loads shown in Table 6 into their Phase III WIPs.[69] Virginia did so, but Maryland and Pennsylvania did not. According to the Bay Program, the states will be required to account for the effects of climate change on pollution loads and on BMP performance, but not until 2021-2023.[70]

The following sections provide more detail on what each of these three states has said about planning for climate change, with respect to both statewide pollution loads and the urban stormwater sector in their Phase III WIPs.

## A. Climate Change in Maryland's Phase III WIP

Maryland's WIP acknowledges the climate change problem but fails to address it. As the WIP explains, "climate change impacts, including increased precipitation and storm events, are causing increased nutrient and sediment loads."[71] The WIP also acknowledges that climate change is likely to reduce the effectiveness of Best Management Practices (BMPs). For example, page 53 of the WIP states that "[t]he BMPs used to control water pollution will likely become less effective at controlling extreme storm events and be subject to damaging stresses of climate change."[72] Yet the WIP ignores the additional load that climate change will almost certainly cause, and it does not make any adjustments to its assumptions about BMP effectiveness.

The additional climate change-related loads from Maryland are expected to be 2.2 million pounds of nitrogen and 114,000 pounds of phosphorus.[73] Maryland's WIP states that the state will address these loads in 2021 and 2022.[74] This seems unwise. Deferring pollutant load adjustments will only increase the difficulty associated with planning for and meeting the adjusted targets in the future.

## B. Climate Change in Pennsylvania's Phase III WIP

The Pennsylvania Department of Environmental Protection (PA DEP) acknowledges that climate change will make TMDL compliance much more difficult. An April 2020 report prepared for PA DEP by the Environment & Natural Resources Institute noted that average annual precipitation in Pennsylvania has increased by 10 percent over the past century, "heavy precipitation" has increased by 55 to 78 percent in the northeastern United States, and these trends will continue in Pennsylvania into the late 21st Century.[75] The authors of this report, like the authors of Maryland's WIP, concluded that climate change will pack a double punch. Increased precipitation intensity will increase pollution loads, and it will also decrease the effectiveness of pollution control BMPs.[76]

Yet Pennsylvania has not started planning for climate change. Its Phase III WIP does not adjust its planning targets to account for the additional climate change-related load,[77] postponing that basic step until 2022.[78] The WIP does have a section entitled "climate change and climate resiliency," but that section mainly deals with steps Pennsylvania is taking to reduce carbon emissions.[79] The WIP commits to studying the issue further, but does not commit to practical steps that might further reduce pollution.[80]

## C. Climate Change in Virginia's Phase III WIP

Virginia, unlike Maryland and Pennsylvania, has explicitly accounted for the additional load attributable to climate change in its WIP:

> *The modeling estimates indicate that across the Bay watershed an additional 9 million pounds of nitrogen and 0.5 million pounds of phosphorus reductions are needed to offset the effects of climate change by 2025. Virginia's share of that additional load reduction is 1.72 million pounds of nitrogen and 0.19 million pounds of phosphorus. . . . Virginia's Phase III WIP includes sufficient practices and policies that when fully implemented account for these additional load reductions.*[81]

Virginia's WIP adjusts targets for each basin to quantitatively account for the additional load due to climate change. For example, the following table appears on page 91 of Virginia's plan:

**Table 7: Potomac River Basin WIP III Final Pollution Targets and Reductions**

| Potomac River Basin | 2007 Progress Load | 2025 Basin Target Load | Reductions Needed to Meet Target | Additional Reductions Needed to Address Climate Change | Reductions Identified in WIP III Final |
|---|---|---|---|---|---|
| Nitrogen (pounds) | 17,109,000 | 16,000,000 | 1,109,000 | 620,000 | 1,729,000 |
| Phosphorus (pounds) | 1,976,000 | 1,892,000 | 84,000 | 82,000 | 302,500 |

Overall, Virginia's WIP states that "the sum of the regulated sectors and the [local area planning goal] loads, together with any resulting state initiatives, is expected to meet the State-Basin planning targets on 2025 base conditions and account for additional loads due to climate change."[82]

Virginia, unlike Maryland and Pennsylvania, is planning for climate change.

## D. Climate Change at the County Level

We reviewed stormwater planning documents for 11 counties in the Chesapeake Bay watershed with large volumes of stormwater pollution: Anne Arundel, Baltimore, Frederick, Montgomery, and Prince George's Counties in Maryland; Lancaster and York Counties in Pennsylvania; and Augusta, Fairfax, Loudon, and Rockingham Counties in Virginia. All of these counties are planning important and commendable work to control stormwater that will provide real benefits to local communities, local ecosystems, and the Bay. However, all of the county plans are based on one critical flaw, which is that they plan for the past, rather than the future. More specifically, they assume that future rainfall patterns will resemble past rainfall patterns, when we know that the future will see more rain and more heavy rain events.

Most stormwater infrastructure design standards adopt local precipitation assumptions from a National Oceanic and Atmospheric Administration atlas of precipitation frequency across the U.S.[83] The problem with using this document, called "Atlas 14," and the data it contains, is neatly spelled out in a 2015 peer review comment:

> *The reality is that public and private infrastructure sized using the new Atlas 14 may become undersized at some point in the future . . . because Atlas 14 only represents current climate, not future climate. Also, the effort to update Atlas 14 will likely not happen again in the near future given potential lack of federal and state funds. Providing a sister tool to predict future design storm intensity … would allow states and engineers engaged in land development the opportunity to design to future conditions, versus current conditions, to extend the longevity of public and private infrastructure.*[84]

In response, NOAA basically said: we don't know if it's a good idea, but we'll look into it. As of the latest progress report in 2019, the agency was still studying the problem.[85] (NOAA's words were "we still do not have a definite answer to whether a non-stationary approach is advantageous for the NA14 process," and "we continue the investigation on this topic.")[86]

To take another example, Maryland's stormwater pollution control permits for counties and cities ("MS4 permits") require "environmental site design" to the "maximum extent practicable."[87] That's legalese for providing treatment (meaning filtration and absorption capacity) for stormwater from the maximum 24-hour rainfall that can be expected once a year.[88] The problem is that these design storm estimates are based on past data, not predictions of future rainfall. In 2025, the amount of rain falling over a 24-hour period once per year will likely be much greater than it was in, for example, the late 20th Century.

Or consider a typical county annual stormwater report, and how that report presents monitoring data. The 2019 annual report (MS4 report) for Baltimore County includes a detailed discussion of a stream, the Scotts Level Branch in the Gwynns Falls watershed.[89] At one monitoring location (site SL-01), the report indicates that the total phosphorus pollution load was 3,002 pounds in 2018. However, the report adjusts that number to what the pollution load *would have been* if the area had seen "average rainfall." Adjusted, the load was only 1,751 pounds.[90] The reality was far different. In fact, 2018 was a year of rainfall totals that were far above average, and therefore pollution loads that were also far above average. That truth becomes obscured by the adjustment to "average" rainfall. The report goes on to compare pollution in 2018 to what the EPA-led Chesapeake Bay Program's computer modeling predicted that year for the same watershed. For monitoring location SL-01, the model predicted a phosphorus load of 1,215 pounds.[91] The real 2018 load was therefore at least 2.5 times greater than the model assumes.[92] Yet one could easily miss that fact by only looking at the "adjusted" load.[93]

As explained earlier this in this report, 2018 was a year of record-breaking rainfall across the Bay watershed. As measured at Baltimore Washington International Airport, the precipitation total that year was higher than it had ever been since rainfall data were first collected in 1871. This leads to an important policy question. Should the record-setting 2018 rainfall be treated as an aberration, or as something that Baltimore County and other jurisdictions should be planning to accommodate more often in the future? When counties adjust their pollution reporting to reflect the amounts in "average" rainfall years, they are embedding an assumption into their plans, and the assumption is that future rainfall patterns will be similar to what they were in the past.

Ironically, the counties in the Bay watershed do frequently think about the future – just not future precipitation. In Virginia, for example, Fairfax County's Watershed Management Plan contemplates "future conditions," but that only refers to future land cover.[94] For precipitation and weather, the plan uses historic data.[95]

Only rarely do counties assume a more forward-looking posture toward the climate and rainfall. Montgomery County, Maryland, for example, is in the midst of a community-based climate workgroup process that should lead to a "climate action and resilience plan" sometime in 2021.[96] Although this process is generally focused on greenhouse gas emissions reduction, it does specifically identify the problem of basing forward-looking stormwater plans on backward-looking rainfall data. The goals and recommendations developed by the climate workgroups include:

- "Reduce risks and impacts of more intense storms."[97]
- "Improve hydrological and meteorological data collection and analysis of wet weather and storms, considering climate change over the next 30 to 100 years, and incorporating trends in land use/land cover change."[98]
- "Work with Maryland and NOAA to ensure that NOAA's outdated and inadequate Atlas 14 precipitation statistics for Maryland are updated and recalculated, and ensure that Maryland update and revise stormwater, floodplain, and other codes and regulations."[99]

And a consultant for Prince George's County said the following:

> *Although average annual precipitation in Maryland has increased by approximately 5 percent in the past century, precipitation from extremely heavy events has increased in the eastern United States by more than 25 percent since 1958 (USEPA 2016). The amount and frequency of precipitation is projected to continue increasing, which could lead to more flooding such as past flooding in Upper Marlboro. Average precipitation is expected to increase during winter and spring, which will cause snow to melt earlier and intensify flooding during those seasons.*[100]
>
> *BMPs designed for current conditions will most likely fail to sufficiently treat and reduce runoff from the projected larger and more intense storm events. That failure could cause stormwater to overflow or damage BMPs; the BMPs would not treat all the*

*runoff and would not reduce runoff volume reaching the County's water bodies. That situation, in turn, could result in downstream channel erosion and flooding.*[101]

Unfortunately, these salient observations were buried in a sediment restoration plan for the Patuxent River watersheds, and are not reflected in county-level policy.

There is no question that the counties should be planning for more rain, more storms, and more flooding. One path forward, given the complexity and breadth of climate modeling, is to advocate for better federal guidance, such as a forward-looking replacement for NOAA's "Atlas 14" guide on rainfall frequency across the U.S. Another strategy – one that would be much easier to implement – would be to use available resources (such as Atlas 14), but to plan for the storms that we used to think of as rare. It's well-known that high-precipitation storms are becoming more common. Southern New Hampshire recently saw 100-year floods three years in a row.[102] (These are floods that are supposed to have a one in one hundred chance of happening in any given year.) Ellicott City, Maryland experienced two 1,000-year storms in three years (see page 28).[103] An EPA modeling exercise for Harford County, Maryland estimated that today's ten-year storm will be tomorrow's two-year storm.[104] If that's the case, then perhaps it would be wise for counties (and states) to simply replace references to "two-year storms" in their planning documents with references to "ten-year storms." This way, they would be planning for the 2-year storms of the future. More generally, it may be time to start building capacity for 1,000-year storms.[105]

There is no question that counties and cities can and should be planning for larger storms. But local governments – on their own, without state and federal assistance – cannot be expected to unilaterally take responsibility for the added impacts of climate change on the Chesapeake Bay. A typical county or city is already working to prioritize and implement stormwater management policies within the constraints of tight budgets that have become more strained because of the Covid-19 economic crash. The EPA and the Bay region states set the Bay cleanup targets for the counties. So the federal and state governments should also take responsibility for leading counties and cities in planning for how climate change will affect Bay cleanup progress.

*When planning for stormwater capacity needs, counties too often look backward at historical rainfall patterns when they should be looking ahead.*

Beyond the progress of the Bay cleanup, another area where planning for increased rainfall from climate change is important is sewage overflows, which is more of a local public health issue than a major source of nitrogen and phosphorus pollution in the Chesapeake. Sewage overflows are not the same as the stormwater problem we have been discussing, but they are related in cities that have combined sewage and stormwater systems.

## Growing Rainfall and Sewage Overflows in Cities

More than 50 cities and towns in the Chesapeake Bay watershed have antiquated, combined sewage and stormwater systems. This means the same pipes that were built under the streets to carry human waste to sewage treatment plants were also designed – whenever there is a significant rainstorm – to carry rainwater runoff mixed with human waste into nearby rivers and streams.[106] Thirty-one of these old-fashioned, leaky systems are in Pennsylvania, including the state capital, Harrisburg.

EPA and state environmental agencies require cities with combined sewer and stormwater systems to comply with the Clean Water Act by creating and following what are called Long-Term Control Plans.[107] These plans lay out improvements and procedures to reduce and minimize their sewage overflows, which often contain fecal bacteria and dangerous pathogens that can render local waterbodies unsafe for contact and recreation.


*More than 50 cities and towns in the Chesapeake Bay watershed have antiquated, combined sewage and stormwater systems in need of major overhaul.*

Long-Term Control Plans often use studies of past rainfall conducted by the city or precipitation data from state or federal sources to calibrate the size of their pipes and infrastructure improvements for future storm events. EIP gathered and analyzed these plans for four cities in the Chesapeake Bay watershed – Harrisburg, Pa; Cumberland, Md., Washington, D.C., and Lynchburg, Va. -- to determine if their long-term plans account for increases in rainfall that have been happening in recent years and reasonably project future increases in precipitation and storm intensity due to climate change.

Methods for determining typical year precipitation vary between cities. Some rely on complex modelling, national weather data, local monitoring, or a combination of these methods. EIP identified the typical year of rainfall assumption for each city's long-term control plan and compared it to the most recent five-year average calculated using data from the National Oceanic and Atmospheric Administration (NOAA). The results are below:

**Table 8: Rainfall Assumptions in Long-Term Control Plans for Cities with Combined Sewage and Stormwater Systems**

| City, State | Annual Rainfall in Plan (inches) | Actual Annual Rainfall from 2015-2019 | % Difference |
|---|---|---|---|
| Cumberland, MD | 36.5 | 47.73 | 27% |
| Washington, DC | 38.95 | 48.14 | 21% |
| Harrisburg, PA | 39.8 | 46.22 | 15% |
| Lynchburg, VA | 42.35 | 48.45 | 13% |

*Table 1: Annual rainfall in plan reflects rainfall depth in inches derived from the combined sewage and stormwater Long Term Control Plans for Washington, D.C., Harrisburg, Pa., and Lynchburg, Va. Rainfall depth assumptions for Cumberland are from the City's 2013 Comprehensive Plan. Harrisburg's rainfall depth has a standard deviation of 8.08. Rainfall depth is a parameter included in the calibration of a city's sewer system and used as a means to make assumptions comparable for the purposes of this report. Actual annual rainfall numbers are NOAA five-year averages, and are calculated from Global Summary of the Year precipitation records for 2015-2019.*

As can be seen in the chart above, the cities' long-term plans are based on outdated rainfall assumptions, and underestimate recent rainfall by between 13 and 27 percent, meaning that their infrastructure improvements and stormwater controls were designed for less precipitation than has been falling – and much less than will fall in the future as climate change impacts grow.

**Cumberland, Maryland**: The greatest discrepancy between assumptions in a city's long-term plan and recent data was in Cumberland. In 2018, the city released 103 million gallons of sewage mixed with stormwater into tributaries to the Potomac River and Chesapeake Bay.[108] To help deal with this problem, the city had planned improvements for their combined sewage and stormwater system, including boosting the capacity of their pumping stations and building a stormwater retention facility that could hold 10 million gallons of overflow per day.[109] However, the city's plans were based on smaller annual rainfall projections than have been actually hitting the region in recent years. Cumberland used climatological data that assumes that the city receives 36.5 inches of rainfall per year.[110] This is 27 percent less than the most recent five-year average, which is 47.73 inches of rain per year, according to NOAA (see table above).[111,112] EIP sent written questions to Cumberland officials about this planning gap, but did not receive a response.[113]

**Washington, D.C.:** The nation's capital has invested far more to control stormwater and solve its sewage overflow problems than most cities (see detailed discussion on pages 25-28). The city's nearly $3 billion[114] in construction projects include the construction of two massive underground stormwater storage tunnels (with capacities of 77 million and 49 million gallons). DC Water is also separating sewage and stormwater outfalls, building new pumping stations, constructing a major sewer line, and installing rain gardens and other rain-absorbing "green" infrastructure. Some of these projects were completed by March 2018, others are still under construction, and the building of green infrastructure will continue through 2030.[115] As a result, discharges of stormwater mixed with sewage to the Potomac and Anacostia rivers have fallen substantially, including from 180,000 gallons in 2018 to 32,000 gallons through the first 10 months of 2019.[116]

However, even DC's massive project was based on rainfall data and projections that are no longer accurate. The city's 2002 long term control plan, which has a 40-year implementation timeline, used rainfall data from the monitoring station at Ronald Reagan National Airport and 1988-1990 as the forecast period. The average amount of rainfall during that period was 38.95 inches,[117] which is 21 percent lower than the most recent five-year average (2015-2019) using NOAA data.[118] This means almost ten inches more rain per year is entering the system than expected.[119] DC Water said that their rainfall assumptions were "developed in accordance with EPA guidelines."[120] This highlights the need for updated EPA guidelines that take climate change into account, as articulated in the conclusion of this report. (For DC Water's full response, see Appendix D.)

**Harrisburg, Pennsylvania:** Pennsylvania's state capital last year released 902 million gallons of sewage mixed with stormwater into the Chesapeake Bay's biggest tributary, the Susquehanna River, and 1.4 billion gallons in 2018, according the reports of the local water authority, called Capital Region Water.[121] This overflow – driven in part by growing rainfall and resulting stormwater – is causing severe local water quality problems. Bacteria monitoring by the Lower Susquehanna Riverkeeper along the Harrisburg waterfront in June and July of 2020, for example, found *E. coli* bacteria concentrations in the Susquehanna that averaged more than 2.5 times safe levels for swimming or water contact recreation, including just downstream from outfalls leading from the Governor's Residence and State Capitol Complex.[122]

To address the sewage and stormwater overflow problem, Capital Region Water signed a partial consent decree with the Pennsylvania Department of Environmental Protection (DEP) in 2015 that required more stormwater planning. Capital Region Water in 2018 released a plan that proposes for Harrisburg area residents to pay $315 million over 20 years improve the maintenance of the long-neglected combined sewage and stormwater pipes. The Harrisburg plan also includes the upgrade of a pumping plant, the repair and rehabilitation of sewer lines, improvements to outfall regulation devices, as well the planting of trees and rain gardens and the creation of other "green infrastructure" to help soak up rainwater.[123] Since Capital Region Water signed its limited consent decree with the state, however, the amount of effluent being piped into the river has increased from what had been an average of about 800 million gallons a year.[124] Harrisburg's control plan uses a median expected annual rainfall of about 40 inches per year, based on historic figures in a 57-year record from Harrisburg's two airport gauges.[125] But that is about 15 percent less than the average 46 inches of rain the region has experienced from 2015 to 2019, based on NOAA data. However, it should be recognized that Harrisburg's plan states that their annual rainfall predictions could vary by as much as 8 inches. That would suggest that its estimates of precipitation totals might be within an acceptable range of reality.[126] In response to questions sent by EIP, Harrisburg Capital Region Water said it was following EPA guidelines when it created its plan.[127] For the full text of Harrisburg's response see Appendix E.)

**Lynchburg, Virginia**: Lynchburg's combined sewer and stormwater system has 132 outfalls that released 65 million gallons of overflows in 2019.[128] To address the problem, the city has a long term control plan that includes closing 87 percent of the outfalls, increasing the capacity of the local wastewater treatment plant, building a storage tank and installing "green" infrastructure.[129] Many of these projects are either under construction or complete. However, this whole plan, updated in 2014, was created with what are now outdated annual estimates of rainfall. The plan used the period of 1993-1995 to create a "typical year" rainfall assumption of 42.35 inches. That's about 13 percent less than the average of 48.45 inches that fell from 2015-2019, according to NOAA data. Lynchburg's Director of the Department of Water Resources, Timothy Mitchell, defended the city's use of older rainfall averages as being "fully in accordance with applicable EPA guidance."[130] As mentioned earlier, this underscores the need for updated federal guidance that takes into account increasing rainfall from climate change. (For his full statement, see Appendix F.)

Looking to the future across the whole Chesapeake region, rainfall has turned out to be much higher than predicted, and in some recent years double historic averages. A 2020 report by NOAA states that this trend is expected to continue.[131] With this growing volume of rainfall in mind, many cities with combined sewage and stormwater systems may be unprepared for current rainfall conditions, much less the dramatic increases that could occur in the future.

In the next section of this report, we look at two case studies of local governments. One has been struggling mightily with stormwater and flash flooding: Ellicott City, Maryland. The other has been building larger and more expensive stormwater control facilities than almost any other city: Washington, D.C.

## Examples of Cities Dealing with Stormwater Control Issues

### CASE STUDY: ELLICOTT CITY, MARYLAND

### *250-year-old Mill Town Confronts Rising Flood Vulnerability*

Founded in 1772, Ellicott City's historic downtown is home to the oldest surviving train station in the country. But while this quaint city on the edge of the Baltimore metropolitan area may be ideally situated for a railroad track, it's in a highly inopportune spot when it comes to flooding. The historic district is nestled within steep, rocky valleys and is part of a three-and-a-half-square-mile watershed that includes four tributaries — the Tiber, Hudson, Autumn Hill, and New Cut rivers — that empty into the Patapsco River, which runs straight through downtown. When it rains, it pours.

*Flood damage along Main Street in Ellicott City on August 10, 2016. The suburban developments that have sprung up all around the town over the last 50 years have heightened flood risk during storm events by preventing natural drainage.*

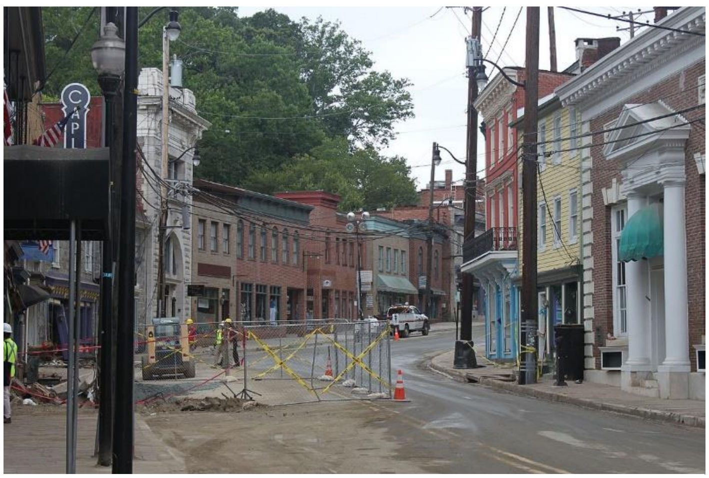
In the last decade, rainfall in the valley has been hitting new highs, as predicted by climate change models showing increased precipitation across the Northeast. The town was slammed by two 1,000-year storms in the span of two years — the first on July 30, 2016, and the second on May 27, 2018. Storms as intense as these are only supposed to have a 1 in 1,000 probability of occurring in any year. But climate change appears to be rewriting this math. Both these devastating downpours released flash floods upon the city's dense center, causing extensive damage and three deaths. During these heavy rains, torrents of water rushed downhill along Main Street, toward the Patapsco River.

Many of the same businesses were damaged by both floods and the same residents displaced. This caused uncertainty among community members about whether rebuilding and remaining in the town was a wise decision. While the town, which is built entirely in a 100-year floodplain, has had at least 18 major floods since it started recording them in 1789, something about the intensity and frequency of these two floods, as well as another major 2011 flood during Tropical Storm Lee, felt like a new kind of crisis.[132]

In March 2020, the Maryland General Assembly approved more than $8 million for additional stormwater control projects in Ellicott City. The money will fund a multi-year "Safe and Sound" plan that includes the construction of new stormwater tunnels to divert water away from Ellicott City's Main Street. The plan also features expanded culverts and new retention ponds higher up the watershed to reduce flooding. The Howard County government is purchasing all but one of ten flood-prone buildings around Main Street, at least four of which will be torn down due to their extreme susceptibility to flooding.[133]

County Executive Calvin Ball said he wants the “Safe and Sound” plan to be recognized as dealing with the realities of climate-driven precipitation increases and flood risks, and to be viewed as an example of how to preserve the character of a small city while prioritizing public health.[134]

The plan not only addresses aging infrastructure lacking adequate drainage, but also more recent suburban sprawl that’s greatly expanded the impervious paved environment. All this pavement upends natural systems and directs more water into already overflowing rivers and stormwater channels. The unincorporated community’s population has exploded in recent decades to over 75,000, and around two-thirds of the watershed’s land is developed, with more than a fifth being covered by pavement, rooftops, and other hard, impervious surfaces.[135]



*Recovery efforts along Main Street in Old Ellicott City during the summer of 2016. Before the 2016 flood, more than 100 businesses lined Main Street and generated some $200 million in annual revenue.*

Stormwater regulations within the watershed today only require new developments to be capable of handling runoff from 100-year storms, which means eight inches in 24 hours. A 1,000-year storm such as the one in May 2018 released eight inches in just three hours,[136] and nearly double that over the course of the day.[137]

David Wood, the stormwater coordinator for the Chesapeake Stormwater Network, which is based in Ellicott City, said even the most drastic improvement to the town’s local infrastructure would only solve part of the flooding problem.

“Topography, past development practices, and other factors play a big role,” he said. “While improving the design of stormwater infrastructure will mitigate the impacts of somewhat more frequent flooding events—up to 100-year storms—the historically large events will likely remain beyond the control of typical stormwater infrastructure.”

With two 1,000-year storms occurring within the space of three years, it’s clear that the solution to the town’s flooding problem must include much more than just adjustments to the city’s stormwater tunnels and culverts. As the city continues to secure financing, build support for its current plans, and envision even bolder future actions, stopgap measures are underway. These include clearing debris out of stormwater channels and making sure stormwater management requirements are met and enforced without exception. The city has also installed a public-alert system with loud beeping to indicate imminent or likely flooding along with signs pointing the way toward higher ground.

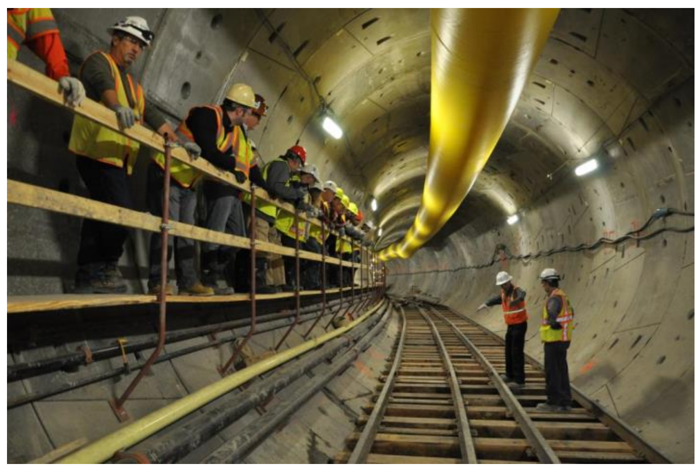
Wood said cities and counties across the Bay watershed, including Ellicott City, are just beginning to plan for the expected increases in rain volume and intensity due to climate change.

"Communities are often balancing budgets on a shoestring while trying to achieve both quantity and quality objectives," he said. "Understanding the changing climate conditions has a significant impact on future stormwater planning and design."

### CASE STUDY: WASHINGTON, DC

## *From Massive Tunnels to Curbside Planters: A Complete Stormwater Infrastructure Overhaul*

Washington, D.C., is in the midst of an ambitious and expensive stormwater infrastructure project that is designed to drastically reduce sewage overflows into the Anacostia and Potomac rivers.



*When the entire DC Clean Rivers Project is completed in 2030, average combined sewage discharges to the three major District waterways—Anacostia and Potomac rivers and Rock Creek—will be reduced by 96 percent overall.*

The goal is to make the waterways – once infamous for their contamination – healthy enough for swimming. Known as the Clean Rivers Project,[138] the construction project hinges on three massive underground tunnels that will be able to accommodate large rainfalls and prevent damaging nuisance flooding across the city, the result of a dated and overburdened drainage system based on 19th-century technology.

According to DC Water, the project will reduce combined sewer overflows by 96 percent overall and will essentially remove overflows of the city's combined sewage and stormwater system – called combined sewage overflows, or "CSOs" -- as a source of pollution to the Potomac.[139] The project will also reduce peak flows to wastewater treatment plants, making nutrient removal more effective and thus reducing pollution into the Chesapeake Bay. The first phase of the tunnel system went into operation in March 2018. By May of 2020, it had prevented over 7.7 billion gallons of sewage and stormwater from running into the District's waterways.

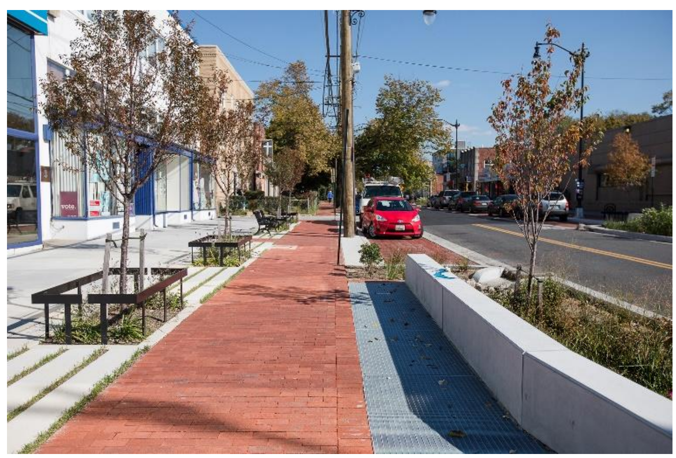
The overhaul of the system is the result of a twenty-year-old lawsuit filed by the Anacostia Watershed Society against DC Water over sewage pollution. DC Water agreed to build the massive sewer tunnels as part of a 2005 consent decree with the Environmental Protection Agency.[140]

More than 700 other cities around the country have similarly antiquated combined sewage and stormwater systems in need of major updating. Many of these cities must not only address dated infrastructure unable to accommodate today's sprawling urban landscapes dominated by impermeable surfaces, which exacerbate flooding, but also increased rainfall and other long-term weather changes driven by climate change.

Kimberly Isom, DC Clean Rivers Project Program Coordinator, said projects like DC's are long-term, expensive, and difficult to implement. With a price tag approaching $3 billion, the project is one of the largest and costliest building projects in the region's history.

"It's important that a comprehensive and defensible plan is developed at the beginning to establish schedule, budget, and performance," she said. "It is equally critical to obtain buy-in on the plan from the start from key stakeholders including regulators, environmental groups, and agency and political leaders."

Getting environmentalists' buy-in necessarily means addressing the storm on the horizon: climate change. The Washington region is forecast to get warmer and wetter.[141] Washington experienced its wettest year on record[142] in 2018, and its wettest 365-day stretch[143] from mid-2018 to mid-2019. More than 71 inches of rain fell between May 12, 2018, and May 12, 2019; almost five inches more than the record-setting 2018 calendar year total of 66.3 inches. Isom said Blue Plains Advanced Wastewater Treatment Plant, where DC's water is pumped out and treated, can be expanded in the future to increase the system's performance in the face of climate change, increasing growing rainfall, or other factors. She also said the tunnel system has been extended to provide additional storm conveyance capacity to historically flood-prone neighborhoods such as Bloomingdale and LeDroit Park.



*The Kennedy Street revitalization project in northwest Washington added more than 13,000 square feet of green space to a city block. It will help reduce combined sewer overflows into nearby Rock Creek Park during major rainfall events.*

The Clean Rivers Project consists of many different coordinated elements. Aside from the 18 miles of tunnels, dug deep underground at a rate of 50 feet per day, there's also a vast network of smaller green infrastructure projects to help mitigate rainfall and prevent overflows.

One of these efforts along the 100 block of Kennedy Street in the city's northwest quadrant won the Chesapeake Stormwater Network's award for "Best Ultra-Urban BMP (Best Management Practice) in the Bay in 2019.[144] The one-block project entails 33 green infrastructure projects, including enhanced tree canopy, permeable pavement (including along parking lanes), bioretention ponds, and curb extensions and planters that store water. Combined, these elements create three "lines of defense"—above-ground rainfall capture by the trees, street-level landscape enhancements and permeable pavements, and below-ground storage drywells.

By designing the infrastructure elements to work in a series, the overall system becomes even more resilient. When stormwater overwhelms one infiltration element it overflows to another, and then to another. This conveyance greatly slows the flow of the water, making it easier to capture before it spills over and causes flooding. The system removes 9,000 square feet of impervious surface from the 1.14-acre site and can accommodate nearly 60,000 gallons of stormwater, enough to mitigate a rainfall event of over two inches.

At the ribbon cutting for the Kennedy Street Project in June 2018, Washington Mayor Muriel Bowser celebrated the project for not only addressing chronic flooding issues, but improving public safety and making the city more beautiful.[145]

"We are proud to celebrate this tremendous revitalization," Mayor Bowser said. "Projects like this one are how we build a safer, stronger DC, and ensure that our neighborhoods continue to meet the needs of a growing city."

Isom pointed to the revitalization happening along Anacostia River waterfront as another example of a major civic improvement made possible in part by the stormwater upgrades.

"After decades of pollution from a variety of sources, the Anacostia River is being reclaimed as the community centerpiece that it can and should be," she said.

"These same benefits are also being experienced by wildlife," she continued. "DC Water has received numerous reports from river users of a surge in aquatic life since commissioning of the tunnel system. Adequate sewer infrastructure, including the tunnel system, is critical to achieving the goal of making the District's waterways fishable and swimmable."

## Conclusion and Recommendations:

Even without the effects of climate change, state and local governments across the Chesapeake Bay region have been struggling with the challenge of urban and suburban runoff pollution. As some communities – like Washington, D.C. – have started to invest in permeable pavement and stormwater pollution control devices like bioretention ponds, others have moved in the opposite direction by continuing to allow sprawling developments with acres of blacktop. Since the most recent Bay cleanup agreement was signed in 2009, the amount of developed land in the Bay watershed has increased by about 291,629 acres – an area six times the size of the District of Columbia -- adding more blacktop, roofs, and roads that accelerate runoff pollution. As a result, while many types of pollution into the Chesapeake Bay have declined – notably, from sewage treatment plans – runoff of nitrogen and phosphorus from urban and suburban areas has increased.

On top of this urban planning problem is the much broader crisis of a global climate that's been thrown out of balance by the burning of fossil fuels. Record-breaking rainfall pummeled most of the Chesapeake region in 2018, and the next year, a record-setting volume of fresh water flowed into the Bay – carrying with it runoff pollution from subdivisions, cities and farms.

As the Chesapeake region states try to execute an ambitious 2010 Bay cleanup agreement, one might think that they would be motivated to address this growing rainfall problem and redouble their plans to build stormwater pollution control systems. These projects, after all, not only soak up the rainwater flushing over parking lots, but also create greenspace in urban areas – including through the planting of trees and the conversion of parking lots to parks. Virginia and the District of Columbia are taking this forward-looking approach. By contrast, Pennsylvania and Maryland are moving in the opposite direction. In their most recent Watershed Implementation Plans, they retreated by weakening their urban and suburban stormwater pollution targets and scaling back their plans for implementing pollution control projects. This is unacceptable, especially at a critical time when a 2025 deadline for the Bay cleanup is just around the corner.

State and federal environmental agencies have also failed to provide enough guidance and grant money to county and city governments struggling with the problem of increased and more intense precipitation.

This report recommends the following solutions:

1) Broadly speaking, we should be planning for the future, not the past. There is no question that rainfall in the Bay region is increasing in both total volume and intensity. Planning at all levels – from the federal government down to the county and city level – must take these trends into account. All levels of government should start calibrating their planning and stormwater control projects and infrastructure to reflect likely future rainfall patterns, not historic averages from decades ago.

2) EPA must take a more active leadership role and require Pennsylvania and Maryland to strengthen their stormwater control plans and account for climate change. Instead of backtracking, Pennsylvania and Maryland should expand the stormwater pollution projects in their Phase III Watershed Implementation Plans.
3) EPA should require Pennsylvania to commit substantially more resources to its Bay cleanup effort, which has been far behind the other states. Federal actions could include the denial of permit approvals for major construction projects in Pennsylvania and a demand that the Commonwealth upgrade its leaky combined stormwater and sewage systems, including in Harrisburg.
4) States and municipalities across the Chesapeake region should invest more in stormwater control projects, such as the construction of artificial wetlands, ponds, rain gardens and the conversion of parking lots and other impervious surfaces to green areas that absorb rain. These projects not only control runoff pollution, they also help address environmental justice issues by creating parks in urban areas that are often dominated by blacktop.
5) Because stormwater control projects are expensive, EPA and Congress should provide substantial federal funds to state and local governments to help pay for these projects, which create jobs. Such federal investments would be a healthy economic stimulus package to help the nation rebound from the COVID-19 recession.

During a time when people are especially concerned about public health and employment, there's no better investment than putting American laborers to work transforming parking lots to parks, installing gardens in our cites, planting wetlands and trees, fixing pipes and culverts, and cleaning sewage out of our rivers, streams, and Chesapeake Bay. Controlling stormwater also creates greenspaces that absorb heat and improve the quality of life in densely-packed urban areas. This helps to alleviate environmental injustice by making cities more livable during an era of climate change.

# APPENDIX A: Additional Tables

**Table A1:** Developed land and stormwater loads from **Delaware**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2019 | Change (%) |
|---|---|---|---|
| Developed acres | 57,457 | 60,133 | +4.7% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 11.40 | 10.99 | -3.6% |
| Phosphorus | 0.43 | 0.40 | -8.2% |
| Sediment | 27.17 | 27.27 | +0.4% |
| Delivered load (pounds) | | | |
| Nitrogen | 654,975 | 660,945 | +0.9% |
| Phosphorus | 24,840 | 23,877 | -3.9% |
| Sediment | 1,561,310 | 1,640,009 | +5.0% |

*NOTE: All load estimates are "edge of tide," or delivered loads.*

**Table A2:** Developed land and stormwater loads from the **District of Columbia**, 2009-2019.

| | 2009 | 2019 | Rate of change (% per year) |
|---|---|---|---|
| Developed acres | 31,312 | 32,621 | +4.2% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 5.45 | 5.30 | -2.7% |
| Phosphorus | 0.47 | 0.44 | -6.0% |
| Sediment | 689 | 642 | -6.9% |
| Delivered load (pounds) | | | |
| Nitrogen | 170,637 | 172,914 | +1.3% |
| Phosphorus | 14,652 | 14,347 | -2.1% |
| Sediment | 21,586,001 | 20,941,874 | -3.0% |

**Table A3:** Developed land and stormwater loads from **Maryland**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2019 | Rate of change (% per year) |
|---|---|---|---|
| Developed acres | 1,240,341 | 1,302,377 | 5.0% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 7.26 | 7.28 | +0.3% |
| Phosphorus | 0.55 | 0.54 | -3.1% |
| Sediment | 313 | 323 | +3.4% |
| Delivered load (pounds) | | | |
| Nitrogen | 9,007,360 | 9,484,662 | +5.3% |
| Phosphorus | 685,400 | 697,536 | +1.8% |
| Sediment | 388,067,503 | 421,219,826 | +8.5% |

**Table A4:** Developed land and stormwater loads from **New York**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2019 | Rate of change (% per year) |
|---|---|---|---|
| Developed acres | 338,546 | 366,185 | +8.2% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 5.74 | 5.71 | -0.5% |
| Phosphorus | 0.22 | 0.21 | -5.2% |
| Sediment | 341 | 322 | -5.6% |
| Delivered load (pounds) | | | |
| Nitrogen | 1,942,778 | 2,091,431 | +7.7% |
| Phosphorus | 73,450 | 75,283 | +2.5% |
| Sediment | 115,389,621 | 117,781,261 | +2.1% |

**Table A5:** Developed land and stormwater loads from **Pennsylvania**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2018 | Rate of change (% per year) |
|---|---|---|---|
| Developed acres | 1,562,739 | 1,646,813 | +5.4% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 9.48 | 9.29 | -2.0% |
| Phosphorus | 0.28 | 0.26 | -6.4% |
| Sediment | 337 | 298 | -11.7% |
| Delivered load (pounds) | | | |
| Nitrogen | 14,811,711 | 15,301,338 | +3.3% |
| Phosphorus | 433,501 | 427,701 | -1.3% |
| Sediment | 526,727,009 | 489,980,766 | -7.0% |

**Table A6:** Developed land and stormwater loads from **Virginia**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2019 | Rate of change (% per year) |
|---|---|---|---|
| Developed acres | 1,759,898 | 1,895,626 | +7.7% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 5.76 | 5.74 | -0.3% |
| Phosphorus | 0.70 | 0.69 | -1.8% |
| Sediment | 308 | 309 | +0.4% |
| Delivered load (pounds) | | | |
| Nitrogen | 10,131,975 | 10,885,541 | +7.4% |
| Phosphorus | 1,237,305 | 1,309,242 | +5.8% |
| Sediment | 541,559,575 | 585,890,045 | +8.2% |

**Table A7:** Developed land and stormwater loads from **West Virginia**'s portion of the Chesapeake Bay watershed, 2009-2019.

| | 2009 | 2019 | Rate of change (% per year) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Developed acres | 166,910 | 174,975 | +4.8% |
| Loading rate (pounds per developed acre) | | | |
| Nitrogen | 7.38 | 6.78 | -8.2% |
| Phosphorus | 0.44 | 0.33 | -24.1% |
| Sediment | 529 | 499 | -5.7% |
| Delivered load (pounds) | | | |
| Nitrogen | 1,232,166 | 1,185,806 | -3.8% |
| Phosphorus | 73,023 | 58,072 | -20.5% |
| Sediment | 88,292,675 | 87,255,613 | -1.2% |

**Table A8.** Stormwater phosphorus loads from developed land (highlighted cells indicate a reduced level of effort)

| | 2009 load (millions of pounds) | 2025 targets (millions of pounds) | | Planned change in load, 2009-2025 | |
|---|---|---|---|---|---|
| | | *2012 plan* | *2019 plan* | *2012 plan* | *2019 plan* |
| DE | 0.02 | 0.03 | 0.02 | +8.4% | +0.1% |
| DC | 0.01 | 0.01 | 0.01 | -0.9% | -10.6% |
| MD | 0.69 | 0.47 | 0.66 | -31.9% | -3.9% |
| NY | 0.07 | 0.07 | 0.05 | -6.5% | -34.8% |
| PA | 0.43 | 0.18 | 0.43 | -57.6% | -1.3% |
| VA | 1.24 | 1.26 | 1.19 | +1.3% | -4.1% |
| WV | 0.07 | 0.06 | 0.05 | -23.6% | -30.5% |
| **TOTAL** | **2.55** | **2.07** | **2.41** | **-18.5%** | **-5.2%** |

NOTE: *All load estimates are "edge of tide," or delivered loads. "2012 plan" and "2019 plan" loads represent the loads associated with Phase II and Phase III WIP commitments, respectively, as shown by the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST).*[146]

**Table A9.** Stormwater sediment loads from developed land (highlighted cells indicate a reduced level of effort)

| | 2009 load (millions of pounds) | 2025 targets (millions of pounds) | | Planned change in load, 2009-2025 | |
|---|---|---|---|---|---|
| | | *2012 plan* | *2019 plan* | *2012 plan* | *2019 plan* |
| DE | 1.57 | 1.77 | 1.67 | +13.2% | +6.7% |
| DC | 22.19 | 19.47 | 19.77 | -12.3% | -10.9% |

| | | | | | |
|---|---|---|---|---|---|
| MD | 388.26 | 284.04 | 393.79 | -26.8% | +1.4% |
| NY | 115.39 | 95.41 | 67.94 | -17.3% | -41.1% |
| PA | 524.52 | 136.11 | 481.38 | -74.1% | -8.2% |
| VA | 542.33 | 511.89 | 475.68 | -5.6% | -12.3% |
| WV | 88.30 | 97.94 | 88.47 | +10.9% | +0.2% |
| **TOTAL** | **1,682.56** | **1,146.63** | **1,528.72** | **-31.9%** | **-9.1%** |

NOTE: *All load estimates are "edge of tide," or delivered loads. "2012 plan" and "2019 plan" loads represent the loads associated with Phase II and Phase III WIP commitments, respectively, as shown by the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST).*[147]

# APPENDIX B: Statement from the Maryland Department of the Environment

In response to questions from the Environmental Integrity Project, Jay Apperson, Deputy Director in the Office of Communications for the Maryland Department of the Environment, emailed the following statement on July 29, 2020:

"Maryland's commitment to reducing polluted urban and suburban stormwater runoff is unwavering. It is important to understand the importance of this being done not in a vacuum but in coordination with work to reduce nutrient and sediment pollution from all sectors for the best results as part of the broad Chesapeake Bay restoration plan. The numbers attached to this work may evolve due to changes reflected in improved modeling, an increasing use of calculations that consider growth and the effects of climate change and an understanding that this work does not end in 2025 and must be sustainable for the long run. Maryland's Phase III WIP includes nutrient targets that represent a substantial increase in effort over the Phase II WIP, with an additional million pounds of nitrogen reductions required by 2025. To reduce stormwater runoff It is crucial that the state gain the buy-in of stakeholders – including local governments that are responsible for planning, paying for and installing BMPs -- by helping them to understand the opportunities for restoration and the opportunities to solve multiple problems (for co-benefits such as reduced flooding, for example) to justify the costs. As a state, Maryland continues to be a leader in reducing nutrient and sediment pollution to our waterways and in restoring the Chesapeake Bay.

**Question 1.** In Maryland's Phase III Watershed Implementation Plan (WIP), submitted to EPA in August 2019, Maryland promised to do less to control stormwater from urban and suburban areas than it pledged back in 2012 in its Phase II WIP. Why the retreat on concrete commitments and projects to reduce urban and suburban stormwater pollution into the bay?

**Response 1:** The Phase III WIP envisions that WWTP upgrades and agricultural BMPs will be the primary nutrient reduction drivers to achieve 2025 goals and that stormwater restoration will need to continue in the future to maintain the 2025 Bay nutrient caps, offset the impact of climate change and to restore local rivers and streams.

The Phase III WIP expects to maintain a pace of restoration of impervious surfaces that would lead to 30% cumulative restoration by 2025 and almost 40% by 2030. There has been no retreat. Restoration of impervious surfaces with little or no stormwater management is largely implemented through the MS4 permits, which regulate more than 90% of the impervious surfaces in the state. In the last decade, the MS4 jurisdictions combined impervious surface restoration (concrete commitments on impervious surfaces with little or no stormwater management) has averaged about 2% per year or 20% by 2019. Continuing at this 2% pace represents a continuation of the most challenging and expensive component of Bay restoration goals in Maryland.

**Question 2:** Maryland's Phase III WIP set numeric goals for nitrogen pollution entering the Bay from urban and suburban stormwater in 2025 that are higher than the nitrogen loads from this sector back in 2009. The Phase III WIP would increase the amount of nitrogen pollution flowing into the Bay from stormwater runoff each year by 247,000 pounds by 2025, compared to the 2009 baseline. This suggests the state is not planning to make any net reductions at all in nitrogen from urban and suburban stormwater by 2025 and is instead accepting increases from this sector. Why?

**Response 2:** With respect to the 2009 comparison, as a result of Chesapeake Bay model changes, improvements in data reporting, load estimates are not comparable. The Phase III WIP reports that between 2017 and 2025 stormwater nitrogen, phosphorus and sediment pollution is expected to decrease. This will result from the combined effect from pollution mitigation and land conservation strategies on future development in addition to restoration of developed land with little to no existing stormwater management practices. The Phase III WIP, unlike the previous WIPs, accounts for growth to 2025 by factoring in the future population and land use (See Section VI). As land is developed, it is subject to many state laws, such as Environmental Site Design, Forest Conservation, Critical Area, Program Open Space, Tier II Waters, and wetland mitigation as well as local ordinances.

**Question 3.** Compared to Maryland's Phase II WIP (back in 2012), Maryland is now planning in its Phase III WIP to build fewer rain gardens (zero acres of rain gardens instead of 34,716 acres) by 2025. The state also plans to create less permeable pavement (zero acres instead of 350 acres), and plant fewer forested buffers along urban streams (zero new acres instead of 26,430 acres), among other retreats in urban and suburban stormwater commitments. Why?

**Response 3:** In the Phase III WIP, the stormwater restoration is estimated using different parameters than the Phase II WIP, thus a direct comparison is flawed. The change reflects that implementation of the strategies, or specific practices, occurs through the MS4 permits. Thus, the MS4 jurisdiction has the flexibility to determine the best practices given the land use, geology and environmental priorities of the county or city, while still meeting the restoration requirements in the WIP and the permit. In the draft MS4 permit expected out later this year, permit incentives have increased for forest buffers, green infrastructure and capturing and treating more runoff volume. These incentives will support growth of green infrastructure that align with local needs and Bay restoration goals.

**Question 4**: Is Maryland essentially giving up on the urban/suburban stormwater sector because of its high cost, compared to other strategies for reducing pollution in the Bay?

**Response 4:** Maryland has strengthened its effort on stormwater restoration in the Phase III WIP and recognizes that restoration will continue past 2025 to restore local streams and rivers and the Chesapeake Bay. This is a long-term commitment. Stormwater restoration is expensive but local communities also invest in co-benefits including increasing flood resiliency, increasing groundwater supplies and greenspace, to name a few.

Maryland's large and medium MS4 jurisdictions have established themselves as national leaders by collectively investing $685 million in clean water infrastructure. As a result, 35,000 impervious acres have been restored, reducing more than 67,000 pounds of phosphorus, 270,000 pounds of nitrogen, and 30,000,000 pounds of sediment annually to local waters and the Chesapeake Bay. The Chesapeake Bay Trust has awarded $36.5 million in grants to MS4 programs that are ensuring a cleaner, greener, and healthier Chesapeake Bay. MDE's Water Quality Finance Administration guaranteed $107 million in low-interest loans for MS4 restoration projects and another $135 million in low-interest loans are pending for additional projects.

To suggest we are giving up is absurd. We are as committed as ever to our nationally acclaimed stormwater permitting program. We continue to successfully defend it against challenges by governments and regulated entities who believe it's too aggressive or costly all the way up to the US Supreme Court and we continue to insist on greater environmental results to meet our Clean Water Act commitments.

**Question 5:** Is Maryland deferring action on the urban/suburban stormwater sector until after 2025? If so, why?

**Response 5:** Maryland is preparing to issue five Phase I Large MS4 permits by the end of this calendar year. These permits will result in a cumulative restoration of 30% by 2025, successfully meeting our phase III WIP Goals. Further, the permits represent a significant effort to engage with local governments. Local support is the key to long term success of restoration goals since planning, funding and execution of BMPs is a local responsibility.

**Question 6**: Maryland has changed its MS4 stormwater permits, which used to require counties and cities to restore 20 percent of a municipality's impervious surfaces. Counties and cities can now buy pollution trading credits as an alternative to restoring 20 percent of their impervious surfaces. Why? Is this switch to the pollution trading option one of the reasons Maryland's Phase III WIP contains fewer commitments for urban and suburban stormwater projects?

**Response 6:** Urban and suburban stormwater projects are as high a priority as ever, and we are doing more than ever to encourage and support the multiple co-benefits of such projects including climate adaptation and resiliency.

No matter how many times you say it, our nutrient and sediment credit trading programs are not "pollution trading," a misleading label to imply pollution is only getting spread around. Nutrient and sediment credit trading is an increasingly important tool in the Chesapeake Bay watersheds around the country to accelerate the pace of actual restoration and bring more partners to the table without letting polluters off the hook. It can increase cost effectiveness and stronger partnerships to meet our Bay restoration goals. In addition to permit compliance, trading done right provides permittees with incentives to explore more cost effective, innovative solutions to achieve their pollution reduction goals, and incorporate other co-benefits into their implementation goals. It's an important tool that can help the Bay and local water quality as long as regulatory accountability, transparency, and public support are joined with it.

# APPENDIX C: Statement from Pennsylvania Department of Environmental Protection

In response to questions from EIP, Deborah Klenotic, Deputy Communications Director for the Pennsylvania Department of Environmental Protection, emailed the following answers on July 24, 2020:

**“Question:** In its Phase III Watershed Implementation Plan (WIP), submitted to EPA in August 2019, Pennsylvania promised to do less to control stormwater from urban and suburban areas than it pledged back in 2012 in its Phase II WIP. Why the retreat on concrete commitments to reduce urban and suburban stormwater pollution into the bay?

**Answer:** The Phase 3 WIP is based on updated and far more sophisticated technical analyses than were possible in 2012, which allows DEP to focus on pursuing the most impactful as well as implementable pollution reduction efforts. The primary difference between the Phase 2 and 3 WIPs is the level of certainty Pennsylvania has with respect to implementation. We are certain we'll accomplish more in urban stormwater load reductions in 2020-2025 than occurred in 2012-2019. The urban stormwater pollutant load reduction goals in the Phase 3 WIP are based on multiple planned actions: stormwater best management practices (BMPs) specified by Municipal Separate Storm Sewer System (MS4) municipalities in the Pollutant Reduction Plans (PRPs) and Total Maximum Daily Load (TMDL) Plans they have submitted for National Pollutant Discharge Elimination System (NPDES) permit requirements; the establishment of forest buffers in urban environments; ongoing efforts to manage post-construction stormwater runoff for development projects; and reductions in illicit discharges to MS4s as required by NPDES permits. These planned actions were simulated in the EPA Phase 6 Chesapeake Bay Model to determine reductions in the Phase 3 WIP and will play a crucial part in meeting our 2025 goals.

That said, while nitrogen is the critical pollutant of concern to the Bay, urban areas generate low concentrations of nitrogen and urban stormwater BMPs are generally inefficient at removing nitrogen. It would serve no purpose to continue using load reduction goals proposed in the past that weren't based on accurate technical understanding, realistic data, or regulatory mechanisms. Pennsylvania decided that moving forward, we need to focus our limited resources on the pollutant load sectors where nitrogen control BMPs will have the greatest impact, such as agriculture.

The focus of the MS4 program is to address the local water quality impairments caused by impervious urban areas. The rate and flow from these areas causes gullies and erodes stream banks and beds. Pollutants wash off because runoff cannot infiltrate the ground. Reduced groundwater recharge causes urban streams to dry up and/or have increased temperatures in the summer. Illicit discharges (e.g., oil, chemicals and sewage from leaky pipes) hurt aquatic life. These are the issues that our urban water quality programs are addressing. In developing Pennsylvania’s MS4 General NPDES Permit (PAG-13) in 2015-2016, DEP also anticipated that more would be expected of the urban stormwater sector as part of its Phase 3 WIP. This is why PAG-13 requires PRPs and TMDL Plans. The focus of these plans is on attaining millions of pounds of sediment reductions to improve local waterways, but hundreds of thousands of pounds of nitrogen reductions will also occur to assist our efforts to clean up the Chesapeake Bay. It is true that it's not cost-effective for urban stormwater management to treat exclusively for nitrogen, but nitrogen is also reduced as sediment is reduced.

Pennsylvania's Phase 3 WIP was developed by over 1,000 Pennsylvanians. Farmers, local municipal and community leaders, foresters, academic experts, environmental organizations, and state government agencies contributed their expertise. This process produced a plan that is realistic, grounded in data and technical knowledge, and is actually going to reduce nitrogen, phosphorus, and sediment in the watershed.

Additionally, DEP is delegated the NPDES Construction Stormwater program from EPA, and we work directly with conservation districts in implementing this program. Our state regulations require that erosion and sediment control and post-construction stormwater management (PCSM) BMPs are implemented and maintained for earth disturbance activities where there is an NPDES permit requirement (equal to or greater than one acre of disturbance). Our state regulations require that the net change in rate, volume, and water quality (pollutant loading), comparing pre-construction to post-construction conditions, is addressed through PCSM. The data submitted quarterly by conservation districts and through our triennial review of the program were analyzed as part of the Phase 3 WIP development process.

**Question:** Pennsylvania's Phase III WIP set numeric goals for nitrogen pollution entering the Bay from urban and suburban stormwater in 2025 that are higher than the nitrogen loads from this sector back in 2009. The Phase III WIP would increase the amount of nitrogen pollution flowing into the Bay from stormwater runoff each year by Pennsylvania's by 301,360 pounds by 2025, compared to 2009. Back in 2012, in the state's Phase II WIP, Pennsylvania committed to decreasing nitrogen pollution from urban and suburban stormwater into the Bay by 6.7 million by 2025. Why the change?

**Answer:** Efforts to curb nitrogen loading to the Bay from urban and suburban stormwater sources will yield smaller results than pursuing nitrogen reductions in other sectors. The Phase 3 WIP will achieve a reduction of 34 million pounds of nitrogen loading by 2025 while accounting for changes in strategy. See above for additional details.

Among other changes, Pennsylvania's Phase III WIP would replace only 202 acres of impervious surfaces instead of the 2,300 acres planned by the state back in 2012 in the Phase II WIP. Pennsylvania's Phase III WIP would create 203,265 acres of stormwater control ponds, wetlands and other projects by 2025, instead of the 1.5 million acres of stormwater control practices planned in the Phase II WIP back in 2012. Is Pennsylvania backing away from these urban/suburban stormwater projects because of their high cost, compared to other strategies for reducing pollution in the Bay?

The Phase 3 WIP provides a more credible estimate of reductions to be achieved from real stormwater projects identified in MS4 Pollutant Reduction Plans and TMDL plans, as well as industrial stormwater projects.

**Question:** Is Pennsylvania essentially deferring action on the urban/suburban stormwater sector until after 2025? If so, why?

**Answer:** DEP is not deferring action on the urban stormwater sector. Quite the opposite. The 2018 MS4 General Permit established a challenging pollutant load reduction requirement for hundreds of Pennsylvania MS4-permitted municipalities. Those municipalities are actively implementing PRPs now, in many cases at substantial cost. Their required BMPs must be operational, and their pollutant load reductions attained, within 5 years after their plans were approved. Those are today's requirements for the urban sector, and they are significant. The nutrient load reductions we'll achieve through the MS4 permit requirements put in place starting in 2018 will be orders of magnitude greater than any nutrient load reductions achieved through prior MS4 permits (which were essentially none), regardless of what load reduction goals were proposed in prior WIPs.

# APPENDIX D: Statement from DC Water

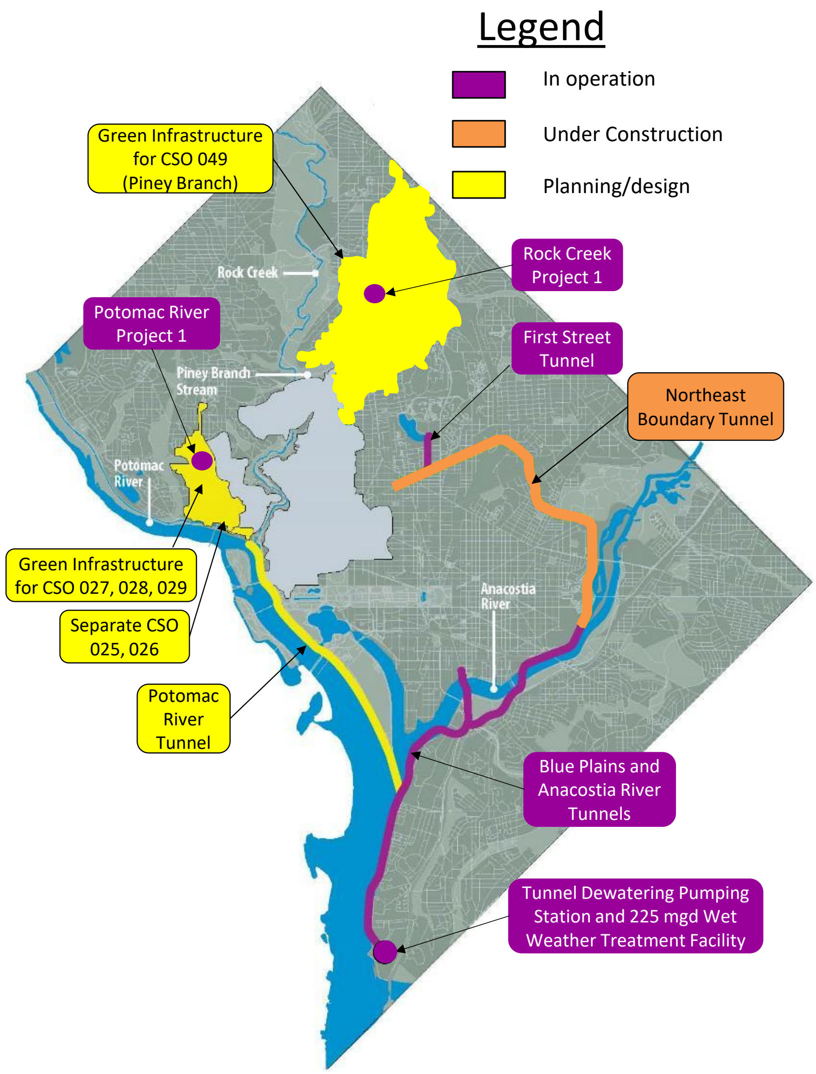
In response to written questions from the Environmental Integrity Project, Tamara Stevenson, Senior Manager of Marketing, Production and Operations at DC Water, emailed the following statement on July 24, 2020:

[Question 1: In DC's 2002 long term control plan, why does the city assume an average amount of rainfall of 38.95 (the average of the forecast period of 1988-1990), when the most recent five-year average from NOAA is significantly higher, 48.14? ]

Answer: As rainfall depths can vary widely from year to year, the Long-Term Control Plan (LTCP) was developed in accordance with EPA guidelines for CSO planning using "system-wide annual average" rainfall conditions. In preparation of the LTCP, DC Water reviewed 50 years of rainfall data at Ronald Reagan National Airport. The average rainfall over this 50 period was 38.95" per year. The rainfall for the periods 1988-1990 was selected as representative of average conditions for use in evaluation of CSO controls. This three-year period averaged 40.97" per year, and included one year each drier than, approximately equal to, and wetter than the long-term average, allowing for evaluation of CSO control performance across a variety of climatic conditions.

[Question 2: Was the construction of the two underground stormwater storage tunnels (capacities of 77 million and 49 million gallons) outlined in the 2002 long term control plan completed? If not, what is their status? In addition, where is DC in the building of additional pumping stations, a new interceptor, green infrastructure, and separating sewage and stormwater outfalls?]

Answer: DC Water is completing the LTCP projects in accordance with the schedule stipulated in its federal consent decree, amended in 2016. Completion of the entire LTCP is required by 2030. The figure below shows the status of the major elements of the program.




**DC Clean Rivers Project Status**

[Question 3: If the above construction projects have been completed, when?]

Answer: The status and completion dates for each project associated with the LTCP is available in the DC Water's Long Term Control Plan Consent Decree Status Report. The most recent report (Q1 2020), is available here.

# APPENDIX E: Statement from Harrisburg Capital Region Water

In response to written questions from the Environmental Integrity Project, Harrisburg Capital Region Water External Affairs Manager Rebecca J. Laufer sent the following statement via email on July 29, 2020:

**"Question 1:** In Capital Region Water's long term control plan for CSO's, why does the plan use a median expected annual rainfall of about 40 inches per year, based on historic figures in a 57-year record from Harrisburg's two airport gauges? That's about 15 percent less than the annual average of 46 inches of rain the region actually experienced from 2015 to 2019, based on NOAA data. Given that climate change is increasing rainfall across the region – and scientists expect those increases to continue into the future – why didn't Capital Region Water use more recent and higher rainfall averages to plan for its infrastructure improvements?

**Answer 1:** CRW's City Beautiful H2O Program Plan (CBH2OPP) follows the EPA guidance requirement to establish a "typical rainfall year" that is calculated from the historical rainfall record at the Harrisburg airport (dating back to 1948). The analysis is an averaging process that includes both wetter- and drier-than average years within the historical record. While it is true that 2017 and 2018 rainfall totals were higher than average, their incorporation would not significantly impact the typical year calculation results. Refer to CRW's Combined Sewer System Characterization Report, Section 2 Characterization of Precipitation Patterns, for CRW's EPA approved "Typical Year" statistical evaluation methodology and conclusion (https://capitalregionwater.com/wp-content/uploads/2018/01/CSS-Characterization-Report_v.2.0-FINAL-FOR-WEBSITE.pdf).

**Question 2:** Capital Region water's long-term plan calls for the upgrade of a sewage pumping plant, improvements to CSO outfall regulation devices, the lining and repair of long-neglected combined sewage and stormwater pipes, as well the planting of trees and rain gardens and the creation of other "green infrastructure" to help soak up rainwater. For which of these specific projects has construction already begun?

**Answer 2:** See attached document from Capital Region Water.

**Question 3**: Specifically which of these projects are now complete? And on what dates were they finished?

**Answer 3:** The attached tables summarize projects undertaken by CRW since submission of CBH2OPP. Each entry includes a brief description and an estimated date of completion. If the project has been completed, it is so noted (and italicized).

# APPENDIX F: Statement from Lynchburg Department of Water Resources

In response to written questions from the Environmental Integrity Project, Timothy A. Mitchell, Director Lynchburg's Department of Water Resources, emailed the following statement on July 21, 2020:

"We very proud of our efforts on our award winning CSO Program. We have aggressively worked for over 3 decades to reduce and eliminate CSO overflow points, volume, and pollutants. To date, since 1993, the City has spent and/or appropriate over $400 million on CSO and Water Quality projects (over $20,000 per household). We anticipate being fully complete with our program within the next 5 years. Of the 10 LTCP Priority Projects identified in the 2014 LTCP, the first 6 are either complete or under construction. It is important to note that prior to the 2014 LTCP Update, we were doing massive separation projects. Specifically, answers to your questions follow:

[Question 1: In Lynchburg's long term control plan, why does the city assume an average amount of rainfall of 42.35, using the period of 1993-1995 as "typical year", when the most recent five-year average from NOAA is significantly higher, 48.45?]

Answer 1: According to the CSO Policy, CSO control alternatives should be assessed on a "system-wide, annual average basis". Our 2014 LTCP complies with this guidance by using a typical hydrologic period for all model applications during the long-term control plan (LTCP) development. The typical hydrologic period used for the 2014 LTCP was selected in 2012 to represent the average hydrologic condition in Lynchburg based on a comprehensive analysis of 63 years (1949-2011) of historical rainfall data and other hydrologic parameters (such as receiving water body flows), as described in detail in Section C.6 of Appendix C of the LTCP. In addition to annual average rainfall depth, rainfall intensity, duration and number of back-to-back events were also considered during the selection process. This standard methodology is widely accepted across the country for CSO LTCPs.

For comparison, the historical annual average rainfall depth from 1949 to 2011 is 40.52 inches, whereas the selected three-year period (1993-1995) has an annual average rainfall depth of 42.35 inches, which provides a conservative representation of the average condition. Even with the more recent rainfall from 2012-2019 included, the annual average rainfall from 1949-2019 is 40.82 inches, still below the annual average rainfall of 42.35 inches for the selected three year period. Similarly, the most recent 30-year annual average rainfall (1990-2019) is 41.68 inches, also below the annual average rainfall of 42.35 for the selected three year period. Therefore, the selected three-year period used in our LTCP is fully in accordance with applicable EPA guidance for LTCP development.

[Question 2: Has the city begun construction of the new storage tank, green infrastructure, and increase in capacity for the local wastewater treatment, as outlined in the long term control plan?]

Answer 2: Yes, all the projects at the WWTP including the storage and pumping facility are currently under construction. It is anticipated that construction will be complete and these facilities online in early 2021. Green infrastructure was fully evaluated but in our situation determined not to be a cost effective alternative due to the steep terrain and limited public area in which it could be implemented. That said, green infrastructure is incorporated into any municipal project when possible but is not part of our LTCP strategy.

[Question 3: If the above construction projects have been completed, when? ]

Answer 3: See above.

## END NOTES

[1] Data from National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information website, accessed 6/5/2020. Link: https://www.ncdc.noaa.gov/cag/city/time-series/USW00093738/pcp/12/12/1920-2020?base_prd=true&begbaseyear=1901&endbaseyear=2000
[2] U.S. Geological Survey streamflow data from USGS "Freshwater Flow into Chesapeake Bay" web page, accessed 6/1/20. Link: https://www.usgs.gov/centers/cba/science/freshwater-flow-chesapeake-bay?qt-science_center_objects=0#qt-science_center_objects
[3] University of Maryland Center for Environmental Science annual "ECOCHECK" report cards on the Chesapeake Bay's health show an overall health rating falling from 54 out of 100 in 2017 to a 44 out of 100 in 2019. Link: https://ecoreportcard.org/report-cards/chesapeake-bay/bay-health/
[4] Data from National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information website, accessed 6/5/2020. Link: https://www.ncdc.noaa.gov/cag/city/time-series/USW00093738/pcp/12/12/1920-2020?base_prd=true&begbaseyear=1901&endbaseyear=2000
[5] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/
[6] Ibid.
[7] Ibid.
[8] Chesapeake Bay Program, 2025 Chesapeake Bay Climate Change Load Projections (Apr. 30, 2018), https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwieqtXxzeHqAhUXoHIEHbT1CpYQFjAAegQIBhAB&url=https%3A%2F%2Fwww.naturalresources.virginia.gov%2Fmedia%2Fgovernorvirginiagov%2Fsecretary-of-natural-resources%2Fpdf%2F2025-Chesapeake-Bay-Climate-Change-Load-Projections.pdf&usg=AOvVaw0z4vRZfDQvZUnwhgW9dRvn.
[9] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/
[10] Ibid.
[11] Tetra Tech, Restoration Plan for Nontidal Sediment in the Patuxent River Lower and Middle Watersheds at 2-3 (July 31, 2019).
[12] Pollution projections from Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/ Maryland Phase III Watershed Implementation Plan (WIP) available at: https://mde.maryland.gov/programs/Water/TMDL/TMDLImplementation/Pages/Phase3WIP.aspx . Maryland has different projections for pollution impact of its WIP than the Bay Program. These numbers reflect the EPA-led Bay Program's estimates.
[13] Numbers compare Maryland's Phase II Watershed Implementation Plan (WIP), approved in 2012, to the state's Phase III WIP, approved in 2019
[14] The pollution control project goals in this category of Pennsylvania's Phase III WIP are "Stormwater Management Composite" includes wet ponds, wetlands, dry ponds, infiltration practices, etc.
[15] Water quality monitoring performed by Susquehanna Riverkeeper on 20 dates in June and July of 2020. Analysis for E coli bacteria performed by ALS Environmental in Middletown, PA.
[16] EPA website, "Learn About Heat Islands," accessed August 5, 2020. Link: https://www.epa.gov/heatislands/learn-about-heat-islands
[17] *See, e.g.*, D.R. Easterling et al., Precipitation change in the United States, pages 218 – 219. In: Climate Science Special Report: Fourth National Climate Assessment, Volume 1. U.S. Global Change Research Program, Washington DC (2017).
[18] *See, e.g.*, L.A. Dupigny-Giroux et al., Northeast, page 705. In: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. U.S. Global Change Research Program, Washington DC (2018).
[19] Environment & Natural Resources Institute, Pennsylvania Climate Change Impacts Assessment Update at 132 (April 2020), prepared for PA DEP, available at http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf.
[20] Data from National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information website, accessed 6/5/2020. Link:

https://www.ncdc.noaa.gov/cag/city/time-series/USW00093738/pcp/12/12/1920-2020?base_prd=true&begbaseyear=1901&endbaseyear=2000
[21] Ibid. Precipitation numbers from Baltimore from Baltimore Washington International Airport (BWI).
[22] Ibid.
[23] M. Hoerling et al., Characterizing Recent Trends in U.S. Heavy Precipitation, 29 Journal of Climate 2313, 2319, 2328 (Apr. 2016). "Very wet days" are defined as "days exceeding the 95th percentile of precipitation falling on a wet day precipitation occurrence exceeding 1 mm." *Id*. at 2315. The northeastern United States, for purposes of this study, included all of the Chesapeake Bay states other than Virginia.
[24] D.R. Easterling et al., Precipitation change in the United States, page 212, Fig. 7-4. In: Climate Science Special Report: Fourth National Climate Assessment, Volume 1. U.S. Global Change Research Program, Washington DC (2017). "99th percentile" days are defined as "daily events that exceed the 99th percentile of all non-zero precipitation days." The northeastern United States, for purposes of this study, included all of the Chesapeake Bay states other than Virginia.
[25] *Id*.
[26] U.S. Geological Survey streamflow data from USGS "Freshwater Flow into Chesapeake Bay" web page, accessed 6/1/20. Link: https://www.usgs.gov/centers/cba/science/freshwater-flow-chesapeake-bay?qt-science_center_objects=0#qt-science_center_objects
[27] University of Maryland Center for Environmental Sciences annual ECOHEALTH report card on the Bay, accessed 6/08/20. Link: https://ecoreportcard.org/report-cards/chesapeake-bay/bay-health/
[28] Ibid.
[29] J.M. Thibeault and A. Seth, Changing Climate Extremes in the Northeast United States: Observations and Projections from CMIP5, 127 Climatic Change 273-287, 275 (2014).
[30] D.R. Easterling et al., Precipitation change in the United States, page 221, Figure 7.8. In: Climate Science Special Report: Fourth National Climate Assessment, Volume 1. U.S. Global Change Research Program, Washington DC (2017).
[31] R.G. Najjar et al., Potential climate-change impacts on the Chesapeake Bay, 86 Estuarine, Coastal and Shelf Science 1, 5 (2010).
[32] *See, e.g.*, Chesapeake Bay Program Principals' Staff Committee, 2025 Chesapeake Bay Climate Change Load Projections at slides 3 and 6 (Mar. 2, 2018) (showing "increased precipitation volume and intensity"); Maryland 10 ("Impacts of climate change, including increased precipitation and storm events, are causing heightened nutrient and sediment loads to the Chesapeake Bay").
[33] Chesapeake Bay Program numbers
[34] Ibid.
[35] U.S. EPA, Improving the Resilience of Best Management Practices in a Changing Environment: Urban Stormwater Modeling Studies, EPA/600/R-17/469F at xix (May 2018).
[36] Id.
[37] Id. at 32.
[38] Id.
[39] Id. at 36. Runoff and pollution loads associated with a mix of both "conventional" BMPs and "green infrastructure" such as permeable pavement and infiltration basins would more than double under future conditions, but they would be starting from a much lower baseline than the conventional BMPs alone. For example, runoff volume using conventional BMPs would increase from 7.04 inches/year (current conditions) to 10.96 inches/year (future conditions), while runoff volume from the green infrastructure BMP mix would increase from 1.52 to 3.40 inches per year.
[40] Id. at 39.
[41] As of 2018, stormwater loads from developed land represented at least 16 percent of total nitrogen loads, 18 percent of total phosphorus loads, and 9 percent of total sediment loads. CAST, May 7, 2020. We say "at least" a certain percentage of total loads because the Chesapeake Bay Program's model outputs attribute part of the stormwater load to the "natural" category. To be more specific, the models assume that some amount of stormwater pollution will settle out in streams and rivers, and then be re-suspended and carried to the Bay. These re-suspended pollution loads are attributed to the "streams" category, which is part of the broader natural source category, even though the pollution originally came from developed land. See Environmental Integrity Project, The

State of Chesapeake Bay Climate Modeling at 24-27 (July 25, 2019), available at https://environmentalintegrity.org/reports/the-state-of-chesapeake-bay-watershed-modeling/ .

[42] U.S. EPA, Chesapeake Bay Watershed Implementation Plans, https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-watershed-implementation-plans-wips.

[43] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/. Accessed May 7, 2020. 2009 and Phase III WIP values have changed slightly with the introduction of the 2019 version of CAST. However, the new version of CAST no longer includes load estimates associated with 2012 WIP II planning targets. In order to maintain an apples-to-apples comparison, this table uses CAST estimates as of May 2020.

[44] Id. In 2018, Maryland, Pennsylvania and Virginia accounted for 90 percent of the urban stormwater nitrogen load, 93 percent of the phosphorus load, and 87 percent of the sediment load.

[45] Maryland Phase III WIP at B-32.

[46] Maryland Phase III WIP at B-33.

[47] Nutrient targets were taken from pages 27-33 of the Phase II WIP and pages 24-25 of the Phase III WIP. BMP implementation estimates were taken from Table 10 of the Phase II WIP and Appendix C of the Phase III WIP.

[48] Maryland Phase II WIP, page 27; Maryland Phase III WIP, page 24.

[49] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/. Accessed May 7, 2020. 2009 and Phase III WIP values have changed slightly with the introduction of the 2019 version of CAST. However, the new version of CAST no longer includes load estimates associated with 2012 WIP II planning targets. In order to maintain an apples-to-apples comparison, this table uses CAST estimates as of May 2020.

[50] “Runoff Reduction” in the Phase III WIP. Again, Maryland’s WIP conflicts with Chesapeake Bay Program model outputs, which show Maryland’s 2025 load as being greater than the 2009 load, for a net increase of roughly 5 million pounds. See Table A9 below.

[51] “MS4 Permit Stormwater Retrofit” and “Stormwater Management Generic BMP” in Phase II WIP.

[52] “Stormwater Treatment” in Phase III WIP.

[53] Described as “Urban Stream Restoration (interim” in Phase II WIP.

[54] “Urban Shoreline Management” in Phase III WIP

[55] Environmental Integrity Project, Pollution Trading in the Chesapeake Bay (Aug. 19, 2019), available at https://environmentalintegrity.org/reports/pollution-trading-in-the-chesapeake-bay/.

[56] Email to EIP from Jay Apperson, Deputy Director of the Office of Communications for the Maryland Department of the Environment on July 29. 2020.

[57] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/. Accessed May 7, 2020. 2009 and Phase III WIP values have changed slightly with the introduction of the 2019 version of CAST. However, the new version of CAST no longer includes load estimates associated with 2012 WIP II planning targets. In order to maintain an apples-to-apples comparison, this table uses CAST estimates as of May 2020.

[58] Includes both “Urban Tree Planting” and “Urban Forest Planting” BMPs.

[59] Email from Deborah Klenotic, Deputy Communications Director from the Pennsylvania Department of Environmental Protection to EIP on July 24, 2020.

[60] Environmental Integrity Project report, “Unsustainable Agriculture: Pennsylvania’s Manure Hot Spots and their Impact on Local Water Quality and the Chesapeake Bay,” August 31, 2017. Link: https://environmentalintegrity.org/wp-content/uploads/2017/08/Unsustainable-Agriculture_revised.pdf

[61] Chesapeake Bay Commission Report, “Healthy Livestock, Healthy Streams,” May 2015, p. 17. Link: https://www.chesbay.us/library/public/documents/Policy-Reports/Healthy-Livestock-Healthy-Streams.pdf

[62] Chesapeake Bay Program, Chesapeake Assessment and Scenario Tool (CAST), https://cast.chesapeakebay.net/. Accessed May 7, 2020. 2009 and Phase III WIP values have changed slightly with the introduction of the 2019 version of CAST. However, the new version of CAST no longer includes load estimates associated with 2012 WIP II planning targets. In order to maintain an apples-to-apples comparison, this table uses CAST estimates as of May 2020; BMP implementation targets from Virginia’s Phase II WIP (Table A.1) and Phase III WIP (Appendix D).

[63] VA's Phase III WIP commits to over one million feet of stream restoration, but places that BMP within the "natural" land use category.

[64] These include "stormwater performance standard" BMPs (21,796 acres), "advanced grey infrastructure nutrient discovery program" (17,306 acres), "floating treatment wetland" (377 acres), and "filter strip runoff reduction" (100 acres). Virginia Phase III WIP Appendix D.

[65] Chesapeake Bay Program, Watershed Model Documentation, Overview at 1-4, https://cast.chesapeakebay.net/Documentation/ModelDocumentation.

[66] *Id*. at 12-1.

[67] *See, e.g.*, Chesapeake Bay Program, Draft Climate Change Analysis, Documentation of Methods and Decisions for 2019-2021 Process, 2, ("The averaging period [1991-2000] and critical period [1993-1995] represent long-term climate norms that will no longer be representative of average conditions or a 10-year recurrence interval condition").

[68] Chesapeake Bay Program, Principals' Staff Committee, 2025 Chesapeake Bay Climate Change Load Projections (Mar. 2, 2018), https://www.chesapeakebay.net/channel_files/26045/v._2025_chesapeake_bay_climate_change_load_projections_explanation_revised_02.28.18.pdf.

[69] Chesapeake Bay Program, Draft Climate Change Analysis, Documentation of Methods and Decisions for 2019-2021 Process, 2.

[70] Chesapeake Bay Program, Draft Climate Change Analysis, Documentation of Methods and Decisions for 2019-2021 Process, 3.

[71] WIP at 9.

[72] WIP at 53.

[73] Chesapeake Bay Program Principals' Staff Committee, 2025 Chesapeake Bay Climate Change Load Projections (Mar. 2, 2018), https://www.chesapeakebay.net/channel_files/26045/v._2025_chesapeake_bay_climate_change_load_projections_explanation_revised_02.28.18.pdf; *see also* WIP at 39.

[74] See WIP at 43 ("Maryland is committed to adopting improved climate science by including refined nutrient reduction goals in 2021, and BMP efficiency into a future WIP addendum, and/or two-year milestone commitments in 2022.

[75] Environment & Natural Resources Institute, Pennsylvania Climate Change Impacts Assessment Update at 132-133 (April 2020), prepared for PA DEP, available at http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf.

[76] *Id*. at 3-4.

[77] Phase III WIP at 28.

[78] Id. at 180.

[79] Id. at 182-185.

[80] Id. at 185-186.

[81] Commonwealth of Virginia, Chesapeake Bay TMDL Phase III Watershed Implementation Plan at 24-25 (Aug. 23, 2019).

[82] Id. at 31.

[83] NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, vol. 10, version 3.0, Northeastern United States at A.4-12 (2015). *See also, e.g.*, Virginia Stormwater Management Program regulations, 9 VAC 25-870-72; Virginia Runoff Reduction Method at 66 (May 2, 2016), https://www.swbmp.vwrrc.vt.edu/vrrm/; York County, Pennsylvania Model Stormwater Ordinance at pages 12 to 13, https://www.ycpc.org/320/Water-Quality-Stormwater-Management; Prince George's County, Maryland Stormwater Management Design Manual at Section 8.2 and Appendix 8-8 (Sep. 2014), https://www.princegeorgescountymd.gov/1478/Design-Manuals. Many local and state regulations also refer to U.S. Department of Agriculture precipitation planning tools, but those tools just incorporate NOAA Atlas 14 data. *See, e.g.*, USDA NRCS, TR-55 DOS version, TR-55 Documentation Appendix B, https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?cid=stelprdb1042925.

[84] NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, vol. 10, version 3.0, Northeastern United States at A.4-12 (2015).

[85] Hydrometeorological Design Studies Center, Progress Report for Period October 2018 to March 2019 (Apr. 2019), available at https://www.nws.noaa.gov/oh/hdsc/current_projects.html.

[86] Ibid.
[87] These permits are called MS4 or Municipal Separate Storm Sewer System permits.
[88] *See, e.g.*, Maryland Department of the Environment, Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Appendix J (Dec. 2019).
[89] Baltimore County, NPDES – Municipal Stormwater (MS4) Discharge permit, 2019 Annual Report at 9-3 (Jan. 22, 2020). The report notes that the Chesapeake Bay TMDL requires 29 percent nitrogen and 45.1 percent phosphorus load reductions for the that the Scotts Level Branch in the Gwynns Falls watershed.
[90] Id. at 9-11.
[91] Id. at 9-24.

[93] Id.
[94] *See, e.g.*, Fairfax County, Difficult Run Watershed Management Plan at 2-15.
[95] *See, e.g.,* Accotink Watershed Management Plan at 2-5 ("Based on many years of rainfall data collected, storms of varying strength have been established based on the duration and probability of that event occurring within any given year").
[96] Montgomery County Department of Environmental Protection, Montgomery County Climate Workgroup, Overview of Recommendations, https://www.montgomerycountymd.gov/green/climate/climate-workgroup-recommendations.html.
[97] Montgomery County Department of Environmental Protection, Montgomery County Climate Workgroup Recommendations at 36, https://www.montgomerycountymd.gov/green/climate/climate-workgroup-recommendations.html.
[98] Id.
[99] *Id*. at 47.
[100] Tetra Tech, Restoration Plan for Nontidal Sediment in the Patuxent River Lower and Middle Watersheds at 2-3 (July 31, 2019).
[101] *Id*. at 11-5.
[102] University of New Hampshire, Trends in Extreme Precipitation Events for the Northeastern United States, 1948-2007 at 1(2010).
[103] *See, e.g.*, Erin B. Logan, Proposals to ease development's impact on Ellicott City flooding draw opposition from industry, Baltimore Sun, Sep. 17, 2019.
[104] *See* U.S. EPA, Improving the Resilience of Best Management Practices in a Changing Environment: Urban Stormwater Modeling Studies, EPA/600/R-17/469F at 32(May 2018).
[105] *See, e.g.*, Maryland Department of Planning, New Howard County Stormwater Management Regulations: Leading the Way in Local Responses to High Intensity Storm Events (Apr. 23, 2020), https://mdplanningblog.com/2020/04/23/new-howard-county-stormwater-management-regulations-leading-the-way-in-local-responses-to-high-intensity-storm-events/. The Howard County ordinance is designed around an actual storm event (from 2016), which itself exceeded the 1000-year storm threshold, and in other ways plans for 10-year and 100-year storms.
[106] Chesapeake Bay Total Maximum Daily Load (TMDL), page 4-18. Link: https://www.epa.gov/sites/production/files/2014-12/documents/cbay_final_tmdl_section_4_final_0.pdf
[107] Combined Sewer Overflows Guidance for Long-Term Control Plan. Environmental Protection Agency, 1995. Available at: https://www.epa.gov/sites/production/files/2015-10/documents/owm0272_0.pdf. Accessed May 29, 2020.
[108] Reported Sewer Overflows. Maryland Open Data Portal, 2018. Available at: https://opendata.maryland.gov/Energy-and-Environment/Reported-Sewer-Overflows/cjin-5f8g. Accessed June 11, 2020.
[109] Cumberland's Long Term Control Plan was approved in 2006. City of Cumberland Comprehensive Long Term Control Plan for Combined Sewer Overflows. Cumberland: Whitman, Requardt and Associates, LLP.
[110] 2013 Comprehensive Plan. Cumberland: City of Cumberland, 2013. Available at: https://www.cumberlandmd.gov/275/2013-Comprehensive-Plan. Accessed May 28, 2020.
[111] Global Summary of the Year. National Oceanic and Atmospheric Administration. Available at: https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.ncdc:C00947. Accessed May 26, 2020.

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# EXPERT REPORT

# Concerns Regarding the Draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities Discharge Permit NO. 20-SW, NPDES Permit No. MDR0000

*Prepared for:*

Chesapeake Accountability Project

*On Behalf of:*

Chesapeake Legal Alliance, Center for Progressive Reform, Environmental Integrity Project, Choose Clean Water Coalition, and the Chesapeake Bay Foundation

*Prepared by:*

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April 15, 2021

Robert M. Roseen, Ph.D., PE, DWRE

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# Acronyms

| Acronym | Definition |
|---|---|
| ASCE | AMERICAN SOCIETY OF CIVIL ENGINEERS |
| BMP | STORMWATER BEST MANAGEMENT PRACTICE |
| CAST | CHESAPEAKE ASSESSMENT SCENARIO TOOL |
| CBP | CHESAPEAKE BAY PROGRAM |
| CFR | CODE OF FEDERAL REGULATIONS |
| CPV | CHANNEL PROTECTION VOLUME |
| CWA | CLEAN WATER ACT |
| DMR | DISCHARGE MONITORING REPORTS |
| DWRE | DIPLOMATE, WATER RESOURCES ENGINEER |
| EPA | UNITED STATES ENVIRONMENTAL PROTECTION AGENCY |
| EWRI | ENVIRONMENTAL WATER RESEARCH INSTITUE |
| EMC | EVENT MEAN CONCENTRATION |
| ESD | ENVIRONMENTAL SITE DESIGN |
| FR | FEDERAL REGISTER |
| FRCP | FEDERAL RULES OF CIVIL PROCEDURE |
| GF | GWYNNS FALLS |
| GIS | GEOGRAPHIC INFORMATION SYSTEMS |
| IA | IMPERVIOUS AREA |
| IC | IMPERVIOUS COVER |
| LA | LOAD ALLOCATION |
| LID | LOW IMPACT DEVELOPMENT |
| MDE | MARYLAND DEPARTMENT OF ENVIRONMENT |
| MDSWM | MARYLAND STORMWATER MANUAL |
| MSGP | MULTI-SECTOR GENERAL PERMIT |
| NCDC | NATIONAL CLIMATE DATA CENTER |
| NHD | NATIONAL HYRDOGRAPHY DATA |
| NRCC | NORTHEAST REGIONAL CLIMATE CENTER |
| NRCS | NATURAL RESOURCES CONSERVATION SERVICE |
| NPDES | NATIONAL POLLUTION DISCHARGE ELIMINATION PERMITS |
| PE | PROFESSIONAL ENGINEER |
| PLA | POLLUTANT LOADING ANALYSES |
| PLER | POLLUTANT LOAD EXPORT RATES |
| SWM | STORMWATER MANAGEMENT |
| TMDL | TOTAL MAXIMUM DAILY LOAD |
| TN | TOTAL NITROGEN |
| TP | TOTAL PHOSPHOROUS |
| TSS | TOTAL SUSPENDED SOLIDS |
| USDA | UNITED STATES DEPARTMENT OF AGRICULTURE |
| USGS | UNITED STATES GEOLOGICAL SURVEY |
| UWRCC | URBAN WATER RESOURCES RESEARCH COUNCIL |
| WLA | WASTE LOAD ALLOCATION |
| WQV | WATER QUALITY VOLUME |

## 1. Executive Summary

This report focuses on the adequacy of the draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities, Discharge Permit No. 20-SW, NPDES Permit No. MDR00002020 released on January 13, 2021.

Upon review, I have noted some significant concerns. To exemplify the concerns and shortcomings of the draft Industrial General permit, they have been evaluated, in part, in the context of the Gwynns Falls (GF) watershed (HUC8# 02130905) including the Gwynns Falls Sediment TMDL[1] and the Bay TMDL. The Gwynns Falls Sediment TMDL falls entirely within Baltimore City and Baltimore County.

The current application of the 20% IA restoration requirement is an unreasonably narrow interpretation of impervious surface. The application of the 20% IA restoration standard for sites with paved surfaces only is unreasonably narrow and it is not supported scientifically. In concept, pervious and impervious surface are clearly distinct, however in practice the distinction is best considered as a spectrum of impervious surfaces. The Permit provides a definition of impervious surfaces: "For the purposes of this permit requirement, impervious surfaces are those surfaces that do not allow stormwater to infiltrate into the ground and may include any driveway, road or parking lot that is paved (concrete, asphalt) or used for vehicular storage or traffic, any building or storage facility rooftop, any water resistant material covers, any sidewalks/paths, any decks, any paved storage areas, any tanks or containment structures or any surfaces that are paved or covered for other reasons."

For example, within the Gwynns Falls watershed there are only 5 industrial facilities subject to the Bay impervious area restoration requirement. The facilities together account for only 39.8 acres of IA of which only 7.9 acres (20%) are subject to restoration. The 7.9 acres of the 5 subject facilities represent only 0.3% of the total industrial area and 0.4% of the total estimated industrial IA for the watershed. This means that there is tremendous additional potential load reduction that should be included in the restoration requirement.

Restricted application of the 20% IA restoration requirement limits important pollutant reduction potential for unpaved surfaces. Non-paved surfaces, being actively worked in an industrial setting, may in fact have a greater pollution potential than do paved surfaces. It is well understood that unpaved roads have significant erosion potential and carry extremely high pollutant load concentrations in comparison to standard paved roads. Including industrial operations that have nonpaved impervious surfaces is critical for impervious area restoration.

The elimination of the 5-Yr IA restoration requirements for each permit cycle results in a substantial decrease of pollutant load reduction potential by limiting restoration to 20%IA. As per the 2013 Response to Comments, it was understood that it would be necessary to require at least 28% of impervious surfaces area to be retrofitted each permit cycle to achieve the necessary nitrogen reduction, with which the prior industrial permit requirement for 20% reduction each cycle was consistent. The draft Industrial General permit rescinds that requirement and the resulting load reductions will be drastically reduced. The impact of weakening the restoration requirement is best understood at a watershed scale. The significance of the lessening of the IA

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[1] MDE (2015). Total Maximum Daily Load of Sediment in the Gwynns Falls Watershed, Baltimore City and Baltimore County, Maryland, Revised Final. Baltimore, MD, Maryland Department of the Environment.

restoration to a single 5-yr iteration was examined in the context of the GF watershed to exemplify changes in load reduction. Very minor load reduction for TSS, TP, and TN will be accomplished through a single iteration of the 20% IA restoration requirement compared with the load reductions if the permit retained this requirement for future permit terms. The treated load from the 5 subject facilities represents only 5% of the load (2,206 lbs. TSS, 6.04 lbs. TP, 74.7 lbs. TN) of the subject facilities, and more importantly, only 0.14% to 0.16% of the total industrial loads (1,361,775 lbs. TSS, 4,404 lbs. TP, 52,319 lbs. TN) for the GF watershed.

Similarly, there is a tremendous lost opportunity for reduction of toxic industrial pollutants. IA restoration for industrial facilities would serve the additional purpose of reduction of common toxic industrial pollutants. A review the 2018 DMRs found that the average concentrations reported for Aluminum, Cadmium, Copper, Lead, and Zinc exceed both the acute and chronic freshwater aquatic life criteria. It is well established that green infrastructure has tremendous protective benefits for aquatic life. This analysis shows that if a second 20% IA restoration requirement were implemented for the 5 facilities there would be a total estimated load reduction of 293.9 lbs of Aluminum, 26.4 lbs of Copper, 1,505.6 lbs of Lead, and 10.3 lbs of Zinc. More importantly, if the IA restoration requirement were applied for all industrial facilities within the watershed a second 20% IA restoration requirement would remove a total estimated load of 11,015.8 lbs of Aluminum, 989.7 lbs of Copper, 56,426.6 lbs of Lead, and 1385.4 lbs of Zinc.

The draft Industrial General permit as written contains no provisions for No Exposure Certifications that would require certification of treatment prior to discharge to groundwater. In my professional experience, No Exposure Certifications have historically been limited to determining that no off-site discharge occurs to waters of the US to the detriment of on-site contamination caused by infiltration of untreated industrial stormwater. It is my opinion that this focus on off-site discharge has led to the inappropriate use of infiltration systems for management of industrial runoff with a concomitant risk to groundwaters and surface waters by direct hydrologic connection. For this reason, the permit should be strengthened to require treatment of all industrial stormwater runoff prior to discharge to surface waters or groundwater. Specifically, the same standards for treatment of stormwater managed and infiltrated on-site should be required as required of off-site runoff per the MD Stormwater Manual.

Sampling frequency concerns have been identified. Quarterly grab sampling is grossly insufficient for the assessment of benchmark monitoring and as such it renders standard permit conditions untenable for the evaluation of the reasonable potential to cause or contribute to an excursion above any applicable water quality standards. The results from a single grab sample generally are not sufficient to develop reliable estimates of the event mean concentration (EMC) for the pollutant or pollutant load because stormwater quality tends to vary dramatically during a storm event. The permissible approach of grab sampling within 30 minutes of a measurable storm event, or as soon as practicable, is predominantly used for discharge monitoring. In my experience in stormwater investigations and having reviewed years of industrial permit monitoring reports, I have observed that monitoring and reporting protocols, particularly with regard to sample time and note-taking, are rarely followed. Samples commonly taken beyond the 30-minute threshold would bias the sampling results by producing samples from the ends of storms, when stormwater is typically far less contaminated, a phenomenon that is well established in the literature.

Concerns regarding sampling method were identified. The continued use of low-quality grab sampling techniques is particularly unacceptable with the advent of simple, low-cost alternatives to flow-weighted composite monitoring. These low-cost alternatives include first flush samplers, passive diffusion samplers, multi parameter sondes, and others that greatly increase the quality of the data. A single grab sample cannot adequately characterize average annual or quarterly maximum concentrations. The use of the grab samples (sampling method) combined with concerns about sampling frequency have the compounded effect of low data quality.

The use of impervious area restoration equivalence on a pollutant load basis is not equivalent when applied to pollutants that have a significant streambank erosion component. The essence of environmental site design (ESD) is the maintenance or restoration of predevelopment hydrology and runoff curve number reduction. This is exemplified in the Environmental Site Design Sizing Criteria detailed in the 2000 Maryland Stormwater Design Manual. ESD sizing is based on the need to reduce runoff volume equivalent to predevelopment hydrology to address the channel protection volume ($Cp_v$).

The source of pollutant load must influence the type of BMP that will be needed and most effective for load reduction. Only BMPs that reduce runoff volume through infiltration and filtration practices will effectively reduce impervious area as measured hydrologically. The absence of required runoff reduction to manage the channel protection volume would result in a fundamental inability to address the total loads for sediment and phosphorus, and to a lesser degree nitrogen.

### *1.1. Report Objectives*

Waterstone Engineering PLLC has been retained to conduct the following scope of services:

1. To provide a pollutant loading analysis (PLA) such that CAP may evaluate the effectiveness of the proposed Clean Water Act permits in the Chesapeake Bay watershed;
2. Review available documentation including permits and related studies;
3. Establish opinions related to draft Industrial General Permit adequacy based on impervious acre restoration by direct or equivalent stormwater runoff treatment crediting.

### *1.2. Facts and Data Considered*

The following opinions are based on:

1. Review of the Draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities, Discharge Permit NO. 20-SW, NPDES Permit No. MDR00002020.
2. Review of reports and related information by the Chesapeake Bay Program and MDE including the 2015 Total Maximum Daily Load of Sediment in the Gwynns Falls Watershed, Baltimore City and Baltimore County, Maryland and the Bay TMDL loading report from CAST.
3. Review of Chesapeake Bay Program Phase 6 Watershed Model, Final Model Documentation for the Midpoint Assessment– 10/1/2018.
4. Review of the 2020 Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits, by the Maryland Department of the Environment.

5. Review of TMDL maps and GIS data including HUC-8 watershed delineation, HUC-12 watershed delineation, Chesapeake Bay segments, Chesapeake Bay land-river segments, impervious area, land use land cover, soil types, TMDL boundaries, county boundaries, NPDES regulated stormwater systems, MS4 delineation, and impairments for the study area from the Maryland Department of the Environment (MDE), state planning office, and the USGS.
6. Review of the 2018 USGS study titled Factors Affecting Long-Term Trends in Surface-Water Quality in the Gwynns Falls Watershed, Baltimore City and County, Maryland, 1998-2016.
7. Review of other relevant citations noted throughout the report and listed in References.

## *1.1. Qualifications and Compensation*

### *1.1.1. Education*

Dr. Roseen received a Bachelor of Arts in Environmental Science/Chemistry from Clark University in 1994. Dr. Roseen received a Master of Science in Environmental Science and Engineering from the Colorado School of Mines in 1998 and a Doctor of Philosophy (Ph.D.) in Civil and Waste Resources Engineering from the University of New Hampshire in 2002. Dr. Roseen served as the Director of the University of New Hampshire Stormwater Center from 2004 through 2012 and served as a Research Assistant Professor from 2007-2012. Dr. Roseen is a licensed Professional Engineer in the states of New Hampshire, Massachusetts, and Maine, and is a Diplomat of Water Resources Engineering ("D.WRE"), the highest professional engineering distinction in this area, through the American Academy of Water Resources Engineers.

### *1.1.2. Professional Experience*

Dr. Roseen provides many years of experience in water resources investigations and most recently, led a project team in the development of an Integrated Plan for nutrient management for stormwater and wastewater. This plan has received provisional approval by EPA and would be one of the first in the nation. Rob is a recognized industry leader in green infrastructure and watershed management, and the recipient of Environmental Merit Awards by the US Environmental Protection Agency Region 1 in 2010, 2016, and 2019. He consults nationally and locally on stormwater management and planning and directed the University of New Hampshire Stormwater Center for 10 years and is deeply versed in the practice, policy, and planning of stormwater management. Rob has over 25 years of experience in the investigation, design, testing, and implementation of innovative approaches to stormwater management and specializing in green infrastructure, nutrient control planning, and climate vulnerability analyses. Rob has led the technical analysis of dozens of nutrient and contaminant studies examining surface water pathways, system performance, management strategies, and system optimization.

Dr. Roseen provides Clean Water Act expert consultation, analysis, modeling, advice, reports and testimony in regard to compliance with TMDLs and Nutrient Control Planning, Construction General Permits, Municipal Separate Storm Sewer System (MS4) Permits, and Multi Sector General Permits. As a consultant, Dr. Roseen has worked for private clients engaged in site development involving project permitting, design, erosion and sediment control plans, construction management plans, construction inspections, construction inspection and reporting, water quality performance monitoring and more.

He also served as Research Assistant Professor for five years. His areas of expertise include water resources engineering, stormwater management (including low impact development design), and porous pavements. He also possesses additional expertise in water resource engineering including hydrology and hydraulics evaluations, stream restoration and enhancement alternatives, dam removal assessment, groundwater investigations, nutrient and TMDL studies, remote sensing, and GIS applications.

Dr. Roseen has taught classes on Stormwater Management and Design, Fluid Mechanics, and Hydrologic Monitoring and lectures frequently on these subjects. He is frequently called upon as an expert on stormwater management locally, regionally, and nationally.

Notable professional activities include active membership with the New Hampshire Rivers Council Board of Directors, the NH Rivers Management Advisory Council, Piscataqua Regions Estuary Program Management Council, and the American Rivers Science and Technical Advisory Committee. He was past chair of the ASCE EWRI 2016 International Low Impact Development Conference, an annual event that draws participants from around the world to discuss advances in water resources engineering and participating until 2017 as a Control Group member for the ASCE Urban Water Resources Research Council (UWRRC). He has also served on the ASCE Task Committee on Guidelines for Certification of Manufactured Stormwater BMPs, EWRI Permeable Pavement Technical Committee, and the Hydrology, Hydraulics, and Water Quality Committee of the Transportation Research Board. Dr. Roseen has been the author or co-author of over two dozen professional publications on the topics of stormwater runoff, mitigation measures, best management practices (BMPs), etc. He has extensive experience working with local, state, and regional agencies and participates on a national level for USEPA Headquarters, WEF, and the White Council on Environmental Quality on urban retrofit innovations and next generation LID/GI technology and financing solutions.

His resume, including a list of all publications over the past 10 years and all cases in which he has served as an expert in for the past 4 years, is provided in Appendix A: Expert Witness Resume, Publications Authored in Previous 10 years, Expert Witness Experience

### *1.1.3. Cases During the Previous 4 Years I have Testified as an Expert at Trial or by Deposition, or Provided Expert Witness Services*

**Total Nitrogen General Permit**

Dr. Roseen is currently providing expert consultation, analysis, modeling, advice, and reports in regard to the January 2020, the United States Environmental Protection Agency (Region 1) National Pollutant Discharge Elimination System (NPDES) Great Bay Total Nitrogen General Permit for Wastewater Treatment Facilities in New Hampshire" (NPDES Permit No. NHG58A000). On March 26, 2020 three municipalities, the Conservation Law Foundation, and EPA entered into a settlement agreement to accept the Total Nitrogen General Permit to manage wastewater, stormwater, and nonpoint source nitrogen in the spirit of integrated planning. This brings to an end nearly 15 years of protracted legal challenge in favor of an adaptive management permit and to abandon a more traditional POTW permit.

**State Municipal Stormwater Permit Challenge**

Dr. Roseen is currently providing (1) written direct expert testimony and (2) live expert testimony in the adjudication hearings before an unnamed Pollution Control Board in a challenge to municipal stormwater permits. This includes written expert testimony (including research, document review, discovery), response to discovery of other parties, hearing preparation, appearance and live testimony at hearing, and rebuttal testimony.

**Low Impact Development Review for Proposed Residential Subdivision**

Dr. Roseen is providing expert witness, review, and testimony with respect to Low Impact Development on behalf a private client for a proposed subdivision. The review sought to identify both LID broadly and in keeping with the local zoning ordinance, the use of the LID Crediting criteria relevant to the MA Stormwater Handbook and the 2016 MA Small MS4 Permit.

**Climate Change Vulnerability Analyses for Industrial Facilities**

Dr. Roseen is currently providing expert consultation, analysis, modeling, advice, and reports in regard to the vulnerability of industrial facilities to climate change and sea level rise for a major east coast port. Evaluations include severe weather events driven by climate change and the exposure of coastal terminals and risk of industrial spills to flooding from storm surge and forecasts for future sea level rise. Such services may include sworn to written or oral expert testimony regarding such matters in Court.

**TMDL and Nutrient Control Attainability Analyses and Clean Water Act Expert Services**

Dr. Roseen is currently providing expert consultation, analysis, modeling, advice, reports and testimony in regard to TMDL and nutrient control attainability. This includes watershed modeling, pollutant load analyses, BMP optimization, and parcel-based analyses. Such services include sworn to written or oral expert testimony regarding such matters in Court. This service is being provided for the plaintiff for three (3) case of significant size geographically and in project scope.

**State Clean Water Permit Review**

Dr. Roseen has provided expert consultation, advice, reports and testimony regarding stormwater discharges for proposed clean water permits for multiple states. Review and analyses include evaluation of stringency of proposed permits for low impact development for new development, redevelopment, and retrofits. This includes the stringency of performance standards, for projects of varying size, exemptions, and permit “trigger” conditions to name a few.

**Construction General Permit (CGP), and Clean Water Act Expert Services**

Dr. Roseen has provided expert consultation, analysis, modeling, advice, reports and testimony in regard to construction general permit compliance, erosion and sedimentation control, and monitoring. Such services include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of defendants’ facilities.

**Municipal Separate Storm Sewer System (MS4) Permit and Clean Water Act Expert Services**

Dr. Roseen has provided expert consultation, analysis, modelling, advice, reports and testimony regarding stormwater discharges in regard to MS4 violations under the Clean Water Act. Such services may include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of defendants’ facilities. This service is being provided for the plaintiff for two (2) cases of significant size geographically and in project scope.

**Multi Sector General Permit, Stormwater Pollution Prevention Plan, and Clean Water Act Expert Services**

Dr. Roseen has provided expert consultation, analysis, modelling, advice, reports and testimony regarding stormwater discharges in regard to MSGP under the Clean Water Act. Such services may include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of facilities. This service is being provided for the plaintiff for over ten (10) separate cases in the northeastern United States.

**Expert Study and Testimony for Erosion and Sediment Control Litigation**

Dr. Roseen is currently providing expert study and testimony in defense of an undisclosed Federal Client in a $25-million-dollar lawsuit from a private entity. The plaintiff alleges impacts from upstream channel erosion and sediment transport. The efforts examine urban runoff and off-site impacts to a downstream channel and subsequent erosion and sediment transport into the downstream storm sewer system.

## 2. Introduction

The Maryland Department of the Environment released the draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities, Discharge Permit NO. 20-SW, NPDES Permit No. MDR0000 on January 13, 2020. The permit is based on the Stormwater Management Act of 2007 and focuses on environmental site design (ESD on all new development and redevelopment projects. Central components of ESD rely on restoration of impervious areas using green infrastructure, low impact development (LID), and runoff reduction practices to manage stormwater runoff at its source. The ultimate goal of ESD and LID stormwater management is maintaining or restoring predevelopment hydrology. As per § 402(p)(3)(A) of the CWA, industrial stormwater permits must require all generally applicable effluent limitations under the CWA. Under 40 CFR §122.44, water quality-based effluent limitations must be consistent with applicable stormwater wasteload allocations (WLAs) developed under EPA established or approved TMDLs.

The draft Industrial General Permit directs the restoration of impervious acres for the reduction of nutrients and sediments and implementation of pollution reduction plans targeting specific pollutants that impair local waters. As written, impervious acre restoration credit is allowed for direct or equivalent stormwater runoff treatment. This allows for credits for Alternative BMPs including street sweeping, tree planting, stream restoration, and others that do not provide direct runoff reduction or volumetric controls.

The draft permits allow for credits for Total Nitrogen, Total Phosphorus, and Total Suspended Solids for impervious acre restoration. Impervious acre restoration crediting is based on reducing 18.08 pounds of TN, 2.23 pounds of TP, and 806[2] pounds of TSS per year. It is important to note that crediting on the basis of nutrient reduction may be very different than crediting based on volume reduction. Similarly, performance for alternative BMPs such as street sweeping and catch basin cleaning, that would reduce solid pollutants, will not reduce volume and thus should be limited in the permit. Pollutant load and volume reduction, in this instance, are strongly correlated because of the contribution of stream erosion. Only runoff reduction and green

[2] The draft permit list TSS impervious acre restoration credit as 8,046 lbs./ac/yr which is believed to be a typo at 806 lbs./ac/yr

infrastructure BMPs that reduce runoff volume can provide channel protection thus mitigating the impacts of urbanization on stream health.

## 3. Watershed Context for Evaluation of Industrial Permit

As noted prior, the Gwynns Falls watershed was examined in the context of the draft Industrial General permit to exemplify identified shortcomings. While this is not the main thrust of this critique, it would be expected, and MDE and EPA[3] have demonstrated, that industrial IA contributes to stream erosion associated sediment, phosphorous, and nitrogen. As such, IA restoration, and specifically the importance of volume controls for industrial facilities, will be an important element of nutrient control and management of urban watersheds.

As per the 2015 Sediment TMDL, Gwynns Falls (HUC8# 02130905) is a 65.2 sqmi watershed with a stream that flows southeast for 25 miles through Baltimore County and into Baltimore City into the tidal Patapsco River of the Chesapeake Bay. The Patapsco River is a sub-basin of the Chesapeake Bay watershed. Of the 5 major tributaries within the watershed[4], Red Run is a "high quality" (Tier II) stream segment which triggers the state antidegradation policy.

An analysis of the 2010 state land use and land cover[5], demonstrated in Figure 1, shows that residential housing is the dominant land use accounting for nearly 50%, 15% forested, 7.8% commercial, 7.2% institutional, and 6.1% industrial. The watershed has approximately 33% impervious area as of the 2009 Sediment TMDL publication. Figure 2 illustrates the increasing urbanization and density of development of the watershed towards the Bay.

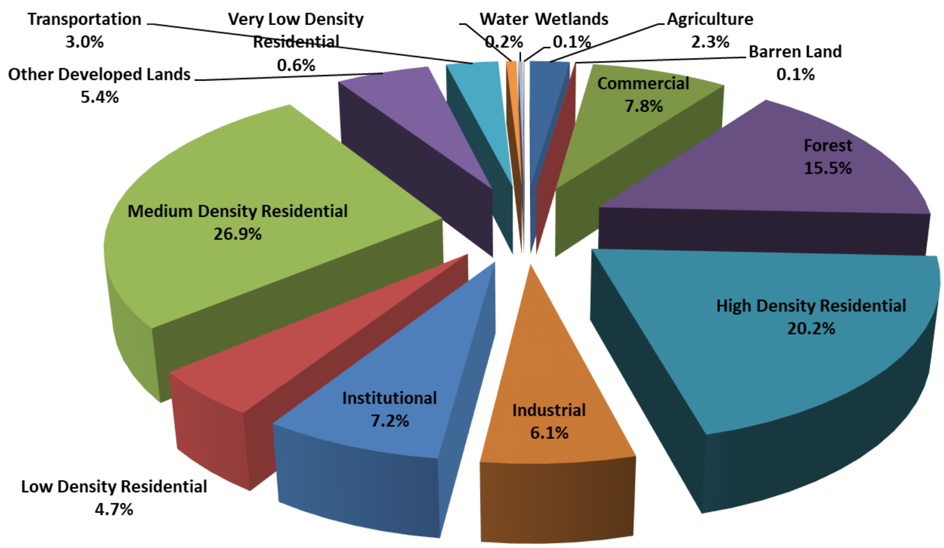


*Figure 1: Land Use and Land Area Distribution for Gwynn's Falls (HUC8# 02130905)*

[3] USEPA (2010). Chesapeake Bay Phase 5.3 Community Watershed Model. Annapolis MD, U.S. Environmental Protection Agency, Chesapeake Bay Program Office.

[4] Red Run, Horsehead Branch, Scotts Level Branch, Dead Run, and Maidens Choice Creek

[5] Land Use Land Cover 2010, Maryland GIS Data Catalog, https://geodata.md.gov/imap/rest/services/PlanningCadastre/MD_LandUseLandCover/MapServer/1

The Gwynns Falls watershed was 303(d) listed in 1996 by MDE as impaired for sediment from nonpoint sources. A sediment TMDL was developed for the watershed in 2009 and revised in 2015[1]. The TMDL baseline sediment load is 22,049 ton/yr of which 77% (16,977 ton/yr) was determined to be due to streambank erosion from elevated impervious area as detailed in Table 1 and Table 2. It is worthy to note that the baseline sediment loads reported in CAST for edge of stream are quite different than listed below.

***Table 1: TMDL Baseline Sediment Loads for Gwynns Falls***

| BASELINE LOAD | NONPOINT SOURCE BL | NPDES STORMWATER BL | PROCESS WATER BL |
|---|---|---|---|
| ton/yr | ton/yr | ton/yr | ton/yr |
| 22,049 | 1,759 | 20,076 | 213 |

Note: BL= baseline

***Table 2: Sediment Load Source Contribution from Urban Activities and Streambank Erosion***

| COMPONENT | BASELINE SEDIMENT LOAD | % SEDIMENT LOAD |
|---|---|---|
| | ton/yr | |
| Total | 22,049 | 100% |
| Urban Load | 5,071 | 23% |
| Streambank Erosion | 16,977 | 77% |

## *3.1. Pollutant Load Analysis*

For this report a pollutant loading analysis (PLA) was conducted for the purpose of distinguishing between the total pollutant load, the load due to streambank erosion, and the remaining urban sources that would be the primary focus of BMPs.

The volume and quality of stormwater runoff generated from each major land use within the study watershed was characterized through the use of a PLA method that is a variation on the unified stormwater sizing criteria from the 2000 MD Stormwater Manual. The PLA method uses a runoff coefficient[6] based on hydrologic soil group and land use in the calculation of runoff volume, and the event mean concentration (EMC) of a specific land use to determine pollutant loads. This enables the development of a simple land development model to examine loads specific to land use and soil type combinations. The PLA method is described in detail in Appendix B: Pollutant Load Analysis.

Table 3 summarizes the calculated pollutant loads from urban sources for TSS, TP, and TN by land use for the watershed *excluding* the contribution from streambank erosion. Pollutant load export rates (PLER) for TSS, TP, and TN were determined for the subset of 14 land uses excluding agriculture, forest, water, and wetlands and are mapped in Figure 3 through Figure 5 for urban sources and exclude streambank erosion sources. PLERs were developed by combining the EMCs with the computed runoff volume for each specific land use and soil type combination.

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[6] Adapted from Table 7.9 from McCuen, R. H. (2004). Hydrologic Analysis and Design. Upper Saddle River, New Jersey, 07458, Prentice Hall.

*Table 3: Gwynns Falls Pollutant Loads for Urban Sources for Total Suspended Solids, Phosphorus, and Nitrogen Excluding Contribution from Streambank Erosion*

| LAND USE | AREA ($MI^2$) | % AREA | TOTAL SUSPENDED SOLID LOAD (TONS/YR) | TOTAL PHOSPHORUS LOAD (TONS/YR) | TOTAL NITROGEN LOAD (TONS/YR) |
|---|---|---|---|---|---|
| Agriculture | 1.5 | 2.3 | | | |
| Barren Land | 0.0 | 0.1 | 0.75 | 0.00 | 0.01 |
| Commercial | 5.1 | 7.8 | 767.61 | 2.13 | 17.59 |
| Forest | 10.1 | 15.5 | | | |
| High Density Residential | 13.2 | 20.2 | 980.45 | 4.74 | 26.88 |
| Industrial | 4.0 | 6.1 | 702.96 | 2.26 | 26.91 |
| Institutional | 4.7 | 7.2 | 1,249.47 | 2.27 | 19.12 |
| Low Density Residential | 3.0 | 4.7 | 164.14 | 0.79 | 4.50 |
| Medium Density Residential | 17.6 | 26.9 | 1,152.10 | 5.57 | 31.59 |
| Other Developed Lands | 3.5 | 5.4 | 205.91 | 0.99 | 5.65 |
| Transportation | 1.9 | 3.0 | 297.89 | 0.72 | 9.43 |
| Very Low Density Residential | 0.4 | 0.6 | 19.40 | 0.09 | 0.53 |
| Water | 0.2 | 0.2 | | | |
| Wetlands | 0.1 | 0.1 | | | |
| Total | 65.2 | 100.0 | 5,540.7 | 19.6 | 142.2 |

Note: Agriculture, Forest, Wetlands, and Open Water land uses were not analyzed.

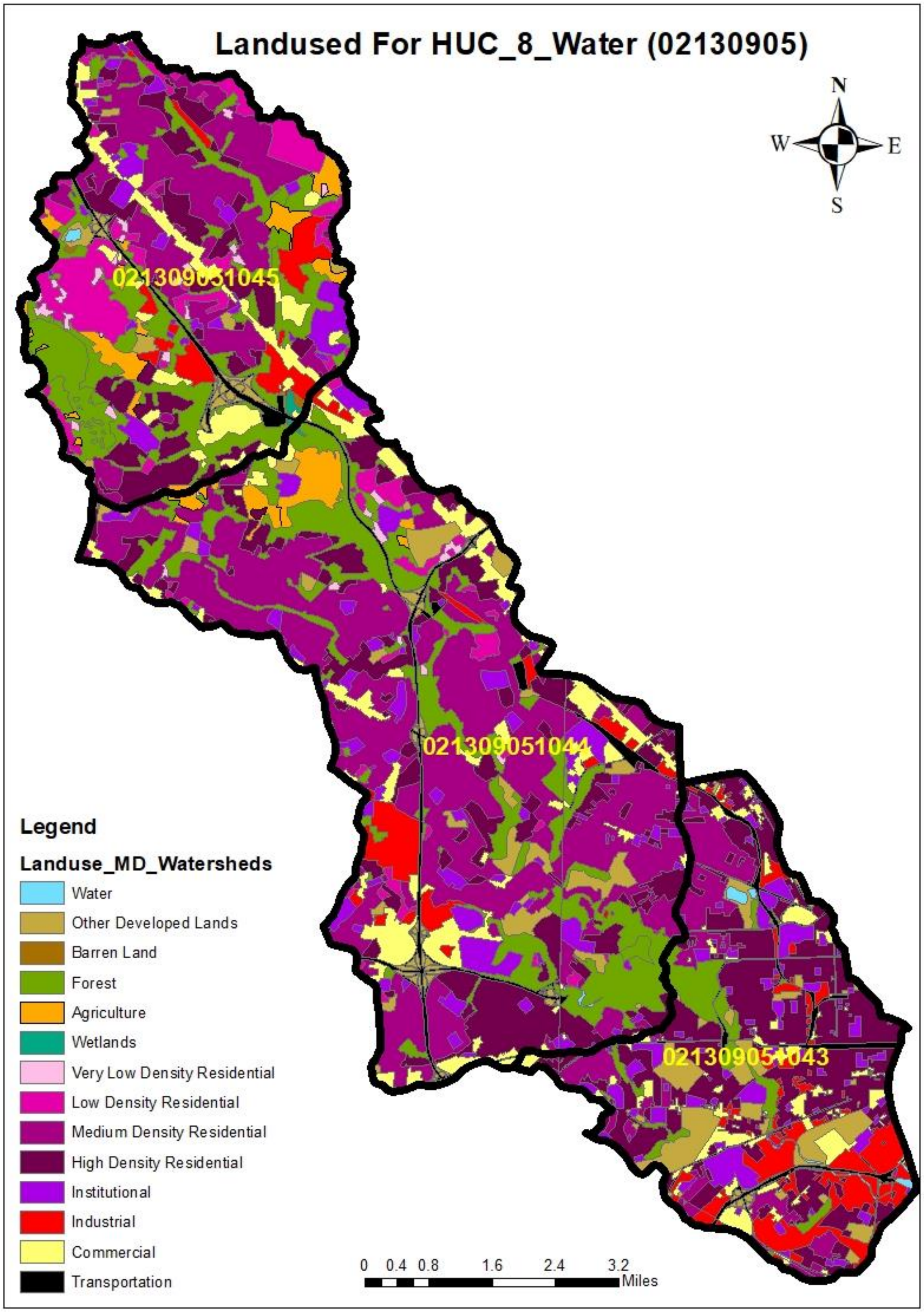


***Figure 2: Land Use and Land Cover for Gwynn's Falls (HUC8# 02130905)***

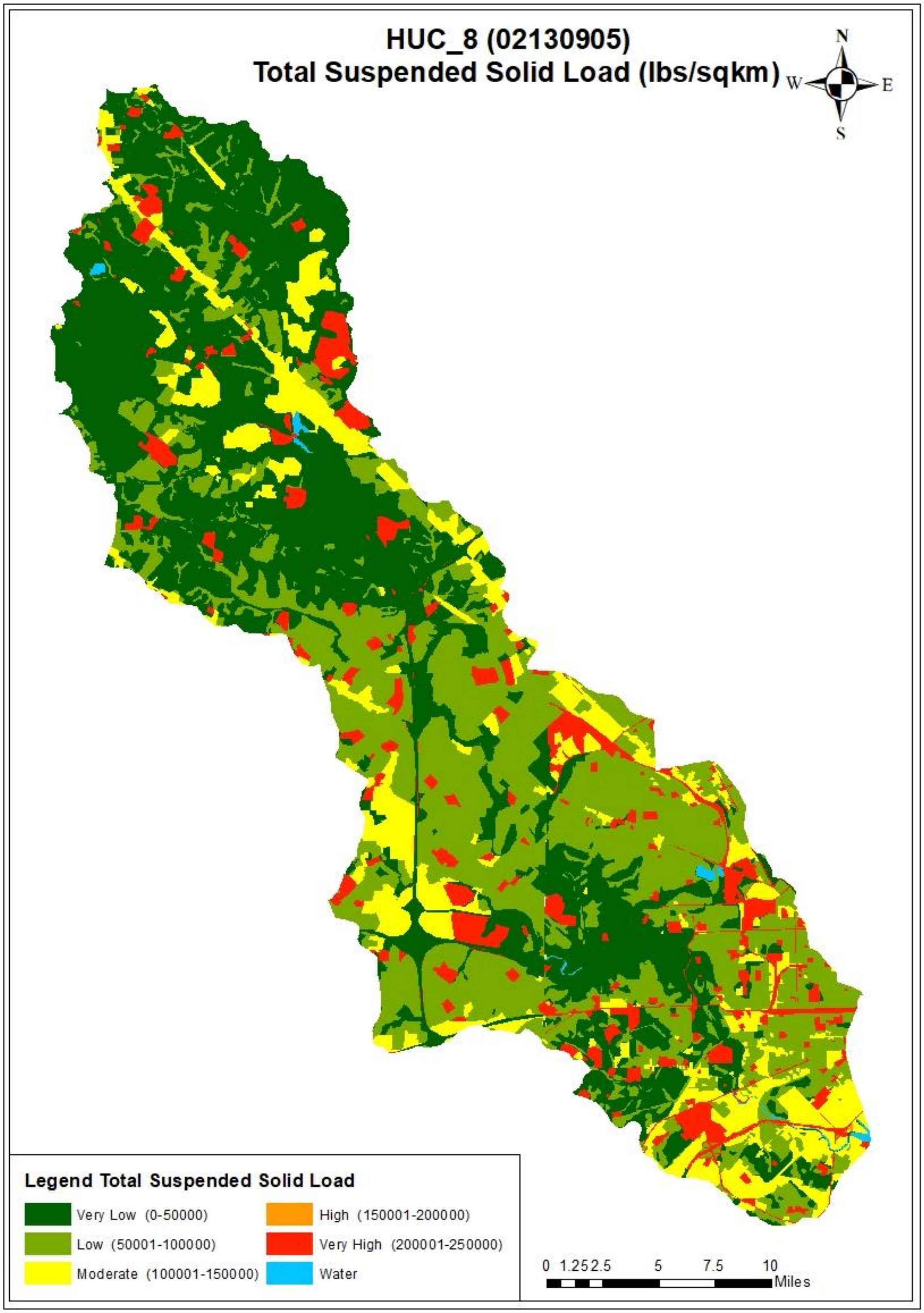


*Figure 3: Total Suspended Solids Load Export Rates by Land Use for Gwynn's Falls*

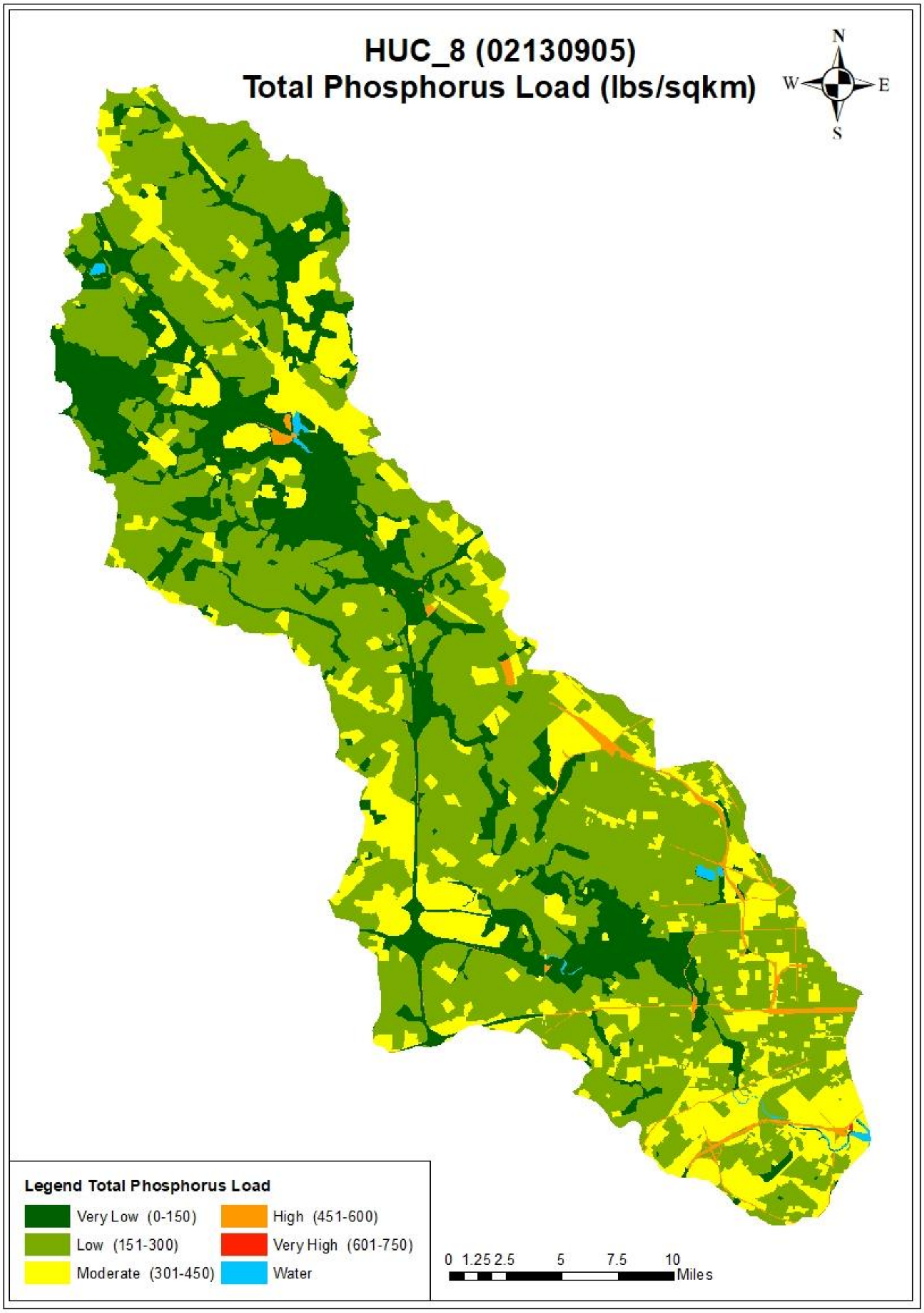


***Figure 4: Total Phosphorus Load Export Rates by Land Use for Gwynn's Falls***

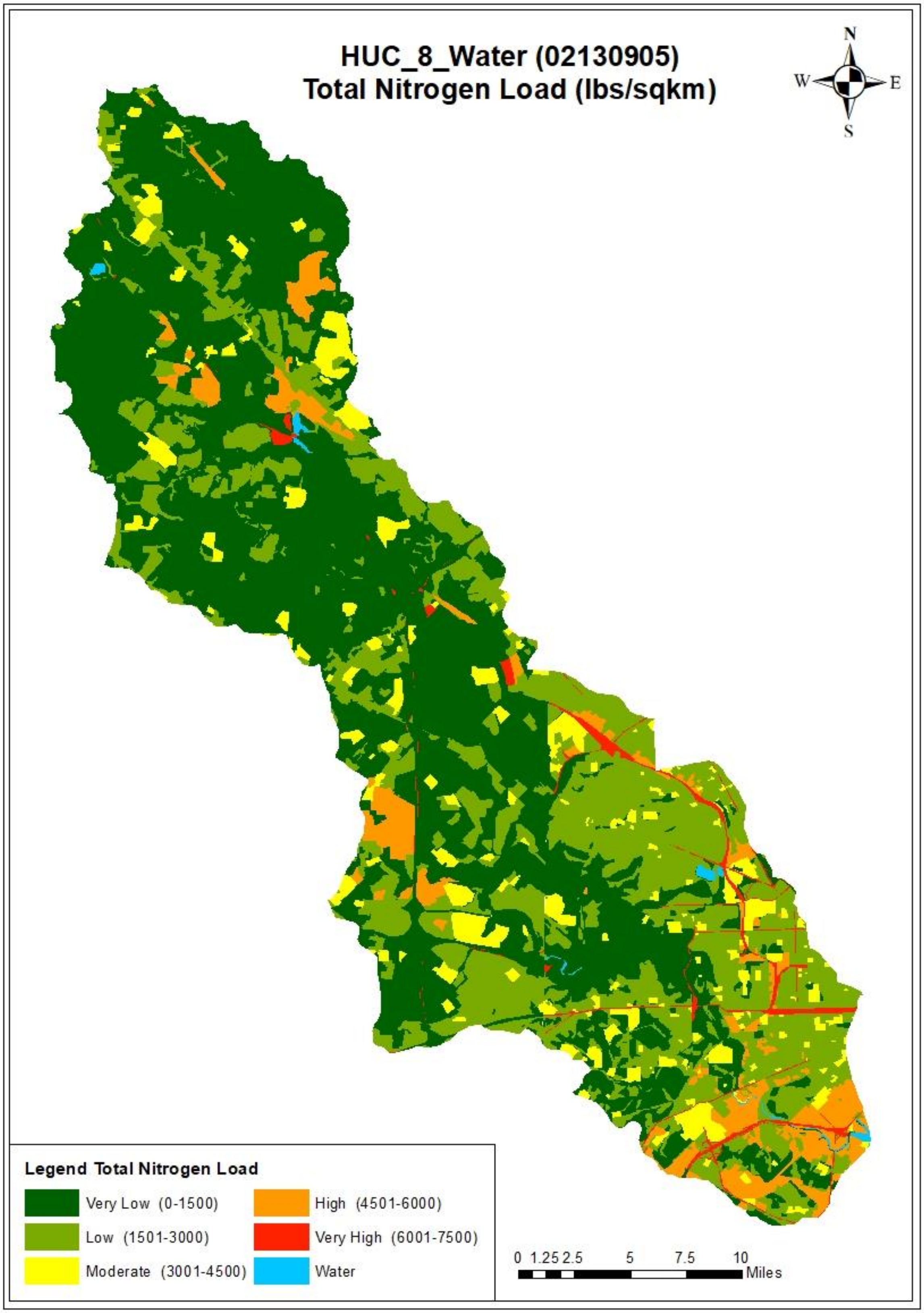


***Figure 5: Total Nitrogen Load Export Rates by Land Use for Gwynn's Falls***

### 3.2. *Toxic Pollutant Loading Based on Industrial Discharge monitoring reports*

To more broadly understand the pollutant loading and impervious area reduction upon other common toxic industrial contaminants data was examined from the 2018 discharge monitoring reports (DMR) for the state of Maryland. This data set includes 6,744 entries for a wide range of contaminants. A subset of contaminants was examined to better understand common concentrations. Summary statistics for 7 common contaminants of concern are listed below in Table 4. Summary statistics are presented along with the data count (number of entries reported) and the water quality criteria for reference. It can be seen that the average concentrations reported for Aluminum, Cadmium, Copper, Lead, and Zinc exceed both the acute and chronic freshwater aquatic life criteria. Exceedances are on average over 10X the acute criteria. Notably, Copper is especially toxic for aquatic life and is nearly 24 times the average acute aquatic life criteria for freshwater, and 183 times the standard deviation. Fish toxicity levels for dissolved copper are < 6 ug/L and dissolved lead are particularly low at 0.2 to 0.4 ug/L when total hardness is 10-20 mg/L as $CaCO3$[7].

***Table 4: Summary Statistics for 7 Common Industrial Pollutants from 2018 MD Discharge monitoring reports***

| POLLUTANT | MIN (MG/L) | AVG (MG/L) | ST DEV (MG/L) | MAX (MG/L) | COUNT | ACUTE CRITERIA (MG/L) | CHRONIC CRITERIA (MG/L) | WATER QUALITY CRITERIA |
|---|---|---|---|---|---|---|---|---|
| Aluminum, total (as Al) | 0.00 | **2.27** | 5.70 | 42.79 | 77 | 0.75 | 0.087 | Aquatic Life, Freshwater |
| Arsenic, total (as As) | 0.00 | 0.10 | 0.44 | 2.00 | 21 | 0.34 | 0.15 | Aquatic Life, Freshwater |
| Cadmium, total (as Cd) | 0.00 | **0.14** | 0.40 | 1.70 | 21 | 0.0018 | 0.00072 | Aquatic Life, Freshwater |
| Copper, total (as Cu) | 0.00 | **0.33** | 2.23 | 24.20 | 134 | 0.014 | 0.0093 | Aquatic Life, Freshwater |
| Hydrocarbons, total petroleum | 0.00 | 1152.72 | 2820.51 | 6910.05 | 6 | | | |
| Lead, total (as Pb) | 0.00 | **0.08** | 0.16 | 0.87 | 128 | 0.065 | 0.0025 | Aquatic Life, Freshwater |
| Zinc, total (as Zn) | 0.00 | **10.39** | 71.66 | 703.82 | 106 | 0.12 | 0.12 | Aquatic Life, Freshwater |

Note: water quality criteria average exceedances are highlighted in red.

## 4. Concerns Regarding the Draft Industrial General Permit

### 4.1. *Application of 20% IA Restoration Requirement to Paved Surfaces at Sites Larger than 5 Acres is an Unreasonably Narrow Application*

The narrow application of the 20% IA restoration standard to sites with paved surfaces only, at industrial sites larger than 5 acres, is unreasonably narrow and it is not supported scientifically. In concept, pervious and impervious surface are clearly distinct, however in practice the distinction is best considered as a spectrum of impervious surfaces.

[7] Horner, R.; Chapman, C. (2007 September) NW 110th Street Natural Drainage System Performance Monitoring (Dept of Civil and Env. Engineering, Univ. of Washington). Seattle, WA: University of Washington.

Impervious surfaces are defined in the permit in Part III. Stormwater Management Requirements, A.1.b: "For the purposes of this permit requirement, impervious surfaces are those surfaces that do not allow stormwater to infiltrate into the ground and may include any driveway, road or parking lot that is paved (concrete, asphalt) or used for vehicular storage or traffic, any building or storage facility rooftop, any water resistant material covers, any sidewalks/paths, any decks, any paved storage areas, any tanks or containment structures or any surfaces that are paved or covered for other reasons."

The MDE Stormwater Design Manual definition of impervious area is "[t]hose surfaces in the landscape that cannot infiltrate rainfall consisting of building rooftops, pavement, sidewalks, driveways, etc."[8]. We know that the definitive element of "cannot infiltrate" is not limited alone to the surfaces listed above and "etc" includes these other surfaces. As such, areas requiring impervious area restoration should be considered as those surfaces that have been altered to an extent that infiltration is reduced to a point where excessive runoff is generated. Unpaved surfaces such as dirt or gravel roads, laydown yards, and materials storage areas (to name a few) could be expected to be compacted over time from industrial activities. Any industrial site that has routine traffic on unpaved surfaces could be expected to have impervious areas comprised of compacted soils and generating runoff.

Consistent with this critique, the SCS Runoff Curve Number method characterizes impervious areas as paved parking lots, roofs, driveways, as well as streets and roads that are gravel and dirt[9]. The method does not limit impervious surfaces to paved surfaces and rooftops as does the draft permit. Similarly, the MD Stormwater Design Manual does not limit impervious areas to paved or covered surfaces. From a scientific and engineering perspective, the issue is simply a function of compaction. Most common land surfaces could become effectively impervious with sufficient compaction. For example, a newly paved dense mix asphalt pavement might be expected to have average 8% voids and may range from 4-12% voids[10]. Similarly, an unpaved sand and gravel road base can be compacted to greater than 95% as demonstrated in the sample field compaction test report[11]. Effectively these surfaces will function as impervious.

Vermont Department of Environmental Conservation has issued a Draft General Permit 3-9050 that serves as the "Three-Acre General Permit" as required under the Vermont Clean Water Act[12]. A "three-acre site" is an impervious surface of three or more acres that has never had an operational stormwater permit, or was permitted to standards in place prior to the 2002 Stormwater Management Manual. The VT Stormwater Rule defines impervious surface as those manmade surfaces, including paved and unpaved roads, parking areas, roofs, driveways, and walkways, from which precipitation runs off rather than infiltrates.

Similarly, EPA Region 1 issued a draft permit in 2008 to regulate stormwater discharges from existing sites with ≥2 acres of impervious surfaces in 3 towns. EPA R1 is now considering a

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[8] MDE (2009). Maryland Stormwater Design Manual, Glossary, Maryland Department of the Environment.
[9] NRCS (1986). Table 2-2a, Urban Hydrology for Small Watersheds TR-55, United States Department of Agriculture Natural Resources Conservation Service Conservation TR-55 Engineering Division.
[10] Tran, N., Turner, P., & Shambley, J. (2016). NCAT Report 16-02R Enhanced Compaction To Improve Durability And Extend Pavement Service Life: A Literature Review, National Center for Asphalt Technology.
[11] Compaction Field Density Report ASTM 6938 (10/3/2018), Stratham NH - Rollins Hill And Kirkwall Drive, Project Number: 17-0090.21, by SW Cole.
[12] https://dec.vermont.gov/watershed/stormwater/9050/3-acre-properties

petition using impervious area thresholds[13] for privately-owned commercial, institutional, industrial, and multifamily residential properties that are one acre or greater for the Charles River watershed in metro-Boston. EPA has stated they may require a permit if discharge is contributing to a water quality violation or is a significant contributor of pollutants to a water of the United States. A 2019 analysis[14] and petition[15] found that the regulated NPDES areas comprised only 55% of the watershed load, an insufficient amount by 5% to achieve TMDL attainability. To achieve attainability would require regulation of private properties at a parcel size threshold <0.05 acres as noted in Figure 6.

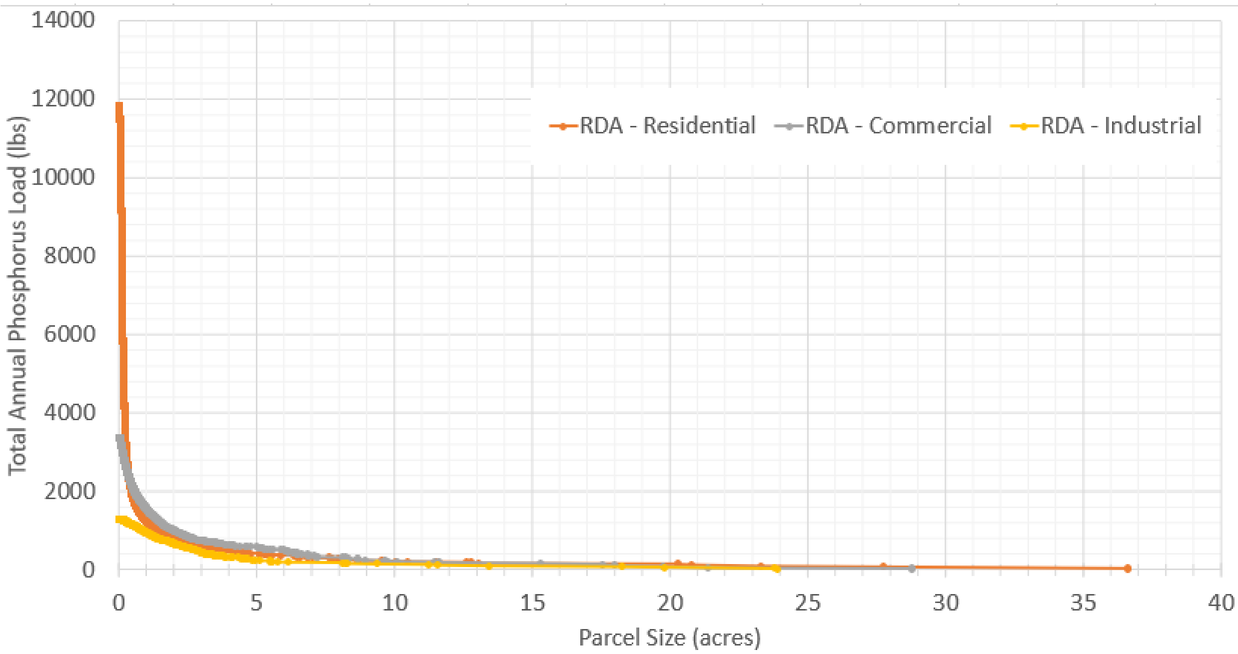


***Figure 6: Cumulative Total Annual Phosphorus Load for Lower Charles River Watershed by Parcel Size for Residential, Commercial and Industrial Land Uses[14]***

In the Gwynns Falls watershed, the inclusion of non-paved impervious surfaces would increase the number of industrial facilities required for imperious area restoration and result in significant additional load reduction. One such facility is United Iron and Metals (MDR001216), a 19.5-acre facility shown in Figure 7. The current IA restoration requirement assesses the property as 12.25 impervious acres. The IA increases to 17.48 acres if all impervious surfaces are considered, increasing the 20% restoration area from 2.45 acres to 3.50 acres, as shown in Table 5.

An estimate of total industrial IA is shown in Table 7 based on the total industrial areas within the watershed assuming 72% IA per NRCS[9] .This estimate of industrial IA, while not exact,

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[13] https://www.epa.gov/charlesriver/charles-river-residual-designation-presentation-september-2020

[14] Roseen, R. and J. Sahl (2019). TMDL Attainability Analyses for Phosphorus and Pathogens for the Charles River Watershed, Massachusetts - Expert Report. Boston, MA, Waterstone Engineering for the Conservation Law Foundation.

[15] CLF (2019). Petition for a Determination that Certain Commercial, Industrial, Institutional, and Multi-Family Residential Property Dischargers Contribute to Water Quality Standards Violations in the Charles River Watershed, Massachusetts, and that NPDES Permitting of Such Properties is Required. U. U.S. Environmental Protection Agency -R1. Boston, MA, Conservation Law Foundation, Charles River Watershed Association.

demonstrates that total potential IA for consideration may be as high as 1,828 acres rather than the 39.8 acres currently subject to restoration for 5 facilities.

Furthermore, within the GF watershed there are only 5 industrial facilities subject to the Bay impervious area restoration requirement. The facilities are listed in Table 6 and together account for only 39.8 acres of IA of which only 7.9 acres (20%) are subject to restoration. Table 7 shows that the 7.9 acres of the 5 subject facilities represent only 0.3% of the total industrial areas and 0.4% of the total estimated industrial IA for the GF watershed.

The total IA not included in the current definition of impervious surface in the permit has tremendous additional potential load reduction that should be considered. This is further described in Section 4.3 Impacts of Elimination of 5-Yr Requirement for Cumulative Reduction of 20% IA Restoration.


*Figure 7: United Iron and Metal, 909 Millington Ave, Baltimore, MD, MDR001216*

*Table 5: Land Cover and IA Restoration for United Iron and Metal Co., MDR#001216*

| RESTORATION REQUIREMENT | TOTAL AREA (ACRES) | TOTAL IA (ACRES) | PAVEMENT | BUILDINGS | GRAVEL | IMPERV. AREA SUBJECT TO 20% RESTORATION (ACRES) |
|---|---|---|---|---|---|---|
| Current | 19.50 | 12.25 | | | | 2.45 |
| Alternate | 19.50 | 17.48 | 4.15 | 1.39 | 11.94 | 3.50 |

*Table 6: Industrial Facilities Subject to Bay Impervious Area Restoration Requirement in the Gwynns Falls Watershed*

| NPDES NUM. | FACILITY NAME | SIC DESCRIPTION | TOTAL IA (ACRES) | IA SUBJECT TO 20% RESTORATION (ACRES) |
|---|---|---|---|---|
| MDR000659 | Ward Trucking | Sector P - Truck terminal and light truck maintenance | 5.45 | 1.09 |
| MDR000777 | Emanuel Tire, LLC | Sector N - Tire recycling | 12.65 | 2.53 |
| MDR000787 | Houff Transfer, Inc. | Sector P - transit warehouse | 6.55 | 1.31 |
| MDR000848 | United Parcel Service - MDBAL | Sector P - small parcel distribution center | 2.92 | 0.5 |
| MDR001216 | United Iron And Metal, LLC | Sector N - scrap metal yard, metals are bought, pr | 12.25 | 2.45 |
| **TOTAL** | | | **39.82** | **7.96** |

http://mes-mde.mde.state.md.us/WastewaterPermitPortal/

*Table 7: Watershed Scale Evaluation of Industrial Areas Subject to Impervious Area Restoration*

| PARAMETER | AREA (ACRES) | PERCENTAGE OF TOTAL |
|---|---|---|
| Industrial Area | 2539.62 | 100.0% |
| Total Industrial Impervious Area | 1828.53 | 72.0% |
| Industrial Areas Subject to Restoration Requirement | 67.76 | 2.7% |
| Industrial Impervious Area Subject to Restoration Requirement | 39.82 | 1.6% |
| 20% Of Area Subject to Restoration Requirement | 7.96 | 0.3% |

Note: Total industrial IC is based on the assumption of 72% IA for industrial areas[9].; 20%IA is actual IA calculated, not assumed.

### *4.2. Restricted Application of 20%IA Restoration Requirement Limits Important Pollutant Reduction Potential for Unpaved Surfaces*

Unstabilized, non-paved surfaces being actively worked in an industrial setting may in fact have a greater pollution potential than do paved surfaces. It's well understood that unpaved roads have significant erosion potential and carry extremely high pollutant concentrations in comparison to standard paved roads. Clinton (2003) reported TSS concentrations from unpaved gravel road surfaces ranging from 10 to 200 times the concentrations of coming from paved roads (Table 8).

Studies have reported that in some instances erosion from gravel roads can account for more than 80 percent of the sediment threatening water quality[16,17].

For these reasons, it is my opinion that including industrial operations that have nonpaved impervious surfaces is critical for impervious area restoration and that the limitation to paved surfaces critically limits pollutant load reduction potential for industrial areas.

***Table 8: Pollutant Concentrations for Paved and Gravel Roads Types[18]***

| | TSS (MG/L) | | |
|---|---|---|---|
| **ROAD TYPE** | **MEAN** | **MIN** | **MAX** |
| Paved | 153 | 1 | 10,300 |
| Improved Gravel | 1,470 | 1 | 117,350 |
| Routine Gravel | 1,983 | 0 | 31,950 |
| Unimproved Gravel | 32,013 | 6 | 71,680 |

### *4.3. Impacts of Elimination of 5-Yr Requirement for Cumulative Reduction of 20% IA Restoration*

As per the 2013 Response to Comments[19], MDE understood that it would be necessary to require at least 28% of impervious surfaces area to be retrofitted each permit cycle to achieve the necessary nitrogen reduction. The draft industrial permit rescinds that requirement and the resulting load reductions are drastically reduced. The requirement for 20% IA reduction increasing each cycle is necessary to achieve substantive reductions for industrial land uses.

The effect of weakening the restoration requirement is best understood at a watershed scale.

Figure 8, Figure 9, and Figure 10 illustrate estimates of the minor load reduction for TSS, TP, and TN accomplished through a single iteration of the 20% IA restoration requirement in relation to the total industrial loads within the Gwynns Falls watershed. Table 9 details the watershed scale context of pollutant load for the 5 industrial facilities subject to restoration. The table lists the total load for all industrial facilities, and the load associated with 20% of all industrial IA (not simply the 5 subject facilities). This demonstrates that the treated load from the 5 subject facilities represents only 5% of the load of the subject facilities, and more importantly, only 0.14% to 0.16% of the total industrial loads for the GF watershed.

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[16] Van Lear, D. H., W. Hansen, et al. (1995). Sedimentation in the Chattooge River Watershed, Clemson University, College of Forest and Recreation Resources.
[17] Riedel, M. S. and J. M. Vose (2003). Collaborative research and watershed management for optimization of forest road best management practices. In: 2003 Proceedings of the International Conference on Ecology and Transportation, edited by C. Leroy Irwin, Paul Garrett, and KP McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University. pp. 148-158.
[18] Clinton, B. D. and J. M. Vose (2003). "Differences in surface water quality draining four road surface types in the southern Appalachians." Southern Journal of Applied Forestry **27**(2): 100-106.
[19] Page 7 from MDE (2013). Response to Public Comments Regarding General Permit for Discharges from Stormwater Associated with Industrial Activities, State Discharge Permit Application No. 12SW, NPDES Permit No. MDR000000. Baltimore, MD, Maryland Department of the Environment**:** 70.

The treated load (i.e., load removed) is only 2,207 lbs. (5%) of the 44,139 lbs. TSS associated with the 5 industrial sites for which the IA restoration requirement is required, or 0.16% of the 1,361,775 lbs. TSS load associated with all of the industrial sites within the watershed.

Similarly, the treated load for Phosphorous (i.e., load removed) is only 6.04 lbs. (5%) of the 121 lbs. TP associated with the 5 industrial sites for which the IA restoration requirement is required, or 0.14% of the 4,404 lbs. TP load associated with all of the industrial sites within the watershed.

The treated load for Nitrogen is only 74.7 lbs. (5%) of the 1,494 lbs. TN associated with the 5 industrial sites for which the IA restoration requirement is required, or 0.14% of the 52,319 lbs. N load associated with all of the industrial sites within the watershed.

Figure 11, Figure 12, Figure 13 plot the load reductions over time for 5 consecutive 5-yr intervals. To illustrate the impact of lessening the restoration requirement, 4 restoration rates are plotted: 20%/5-yrs, 15%/5-yrs, 10%/5-yrs, and 5%/5-yrs at an assumed 25% BMP performance efficiency, consistent with the WIP assumptions[19]. The pollutant load removed as a component of total watershed load is demonstrated at 5-year intervals. These are presented in relation to the total load associated with the 20% impervious areas for the 5 facilities subject to restoration and the total acres restored over time. The reduced restoration rates (5%, 10%, 15%) from the current 20% exemplify the impact of reduced load reductions over time that could occur if only a single iteration were applied over multiple permit cycles. For example, 5% impervious area restoration represents a 20% reduction over 4 permit cycles (20 years); 10% represents a 20% reduction over 2 permit cycles (10 years); and 15% represents a 20% reduction over 1.3 permit cycles (6.7 years).

This illustrates the potential insignificance of both a single iteration of the 20% IA restoration, and of the narrow application to paved industrial areas (as discussed previously in Sections 4.1 and 4.2).

As such it is useful to understand the level of reductions that could be achieved if IA restoration were applied to all industrial IA (1,828 acres), not simply the 5 subject facilities (39.8 acres). Figure 14, Figure 15 and Figure 16 present this data in relation to the 4 restoration rates in comparison with the IA load for 20% impervious areas for the 5 subject facilities and load associated with 20% of all industrial impervious areas in GF watershed. As mentioned previously, Table 9 lists the loads for the 5 subject facilities, the loads of 20% IA for the subject areas, and the loads for all industrial areas and loads from 20% of all industrial areas. From these figures it can be clearly observed that very little reduction from industrial facilities is being achieved in relation to the total load and the reduction potential if IA restoration were applied more broadly.

*Table 9: Watershed Scale Evaluation of Pollutant Load for 5 Industrial Facilities Subject to 20% IA Restoration*

| AREA (DESCRIPTION) | TSS LOAD (LBS) | PHOSPHORUS LOAD (LBS) | NITROGEN LOAD (LBS) |
|---|---|---|---|
| Industry– Total Watershed | 1,361,775 | 4,404 | 52,319 |
| 20% IA Load– Total Watershed | 272,355 | 881 | 10,464 |
| Treated Load @25%RE – Total Watershed | 68,089 | 220 | 2,616 |
| Total Industrial Load IA Restoration Sites | 44,138.61 | 120.77 | 1,493.94 |
| 20% IA Load Total IA Restoration Sites | 8,827.72 | 24.15 | 298.79 |
| Treated Load @25%RE | 2,206.93 | 6.04 | 74.70 |
| % Treated Load of IA Restoration Sites | 5.0% | 5.0% | 5.0% |
| % Treated Load of All Industrial | 0.16% | 0.14% | 0.14% |

Note: This assumes the 25% BMP removal efficiency, consistent with the WIP assumptions[19]

### *4.4. Lost Opportunity for Reduction of Toxic Industrial Pollutants*

As mentioned previously, IA restoration for industrial facilities would serve the additional purpose of reduction of common toxic industrial pollutants. A review the 2018 DMRs found that the average concentrations reported for Aluminum, Cadmium, Copper, Lead, and Zinc exceed both the acute and chronic freshwater aquatic life criteria. Copper, in particular, is especially toxic for aquatic life and is nearly 24 times the average acute aquatic life criteria for freshwater, and 183 times the standard deviation. To fully understand watershed loading for industrial contaminants would require a site-by-site analysis.

It is well established that green infrastructure has tremendous protective benefits for aquatic life. One of the most significant studies regarding the protective benefits of low impact development (aka green infrastructure) was completed in 2015 by Spromberg et al[20] whom documented a National Marine Fisheries Service study that examined the effects of stormwater on salmon which found that salmon exposed to undiluted stormwater from a major highway were killed within hours however when that same stormwater was pre-filtered through soil, no fish died. The study provides the first direct evidence that toxic runoff is killing adult Coho salmon in urban watersheds and that inexpensive mitigation measures (e.g., biofiltration by green infrastructure) can improve water quality and promote salmon survival.

A 2013 meta-analysis of bioretention systems[21] examined approximately 75 literature sources from leading sources, review of significant published literature and other relevant data. The study found that the median removal efficiency for total copper, lead and zinc median removals were 46%, 84% and 76%, respectively. Excellent performance was observed for other contaminants including 83% for total suspended solids and 99% for oil and grease. Runoff reduction in bioretention systems also contributes to reduction of total pollutant loads and the

[20] Spromberg, J. A., D. H. Baldwin, et al. (2016). "Coho salmon spawner mortality in western US urban watersheds: bioinfiltration prevents lethal storm water impacts." Journal of Applied Ecology **53**(2): 398-407.
[21] Roseen, R. M. and R. Stone (2013). Bioretention Water Quality Treatment Performance Assessment--Technical Memorandum. Seattle, WA, Seattle Public Utilities, Seattle, WA**:** 84.

median volume reduction of systems was found to be 76%. Table 10 presents statistics of the removal efficiencies for bioretention systems reported for a range of common toxic pollutants.

***Table 10: Summary Statistics of Removal Efficiency central tendencies in bioretention systems from database.***

| | | | REMOVAL EFFICIENCY | | |
|---|---|---|---|---|---|
| **POLLUTANT** | **N** | **MEDIAN** | **LOWER CI** | **UPPER CI** | **ACTUAL CONFIDENCE** |
| TSS | 30 | 83% | 71% | 91% | 96% |
| Fecal Coli* | 6 | 77% | 0% | 95% | 97% |
| O&G | 16 | 99% | 75% | 99% | 92% |
| Total Cu | 11 | 46% | 2% | 59% | 93% |
| Dissolved Cu* | 4 | 61% | -575% | 97% | 88% |
| Total Pb | 18 | 81% | 64% | 93% | 97% |
| Dissolved Pb* | 3 | 70% | -90% | 95% | 75% |
| Total Zn | 20 | 76% | 64% | 83% | 96% |
| Dissolved Zn* | 5 | 64% | 30% | 95% | 94% |
| Total P | 28 | 57% | 34% | 75% | 96% |
| Total N | 17 | 44% | -3% | 58% | 95% |
| Nitrate | 27 | 8% | 4% | 42% | 95% |
| Ammonia | 13 | 49% | 9% | 82% | 98% |

To illustrate the opportunity for reduction of toxic industrial pollutants the average concentrations for Aluminum, Copper, Lead, and Zinc from the DMR analyses were used to develop PLERs using a similar method as described for the pollutant loading analysis. This analysis was conducted at 2 scales to examine the pollutant load reduction potential for 1) the 5 facilities subject to IA restoration, and 2) for the GW watershed. Table 11 lists the load reduction potential for a single iteration of the 20% IA restoration requirement, and if that requirement were applied with subsequent permits for 40%, 60%, 80% and 100%. Load reductions were calculated from median removal efficiencies listed in Table 10, except for Aluminum which was assumed to 75%. This illustrates that if a second 20% IA restoration requirement were implemented for the 5 facilities there would be a total estimated load reduction of 293.9 lbs of Aluminum, 26.4 lbs of Copper, 1,505.6 lbs of Lead, and 10.3 lbs of Zinc.

Similarly, Table 12 lists load reductions if the IA restoration requirement were applied for all industrial facilities within the watershed at 20%, 40%, 60%, 80% and 100% restoration levels. This illustrates that if a second 20% IA restoration requirement were implemented for all industrial facilities within the watershed would remove a total estimated load of 11,015.8 lbs of Aluminum, 989.7 lbs of Copper, 56,426.6 lbs of Lead, and 1385.4 lbs of Zinc.

*Table 11: Toxics Load Reduction Potential for 5 Facilities Subject to Restoration Requirements*

| | | | 5 FACILITIES LOAD REDUCTION IN LBS/YR | | | | |
|---|---|---|---|---|---|---|---|
| **POLLUTANT** | **TOTAL INDUSTRIAL LOAD** | **20% IC LOAD TOTAL** | **20%IA REST.** | **40%IA REST.** | **60%IA REST.** | **80%IA REST.** | **100%IA REST.** |
| Aluminum, total (as Al) | 979.7 | 195.9 | 147.0 | 293.9 | 440.9 | 587.8 | 734.8 |
| Copper, total (as Cu) | 143.5 | 28.7 | 13.2 | 26.4 | 39.6 | 52.8 | 66.0 |
| Lead, total (as Pb) | 4,480.9 | 896.2 | 752.8 | 1,505.6 | 2,258.3 | 3,011.1 | 3,763.9 |
| Zinc, total (as Zn) | 33.8 | 6.8 | 5.1 | 10.3 | 15.4 | 20.6 | 25.7 |

*Table 12: Toxics Load Reduction Potential for Gwynns Falls Watershed if Subject to Restoration Requirements*

| | | | WATERSHED LOAD REDUCTION IN LBS/YR | | | | |
|---|---|---|---|---|---|---|---|
| **POLLUTANT** | **TOTAL INDUSTRIAL LOAD** | **20% IC LOAD TOTAL** | **20%IA REST.** | **40%IA REST.** | **60%IA REST.** | **80%IA REST.** | **100%IA REST.** |
| Aluminum, total (as Al) | 36,719.2 | 7,343.8 | 5,507.9 | 11,015.8 | 16,523.6 | 22,031.5 | 27,539.4 |
| Copper, total (as Cu) | 5,378.7 | 1,075.7 | 494.8 | 989.7 | 1,484.5 | 1,979.4 | 2,474.2 |
| Lead, total (as Pb) | 167,936.3 | 33,587.3 | 28,213.3 | 56,426.6 | 84,639.9 | 112,853.2 | 141,066.5 |
| Zinc, total (as Zn) | 1,267.7 | 253.5 | 192.7 | 385.4 | 578.1 | 770.8 | 963.4 |

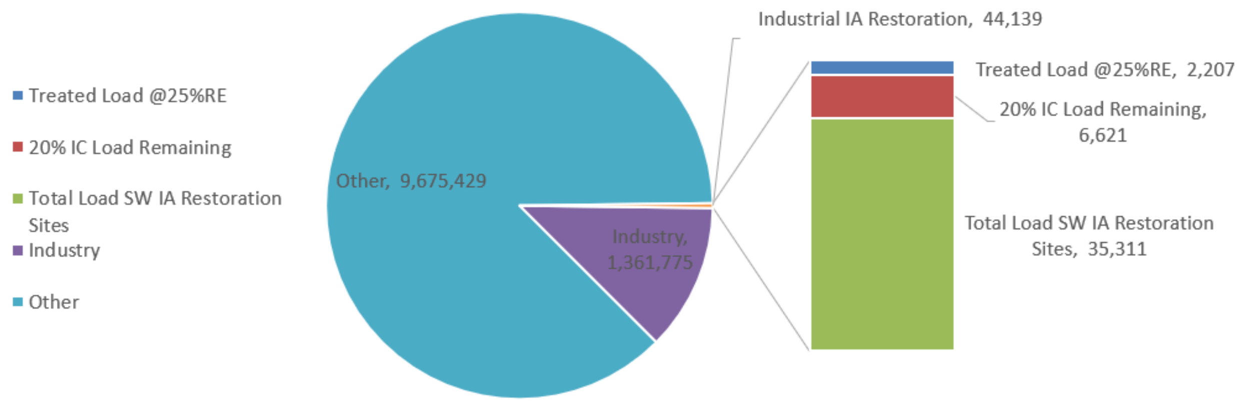


*Figure 8: TSS Load (Lbs./Yr) within Gwynns Falls Required for Impervious Area Restoration*

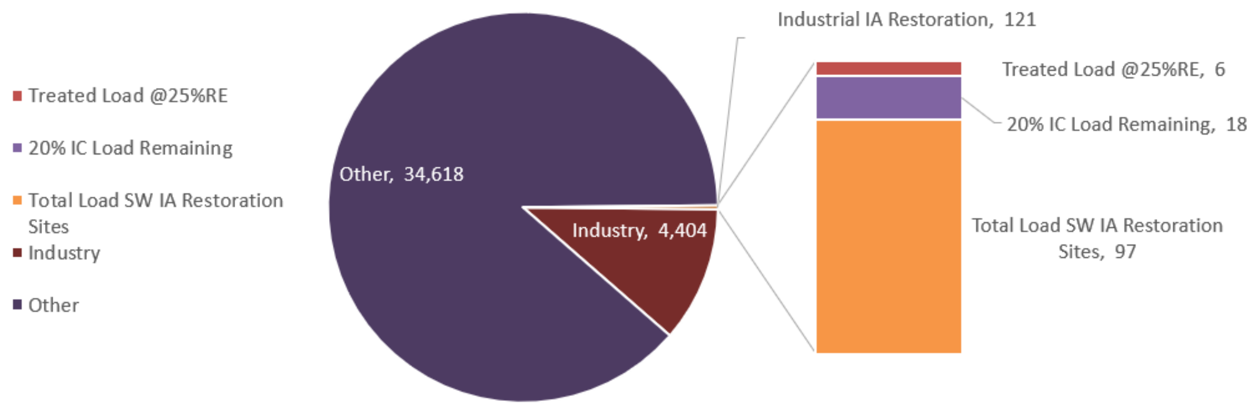


*Figure 9: TP Load (Lbs./Yr) within Gwynns Falls Required for Impervious Area Restoration*

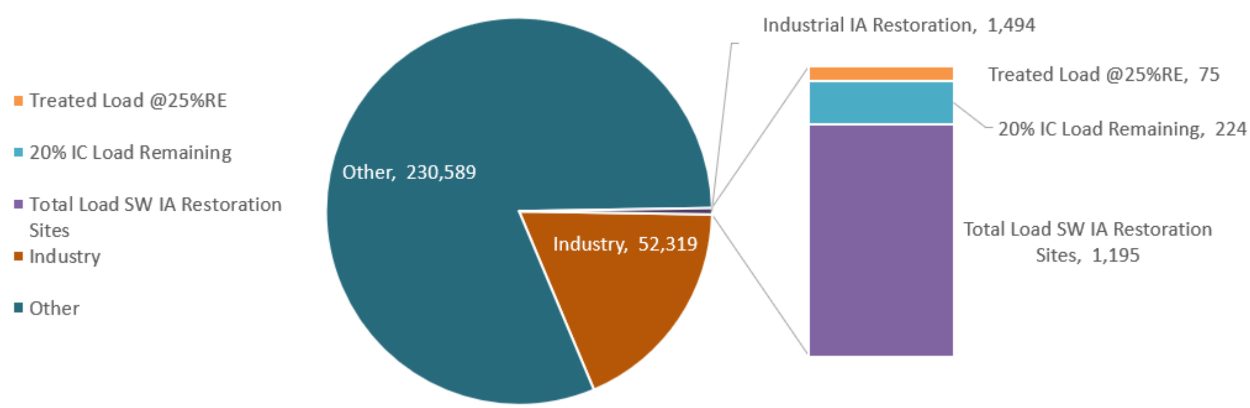


*Figure 10: TN Load (Lbs./Yr) within Gwynns Falls Required for Impervious Area Restoration*

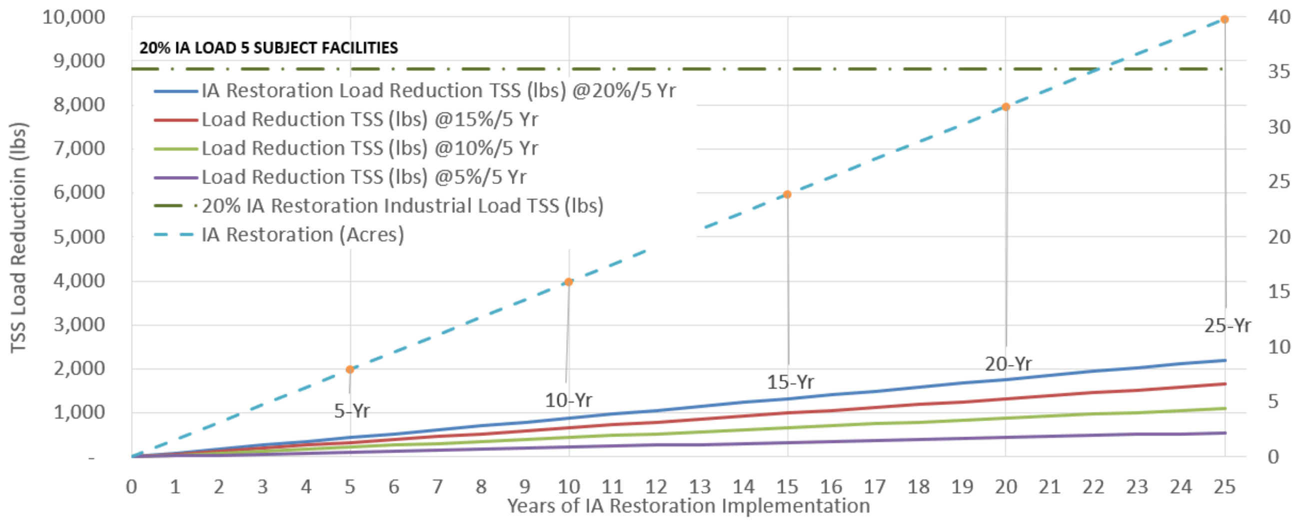


*Figure 11: TSS Load Reduction @ 20%, 15%, 10%, and 5% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration*

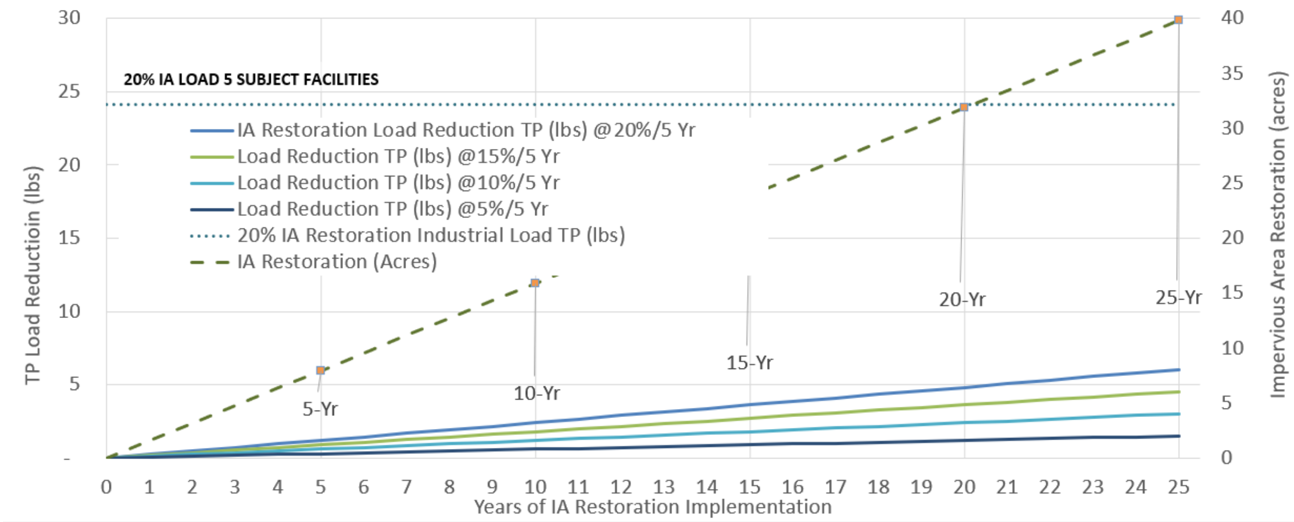


*Figure 12: TP Load Reduction @ 20%, 15%, 10%, and 5% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration*

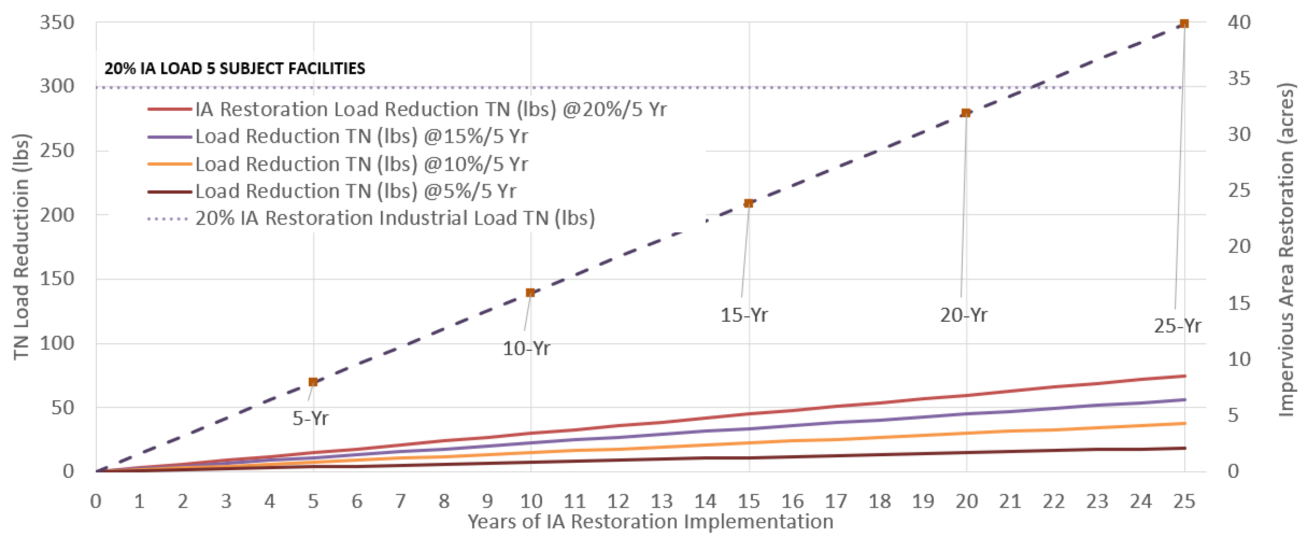


*Figure 13: TN Load Reduction @ 20%, 15%, 10%, and 5% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration*

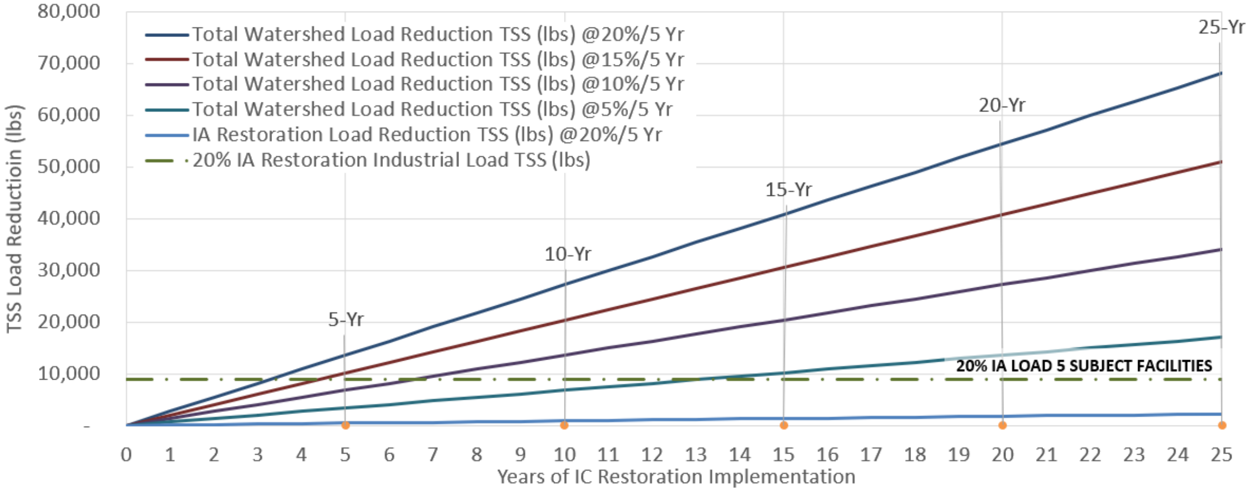


***Figure 14: TSS Load Reduction Over Time @ 20% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration Vs Restoration for 5%, 10%, 15%, 20% of All Industrial IA***

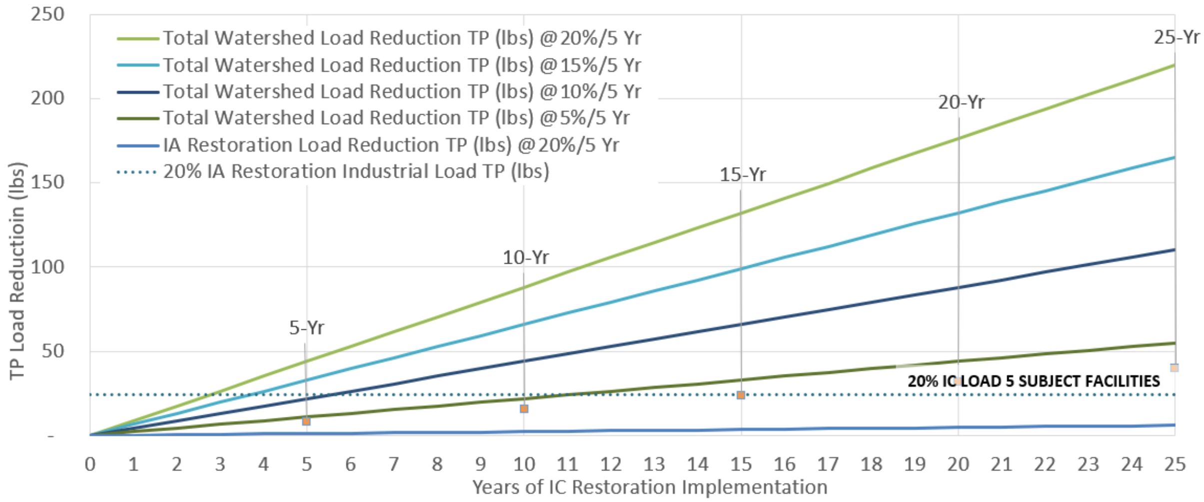


***Figure 15: TP Load Reduction Over Time @ 20% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration Vs Restoration for 5%, 10%, 15%, 20% of All Industrial IA***

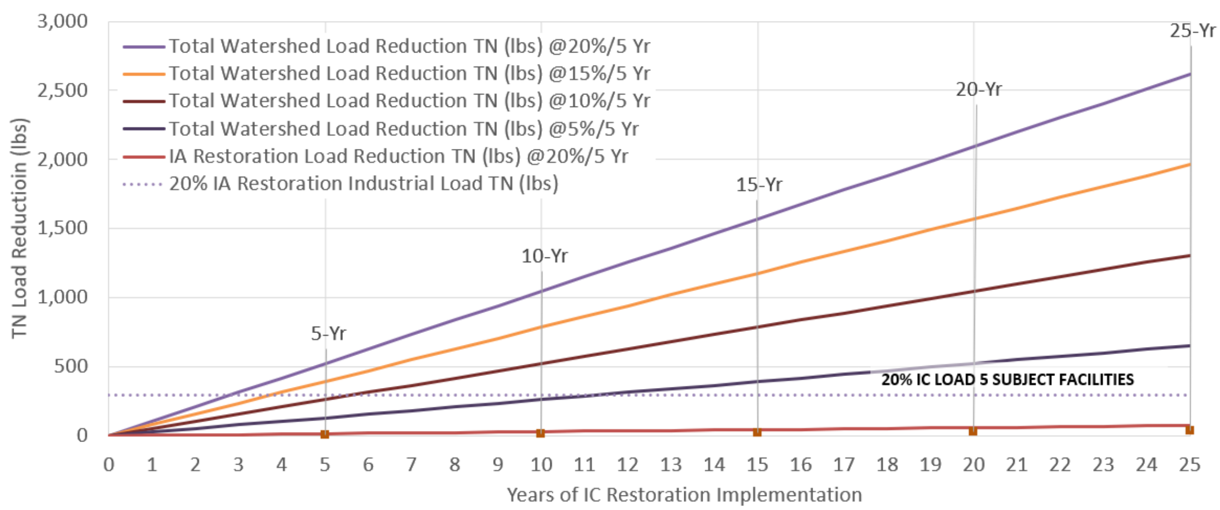


***Figure 16: TN Load Reduction Over Time @ 20% Restoration per 5 Year Cycles for 5 Facilities Subject to Restoration Vs Restoration for 5%, 10%, 15%, 20% of All Industrial IA***

## 5. No Exposure Certification Weakness

The draft Industrial General permit as written contains no provisions for No Exposure Certifications that would require certification of treatment prior to discharge to groundwater. In my professional experience, No Exposure Certifications have historically been limited to determining that no off-site discharge occurs to waters of the US to the detriment of on-site contamination. It is my opinion that this focus on off-site discharge has led to the inappropriate use of infiltration systems for management of industrial runoff and the concomitant risk to groundwaters and surface waters by direct hydrologic connection.

For this reason, treatment of all industrial process waters should be required prior to discharge to surface waters or groundwater. Infiltration systems typically are not appropriate for land uses of high pollutant load potential, and instead filtration systems should be required for any industrial site that portends to manage all industrial waters on-site including the use of infiltration. This would be consistent with treatment requirements for off-site discharge to surface waters and should be consistent with on-site discharge to groundwater.

The issue of CWA jurisdiction over the connection of groundwater and surface water is becoming more established and represents an opportunity to mitigate impacts from industrial pollutants. The 2020 Supreme Court decision on the County of Maui, Hawaii V. Hawaii Wildlife Fund[22] has numerous instructional findings including

> *"that a permit is required when "pollutants are fairly traceable from the point source to a navigable water." " and that "that a permit is required when there is a discharge from a point source directly into navigable waters or when there is the functional equivalent of a direct discharge."*

These recent findings clearly indicate the increasing need to address the undisputed scientific connection of surface waters and groundwaters from a legal and regulatory perspective. As such, there should be an equivalent requirement for treatment of all industrial process waters, groundwater and surface water discharge, by use of filtration systems.

## 6. Benchmark Monitoring Weaknesses

### *6.1. Grab Sampling Deficiencies*

Based on my professional judgment and experience of stormwater monitoring, quarterly grab sampling is grossly insufficient for the assessment of pollutant loads and as such it renders Part VI. Standard Permit Conditions untenable. Section P. Permit Actions states

> *"At any time at the discretion of the Department or the U.S. Environmental Protection Agency, or if there is evidence indicating that stormwater discharges authorized by this permit cause, have the reasonable potential to cause or contribute to an excursion above any applicable water quality standard, the Department may require the owner or operator of such discharge to obtain an individual permit or alternative general permit coverage."*

Quarterly monitoring by use of grab samples cannot effectively determine annual averages for benchmark monitoring because the data are routinely low quality. "The results from a single grab

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[22] SCOTUS (2020). County of Maui, Hawaii v. Hawaii Wildlife Fund. S. Ct., Supreme Court. **140:** 1462.

sample generally are not sufficient to develop reliable estimates of the event mean concentration (EMC) for the pollutant or pollutant load because stormwater quality tends to vary dramatically during a storm event.[23]" High quality monitoring methods (of which grab samples are not one) could be expected to provide reasonable estimations of annual averages. However, given the low data quality of grab samples either the frequency would need to be increased substantially, or the monitoring quality would have to improve, or both. The draft Industrial General permit recognizes this limitation, but does not enforce it, with the statement

> *"you may use a composite sampling method instead of taking grab samples as described above. This composite method may be either flow-weighted or time weighted. Flow-Weighted composite sample means a composite sample consisting of a mixture of aliquots collected at a constant time interval, where the volume of each aliquot is proportional to the flow rate of the discharge."*

In my experience in reviewing benchmark monitoring data, grab sampling most commonly occurs, not within 30 minutes, but rather "as soon as practicable". This would be expected for events that were to occur during non-business hours; however, a trend of improper sampling would bias the sampling results by obtaining samples at the end of a storm which are typically far less contaminated. This phenomenon is well established in the literature.[24] In reaching the above conclusions, I weigh heavily my experience in stormwater investigations having tested over forty different stormwater systems and project sites and having coauthored numerous peer reviewed publications on stormwater monitoring[25] including national guidelines for BMP certification[26]. I have reviewed years of industrial permit monitoring reports for other permits and have observed that monitoring and reporting protocols related to sample time and note-taking are rarely followed for sample time and recorded notes.

Numerous draft permits require more stringent sampling approaches. NPDES Permit No. MA0003280 draft 2020/2021 NPDES Permit No. MA0000825 for Global Companies LLC, NPDES Permit No. MA0001091 for Gulf Oil Limited Partnership, NPDES Permit No. MA0001929 for Irving Oil Revere Terminal, NPDES Permit No. Ma0003280 for Chelsea Sandwich LLC, NPDES Permit No. MA0004006 for Sunoco Partners Marketing and Terminals L.P.. These permits will require composite monitoring for numerous contaminants.

The continued use of low-quality grab sampling techniques is particularly unacceptable with the advent of low-cost and simple alternatives to flow-weighted composite sampling methods. These

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[23] Geosyntec Consultants and I. Wright Water Engineers (2009). "Urban Stormwater BMP Performance Monitoring." Prepared with support from the US EPA, Water Environment Research Foundation, Federal Highway Administration, and the Environmental and Water Resources Institute of the American Society of Civil Engineers,< www. bmpdatabase. org.
[24] Sansalone, J., and Buchberger, S. (1997). "Partitioning and First Flush of Metals in Urban Roadway Storm Water." Journal of Environmental Engineering, 123(2): 134-143.
[25] Geosyntec Consultants and I. Wright Water Engineers (2009). "Urban Stormwater BMP Performance Monitoring." Prepared with support from the US EPA, Water Environment Research Foundation, Federal Highway Administration, and the Environmental and Water Resources Institute of the American Society of Civil Engineers,< www. bmpdatabase. org.
[26] Guo, Q. (2009). ASCE/EWRI Task Committee on Guidelines for Certification of Manufactured Stormwater BMPs, ASCE The Stormwater Infrastructure Committee, Water, Wastewater, and Stormwater Council (WWSC)
The Wet Weather Flow Technology Committee of the Urban Water Resources Research Council (UWRRC).

low-cost alternatives include first flush samplers[27], passive diffusion samplers[28], and multi parameter sondes, that greatly increase the quality of the data.

An old adage holds, if you want to be confident in your data, take one measurement; if you want to truly understand your data, take many. Grab sampling is grossly deficient because stormwater volumes and pollutant concentrations change dramatically during a storm event. The inferior nature of grab samples can only be improved by taking numerous samples or use of a different approach. Section C Monitoring Requirements of the Draft Permits states that "samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity."

A single grab sample, or quarterly grab samples, cannot adequately characterize average annual or quarterly maximum concentrations. Similarly, low-quality monitoring is not sufficient to determine whether the level of pollution has a reasonable potential to cause or contribute to an excursion above water quality criteria.

For these reasons I believe the draft Industrial General permit sampling frequencies are grossly insufficient to determine average quarterly or average annual benchmark concentrations for the purpose of assessing the risk of causing or contributing to excursions above water quality criteria.

### *6.2. Data Reporting Deficiencies*

This discussion centers around concerns about the reporting of data that fall "between the method detection level (MDL) and the quantitation limit (i.e., a confirmed detection but below the level that can be reliably quantified), use a value halfway between zero and the quantitation limit."[29] Data in this range is usable data that is within the calibration range for the method and the substitution of an average is not best practice.

The use of "a value halfway between zero and the quantitation limit" or averages instead of reporting the actual concentration calculated, is inconsistent with best practices for data analyses and is not consistent with the literature. The substitution of averages for qualified data reduces the utility of the monitoring data and the ability to assess benchmark monitoring compliance. Data substitutions make it impossible to compute a simple mean concentration. When the industry substitutes a zero for each less-than, the standard is not exceeded. When the regulatory agency substitutes a value equal to the reporting limit, the standard is exceeded. Which is correct? Has the law been violated?" [30]

There should be no need to report averages when data is available. An EPA publication recommends "one should obtain the actual values for the observations reported as BDL", and simply report the limit of detection as a separate variable. This is based on the fact that qualified data is more informational and useful than no data[31].

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[27] Thermo Scientific 1100-1000 Storm Water Sample Bottle

[28] Harte, P. T., M. J. Brayton, et al. (2000). Use of passive diffusion samplers for monitoring volatile organic compounds in ground water, Geological Survey (US).

[29] Page 38, Maryland Draft Permit No. 20-SW, NPDES Permit No. MDR00002020

[30] Helsel, D. R. and R. M. Hirsch (1992). Statistical methods in water resources, Elsevier.

[31] CBP (1993). Incorporating Uncertainty Associated with Censored Water Quality Data In Parametric Trend Analysis, Chesapeake Bay Program, US EPA**:** 35.

Data that is biased low would increase the risk of furthering impairment and increasing risk to human health. The substitution of qualified data with a value of zero is scientifically indefensible and well established to be poor practice, “Simple substitution methods”…“are widely used, but have no theoretical basis.” “Studies cited above [32,33,34,35,36] determined that simple substitution methods performed poorly in comparison to other procedures. Substitution of zero produced estimates of mean and median which were biased low, while substituting the reporting limit resulted in estimates above the true value.” “As the choice of value to be substituted is essentially arbitrary without some knowledge of instrument readings below the reporting limit, and as large differences may occur in the resulting estimates, simple substitution methods are not defensible.”[37]

The ability to assess compliance with benchmark monitoring is reduced, and risk to human health and water quality impairments is increased, by reporting of averages and not making use of the most detailed information available.

## 7. Impervious Acre Restoration Equivalence

The use of impervious acre restoration equivalence on a nitrogen load basis, as is the case for the draft Industrial General permit, fails to account for pollutants that have a significant streambank erosion component, like TSS, and fails to account for other pollutants in industrial stormwater like PCBs and toxic metals. The essence of environmental site design (ESD) is the maintenance or restoration of predevelopment hydrology and runoff curve number reduction. This is exemplified in the Environmental Site Design Sizing Criteria detailed in the 2000 Maryland Stormwater Design Manual[38]. ESD sizing is based on the need to reduce runoff volume equivalent to predevelopment hydrology to address the channel protection volume ($Cp_v$).

As evident in the sediment TMDL for Gwynns Falls, and other urban streams, it is necessary to account for the sources of sediment and phosphorus loading to distinguish between urban land uses (residential, commercial, transportation, etc) and those derived by stream bank erosion that are caused as a result of increased imperviousness and runoff volumes. ***The source of pollutant load must influence the type of BMP that will be needed and most effective for load reduction.*** For example, pollutants derived from urban land uses such as sediment and phosphorus associated with transportation activities could be managed by street sweeping of roadways and parking lots. Whereas pollutants derived from streambank erosion that is caused by increased imperviousness and corresponding runoff volume will not benefit from street sweeping. Only

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[32] Gilliom, R. J. and D. R. Helsel (1986). "Estimation of distributional parameters for censored trace level water quality data: 1. Estimation techniques." Water Resources Research **22**(2): 135-146.
[33] Gleit, A. (1985). "Estimation for small normal data sets with detection limits." Environmental science & technology **19**(12): 1201-1206.
[34] Helsel, D. R. and T. A. Cohn (1988). "Estimation of descriptive statistics for multiply censored water quality data." Water Resources Research **24**(12): 1997-2004.
[35] Newman, M. and P. Dixon (1990). "UNCENSOR: A program to estimate means and standard deviations for data sets with below detection limit observations." American Environmental Laboratory(4): 26-32.
[36] Helsel, D. R. and R. J. Gilliom (1986). "Estimation of distributional parameters for censored trace level water quality data: 2. Verification and applications." Water Resources Research **22**(2): 147-155.
[37] Helsel, D. R., R. M. Hirsch, et al. (2002). Statistical methods in water resources, US Geological Survey.

[38] Section 5.2.2 Environmental Site Design Sizing Criteria, 2000 Maryland Stormwater Design Manual, Chapter 5 Environmental Site Design, Maryland Department of the Environment.

BMPs that reduce runoff volume through infiltration and filtration practices will effectively reduce impervious area as measured hydrologically.

As detailed in Appendix B, in Gwynns Falls 75% of the sediment load, 74% of phosphorus, and 11% of the nitrogen load would go unmanaged in absence of runoff reduction and associated structural controls. The significant source contribution for streambank erosion illustrates the shortcomings of the impervious acre restoration equivalence on a pollutant load basis in replacement of runoff reduction. ***The absence of required runoff reduction to manage the channel protection volume would result in a fundamental inability to address the total loads for sediment and phosphorus, and to a lesser degree nitrogen.***

## 8. Discussion and Conclusion

This review identifies some significant concerns regarding the adequacy of the draft 2020 General Permit for Discharges from Stormwater Associated with Industrial Activities, Discharge Permit No. 20-SW, NPDES Permit No. MDR00002020 released on January 13, 2021.

The current application of the 20% IA restoration requirement is unreasonably narrow. The narrow application of the 20% IA restoration standard for sites with paved surfaces only is unreasonably narrow and it is not supported scientifically.

For example, within the Gwynns Falls watershed there are only 5 industrial facilities subject to the impervious area restoration requirement. The facilities together account for only 39.8 acres of IA of which only 7.9 acres (20%) is subject to restoration. The 7.9 acres of the 5 subject facilities represent only 0.3% of the total industrial areas and 0.4% of the total estimated industrial IA for the watershed. This means that there is tremendous additional potential load reduction that should be included in the restoration requirement.

Restricted application of the 20% IA restoration requirement limits important pollutant reduction potential for unpaved surfaces. Non-paved surfaces, being actively worked in an industrial setting may in fact have a greater pollution potential than do paved surfaces. It’s well understood that unpaved roads have significant erosion potential and carry extremely high pollutant load in comparison to standard paved roads. Including industrial operations that have nonpaved impervious surfaces is critical for impervious area restoration.

Eliminating the sequential 20% restoration requirements from the permit will have substantial impacts. In 2013, MDE stated that permittees would have to restore at least 28% of impervious surfaces area <u>each permit cycle</u> to achieve the necessary nitrogen reduction.

Similarly, there is a tremendous lost opportunity for reduction of toxic industrial pollutants. IA restoration for industrial facilities would serve the additional purpose of reduction of common toxic industrial pollutants. A review the 2018 DMRs found that the average concentrations reported for Aluminum, Cadmium, Copper, Lead, and Zinc exceed both the acute and chronic freshwater aquatic life criteria. It is well established that green infrastructure has tremendous protective benefits for aquatic life.

The draft Industrial General permit as written contains no provisions for No Exposure Certifications that would require certification of treatment prior to discharge to groundwater. In my professional experience, No Exposure Certifications have historically been limited to determining that no off-site discharge occurs to waters of the US to the detriment of on-site contamination. Treatment of all industrial process waters should be required prior to discharge to surface waters or groundwater as part of a No Exposure Certification.

Quarterly grab sampling is grossly insufficient for the assessment of annual average or peak quarterly concentrations and as such it renders standard permit conditions untenable for the evaluation of the reasonable potential to cause or contribute to an excursion above any applicable water quality standards. The results from a single grab sample generally are not sufficient to develop reliable estimates of the event mean concentration (EMC) for the pollutant or pollutant load because stormwater volume and quality tends to vary dramatically during a storm event. Experience (and published literature) show that weak sampling requirements tend to produce grab samples from late in storm events, when the stormwater is far less contaminated. This, of course, leads to underestimates of EMCs and loads. The continued use of low-quality grab sampling techniques is particularly unacceptable with the advent of multiple low-cost, simple composite monitoring methods.

An additional concern regarding benchmark monitoring is with respect to data substitution for data reporting. The substitution of data that falls "between the method detection level (MDL) and the quantitation limit with a value halfway between zero and the quantitation limit" is inconsistent with best practices for data analyses and is not consistent with the literature. The substitution of averages for qualified data reduces the utility of the monitoring data and the ability to assess benchmark monitoring compliance. There should be no need to report averages when data is available and contrary to published EPA recommendations.

The use of impervious acre restoration equivalence on a nitrogen load basis fails to account for pollutants that have a significant streambank erosion component and fails to account for other pollutants in industrial stormwater such as toxic metals. The essence of environmental site design (ESD) is the maintenance or restoration of predevelopment hydrology and runoff curve number reduction. The source of pollutant load must influence the type of BMP that will be needed and most effective for load reduction. Only BMPs that reduce runoff volume through infiltration and filtration practices will effectively reduce impervious area as measured hydrologically. The absence of required runoff reduction to manage the channel protection volume would result in a fundamental inability to address the total loads for sediment and phosphorus, and to a lesser degree nitrogen.

For this reason, the allowance of alternative BMPs and impervious acre restoration credits on the basis of nitrogen load, and the lack of required runoff reduction and structural volumetric controls, is inconsistent with MDE's stated goal to make significant and continued progress toward achieving the Chesapeake Bay's WLAs as well as local nutrient and sediment TMDLs.

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## 10.APPENDICES

Appendix A: Expert Witness Resume, Publications Authored in Previous 10 years, Expert Witness Experience

Appendix B: Pollutant Load Analysis

Appendix C: Compaction Test Report Example

## Appendix A: Expert Witness Resume, Publications Authored in Previous 10 years, Expert Witness Experience

**ROBERT M. ROSEEN, Ph.D., P.E., D.WRE**
rroseen@waterstone-eng.com 603-686-2488

## EDUCATION

Ph.D., Civil- Water Resources Engineering, Univ. of New Hampshire, Durham, NH, 2002
M.S., Env. Science and Engineering, Colorado School of Mines, Golden, CO, 1998

## PROFESSIONAL EXPERIENCE

Waterstone Engineering, Owner, Stratham, NH, 2016-Present
Horsley Witten Group, Practice Leader, Newburyport, MA, 2015- 2016
Geosyntec Consultants, Inc., Associate, Acton, MA, 2012 – 2015
Univ. of New Hampshire, Research Assistant Professor, Durham, NH, 2007 – 2012
UNH Stormwater Center, Director, Durham, New Hampshire, 2004 – 2012
Univ. of New Hampshire, Research Project Engineer III, Durham, NH, 2001 - 2007
The Bioengineering Group, Inc., Salem, MA, 2001 - 2004

## REGISTRATIONS AND CERTIFICATIONS

Registered Professional Engineer, NH No. 12215, ME No. PE15125, MA No. 333
Diplomate of Water Resources Engineering, American Academy of Water Resources Eng., No. 00556

## CAREER SUMMARY

Dr. Roseen provides many years of experience in water resources investigations and most recently, led a project team in the development of an Integrated Plan for nutrient management for stormwater and wastewater. This plan has received provisional approval by EPA and would be one of the first in the nation. Rob is a recognized industry leader in green infrastructure and watershed management, and the recipient of Environmental Merit Awards by the US Environmental Protection Agency Region 1 in 2010, 2016, and 2019. He consults nationally and locally on stormwater management and planning and directed the University of New Hampshire Stormwater Center for 10 years and is deeply versed in the practice, policy, and planning of stormwater management. Rob has over 25 years of experience in the investigation, design, testing, and implementation of innovative approaches to stormwater management and specializing in green infrastructure, nutrient control planning, and climate vulnerability analyses. Rob has led the technical analysis of dozens of nutrient and contaminant studies examining surface water pathways, system performance, management strategies, and system optimization.

Dr. Roseen provides Clean Water Act expert consultation, analysis, modeling, advice, reports and testimony in regards to compliance with TMDLs and Nutrient Control Planning, Construction General Permits, Municipal Separate Storm Sewer System (MS4) Permits, and Multi Sector General Permits.

He also served as Research Assistant Professor for five years. His areas of expertise include water resources engineering, stormwater management (including low impact development design), and porous pavements. He also possesses additional expertise in water resource engineering including hydrology and hydraulics evaluations, stream restoration and enhancement alternatives, dam removal assessment, groundwater investigations, nutrient and TMDL studies, remote sensing, and GIS applications.

Dr. Roseen has taught classes on Stormwater Management and Design, Fluid Mechanics, and Hydrologic Monitoring and lectures frequently on these subjects. He is frequently called upon as an expert on stormwater management locally, regionally, and nationally.

Notable professional activities include chairing the ASCE EWRI 2016 International Low Impact Development Conference, an annual event that draws participants from around the world to discuss advances in water resources engineering, and participating until 2017 as a Control Group member for the ASCE Urban Water Resources Research Council (UWRRC). He has also served on the ASCE Task Committee on Guidelines for Certification of Manufactured Stormwater BMPs, EWRI Permeable Pavement Technical Committee, and the Hydrology, Hydraulics, and Water Quality Committee of the Transportation Research Board. Dr. Roseen has been the author or co-author of over two dozen professional publications on the topics of stormwater runoff, mitigation measures, best management practices (BMPs), etc. He has extensive experience working with local, state, and regional agencies and participates on a national level for USEPA Headquarters, WEF, and the White Council on Environmental Quality on urban retrofit innovations and next generation LID/GI technology and financing solutions.

## SELECT EXPERT WITNESS EXPERIENCE OVER THE PAST 10-YEARS

### *Chesapeake Bay Program MS4 and Industrial Permit Review*

Dr. Roseen is currently providing expert testimony and technical analysis and review for the Chesapeake Accountability Project which seeks to review draft MS4 and Industrial Stormwater Permits. The goal is to provide a pollutant loading analysis (PLA) tool and concurrent documentation to evaluate the effectiveness of both existing and proposed Clean Water Act permits to protect water quality in the Chesapeake Bay watershed.

### *State Municipal Stormwater Permit Challenge*

Dr. Roseen is currently providing (1) written direct expert testimony and (2) live expert testimony in the adjudication hearings before an unnamed Pollution Control Board in a challenge to municipal stormwater permits. This includes written expert testimony (including research, document review, discovery), response to discovery of other parties, hearing preparation, appearance and live testimony at hearing, and rebuttal testimony.

### *Low Impact Development Review for Proposed Residential Subdivision*

Dr. Roseen is providing expert witness, review, and testimony with respect to Low Impact Development on behalf a private client for a proposed subdivision. The review sought to identify both LID broadly and in keeping with the local zoning ordinance, the use of the LID Crediting criteria relevant to the MA Stormwater Handbook and the 2016 MA Small MS4 Permit.

### *Climate Change Vulnerability Analyses for Industrial Facilities*

Dr. Roseen is currently providing expert consultation, analysis, modeling, advice, and reports in regard to the vulnerability of industrial facilities to climate change and sea level rise for a major east coast port. Evaluations include severe weather events driven by climate change and the exposure of coastal terminals and risk of industrial spills to flooding from storm surge and forecasts for future sea level rise. Such services may include sworn to written or oral expert testimony regarding such matters in Court.

### *State Clean Water Permit Review*

Dr. Roseen has provided expert consultation, advice, reports and testimony regarding stormwater discharges for proposed clean water permits for multiple states. Review and analyses include evaluation of stringency of proposed permits for low impact development for new development, redevelopment, and retrofits. This includes the stringency of performance standards, for projects of varying size, exemptions, and permit “trigger” conditions to name a few.

### *TMDL and Nutrient Control Attainability Analyses and Clean Water Act Expert Services*

Dr. Roseen is currently providing expert consultation, analysis, modeling, advice, reports and testimony in regards to TMDL and nutrient control attainability. This includes watershed modeling, pollutant load analyses, BMP optimization, and parcel-based analyses. Such services include sworn to written or oral expert testimony regarding such matters in Court. This service is being provided for the plaintiff for three (3) case of significant size geographically and in project scope.

### *Construction General Permit (CGP), and Clean Water Act Expert Services*

Dr. Roseen has provided expert consultation, analysis, modeling, advice, reports and testimony in regards to construction general permit compliance, erosion and sedimentation control, and monitoring. Such services include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of defendants' facilities. This service is being provided for the plaintiff for one (1) case of significant size geographically and in project scope.

### *Municipal Separate Storm Sewer System (MS4) Permit and Clean Water Act Expert Services*

A team lead by Dr. Roseen is currently providing and has provided expert consultation, analysis, modelling, advice, reports and testimony regarding stormwater discharges in regards to MS4 violations under the Clean Water Act. Such services include sworn to written or oral expert testimony regarding such matters in Court, and site and facility inspections. This service is being provided for the plaintiff for three cases of significant size geographically and in project scope.

### *Multi Sector General Permit (MSGP), Stormwater Pollution Prevention Plan, and Clean Water Act Expert Services*

A team lead by Dr. Roseen is currently providing expert consultation, water quality monitoring, analysis, modelling, advice, reports and testimony regarding stormwater discharges in regards to MSGP under the Clean Water Act. Such services include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of defendants' facilities. This service is being provided for the plaintiff for over ten (10) separate cases in the northeastern United States.

### *Multi Sector General Permit (MSGP) and Clean Water Act Expert Services*

A team lead by Dr. Roseen provided expert consultation, analysis, modelling, advice, reports and testimony regarding the operations of a scrap metal and automotive recycling facility in relation to Multi Sector General Permit, Safe Drinking Water Act, and National Water Quality Criteria violations of the Clean Water Act. Such services include sworn to written or oral expert testimony regarding such matters in Court, and on-site inspections of facilities. This service was provided for a single location in the northeastern United States.

### *Expert Study and Testimony for Erosion and Sediment Control Litigation*

A team lead by Dr. Roseen is currently providing expert study and testimony in defense of an undisclosed Federal Client in a $25-million-dollar lawsuit from a private entity. The plaintiff alleges impacts from upstream channel erosion and sediment transport. The efforts examine urban runoff and off-site impacts to a downstream channel and subsequent erosion and sediment transport into the downstream storm sewer system.

### *Participation in National Expert Meeting by the White House Council on Environmental Quality and Environmental Protection Agency*

Dr. Roseen participated in a national meeting of experts entitled "Municipal Stormwater Infrastructure: Going from Grey to Green". This meeting purpose was to engage stakeholders in developing options and solutions that result in wider implementation of green infrastructure practices to manage municipal stormwater.

## SELECT OTHER PROJECTS

***Great Bay Nitrogen Control Plan Feasibility Study, Seacoast, NH (2019-Current)*** Dr. Roseen lead a study to determine the feasibility and cost for regulated 16 communities in the Great Bay watershed to implement the optional non-point source and stormwater point source nitrogen reduction pathway outlined in EPA's draft Total Nitrogen General Permit. Feasibility was based on both an assessment of methods to implement nitrogen controls and a corresponding cost analysis. By looking at land use categories and modeled nutrient loads the analysis determined how to optimize nitrogen reductions through a variety of structural and non-structural stormwater Best Management Practices (BMPs).

***Examination of Proposed Timber Harvesting Flood Impacts in the Mill Brook Valley (2018-2019)*** Dr. Roseen led a study to examine flood impacts from proposed timber harvesting in a heavily forested watershed and populated with residential homes. This study included 1) examining proposed timber harvesting impacts in relation to current flooding, 2) a review of the Town's FEMA awards, and 3) development of a watershed model to assess current and future land use management and climate change impacts in relation to regulatory floodplains and bank erosion.

***Little Hale Pond Stormwater Management and Nutrient Control Design, Durham, NH (2019-Current)*** Dr. Roseen is leading a design for two BMPs for stormwater management and nutrient controls as part of a larger stream crossing and culvert replacement design for a low head impoundment. This project involves drainage design, pollutant load analysis, BMP costing. The installations will be implemented in spring of 2019

***Nutrient Control Planning for Mill Pond, Durham, NH (2018-Current)*** Dr. Roseen lead a nutrient control study to identify restorative actions that will be effective within the life expectancy of the dam and at the same time help address declining water quality in Mill Pond and NPDES permitting requirements. Aspects of this study are intended to be consistent (in part) with the 2017 MS4 permit. This includes source identification reporting, BMPs to be optimized for pollutant removal , retrofit inventory and priority ranking, BMP design and costing. This project is intended to lay the groundwork for broader watershed and implementation planning.

***Integrated Permitting for MS4 and Wastewater in Burlington, VT (2016-Current),*** Dr. Roseen is currently leading the stormwater services for a 5-firm engineering team for integrated planning beginning in 2016. The integrated planning effort is the first in the northeastern United States for a municipally funded effort. This project seeks to develop an integrated plan for stormwater, wastewater, and nonpoint sources for a phosphorous TMDL.

***Commercial Street Porous Pavement Design, Provincetown, MA (2009-Current)*** Since 2009, Dr. Roseen has been the technical expert for a project team led by GHD Inc. on porous pavement design for the construction over 12,000' of the first "Porous Municipal Main Street". The project addressed existing infrastructure problems with flooding and drainage along a main thoroughfare that had tremendous traffic during the busy tourist season. Through the use of widespread infiltration, the design sought to help Provincetown address their need to manage stormwater and beach impairments which occur from the discharge of untreated runoff from many outfalls. Beach closures have been reduced by nearly 90% since 2011. The design also considered the long-term maintenance aspect of the pavement with respect to the town's current maintenance routine.

***Rollins Hill Conservation Development, Stratham, NH (2015-Present)*** Rollins Hill is a Low Impact Development designed to integrate homes with the landscape and provide protection for water quality and habitat with over 50 acres of conservation land in a 104-acre development. Dr. Roseen has provided design and construction quality assurance for structural and non-structural BMP design for the various ongoing construction phases and continues to supervise the implementation of long-term O&M with permeable pavements, raingardens, and rooftop infiltration to protect water quality and habitat, recharge groundwater, and reduce the need for stormwater ponds and drainage.

***Lincoln Street Subwatershed Nutrient Control Planning, Phase I and Phase II of the Exeter (WISE) Integrated Plan,*** (2016-2017, Phase I),(2017-2018 Phase II Project of Special Merit). Dr. Roseen is the lead for these 2 phased projects to focus on climate resiliency and the development of nutrient controls plans for the towns largest subwatershed. This includes watershed modeling, planning, BMP design, and costing of green infrastructure for nutrient controls and climate change resiliency. Up to 15 BMP designs and operations and maintenance manuals were developed.

***Building Resilience to Flooding and Climate Change in the Moonlight Brook Watershed****,* (2015-Current), New Hampshire Coastal Program. This project focuses on the subwatershed modeling, planning and design of green infrastructure for climate change resiliency. Dr. Roseen was the lead author and Project Director in partnership with the Town of Newmarket.

***Water Integration for the Squamscott Exeter (WISE),*** (2013-2015), Dr. Roseen was the lead author and Project Director and Principal Investigator for this two-year project to develop an Integrated Plan for nutrient management for stormwater and wastewater amongst 3 communities and 5 wastewater and stormwater NPDES permits. This plan has received provisional approval by EPA and would be one of the first in the nation.

***Urban Watershed Renewal in Berry Brook: Building a Cultural of Watershed Stewardship (2009-2012),*** *Aquatic Resource Mitigation Fund of the NHDES and ACOE*. Dr. Roseen led this >$750,000 grant project between 2009-2012. Implementation in Berry Brook had a combination of LID stormwater management, stream restoration improvements, and community engagement and included 11 BMP designs, costing, and construction supervision. This project fostered clean water and habitat restoration through urban watershed renewal to achieve less than 10% effective impervious cover.

## SELECT PEER REVIEWED PUBLICATIONS

ASCE, D. K. Hein, et al. (2018). ASCE/T&DI/ICPI 68-18 Permeable Interlocking Concrete Pavement Standard. Reston, VA, ASCE Transportation and Development Institute, Interlocking Concrete Pavement Institute.

Bean, E. Z. and R. Roseen (2018). Permeable Pavement Design. Alexandria, Virginia, ASCE Continuing Education, American Society of Civil Engineers.

Bean, E., R. Roseen, et al., Eds. (2017). Permeable Pavements Design Construction And Maintenance. Guided Online Course. Arlington, VA, American Society of Civil Engineers.

Medina, D., R. Roseen, et al., Eds. (2017). Low Impact Development: A Holistic Approach To Urban Stormwater Management. Guided Online Course. Arlington, VA, American Society of Civil Engineers.

ASCE, E. Z. Bean, et al., Eds. (2015). Permeable Pavements. Manual of Practice on Recommended Design Guidelines for Permeable Pavements, American Society of Civil Engineers, The Permeable Pavements Technical Committee, Low Impact Development Standing Committee, Urban Water Resources Research Council, Environment and Water Resources Institute.

Potts, A. and R. M. Roseen (2015). Chapter 2, Recommended Design Guidelines for the Use of Porous Asphalt Pavements. Committee Report on Recommended Design Guidelines for Permeable Pavements: Report on Engineering Practice. B. Eisenberg, K. Lindow and D. Smith, American Society of Civil Engineers, The Permeable Pavements Technical Committee, Low Impact Development Standing Committee, Urban Water Resources Research Council, Environment and Water Resources Institute.

Roseen, R. M., T. V. Janeski, et al. (2015). "Economic and Adaptation Benefits of Low Impact Development." Low Impact Development Technology: 74.

Strecker, E., A. Poresky, et al. (2015). Volume Reduction of Highway Runoff in Urban Areas: Guidance Manual.

Roseen, R., R. Waldo, et al. (2014). Provincetown Porous Asphalt Keeps Beaches Open. Asphalt Pavement Magazine, National Asphalt Pavement Association. Sept 2014.

Roseen, R. M., T. P. Ballestero, et al. (2014). "Assessment of winter maintenance of porous asphalt and its function for chloride source control." Journal of Transportation Engineering 140(2).

Hlas, V., R. Roseen, et al. (2013). An Examination of the Reduction of Effective Impervious Cover and Ecosystem Watershed Response. Department of Civil Engineering. Durham, NH, University of New Hampshire Stormwater Center,.

Houle, J. J., R. M. Roseen, et al. (2013). "A Comparison of Maintenance Cost, Labor Demands, and System Performance for LID and Conventional Stormwater Management." Journal of Environmental Engineering(139): 932-938.

Ballestero, T. P. and R. M. Roseen (2012). Porous Pavement Performance in Cold Climates. The Stormwater Report, Water Environment Federation. Vol 2, No. 1.

Roseen, R. M., T. P. Ballestero, et al. (2012). "Water Quality and Hydrologic Performance of a Porous Asphalt Pavement as a Stormwater Treatment Strategy in a Cold Climate." ASCE Journal of Environmental Engineering: 81-89.

Roseen, R. M., T. P. Ballestero, et al. (2012). Subsurface Gravel Wetlands for Stormwater Management. The Stormwater Report, Water Environment Federation. Vol 2, No. 7.

Sample, D. J., T. J. Grizzard, et al. (2012). "Assessing performance of manufactured treatment devices for the removal of phosphorus from urban stormwater." Journal of environmental management 113: 279-291.

Gunderson, J., R. M. Roseen, et al. (2011). Cost-Effective LID in Commercial and Residential Development. Stormwater, Forrester Communications. March-April.

Roseen, R. M., T. P. Ballestero, et al. (2011). "Sediment Monitoring Bias by Autosampler in Comparison with Whole Volume Sampling for Parking Lot Runoff." Journal of Irrigation and Drainage Engineering 4: 251-257.

Scholz, A., R. M. Roseen, et al. (2011). Consequences Of Changing Climate And Land Use To 100-Year Flooding In The Lamprey River Watershed Of New Hampshire. Civil Engineering. Durham, NH, University of New Hampshire.

Peterson, J., Stone, A., Houle, J., & Roseen, R. (2010). Protecting Water Resources and Managing Stormwater: A Bird's Eye View for Communities in New Hampshire and Throughout New England. Durham, NH, NH Seagrant, UNH Stormwater Center.

RIDEM, CRMC, et al. (2010). Rhode Island Stormwater Design and Installation Standards Manual, Rhode Island Department of Environmental Management and the Coastal Resources Management Council.

Roseen, R., N. DiGennaro, et al. (2010). Preliminary Findings on Examination of Thermal Impacts From Stormwater Best Management Practices. ASCE EWRI World Environmental and Water Resources Congress, Providence, Rhode Island, ASCE, University of New Hampshire Stormwater Center, Prepared for US EPA Region 1.

Watts, A. W., T. P. Ballestero, et al. (2010). "Polycyclic Aromatic Hydrocarbons in Stormwater Runoff from Sealcoated Pavements." Environ. Sci. Technol. 44(23): 8849–8854.

Roseen, R. M., Ballestero, T. P., Houle, J. J., Avellaneda, P., Briggs, J. F., Fowler, G., and Wildey, R. (2009). "Seasonal Performance Variations for Stormwater Management Systems in Cold Climate Conditions." Journal of Environmental Engineering-ASCE, 135(3), 128-137.

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Roseen, R. M., Ballestero, T. P., Houle, J. J., Avellaneda, P., Wildey, R., and Briggs, J. F. (2006). "Performance evaluations for a range of stormwater LID, conventional structural, and manufactured treatment strategies for parking lot runoff under varied mass loading conditions." Transportation Research Record: Journal of the Transportation Research Board (No. 1984), 135–147.

## REPORTS AND CONFERENCE PROCEEDINGS

- Roseen, R. and J. Sahl (2020 ). Attainability Analysis For A Great Bay Total Nitrogen Permit: Great Bay Nitrogen Control Plan Feasibility Study For The Towns Of Rochester, Portsmouth, Dover, Exeter, Durham, Kittery, Somersworth, Pease ITP, Berwick, North Berwick, Newmarket, South Berwick, Epping, Newington, Rollinsford, Newfields, and Milton. Boston, MA, Waterstone Engineering for the Conservation Law Foundation.
- Roseen, R., R. Graham, et al. (2019). Rollins Hill: Unique Conservation Development for Improved Permitting and Added Project Value. NH Rivers Council Annual Meeting 2019, Stratham, NH.
- Roseen, R. and J. Sahl (2019). Examination of Proposed Timber Harvesting Flood Impacts in the Mill Brook Valley for the Wanosha Integrated Resource Project by the White Mountain National Forest. Thornton, NH, BCM Environmental and Land Law, Deachman and Cowie, Mill Brook Valley Maintenance Corporation.
- Roseen, R. and J. Sahl (2019). TMDL Attainability Analyses for Phosphorus and Pathogens for the Charles River Watershed, Massachusetts - Expert Report. Boston, MA, Waterstone Engineering for the Conservation Law Foundation.
- Roseen, R. and J. Sahl (2018). Mill Pond Nutrient Control Measures -Final Report. Durham, NH, Department of Public Works, Waterstone Engineering, Weston and Sampson.
- Roseen, R. and J. Sahl (2018). TMDL Attainability Analyses for Phosphorus and Enterococci for Bailey's Brook and North Easton Pond, Rhode Island - Expert Report. Providence, Rhode Island, Waterstone Engineering for the Conservation Law Foundation.
- Roseen, R. and J. Sahl (2018). TMDL Attainability Analyses for Phosphorus and Fecal Coliform for Mashapaug Pond, Rhode Island - Expert Report. Providence, Rhode Island, Waterstone Engineering for the Conservation Law Foundation.
- Roseen, R., J. Sahl, et al. (2018). Phase 1 and Phase 2: Lincoln Street Subwatershed Nutrient Control Strategies Incentivizing Resiliency Through Implementation Plans in One of Coastal New Hampshire's Fastest Growing

Communities- Final Report. Exeter, NH, Department of Public Works, Waterstone Engineering, Rockingham Planning Commission.

- Roseen, R., Watts, A., Bourdeau, R., Stacey, P., Sinnott, C., Walker, T., Thompson, D., Roberts, E., and Miller, S. (2015). Water Integration for Squamscott Exeter (WISE), Preliminary Integrated Plan, Final Technical Report. Portsmouth, NH, Geosyntec Consultants, University of New Hampshire, Rockingham Planning Commission, Great Bay National Estuarine Research Reserve, Consensus Building Institute.
- Roseen, R. (2013). Design and Sizing of Innovative Bioretention-ISR System. Stratham, NH, Waterstone Engineering: 7.
- Roseen, R. and R. Stone (2013). Evaluation and Optimization of the Effectiveness of Stormwater Control Measures for Nitrogen Removal, Final Report. Boston, MA, University of New Hampshire Stormwater Center, Geosyntec Consultants, USEPA Region 1.
- Roseen, R. M. and R. Stone (2013). Bioretention Water Quality Treatment Performance Assessment--Technical Memorandum. Seattle, WA, Seattle Public Utilities, Seattle, WA: 84.
- Roseen, R. M., R. Stone, et al. (2013). Final Report on Evaluation And Optimization Of The Effectiveness Of Stormwater Control Measures For Nitrogen And Phosphorus Removal. Boston, MA, US EPA Region 1 TMDL Program, University of New Hampshire Stormwater Center.
- Wake, C. P., S. Miller, et al. (2013). Assessing the Risk of 100-year Freshwater Floods in the Lamprey River Watershed of New Hampshire Resulting from Changes in Climate and Land Use. Durham, NH, University of New Hampshire.
- Wake, C. P., F. Rubin, et al. (2013). Review of Land Development (Build-out) and Climate Scenarios. Durham, NH, University of New Hampshire.
- Houle, J., R. Roseen, et al. (2012). UNH Stormwater Center 2012 Biennial Report. Durham, NH, University of New Hampshire Stormwater Center Cooperative Institute for Coastal and Estuarine Environmental Technology.
- Roseen, R. M., J. J. Houle, et al. (2012). Report On A Cold Climate Permeable Interlocking Concrete Pavement Test Facility At The University Of New Hampshire Stormwater Center. Durham, University of New Hampshire Stormwater Center Geosyntec Consultants.
- Roseen, R., J. Houle, et al. (2011). Performance Evaluation Report Of The Stormtech Isolator Row® Treatment Unit. Durham, NH, University of New Hampshire Stormwater Center.
- Roseen, R., A. Watts, et al. (2011). Final Report on Examination of Thermal Impacts From Stormwater Best Management Practices. Durham, NH, University of New Hampshire Stormwater Center Prepared for US EPA Region 1.
- Roseen, R. M., T. V. Janeski, et al. (2011). Forging the Link: Linking the Economic Benefits of Low Impact Development and Community Decisions. Durham, New Hampshire, The UNH Stormwater Center, Environmental Research Group, The University of New Hampshire: 172.
- Stack L, Simpson MH, et al. (2010). The Oyster River culvert analysis project, Syntectic International, Antioch University New England, Climate Techniques, the University of New Hampshire Stormwater Center, the Piscataqua Region Estuaries Partnership, Prepared for the EPA Climate Ready Estuaries Program.
- UNHSC, R. M. Roseen, et al. (2010). Technology Assessment Protocol (TAP) For Innovative And Emerging Technologies. Rhode Island Stormwater Design and Installation Standards Manual, Rhode Island Department of Environmental Management..
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- Roseen, R. M., and Roseen, R. M., Ballestero, T. P., and Houle, J. J. (2009). "UNHSC Subsurface Gravel Wetland Design Specifications." University of New Hampshire Stormwater Center, Durham, NH.
- Roseen, R. M., Ballestero, T. P., Briggs, J. F., and Pochily, J. (2009, Revised). "UNHSC Design Specifications for Porous Asphalt Pavement and Infiltration Beds." University of New Hampshire Stormwater Center, Durham, NH.
- Watts, A. W., Roseen, R. M., Ballestero, T. P., Houle, J. J., and Gilbert, H. L. (2008) "Polycyclic Aromatic Hydrocarbons In Stormwater Runoff From Sealcoated Pavements." StormCon 08, Orlando, FL.

- Roseen, R. M., Ballestero, T. P., Fowler, G. D., Guo, Q., and Houle, J. (2009) "Sediment Monitoring Bias by Autosampler in Comparison with Whole Volume Sampling for Parking Lot Runoff." EWRI World Water Resources Congress, Kansas City, Mo.
- Roseen, R. M., Carrasco, E., Cheng, Y., Hunt, B., Johnston, C., Mailloux, J., Stein, W., and Williams, T. (2009)"Data Reporting Guidelines for Certification of Manufactured Stormwater BMPs: Part II." ASCE EWRI World Water Resources Congress, Kansas City, MO.
- Roseen, R. M., Houle, K. M., Briggs, J. F., Houle, J. J., and Ballestero, T. P. (2009)"Examinations of Pervious Concrete and Porous Asphalt Pavements Performance for Stormwater Management in Northern Climates." EWRI World Water Resources Congress, Kansas City, Mo.
- Roseen, R.M., Ballestero, T. P. (2008). "Porous Asphalt Pavements for Stormwater Management in Cold Climates." HMAT, National Asphalt Pavement Association.
- Roseen, R. M., Houle, J. J., and Ballestero, T. P. (2008). "Final Report On Field Verification Testing Of The Downstream Defender And Upflo Filter Treatment Units." The University of New Hampshire Stormwater Center.
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- UNHSC, (2005). University of New Hampshire Stormwater Center 2005 Data Report. Durham, NH, University of New Hampshire.
- Roseen, R., and Ballestero, T. P. (2003). "Characterization of Groundwater Discharge to Hampton Harbor." The New Hampshire Estuaries Project, and the Department of Civil Engineering, Environmental Research Group, University of New Hampshire, Durham, NH 03824.
- Roseen, R., and Stone, R. (2013). "Evaluation and Optimization of the Effectiveness of Stormwater Control Measures for Nitrogen Removal, Final Report." University of New Hampshire Stormwater Center, Geosyntec Consultants, USEPA Region 1, Boston, MA.
- Roseen, R. M., and Ballestero, T. P. (2008). "Porous Asphalt Pavements for Stormwater Management in Cold Climates." HMAT, National Asphalt Pavement Association.
- Roseen, R. M., Ballestero, T. P., and Brannaka, L. K. (2002). "Quantifying groundwater discharge using thermal imagery and conventional groundwater exploration techniques for estimating the nitrogen loading to a meso-scale inland estuary," PhD. Dissertation, University of New Hampshire., Durham, NH.

## PROFESSIONAL AFFILIATIONS

- River Management Advisory Council, Member on behalf of New Hampshire Rivers Council and the Appalachian Mountain Club, since 2010
- Massachusetts Stormwater Management Updates Advisory Committee, Member At Large, since 2019.
- New Hampshire Rivers Council, Board of Directors, since 2019.
- Management Committee, Piscataqua Region Estuary Partnership, since 2015
- Expert Panel, Long Creek Watershed Management District, since 2014.
- Wetlands Expert Panel, Chesapeake Bay Program, 2018-2019
- USEPA Headquarters, Urban Retrofit Innovation Roundtable, Next Generation LID/GI Technology and Financing Solutions, The National Experience, Selected participant, April 2012
- Urban Water Resources Research Council, Control Group Member, American Society of Civil Engineers, 2012-2017.
- Water Quality Standards Advisory Committee, Piscataqua Region Estuary Program, since 2010

- Technical Advisory Committee, Piscataqua Region Estuary Partnership, since 2009
- American Academy of Water Resources Engineers, Member since May, 2010
- ASCE EWRI-WERF Task Committee on Guidelines for Certification of Manufactured Stormwater BMPs-Subgroup Chair, Member since 2007
- Science and Technical Advisory Committee, American Rivers, Washington, DC, since 2011
- Board of External Reviewers, Washington State Stormwater Technology Assessment Program, 2010-2014
- Board of Directors, The Low Impact Development Center, Beltsville, Maryland, 2009-2015
- Board of Directors, The NH Coastal Protection Partnership, 2008-2012

## HONORS AND AWARDS

- Environmental Merit Award, as porous pavement design expert for Provincetown, MA, awarded by the US Environmental Protection Agency, Region 1, 2019.
- Environmental Merit Award, as project lead for the Water Integration for Squamscott Exeter (WISE) in coastal New Hampshire, awarded by the US Environmental Protection Agency, Region 1, 2016.
- Environmental Merit Award, as participating member in the New Hampshire Climate Adaption Workgroup, awarded by the US Environmental Protection Agency, Region 1, 2015
- In 2010, received the prestigious certification as a Diplomate by the American Academy of Water Resources Engineers (D. WRE), to certify competence in water resources specialization for 1) advanced stormwater management, and 2) design and execution of experiments, data analysis, and interpretation.
- 2010 Outstanding Civil Engineering Achievement Award, New Hampshire ASCE, Project Title: State Street Utilities Replacement and Street Revitalization, Portsmouth, New Hampshire, Design Team Member and Lead for Low Impact Development
- Environmental Merit Award, as participating member in the Long Creek Watershed Management Team, awarded US Environmental Protection Agency, Region 1, 2010
- Letter of Commendation from Commissioner Burack of the New Hampshire Department of Environmental Services for School Street School Stormwater Retrofit Project, September 2010

# Appendix B: Pollutant Load Analysis

## 1. Methods

The PLA method used for this study is distinctly different than the Bay Model, however each approach has merit, and combined can be very useful. In the scientific community the weight of evidence is the idea that multiple approaches and forms of inquiry will result in similar outcomes. The use of different forms of analysis to confirm similar findings is especially valuable in that different methods tend to have different errors and biases. In this instance, the two modeling approaches are 1) the Bay Model, a time-averaged mechanistic simulation watershed model (Phase 6), and 2) PLA Method, a simplistic empirical lumped parameter model. The Bay Model is a physically based calibrated simulation model that establishes loads and loading rates that vary by land use and location. For this reason, a single land use has a wide range of loading rates that represent the unique condition and location in the watershed. The PLA method used here is a simple land use development model that is a variation on the unified stormwater sizing criteria from the 2000 MD Stormwater Manual. The variation includes the modification of the runoff coefficient ($R_v$) to include the consideration of hydrologic soil group type in the calculation of runoff volume and pollutant loads.

### *1.1. Land Use Assessment*

The Gwynns Falls HUC 8-digit watershed is comprised of three 12 digit watersheds (Table 13).

***Table 13: HUC8 and HUC12 Watersheds for Gwynns Falls***

| | **HUC8** | **HUC12-1** | **HUC12-2** | **HUC12-3** |
|---|---|---|---|---|
| Name | Gwynns Falls | Gwynns Falls, Lower | Gwynns Falls, Middle | Gwynns Falls, Upper |
| Watershed Number | 02130905 | 021309051043 | 021309051044 | 021309051045 |
| Acres | 41,711 | 9,901 | 20,424 | 11,386 |
| Square Miles | 65.17 | 15.47 | 31.91 | 17.79 |

In order to perform the pollutant load analysis and load allocation amongst urban sources and streambank erosion, detailed land use data from a 2010 Maryland GIS dataset was generalized to fit into categories for which EMC values are available.

Table 14 lists the 2010 MDE detailed land uses and resultant categorization into more generalized land uses. Figure 1 shows the relative land use distribution within the watershed and Figure 2 maps the land use for the 65 $mi^2$ watershed and Table 13 quantifies the land uses. Table 14 details the land use category generalization that was used for the 2010 land use data set to determine pollutant loads.

*Table 14 - Land Use Category Generalization*

| 2010 LU_ID | 2010 LU_CLASS | Reduced LU_ID | Reduced LU_CLASS |
|---|---|---|---|
| 11 | Low-density residential | 8 | Low Density Residential |
| 12 | Medium-density residential | 9 | Medium Density Residential |
| 13 | High-density residential | 5 | High Density Residential |
| 14 | Commercial | 3 | Commercial |
| 15 | Industrial | 6 | Industrial |
| 16 | Institutional | 7 | Institutional |
| 17 | Extractive | 10 | Other Developed Lands |
| 18 | Open urban land | 10 | Other Developed Lands |
| 21 | Cropland | 1 | Agriculture |
| 22 | Pasture | 1 | Agriculture |
| 23 | Orchards/vineyards/horticulture | 1 | Agriculture |
| 24 | Feeding operations | 1 | Agriculture |
| 25 | Row and garden crops | 1 | Agriculture |
| 41 | Deciduous forest | 4 | Forest |
| 42 | Evergreen forest | 4 | Forest |
| 43 | Mixed forest | 4 | Forest |
| 44 | Brush | 4 | Forest |
| 50 | Water | 13 | Water |
| 60 | Wetlands | 14 | Wetlands |
| 70 | Barren land 71 Beaches | 2 | Barren Land |
| 72 | Bare exposed rock | 2 | Barren Land |
| 73 | Bare ground | 2 | Barren Land |
| 80 | Transportation | 11 | Transportation |
| 191 | Large lot subdivision (agriculture) | 12 | Very Low Density Residential |
| 192 | Large lot subdivision (forest) | 12 | Very Low Density Residential |
| 241 | Feeding operations | 1 | Agriculture |
| 242 | Agricultural buildings | 1 | Agriculture |

*Table 15 - Land Use / Land Cover in the Gwynns Falls Watershed*

| SR | LAND USE | AREA (MI$^2$) | % AREA |
|---|---|---|---|
| 1 | Agriculture | 3.8 | 2.3 |
| 2 | Barren Land | 0.1 | 0.1 |
| 3 | Commercial | 13.2 | 7.8 |
| 4 | Forest | 26.2 | 15.5 |
| 5 | High Density Residential | 34.1 | 20.2 |
| 6 | Industrial | 10.3 | 6.1 |
| 7 | Institutional | 12.1 | 7.2 |
| 8 | Low Density Residential | 7.9 | 4.7 |
| 9 | Medium Density Residential | 45.5 | 26.9 |
| 10 | Other Developed Lands | 9.0 | 5.4 |
| 11 | Transportation | 5.0 | 3.0 |
| 12 | Very Low Density Residential | 1.0 | 0.6 |
| 13 | Water | 0.4 | 0.2 |
| 14 | Wetlands | 0.1 | 0.1 |
| | Total | 168.8 | 100.0 |

## 1.2. *Hydrologic Soil Groups and Runoff Coefficients*

Hydrologic soil groups were mapped for the watershed using the NRCS SSURGO Soils database for Maryland[39]. Hydrologic soils groups are a necessary component of determining the runoff coefficient for a given land use. Table 16 tabulates the area of the hydrologic soil groups within the watershed. Figure 17 illustrates the hydrologic soil group for the watershed. Soil type largely determines the runoff characteristics of a given land cover. Land use determines largely the pollutant loading characteristics. Table 17 lists runoff coefficients ($R_v$) by soil type from McCuen (2004)[40]. These runoff coefficients factor in the land use, impervious area (implicitly), and soil type.

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[39] Maryland SSURGO Soils, Maryland GIS Data Catalog https://geodata.md.gov/imap/rest/services/Geoscientific/MD_SSURGOSoils/MapServer/0

[40] Adapted from Table 7.9 from McCuen, R. H. (2004). Hydrologic Analysis and Design. Upper Saddle River, New Jersey, 07458, Prentice Hall.

*Table 16: Area of Hydrologic Soil Groups*

| HYDROLOGIC SOIL GROUP | AREA | AREA2 |
|---|---|---|
| | $MI^2$ | ACRES |
| HSG A | 0.28 | 176 |
| HSG B | 19.31 | 12,356 |
| HSG B/D | 1.67 | 1,066 |
| HSG C | 12.68 | 8,118 |
| HSG C/D | 6.16 | 3,939 |
| HSG D | 22.98 | 14,710 |
| Water | 2.08 | 1,334 |
| Total | 65.16 | 41,699 |

*Table 17: Runoff Coefficients ($R_v$) by Hydrologic Soil Group (McCuen 2004)*

| LAND USE | HYDROLOGICAL SOIL GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | A/D | B/D | C/D |
| Agriculture | 0.08 | 0.11 | 0.14 | 0.18 | 0.13 | 0.15 | 0.16 |
| Barren Land | 0.05 | 0.08 | 0.12 | 0.15 | 0.10 | 0.12 | 0.14 |
| Commercial | 0.71 | 0.71 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 |
| Forest | 0.05 | 0.08 | 0.10 | 0.12 | 0.09 | 0.10 | 0.11 |
| High Density Residential | 0.22 | 0.24 | 0.27 | 0.30 | 0.26 | 0.27 | 0.29 |
| Industrial | 0.67 | 0.68 | 0.68 | 0.69 | 0.68 | 0.69 | 0.69 |
| Institutional | 0.67 | 0.68 | 0.68 | 0.69 | 0.68 | 0.69 | 0.69 |
| Low Density Residential | 0.16 | 0.19 | 0.22 | 0.26 | 0.21 | 0.23 | 0.24 |
| Medium Density Residential | 0.19 | 0.22 | 0.25 | 0.28 | 0.24 | 0.25 | 0.27 |
| Other Developed Lands | 0.22 | 0.24 | 0.27 | 0.30 | 0.26 | 0.27 | 0.29 |
| Transportation | 0.70 | 0.71 | 0.72 | 0.73 | 0.72 | 0.72 | 0.73 |
| Very Low Density Residential | 0.14 | 0.17 | 0.20 | 0.24 | 0.19 | 0.21 | 0.22 |
| Water | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Wetlands | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Note: Based on assumption that slopes are <=2%.

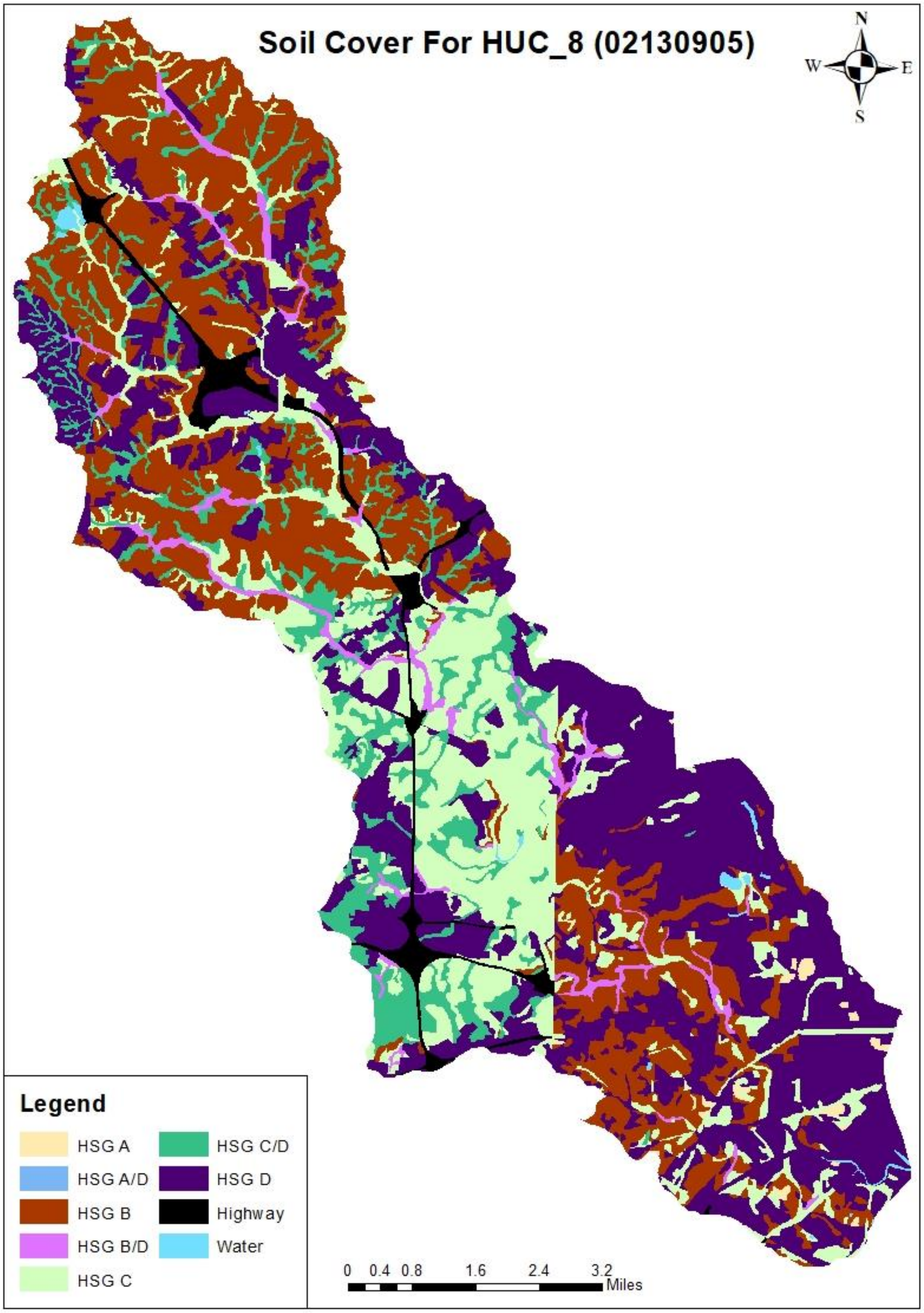


*Figure 17 – Soil Cover for the Gwynns Falls Watershed*

## *1.3. Pollutant Load Analysis*

The volume and quality of stormwater runoff generated from each major land use within the study watershed was characterized through the use of a PLA method that is a variation on the unified stormwater sizing criteria from the 2000 MD Stormwater Manual as shown in Equation 1 for calculation of the water quality volume. The PLA method, shown in Equation 2, uses a runoff coefficient ($R_v$)[40] based on hydrologic soil group and land use in the calculation of runoff volume, and the event mean concentration (EMC) of a specific land use to determine pollutant loads. This enables the development of a simple land development model.

***Equation 1: Water Quality Volume*** $\boldsymbol{WQV = P\ x\ R_v\ x\ A}$

P = Average annual runoff (inches)

$R_v$ = Runoff coefficient (unitless)

A = Area

***Equation 2: Pollutant Load*** $\boldsymbol{L_{LU} = P\ x\ R_{LU}\ x\ A_{LU}\ x\ C_{LU}}$

$L_{LU}$= Land-use specific pollutant load (lbs.)

P = Average annual runoff (41.18 inches)

$R_{LU}$ = Land-use specific runoff coefficient (unitless)

$A_{LU}$ = Land-use specific area

$C_{LU}$ = Land-use pollutant concentration or EMC

The average annual rainfall (P) of 41.18 inches was used for Baltimore. Rainfall was determined by data calculated from 1948 to 2008 for the City of Baltimore[41, 42]. Land-use specific EMCs ($C_{LU}$) for Total Suspended Solids (TSS), Total Phosphorous (TP), and Total Nitrogen (TN) were used to determine the pollutant load source contribution for respective areas. Regional EMCs were calculated by Struck et al (2015) from a subset of the National Stormwater Quality Database (NSQD, 2012) and presented in Table 18. Lastly, pollutant load export rates (PLER)s for TSS, TP, and TN were determined for the subset of 14 land uses excluding agriculture, forest, water, and wetlands. PLERs were developed by combining the EMCs with the computed runoff volume for each specific land use and soil type combination.

Table 19 through Table 21 list the PLER rates in pounds of pollutant per acre per year. Lastly, pollutants loads were calculated and summed by land use. Summary pollutant loads by land use are presented in

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[41] Baltimore City, NCDC Station CoopID: 180470, National Climatic Data Center (NCDC)

[42] Struck, S., K. Havens, et al. (2015). Urban Stormwater Runoff Pollutant Loading Analyses for Case Study Watersheds. Lafayette, CO, Geosyntec Consultants, Inc., for American Rivers.

Table 22 for TSS, TP, and TN.

*Table 18: Regional Land Use Specific EMCs for Baltimore, Maryland (NSQD, 2012)*

| LAND USE | TSS (mg/L) | TP (mg/L) | TN (mg/L) |
|---|---|---|---|
| COMMERCIAL | 72 | 0.2 | 1.65 |
| INDUSTRIAL | 87 | 0.28 | 3.33 |
| INDUSTRIAL MIX | 101 | 0.33 | 3.28 |
| INSTITUTIONAL | 132 | 0.24 | 2.02 |
| TRANSPORTATION | 133 | 0.32 | 4.21 |
| OPEN SPACES | 78 | 0.34 | 1.16 |
| RESIDENTIAL | 89 | 0.43 | 2.44 |

*Table 19: Total Suspended Solids Pollutant Loading Export Rates (TSS/lbs./ac/yr)*

| MARYLAND LAND USE CLASS | HYDROLOGIC SOIL GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | A/D | B/D | C/D |
| Agriculture | | | | | | | |
| Barren Land | 36.40 | 58.23 | 87.35 | 109.19 | 72.79 | 83.71 | 98.27 |
| Commercial | 477.07 | 477.07 | 483.78 | 483.78 | 480.42 | 480.42 | 483.78 |
| Forest | | | | | | | |
| High Density Residential | 182.73 | 199.34 | 224.25 | 249.17 | 215.95 | 224.25 | 236.71 |
| Industrial | 543.98 | 552.10 | 552.10 | 560.22 | 552.10 | 556.16 | 556.16 |
| Institutional | 825.35 | 837.66 | 837.66 | 849.98 | 837.66 | 843.82 | 843.82 |
| Low Density Residential | 132.89 | 157.81 | 182.73 | 215.95 | 174.42 | 186.88 | 199.34 |
| Medium Density Residential | 157.81 | 182.73 | 207.64 | 232.56 | 195.18 | 207.64 | 220.10 |
| Other Developed Lands | 182.73 | 199.34 | 224.25 | 249.17 | 215.95 | 224.25 | 236.71 |
| Transportation | 868.83 | 881.25 | 893.66 | 906.07 | 887.45 | 893.66 | 899.86 |
| Very Low Density Residential | 116.28 | 141.20 | 166.11 | 199.34 | 157.81 | 170.27 | 182.73 |
| Water | | | | | | | |
| Wetlands | | | | | | | |

*Table 20: Total Phosphorus Pollutant Loading Export Rates (TP/lbs./ac/yr)*

| MARYLAND LAND USE CLASS | HYDROLOGIC SOIL GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | A/D | B/D | C/D |
| Agriculture | | | | | | | |
| Barren Land | 0.16 | 0.25 | 0.38 | 0.48 | 0.32 | 0.36 | 0.43 |
| Commercial | 1.33 | 1.33 | 1.34 | 1.34 | 1.33 | 1.33 | 1.34 |
| Forest | | | | | | | |
| High Density Residential | 0.88 | 0.96 | 1.08 | 1.20 | 1.04 | 1.08 | 1.14 |
| Industrial | 1.75 | 1.78 | 1.78 | 1.80 | 1.78 | 1.79 | 1.79 |
| Institutional | 1.50 | 1.52 | 1.52 | 1.55 | 1.52 | 1.53 | 1.53 |
| Low Density Residential | 0.64 | 0.76 | 0.88 | 1.04 | 0.84 | 0.90 | 0.96 |
| Medium Density Residential | 0.76 | 0.88 | 1.00 | 1.12 | 0.94 | 1.00 | 1.06 |
| Other Developed Lands | 0.88 | 0.96 | 1.08 | 1.20 | 1.04 | 1.08 | 1.14 |
| Transportation | 2.09 | 2.12 | 2.15 | 2.18 | 2.14 | 2.15 | 2.17 |
| Very Low Density Residential | 0.56 | 0.68 | 0.80 | 0.96 | 0.76 | 0.82 | 0.88 |
| Water | | | | | | | |
| Wetlands | | | | | | | |

*Table 21: Total Nitrogen Pollutant Loading Export Rates (TN/lbs./ac/yr)*

| MARYLAND LAND USE CLASS | HYDROLOGIC SOIL GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | A/D | B/D | C/D |
| Agriculture | | | | | | | |
| Barren Land | 0.54 | 0.87 | 1.30 | 1.62 | 1.08 | 1.24 | 1.46 |
| Commercial | 10.93 | 10.93 | 11.09 | 11.09 | 11.01 | 11.01 | 11.09 |
| Forest | | | | | | | |
| High Density Residential | 5.01 | 5.46 | 6.15 | 6.83 | 5.92 | 6.15 | 6.49 |
| Industrial | 20.82 | 21.13 | 21.13 | 21.44 | 21.13 | 21.29 | 21.29 |
| Institutional | 12.63 | 12.82 | 12.82 | 13.01 | 12.82 | 12.91 | 12.91 |
| Low Density Residential | 3.64 | 4.33 | 5.01 | 5.92 | 4.78 | 5.12 | 5.46 |
| Medium Density Residential | 4.33 | 5.01 | 5.69 | 6.38 | 5.35 | 5.69 | 6.03 |
| Other Developed Lands | 5.01 | 5.46 | 6.15 | 6.83 | 5.92 | 6.15 | 6.49 |
| Transportation | 27.50 | 27.90 | 28.29 | 28.68 | 28.09 | 28.29 | 28.48 |
| Very Low Density Residential | 3.19 | 3.87 | 4.55 | 5.46 | 4.33 | 4.67 | 5.01 |
| Water | | | | | | | |
| Wetlands | | | | | | | |

*Table 22: Pollutant Loads for Urban Sources for Total Suspended Solids, Phosphorus, and Nitrogen Excluding Contribution from Streambank Erosion*

| LAND USE | AREA (MI$^2$) | % AREA | TOTAL SUSPENDED SOLID LOAD (TONS/YR) | TOTAL PHOSPHORUS LOAD (TONS/YR) | TOTAL NITROGEN LOAD (TONS/YR) |
|---|---|---|---|---|---|
| Agriculture | 1.5 | 2.3 | | | |
| Barren Land | 0.0 | 0.1 | 0.75 | 0.00 | 0.01 |
| Commercial | 5.1 | 7.8 | 767.61 | 2.13 | 17.59 |
| Forest | 10.1 | 15.5 | | | |
| High Density Residential | 13.2 | 20.2 | 980.45 | 4.74 | 26.88 |
| Industrial | 4.0 | 6.1 | 702.96 | 2.26 | 26.91 |
| Institutional | 4.7 | 7.2 | 1,249.47 | 2.27 | 19.12 |
| Low Density Residential | 3.0 | 4.7 | 164.14 | 0.79 | 4.50 |
| Medium Density Residential | 17.6 | 26.9 | 1,152.10 | 5.57 | 31.59 |
| Other Developed Lands | 3.5 | 5.4 | 205.91 | 0.99 | 5.65 |
| Transportation | 1.9 | 3.0 | 297.89 | 0.72 | 9.43 |
| Very Low Density Residential | 0.4 | 0.6 | 19.40 | 0.09 | 0.53 |
| Water | 0.2 | 0.2 | | | |
| Wetlands | 0.1 | 0.1 | | | |
| Total | 65.2 | 100.0 | 5,540.7 | 19.6 | 142.2 |

Note: Agriculture, Forest, Wetlands, and Open Water land uses were not analyzed.

## 2. Stream Erosion and Impervious Area

In the 2015 sediment TMDL, MDE distinguished between sediment sources from urban development and stream erosion. "*Many studies have documented the relationship between high amounts of connected impervious surfaces, increases in storm flows, and stream degradation in the form of streambank erosion (Schueler 1994; Arnold and Gibbons 1996)*" (MDE 2015). Based on prior studies elsewhere MDE developed a relationship between impervious area and sediment load due to streambank erosion. This was calculated as the difference between the target edge of forest sediment loads and loads within urbanized stream segments. This relationship enables the estimation of the percent of stream sediment load that could be attributed to the streambank erosion and urban development sources.

Figure 6 is a re-creation of the MDE erosional sediment and impervious area relationship for the TMDL. For Gwynns Falls, with an impervious area of 33%, MDE determined that approximately 77% of the sediment load was due to streambank erosion. The Phase 6 Bay Model further develops this relationship between impervious area and edge of stream sediment loading rates[3] as is demonstrated in Figure 7.

Phase 6 Model documentation lists streambank erosion flux rates for TSS, TP, and TN as shown in Table 4. It is noted that the Phase 6 sediment target represents the edge of stream sediment load from urban development and does not include load sourced by streambank erosion. The pollutant load due to streambank erosion is determined by the stream length as noted in the National Hydrography Dataset (NHD).

For this study, streambank erosional pollutant loads were calculated, as detailed above from the Phase 6 documentation, from the TSS, TN, and TP erosional flux rates and total watershed stream length. Watershed stream length was then measured using the NHD. The pollutant sources (streambank erosional pollutant loads, urban loads calculated by PLA) were then examined in the context of observed watershed loads reported by the USGS from 1998-2016[43]. Table 5 lists the calculated loads by source and relative contribution to total load. This analysis demonstrates the significant contribution of streambank erosion to sediment and phosphorus loading (75% and 71% respectively) and to a lesser degree nitrogen (11%) and the importance of runoff reduction in managing total loads.

[43] Majcher, E. H., E. L. Woytowitz, et al. (2018). Factors affecting long-term trends in surface-water quality in the Gwynns Falls watershed, Baltimore City and County, Maryland, 1998-2016, U.S. Geological Survey**:** 27.

*Table 23: Streambank Erosion Flux Rates and Loads for TSS, TN, and TP for the Gwynns Falls Watershed*

| CONSTITUENT | FLUX RATE[44] (lbs./ft/yr) | CALCULATED EROSIONAL SEDIMENT LOAD (tons/yr) |
|---|---|---|
| Sediment | 62.69 | 11,298.8 |
| Nitrogen | 0.093 | 16.8 |
| Phosphorus | 0.31 | 55.9 |

Note: Loads calculated based on NHD total watershed stream length of 360,466 ft.

*Table 24: Calculated and Observed Pollutant Loads by Source for TSS, TN, and TP in the Gwynns Falls Watershed*

| CONSTITUENT | STREAMBANK LOAD (tons/yr) | URBAN LOAD BY PLA (tons/yr) | % STREAMBANK LOAD | TOTAL LOAD (tons/yr) | OBSERVED LOAD[43] (tons/yr) |
|---|---|---|---|---|---|
| Sediment | 16,977.3 | 5,540.7 | 75% | 22,518.0 | N/A |
| Nitrogen | 16.8 | 142.2 | 11% | 159.0 | 119.9 |
| Phosphorus | 55.9 | 19.6 | 74% | 75.4 | 3.9 |

[44] Table 9-3 from Section 9.3.1: Streambank Erosion Due to Impervious Cover, Stream-to-River, Chesapeake Bay Program Phase 6 Watershed Model, Final Model Documentation for the Midpoint Assessment – 10/1/2018

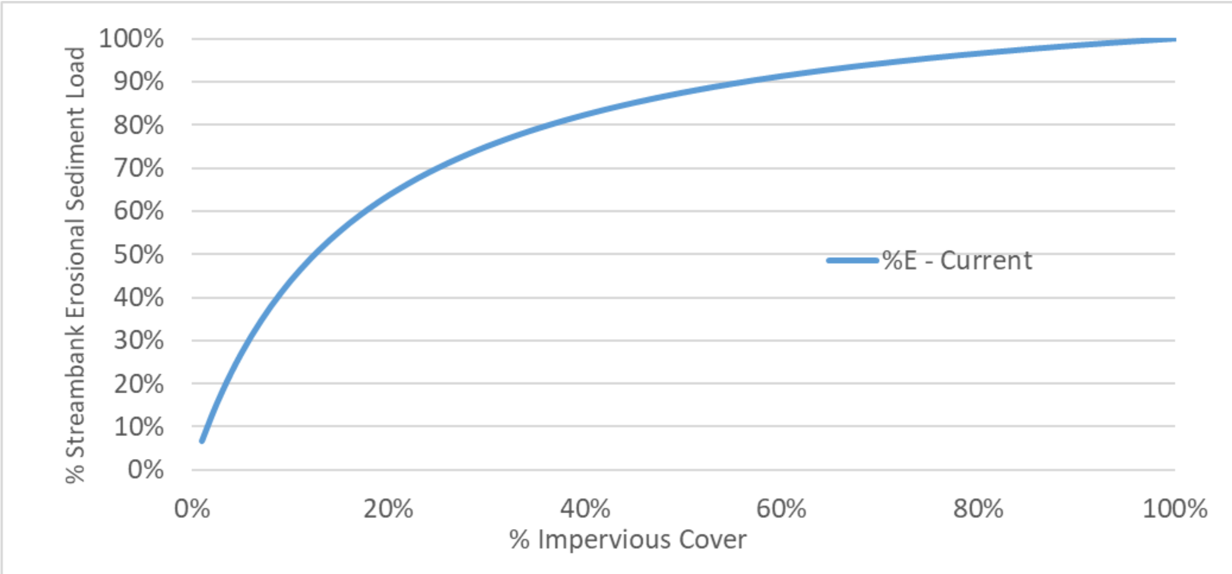


***Figure 18: Streambank Erosional Sediment % Contribution Vs. Impervious Area (Adapted from MDE 2015)***

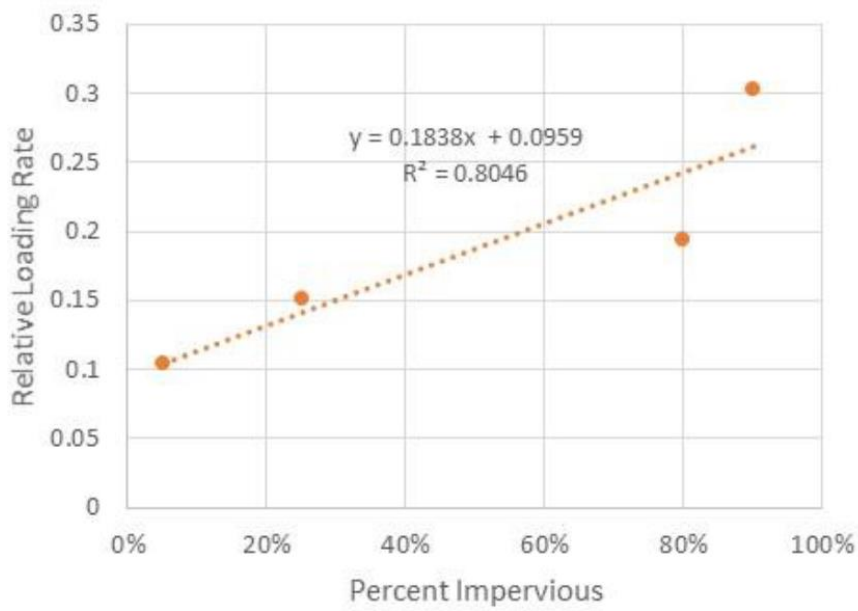


***Figure 19: Relation Between Percent Impervious Area and Edge-Of-Stream Sediment Loading Rate[45]***

[45] Figure 9-5 from Section 9.3.2: Streambank Erosion Due to Impervious Cover, Stream-to-River, Chesapeake Bay Program Phase 6 Watershed Model, Final Model Documentation for the Midpoint Assessment – 10/1/2018

# Appendix C: Compaction Test Report Examples

S.W.COLE ENGINEERING, INC.

# Report of Field Density

## ASTM D6938

Project: **STRATHAM NH - ROLLINS HILL DEVELOPMENT, KIRKWALL DRIVE - CONSTRUCTION MATERIALS TESTING SERVICES**

Project Number: **15-0682.1**

Client: **WATERSTONE ENGINEERING, PLLC**

## Field Density Test Results

| Test # | Test Date | Tech | Test Location | Elev Feet | Test Depth | Lab ID | Dry Density | Moisture Content Percent | Compaction Percent | Required Compaction |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10/3/2018 | RGM | STA: 9+20' ; CL (4.1) | 98.2 | 12 | 17621S | 131.4 | 5.8 | 99.8 | 95 |
| 2 | 10/3/2018 | RGM | STA: 10+20' ; CL (3.1) | 98.2 | 12 | 17621S | 128.3 | 9.2 | 97.4 | 95 |
| 3 | 10/3/2018 | RGM | STA: 11+20' ; CL (2.1) | 98.2 | 12 | 17621S | 128.9 | 6.9 | 97.9 | 95 |
| 4 | 10/3/2018 | RGM | STA: 12+20' ; CL (1.1) | 98.2 | 12 | 17621S | 127.7 | 9.0 | 97.0 | 95 |
| 5 | 10/3/2018 | RGM | STA: 12+20' ; 6' LT (1.2) | 98.2 | 12 | 17621S | 129.8 | 9.3 | 98.6 | 95 |
| 6 | 10/3/2018 | RGM | STA: 11+20' ; 6' RT (2.2) | 98.2 | 12 | 17621S | 122.7 | 7.0 | 93.2 | 95 |
| 7 | 10/3/2018 | RGM | STA: 10+20' ; 6' LT (3.2) | 98.2 | 12 | 17621S | 127.8 | 9.0 | 97.0 | 95 |
| 8 | 10/3/2018 | RGM | STA: 9+20' ; 6' RT (4.2) | 98.2 | 12 | 17621S | 131.9 | 6.9 | 100.2 | 95 |

## Laboratory Compaction Test Reference

| Lab ID | Date Received | Material Source | Material Type | Method | Max Dry Density PCF | Optimum Moisture Content (%) | Comments |
|---|---|---|---|---|---|---|---|
| 17621S | 10/4/2018 | Native Soil, In-Situ | 3" Gravel | ASTM D-1557 Modified C | 131.7 | 7.0 | |

**Elevation Notes:**

TOP OF FINISHED ASPHALT = 100.0'

**Comments:**

LT / RT / CL - LEFT / RIGHT / CENTER LINE.
INFORMATION IN PARENTHASES INDICATES REFERENCE TESTS FOR ROBERT ROSEEN

Reviewed By

**Land and Materials Administration**

Solid Waste Program – Solid Waste Operations

Maryland
Department of
the Environment

# *Memorandum*

TO: Andrew Grenzer

FROM: Brenda Keister

DATE: August 28, 2019

RE: Quarantine Road Municipal LF 2019-252

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This memo is in regards to the 1st Semi-annual 2019 Monitoring Report for the Quarantine Road Landfill, Baltimore City. The report was submitted by SCS Engineers (SCS) and was received by MDE on July 3, 2019. The City purchased the former Millennium Industrial Landfill in 2006 and plans to expand onto that portion of the site. Forty-two (42) wells were monitored along both the active and Millennium portions of the site. Wells with 'C', 'M', and 'W' designations monitor the active Quarantine Road LF and 'Q' wells monitor the Millennium site. Well M-8 was not sampled this event due to insufficient water column.

In April 2016, KCI Technologies (KCI) made a determination that M-4 had been impacted by leachate and submitted a remedial action plan that the City never implemented. Over the next two sampling events, KCI also noted MCL exceedances and increasing trends in M-3. In late 2017, the City transitioned to SCS as the consultant to conduct groundwater analyses. MDE met with City staff and SCS on December 20, 2017. The City was required to enter assessment monitoring at wells that monitor the active landfill in spring 2018 as it did not meet the 90-day deadline for an alternate source demonstration (ASD) at M-4.

It was agreed at the December 20, 2017 meeting that the City could have 90 days to make another ASD that neither M-4 nor M-3 were affected by the active landfill. SCS submitted that ASD on April 24, 2018, and MDE did not accept the results based on the concern that two of the three wells used as background (C-5, W-3) showed evidence of impact, if not by Quarantine Road Landfill, then by the Millennium Landfill. The City had been instructed at the December 20th meeting that they will need to implement a remedy if an ASD could not be made.

Subsequently, SCS submitted a nature and extent investigation (NEI) work plan that MDE approved on December 21, 2018. In March through May 2019, ten (10) new or replacement wells were installed and surveyed. Wells along the Millennium boundary are to be fitted with pressure transducers to enhance the City's understanding of groundwater flow conditions. SCS will evaluate water levels to determine the most suitable background well(s) to use at the site for both the active landfill and the wells along the Millennium property. The wells along the Millennium boundary would become subject to 40 CFR 258 upon issuance of a refuse disposal permit.

The City has been informed that it is responsible for the current exceedances at the Millennium property line, and that any nature & extent study or corrective measures for wells monitoring the expansion portion of the site are independent from the permit application for the Quarantine Road II landfill.

The Spring 2019 report shows VOC detections in numerous wells monitoring the site. The detections were predominantly in the 'Q' wells surrounding the Millennium boundary. MCL exceedances were detected for benzene in Q-1 (53.9 ug/L), Q-4 (6.14 ug/L), Q-8 (40.2 ug/L), Q-8D (29.4 ug/L), and Q-10 (11.9 ug/L). Q-8D also detected methylene chloride over the MCL at 11.1 ug/L. The MCL for both parameters is 5 ug/L. These detections are consistent with historical data.

The following parameters were in exceedance or equal to the respective MCL:
Antimony (6 ug/L): C-3
Arsenic (10 ug/L): M-4B, Q-5, Q-7, Q-8A, Q-8D, Q-12
Nitrate (10 mg/L): C-10, M-2, W-10
Beryllium (4 ug/L): M-5, Q-4, Q-5, Q-7, Q-8D, Q-9S
Cadmium (5 ug/L): M-4, W-3
Chromium (100 ug/L): Q-8D
Lead (15 ug/L): C-3, Q-4
Mercury (2 ug/L): Q-5
Selenium (50 ug/L): Q-5, Q-7, Q-8D

As required under assessment monitoring, SCS also implemented groundwater protection standards (GWPS) for parameters that do not have a MCL. In addition to the MCL exceedances mentioned, cobalt, vanadium, and 1,1-Dichloroethane were over the respective GWPS in March. SCS performed confirmation sampling in May 2019. Selenium in Q-7 and cadmium in W-3 were non-detect in May. Cadmium in M-4 was detected at 5 ug/L. General chemistry parameters such as ammonia, calcium, hardness, iron, magnesium, manganese, sodium, specific conductance, total dissolved solids, sulfates, and chlorides were found at elevated levels consistent with historical data.

The retained Appendix II parameters for assessment monitoring include: acenaphthene, diethyl phthalate, Bis(2-chloroethyl)ether, Bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, Di-n-butyl phthalate, isophorone, m-p cresol, phenol, herbicide 2,4-D, naphthalene, cyanide, tin, and sulfide. None of these parameters were detected this event after the previous two events returned numerous detections, though herbicide 2,4-D was inadvertently omitted this event.

In the 1st 2018 semi-annual report and April 2018 ASD, SCS had presented inter-well statistical analysis using wells C-4, C-5, and W-3. After review of both documents, MDE did not believe these wells to be representative of background conditions but agreed to allow the City to install additional wells, review groundwater elevations and water quality data, and make a final determination on the most suitable well to use for background. The results including the proposed background wells and Upper Prediction Limits

(UPLs) to be used will be presented to MDE after one year of data collection. Until that time, the statistical protocol consists of outlier and trend analyses. Per 40 CFR 258, background should represent the quality of groundwater that has not been affected by leakage from a waste management unit. The City will continue with assessment monitoring protocols at any potential background well and new/replacement well that monitors the site's active landfill boundary. Upon MDE concurrence on background well(s) and UPLs, the City will have one more opportunity to demonstrate that any well showing a statistically significant increase (SSI) over background at the property line is not the result of the landfill or they will be required to proceed with the requirements of 40 CFR 258.55/56.

Gas sampling was performed on February 1, 2019 at 39 sampling locations. The 2$^{nd}$ quarterly event was conducted in May, and those results will be included in the Fall semi-annual report. No monitoring point exceeded the LEL in February.

The City should continue with routine monitoring and reporting as well as the actions within the NEI. Questions concerning this matter may be directed to me at X3331.

bk

# ASSESSMENT OF

# MARYLAND'S GENERAL PERMIT FOR DISCHARGES FROM STORMWATER ASSOCIATED WITH INDUSTRIAL ACTIVITIES

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March 24, 2021

## INTRODUCTION

I was requested by the Chesapeake Accountability Project (CAP) to review Maryland's draft General Permit for Discharges from Stormwater Associated with Industrial Activities, Discharge Permit No. 20-SW (the MD Permit or 20-SW). I was asked to prepare a written report providing my assessment of the adequacy of the MD Permit with respect to protecting and recovering the Chesapeake Bay ecosystem, which I present herein.

In assessing the MD Permit and its Fact Sheet, I applied the experience of my 43 years of work in the stormwater management field and 11 additional years of engineering practice. During this period, I have performed research, taught, and offered consulting services on all aspects of the subject, including investigating the sources of pollutants and other causes of aquatic ecological damage, impacts on organisms in waters receiving urban stormwater drainage, and the full range of methods of avoiding or reducing these impacts. I am very familiar with the content and implementation of the U.S. Environmental Protection Agency (EPA) Multi-Sector General Permit (MSGP) and industrial stormwater general permits in Washington state and California. I have given written and verbal testimony on the Washington permit. I am also knowledgeable regarding the report issued by the National Academies' Committee on Improving the Next-Generation EPA Multi-Sector General Permit for Industrial Stormwater Discharges (the National Academies report).[1] Attachment A to this report presents a more complete description of my background and experience, and Attachment B contains my full *curriculum vitae*.

This report comments on the following parts of the MD Permit and sections of the Fact Sheet:

Permit Part I.F: No Exposure Certification;
Permit Part III.A: Chesapeake Bay Restoration Requirements;
Permit Part III.B: Control Measures;
Permit Part III.B.2.b: Discharges to Water Quality Impaired Waters;
Permit Part IV: Corrective Action;
Permit Part IV.B.5: AIM Exceptions;
Permit Part V.B.2: Suspending Monitoring;
Permit Part V.B.3.a.i) and ii): Facilities Required to Monitor Discharges to Impaired Waters;
Permit Part V.C: Monitoring Procedures;
Fact Sheet section 2.1: Review of 12-SW Benchmark Monitoring Data;
Fact Sheet section 2.2.2: The National Research Council (NRC) National Academies of Sciences; and
Fact Sheet section 2.3.2.1.

In each case I briefly summarize the MD Permit or Fact Sheet provision, provide my assessment and opinion of it from the standpoint of the charge I was given by CAP, and recommend improvements. I also cover one additional topic not present in the draft Permit and recommend its inclusion: industries handling plastic materials.

[1] Committee on Improving the Next-Generation EPA Multi-Sector General Permit for Industrial Stormwater Discharges. 2019. Improving the EPA Multi-Sector General Permit for Industrial Stormwater Discharges. The National Academies Press, Washington, D.C.

## PERMIT PART I.F: NO EXPOSURE CERTIFICATION

### Permit Term Summary

To qualify for this certification, the industry must verify that there is no potential for the stormwater discharged from the facility to waters of the state to be exposed to pollutants. The verification must be certified by an approved professional.

### Assessment

The Permit provides no guidance to assist the applicant in preparing the verification. Therefore, the expectations of the Maryland Department of the Environment (MDE or the Department) are not clearly delineated.

### Recommended Improvement

The provision should be upgraded to specify the conditions for a comprehensive verification. It should designate the industrial materials, activities, and equipment to be considered in evaluating exposure. Examples of these factors follow, without limitation in each case. Subject materials include raw materials, intermediate products, byproducts, final products, and wastes. Industrial activities to be assessed would be storage, loading, unloading, transport, and conveyance of these materials. Equipment to be considered is industrial machinery, fork lifts and other vehicles used within the plant, and trucks used to bring materials into and away from the site. The location of each of these components of the industrial operation should be considered, in terms of their exposure outdoors or isolated from contact with rainfall or runoff.

Following is a list of questions to determine qualification for a No Exposure Certification, derived from the Washington state Industrial Stormwater General Permit effective January 1, 2020 (the WA Permit),[2] part S1.F:

- Are industrial machinery or equipment used, stored, or cleaned in an area that is exposed to stormwater; or are there areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to stormwater?
- Are there materials or residuals on the ground or in stormwater inlets from spills or leaks?
- Are materials or products from past industrial activity exposed to precipitation or runoff?
- Is material handling equipment used or stored where exposed to precipitation or runoff (except adequately maintained vehicles)?

[2] https://fortress.wa.gov/ecy/ezshare/wq/permits/ISGP_PermitFINAL.pdf (last accessed March 12, 2021).

- Are materials or products exposed to precipitation or runoff during loading and unloading or transporting activities?
- Are materials or products stored outdoors (except final products intended for outside use) where exposure to stormwater does not result in the discharge of pollutants)?
- Are materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers?
- Are materials or products handled or stored on roads or railways owned or maintained by the discharger?
- Is waste material exposed to precipitation (except waste in covered, non-leaking containers)?
- Does the application or disposal of process wastewater occur (unless otherwise permitted)?
- Are there particulate matter deposits or other visible residuals from roof stacks or vents not otherwise regulated (*i.e.*, under an air quality control permit) and evident in the stormwater outflow?

## PERMIT PART III.A: CHESAPEAKE BAY RESTORATION REQUIREMENTS

### Permit Term Summary

An industrial facility 5 acres or greater in size must select, design, install and implement restoration of 20 percent of the untreated impervious surface area or apply equivalent control measures for the reduction of nutrients. The controls are to be selected from the Maryland Stormwater Design Manual (the Design Manual), the document Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated (the Accounting Guidance), or other proprietary practices or equivalent measures.

### Assessment

I have extensively evaluated the concept of impervious surface restoration and the Accounting Guidance in my comments on the recently issued draft Maryland Municipal Separate Storm Sewer System (MS4) Discharge Permits.[3] I do not repeat those comments here but incorporate them by reference as applicable to industries as well as to other elements of the municipal environment.

[3] Horner, R.R. 2021. Assessment of Maryland's Draft Municipal Separate Storm Sewer System Discharge Permits and Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated. Prepared for Chesapeake Legal Alliance.

**Recommended Improvement**

I incorporated recommendations for improvement of impervious surface restoration and the Accounting Guidance within my MS4 permit comments. Again, I include them here by reference without repetition.

## PERMIT PART III.B: CONTROL MEASURES

**Permit Term Summary**

20-SW lists control measures under the topic Non-Numeric Technology-Based Effluent Limits. The controls are presented in 11 categories (Parts III.B.1.b.i-xi). Stormwater control practices can be classified broadly as operational source controls,[4] structural source controls,[5] and treatment controls.[6] The MD Permit's list is comprehensive in the area of source controls of the two types but does not include treatment controls, at least not in any straightforward way. The only passages that suggest that treatment-type practices could fit into an industry's stormwater management program are in Part III.B.1.a, which mentions, "infiltrating runoff onsite (including bioretention cells, green roofs, and pervious pavement …)," "… open vegetated swales and natural depressions …," and "… swirl separators and sand filters …" However, this account is not comprehensive and gives no guidance or directions regarding where, when, or how these controls should be considered and implemented.

**Assessment**

The MD Permit exceedingly shortchanges treatment controls. Fact Sheet section 5.3.1 reveals the philosophy behind this position, citing an EPA belief that, for many facilities, minimization of pollutants in stormwater discharges can be achieved without using highly engineered, complex treatment systems. Accordingly, Part III.B.1 emphasizes "low-tech" controls, such as minimizing exposure to stormwater, regular cleaning of outdoor areas, maintenance, stormwater diversion, runoff minimization, planning, and training.

These and other types of source controls should always be part of any industrial stormwater management program, and indeed should be the first options considered. However, even if they are sufficient for many facilities, my experience has firmly convinced me that they are not adequate for all. Some industries simply cannot fulfill all stormwater permit obligations with these techniques alone and can only do so by applying effective treatment controls. A variety of industrial types are in this category, including in my direct experience: metal recycling, auto dismantling, solid waste transfer, landfills, wood products processing and shipping, petroleum products shipping, glass container manufacture, industrial and commercial glass and lighting products manufacture, freight trucking terminals, aircraft finishing and delivery, and marine construction equipment yard. Through contact with suppliers of treatment systems, I have

[4] Scheduling of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the pollution discharges.
[5] Minimizing the exposure of manufacturing, processing, and material storage areas (including loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to precipitation and runoff.
[6] Extracting pollutants that have already entered runoff.

learned of additional industrial categories that needed to go to effective treatment controls, including: asphalt batch processing, bulk fueling, concrete recycling, galvanizing, heavy equipment rental, containerized marine shipping, locomotive repair, boatyard, marine vessel manufacture, marine vessel maintenance, microchip processing, roofing material manufacture, food processing, and sand and gravel extraction.

**Recommended Improvement**

Increased Emphasis on Treatment Controls

Maryland should change its philosophy as expressed in the Fact Sheet, embrace treatment for those situations where it is necessary for environmental protection and Permit compliance, and provide full directives for assessing and selecting the optimal practice and then implementing it. Other state permits can provide models for this addition. The WA Permit states that, "The Permittee shall include each of the following mandatory [emphasis added] BMPs [best management practices] in the SWPPP [stormwater pollution prevention plan] and implement the BMPs."[7] It goes on to organize the BMP list according to:

- Operational source control BMPs;
- Structural source control BMPs;
- Treatment BMPs;
- Stormwater peak runoff rate and volume control BMPs; and
- Erosion and sediment control BMPs.

The California General Permit for Storm Water Discharges Associated with Industrial Activities (the CA Permit) effective July 1, 2015[8] requires dischargers to implement minimum BMPs and applicable advanced BMPs, as follows:

Minimum BMPs—

- Good housekeeping;
- Preventive maintenance;
- Material handling and waste management;
- Erosion and sediment controls;
- Employee training program; and
- Quality assurance and record keeping.

Advanced BMPs—

- Exposure minimization BMPs;
- Stormwater containment and discharge reduction BMPs; and
- Treatment control BMPs.

[7] The Permittee may omit individual BMPs if site conditions render the BMP unnecessary or infeasible and the Permittee provides alternative and equally effective BMPs. The Permittee must justify each BMP omission in the SWPPP.

[8] https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/industrial/2014indgenpermit/wqo2014_0057_dwq_revmar2015.pdf (last accessed March 12, 2021).

It can be seen in these two BMP catalogues that both Washington and California incorporate the idea of controlling the quantity as well as the quality of the industrial runoff. That idea is not entirely absent from the MD Permit, which has the provision, "attenuating flow using open vegetated swales and natural depressions can reduce in-stream impacts of erosive flows;" but is not as highly emphasized and not tied to the concept of reducing the carrier of pollutant loadings.

As a general matter, the MD Permit specifies using controls that are technologically available and economically practicable and achievable in light of best industry practice. That standard has often been expressed, following EPA's lead, under the rubric BAT/BCT: Best Available Technology (BAT) for toxic pollutants and Best Conventional Technology (BCT) for conventional pollutants. The MD Permit already uses BAT/BCT, but the term appears only once in the entire document. Expanding its use would emphasize the requirement for stormwater management to rise to the best level found in industry practice. The Fact Sheet (on pages 44-45) gives the concept more prominence, and the Permit should follow suit.

Additional Details and Further Justification for Increasing Treatment Emphasis

In my experience in Washington and California, industries are increasingly turning to advanced, active treatment controls. In many cases they have been sued under the citizen suit provisions of the Clean Water Act, while in others state-enforced corrective actions under permits have turned them toward treatment as the solution.

Prominent among the treatment types have been polymer-assisted coagulation followed by settling and/or filtration. Often used is chitosan, a natural polymer derived from shellfish waste. Another treatment type is electrocoagulation, a process of destabilizing suspended, emulsified or dissolved contaminants by introducing electrical current, which causes chemical reactions that form masses of solids and other pollutants entrained with them, again followed by settling and/or filtration. Activated carbon is the filter medium in some cases. Other technologies used in water treatment in general, such as ion exchange, are not common yet in the stormwater field but are beginning to see use. Another technology employed successfully in a small but growing number of situations is bioretention with specialized soil media to target certain industrial pollutants. These treatment controls have demonstrated highly consistent ability to produce effluents meeting stormwater permit benchmarks when other measures have not.

I have been directly involved with cases in which these advanced treatment controls have been installed in the types of industries I named above in my assessment of Permit Part III.B (Control Measures). All of industries in these cases were covered by general stormwater permits. Above I also named other industrial categories that I am aware of having advanced treatment controls. I expect that all or most of these examples are also under general stormwater permits, but it is possible that a small number have individual permits.

I have contacted three companies that market polymer-based and electrocoagulation treatments, as well as some other advanced types, to ask how many systems they have installed. One replied that they now number 50-60 at permitted industrial sites.[9] The second and third counted 38[10] and 31,[11] respectively, in that service. By this point, a relatively robust performance database exists for these treatment systems, because their operators submit discharge monitoring reports under industrial stormwater permit auspices.

I believe that these 120-some advanced industrial stormwater treatment systems in service signify that they are technologically available and economically practicable and achievable in light of best industry practice; *i.e.*, they are BAT/BCT. Maryland should modify 20-SW to bring treatment controls in general, and these proven most effective options in particular, into its permitted industrial stormwater management program.

## PERMIT PART III.B.2.B: DISCHARGES TO WATER QUALITY IMPAIRED WATERS

### Permit Term Summary

The MD Permit speaks to situations in which an industry discharges to a Clean Water Act section 303(d)-listed impaired water both with and without an EPA-approved or established total Maximum Daily Load (TMDL). In the first case it states that the Department will inform the permittee if any additional monitoring, limits, or controls above standard requirements are necessary. Similarly, in the second situation the Department will inform the permittee as to what actions are required.

### Assessment

In my opinion, the 20-SW term is vague and subject to slippage in contact between the Department and permittees. There is no indication at all how the Department will decide if and how each affected industry should apply controls, monitor, and be assessed for performance. Departmental follow up is subject to potential personnel and resource constraints.

### Recommended Improvement

The MD Permit should specify sampling requirements and effluent limits applicable to discharges to 303(d)-listed waters, including sampling frequency, water quality variables to analyze, analytical methods, laboratory quantitation limits, and pollutant numeric limits in the discharge. These considerations may differ between impaired and unimpaired waters and should be specially set forth for those impaired. Any distinctions existing between waters with and without an active TMDL should also be specified.

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[9] T.J. Mothersbaugh, WaterTectonics, Inc.; Everett, Washington; personal communication; March 10, 2021.
[10] D. Medlin, Clear Water Services; Everett, Washington; personal communication; March 12, 2021.
[11] D. Heitz, Clear Creek Systems; Pacific, Washington; personal communication; March 19, 2021.

## PERMIT PART IV: CORRECTIVE ACTION

**Permit Term Summary**

A permittee enters the Maryland corrective action system at Level 1 when either an annual average of pollutant concentration measurements (generally, four) exceeds a benchmark or a single concentration is four times the benchmark or higher. The discharger progresses to Levels 2, 3, and 4 with, respectively, a second, third, or fourth annual average in excess of the benchmark or one measurement four times the benchmark or more. The designated responses at the first and second levels are review of BMPs and implementing Additional Implementation Measures (AIMs) as needed, but without designation of the types to be considered. Only at Level 3 does that specificity enter. Finally, reaching the fourth level requires an action plan produced by a professional in the stormwater field.

**Assessment**

According to Permit Part V.B.1, benchmark monitoring is primarily for the purpose of determining the overall effectiveness of control measures and indicating when AIMs may be necessary to comply with the effluent limitations in Part III.B. Under the corrective action system in Part IV, a discharger with multiple pollutants over their benchmarks could go an entire year without having to take any corrective action, so long as no benchmark exceedance was as high as four times the benchmark level. The discharger could proceed year after year without correction, so long as annual averages are beneath benchmarks, even if one or multiple pollutants sometimes surpass benchmarks by a margin of two or three times. A permittee who has already advanced to Level 2 could go three full years without being directed specifically to consider permanent source control and treatment BMPs and, even if in Level 3, four full years without having to consult an informed professional for assistance. This schedule is egregiously lax in my opinion.

**Recommended Improvement**

I again call upon the WA and CA Permits to offer possible models for tightening the corrective action aspects of the Maryland Permit. Like Maryland's, these permits have levels of action, three in WA and two in CA.

A WA permittee enters Level 1 with the first benchmark exceedance and is required to adopt additional operational source control BMPs. A second benchmark exceedance for the same pollutant in the same year places a permittee in Level 2, with the requirement to implement additional structural source control BMPs. Level 3 status arrives with a third benchmark exceedance for the same pollutant within a calendar year. Then, the discharger must commission an engineering report by a professional to specify treatment, subject to agency approval. Thus, the permittee has the chance and incentive to solve the problem early with the least demanding action of operational source controls. Consistent performance shortfall, though, rather quickly ramps up requirements to move to more effective BMPs and get professional help.

The CA Permit has numeric action levels (NALs) instead of benchmarks. NALs generally follow the MSGP, for metals assuming the highest hardness in the MSGP's tables. A NAL exceedance can occur in either of two ways: (1) for two or more samples in a reporting year, surpassing a designated maximum concentration for total suspended solids or oil and grease or falling outside a designated range for pH; or (2) for all samples collected in a reporting year, exceeding a designated maximum average concentration for any of 20 pollutants.

In the CA system, one NAL exceedance of either type puts a permittee in corrective action Level 1. That discharger must designate a Qualified Industrial Storm Water Practitioner (QISP) who has received state-approved training and, in some instances, a competency examination. This staff member is responsible for an Exceedance Response Action (ERA) Report designating additional BMPs considered to be needed to avoid NAL exceedances. A discharger enters Level 2 if another NAL exceedance (of either type) for the same pollutant occurs while in Level 1. At this level the QISP must prepare both an ERA Action Plan and Technical Report.

In its level of environmental protection, the California system has two disadvantages compared to Washington's but one important advantage. The Washington process can trigger an immediate corrective action with a benchmark exceedance for any pollutant, whereas in California a discharger could go a full year with elevated concentrations of the same pollutant before having to take action. Also, California does not specify the types of BMPs that must be considered in the Level 1 or 2 ERAs as Washington does. However, California does require the involvement of a trained person as soon as corrective action is designated.

The protective features of the WA and CA Permits should be built into the MD Permit. The improvement should follow the WA Permit in establishing a much quicker action trigger and specifying the types of control measures that must be evaluated at each level, with treatment the ultimate recourse. In line with the CA Permit, Maryland's 20-SW should provide for earlier qualified professional involvement.

## PERMIT PART IV.B.5: AIM EXCEPTIONS

### Permit Term Summary

An industry is not required to perform AIM or additional benchmark monitoring for any parameters when it can be demonstrated, with the Department's agreement, that run-on from a source external to the facility is the cause of the exceedance, provided that: (1) personnel responsible for the external source are notified and requested to abate their pollutant contribution; and (2) with failure by the external party to take action to address their discharges, the permittee contacts the Department's Compliance Program.

### Assessment

The MD Permit term does not recognize simple steps that could be taken to solve the problem expeditiously before taking it to the Department. Merely reporting it to the Department leaves the resolution of the problem open-ended and lends no confidence that it will be solved.

**Recommended Improvement**

In my opinion, 20-SW should first require the permittee to determine if there is a potential solution to the run-on problem that can be implemented from the industry's own property (*e.g.*, rerouting it). If not, then the permittee should approach the operator of the external source and see if it is possible to work cooperatively to find a solution. Only with the failure of that step should the Department be contacted. If it is, the MD Permit should express a commitment by the Department to pursue a solution, including specified timing to investigate, work with the source, and communicate the results to the permittee receiving the run-on.

## PERMIT PART V.B.2: SUSPENDING MONITORING

**Permit Term Summary**

If the annual average for any water quality variable does not exceed the benchmark, a permittee can request to discontinue monitoring for that parameter for the remainder of the permit term.

**Assessment**

The allowed moratorium on monitoring could be as much as 4 years in a normal 5-year permit cycle, which is an excessively lenient period. A permittee could abandon all efforts at controlling pollutant discharges for as much as 80 percent of the Permit's coverage. Even without a concerted decision to forsake stormwater management efforts, bad habits could form with lack of practice.

In criticizing the same waiver allowed under EPA's MSGP, the National Academies' report expressed the opinion that quarterly stormwater event samples collected over one year are inadequate to characterize industrial stormwater discharge or describe control measure performance over the permit term.[12] For permittees with average results meeting benchmarks, the Committee recommended at least a minimum of continued annual sampling to ensure appropriate stormwater management throughout the remainder of the permit term.

**Recommended Improvement**

Once again, the WA and CA Permits present alternatives that reward good performance while avoiding these potential problems. In Washington, if eight consecutive quarterly samples are within benchmarks, the permittee is declared in consistent attainment and can reduce monitoring to once a year for three years. A permittee whose annual sample exceeds the benchmark loses that status and returns to the standard quarterly monitoring schedule. That schedule is again in effect after three years pending repeating the demonstration of consistent attainment. In California, obtaining four consecutive readings within NALs reduces sampling occasions from four to two per year. The frequency returns to four with any NAL exceedance. The MD Permit should adopt a rule equivalent in stringency to these examples.

[12] Improving the EPA Multi-Sector General Permit for Industrial Stormwater Discharges, page 65.

## PERMIT PART V.B.3.A.I) AND II): FACILITIES REQUIRED TO MONITOR DISCHARGES TO IMPAIRED WATERS

**Permit Term Summary**

Discharges to impaired waters without an EPA-approved or established TMDL must be monitored once per year at each discharge point. The permittee is instructed to compare two lists: (1) industrial pollutants identified in Permit Part III.C.3 plus any sector-specific benchmark monitoring pollutants, and (2) pollutants for which the water body is impaired and for which a standard analytical method exists. Those pollutants that appear on both lists are to be monitored.

For stormwater discharges to waters for which there is an EPA-approved or established TMDL, the permittee is not required to monitor for the pollutant(s) for which the TMDL was written unless informed otherwise by the Department.

**Assessment**

This provision seems to be in part inconsistent with Part III.B.2.b, covered above. That text indicates that the Department will inform permittees of their requirements both with and without a TMDL in place.

As stated here, the provision for waters without a TMDL is likely to be obscure and burdensome to apply for many permittees, who are not accustomed to accessing the sources and making the judgments needed.

**Recommended Improvement**

This dichotomy between Parts III.B.2.b and V.B.3.a.i) and ii) must be reconciled.

Generally, I believe that a permittee should monitor for any pollutants that they do or could produce and that are responsible for 303(d) listings, whether or not they have currently operative TMDLs. The MD Permit should help them determine what that monitoring should be, probably best by preparing an appendix laying out the impaired waters and their listed pollutants having standard analytical methods and guiding permittees on how to select pollutants pertinent to them for monitoring.

## PERMIT PART V.C: MONITORING PROCEDURES

**Permit Term Summary**

This portion of the Permit has eight subparts covering: (1) monitored outfalls, (2) commingled discharges, (3) measurable storm events, (4) sample type, (5) adverse weather conditions, (6) representative sampling, (7) monitoring periods, and (8) data recording requirements.

**Assessment**

I believe that the provision is missing an important subpart: sample analysis requirements.

**Recommended Improvement**

First, 20-SW should specify that analyses must be performed in a state-accredited laboratory. It should go on the require that laboratory reports provide at least the following information: (1) date of analysis; (2) parameter name; (3) CAS number, if applicable; (4) analytical method; (5) individual who performed the analysis; (6) method detection limit (MDL); (7) laboratory quantitation level (QL); (8) reporting units; (9) sample result; and (10) complete quality assurance/quality control data. It should further specify that detection limits be low enough to detect benchmark exceedances.

## FACT SHEET SECTION 2.1: REVIEW OF 12-SW BENCHMARK MONITORING DATA

**Fact Sheet Term Summary**

Point 1: The analysis in this section reveals that there is a set of permittees with persistent and long-standing problems in meeting benchmarks.[13] It goes on to state that, "… the ultimate solution may be structural control such as a treatment system …"

Point 2: Page 12 remarks that the Department cannot endorse specific proprietary devices, which leaves it up to the industry professionals to identify strategies that work.

Point 3: On page 12 also is the comment that the corrective action portion of the permit has changed since the last iteration to include requirements for operators to engage eventually with a professional to assist those who are not meeting benchmarks after substantial timeframes.

**Assessment**

Point 1: These statements in the Fact Sheet identify a problem, and a solution, that is not given the deserved attention by 20-SW itself. As I commented concerning Permit Part IV above, the criteria for corrective action allow potentially protracted periods of benchmark exceedances. The Fact Sheet's point that treatment may constitute the ultimate solution supports my opinions on the subject expressed extensively in my assessments on Parts III.B and IV.

Point 2: I accept that it would be improper for the Department to endorse proprietary devices. However, it would be entirely proper for the Department to provide information about them to assist in selection, as other states do.

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[13] Page 10: "… the average doesn't reflect any specific site trend, it actually reflects the worst case since the difficult sites skew the data and end up on the list for all 5 years."
Page 12: "This data indicates that there are operators who are very challenged in meeting the benchmarks."

Point 3: I provided my opinions on this point earlier in discussing Permit Part IV (Corrective Action). As I stated there, I believe that the allowable timeframes are entirely too long and that professional engagement "eventually" is much too delayed.

**Recommended Improvement**

Point 1: Recommendations in my discussion of Part IV address the problem of benchmark exceedance persistence. My coverage under both Parts III.B and IV comprehensively discuss how the MD Permit should upgrade its attention to treatment.

Point 2: Concerning proprietary devices, Maryland could use resources from other states and not repeat the investigations they have performed to generate information about proprietary stormwater equipment. Washington state and New Jersey have well-developed and widely used systems to produce and disseminate that information: Technology Assessment Program – Ecology (TAPE)[14] for Washington, and New Jersey Corporation for Advanced Technology (NJCAT)[15] for New Jersey. Both entail testing, often in both the laboratory and the field, and independent third-party confirmation of claims.

Point 3: Relative to corrective action, please see my recommended improvement above under Part IV.

## FACT SHEET SECTION 2.2.2

**Fact Sheet Term Summary**

Point 1: Page 19 states the Department's agreement with EPA's judgment that, generally, numeric effluent limits (NELs) are feasible only where predictably reliable treatment technologies are employed.

Point 2: Page 20 provides the Department's decision not to adopt the recommendation of the National Academies' report for universal analysis of total suspended solids (TSS), pH, and chemical oxygen demand (COD) in permitted industrial stormwater discharges.

Point 3: Page 21 introduces EPA's NPDES Compliance Inspection Manual,[16] which gives guidance on laboratory procedures and quality assurance, and indicates the Department's appreciation for such guidance as EPA provides.

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[14] https://apps.ecology.wa.gov/publications/SummaryPages/1810039.html (last accessed on March 11, 2021).
[15] http://www.njcat.org/verification-process/technology-verification-database.html (last accessed on March 11, 2021).
[16] U.S. Environmental Protection Agency. 2017. NPDES Compliance Inspection Manual, EPA Publication Number: 305-K-17-001. U.S. Environmental Protection Agency, Washington, D.C. https://www.epa.gov/sites/production/files/2017-01/documents/npdesinspect.pdf (last accessed March 24, 2021.

**Assessment**

Point 1: The point circumvents two issues that should be confronted by the Fact Sheet and 20-SW itself. First, the rationale employed to underpin decisions about NELs should be, first and foremost, a function of the protection and recovery needs of the affected environment. Second, reliable treatment technologies with known performance characteristics are available. Establishing NELs on the basis of environmental requirements would stimulate their use. The proper sequence is thus the reverse of the order implied by the Fact Sheet point: first set goals, then impose means of meeting them.

Point 2: It is already common practice to monitor industrial stormwater discharges for TSS and pH, along with some metals and nutrients. The innovation in the National Academies' report is to add COD for routine monitoring. The report mainly advanced it as an indicator of polycyclic aromatic hydrocarbons (PAHs), although it represents other organic compounds as well. PAHs are rarely, if ever, included in current monitoring programs; but some are present with some frequency in discharges heavily influenced by petroleum products and their combustion. Some of those have potentially serious environmental and human health impacts. Analyzing the indicator would provide information not now available without the expense of measuring the numerous compounds in the PAH category.

Point 3: The NPDES Compliance Inspection Manual is a very comprehensive document over 900 pages in length covering not only industrial stormwater discharges but all forms of NPDES permit investigation and monitoring. Well beyond expressing appreciation, the Department should extract the relevant lessons from the guidance to set standards for monitoring under 20-SW.

**Recommended Improvement**

Point 1: In my Part III.B discussion above I presented information on reliable treatment technology types in industrial stormwater service and some sense of their scale of application. I believe that the experience is now sufficient that a permitting agency can develop NELs appropriate to environmental needs with confidence that BAT/BCT treatment practices can meet them. My opinion is that Maryland should initiate this effort in the current permit and bring it to full fruition in the next iteration. This strategy would be analogous to the Department's development of benchmarks, in which it introduced them for some permittees with 12-SW and now plans full extension with 20-SW.

Point 2: I believe that the MD Permit should add COD to the other water quality variables now being monitored to gain some information about PAHs (and other organics).

Point 3: I recommended monitoring program improvements in my comments on Part V.C earlier. EPA's NPDES Compliance Inspection Manual can serve as the source of and authority for those improvements.

## FACT SHEET SECTION 2.3.2.1

**Fact Sheet Term Summary**

20-SW increases the iron benchmark from 1 mg/L to 3 mg/L.

**Assessment**

Iron can be directly toxic to aquatic life at very high concentrations and also cause harm indirectly by reducing pH well into the acidic range. The results of toxicity testing are frequently expressed in terms of the concentration lethal to 50 percent of the test organisms ($LC_{50}$). $LC_{50}$ values vary widely with species and water hardness but start at less than 1.0 mg/L for a variety of fish species with exposure times as short as 24 hours.[17]

**Recommended Improvement**

The iron benchmark should remain at 1.0 mg/L since some aquatic species are vulnerable to this or even a lower concentration.

## ADDITIONAL TOPIC: COVERAGE OF INDUSTRIES HANDLING PLASTIC MATERIALS

Recognizing the great problem that plastics have become in oceans and other water bodies, the CA Permit has special requirements for industries that manufacture, transport, store, or consume virgin and recycled plastic resin pellets, powders, flakes, powdered additives, regrind, dust, and other similar types of pre-production plastics with the potential to discharge or migrate off-site. The requirements extensively specify containment systems to trap particles or alternative BMPs. The MD Permit should add this coverage. Refer to Part XVIII of the CA Permit for specifications.

[17] Phippen, B., C. Horvath, R. Nordin, and N. Nagpal. 2008. Ambient Water Quality Guidelines for Iron. Science and Information Branch, Water Stewardship Division, Ministry of Environment, Province of British Columbia. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/iron-or.pdf (last accessed on March 11, 2021)

# ATTACHMENT A

## Background and Experience

RICHARD R. HORNER, PH.D.

I have 54 years of professional experience, 44 teaching and performing research at the college and university level. For the last 43 years I have specialized in research, teaching, and consulting in the area of storm water runoff and surface water management.

I received a Ph.D. in Civil and Environmental Engineering from the University of Washington in 1978, following two Mechanical Engineering degrees from the University of Pennsylvania. Although my degrees are all in engineering, I have had substantial course work and practical experience in aquatic biology and chemistry.

For 12 years beginning in 1981, I was a full-time research professor in the University of Washington's Department of Civil and Environmental Engineering. From 1993 until 2011, I served half time in that position and had adjunct appointments in two additional departments (Landscape Architecture and the College of the Environment's Center for Urban Horticulture). I spent the remainder of my time in private consulting through a sole proprietorship. My appointment became emeritus in late 2011, beyond which I continued university research and teaching at a reduced level while maintaining my consulting practice. My research, teaching, and consulting have embraced all aspects of stormwater management, including determination of pollutant sources; their transport and fate in the environment; physical, chemical, and ecological impacts; and solutions to these problems through better structural and non-structural management practices.

I have conducted numerous research investigations and consulting projects on these subjects. Serving as a principal or co-principal investigator on more than 40 research studies, my work has produced three books, approximately 30 papers in the peer-reviewed literature, and over 20 reviewed papers in conference proceedings. I have also authored or co-authored more than 100 scientific or technical reports.

In addition to graduate and undergraduate teaching, I have taught many continuing education short courses to professionals in practice. My consulting clients include federal, state, and local government agencies; citizens' environmental groups; and private firms that work for these entities, primarily on the West Coast of the United States and Canada but in some instances elsewhere in the nation.

Over a 17-year period beginning in 1986, I spent a major share of my time as the principal investigator on two extended research projects concerning the ecological responses of fresh water resources to urban conditions and the urbanization process. I led an interdisciplinary team for 11 years in studying the effects of human activities on fresh water wetlands of the Puget Sound lowlands. This work led to a comprehensive set of management guidelines to reduce negative effects and a published book detailing the study and its results. The second effort involved an analogous investigation over 10 years of human effects on Puget Sound's salmon spawning and rearing streams. These two research programs have had broad sponsorship, including the U.S. Environmental Protection Agency, the Washington Department of Ecology, and a number of local governments.

I have helped to develop stormwater management programs in Washington State, California, and British Columbia, and studied such programs around the nation. I was one of four principal participants in a U.S. Environmental Protection Agency-sponsored assessment of 32 state, regional, and local programs spread among 14 states in arid, semi-arid, and humid areas of the West and Southwest, as well as the Midwest, Northeast, and Southeast. This evaluation led to the 1997 publication of "Institutional Aspects of Urban Runoff Management: A Guide for Program Development and Implementation" (subtitled "A Comprehensive Review of the Institutional Framework of Successful Urban Runoff Management Programs").

I was a member of the National Academy of Sciences-National Research Council (NAS-NRC) committee on Reducing Stormwater Discharge Contributions to Water Pollution. NAS-NRC committees bring together experts to address broad national issues and give unbiased advice to the federal government. The panel was the first ever to be appointed on the subject of stormwater. Its broad goals were to understand better the links between stormwater discharges and impacts on water resources, to assess the state of the science of stormwater management, and to apply the findings to make policy recommendations to the U.S. Environmental Protection Agency relative to municipal, industrial, and construction stormwater Permitting. The committee issued its final report to the public in October 2008, with a printing date of 2009. My principal but not sole contribution to the report was the chapter presenting the committee's recommendations for broadly revamping the nation's stormwater program.

I have inspected many industrial and other types of facilities to evaluate stormwater management practices and issues related to the environmental impacts of stormwater and to make recommendations on these issues. My work has involved analysis of the sources of stormwater contamination, probable negative effects on receiving waters, stormwater pollution prevention plans intended to manage stormwater to avoid or minimize negative ecological outcomes, existing and potential best management practices, and stormwater monitoring procedures and results. I have substantial familiarity and experience with state Industrial Stormwater Permits regulating all of these aspects of industrial stormwater management.

My experience includes activities concerning industrial stormwater within and outside the litigation framework. I have provided analyses and, in some cases, expert testimony in more than 60 legal cases involving industrial stormwater Permits, over 30 of which have been in Washington. I was appointed as a special master by Judge Christina A. Snyder of the Federal Court for the Central District of California to offer advice on bringing a Los Angeles automobile recycling yard into compliance with the terms of a consent decree entered into with a citizen environmental group. Additionally, I was a member of a panel formed to develop an industry-specific industrial stormwater general Permit (for metal recyclers) under the jurisdiction of the California's Santa Ana Regional Water Quality Control Board. The panel included representation from the industry and its consultants, environmental groups and their consultants, and the Board. The resulting Permit has been in effect for approximately six years and is now in the process of being reissued. Having demonstrated its utility for a full term, it is being considered as a model for stormwater Permits in other California Regional Water Quality Control Boards. I have twice provided analyses and expert testimony in hearings considering appeals of the State of Washington's industrial stormwater Permits.

# ATTACHMENT B

***Curriculum Vitae***

HORNER, Richard Ray

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University of Washington:
Emeritus Research Associate Professor,
Departments of Landscape Architecture and Civil and Environmental Engineering and
Sole Proprietor Consultant

## EDUCATION

1976 - 1978 University of Washington, Seattle, Washington; Ph.D. (Civil Engineering)

1965 - 1966 University of Pennsylvania, Philadelphia, Pennsylvania; M.S. (Mechanical Engineering)

1961 - 1965 University of Pennsylvania, Philadelphia, Pennsylvania; B.S. *Cum Laude* (Mechanical Engineering)

## HONORS AND AWARDS

Augustus Trask Ashton Scholarship, University of Pennsylvania, 1961 - 65
Annual Academic Honors, University of Pennsylvania, 1961 - 65
Tau Beta Pi National Engineering Honor Society
National Science Foundation Traineeship, University of Pennsylvania, 1965 - 66

## EMPLOYMENT

1986 - Present Richard R. Horner, Sole Proprietor (offering services in environmental engineering and science)

2011 - Present University of Washington, Seattle, Washington
Emeritus Research Associate Professor

1981 - 2011 University of Washington, Seattle, Washington
Research Associate Professor

1986 - 1990 King County, Seattle, Washington
Coordinator of Puget Sound Wetland and Stormwater Management Research Program (part-time; continued under contract to University of Washington)

1969 - 1981 Northampton Community College, Bethlehem, Pennsylvania
Engineering Department (Coordinator, 1971 - 73 and 1978 - 79)

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|---|---|
| | Environmental Studies Department (Co-coordinator, 1973 - 76 and 1978 - 1981)<br>Professor, 1978 - 1981; Associate Professor, 1973 - 78;<br>Assistant Professor, 1969 - 73,<br>Leave of Absence, 1977 - 78; Sabbatical Leave, 1976 - 77 |
| 1977 - 1978 | University of Washington, Seattle, Washington<br>Department of Civil Engineering<br>Research Engineer, Highway Runoff Water Quality Project |
| 1976 - 1977 | University of Washington, Seattle, Washington<br>Department of Civil Engineering and Institute for Environmental Studies<br>Research Assistant and Teaching Assistant |
| 1966 - 1969 | Exxon Research and Engineering Company, Florham Park, New Jersey;<br>Project Engineer |
| 1965 - 1966 | University of Pennsylvania, Philadelphia Pennsylvania<br>Department of Mechanical Engineering; Research Assistant |

NATIONAL COMMITTEES

National Academy of Sciences Panel on Reducing Stormwater Discharge Contributions to Water Pollution, 2007-2008.

Technical Advisory Panel for Water Environment Federation projects on Decentralized Stormwater Controls for Urban Retrofit and Combined Sewer Overflow Reduction, 2005-2007.

Co-chair, Engineering Foundation Conference on Effects of Watershed Development and Management on Aquatic Ecosystems, 1996.

National Academy of Sciences Panel on Costs of Damage by Highway Ice Control, 1990-91.

U.S. Environmental Protection Agency National Wetland Research Planning Panel, 1988, 1991.

RESEARCH PROJECTS

* Principal Investigator.
** Co-Principal Investigator. (Where undesignated, I was a member of the faculty investigation team without principal investigator status).

Effects of Waterfront Stormwater Solutions Prototypes on Water Quality Runoff in Puget Sound near Pomeroy Park - Manchester Beach; Washington Sea Grant; $148,838; 2015-17.

Development of a Stormwater Retrofit Plan for Water Resources Inventory Area (WRIA) 9 and Estimation of Costs for Retrofitting all Developed Lands of Puget Sound; U.S. Environmental Protection Agency and King County (WA); $243,619; 2010-13.

Ultra-Urban Stormwater Management; Seattle Public Utilities; $1,130,000; 1999-2008.*

Roadside Vegetation Management Study; Washington State Department of Transportation; $50,000; 2004-05.

The Ecological Response of Small Streams to Stormwater and Stormwater Controls; U. S. Environmental Protection Agency, cooperating with Watershed Management Institute (Crawfordsville, FL); $579,117; 1995-2003.*

Vegetated Stormwater Facility Maintenance; Washington State Department of Transportation; $86,000; 1998-2000.*

Roadside Drainage System Management for Water Quality Improvement; King and Snohomish (WA) Counties; $70,000; 1997-2000.*

Standardization of Wet Weather Protocols for Stream Impact and Treatment Technology Performance Assessments; Water Environment Research Foundation, cooperating with Water Research Center (Huntington Valley, Pennsylvania) and University of Illinois; $125,000; 1996-97.

Road Shoulder Treatments for Water Quality Protection; Washington State Department of Transportation and King County Roads Division; $90,000; 1995-96.**

Control of Nuisance Filamentous Algae in Streams by Invertebrate Grazing; National Science Foundation; $193,691; 1994-96.

Criteria for Protection of Urban Stream Ecosystems; Washington Department of Ecology; $230,000; 1994-96.

Region-Specific Time-Scale Toxicity in Aquatic Ecosystems; Water Environment Research Foundation, cooperating with Water Research Center (Huntington Valley, Pennsylvania) and University of Illinois; $670,000; 1994-96.

Establishing Reference Conditions for Freshwater Wetlands Restoration; U. S. Environmental Protection Agency; $75,000; 1993-97.

Stormwater Management Technical Assistance to Local Governments; Washington Department of Ecology; $115,000; 1992-93.*

Center for Urban Water Resources Management; Washington Department of Ecology; $336,490; plus $157,400 matching support from seven local governments; 1990-93.*

University of Washington Cooperative Unit for Wetlands and Water Quality Research; King County, Washington; amount varied by year; 1987-95.*

Assessment of Portage Bay Combined Sewer Overflows; City of Seattle; $132,676; 1990-91.*

Velocity-Related Critical Phosphorus Concentrations in Flowing Water, Phase 3; National Science Foundation; $108,332; 1988-90.**

Design of Monitoring Programs for Determining Shellfish Bed Bacterial Contamination Problems; Washington Department of Ecology; $12,000; 1988-89.*

Puget Sound Protocols Development; Tetra Tech, Inc. and Puget Sound Estuary Program; $10,144; 1988.*

Improving the Cost Effectiveness of Highway Construction Site Erosion/ Pollution Control, Phase 2; Washington State Department of Transportation; $97,000; 1987-89.*

Wetland Mitigation Project Analysis; Washington State Department of Transportation; $74,985; 1987-89.*

Lake Chelan Water Quality Assessment; Harper-Owes, consultant to Washington State Department of Ecology; $42,977; 1986-88.

Quality of Management of Silver Lake; City of Everett; $67,463; 1986-88.

Effectiveness of WSDOT Wetlands Creation Projects; Washington State Department of Transportation; $42,308; 1986-87.*

Improving the Cost Effectiveness of Highway Construction Site Erosion/Pollution Control; Washington State Department of Transportation; $41,608; 1986-87.*

Management Significance of Bioavailable Phosphorus in Urban Runoff; State of Washington Water Research Center and Municipality of Metropolitan Seattle; $32,738; 1986-87.**

Environmental Monitoring and Evaluation of Calcium Magnesium Acetate (CMA); Transportation Research Board of National Academy of Sciences; $199,943; 1985-87.*

Conceptual Design of Monitoring Programs for Determination of Water Quality and Ecological Change Resulting from Nonpoint Source Discharges; Washington State Department of Ecology; $49,994; 1985-86.**

Development of an Integrated Land Treatment Approach for Improving the Quality of Metalliferous Mining Wastewaters; Washington Mining and Mineral Resources Research Institute; $4,000; 1985-86.*

Preliminary Investigation of Sewage Sludge Utilization on Roadsides; Washington State Department of Transportation; $6,664; 1984-85.*

Source Control of Transit Base Runoff Pollutants; Municipality of Metropolitan Seattle; $26,867; 1984-85.**

Lake Sammamish Future Water Quality; Municipality of Metropolitan Seattle; $28,500; 1984-85.

Implementation of Highway Runoff Water Quality Research Results; Washington State Department of Transportation; $13,998; 1984-85.*

Performance Evaluation of a Detention Basin and Coalescing Plate Oil Separator for Treating Urban stormwater Runoff; Washington State Water Research Center; 1984-85; $11,724.**

Velocity-Related Critical Phosphorus Concentrations in Flowing Water, Phase 2; National Science Foundation; $99,088; 1983-85.**

Development of a Biological Overland Flow System for Treating Mining Wastewaters; Washington Mining and Mineral Resources Research Institute; $6,030; 1983-84.*

Nutrient Contributions of Agricultural Sites to the Moses Lake System; Moses Lake Conservation District; $15,039; 1982-84.*

Planning Implementation of Runoff Water Quality Research Findings; Washington State Department of Transportation; $12,735; 1982-83.**

Transport of Agricultural Nutrients to Moses Lake; Brown and Caldwell Engineers; $22,725; 1982-83.**

Investigation of Toxicant Concentration and Loading Effects on Aquatic Macroinvertebrates; University of Washington Graduate School Research Fund; $3,788; 1982.*

Sampling Design for Aquatic Ecological Monitoring; Electric Power Research Institute; $542,008; 1981-86.

Velocity-Related Critical Phosphorus Concentrations in Flowing Water; National Science Foundation; $70,310; 1980-82.

Highway Runoff Water Quality; Washington State Department of Transportation; $461,176; 1977-82.

BOOKS

Shaver, E., R. Horner, J. Skupien, C. May, and G. Ridley. *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*, 2nd Edition. U.S. Environmental Protection Agency, Washington, D.C., 2007.

Azous, A. L. and R. R. Horner. *Wetlands and Urbanization: Implications for the Future*. Lewis Publishers, Boca Raton, FL, 2000.

Horner, R. R., J. J. Skupien, E. H. Livingston, and H. E. Shaver. *Fundamentals of Urban Runoff Management: Technical and Institutional Issues*. Terrene Institute, Washington, D. C., 1994.

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Wright, O.M., E. Istanbulluoglu, R.R. Horner, C.L. DeGasperi, and J. Simmonds. 2018. Is There a Limit to Bioretention Effectiveness? Evaluation of Stormwater Bioretention Treatment Using a Lumped Ecohydrologic Watershed Model and Ecologically-Based Design Criteria. *Hydrological Processes* 2018:1-17.

Chapman, C. and R.R. Horner. Performance Assessment of a Street-Drainage Bioretention System. *Water Environment Research* 82(2): 109-119, 2010.

Horner, R. R. et al. Structural and Non-Structural Best Management Practices (BMPs) for Protecting Streams. In *Linking Stormwater BMP Designs and Performance to Receiving Water Impact Mitigation*, B. K. Urbonas (ed.), American Society of Civil Engineers, New York, pp. 60-77, 2002.

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Anderson, E. L., E. B. Welch, J. M. Jacoby, G. M. Schimek, and R. R. Horner. Periphyton Removal Related to Phosphorus and Grazer Biomass Level. *Freshwater Biology* 41:633-651, 1999.

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Walton, S. P., E. B. Welch, and R. R. Horner. Stream Periphyton Response to Grazing and Changes in Phosphorus Concentration. *Hydrobiologia* 302:31-46, 1994.

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Horner, R.R. Long-Term Effects of Urban Stormwater on Wetlands. In *Design of Urban Runoff Quality Controls*, L.A. Roesner, B. Urbonas, and M.B. Sonnen (eds.), American Society of Civil Engineers, New York, pp. 451-466, 1989.

Welch, E.B., R.R. Horner, and C.R. Patmont. Phosphorus Levels That Cause Nuisance Periphyton: A Management Approach. *Water Research* 23(4):401-405, 1989.

Butkus, S.R., E.B. Welch, R.R. Horner, and D.E. Spyridakis. Lake Response Modeling Using Biologically Available Phosphorus. *Journal of the Water Pollution Control Federation* 60(9):1663-1669, 1988.

Reinelt, L.E., R.R. Horner, and B.W. Mar. Nonpoint Source Pollution Monitoring Program Design. *Journal of Water Resources Planning and Management* 114(3):335-352, 1988.

Welch, E.B., J.M. Jacoby, R.R. Horner, and M.R. Seeley. Nuisance Biomass Levels of Periphytic Algae in Streams. *Hydrobiologia*, 157:161-168, 1988.

Reinelt, L.E., R. Castensson, and R.R. Horner. Modification of an Existing Monitoring Program to Address Nonpoint Source Pollution, A Case Study of the Svarta River Basin, Sweden. *Vatten* 43:199-208, 1987.

Mar, B.W., R.R. Horner, J.S. Richey, D.P. Lettenmaier, and R.N. Palmer. Data Acquisition, Cost-Effective Methods for Obtaining Data on Water Quality. *Environmental Science and Technology* 20(6):545-551, 1986.

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Richey, J.S., B.W. Mar, and R.R. Horner. The Delphi Technique in Environmental Assessment, Part 1: Implementation and Effectiveness. *Journal of Environmental Management* 21:135-146, 1985.

Richey, J.S., R.R. Horner, and B.W. Mar. The Delphi Technique in Environmental Assessment, Part 2: Consensus on Critical Issues in Environmental Monitoring Program Design. *Journal of Environmental Management* 21:147-159, 1985.

Horner, R.R. and B.W. Mar. Assessing Impacts of Operating Highways on Aquatic Ecosystems. *Transportation Research Record* 1017:47-55, 1985.

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Horner, R.R. and B.W. Mar. A Guide for Assessing Water Quality Impacts of Highway Operations and Maintenance. *Transportation Research Record* 948:31-40, 1983.

Chui, T.W., B.W. Mar, and R.R. Horner. A Pollutant Loading Model for Highway Runoff. *Journal of Environmental Engineering Division*, ASCE 108:1193-1120, 1982.

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Horner, R. R. Stormwater Runoff Flow Control Benefits of Urban Drainage System Reconstruction According to Natural Principles. Presentation at Puget Sound—Strait of Georgia Research Conference, Vancouver, B. C., 2003.

May, C.W. and R.R. Horner. 2002. The Limitations of Mitigation-Based Stormwater Management in the Pacific Northwest and the Potential of a Conservation Strategy Based on Low-Impact Development Principles. Proc. 2002 ASCE Stormwater Conference, Portland, OR.

Horner, R. R. and C. R. Horner. Performance of a Perimeter ("Delaware") Sand Filter in Treating Stormwater Runoff from a Barge Loading Terminal. Proc. Comprehensive Stormwater and Aquatic Ecosystem Management Conf.; Auckland, New Zealand; February 1999, pp. 183-192, 1999.

Horner, R. R. and C. W. May. Regional Study Supports Natural Land Cover Protection as Leading Best Management Practice for Maintaining Stream Ecological Integrity. Proc. Comprehensive Stormwater and Aquatic Ecosystem Management Conf.; Auckland, New Zealand; February 1999, pp. 233-248, 1999.

Horner, R. R. Constructed Wetlands for Urban Runoff Water Quality Control. Proc. National Conf. on Urban Runoff Management; Chicago, Illinois; March 1993, pp. 327-340, 1995.

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Horner, R. R. and L. E. Reinelt. Guidelines for Managing Urban Wetlands. Proc. Puget Sound Water Quality Authority Research Meeting; Seattle, Washington; January 1995, pp. 171-178, 1995.

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PRESENTATIONS AND DISCUSSIONS

*Presented by a co-author. In all other cases, I presented the paper.

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Structural and Non-Structural Best Management Practices (BMPs) for Protecting Streams. Invited presentation at the Engineering Foundation Conference on Linking Stormwater BMP Designs and Performance to Receiving Water Impact Mitigation; Snowmass, Colorado; August 2001.

Performance of a Perimeter ("Delaware") Sand Filter in Treating Stormwater Runoff from a Barge Loading Terminal. Invited presentation at the Comprehensive Stormwater and Aquatic Ecosystem Management Conf.; Auckland, New Zealand; February 1999.

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Toward Ecologically Based Urban Runoff Management. Invited presentation at The Engineering Foundation Conference on Urban Runoff and Receiving Systems; Crested Butte, Colorado; August 1991.

How Stormwater Harms Shellfish. Invited presentation at the Pacific Rim Shellfish Sanitation Conference; Seattle, Washington; May 1991.

Environmental Evaluation of Calcium Magnesium Acetate for Highway Deicing Applications. Invited presentation at Conference on Calcium Magnesium Acetate, An Emerging Chemical for Environmental Applications; Boston, Massachusetts; May 1991.

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The Impact of Nonpoint Source Pollution on River Ecosystems. Invited presentation at the Northwest Rivers Conference; Seattle, Washington; November 1990.

Research Program Overview and Discussion of Hydrologic and Water Quality Studies. Presented at the Puget Sound Wetlands and Stormwater Management Research Program Workshop; Seattle, Washington; October 1990.

Control of Urban Runoff Water Quality. Invited presentations at American Society of Civil Engineers Urban Stormwater Short Courses; Bellevue, Washington; April, 1990; Portland, Oregon; July 1990.

Various Aspects of Erosion Prevention and Control. Invited presentations at University of Wisconsin Erosion Control Short Course; Seattle, Washington; July 1990.

Examination of the Hydrology and Water Quality of Wetlands Affected by Urban Stormwater. Presented at the Society of Wetland Scientists Annual Meeting; Breckenridge, Colorado, June 1990 (prepared with L.E. Reinelt).*

Analysis of Plant Communities of Wetlands Affected by Urban Stormwater. Presented at the Society of Wetland Scientists Annual Meeting; Breckenridge, Colorado; June 1990 (prepared with S.S. Cooke).*

Environmental Evaluation of Calcium Magnesium Acetate. Invited presentation at the Symposium on the Environmental Impact of Highway Deicing; Davis, California; October 1989.

Application of Wetland Science Principles in the Classroom and Community. Invited presentation at the Annual Meeting of the Association of Collegiate Schools of Planning; Portland, Oregon; October 1989.

Structural Controls for Urban Storm Runoff Water Quality. Invited presentation at the Northwest Regional Meeting of the North American Lake Management Society; Seattle, Washington; September 1989.

The Puget Sound Wetlands and Stormwater Management Research Program. Invited presentation at the U.S. Environmental Protection Agency Workshop on Wetlands and Stormwater; Seattle, Washington; September 1989.

An Overview of Storm Runoff Water Quality Control. Invited presentation at the American Water Resources Association Workshop on Forest Conversion; LaGrande, Washington; November 1988.

Progress in Wetlands Research. Invited presentation at the Pacific Northwest Pollution Control Association Annual Meeting; Coeur d'Alene, Idaho; October 1988.

Long-Term Effects of Urban Stormwater on Wetlands. Invited presentation at the Engineering Foundation Conference on Urban Stormwater; Potosi, Missouri; July 1988.

Highway Construction Site Erosion and Pollution Control: Recent Research Results. Invited presentation at the 39th Annual Road Builders' Clinic; Moscow, Idaho; March 1988.

Urban Stormwater and Puget Trough Wetlands. Presented at the 1st Annual Puget Sound Water Quality Authority Research Meeting; Seattle, Washington; March 1988 (prepared with F.B. Gutermuth, L.L. Conquest, and A.W. Johnson).

Preliminary Comparative Risk Assessment for Hanford Waste Sites. Presented at Waste Management 88; Tucson, Arizona; February 1988 (prepared with R.F. Weiner and J. Kettman).*

What Goes on at the Hanford Nuclear Reservation? Invited presentation at the Northwest Association for Environmental Studies Annual Meeting; Western Washington University, Bellingham, WA; November 1987.

The Puget Sound Wetlands and Stormwater Management Research Program. Invited presentation at the Pacific Northwest Pollution Control Association Annual Meeting; Spokane, Washington; October 1987.

Design of Cost-Effective Monitoring Programs for Nonpoint Source Water Pollution Problems. Invited presentation at the American Water Resources Association, Puget Sound Chapter, Annual Meeting; Bellevue, Washington; November 1986.

A Review of Wetland Water Quality Functions. Invited plenary presentation at the Conference on Wetland Functions, Rehabilitation, and Creation in the Pacific Northwest: The State of Our Understanding; Port Townsend, Washington; May 1986.

Nonpoint Discharge and Runoff session leader. American Society of Civil Engineers Spring Convention; Seattle, Washington; April 1986.

Prevention of Lake Sammamish Degradation from Future Development. Invited presentation at the American Society of Civil Engineers Spring Convention; Seattle, Washington; April 1986.

Design of Monitoring Programs for Nonpoint Source Water Pollution Problems. Invited presentation at the American Society of Civil Engineers Spring Convention; Seattle, Washington, April 1986 (prepared with L.E. Reinelt, B.W. Mar, and J.S. Richey).*

Nonpoint Pollution Control Strategies for Moses Lake, Washington. Presented at the Fifth Annual Meeting of the North American Lake Management Society; Lake Geneva, Wisconsin; November 1985 (prepared with R.C. Bain, Jr., and L. Nelson).

Response of Lake Sammamish to Urban Runoff Control. Presented at the Fifth Annual Meeting of the North American Lake Management Society; Lake Geneva, Wisconsin; November 1985 (prepared with J.I. Shuster, E.B. Welch, and D.E. Spyridakis).*

A General Approach to Designing Environmental Monitoring Programs. Invited presentation at the Pacific Section AAAS Symposium on Biomonitors, Bioindicators, and Bioassays of Environmental Quality; Missoula, Montana; June 1985 (prepared with J.S. Richey and B.W. Mar).

Panel Discussion on the Planning Process for Non-point Pollution Abatement Programs. Non-point Pollution Abatement Symposium; Milwaukee, Wisconsin; April 1985.

Nutrient Transport Processes in an Agricultural Watershed. Presented at the Fourth Annual Meeting of the North American Lake Management Society; McAfee, New Jersey; October 1984 (prepared with E.B. Welch, M.M. Wineman, M.J. Adolfson, and R.C. Bain Jr.).*

Nutrient Transport Processes in an Agricultural Watershed. Presented at the American Society of Limnology and Oceanography Annual Meeting; Vancouver, British Columbia; June 1984 (prepared with M.M. Wineman, M.J. Adolfson, and R.C. Bain, Jr.).

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A Guide for Assessing the Water Quality Impacts of Highway Operations and Maintenance. Presented at the Transportation Research Board Annual Meeting; Washington, D.C.; January 1983 (prepared with B.W. Mar).

Assessment of Pollutant Loadings and Concentrations in Highway Stormwater Runoff. Presented at the Pacific Northwest Pollution Control Association Annual Meeting; Vancouver, British Columbia; November 1982 (prepared with B.W. Mar and L.M. Little).

Phosphorus and Velocity as Determinants of Nuisance Periphytic Biomass. Presented at the International Workshop on Freshwater Periphyton (SIL); Vaxjo, Sweden; September 1982 (prepared with E.B. Welch and R.B. Veenstra).*

The Development of Nuisance Periphytic Algae in Laboratory Streams in Relation to Enrichment and Velocity. Presented at the American Society of Limnology and Oceanography Annual Meeting; Raleigh, North Carolina; June 1982 (prepared with R.B. Veenstra and E.B. Welch).

A Predictive Model for Highway Runoff Pollutant Concentrations and Loadings. Presented at the Stormwater and Water Quality Model Users' Group Meeting; Alexandria, Virginia; March 1982 (prepared with B.W. Mar).

Stream Periphyton Development in Relation to Current Velocity and Nutrients. Presented at American Society of Limnology and Oceanography Winter Meeting; Corpus Christi, Texas; January 1979 (prepared with E.B. Welch).

A Comparison of Discrete Versus Composite Sampling of Storm Runoff. Presented at the Northwest Pollution Control Association Annual Meeting; Victoria, British Columbia; October 1978 (prepared with B.W. Mar and J.F. Ferguson).*

A Method of Defining Urban Ecosystem Relationships Through Consideration of Water Resources. Presented at UNESCO International Man and the Biosphere Project 11 Conference; Poznan, Poland; September 1977.

GRADUATE AND UNDERGRADUATE COURSES TAUGHT (University of Washington)

Civil and Environmental Engineering 552, Environmental Regulations; 8 quarters.

Landscape Architecture 590, Urban Water Resources Seminar; 3 quarters.

Landscape Architecture 522/523, Watershed Analysis and Design; 15 quarters.

Engineering 260, Thermodynamics; 1 quarter.

Engineering 210, Engineering Statics; 2 quarters.

Civil Engineering/Water and Air Resources 453, Water and Wastewater Treatment; 1 quarter.

Civil Engineering/Water and Air Resources 599, Analyzing Urbanizing Watersheds; 1 quarter.

CONTINUING EDUCATION SHORT COURSES TAUGHT (University of Washington; multiple offerings)

Infiltration Facilities for Stormwater Quality Control

Wetlands Ecology, Protection, and Restoration

Storm and Surface Water Monitoring

Fundamentals of Urban Surface Water Management

Applied Stormwater Pollution Prevention Planning Techniques

Construction Site Erosion and Pollution Control Problems and Planning

Construction Site Erosion and Pollution Control Practices

Construction Site Erosion and Sediment Control Inspector Training

Inspection and Maintenance of Permanent Stormwater Management Facilities

Biofiltration for Stormwater Runoff Quality Control

Constructed Wetlands for Stormwater Runoff Quality Control

LOCAL COMMITTEES

Stormwater Panel advising Puget Sound Partnership, 2007.

Technical Advisory Committee, City of Seattle Environmental Priorities Project, 1990-91.

Environmental Toxicology Graduate Program Planning Committee, University of Washington, 1990.

Habitat Modification Technical Work Group, Puget Sound Water Quality Authority, 1987.

Underground Injection Control of Stormwater Work Group, Washington State Department of Ecology, 1987.

Nonpoint Source Pollution Conference Advisory Committee, 1986-87.

Puget Sound Wetlands and Stormwater Management Research Committee, 1986-90.

Accreditation Review, University of Washington Department of Landscape Architecture, 1986.

Planning Committee for University of Washington Institute for Environmental Studies Forum on Perspectives on Cumulative Environmental Effects, 1983.

CONSULTING

Chesapeake Legal Alliance; Annapolis, Maryland; Assessment of and comment on Maryland's draft Municipal Separate Storm Sewer Discharge Permits and Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated; 2020-2021.

Gonzaga University Legal Assistance; Spokane, Washington; Review of technical documents supporting a proposal for a PCB water quality variance for the Spokane River; 2020.

City of Monrovia, California; Recommendations for improving a watershed management plan; 2020.

Columbia Riverkeeper; Portland Oregon; Assessment of a port industrial development; 2020.

Columbia Riverkeeper and Northwest Environmental Defense Center; Portland Oregon; Assessment of Oregon Department of Environmental Quality's actions regarding setting Water Quality-Based Effluent Limits; 2020.

Coast Law Group, Encinitas, California; Technical assistance in a Clean Water Act legal cases and expert testimony; 2019-2020.

Monterey County District Attorney, Monterey, California; Assessment of pollution issues at two construction company yards; 2019-2020.

Seneca Lake Guardian, Seneca Falls, New York; Assessment of potential water quality problems associated with an industrial plant; 2019.

Endangered Habitats League, Los Angeles, California; Assessment of stormwater management systems proposed for a large residential development; 2018-2019.

Ziontz Chestnut Law Firm, Seattle, Washington; Assistance with implementation of a court order on a settled case.

U.S. Department of Justice; Technical assistance in a Clean Water Act legal case; 2017-2018.

Kampmeier & Knutsen PLLC, Portland, Oregon; Technical assistance in a Clean Water Act legal case; 2017.

Black Warrior Riverkeeper, Birmingham, Alabama; Review and comment on a total maximum daily load assessment for the Black Warrior River; 2017.

DeLano and DeLano, Escondido, California; Assessment of stormwater management systems proposed for residential and commercial developments; 2012-present.

Salmon-Safe, Inc.; assessment of sites for possible certification representing practices that protect salmon; 2004-present.

Puget Soundkeeper Alliance and Smith and Lowney, PLC, Seattle, Washington; Technical assistance in Clean Water Act legal cases and expert testimony; 1996, 2002-present.

Natural Resources Defense Council, Los Angeles, California; Technical and program analysis and expert testimony on legal cases involving municipal and industrial stormwater NPDES permit compliance and assistance in reacting to California municipal stormwater permits; 1993-present.

Santa Monica Baykeeper (now Los Angeles Waterkeeper); Technical and program analysis and expert testimony on legal cases involving municipal and industrial stormwater NPDES permit compliance; 1993-present.

Orange County Coastkeeper; Assistance with legal cases involving industrial and construction site pollution control and monitoring and expert testimony; 2001-present.

Lawyers for Clean Water; Assistance with legal cases involving stormwater discharges and expert testimony; 2004-2018.

Earthjustice; Report and testimony regarding Washington state municipal stormwater permit before Pollution Control Hearing Board; 2008, 2013; assessment of Washington, DC combined sewer overflow control plan; 2015.

Tulane Environmental Law Clinic; Assessment and declaration on a legal case involving discharge under an industrial stormwater permit and expert testimony; 2015.

San Diego Coastkeeper, San Diego, California; Technical and program analysis and expert testimony on potential legal cases involving municipal and industrial stormwater NPDES permit compliance; liaison with City of San Diego; 1996-2011 and 2019.

Stillwater Science and Washington Department of Ecology; Water quality modeling for Puget Sound Characterization, Phase 2; 2010-2011.

City of Seattle Public Utilities; Analysis of technical aspects of stormwater management program; 2000-2008.

Ventura Coastkeeper; Technical and program analysis and expert testimony on legal cases involving municipal and industrial stormwater NPDES permit compliance; 2010-2015.

San Diego Airport Authority; Peer review of consultant products, training; 2004-2006.

U. S. Federal Court, Central District of California; Special master in Clean Water Act case; 2001-2002.

Storm Water Pollution Prevention Program, City of San Diego; Advising on response to municipal stormwater NPDES program; 2001-2002.

Kerr Wood Leidel, North Vancouver, B.C.; subconsultant for Stanley Park (Vancouver, B.C.) Stormwater Constructed Wetland Design; 1997-1998.

Clean South Bay, Palo Alto, California; Technical and program analysis and expert testimony on potential legal cases involving municipal and industrial stormwater NPDES permit compliance; 1996.

Resource Planning Associates, Seattle, Washington; Assistance with various aspects of monitoring under Seattle-Tacoma International Airport's stormwater NPDES permit; 1995-1997.

Watershed Management Institute, Crawfordsville, Florida; Writing certain chapters of guides for stormwater program development and implementation and maintenance of stormwater facilities; 1995-2003.

King County Roads Division, Seattle, Washington; Teaching two courses on construction erosion and sediment control; 1995.

Snohomish County Roads Division, Seattle, Washington; Teaching a course on construction erosion and sediment control; 1995.

Alaska Marine Lines, Seattle, Washington; Performance test of a sand filter stormwater treatment system; 1994-95.

Economic and Engineering Services, Inc., Bellevue, Washington; Assessment of the potential for water quality benefits through modifying existing stormwater ponds; technical advice on remedying operating problems at infiltration ponds; 1994-96.

Washington State Department of Transportation, Olympia, Washington; Teaching courses on construction erosion and sediment control; 1994.

City of Bellevue, Washington; Peer review of documents on potential erosion associated with a road project; analysis of stormwater quality data; 1993-95.

City of Kelowna, B. C., Canada; Teaching short courses on constructed wetlands and erosion and sediment control; 1993.

Oregon Department of Environmental Quality, Portland, Oregon; Technical review of Willamette River Basin Water Quality Study reports; 1992-93.

Whatcom County, Bellingham, Washington; Mediation on lakeshore development moratorium among county, water district, and local community representatives; 1993.

Boeing Commercial Airplane Company, Renton, Washington and Sverdrup Corporation, Kirkland, Washington (at request of City of Renton); Review of stormwater control system design; design of performance monitoring study for system; 1992-94.

Golder Associates, Redmond, Washington; Technical advisor for study of stormwater infiltration; 1992.

Smith, Smart, Hancock, Tabler, and Schwensen Attorneys, Seattle, Washington; Technical advice on a legal case involving a stormwater detention pond; 1992.

PIPE, Inc., Tacoma, Washington; Teaching a course on the stormwater NPDES permit; 1992.

CH2M-Hill, Inc., Bellevue, Washington and Portland, Oregon; Technical seminar on constructing wetlands for wastewater treatment; literature review on toxicant cycling in arid-region wetlands constructed for waterwater treatment; literature and data review on lake nutrient input reduction; expert panel on TMDL analysis for Chehalis River; 1989-1995.

Kramer, Chin and Mayo, Inc., Seattle, Washington; Watershed analysis in Washington County and Lake Oswego, Oregon; literature review in preparation for stormwater infiltration system design; literature review and contribution to design of constructed wetland for municipal wastewater treatment; 1989-1995.

Woodward-Clyde Consultants, Portland, Oregon and Oakland, California; Analysis of wetland capabilities for receiving urban stormwater; design of a constructed wetland for urban stormwater treatment; technical advisor on Washington Department of Ecology and City of Portland stormwater manual updates; 1989-1995.

R.W. Beck and Associates, Seattle, Washington; Assessment of pollutant loadings and their reduction for one master drainage planning and two watershed planning efforts; 1989-92.

Boeing Computer Services Corporation, Bellevue, Washington; mediation among Boeing, citizens' group, and City of Bellevue on stormwater control system design; 1990.

Parametrix, Inc., Bellevue, Washington; Review of Kitsap County Drainage Ordinance; 1990.

U.S. Environmental Protection Agency, Duluth Laboratory; Review of certain provisions of WET 2.0 wetland functional assessment model; 1989.

King County Council, Seattle, Washington; Review of King County Surface Water Design Manual; 1989.

Port of Tacoma, Washington; Assessment of stormwater control strategies; 1989.

Municipality of Metropolitan Seattle, Seattle, Washington; Assessment of land treatment systems for controlling urban storm runoff water quality; 1988-1992.

Impact Assessment, Inc., La Jolla, California (contractor to Washington State Department of Ecology); Socioeconomic impact assessment of the proposed high-level nuclear waste repository at Hanford, Washington; 1987.

Technical Resources, Inc., Rockville, Maryland (contractor to U. S. Environmental Protection Agency); assessment of water treatment waste disposal at pulp and paper plants; 1987-88.

Dames and Moore, Seattle, Washington; analysis of the consequences of a development to Martha Lake; 1987.

Harper-Owes, Seattle, Washington; project oversight, data analysis, and review of limnological aspects for Lake Chelan Water Quality Assessment Study; 1986-88.

URS Corporation, Seattle, Washington and Columbus, Ohio; presentation of a workshop on nonpoint source water pollution monitoring program design; analysis of innovative and alternative wastewater treatment for Columbus; development of a stormwater utility for Puyallup, Washington; watershed analysis for Edmonds, Washington; 1986-88.

Entranco Engineers, Bellevue, Washington; environmental impact assessment of proposed highway construction; technical review of Lake Sammamish watershed management project; technical review of Capital Lake wetland development; 1981-82; 1987-88; 1990.

Washington State Department of Ecology, Olympia, Washington; review of literature on wetland water quality, preparation of conference plenary paper, and leading discussion group at conference; analysis in preparation for a Shoreline Hearing Board case; 1986-87.

Richard C. Bain, Jr., Engineering Consultant, Vashon Island, Washington; analysis of watershed data and development of a policy for septic tank usage near Moses Lake, Washington; 1984-87.

University of Washington Friday Harbor Laboratory; analysis of adjacent port development and preparation of testimony for Shoreline Hearing Board; 1986.

Washington State Department of Transportation and Morrison-Knudsen Company, Inc./H.W. Lochner, Inc., Joint Venture, Mercer Island, Washington; environmental assessment of disposal of excavated material by capping a marine dredge spoil dumping site; 1984.

Foster, Pepper, and Riviera Attorneys, Seattle, Washington; analysis and testimony on provisions to reduce pollutants in stormwater runoff from a site proposed for development; 1983.

Williams, Lanza, Kastner, and Gibbs Attorneys, Seattle, Washington; collection and analysis of water quality data to support a legal case and preparation of testimony; 1982.

Herrera Environmental Consultants, Seattle, Washington; lake data analysis and report preparation; 1982-83.

Brown and Caldwell Engineers, Seattle, Washington; data collection and analysis for watershed study; 1982-83.

City of Marysville, Washington; environmental impact assessment of proposed bridge construction; 1982-83.

F.X. Browne Associates, Inc., Lansdale, Pennsylvania; contributions to manual on lake restoration for U.S. Environmental Protection Agency; preparation of funding proposals and permits for lake restoration; lake data analysis; literature reviews and analysis of septic tank contributions to lake nutrient loading and availability of different forms of nutrients; 1980-83.

Reston Division of Prentice-Hall, Inc., Reston, Virginia; review of and contributions to texts on environmental technology; 1978-79.

Butterfield, Joachim, Brodt, and Hemphill Attorneys, Bethlehem, Pennsylvania; analysis of environmental impact statements; expert witness; 1973.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1

| | | |
|---|---|---|
| IN THE MATTER OF | ) | **DOCKET NO. CWA-AO-R01-FY16-09** |
| Town of Hull | ) | **FINDINGS OF VIOLATION** |
| | ) | **AND** |
| Proceedings under Sections 308(a) and 309(a)(3) of the Clean Water Act, as Amended, 33 U.S.C. §§ 1318(a) and 1319(a)(3) | ) | **ORDER FOR COMPLIANCE** |
| | ) | **ON CONSENT** |

## I. STATUTORY AUTHORITY

The following Findings are made and ORDER ON CONSENT ("Order") issued pursuant to Sections 308(a) and 309(a)(3) of the Clean Water Act, as amended (the "Act"), 33 U.S.C. §§ 1318(a) and 1319(a)(3). Section 309(a)(3) of the Act grants the Administrator of the U.S. Environmental Protection Agency ("EPA") the authority to issue orders requiring persons to comply with Section 301, 302, 306, 307, 308, 318, and 405 of the Act. Section 308(a) of the Act, 33 U.S.C. § 1318(a), authorizes EPA to require submission of any information required to carry out the objectives of the Act. These authorities have been delegated to EPA, Region 1's Administrator, and in turn to the Director of EPA, Region 1's Office of Environmental Stewardship ("Director").

The Order herein is based on findings of violation of Section 301(a) of the Act, 33 U.S.C. § 1311(a). Pursuant to Section 309(a)(5)(A) of the Act, 33 U.S.C. § 1319(a)(5)(A), the Order provides a schedule for compliance which the Director has determined to be reasonable.

## II. DEFINITIONS

Unless otherwise defined herein, terms used in this Order shall have the meaning given to those terms in the Act, 33 U.S.C. § 1251 *et seq.* and the regulations promulgated thereunder.

## III. FINDINGS

The Director makes the following findings of fact:

1. The Town of Hull ("Hull" or "Town") is a person under Section 502(5) of the Act, 33 U.S.C. § 1362(5).

2. The Town is the owner and operator of a Publicly Owned Treatment Works ("POTW"), which includes a wastewater collection system ("Collection System") consisting of sewerage conveyance pipelines, pump stations, and a Wastewater Treatment Facility ("WWTF") from which pollutants, as defined in Section 502(6) and (12) of the Act, 33 U.S.C. §§ 1362(6) and (12), are discharged to Massachusetts Bay and the Atlantic Ocean.

3. On September 1, 2009, the Town was issued NPDES Permit No. MA0101231 ("NPDES Permit") by EPA under the authority of Section 402 of the Act, 33 U.S.C. § 1342. The NPDES Permit became effective October 1, 2009 and superseded a permit issued on May 6, 2002. The towns of Cohasset and Hingham, Massachusetts are co-permittees. The NPDES Permit expired on September 30, 2014. Based on the Town's timely re-application, the conditions of the NPDES Permit remain in effect, pursuant to 40 C.F.R., § 122.6.

4. The NPDES Permit authorizes Hull to discharge pollutants from WWTF Outfall 001 to the Massachusetts Bay/Atlantic Ocean. The discharge is subject to the effluent limitations, monitoring requirements and other conditions specified in the NPDES Permit.

5. Section 301(a) of the Act, 33 U.S.C. § 1311(a), makes unlawful the discharge of pollutants to waters of the United States except, among other things, in compliance with the terms and conditions of an NPDES permit issued pursuant to Section 402 of the Act, 33 U.S.C. § 1342.

6. Since at least February 1, 2011, Hull has periodically discharged untreated sewage from various components of its Collection System during dry and wet weather to Massachusetts Bay and the Atlantic Ocean without authorization by the Permit.

7. Massachusetts Bay and the Atlantic Ocean are waters of the United States and, as such, are navigable waters under Section 502(7) of the Act, 33 U.S.C. § 1362(7), and the regulations promulgated thereunder.

8. Untreated sewage contains pollutants, as defined in Sections 502(6) and (12) of the Act, 33 U.S.C. §§ 1362(6) and (12), including fecal coliform and enterococci bacteria.

9. The various unauthorized components of the Collection System from which the Town has discharged untreated sewage are point sources, as defined in Section 502(14) of the Act, 33 U.S.C. § 1362(14).

10. The Town's unauthorized discharges of pollutants to waters of the United States violate Section 301(a) of the Act, 33 U.S.C. § 1311(a).

## IV. ORDER

Accordingly, pursuant to Sections 308 and 309(a)(3) of the Act, it is hereby ordered that the Town shall:

1. By July 31, 2016, submit an Unauthorized Discharge Summary to EPA and MADEP. The Unauthorized Discharge Summary shall include a list of unauthorized discharges from the Collection System that have occurred between January 1, 2013, and December 31, 2015, categorized as follows: Unauthorized discharge events to surface waters (this category shall include all releases with a reasonable potential to reach surface waters, such as releases to streets or areas with storm drain catch basins) and unauthorized discharge events at businesses and/or residences (such as building/private property backups). The listings shall be organized chronologically and include, at a minimum, the following:
   a. the type of asset from which the unauthorized discharge occurred (e.g., pump station, manhole, sewer main);
   b. the location (nearest address or latitude and longitude) of each unauthorized discharge;
   c. the cause of the unauthorized discharge, including but not limited to, whether it was caused by a sewerage line blockage or break; mechanical, electrical, or structural failures; hydraulic overload; operator error, or vandalism;
   d. if the unauthorized discharge was caused by a blockage, identify the type of blockage (e.g., grease, rags, debris);
   e. if the unauthorized discharge was caused by a mechanical, electrical, or structural failure, the date of the last inspection, maintenance, or repair of the failed asset;
   f. the date and time on which each unauthorized discharge began;
   g. the date and time on which each unauthorized discharge stopped;

h. the source of the notification (e.g., property owner, field crew, police);
i. the estimated gallons of wastewater released;
j. the method used to estimate the volume;
k. A clear statement of whether or not the release reached a storm water catch basin or any other portion of the Town's Municipal Separate Storm Sewer System ("MS4"). If the release occurred to the ground or street, regardless of whether the discharge reached any portion of the Town's MS4, the Town shall provide the location of the nearest down-gradient stormwater catch basin and the name of the receiving water to which the catch basin discharges;
l. A clear statement of whether or not the release reached a wetland or surface water. If the release reached a surface water, the Town shall include the name of the surface water or the name of the first downstream named surface water and a description of the exact location where the release reached the surface water;
m. the measures taken to minimize the volume and duration of the unauthorized discharge;
n. the measures taken to clean the area where the unauthorized discharge occurred;
o. the corrective actions taken to prevent reoccurrence of unauthorized discharges at the same location; and
p. the date of the last unauthorized discharge in the same general location.

2. By August 31, 2016, the Town shall develop and submit an Emergency Response Plan to EPA and MADEP for review and comment, and incorporate any comments provided by EPA or MADEP into the final Emergency Response Plan. The Emergency Response Plan shall be designed to ensure that should an unauthorized discharge occur, the volume of untreated wastewater discharged to the environment and the impact of the discharge on the environment and public health is minimized. The Emergency Response Plan shall have a goal of identifying and halting unauthorized discharges as quickly as possible, appropriately mitigating the impacts, and identifying measures to prevent a reoccurrence. Upon its submission, the Town shall immediately and continuously implement the Emergency Response Plan. The Emergency Response Plan shall include, at a minimum, the following:

a. an emergency 24-hour telephone number that can be used by the public to report unauthorized discharges, including those to buildings and private property;
b. procedures to publicize on the Town's website, newspapers, and other methods of public communication, that all unauthorized discharges should be reported to the emergency 24-hour telephone number;
c. procedures to provide oral notice within 24-hours of the Town learning of the unauthorized discharge and a written submission within 5 days, in accordance with the NPDES Permit and MADEP requirements at: http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-sewer-overflow-bypass-backup-notification.html;
d. procedures to make the public aware of any unauthorized discharges and to limit public access and exposure to areas affected by unauthorized discharges;
e. procedures to ensure the rapid dispatch of personnel and equipment necessary to correct or repair the condition causing or contributing to any unauthorized discharge, such that it is contained, and stopped in a timely manner;
f. procedures for minimizing and mitigating the impacts of the unauthorized discharge on human health and the environment;
g. procedures to provide relief, as needed, to residents experiencing building and private property backups associated with unauthorized discharges from the Collection System;
h. procedures to clean up building/private property backups, as required by applicable claims policies;
i. procedures to document the information outlined in item IV.1 of this Order for all unauthorized discharges from the Collection System;
j. procedures to ensure the preparedness, including responsiveness training of the Town's employees and contractors necessary for the effective implementation of the Emergency Response Plan;
k. periodic reviews to ensure that the Town has available staff and equipment necessary to respond to unauthorized discharges and to implement this Emergency Response Plan;
l. provisions for safety training for all Collection System personnel;

3. By August 31, 2016, the Town shall develop and submit an updated Inflow and Infiltration ("I/I") Control Plan for review and comment to EPA and MADEP. The Town shall immediately and continuously implement the I/I Control Plan upon submission. The Town shall incorporate any comments provided by EPA or MADEP into the I/I Control Plan. The I/I Control Plan shall, at a minimum, include:

   a. A summary of the existing I/I control plan, including a discussion of the program developed under the current NPDES permit to identify and remove sources of I/I and the funding that has been provided each year to implement the program since the NPDES Permit was reissued in September 2009;
   b. A description of the sewer rehabilitation projects that have performed by the Town since January 1, 2005 to remove or reduce infiltration;
   c. A description of the public and private inflow sources (e.g., illegal sump pumps and roof down spouts) that removed since January 1, 2005;
   d. Annual estimates of the following flows for current conditions:
      i. Peak I/I
      ii. Total yearly I/I;
   e. A description of the Town's future plans for identify and remove I/I.

4. By October 31, 2016, the Town shall complete and submit a Capacity, Management, Operation and Maintenance ("CMOM") Program Assessment of the Town's operation and maintenance practices (the "CMOM Program Self-Assessment") for review and comment to EPA and MADEP. The Town shall determine whether improvements to the Town's preventive maintenance practices are necessary in order to preserve the infrastructure of the Collection System and to prevent future unauthorized discharges from the Collection System. The CMOM Program Assessment shall be conducted in accordance with EPA's Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002, January 2005), which is available on-line at http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf. As part of the CMOM Program Assessment, the Town shall complete and submit the Wastewater Collection System CMOM Program Assessment Checklist ("CMOM Program Self-Assessment Checklist") (see Attachment

No. 1), which is a Region 1 modification of the checklist that accompanies the above-referenced guidance.

5. By February 28, 2017, the Town shall submit a CMOM Corrective Action plan (the "CMOM CAP") for review and comment to EPA and MADEP. The Town shall immediately and continuously implement the CMOM CAP. The Town shall incorporate any comments provided by EPA or MADEP into its CMOM CAP. The CMOM CAP shall, at a minimum, include the following:
   a. a list of any action items identified by the CMOM Program Self-Assessment;
   b. a list of causes and contributing factors that lead to the unauthorized discharges identified in the Collection System Unauthorized Discharge Summary, described in IV. 1, above;
   c. a description of the specific short and long-term actions that the Town is taking, or plans to take, to address any of the deficiencies identified in IV. 5. a or b;
   d. a schedule for the completion of actions required to bring back on-line back-up equipment at the WWTF that currently is not operational; and
   e. a schedule for implementation of the CMOM CAP (the "CMOM CAP Implementation Schedule").

6. By June 30, 2017, the Town shall submit a CMOM Program Manual to EPA and MADEP for review and comment. The CMOM Program Manual shall contain all information used by the Town to properly operate and maintain the Collection System and minimize the frequency, duration, and volume of unauthorized discharges. The CMOM Program document shall be maintained at a location that is readily accessible to the Town's maintenance staff and shall be updated periodically thereafter in an iterative manner. The subject areas shall include, but are not limited to, the following topics:
   a. Collection System Management
      i. Organizational Structure
      ii. Training
      iii. Internal Communication
      iv. Customer Service
      v. Management Information Systems
      vi. Unauthorized Discharge Notification Systems

vii. Legal Authority;

b. Collection System Operation

i. Budgeting

ii. Monitoring

iii. Hydrogen Sulfide Monitoring and Control

iv. Safety

v. Emergency Preparedness and Response

vi. Modeling

vii. Mapping

viii. New Construction

ix. Pump Stations;

c. Equipment and Collection System Maintenance

i. Maintenance Budgeting

ii. Planned and Unplanned Maintenance

iii. Sewer Cleaning

iv. Parts and Equipment Inventory;

d. Sewer System Capacity Evaluation – Testing and Inspection

i. Flow Monitoring

ii. Sewer System Testing

iii. Sewer System Inspection;

e. Sewer System Rehabilitation.

7. Until further notice, beginning March 31, 2017, and each March 31st annually thereafter, the Town shall submit a CMOM Program Implementation Annual Report (the "CMOM Annual Report") to EPA and MADEP, detailing the actions taken by the Town during the prior calendar year, or known by the Town to have been taken by other parties, to resolve the deficiencies identified in the CMOM Corrective Action Plan and to comply with this Order. The CMOM Program Implementation Annual Report shall also include:

a. a summary listing of all unauthorized discharges that have occurred during the last calendar year, including all of the information outlined in item IV.1 of this Order;

b. a map or maps of the Town's Collection System showing the location of each unauthorized discharge included in the summary listing;

c. a detailed description of the actions taken during the previous calendar year to address any action items included in the CMOM Corrective Action Plan, including updates to the CMOM Program Manual, required in IV.6, above; and

d. a description of the actions that will be taken during the current calendar year to address any action items included in the CMOM Corrective Action Plan.

8. By July 31, 2019, the City shall submit an updated Third Year CMOM Program Self-Assessment Checklist to EPA and MADEP.

9. All work pursuant to this Order shall be performed using sound engineering practices to ensure that construction, management, operation and maintenance of the Town's Collection System complies with the CWA, including practices to improve the resilience of the sewer system to the impacts of climate change.

## V. NOTIFICATION PROCEDURES

1. Where this Order requires a specific action to be performed within a certain time frame, the Town shall submit a written notice of compliance or noncompliance with each deadline. Notification of compliance shall be mailed within 14 days after each required deadline. The timely submission of a required report shall satisfy the requirement that a notice of compliance be submitted.

2. If noncompliance is reported, notification shall include the following information:

a. A description of the noncompliance;

b. A description of any actions taken or proposed by the Town to comply with the lapsed schedule requirements;

c. A description of any factors that tend to explain or mitigate the noncompliance; and

d. An approximate date by which the Town will perform the required action.

3. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting any required documents or providing EPA with a written report indicating that the required action has been achieved.

4. Submissions required by this Order shall be in writing and shall be mailed to the following addresses:

U.S. Environmental Protection Agency
5 Post Office Square - Suite 100
Mail Code: OES04-3
Boston, MA 02109-3912
Attn: David Turin

and

Massachusetts Department of Environmental Protection
Southeast Region Main Office
20 Riverside Drive
Lakeville, MA 02347
Attn: David Burns

In addition, electronic copies of submissions shall be emailed to the following addresses: turin.david@epa.gov and david.burns@state.ma.us. EPA or MADEP shall notify the Town in writing of any changes to the contact persons or addresses.

## VI. GENERAL PROVISIONS

1. This Order does not constitute a waiver or modification of the terms and conditions of the NPDES Permit. The NPDES Permit remains in full force and effect. EPA reserves the right to seek any and all remedies available under Section 309 of the Act, 33 U.S.C. § 1319, as amended, for any violation cited in this Order.
2. The Town waives any and all claims for relief and otherwise available rights or remedies to judicial or administrative review which the Town may have with respect to any issue of fact or law set forth in this Order, including, but not limited to, any right of judicial review of the Section 309(a)(3) Compliance Order on Consent under the Administrative Procedure Act, 5 U.S.C. §§ 701-708.
3. Any material modification to the terms of this Order shall be by written agreement of the Parties. Any nonmaterial modifications to the terms of this Order, such as approval of

modifications to submissions to EPA and MADEP or the due dates of such submissions, shall be effective upon written approval from EPA.

4. This Order shall become effective upon signature by both parties (the "Effective Date").

| | |
|---|---|
| Date | Susan Studlien, Director<br>Office of Environmental Stewardship<br>Environmental Protection Agency, Region 1 |

Consented to by:

| | |
|---|---|
| 5-4-2016<br>Date | Philip E. Lemnios, Town Manager<br>Hull, Massachusetts |

World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs

# Model Code of Practice:

## Principles of Climate Change Adaptation for Engineers

**Prepared by:**

**WFEO Committee on Engineering and the Environment**

**December 2015**

# 1 Foreward

This Model Code of Practice provides further amplification and explanation to engineers and national engineering organizations to interpret and implement principles of climate change adaptation at a practical level. It is intended for practicing engineers who are members of one or more of the national organizations who are members of the World Federation of Engineering Organizations (WFEO). The Model Code of Practice has been prepared as a complement to the WFEO Model Code of Ethics for Engineers and the Model Code of Practice for Sustainable Development and Environmental Stewardship.

The Model Code of Practice supports the WFEO vision of the global engineering profession supporting the achievement of the United Nations Sustainable Development Goals.

The Model Code of Practice reflects the use of engineers' judgement by the use of the 'Should, May, Shall' terminology.[1]

The word *should* is used to indicate that among several possibilities, one is recommended as particularly suitable without necessarily mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain course of action is disapproved of but not prohibited (*should* equals *is recommended that*). The word *may* is used to indicate a course of action permissible within the limits of the guide (*may* equals *is permitted*).

Governing bodies for engineers who wish to adopt a version of the Model Code of Practice in whole or in part are advised to consider substituting the word *shall* for the word *should* to indicate requirements that must be followed (*shall* equals *is required to*) to effectively implement in their jurisdiction.

Governing bodies for engineers who wish to reference or recommend, instead of adopting, the Model Code of Practice in whole or in part, are advised to communicate that the Model Code of Practice are voluntary i.e. it is not binding on their organization or its individual engineers unless they wish to make it so.

National bodies who register but do not necessarily govern engineers may wish to adopt or endorse this Model Code of Practice voluntarily as a best or preferred practice to assist their members.

# 2 Acknowledgments

This Model Code of Practice was developed by the WFEO Standing Technical Committee on Engineering and the Environment. It was approved by the WFEO General Assembly in December 2015 for distribution to national and international members and placement on the WFEO website (www.wfeo.org)

[1] The 'Should, May, Shall' terminology has been generalized from **National Guideline on Environment and Sustainability**, Engineers Canada (2006). http://www.engineerscanada.ca/e/pu_guidelines.cfm

The primary source document for this publication is from Engineers Canada entitled "Principles of Climate Change Adaptation for Professional Engineers", published in October 2014. (http://www.engineerscanada.ca/sites/default/files/01_national_guideline_climate_change_adaptation.pdf).

## 3 Summary

The climate is changing. Historical climatic design data is becoming less representative of the future climate. Many future climate risks may be significantly under-estimated. Engineers cannot assume that the future will be similar to the past. Historical climate trends cannot be simply projected into the future as a basis for engineering planning, design, operations and maintenance of infrastructure.

The World Federation of Engineering Organizations and its national and international members are committed to raising awareness about the potential impacts of the changing climate as these relate to engineering of existing and future civil infrastructure and buildings. Engineers are encouraged to keep themselves informed about the changing climate, and consider potential impacts on their professional activities.

The Model Code of Practice is provided as guidance to engineers to consider the implications of climate change in their professional practice and that they create a clear record of the outcomes of those considerations. It consists of nine principles that constitute the scope of professional practice for engineers to initiate climate change adaptation actions, particularly for civil infrastructure and buildings. The principles are summarized into three categories:

1. Professional judgment
2. Integrating Climate Information
3. Practice guidance

*Professional Judgment*

**Model Code Principle # 1**: Integrate Adaptation into Practice

**Model Code Principle #2:** Review Adequacy of Current Standards

**Model Code Principle # 3**: Exercise Professional Judgement

*Integrating Climate Information*

**Model Code Principle # 4**: Interpret Climate Information

**Model Code Principle # 5**: Work with Specialists and Stakeholders

**Model Code Principle # 6**: Use Effective Language

*Practice Guidance*

**Model Code Principle # 7**: Plan for Service Life

**Model Code Principle # 8:** Use Risk Assessment for Uncertainty

**Model Code Principle # 9**: Monitor Legal Liabilities

The principles described in the Model Code of Practice support sound professional judgment for this element of engineering practice. Adapting to climate change presents beneficial opportunities to save money and protect public health and safety.

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# 4 Introduction

## 4.1 Background

The primary duty of engineers is to hold paramount the safety, health and welfare of the public and the protection of the environment and promote health and safety within the workplace.

The current state of scientific knowledge indicates that the climate is changing and will continue to change. Furthermore, evidence suggests that climate change has led to changes in climate extremes such as heat waves, record high temperatures and, in many regions, heavy precipitation in the past half century (Intergovernmental Panel on Climate Change). The IPCC in its report Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (2012) notes that climate extremes, or even a series of non-extreme events, in combination with social vulnerabilities and exposure to risks can produce climate-related disasters.[2]

Changing climate conditions, particularly weather patterns that deviate from historical climate ranges, may adversely affect the integrity of the design, operation, and management of engineered systems. It is vital, therefore, for engineers to consider how those systems might appropriately anticipate the impact of changing climate conditions. In some cases, changing climate conditions result in impacts that pose un-accounted for risks.

It is incumbent upon the engineering profession to continue to advance means and practices to address the impacts of climate change within engineering works. Engineers in practice can contribute to this goal in two ways. First, engineers who design public facilities and infrastructure, and those who retain them, should recognize the need to accommodate the changing climate at the local level so as to protect the public health and safety. Second, engineers should contribute their expertise in furthering the level of awareness of this issue and communicating the risks and impacts arising from more intense and severe weather events. Scientific literature indicates significant departures from historical climate averages occurring globally, and engineering design should account for an expanded range of climate in the operating environments intended for their designs.

Engineers have a wide diversity of occupations and responsibilities. Many are involved in different types of economic and product development, which occur in a cost effective, socially and environmentally responsible manner. Engineers develop new projects and public infrastructure and keep existing facilities operating effectively. They explore resources and design economic and sustainable methods of developing these resources.

Engineers work as employees, employers, procurement and selection officers, researchers, academics, consultants, and in regulatory and managerial roles. They frequently work as a team where they are involved and must collaborate with other specialists in multi-disciplinary teams. An individual may or may not have control of, or be solely responsible for, a particular project. Regardless of the nature of their contributions, professional engineers should always pay heed to the public health and safety aspects of the project.

[2] IPCC Press Release. http://ipcc-wg2.gov/SREX/images/uploads/IPCC_Press_Release_SREX.pdf

Engineers are expected to exercise professional judgment and due diligence in the execution of their work. That expectation includes practicing in accordance with the code of ethics of the association in which they are licensed, provincial and federal laws, restricting practice to areas of personal expertise and practicing in accordance with established standards.

Engineers may or may not be directly managed by other engineers. Regardless, engineers should be encouraged and supported in making decisions that appropriately accommodate changing climate conditions, even if data pertaining to these changes is sparse. Management and other team members also have a societal responsibility for the design, construction, operation and managing of safe engineered systems that may be impacted by climate change.

Legislation and regulation in the field of climate change adaptation is sparse. In the absence of such regulation, engineers need guidance on climate change in their professional work. This Model Code of Practice is intended to fill this gap.

## 4.2 Limitations

While engineers should advise their clients or employers regarding matters related to climate change adaptation that may impact the professional activities for which they are responsible, they are generally not in a position to ensure that the appropriate action is taken.

Engineers are not expected to assume responsibility for considering the implications of climate change adaptation in engineered systems beyond their scope of authority. For example, an engineer is not responsible for implementing solutions that address climate change adaptation since the engineer's scope of authority generally limits him or her from doing so. The scope of authority is provided by the client or the employer of the engineer.

While the engineer presents the alternatives and rationale for implementing solutions that address climate change adaptation, the decision on the form of such solutions remains with the client or employer. Nevertheless, in keeping with their professional obligations an engineer can and should appropriately communicate the risks associated with ignoring recommendations related to climate change adaption to their employer or client. Such communications should be clearly documented in the appropriate files.

## 4.3 Scope

The Model Code of Practice is strictly advisory in nature and is solely intended to assist engineers to balance competing interests. This document, through amplification and commentary of each of the nine principles, summarizes how an engineer should strive to influence the practice of engineering in a manner that anticipates the effects of a changing climate on engineered systems. The application of this guideline will always be a matter of professional judgment. Application of the guideline may require engineers to balance competing interests, an essential element of the practice of engineering.

## 4.4 Purpose

The Model Code of Practice is intended to inform, to provide guidance, and to encourage engineers and consulting engineering firms that provide infrastructure planning, design and construction services to be pro-active in managing the impacts of a changing climate on engineered systems. The document also provides a basis for understanding and accepting definitions for key terms and concepts applied in assessing climate-induced risks.

The Model Code of Practice offers a considered interpretation of the responsibilities of professional engineers to adapt to a changing climate.

## 4.5 Definitions

This guideline uses a number of terms that may not be used in an engineer's day-to-day practice. These are defined in **Appendix A.**

As this document evolves, new definitions will be added as necessary.

# 5 Engineers and Climate Change Adaptation

In 2001, the national members of WFEO agreed to an international code of ethics[3] :

> ***To hold paramount the safety, health and welfare of the public including people with activity limitations, and the protection of both the natural and the built environments in accordance with the Principles of Sustainable Development***

Furthermore:

> ***Be aware of and make clients and employers aware of societal and environmental consequences of actions or projects and endeavor to interpret engineering issues to the public in an objective and truthful manner***

These expectations provide engineers with a foundation for a method of addressing or discharging their professional responsibilities. That is, engineers must be mindful of the public health and safety aspects of their professional activities and are also bound to disclose issues that could compromise the integrity of their professional work.

How does this play out in real professional practice?

Professionals can only be accountable for establishing that their work addresses concerns that could ***reasonably*** be identified given the state of knowledge at the time they executed the work. But what does reasonable mean in this context? In engineering practice we define ***reasonable*** in terms of the standard of care. In this context, the expectation is that engineers should behave in a way that draws on the composite of the entire professional community's opinion of how a typical member should behave in the same circumstances.

It is notable that this standard does not require that the engineer be an expert. Rather, it is based on how a typical engineer, with a normal level of professional experience and training, would discharge their responsibilities. In engineering practice, when the engineer identifies areas of practice that are outside of the scope of their training and expertise, they are required to seek input and advice from other qualified professionals who do have that expertise.

Climate change imposes a new and evolving pressure on the practice of engineering.

This understanding is generally accepted within a broader societal context resulting in the layperson's belief that the climate is changing. This guideline outlines principles for adjusting normal engineering practice to mitigate such risks.

The word ***reasonable*** is used throughout this document. This language is used in the context of the above commentary. The guidelines offer a series of objectives for professional engineers to incorporate in their practice so as to reflect the understanding that the climate is changing and that historical

[3] World Federation of Engineering Organizations, **The Model Code of Ethics**, adopted in 2001

weather and climate information traditionally used by the professional may require adjustment. Such adjustments would account for the changing climate, based on scientifically defensible methods and projections that are documented as part of the engineering process. This document provides guidance on how to ***reasonably*** address the concern given the current level of understanding of the issue.

## 6 Model Code of Practice Principles

The principles that comprise the Model Code of Practice are divided into three categories. Within each category there are three principles that engineers should apply within their professional practice.

The nine principles constitute the professional practice required to initiate climate change adaptation actions.

Each principle is described in three parts:

- A description of the principle;
- An amplification of the principle; and
- Suggested implementing actions that address the guideline principle.
    - Examples of actions for engineers to address these concerns.
    - Engineers may identify additional actions or may decide that only a subset of the suggested actions is necessary or appropriate.

### *Professional Judgment*

**Principle # 1**: Integrate Adaptation into Practice

**Principle # 2:** Review Adequacy of Current Standards

**Principle # 3**: Exercise Professional Judgement

### *Integrating Climate Information*

**Principle # 4**: Interpret Climate Information

**Principle # 5**: Work with Specialists and Stakeholders

**Principle # 6**: Use Effective Language

### *Practice Guidance*

**Principle # 7**: Plan for Service Life

**Principle # 8** Use Risk Assessment for Uncertainty

**Principle # 9**: Monitor Legal Liabilities

## 6.1 **Principle # 1**: Integrate Adaptation into Practice

***All engineers are responsible and need to be engaged***

Engineers should integrate an understanding of changing climate and weather into the normal day-to-day design, operation, maintenance, planning and procurement activities for which they are professionally responsible. These activities constitute the scope of engineering work.

### 6.1.1 Amplification

Engineers participate in many facets of a country's economy. Instituting meaningful change into professional practice requires recognition of this reality. Simply changing professional expectations in one element of the design, supply, construction, operation chain, will be difficult and ineffective. Ultimately, professionals can only institute adaptation measures when there is a broader acceptance that these actions are required.

To this end, engineers engaged in each sector of the economy should integrate climate change adaptation considerations into their professional works. It is unreasonable to place this entire obligation on the much smaller group of professionals that work specifically in design functions. Without support from the rest of the profession, these practitioners may not be able to gain approval for adaptation measures that exceed codes, standards or professional guidelines; especially if those changes result in higher overall project costs.

Understanding the potential of adverse impacts from climate change is especially relevant for those engineers that are in significant decision-making positions. These individuals establish the environment within which other professionals must function. They should establish organizational objectives that incorporate the recognition that climate change may demand professional practice that may exceed codes, standards and professional guidelines. Accepting this, the policy environment would furthermore be amenable to reasonable increases in project costs that address climate adaptation objectives. By establishing this environment, the decision-maker enables their subordinates and contractors to take reasonable actions to address climate change in their professional works.

Similarly, those professionals that work in procurement positions, setting project specifications and reviewing competitive proposals should include requesting consideration of current and future climate impacts on their projects. Achieving sustainable infrastructure that will last its whole service life without major damage or disruption will lower life cycle costs.

Foregoing consideration of climate change impacts in project scope may not lead to life cycle cost avoidance. The costs of future damage and disruption of service may far outweigh the incremental costs of anticipating climate change. Engineers engaged in, and advising others involved in infrastructure specification and procurement should recommend including climate considerations. Engineers in management positions or advising management should recommend the provision of sufficient financial resources or proposal evaluation incentives to support the integration of climate considerations.

Finally, those engineers in maintenance and operation functions see the impact of extreme weather events as well as creeping climate change on a daily basis. They should not only operate systems for which they are responsible sustainably, but also, should clearly identify the impacts to which they are responding to other professionals and managers/owners. The other professionals may have the capacity to incorporate appropriate changes in policies and procedures as well as their professional works, codes, standards and guidelines to reduce the impacts in the longer term.

Engineers rely on the work of other engineers and other professionals to support their work. It is critical that the profession, as a whole, create an environment where climate change adaptation is not only an accepted part of daily practice, but also, a guiding principle of professional practice. Individual engineers should make reasonable efforts to incorporate adaptation into their personal professional practice through continuing professional development and experience.

### 6.1.2 Implementing Actions

The following actions can help engineers integrate the consideration of, and adaptation to climate into their scope of practice. This will vary widely across disciplines and the nature of the engineering works or task being performed. Not all engineers will need the same level of integration into their practice; however, virtually all engineers engaged in direct and indirect work associated with all types of physical infrastructure should be aware of the climate change issue and always consider, if and how their work could be affected by current and future climate.

For designers, the need to incorporate climate change considerations into the work can be realized through the following actions:

1. Listing the climate change predictions and potential impacts for the area where your project is located;
2. Discussing the aspects of the project the engineer believes could be impacted;
3. Detailing what has been done in the design to mitigate those impacts; and
4. Detailing what additional/revised O&M and inspection procedures are recommended within the design-life of your project.

All engineering disciplines should use professional judgment to modify the above noted actions to address the specific job or circumstance.

The following additional actions are suggested as good practices. Not all of these may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions in addition to those listed here. Any successful practices or improvements should be reported to their national body and the World Federation of Engineering Organizations. These will be incorporated into the next edition of this model code of practice.

- Maintain a record of actions undertaken within daily practice that facilitate addressing climate change issues
- As appropriate, pursue education and training on climate change and meteorology to provide a scientific grounding on the subject matter that form a basis for climate change adaptation actions
- If an engineer is responsible for specifying engineering work, the specification should explicitly include consideration of climate
    - Consider the long term sustainability of the infrastructure
    - In procurement, allow margins to accommodate climate adaptation measures
    - In management, be receptive to recommendations that address climate risk

- Review operations, maintenance and management procedures and practices to accommodate future climate risks
- Consider using approaches that balance economic, environment and social considerations in recommending and implementing adaptation measures.
- Explicitly identify the requirement for identifying climate adaptation measures in contracted engineering work and reward proposals that include such recommendations.
- In defining environmental impact assessment terms and conditions, include climate change implications of the proposed project.

## 6.2 **Principle # 2**: Review Adequacy of Current Standards

***Review applicable codes and standards and advise stakeholders on potential revisions or updates***

Engineers should review the local design standards used within their professional practice. These standards should reasonably represent the current and anticipated climate that the engineered system will experience over its useful operating life.

### 6.2.1 Amplification

Given the potential impact of changing climate on engineering works, it may no longer be appropriate for professionals to simply rely on the veracity of codes, standards and professional guidelines that include embedded climate assumptions. In the course of their professional practice they may make changes to their professional practice that would be generally applicable to professional practice in their discipline. In this case, the professional should actively work towards the adoption of those changes in codes, standards and professional guidelines, as appropriate. Engineers must adhere, as a minimum, to published codes and standards, even when evidence may suggest that designing below a code or standard is possible.

The professional should routinely review and challenge the tools that they use in their practice. This is an outcome of ***Principle # 1***, but the focus of this principle is broader than the assessment of an individual project or work conducted by the professional. Knowledge gained through ongoing review of the professional's tools should be shared and ultimately universally represented in the tools of their professional discipline. Once a professional has identified a deficiency in a code, standard or professional guideline, they should promptly share their findings within their professional community. This will reduce the risk that the deficiency they have identified will creep into other professionals' work leading to threats to public health and safety.

The obligation to review professional tools also covers those used by professionals on a daily basis, such as procedures, codes of practice, rules of thumb, etc. These tools should be evaluated within the context of each situation to which the professional applies the tool and on a routine basis. As the professional identifies even small modifications to their tools, they should document the changes and share them within the group of professionals who would normally use the tools. For example, do historical return periods in available flood statistics accurately reflect recent trends in flooding? In many cases, a 1 in 100 year event derived from an older historical record may not reflect conditions where flooding is more frequent in recent years.

### 6.2.2 Implementing Actions

The following are suggested actions engineers should undertake to aid in their use of current codes and standards that include climate parameters. This includes advising other engineers and codes and standards governing bodies when a code or standard with embedded climate parameters warrants review of possible change based on evidence from practice.

Not all of these actions may be appropriate to the situation at hand nor is the list complete. Engineers are encouraged to develop their own successful strategies and experiences. Notifying their national body and the WFEO will enable the model code of practice to be updated to reflect most current and best practices.

- As a minimum, apply the most up to date revision of relevant practice guidelines, codes and standards, as a baseline from which climate change adaptation measures are applied.
- Create a file of adjustments made to codes, standards and assumptions to accommodate changing climate. As appropriate, communicate adjustments:
    - Within the department, division or organization;
    - To the employers and clients;
    - To professional societies, associations or groups; and
    - To standards organizations and regulators who developed the codes and standards.

## 6.3 Principle # 3: Exercise Professional Judgment

***Evaluate and document the impact of climate on engineering works***

A reasonable standard of professional judgment should be applied in order that changing climate conditions are considered within their professional practice.

### 6.3.1 Amplification

Engineers are held to a higher standard of reasonable care than the average layperson. By virtue of the professional's training and experience, they are expected to apply a high level of expertise to issues that affect their professional practice. Engineers are expected to be aware of the limitations of their professional scope and access other qualified professionals to augment those areas where they may not be fully qualified to express professional judgment. Through extensive media coverage, the average layperson is cognizant of the climate change issue and its potential for disruptive and serious impacts. Similarly, the average engineer should also be sensitive to the potential for changing climate conditions and appropriately apply these sensitivities to their professional practice. Given the level of public awareness of the climate change issue, a professional cannot make the argument that they were unaware that climate change could potentially affect their professional work.

This model code of practice should not be interpreted to mean that an engineer should become an expert on weather and climate issues. Rather, the expectation is that engineers should, as part of their normal practice, determine where climate information is embedded in codes, standards and assumptions and evaluate how the information is applied in their professional work. Where climate information is embedded in their professional work, they should challenge the information to assess if changing climate conditions might affect the information leading to a wider spectrum of operating environments that could lead to unanticipated outcomes from their engineering work. As a best practice, the engineer should document that they have undertaken this analysis and the outcomes. As part of this documentation, the engineer should outline their rationale for:

- Not making adjustments to climate information embedded in their work;
- Changes that they may have made; and
- Any other factor that may have been considered including, but not limited to, the results of their consultations with outside experts on the climate change issues affecting their work.

The overall intent of this principle is that engineers should consider the implications of climate change on their professional practice and that they create a clear record of the outcomes of those considerations.

### 6.3.2 Implementing Actions

The following actions are suggested to aid professional judgment. Not all may be appropriate to the situation at hand nor is the list complete. As engineering practice in climate change adaptation evolves, the nature and range of examples to help guide future practice will no doubt increase and will be reflected in future updates to this model code of practice.

- Develop a checklist of climate parameters with potential to impact performance of design.
- In the process of design, operation, procurement, management and maintenance activities, confirm applicability of climate information that may be embedded in codes, standards and assumptions.
- In engineering working papers, spreadsheets and other documents note that the review has been completed and prepare an accompanying memo to file that the review was completed. Outline where:
    - No changes have been made to climate information embedded in the work;
    - Changes have been made and the rationale for making them;
    - Any other factor that may have been considered including, but not limited to, the results of consultations with outside experts on the climate change issues affecting the work; and
    - The date of the review.
- The engineer responsible for engineering activity should sign the accompanying memo.

## 6.4 **Element # 4**: Interpret Climate Information

| ***Consult with climate scientists and specialists*** |
| --- |

Engineers should work with climate and meteorological specialists/experts in order that interpretations of climatic and weather considerations used in professional practice reasonably reflect the most current scientific consensus regarding the climate and/or weather information.

### 6.4.1 Amplification

Many engineers do not have the extensive training or experience in managing and assessing climate and weather information necessary to be considered expert in the field. Historically, the professions have been consumers of such information, relying on government agencies and other authorities to package information into the formats used within their professional practice.

Assessing climate information can be a very subtle and technically demanding activity requiring a significant level of professional expertise. On the other hand, climate and weather specialists may not have a detailed understanding of the nature of the professional engineer's area of practice and may find it difficult, without guidance, to provide climate and weather information that is meaningful within the professional's area of practice.

These groups should work together to identify and develop the sorts of data that address the professional engineer's technical requirements. Engineers should secure the technical expertise and support provided by climate scientists and experts.

Climate and weather information often may contain embedded uncertainties or sensitivities. Climate experts are aware of these issues and can help the professional engineer come to grips with the overall quality of the information they are being provided. Furthermore, the engineer could apply climate and weather information in ways that are completely inappropriate based on the methodological limitations of the processes used to develop that information. The engineer should work with climate and weather specialists to gain a fulsome understanding of the strengths and limitations of the information they are using. Armed with this understanding, the engineer will be better equipped to incorporate appropriate measures within their own work to accommodate the quality of the information they are using.

Key to understanding future climate conditions is a fundamental knowledge of historical and current climate conditions and how these have evolved.

While consulting with weather and climate specialists, it is important to develop a firm understanding of historic weather information to develop a baseline. Engaging a specialist is even more important with respect to climate change information. Climate change projections are based on very sophisticated modeling and analysis derived from socioeconomic and greenhouse gas emission forecasts. A large number of models are used in developing climate projections and the models all have different strengths and weaknesses. Due to the inherent uncertainty associated with modeling, current practice is to apply an ensemble approach where more than one model is used to establish the boundaries of projected climate change. Furthermore, the underlying emission forecasts and socioeconomic assumptions are often not stated when presenting climate change projection information.

While these factors introduce some uncertainty into climate projections, the uncertainty can be managed through appropriate data treatment and climate scenario development. These practices are typically outside of the experience of the professional engineer. It is therefore important that engineers consult with climate experts in order to understand the overall integrity and limitations of the information they are planning to use and can incorporate appropriate measures from their own professional discipline to accommodate these factors within their professional work.

The OURANOS Consortium on Regional Climatology and Adaptation located in Montréal, Quebec, Canada has published a guidebook on climate scenarios and the use of climate information to guide adaptation research and decisions[4] . Published in September 2014, the guide is a resource for climate change adaptation decision-making and research. The following is an excerpt from the Executive Summary (reproduced with permission):

"*This guide is a tool for decision-makers to familiarize themselves with future climate information. It is aimed at all actors involved in climate change adaptation, from those in the early stages of climate change awareness to those involved in implementing adaptation measures.*

*The guide consists of three main sections. The first categorizes climate information based on its use and on its level of complexity. The second section presents a catalogue of different ways in which climate information can be presented to decision-makers, such as planners, engineers, resource managers, and government. Finally, a third section outlines key climate modeling concepts that support a good understanding of climate information in general.*

*This document is not detailed enough to inform users on how to prepare different types of climate information, nor is it intended as a critical analysis of how the information is produced. Rather, it highlights the importance of working in collaboration with climate service providers to obtain climate information. The guide allows users to engage more easily with climate service providers and to become more critical of the information that is provided to them. It should be recognized that, at this point in time, the number of climate service providers is low relative to the demand for climate information.*

*Using this guide will allow engineers to become more familiar with climate information products and hence better evaluate what climate information best suits their needs*."

Key important messages emerging from the guide include:

- Climate information at different levels of complexity can be valuable, depending on the type of decision being made
- More detailed information is not always necessary to inform better decisions
- Climate information can be tailored into formats that best match the level of expertise of the decision-makers
- Decisions should be based on a range of plausible futures; a single best climate scenario does not exist

It is important to understand the limitations of the climate information used. Engineers are cautioned that whatever climate information or methodologies used in their professional work should be considered scientifically defensible by the climate specialists they consult.

4 Charron, I. (2014). A Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions. Ouranos, 86 p.

ISBN (Print) : 978-2-923292-14-4

ISBN (PDF) : 978-2-923292-16-8

Copies of this guidebook can be downloaded from http://www.ouranos.ca/

### 6.4.2 Implementing Actions

The following are some suggested actions to aid engineers in interpreting and assessing climate information. Not all of these may be appropriate to the situation at hand nor is the list complete.

- List climate information needs in terms of parameters that are listed in codes, standards, guidelines and "rules of thumb" as well as other information that is not formally codified within codes, standards, etc. but are nonetheless relevant to the professional work.
    - Develop the current climate profile based on analysis of historical weather data
    - Estimate the changes in frequency and value of extreme values of relevant climate parameters based on scientifically defensible methods of future climate projections over the service life of the engineered system
    - Engage climate scientists and climate experts as appropriate to derive current and future extreme values and frequencies of relevant climate parameters

For this climate information seek the advice from climate scientists and climate experts to define the:

- Associated uncertainties with the information;
- Assumptions made;
- Data sources; and
- Relative differences between current climate data derived from measured metrological data and projected climate information based on modeling.
- Scientific validity of the methods and data used to derive current and future climate parameter values and frequencies

- Assess the criticality of the impact of the climate assumptions on the overall engineering design and function of the system.
- Determine if the assumptions and factors have undergone recent review/update in light of climate change.
- Review the assumptions and factors with climate experts to assess the applicability of the assumptions and factors over the anticipated service life of the design.
- Based on professional judgment, add appropriate safety factors or margins to plans and designs to accommodate anticipated future climate conditions in relation to the current climate conditions and where applicable and available, the climate design parameters used in the original design.

## 6.5 **Principle # 5**: Work with Specialists and Stakeholders

| ***Work with multi-disciplinary and multi-stakeholder teams*** |
|---|

Engineers should work with others, including those that are not engineers, in order to have a full understanding of the implications of changing climate and weather on the engineered systems for which they are responsible.

### 6.5.1 Amplification

Engineers normally work in multi-disciplinary teams. However, it is quite common for engineers to define those teams with respect to disciplines within engineering. To address climate change, the definition of multi-disciplinary teams should be expanded to include a much broader spectrum of players. The need for climate specialists is outlined in ***Principle # 4***. However, the impacts of climate change can be far reaching and outside of the scope of an engineer's normal practice. To accommodate this reality, the professional should structure project teams in order that, as a minimum, the team possesses:

- Fundamental understanding of risk and risk assessment processes;
- Directly relevant engineering knowledge of the system;
- Climatic and meteorological expertise/knowledge relevant to the region;
- Expertise in natural sciences such as hydrology, geology, forestry, biology and other specialized sciences;
- Hands-on operation and maintenance experience with the system or similar systems;
- Hands-on management knowledge with the system or similar systems;
- Local knowledge and history, especially regarding the nature of previous climatic events, their overall impact in the region and approaches used to address concerns, arising; and
- High awareness of levels of process or design "minimum acceptable performance" for the community and stakeholders reliant on the design.

Additionally, the professional should also consider adding skills for the team in:

- Natural sciences (geologists, hydrologists, agronomists, etc.) as appropriate to the geographic location and climatic region in which the engineering work is located;
- Social impact analysis (social scientists and policy specialists);
- Environmental impact analysis;
- Economic impact analysis;
- Political decision makers;
- Insurance specialists;
- Environmental practitioners'
- Community stakeholders;
- Emergency planning and response specialists; and
- Others stakeholders as appropriate. This may include members of the public or at the political level e.g. city councilor.

Practitioners may possess more than one of the requisite skill sets. Thus, teams may comprise a smaller number of individuals than the skills list may suggest. Engineers should evaluate the skills represented on their teams in order to have the right balance of skill and experience represented to reasonably anticipate climate change and incorporate reasonable adaptive measures into the project.

Where professionals do not have the skills outlined above, they should consult with other qualified professionals to augment the team's expertise, as they would normally do when they encounter issues outside of their professional scope of practice.

### 6.5.2 Implementing Actions

The following actions can help engineers secure the requisite range of skills and expertise that are needed to identify potential climate risks and impacts as well as develop acceptable adaptation solutions. Not all of these may be needed or appropriate as skill set needs depend on the situation at hand and the stakeholders that need to be involved.

The engineer is encouraged to give thought to and implement other actions or engage other stakeholders and expertise not listed in this guideline. These should be reported to their national body and the WFEO. These will be incorporated into the next edition of this model code of practice.

- During the formation of multi-disciplinary teams, review the overall service life and operability requirements of the engineered system in order to have the entire range of skills necessary to assess climate implications of the work are covered

  In working papers and files maintain a written record of the team membership and skill sets and training of each member of the multi-disciplinary team relative to the project/assignment.

## 6.6 **Element # 6**: Use Effective Language

| ***Communicate effectively*** |
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Engineers should communicate about climate change adaptation issues and recommendations using simple, unambiguous, language.

### 6.6.1 Amplification

Engineers possess unique technical knowledge and skills necessary to plan and implement effective adaptation to changing climate conditions. However, engineers can only implement those adaptive measures when decision-makers approve these actions. Sometimes, decisions are politically motived and arguments based on pure logic and cost analysis may not be persuasive.

In most circumstances, the engineer cannot implement adaptive measures independently. This places a demand on the engineer to communicate effectively with the decision-maker about climate change adaptation issues and the associated risks. As part of this communication, the engineer should clearly communicate the costs and benefits of recommended actions and how those actions mitigate the identified risks. It is important that the engineer clearly articulate the economic benefits of the adaptation measure and the potential costs of not adapting to the identified risks.

The complexities and uncertainties inherent in the engineer's work should not cloud the necessity for action. Assessing climate change impacts demands a significant level of professional judgment that can be perceived to be subjective. However, professional judgment is a level of competence and knowledge of technical standards obtained through many years of training and professional practice guided by practitioners with many more years of professional practice in a specific area of professional practice. Thus the judgment applied by professionals on climate change should be based on a solid foundation of technical expertise and experience.

It is not unusual for expert practitioners to communicate using language embedded with technical terms. Even more perplexing, professionals may use common language with nuanced or very different meanings than the average person. The layperson may not know the meaning of the language being used by the professional and may not fully appreciate the full message the professional is attempting to convey. In addition, they may not know that they do not fully understand and may interpret the professional's language incorrectly resulting in inappropriate responses.

This is a very subtle problem. For their part, engineers may not realize that they have been misunderstood until the decision-maker takes decisions that do not seem to address the concerns the professional was attempting to convey.

Given the critical importance of these issues, the engineer should take all reasonable measures to be correctly understood. They should alter their language so that an average layperson can understand the magnitude of the risks. In addition, the professional should understand how they may be using common language in different ways than the average layperson. This is a situation where the professional cannot afford to simply sound knowledgeable, but rather should focus on communicating their knowledge and ensuring that they are appropriately understood.

When decision-makers have a fulsome understanding of the issues they are facing, they are much better equipped to place the climate change adaptation concerns in the broader context of the entire range of issues that the decision-maker is managing. With this context, they are better placed to advance appropriate, well rounded, decisions on climate change adaptation matters.

The need for communicating in clear and effective language also includes the professional's interactions with the general public. The professional may sometimes be required to communicate to the public such as during public consultation on behalf of a client or in representing their client or employer with media. In these circumstances, the professional should strive to clearly communicate the issue using language easily understood by the layperson. The public can influence decision makers to take either appropriate or inappropriate actions in response to climate change adaptation recommendations. The professional should strive for an accurate, if not comprehensive, understanding of the issues and recommended adaptive measures by the general public.

Finally, the professional may find that they have identified and communicated climate risks and adaptive measures to non-receptive decision makers. The decision maker may opt to reject or, even worse, simply ignore the professional's recommendations. In this situation the professional must assess the potential long-term implications of the decision maker's actions and decide if they are obliged, in the interest of public health and safety, to communicate their concerns more broadly. This situation is not unique to climate change, and the profession has a long history in managing such issues. The Code of Ethics holds the duty to the public welfare paramount in these situations, and the professional may be required to first advance the issue within their own organizations and then finally outside with regulators and other responsible external agencies.

Registering bodies may provide guidance and advice to engineers who suspect that they are in such a situation.   For climate change adaptation the question is a bit less certain as the case law on these matters is evolving.  However, it is essential for professionals to recognize that their professional obligations regarding climate change risks may not be satisfied simply by proposing actions to decision makers.

### 6.6.2 Implementing Action

The following actions can help engineers review communication of climate risks, costs and adaptation actions to decision-makers and the public as necessary. Not all of these may be needed or appropriate for the situation.

The engineer is encouraged to give thought to and implement other actions that result in improved and effective communication or climate risk, impacts and adaptation actions. These should be reported to their registering body and WFEO. These will be incorporated into the next edition of this model code of practice.

- Review each piece of professional writing with an eye to the intended audience for the piece.
    - In aid of clearly communicating the primary message of the piece, revise, edit and adjust the language used in the piece applying common language and expressions more likely to be understood by the audience.
    - As necessary, discuss suitable language with the intended audience and come to an agreement regarding the definition of terms used in the writing.
    - In situations where common language may not suffice, include sufficient background information and definitional material to promote the audience's understanding.
- Where the professional does not have the skills or expertise to simplify the writing, consult with or engage suitably qualified communications professionals in revising the piece for more general, broader, understanding.
- Consider hiring a communications consultant to redraft the language to convince the necessary decision-making audience(s)
- Assume that each piece of writing may be misunderstood and challenge the writing from different perspectives to identify areas where simplification or greater amplification may be necessary.
- Work with other members of the multi-disciplinary team and stakeholders engaged in the work for appropriate communication to different target audiences and stakeholders that will inform, or trigger evidence based decision-making with regards to climate change adaptation

## 6.7 **Principle # 7**: Plan for Service Life

| ***Consider the entire service life of the engineering work*** |
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Engineers should give reasonable consideration to the impact of changing weather and climate conditions over the entire service life of an engineered system.

### 6.7.1 Amplification

Climate change is a long-term issue. Climate models project changes in climate parameters twenty, forty, even one hundred years into the future. The uncertainty in climate projections increases as the time horizon for those projections is extended farther into the future. Engineers develop and operate works that must be resilient to changing climate conditions over similar periods. Stable climate conditions observed in the past or even today may not be sustained throughout the entire service life of a project.

Engineers may find this a daunting task. Many large infrastructure systems are designed for an extended service life. If climate conditions change over that service life, it can be difficult to adapt the engineered system to the new environment without wholesale changes to the system. However, the engineer is not being asked to make perfect decisions that correctly anticipate all future events. They are being asked, based on professional judgment, to make ***appropriate*** decisions within the context of current scientific, economic and social constraints.

The refurbishment of infrastructure allows for checkpoints throughout the service life of a system. If there are no refurbishment opportunities, then the evaluation of climate change in the initial design becomes more critical, as the system will have to stand for a very long time without any routine opportunities to adjust. Even in these cases, many climate risks can be addressed through enhancements in operations, maintenance and management procedures and practices.

There are two facets to this issue. First, while it is difficult to anticipate climate change impacts forty or one hundred years hence, professionals should nonetheless contemplate the possible impacts of such change. Second, while projects may last for extended periods, they are normally subject to periodic refurbishment and upgrading that will afford the professional opportunities to incorporate appropriate adaptive measures at a number of points over the life of the project.

Engineers should capitalize on refurbishment opportunities to review, revise and adapt during the life of a project. Replacement in kind may not be the appropriate professional response for refurbishing a system. The engineer should evaluate the possibility that climate change may have contributed to the observed wear and tear on the project and upgrade the system appropriately. Furthermore, the professional should consider not only the useful life of the project, but also the useful life of the refurbishment activities with respect to climate change impacts. Even if the system elements being refurbished are not presently seeing the impact of climate change, it is possible that they will experience those impacts before the next refurbishment is planned. The engineer should contemplate those impacts in refurbishment planning in the same way that professionals would consider these factors for a new project.

In some ways, anticipating climate change on a refurbishment plan is simpler than it would be for the entire life of a project. The climate change projections are on a shorter time horizon and therefore have much less uncertainty associated with them. This provides the engineer with much greater confidence to recommend appropriate adaptive responses.

Extending the service life of an infrastructure system may sometimes be viewed as an adaptation strategy. It deals with infrastructure deficit issues by deferring the need to spend capital dollars on new infrastructure to a later date. It also defers decisions on building new structure into a timeframe where data may be more certain. Engineers can support this strategy by instituting monitoring and measurement programs to secure climate data to define evolving climate conditions. This climate information is less uncertain.

Refurbishment timeframes are typically shorter than the service life of the entire engineered system. Under these conditions, the engineer may be able to access sufficient climate data that can address the issue that is somewhat less detailed than a full climate projection. This can save costs and time.

Similarly, engineers in operations, maintenance and planning functions should seek to allocate (or are allocated) appropriate resources to allow other professionals the scope to incorporate appropriate adaptive measures into their engineered works. Where the engineer does not have direct authority to allocate resources, they should advocate decision-makers to delegate them sufficient authority to do so.

Projects that do not include consideration of climate in their scope may seem to be less costly for initial procurement. However, projects with no scope for incorporating climate risk are likely to incur much higher costs associated with renewing non-resilient designs over the life of the system. It is a question of allocating more resources now along with good operations and maintenance practices to reduce or avoid substantially higher costs of repair and replacement at some unexpected time later in the service life.

### 6.7.2 Implementing Actions

The following actions can help engineers anticipate the impacts of changing climate by considering actions that address the service life of the infrastructure asset. Not all of these may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions that better manage identified risks of the service life. Any new practices or improvements should be reported to their national body and WFEO. These will be incorporated into the next edition of this model code of practice.

- During the design phase of a project, maintain a record of any reviews of climate and/or meteorological assessment conducted during the design of the engineered system
    - Identify any adjustments made to the design based on climate considerations
    - Identify the basis for any adjustments made to the design based on climate considerations
    - Identify the economic impact of changes made to design based on climate considerations
    - Identify how the adjustments address the full service life cycle of the engineered system

- During refurbishment planning and design, maintain a record of any reviews of climate and/or meteorological assessment conducted during the design/plan of the refurbishment
    - Identify any adjustments made to the refurbishment design/plan based on climate considerations
    - Identify the basis for any adjustments made to the refurbishment design/plan based on climate considerations
    - Identify the economic impact of changes made to the refurbishment design/plan based on climate considerations
    - Identify how the adjustments address the full service life cycle of the refurbishment design/plan
- Ask the climate specialist to recommend a range of alternative methodologies for projecting climate information over the shorter timeframes used for refurbishment service cycles.
- Develop, institute, review and/or revise operations and maintenance policies, standards, and procedures to permit the infrastructure asset to function at the capacity it was designed to perform, including ability to respond to loadings imposed by future changes in climate.
- Good practices can extend service life beyond the design life, which means replacement or rehabilitation can be delayed, allowing re-allocation of human and financial resources to other priorities
- Review and modify training and competency policies and standards to enable operations and maintenance personnel to enhance operations and maintenance practices as well as emergency preparedness and response

## 6.8 **Principle # 8:** Apply Risk Management Principles for Uncertainty

| ***Use risk management to address uncertainties*** |
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Engineers should maintain a reasonable level of professional competence in risk assessment strategies to assess the impact of changing climate on engineered systems where the engineer has professional responsibility. Where the engineer does not have a sufficient level of this expertise, their activities should be reviewed by professionals that do have such expertise.

### 6.8.1 Amplification

Assessing climate change impacts on professional work is, by its nature, a risk assessment process. In this work, professionals project the future climate and assign measures of the likelihood of those projected futures and the seriousness of the impacts of those changes on systems for which they are responsible. This is the very definition of risk assessment. The engineer will find further guidance on risk management approaches in a publication from Engineers Canada[5]

International standards on risk management are published by the International Standards Organization (ISO) in its 31000 series[6] as follows:

[5] Engineers Canada **National Guideline – Risk Management** (2013), https://www.engineerscanada.ca/sites/default/files/Risk-Management.pdf

[6] http://www.iso.org/iso/home/standards/iso31000.htm

1. ISO 31000:2009, Risk management – Principles and Guidelines provides principles, framework and a process for managing risk. It can be used by any organization regardless of its size, activity or sector.

2. ISO/IEC 31010:2009, Risk management – Risk assessment techniques focuses on risk assessment. ISO/IEC 31010:2009 focuses on risk assessment concepts, processes and the selection of risk assessment techniques.

3. ISO Guide 73:2009, Risk management - Vocabulary complements ISO 31000 by providing a collection of terms and definitions relating to the management of risk.

With this understanding, and in order to address potential climate change impacts, the engineer should develop a comprehensive understanding of risk assessment techniques or consult, as appropriate, with professionals who do have those skills.

Engineers Canada, recognizing this reality, developed a tool that Canada's professional engineers may use to aid in these assessments[7]. The PIEVC Engineering Protocol (the Protocol) guides professionals through the risk assessment process from project concept through to an evaluation of adaptation options in a manner that weighs social, environmental and economic factors. The Protocol is one of a number of tools and methodologies that have been developed to help professionals assess the impact of climate change through risk assessment. Not every engineer may be conversant with risk methodologies. In such cases, the engineer is urged to consult with those that do have risk assessment expertise and be guided through a robust evaluation of their professional work.

When considering the application of risk assessment methodologies in managing the impacts of a changing climate on engineered systems, professional engineers must follow relevant federal and/or provincial/territorial legislation regulating how such assessments are carried out.

The focus of this principle is the application of standard risk assessment techniques to the question of climate change. The engineering profession has developed a body of work that can support this activity (http://www.pievc.ca). It is up to the engineer to access and apply that knowledge.

### 6.8.2 Implementing Actions

Engineers can apply climate risk management principles and practices to plan and implement adaptations to their work to accommodate the impacts of current and future climate.

[7] Engineers Canada, **PIEVC Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate**, Version 10, March 2013 (www.engineerscanada.ca)

Not all of these actions may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions that better manage identified risks. Any new practices or improvements should be reported to their national body and WFEO. These will be incorporated into the next edition of this model code of practice.

- First, develop competence in risk assessment
    - Establish awareness and knowledge of the range and applicability of risk assessment tools, including international standards such as ISO 31000
    - Where appropriate, pursue professional development and training in risk assessment tools and approaches relevant to professional practice
- Where the engineer does not have sufficient expertise in risk assessment, seek guidance from qualified professional practitioners that have such expertise
- As appropriate retain the services of professional practitioners with risk assessment expertise to advise and/or assist in the review of climate risks
- Consider building risk assessment into all stages of the process – design, operation, maintenance, planning, procurement, management, etc.
    - Different tools will be applicable in different stages and the engineer should apprise themselves of the risk assessment approaches that are appropriate at each stage of a project or engineering task.
    - Consult with the broad range of stakeholders/users of the engineered system to assess their overall risk tolerance levels for the system.

***Comment***: *Establishing risk tolerance is very important because it establishes the stakeholder/owner willingness to trade-off between accepting a certain level of risk with the cost and complexity to mitigate or reduce risks through additional engineering and construction with a higher safety factor. Assessing different options with stakeholders to address the economic, environmental and social trade-offs is recommended. This will achieve buy-in of all parties to the final engineering solution.*

**Comment: Establishing risk tolerance is very important because it establishes the stakeholder/owner willingness to trade-off between accepting a certain level of risk with the cost and complexity to mitigate or reduce risks through additional engineering and construction with a higher safety factor. Assessing different options with stakeholders that address the economic, environmental and social trade-offs is recommended. This will achieve buy-in of all parties to the final engineering solution.**

## 6.9 **Principle # 9**: Monitor Legal Liabilities

| ***Be aware of potential legal liability*** |
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Engineers should be aware of any legal liability associated with reliance on historic climatic and weather information within their professional practice.

### 6.9.1 Amplification

Case law is presently evolving on this issue.

Engineers operate under both a professional and social license. The social license is equally as important. The engineer should address the issues that concern the stakeholders under whose social license they are allowed to practice. In this case, if climate change is deemed to be a broad social concern, the profession neglects that issue at its peril. If engineers don't address this, they will be held accountable to a broader social group and ultimately may be sidelined as other professionals take up the task.

Engineers have always been held responsible for the effects of their works on public health and safety. With increasing understanding of the scope and impact of climate change, professionals may be held accountable for anticipating the impacts of climate change on their professional work.

Reliance on codes, standards and professional guidelines that fail to reflect an understanding of the impact of climate change may not be sufficient to mitigate potential liability related to managing those impacts on professional work. This is especially the case where there is an evolving understanding that historic climate information may not be reflective of future climatic conditions. With this understanding, it may be difficult for an engineer to argue that an average professional in their discipline would not have known that climate change might impact the work. The standard of reasonable care is evolving with society's increased awareness and understanding of potential climate change impacts, resulting in a corresponding evolution in the professional's obligation to evaluate those potential impacts and address them in their professional work.

Engineers have a much more detailed understanding of the codes, standards and guidelines that govern their professional practice than would a layperson. In this regard, the professional is much better placed to evaluate the implications of potential climate change impacts on climate, weather information and assumptions embedded in their professional tools. Failure to consider these implications may be construed as professional negligence and could expose the professional engineer to professional sanctions and/or legal action. If the applicable standard of care reflects an understanding that a technical standard may be deficient it follows that merely adhering to this outdated standard could be considered to be a breach of a professional engineer's standard of care. Under certain circumstances, merely designing to meet minimum code requirements may still be deemed negligent if the circumstances and the applicable standard of care dictate a design solution that clearly exceeds code.

As this is an evolving issue, it is important for the engineer to remain apprised of decisions and case law in their country of work governing societal expectations of reasonable professional care and practice. As a matter of self-interest, if for no other reason, the engineer should periodically contact his/her national body or the appropriate government agency to determine if there have been any material changes in liability case law in this area, or if new or amended practice guidelines to mitigate this risk for engineers are under development. In so doing, they will develop an appreciation of what their profession and society demands from them and take appropriate action to respond to those demands within their own professional practice.

### 6.9.2 Implementing Actions

Engineers should take reasonable steps so that potential legal liability from their practice in general and to particular engineering work is understood. Actions that consider and/or adjust the engineering work to accommodate current and future climate should be documented.

Not all of these actions may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to review these and give thought to other actions that address the need to demonstrate due diligence of the issues at hand. Such documentation will help discharge professional responsibility for dealing with this aspect of practice.

- Consult on any applicable case law that may apply to the general scope or responsibilities as an engineer, including projects, engineering work or tasks that may be affected by climate considerations.
    - Professional associations where they exist in countries routinely report on disciplinary actions and will report on such cases as they arise
    - National members of WFEO or professional and technical associations may develop practice guidelines specific to the topic of climate or include reference to it in the context of more specific areas of practice.
- Maintain a record of actions undertaken to address climate change issues within daily practice as appropriate or as part of the documentation of a completed task or project
- Pursue enough additional professional training on climate change and meteorology to increase knowledge of climate science, measurement, data and definitions to enable review of climate analysis and advice provided by climate scientists and specialists.
- As appropriate, consult with climate and meteorological specialists to inform climate change adaptation measures
- In working papers and files, maintain written documentation of training and consultation on climate change and meteorology

# 7 Other Resources

In 2015, the American Society of Civil Engineers (ASCE) released a white paper providing considerable detail on adapting infrastructure and civil engineering practice to a changing climate[8]. The executive summary describes the purpose and scope of this document as follows:

”*The purpose of the white paper is to:*

- *foster understanding and transparency of analytical methods necessary to update and describe climate, including possible changes in the frequency and intensity of weather and extreme events and for planning and engineering design of the built and natural environments*
- *identify (and evaluate) methods to assess impacts and vulnerabilities caused by changing climate conditions on the built and natural environments*

[8] “Adapting Infrastructure and Civil Engineering Practice to a Changing Climate
Committee on Adaptation to a Changing Climate” Edited by J. Rolf Olsen, Ph.D., Published by American Society of Civil Engineers (2015) (with permission of ASCE), http://ascelibrary.org/doi/pdfplus/10.1061/9780784479193

- *promote communication of best practices in civil engineering practice for addressing uncertainties associated with changing development and conditions at the project scale, including climate, weather, extreme environments and the nature and extent of the built and natural environments*"

It consists of the following sections:

- Section 2: "Review of climate science for engineering practice," provides an overview of the current knowledge of climate and weather science, as well as its limitations and relevance, to engineering practice.
- Section 3: "Incorporating climate science into engineering practice," presents the challenges of incorporating climate change and weather science into engineering practice.
- Section 4: "Civil engineering sectors," reviews the impacts of climate change on specific sectors, including codes and standards that might be affected, and includes recommendations for action.
- Section 5: "Research, Development and Demonstration needs," proposes research and other activities to advance civil engineering practices and standards to effectively address climate change impacts.
- Section 6, "Summary, Conclusions and Recommendations," concludes the white paper with a discussion on near-term decision making and recommendations for research, development and implementation of improved practices".

Engineers active in planning and implementing adaptation actions are encouraged to consult this paper for the background science of climate and to gain further understanding of the issues facing engineers and what can be done to address them.

# Appendix A – Definitions

The Model Code of Practice uses the following terms and definitions.

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| **Act** | The applicable engineering act that has legal standing in a jurisdiction. Some acts in Canada include “geoscientists” or “geologists and geophysicists.” |
| **Adaptation to climate change** | An adjustment in natural or human systems in response to actual or expected climatic changes, which moderates harm or exploits beneficial opportunities. |
| **Acquiescence** | To accept or comply passively, without question or objection. |
| **Adverse effect** | Impairment of, or damage to, the environment, human health or safety or property. |
| **Climate** | Climate is the statistics of weather events over a long period of time. The term weather is used to describe discrete events in place and time. |
| **Climate change** | Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.[9] |
| **Climate information** | In this document “climate information” means data and projections and any other form of climate factor/assumption/etc. In other literature this may sometimes be called climate factors or parameters. |
| **Climate scientist** | Those individuals engaged in the development of, or execution of, scientific climate projections based on one or more climate models. |
| **Climate specialist** | Any individual compiling, analyzing and/or interpreting meteorological and/or climatological data, producing or interpreting weather forecasts or any other individual that may interpret climate information. The expressions “meteorologist” or “weather forecaster” refer to those individuals that provide climate information based on measured data. In this document, use of the phrase climate specialist is inclusive of all those individuals. |
| **Climate risk mitigation** | Actions taken to reduce the level of risk associated with changing |

[9] Intergovernmental Panel on Climate Change (IPCC), 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22.

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| | climatic conditions. These can include changes in system designs, or other procedural, operational or management adaptations to reduce impacts from identified risks. |
| **Cost-benefit analysis** | An economic analysis method that seeks to express the costs of an activity, in comparison to the benefits, using common units, to aid decision-making. The analysis would normally include capital, operating, maintenance, and decommissioning, social and environmental costs. |
| **Cumulative effects** | Individual effects that are incremental, additive or synergistic such that they must be considered collectively and over time, in order for a true measure of the total effect and associated environmental costs of an activity to be assessed. |
| **Due diligence** | The reasonable care that a person exercises under the circumstances to avoid harm to other persons, property and the environment. In professional practice, engineers must document the steps that they have undertaken to demonstrate due diligence. |
| **Engineered system** | Any civil infrastructure including buildings or engineering work that interacts with or may be affected by climate. |
| **Engineering adaptation** | A process of engineering decision-making in response to any kind of vulnerability or socio-political consideration. |
| **Engineering vulnerability** | The difference between an engineered system's capacity and the loads that the system is expected to see |
| **Environmental effects** | Outcomes arising from a technological activity that cause changes to the environment. Any change that project may cause in the environment, including but not limited to:<br>• Health and socioeconomic conditions<br>• Physical and cultural heritage<br>• Current use of lands and resources<br>• Or any change to the project that may be caused by the environment. |
| **Liability** | Legal responsibility to another or to society, which is enforceable by civil remedy or criminal penalty. |
| **Life-cycle assessment** | Assessing the environmental, social or economic effects of a chemical, product, development or activity from its inception, implementation and operation through to termination or decommissioning. It is the assessment of a system throughout the term of its entire service life. |
| **Mitigation** | Within the context of this model guideline, mitigation refers to technological change and changes in activities that reduce greenhouse gas emissions, thereby reducing the anthropogenic emissions causing climate change. |
| **Professional engineer** | The protected title given to a person licensed to engage in the practice of engineering under the applicable engineering act in a Canadian province or territory. Canadian professional engineers |

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| | use the designation "P.Eng.", or in Quebec "Eng." or "Ing." In the United States the designation is P.E. and in Europe through FEANI the designation is EurEng. Other countries may use other forms of designation to identify engineers. |
| **Professional judgment** | A level of competence and knowledge of technical standards obtained through many years of training and professional practice guided by practitioners with many more years of professional practice in a specific area of engineering practice. Typically, it takes four years of university, five years of practice under the guidance of licensed professionals and then many more years of professional practice as a licensed professional before the profession would deem an individual fully qualified to express independent professional judgment. |
| **Quality of life** | The factors related to the state of health and well-being of an individual or a community. |
| **Resiliency** | The ability of a system to withstand stress, adapt and recover from a crisis or disaster and move on. Resiliency is the societal benefit of collective efforts to build collective capacity and the ability to withstand stress including that caused by a changing climate. |
| **Societal values** | The attitudes, beliefs, perceptions and expectations generally held in common in a society at a particular time. |
| **Socio-economic effects** | The effects of a development, product or activity, on the economy and social structure of affected communities. Socio-economic effects may include issues such as: employment, housing and social needs, medical services, recreational facilities, transportation and municipal infrastructure and financial benefits to local residents and businesses. |
| **Stakeholder** | A person or organization that is directly involved with, or affected by, a development, product, or activity or has an interest in it. |
| **Sustainability** | Ability to meet the needs of the present without compromising the ability of future generations to meet their own needs, through the balanced application of integrated planning and the combination of environmental, social, and economic decision-making processes. |
| **Vulnerability** | The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate, including climate variability and extremes or any other natural events or man-made activity. |
| **Weather** | Specific events that occur within a set of meteorological data. The term weather is used to describe discrete events in place and time. Unique pieces of data that contribute to an overall statistical synopsis. |

June 1, 2020

U.S. Environmental Protection Agency
Office of Water, Office of Wastewater Management (4203M)
1200 Pennsylvania Avenue NW, Washington, DC 20460
Docket # EPA-HQ-OW-2019-0372

*Via https://www.regulations.gov/*

This comment letter is submitted in response to the United States Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System Proposed Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity. The comment letter is submitted on behalf of the Center for Biological Diversity, Center for Progressive Reform, Chesapeake Bay Foundation, Chesapeake Legal Alliance, Conservation Law Foundation, Environmental Integrity Project, San Francisco Baykeeper, Waterkeeper Alliance, and 95 additional public interest organizations and individuals.

Commenters recognize that the EPA's proposed renewal permit includes reforms that will result in improved protections for water quality, wildlife, and human health. However, there are proposals in the draft permit, which are not supported by the law or science, that will undo or significantly weaken public safeguards. In some instances, EPA rejects the recommendations of the National Academies of Sciences, Engineering, and Medicine without providing sufficient technical and legal justification. Lastly, there are a number of omissions or other areas where EPA has failed to adopt or modify aspects of the permit that are necessary to address ongoing harm to waterways, the environment, and human health.

### 1. *EPA Should Adopt its Proposal to Expand the Eligibility Criterion for Applicants that Discharge Stormwater to CERCLA Sites to All EPA Regions, with Certain Revisions.*

EPA rightfully acknowledges that by expanding the eligibility criterion for dischargers to CERCLA sites, the 2020 MSGP will be significantly more protective of water quality, of the efforts to remediate CERCLA sites, and of environmental quality and human health nationwide. In its Fact Sheet, EPA clearly illustrates the need for and benefit of expanding the eligibility criterion to all EPA Regions.[1] For example, EPA states that 12 facilities in Region 10 are currently subject to the CERCLA eligibility criterion under the 2015 permit, and the Agency estimates that there may be 103 total facilities subject to the eligibility criterion, should it be expanded to all EPA Regions as proposed. EPA also cites known examples of discharges of industrial stormwater that have contributed to downstream recontamination of CERCLA sites and water quality.

Run-on from industrial stormwater dischargers to CERCLA sites has the potential to cause downstream impairments and is particularly concerning given the type of hazardous substances regulated under CERCLA that have the potential for serious harm to the environment and human health.[2] The eligibility criterion also fairly serves the interests of CERCLA responsible parties and other stakeholders. This includes taxpayers who support CERCLA remediation and members of the public, especially those populations and communities that live or work near affected CERCLA sites or use impacted aquatic resources.

As proposed by EPA, the operators of facilities that discharge to CERCLA sites should be required to provide advanced notice to the Agency of a minimum of 30 days before submission of NOI applications for permit coverage.[3] EPA should also provide public notice and comment on advanced notifications by prospective applicants during this time period. Advanced notice to EPA and public notice and comment will serve the interests of all parties - permit applicants, EPA, and the public. Advanced notice will allow EPA to undertake an investigation and evaluation of the impact of the discharger on downstream CERCLA sites and provide a determination for the controls that must be implemented before permit coverage will be granted. This will potentially shorten the time between when an application is submitted and coverage is granted.

Comments from the public and other stakeholders such as local governments, especially those with, local and/or specialized knowledge about CERCLA sites, stormwater, and downstream water quality and public use, for example, will also support the Agency's evaluation and determination on eligibility. The advanced notice requirement also provides an incentive to operators who know or suspect the possibility

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[1] U.S. Envtl. Prot. Agency. United States Environmental Protection Agency National Pollutant Discharge Elimination System Proposed Multi-Sector General Permit Fact Sheet for Stormwater Discharges Associated with Industrial Activity (2020) at 17-20 (hereinafter "Fact Sheet").
[2] *Id.* at 19.
[3] U.S. Envtl. Prot. Agency. United States Environmental Protection Agency National Pollutant Discharge Elimination System Proposed Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (2020) at 4, Part 1.1.7 (hereinafter "Draft Permit").

of downstream impacts to CERCLA sites to evaluate the necessary controls and measures and then determine whether general permit or individual permit coverage is appropriate given their particular circumstances, well in advance of developing a permit application.

EPA rightly acknowledges that stormwater general permits, as designed, may not be sufficient instruments for regulating the potential impact of discharges on downstream sediment recontamination at CERCLA sites.[4] EPA and applicants should absolutely have the flexibility to select individual NPDES permits where the design of the general permit cannot ensure downstream recontamination of CERCLA sites and compliance with applicable water quality standards.[5]

EPA should also revise Part 1.1.7 of the Draft Permit to require prospective applicants to collect and submit data on the magnitude of stormwater discharged from facilities and the concentration of sediment in discharges as a component of the proposed advanced notice to the Agency before an NOI application for coverage is submitted. EPA should also exercise its discretion to request additional data from applicants during the pre-application phase for other contaminants specific to the CERCLA site and those associated with dischargers' applicable sector(s). This data will support the Agency's evaluation and determination of whether the discharge has the potential to contribute to mobilization of contaminated sediments in CERCLA sites (i.e. the magnitude of stormwater discharged) and whether the discharged sediment have the potential to contribute to additional mobilization and transport of CERCLA site contaminants as well.

Lastly, EPA should require all applicants that do not provide advanced notice for the CERCLA eligibility criterion to include both an affirmative statement that their discharges comply with the eligibility criterion and the information and analysis they relied upon to make that determination in their NOI applications for permit coverage. The information and analysis relied upon by applicants will allow EPA to identify any potential gaps in the applicants' self-evaluation, including relevant data and analysis, and to address those gaps before permit coverage is granted. The certification requirement will also incentivize applicants to conduct thorough and rigorous reviews of the potential downstream impacts of their discharges on CERCLA sites before developing an application for permit coverage.

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[4] Fact Sheet at 18.
[5] *Id.* at 19.

## 2. *EPA Should Adopt its Proposal to Include an Eligibility Criterion Related to Application of Coal-tar Sealcoats to Paved Areas Where Industrial Activities are Located.*

Commenters strongly support EPA's proposal to include an eligibility criterion related to the application of coal-tar sealcoat to paved areas where industrial activities are located. EPA's fact sheet supporting the draft permit clearly summarizes the toxicological information on Polycyclic Aromatic Hydrocarbons (hereinafter "PAH"), lab-based research on the biological impacts of PAH contaminated sediment on aquatic organisms, and field research and modeling that show that coal tar sealcoat is a significant source of PAHs into the nearby environment, and that stormwater runoff is a pathway through which organisms and habitats are exposed to PAH contamination from coal tar sealcoat. All of EPA's conclusions about coal tar sealcoat are well supported in the scientific literature.

In addition to the many studies cited by EPA in its references section, additional support for EPA's conclusion that coal tar sealcoat is a significant contributor of PAHs to waterbodies in the United States is found in the two studies attached to this comment letter, one based on sampling conducted in Minnesota and one based on sampling conducted in Springfield, Missouri.[6]

EPA has also requested comment about alternative control measures that would allow continued application of coal tar sealcoat instead of an eligibility restriction. Commenters believe that alternative controls are unlikely to be feasible. Commenters agree with EPA's conclusion that data from studies conducted in Austin, Texas and other locations show that substituting similarly priced, low-PAH alternatives in place of coal tar sealcoats is effective at reducing PAH loadings from paved surfaces.

Substitution away from coal tar sealant is both simple and extremely cost-effective because there are widely available and similarly priced substitute sealants that contain orders of magnitude fewer PAHs. Also, as EPA notes, there are alternative paving methods that don't require a sealant at all. In light of the effectiveness, simplicity, and low cost of just not using coal tar-based products, Commenters believe EPA is unlikely to find alternative stormwater control measures it can include under the MSGP that are equally attractive – i.e., equally effective, simple for permittees to implement, and cost-beneficial.

Commenters also reiterate that EPA's suggestion to restrict use of coal tar sealants is cost-beneficial and economically sensible because the costs of restricting use of coal tar sealants is marginal to society. Although some companies and organizations in the

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[6] Pavlowsky RT, Baseline Study of PAH Sources and Concentrations in Pond and Stream Sediments, Springfield, Missouri (Oct. 30, 2012), The Ozarks Environmental and Water Resources Institute (OEWRI) Missouri State University (MSU) (attached); Crane JL, Grosenheider K, and CB Wilson, Contamination of Stormwater Pond Sediments by Polycyclic Aromatic Hydrocarbons (PAHs) in Minnesota: The Role of Coal Tar-based Sealcoat Products as a Source of PAHs (March, 2010), Minnesota Pollution Control Agency (attached).

sealant industry protest all restrictions on coal tar sealants, experience with bans in different parts of the country has shown that restrictions on coal tar sealant use are practical and not economically harmful to paving companies. For example, after Minnesota banned coal tar sealants in 2015, dozens of companies in Minnesota abandoned use of these sealants with relatively little expense. Paving and sealing contractors have no capital costs associated with the change - their existing equipment works as well with asphalt based or other kinds of sealants as it does with coal tar. Suppliers/wholesalers typically stock both coal tar sealants and alternatives - switching from one to the other is not a problem, just a matter of running down inventory and not reordering. Almost all pavement sealant manufacturers make both coal tar sealants and alternatives - companies such as SealMaster, JetBlack, Neyra, GemSeal, Vance, Brewer, STAR and other smaller manufacturers of sealants all make both coal tar and asphalt-based product lines. In short, the costs side of the cost-benefit balancing is very small. A ban on coal tar sealants does not deprive the economy of pavement sealants and does not impose high costs (or almost any costs) on the sealant industry.

Commenters make two suggestions that we believe would enhance the MSGP's handling of PAHs from sealed surfaces:

1. Expand the eligibility criterion to apply to all high-PAH sealcoats, in recognition of the recent emergence of a new class of high-PAH sealcoats made with substances such as ethylene cracker residue or "ECR" (also referred to as steam-cracked asphalt).

2. Provide a definition of the affected sealcoats that enables permittees to more easily identify products that cannot be used during the permit term.

First, Commenters suggest that EPA transition from focusing exclusively on coal tar sealcoats to cover all high PAH sealcoats. Information to support this transition is readily obtainable from Washington D.C.'s Department of Energy and Environment (the comparison is relevant since EPA's MSGP is issued in and applies to dischargers located within D.C.). The District banned the use of coal tar sealcoat in 2009. In 2018, in light of new information, chiefly the results of field tests that showed parking lots coated with an ECR-based sealcoat product contained high levels of PAHs, the District extended its ban to all high PAH sealcoats, including those made with ethylene cracker residue. Washington D.C. revised its rules to set a content restriction – only sealants containing less than 0.1% PAHs by weight can be used. A presentation prepared by Washington DOEE staff on this topic is attached, and further information is available from DOEE and from sources listed in that presentation.[7]

The District of Columbia has provided convenient definitions of banned sealcoat products. See, e.g. https://doee.dc.gov/coaltar. A copy of DEC's 2019 amendments to

[7] Lillian Power and Zachary Rybarczyk, Challenges and Proposed Solutions to the District's Coal Tar Pavement Sealant Ban, Department of Energy and Environment, Washington, District of Columbia (attached).

its coal tar regulation are attached to this Comment.[8] Under that city's laws, the term "high PAH sealant product" means a material that:

(1) Contains:

A. Coal tar;
B. Coal tar pitch, coal tar pitch volatiles, RT-12, refined tar, or a variation of those substances assigned the chemical abstracts services ("CAS") number 65996-92-1, 65996-89-6, or 8007-45-2;
C. A surface-applied product containing steam-cracked petroleum residues, steam-cracked asphalt, pyrolysis fuel oil, heavy fuel oil, ethylene tar, ethylene cracker residue, or a variation of those substances assigned the CAS number 64742-90-1 or 69013-21-4; or
D. Substances containing more than 0.1% (1000ppm) polycyclic aromatic hydrocarbons, by weight; and

(2) Is used, or is intended for use, on an impermeable surface, including bricks, block, metal, roofing material, asphalt, or concrete.

The definitions used by D.C. could enhance EPA's permit, providing more clarity to permittees.

[8] Limitations on Products Containing Polycyclic Aromatic Hydrocarbons Amendment Act of 2018, D.C. Act 22-628, Council of the District of Columbia (2019) (attached).

### 3. *EPA Must Strengthen and Revise Eligibility Criteria Related to Endangered Species Act Reviews.*

EPA's proposed Appendix E – Procedures Relating to Endangered Species Protection – is insufficient to protect threatened and endangered species and their proposed or designated critical habitat from industrial stormwater pollution. Too much is left to the discharger's discretion. Criterion C in particular delegates duties of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (NMFS) (the "Services") under the Endangered Species Act to the discharger with no guaranteed oversight or accountability to ensure that eligibility is appropriately determined or that required controls and other measures to reduce impacts support a "not likely to adversely affect" determination. EPA received approximately twice as many Form Cs as expected according to the Biological Opinion issued by NMFS on the 2015 MSGP, which highlights the need to confirm that these determinations are correct and eligibility is warranted and maintained through the life of the MSGP.[9]

We request the following changes to ensure eligibility is based on the best available science and accurately determined:

1. The Service(s) must affirmatively review and confirm eligibility under the selected eligibility criterion in all cases.

2. The NOIs and confirmations issued by the Service(s) must be made publicly available on EPA and the Service(s) websites with notice of availability published in the Federal Register.

3. EPA and the Services should jointly commit to auditing some proportion of Form A-C facilities to verify the correctness of eligibility determinations and the implementation of measures that formed the basis for eligibility for coverage under the MSGP. The results of the joint compliance study must be made publicly available with notice of availability published in the Federal Register.

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[9] "Based on data from the 2008 MSGP, out of the approximate 2,365 facilities expected to seek coverage under the new MSGP, only approximately 400 of those facilities are expected to fall under the Part 1.1.4.5 eligibility criterion C in the new proposed permit." National Marine Fisheries Service. Biological Opinion on EPA Multi-Sector General Permit for Industrial Stormwater Discharges Pursuant to the National Pollution Elimination System, (2015) at 190. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration. U.S. Department of Commerce, FPR-2014-9094, https://doi.org/10.7289/V5D798G7.

### *4. Biological Opinions Pursuant to Section 7 of the Endangered Species Act Must Also Address the Issues Raised Above in Section 3 of this Comment.*

The concerns raised in this letter must also be addressed in the U.S. Fish and Wildlife Service and the National Marine Fisheries Service's forthcoming Biological Opinions pursuant to Section 7 of the Endangered Species Act.

### *5. EPA Should Adopt its Proposal to Establish a 60-Day Authorization Wait Period for Operators Not Previously Covered by the MSGP and are the Subject of a Pending Enforcement Action Related to Stormwater.*

EPA should adopt the proposal to establish a discharge authorization wait period of 60 days for operators that have not previously obtained coverage under the MSGP and are the subject of a pending enforcement action, because the extended authorization wait period will protect water quality while serving the interests of other permittees, EPA and the public. The lengthened wait period before authorization will contribute to efforts that prevent dischargers from obtaining coverage as a shield from enforcement of prior and/or continuing Clean Water Act violations. EPA will benefit from the 60-day authorization period because the comparatively longer period will support the Agency's efforts to conduct a sufficient evaluation of the application for permit coverage while also investigating and resolving violations of the Clean Water Act, and coordinating, as appropriate, between these two activities. Eliminating the opportunity for what amounts to, in part, an unfair business advantage will also benefit the far greater proportion of dischargers who seek to obtain coverage on a timely basis and comply with the requirements of the MSGP and Clean Water Act. Lastly, the extended 60-day period will provide other agencies and citizens with sufficient time to review and comment on the NOI submitted under the circumstances.

### *6. EPA Must Either Adopt Revisions to the MSGP or Separately Undertake a Regulatory Action to Address Discharges from Nonindustrial Facilities with Activities Similar to Those Currently Covered by the MSGP, in Accordance with the Recommendations of the National Academies of Sciences.*

The NAS recommended that EPA extend MSGP classification to "nonindustrial facilities with activities similar to those currently covered."[10] EPA does not disagree with the substance of the NAS recommendation. Indeed, "EPA recognizes the benefits of the recommendation."[11] Instead, EPA's main reason for declining to adopt the NAS recommendation is that doing so would require a separate regulatory action.[12] If this is true, then EPA should initiate a formal rulemaking to modify the definition of industrial stormwater.

EPA also refers to Sector AD of the MSGP, implying that sector AD is adequate to deal with the issues raised by the NAS. Sector AD – "Stormwater Discharges Designated by the Director as Requiring Permits" – plays an important role in the industrial stormwater permitting scheme, and indeed EPA has previously determined that there is a huge universe of facilities and activities that fall outside of the regular MSGP sectors, many of which could be subject Sector AD.[13]

However, the examples cited by the NAS – "school bus transportation facilities and fuel storage and fueling facilities" – are not necessarily the kinds of facilities to which section 122.26(a)(9)(i) applies. Section 122.26(a)(9)(i) applies to small MS4s, small construction activity, dischargers subject to a TMDL, dischargers that are known to be contributing to water quality standard violations, or otherwise "significant" dischargers.[14] It is not hard to imagine a school bus depot that fits none of those descriptions, and would therefore not fall within Sector AD. Yet, as the NAS points out, some states do include these activities in their general permits, precisely because they do warrant coverage.[15]

In 1999, when EPA identified over 1,000,000 facilities that should be regulated under the MSGP, the Agency claimed that it lacked sufficient data to designate any new sources.[16] That was 20 years ago. The NAS report therefore raises a concern that the EPA has shared for decades. Over the past 20 years, EPA should have been collecting

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[10] National Academies of Sciences, Engineering, and Medicine 2019. Improving the EPA Multi-Sector General Permit for Industrial Stormwater Discharges at 3, 42 (2019) (hereinafter "NAS") (attached). Washington, DC: The National Academies Press. https://doi.org/10.17226/25355. 31-34.
[11] Fact Sheet at 5.
[12] *Id.* at 5.
[13] *See, e.g.*, U.S. EPA, National Pollutant Discharge Elimination System—Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges (Dec. 8, 1999), 63 Fed. Reg. 68722, 68779 (describing roughly 100,000 facilities that are "very similar, or identical, to regulated stormwater discharges associated with industrial activity," but are omitted from the regular MSGP sectors due to EPA's use of SIC codes in defining the universe of regulated activity, and another roughly 1,000,000 facilities that have the "potential for discharging pollutants to waters of the United States through storm water point sources").
[14] 40 C.F.R. § 122.26(a)(9)(i).
[15] NAS at 3, 42.
[16] *Id.*

sufficient data to designate new sources. The inability to identify new sources now is a problem that falls squarely on EPA's shoulders.

EPA has no reasoned basis for continuing to ignore "nonindustrial facilities with activities similar to those currently covered."[17] Regardless of how EPA chooses to go about addressing the concerns raised by the NAS, the Agency must somehow address those concerns, if not in the MSGP itself, then through a separate regulatory action.

[17] NAS at 3, 42.

### 7. *EPA Should Require Operators to Post Public Signage of Permit Coverage to Promote Public Transparency and Compliance.*

Commenters support EPA's decision to require that operators post signage of permit coverage at a safe, publicly accessible location in close proximity to the facility.[18] Commenters also agree with the Agency that operators should be required to include information on how to contact EPA if a member of the public observes stormwater pollution.[19] To facilitate public reporting of stormwater pollution, the signage should include the name of the operator and facility as listed on the permittee's NOI. Moreover, as further discussed below, Commenters believe the signage should include one straightforward URL to an EPA website where members of the public can (1) report observations of stormwater pollution, and (2) access permit compliance materials such as NOIs, annual inspection reports, and updated SWPPPs. This will allow the public to gain a better understanding of a specific facility's compliance with the MSGP. In turn, the public will be able to provide a more informed report of stormwater pollution to EPA.

*a. In order to further promote public transparency, EPA should maintain a publicly available website where the public can access MSGP permit documents (NOIs, annual reports, and SWPPPs) as well as report any observations of stormwater pollution.*

Commenters acknowledge that EPA already provides public access to NOIs submitted for the 2015 MSGP (through ECHO for NOIs submitted prior to April 1, 2018, and through https://e-enterprise.gov/eenterprise-new for NOIs submitted on or after April 1, 2018). We urge EPA to also make annual reports (pursuant to section 7.5 of the proposed MSGP) and updated SWPPPs available on a central, publicly available website, where the public can also report any observations of stormwater pollution. Commenters recognize that the 2020 MSGP encourages operators to publish updated SWPPPs on publicly accessible URLs. However, this is not a requirement. If an operator does not follow this suggestion, the Proposed 2020 MSGP merely states, "EPA may provide access to portions of your SWPPP to a member of the public upon request…."[20] Proposed 2020 MSGP § 6.4.1. This language is insufficient to allow the public timely access to these records. Not only is it unclear what steps the public must take to request a facility's updated SWPPP, but also there are no mandatory timeframes by which EPA (and subsequently, the operator) must respond to such requests.[21]

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[18] *See* Draft Permit at 10, Part 1.3.6.
[19] *Id*.
[20] *Id*. at section 6.4.1.
[21] Compare Draft Permit with Washington State Industrial Stormwater General Permit at 42 (effective Jan. 1, 2020), *available at https://fortress.wa.gov/ecy/ezshare/wq/permits/ISGP_PermitFINAL.pdf* (which requires a permittee to provide a copy or to provide access to the SWPPP within 14 days of receiving a written request from the public); and New York State, SPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Permit No. GP-0-17-004, at 26 (effective Mar. 1, 2018) *available at* https://www.dec.ny.gov/docs/water_pdf/msgppermit.pdf (which requires permittees to make a copy of the SWPPP available to the public within 14 days of a request).

*i. EPA already has both a foundation and experience to make these documents available to the public.*

Given that EPA already established an online system to electronically submit NOIs and annual inspection reports through EPA's Central Data Exchange,[22] the Agency already has a foundation to create a platform for the public to view these compliance documents.

Further, EPA has had prior experience with – and is fully capable of – establishing or requiring electronic databases for the public to access and review compliance documents. For example, under EPA's solid waste regulations for coal ash disposal facilities, owners and operators are required to maintain publicly accessible websites where most of the documentation required by the regulations, including dozens of individual documents, must be posted.[23]

*ii. States with equivalent permits have set up similar databases.*

Other states have established public databases for equivalent general permits and require operators to post compliance documents. For example, California's General Permit for Storm Water Discharges Associated with Industrial Activities requires permittees to upload NOIs, SWPPPs, and annual inspection reports to its Stormwater Multiple Application and Report Tracking System (SMARTS) database.[24] These updated SWPPPs must be posted to the publicly accessible SMARTS database within 30 days of significant revisions to the SWPPP.[25] In addition, Rhode Island similarly requires permittees to upload Stormwater Management Plans (Rhode Island's version of the SWPPP) to its online NeT system once per year or else publish current plans on a publicly assessable URL.[26]

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[22] https://npdes-ereporting.epa.gov/msgp
[23] 40 C.F.R. §257.107 ("Publicly accessible internet site requirements").
[24] California, *General Permit for Storm Water Discharges Associated with Industrial Activities,* at 3, 59 (effective July 1, 2015) *available at* https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/industrial/2014indgenpermit/wqo2014_0057_dwq_revmar2015.pdf.
[25] *Id.* at 24.
[26] Rhode Island, *Multi-Sector General Permit: Rhode Island Pollutant Discharge Elimination System: Storm Water Discharge Associated with Industrial Activity*, at 32 (effective May 3, 2019), *available at* http://www.dem.ri.gov/programs/benviron/water/pn/ripdes/msgp.pdf.

### 8. *EPA Should Adopt Universal Benchmark Monitoring, with Certain Revisions.*

The NAS made a number of recommendations about universal benchmark monitoring, the frequency of benchmark monitoring, and how benchmark monitoring should be conducted. EPA adopts some NAS recommendations, declines to adopt others, and raises additional issues in requests for comment. We respond to each issue in detail below.

In short, EPA must require quarterly benchmark monitoring throughout the permit term for all benchmark parameters, including both universal and sector-specific parameters.

*a. Industry-wide (universal) benchmark monitoring*

The NAS recommended "industry-wide" benchmark monitoring for pH, TSS and COD, noting that these parameters "can serve as broad indicators of poor site management, insufficient SCM [source control measures], or SCM failure, which can lead to high concentrations of these and other pollutants."[27] EPA adopted this recommendation by requiring "universal" benchmark monitoring for pH, TSS and COD in section 4.2.1.1 of the permit.[28]

*i. Industry-wide benchmark monitoring for pH, TSS and COD*

We strongly support EPA's decision to require universal benchmark monitoring for pH, TSS and COD. The NAS report confirms our experience with industrial stormwater monitoring – permittees do not collect nearly enough monitoring data to provide useful information. As the NAS observed, "[i]t is widely recognized that the monitoring program suffers from a paucity of useful data," and this in turn leads to "poor accountability."[29] Indeed, "[m]any industrial sectors have never collected and reported data for any of the conventional and nonconventional pollutants, toxic pollutants, and hazardous substances listed in Appendix B."[30]

*ii. Industry-wide benchmark monitoring for other parameters*

EPA requests comment on whether there are any other parameters that should be required.[31] The answer is yes. There is no way to assess pollution loads without flow rates. EPA must also require some measure of flow-rate and discharge, ideally continuous flow monitoring, but at the very least synoptic flow rate measurements coincident with benchmark monitoring sample collection events.

The NAS report states that a "pollutant concentration measured at a single time during a stormwater event cannot be considered to be representative of the [event mean

[27] NAS at 3, 27-29, 42.
[28] Draft Permit at 29, Part 4.2.1.1.
[29] NAS at 18 (internal citations omitted).
[30] *Id*. at 21.
[31] Draft Permit at 29, Request for Comment 10.

concentration],” which is necessary for determining pollutant loads and therefore downstream water quality impacts and impairments.[32] It is clear that EPA also recognizes the necessity of flow-rate data for determining whether industrial stormwater discharges cause or contribute to downstream violations of water quality standards by, for example, requiring operators to measure and report flow-rates of their discharges as a component of the proposed Additional Implementation Measures.[33]

There are a number of time-tested, low- to medium-cost monitoring technologies and methodologies for measuring flow-rates for a variety of discharges from, for example, culverts and piped outfalls.[34] Requiring low-cost flow monitoring of all permittees has the potential to provide a substantial and diverse (E.g. by geography, industrial sector, suite of SCMs) data-set for pollutant loading by industrial stormwater dischargers, which could contribute significantly to future development of numeric effluent limitations.[35]

EPA cannot meet its Clean Water Act mandates – to eliminate pollution to the maximum extent possible and to protect water quality – without information about the quality *and* quantity of industrial wastewater discharges, and information about the extent to which SCMs are reducing pollutant loads. Furthermore, as the NAS noted, the development of numeric effluent limits may be necessary, but can only happen after EPA collects more data.[36]

*b. Benchmark monitoring schedule*

The NAS recommended that EPA require benchmark monitoring for four quarters at the beginning of a permit term (as is currently required), and then annually for the duration of each permit term.[37] As the NAS explains, “four quarterly samples are insufficient to assess the adequacy of stormwater management at a facility over the course of a permit term of 5 years.”[38] This is in large part a matter of statistical power: “Collection of more samples increases the confidence that a site is complying with the requirements by reducing the acceptable error.”[39] But the NAS also provides a second, eminently reasonable basis for recommending annual monitoring – conditions at a site may change over time. Routine monitoring is the only way to ensure that permittees “continue to implement and maintain SCMs,” and the only way to provide a “consistent representation of stormwater discharge as operations and personnel change over the duration of a permit term.”[40]

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[32] NAS at 46.
[33] Draft Permit at 45, Part 5.3.3.2.b.2.
[34] Burton, G. A., and R. E. Pitt. 2002. Pp. 357–377 in Stormwater effects handbook: A toolbox for watershed managers, scientists, and engineers, G. A. Burton and R. E. Pitt, eds. Boca Raton, FL: Lewis Publishers.
[35] Fact Sheet at 6.
[36] NAS at 41.
[37] *Id.* at 5, 49-51.
[38] *Id*. at 50.
[39] *Id*.
[40] *Id*.

The NAS also recommends that EPA require more frequent monitoring for sectors with unacceptably high coefficients of variation (COVs).[41]

EPA's response to the NAS recommendations on benchmark monitoring frequency is inadequate. EPA must require quarterly monitoring throughout the permit term for <u>all</u> benchmark monitoring parameters, including both the universal and the sector-specific benchmark monitoring parameters, and must also require more frequent monitoring for sectors with unacceptably high coefficients of variation.

*i. Benchmark monitoring schedule for universal benchmark monitoring parameters*

The draft permit does require consistent monitoring of the three "universal" parameters – pH, TSS and COD – on a quarterly basis for the entire permit term.[42] EPA requests comment on whether this is appropriate.

Yes, it is entirely appropriate and reasonable for EPA to require consistent quarterly monitoring of the universal benchmark monitoring parameters, for at least three reasons.

1. As EPA notes in its request for comment, quarterly monitoring helps to "ensure facilities have current indicators of the effectiveness of their stormwater control measures throughout the permit term."

2. From a statistical perspective, quarterly monitoring is still not good enough. As the NAS observed, assuming a COV of 1, "for a TSS benchmark of 100 mg/L, any quarterly average concentration from 0 to 225 mg/L is statistically indistinguishable from the benchmark." Achieving a "scientifically preferred" error rate would require 150 samples per year.[43] Quarterly monitoring is not sufficient, but it is an important step in the right direction.

3. As NAS correctly notes, the burden of quarterly sampling for permittees is trivial. "Considering that all permittees must collect quarterly storm event samples for visual monitoring, the additional cost burden [of analyzing pH, TSS and COD] is expected to be small."[44] The NAS estimates that analyzing all three parameters would cost less than $100.[45]

For all of these reasons, we support EPA's decision to require ongoing quarterly monitoring of the universal benchmark monitoring parameters.

*ii. Benchmark monitoring schedule for sector-specific benchmarks*

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[41] *Id*. at 5, 51, 65.
[42] Draft Permit at 30, Part 4.2.1.2(a).
[43] NAS at 50.
[44] *Id*. at 28; *see also,* Fact Sheet at 63.
[45] NAS at 28.

EPA inexplicably and arbitrarily ignores the NAS recommendation with respect to sector-specific benchmarks and fails to require any monitoring beyond the initial four quarters that are currently required.[46] EPA did not even solicit comment on this issue. This is an egregious oversight on EPA's part, and one that the Agency must correct.

There was nothing in the NAS report to suggest that its recommendations for more frequent monitoring were limited to the universal benchmarks. The two-part rationale for recommending ongoing annual monitoring – statistical confidence and accounting for changing conditions – apply equally to sector-specific benchmark monitoring parameters. EPA failed to provide any justification for ignoring the NAS recommendation, so we are forced to speculate. Perhaps EPA believes that quarterly monitoring of the universal benchmark monitoring parameters will provide adequate assurances of site performance. This would be unreasonable. Only the sector-specific benchmarks provide information about "total" metals, for example, including metals in dissolved form. The NAS notes that TSS is not a reliable indicator of dissolved pollutants, and not even the best indicator of particulate matter.[47] According to the NAS, "attaining the benchmark for TSS at industrial sites is not a sufficient surrogate for meeting the metals benchmark[s]."[48] It would be arbitrary and unwise for EPA to forego annual monitoring for total metals because the dissolved fraction is "more biologically available than particulate-bound metals" and "more important in assessing pollutant risk."[49] According to the NAS, "[i]n a number of stormwater studies, a significant fraction (approximately 30 to 70 percent) of copper, cadmium, and zinc was found in dissolved form."[50]

Again, the NAS strongly recommended at least ongoing annual monitoring for <u>all</u> benchmarks, not just the universal benchmarks. Given that permittees are already required to collect quarterly storm event samples and would be required by the draft MSGP to analyze for universal benchmarks, there would be very little additional burden on permittees to analyze sector-specific benchmarks on a quarterly basis.

EPA must require ongoing, quarterly monitoring of sector-specific benchmarks throughout the permit term.

*c. More frequent benchmark monitoring for sectors with high coefficients of variation*

The NAS urged EPA to require more monitoring from sectors with unacceptably high coefficients of variation (COVs).[51] A high COV shows that the existing monitoring data for a sector are too variable and/or uncertain to provide a meaningful characterization of that sector's discharges.

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[46] Draft Permit at 30, Part 4.2.1.2(b).
[47] NAS at 28.
[48] *Id*. at 40.
[49] *Id*. at 61.
[50] *Id*.
[51] *Id.* at 5, 51, 65.

One important reason for requiring more data is so that EPA can evaluate the need for numeric effluent limitations and develop such limitations where necessary. The only reason that the NAS did not recommend the development of new limitations at present is that EPA lacks the necessary data:

> Based on the paucity of industrial SCM performance data available at this time, no specific sectors are recommended for development of new numeric effluent limitations *solely based* on existing data, data gaps, and the current likelihood of filling them."[52]

Numeric effluent limitations may in fact be necessary, and the only thing standing between EPA and the developmental of new limitations is a lack of data. This includes targeted SCM performance data (discussed elsewhere in this comment letter), but more frequent benchmark monitoring data would also be useful for this purpose.

As EPA notes in the Fact Sheet, in order to derive numeric effluent limitations, "[m]any samples are needed because of the high variability (i.e., coefficients of variation) for industrial stormwater (which is much greater than for drinking water and wastewater). The benchmark monitoring data that is currently collected in the MSGP is not suitable or sufficient for determining [numeric effluent limitations]."[53] Here we see that EPA acknowledges the problem with high coefficients of variation, but the Agency fails to respond to the NAS recommendations aimed at ameliorating this problem.

It is worth pointing out that the NAS suggested specific monitoring frequencies that might be appropriate for the sectors with high coefficients of variation: 2-4 samples per year.[54] In other words, if EPA were to adopt uniform, quarterly monitoring for all benchmark monitoring parameters, including sector-specific parameters, it would automatically address the data gaps flagged by the NAS.

*d. Monitoring based on Effluent Limitation Guidelines (ELGs)[55] (and where discharges are to impaired waters)*

Where stormwater discharges are subject to specific ELGs (or occur in impaired waters), <u>quarterly</u> monitoring should be used at each discharge point containing the pollutant discharges identified in Table 6-1 and for the pollutants listed as adversely affecting water quality standards. The draft language in these two sections would otherwise allow such discharges to persist as long as a year before potential discovery and remediation, which is too long for the pollutants with ELGs or those specifically listed as limiting water quality. Some of these pollutants, discharged in locations where water bodies are already stressed for a particular pollutant or its major component(s), pose specific threats to water quality. For example, urea used as a deicer at airports

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[52] *Id*. at 41 (emphasis added).
[53] Fact Sheet at 6.
[54] NAS at 51.
[55] Draft Permit at 32 and 33, Parts 4.2.2.1 and 4.2.4.1, respectively.

contains a very high nitrogen content, which could add significant nutrients to a waterbody already threatened by or undergoing eutrophication. More frequent – i.e. quarterly -- monitoring and, as necessary, possible corrective action, is required in these two circumstances.

*e. Benchmark monitoring summary*

Broadly speaking, the need for more industrial stormwater monitoring data is plain. If EPA were to simply require quarterly benchmark monitoring for all benchmark parameters, including sector-specific parameters, it would address all of the concerns raised by the NAS – it would produce more data overall, it would address the need for data over the course of the permit term, it would address the need for more data for sectors with high coefficients of variation, and it would begin to create the foundation for the development of numeric effluent limitations – all at a minimal additional cost to permittees. Uniform quarterly benchmark monitoring is EPA's only reasonable policy choice. Additionally, EPA should require quarterly benchmark monitoring where stormwater discharges are subject to specific ELGs or occur in impaired waters, the latter for particular pollutant stressors. <u>EPA must require quarterly benchmark monitoring throughout the permit term for all benchmark parameters, including both universal and sector-specific parameters</u>.

### *9. EPA Should Not Adopt an "Inspection-Only" Tier for Certain Facilities.*

Commenters agree with EPA's decision not to create an "inspection-only" category that exempts certain facilities from benchmark monitoring. The NAS suggested that EPA consider providing an "inspection-only" option in lieu of monitoring *if* it "can reduce the burden on small, low-risk facilities."[56] However, as EPA has acknowledged, the "inspection-only" option "may not be a viable alternative and [] benchmark monitoring may be more cost effective for operators."[57] Therefore, this option would not actually reduce the burden on small, low-risk facilities. Commenters also point out that this "inspection-only" option would be even more expensive than estimated by EPA's Cost Impact Analysis. This is because EPA's own analysis does not take into account the additional costs an "inspection-only" option would put on the Agency. For example, the additional tasks of reviewing inspection reports and following up with inspectors would be extremely resource- and time-intensive for Agency staff.

Also, the Proposed 2020 MSGP includes no clear provisions or guidelines for operators, inspectors, and EPA staff on the factors that would trigger additional inspections, corrective actions, or benchmark monitoring. This would burden permittees and the rest of the public with unnecessary uncertainty regarding compliance with and enforceability of the MSGP for these exempt facilities. Further, EPA's Cost Impact Analysis does not take into account the costs of any follow-up inspections that would be borne by the facility.

As EPA acknowledges, "categorizing low-risk facilities that would be eligible for an inspection-only option is somewhat challenging."[58] If EPA were to adopt an "inspection-only" option, the Agency would also have to adopt the recommendations laid out in the NAS study to define this category.[59] Among other things, EPA would have to require:

1. Publicly accessible,[60] facility-level determinations verified by certified inspectors;[61]

2. A demonstration that each facility has a low likelihood of discharging toxic substances in toxic amounts using specific criteria such as those suggested by the NAS;[62]

3. A demonstration that the facility has a "small area" of exposed industrial activity, where "small area" would be formally defined as roughly equivalent to "less than 0.5 to 1 acre";[63]

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56 NAS at 54-55.
57 U.S. Envtl. Prot. Agency. Cost Impact Analysis for the Proposed 2020 Multi-Sector General Permit (2020) at 50.
58 Fact Sheet at 58-62, Part 4.2.1.1.
59 NAS at 54-58.
60 *Id*. at 56.
61 *Id*. at 55-58.
62 *See id*. at 57, Table 3-3.
63 *Id*. at 55.

4. A demonstration that the facility is well-managed.

Further, if this option is adopted, the final 2020 MSGP permit would have to spell out the factors that would trigger follow-up inspections, benchmark monitoring, and/or corrective actions, along with enforceable timetables.

### *10. EPA Must Ensure Compliance with Water Quality Standards and Ensure Consistency with Waste Load Allocations.*

The Clean Water Act, 33 U.S.C. § 1251 et seq., ("CWA") unambiguously requires all NPDES permits to ensure compliance with Water Quality Standards (WQS). See CWA § 301(b)(l )(C) and 402(p)(3)(A); 40 CFR § 122.44(d). The permitting authority, whether EPA or a delegated state, may issue an NPDES permit only when the permit meets all applicable CWA requirements. See, e.g., 33 U.S.C. §§ 1311(a), 1342(a); see also, 40 C.F.R. § 122.4 ("No permit may be issued: (a) When the conditions of the permit do not provide for compliance with the applicable requirements of CWA, or regulations promulgated under CWA ...."). In addition, "[n]o permit may be issued ... when the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 C.F.R. § 122.4(d).

The CWA also requires EPA to set effluent limitations for point sources that can reasonably be expected to contribute to the attainment or maintenance of water quality in a specific portion of navigable waters. 33 U.S.C. § 1312(a). Permit "limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standards, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i). "Permit writers must consider the impact of every proposed surface water discharge on the receiving water" to determine the need for water-quality based effluent limits. EPA, NPDES Permit Writers' Manual, at 87 (1996).1 This is critically important because Section 402(k) of the CWA creates a "permit shield" limiting a discharger's obligations to those enumerated in the permit. 33 U.S.C. § 1342(k).

Unfortunately, however, the proposed permit again falls far short of ensuring compliance with WQS. Because the proposed MSGP regulates all industrial dischargers, including many who are violating water quality standards, the permit's actual terms and conditions must ensure that all discharges will comply with water quality standards.

*a. Industrial Stormwater Discharges Must Comply Strictly with Water Quality Standards*

Congress has required industrial storm water discharges and industrial storm water discharge permits to achieve strict compliance with WQS due to the potential for industrial pollutants to impair the Nation's waters. When the stormwater program was expressly added to the CWA in 1987, language was added to the statute specifically requiring that industrial stormwater permits must require compliance with water quality standards: “Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 of this title.” 33 U.S.C. § 1342(p)(3)(A). In Defenders of Wildlife v. Browner, (1999) 191 F.3d 1159, the U.S. Court of Appeals for the 9th Circuit held that Congress has expressly required industrial storm water dischargers to comply with the requirements of 33 U.S.C. Section 1311 and, therefore, such dischargers shall achieve any more stringent effluent limitation, including those necessary to meet water quality standards established pursuant to any federal or state law or regulation. "In other words, industrial discharges must comply strictly with state water quality standards." Defenders, 191 F.3d at 1165 (emphasis added). Although EPA does not dispute that the permit is required to ensure that the discharges it authorizes will comply with WQS, the proposed permit utterly fails to do so. As laid out in more detail below, the proposed permit fails to determine whether the discharges have the reasonable potential to cause or contribute to water quality standards violations; it fails to set water-quality based effluent limitations for pollutants that are identified as having the reasonable potential to cause or contribute to water quality standards violations; it fails to comply with the prohibition on new or expanded discharges into impaired waterbodies; it fails to ensure compliance with applicable TMDLs; and it lacks any method even to determine whether (much less set conditions to ensure that) discharges authorized by the permit are in compliance with WQS.

A general permit cannot ensure compliance with any of those standards unless it contains provisions to evaluate the impact of proposed discharges on a particular water body and to develop water-quality based effluent limitations for all discharges that have the reasonable potential to cause or contribute to a violation of those standards. As the Ninth Circuit noted in Defenders, "Section 301 further mandates that NPDES permits include requirements that receiving waters meet water quality-based standards." 191 F.3d at 1165 (internal citation omitted) Many if not most of the states' impaired waters are impaired by pollutants associated with industrial activities. For example, 11,388 miles of assessed rivers and streams are listed as impaired by industrial sources. https://ofmpub.epa.gov/waters10/attains_nation_cy.control.

Many industrial pollutants are toxic, or "priority," pollutants for which numeric water quality criteria have been established by EPA, and which are included in the NTR. In addition, industrial facilities have the potential to discharge other non-priority pollutants, such as oil and grease, pesticides from irrigation and other pollutants that may violate WQS. The discharge of an impairing pollutant above WQS by an industrial facility to waters already impaired by that pollutant by definition causes or contributes to impairment of water quality and constitutes a WQS violation. Further, the discharge of any bioaccumulative or persistent pollutants by an industrial facility to a water body impaired by that pollutant causes or contributes to impairment, and therefore constitutes a WQS violation. Under the CWA, any Permit ultimately issued by EPA must contain requirements to ensure the elimination of this contribution.

*b. The CWA Requires Reasonable Potential Analyses (RPAs) for Each NPDES Permit. EPA's Failure to conduct RPAs in Conjunction with the Proposed MSGP is Unlawful.*

In order to ensure WQS are achieved, the Clean Water Act, and its implementing regulations, require Reasonable Potential Analyses ("RPAs") for all NPDES permits when the discharges they permit may cause, or have reasonable potential to cause, violations of water quality standards: Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard . . .40 C.F.R. § 122.44(d)(l)(i).

At a minimum, the RPA must consider the following four factors in projecting potential exceedances of water quality standards: "existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and, where appropriate, the dilution of the effluent in the receiving water." 40 CFR § 122.44(d)(l)(ii).

EPA has developed guidance documents to assist permit writers in undertaking the RPA analysis. The EPA Permit Writer's Handbook (1996) sets out the threshold requirement for RPAs:

> Reasonable Potential and Numeric Criteria
>
> When conducting an effluent characterization to determine if WQBELs are needed based on chemical-specific numeric in the water quality standards, the permit writer projects the receiving waters concentration of pollutants contained in the effluent once that effluent enters the receiving water. If the projected concentration exceeds the applicable numeric water quality criteria for a specific pollutant, there is reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standards and the permit writer must develop a WQBEL. Permit Writer's Handbook, p. 100.

The Handbook goes on to explain the data to be evaluated:

> Determining Reasonable Potential With Effluent Monitoring Data
>
> When characterizing an effluent for the need for a WQBEL, the permit writer should use any available effluent monitoring data as well as other information relating to the discharge ...as the basis for a decision...EPA recommends monitoring data be generated prior to permit limit development for the following reasons: (1) the presence or absence of a pollutant can be more clearly established or refuted; and (2) effluent variability can be more clearly defined. Permit Writer's Handbook, p. 101 (emphasis added).

Once the RPA is complete, EPA must, through an NPDES Permit, implement limitations that control all pollutants or pollutant parameters which the EPA determines "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(l)(i).

For waters that are Section 303(d) listed as impaired, the RPA for discharges of impairing pollutants is simple: discharges above WQS have the reasonable potential to cause, or contribute, to excursions above State WQS. Similarly, developing the WQBEL to be included in the General Permit is simple: the WQBEL is the NTR or State WQS for that pollutant. For waters not impaired, and thus with some assimilative capacity, the RPA and the development of the WQBEL can be more complicated. Nonetheless, EPA is required to undertake this analysis in developing all NPDES permits, including the proposed MSGP.

While it admits that it has not conducted an RPA (or required dischargers to do so), EPA has provided no justification for this failure. EPA may not ignore the CWA's regulatory scheme for conducting RPAs and making determinations regarding the reasonable potential of industrial discharges to cause or contribute to excursions above WQS.

*c. Water Quality Based Effluent Limitations Must Be Included in the Permit Where Permitted Discharges are Determined to Cause, or Have the Reasonable Potential to Cause Excursions Above Water Quality Standards.*

Once RPAs are conducted, EPA is required to include Water Quality Based Effluent Limitations ("WQBELs") in any NPDES Permit for discharges of pollutants that the EPA determines causes, or has the reasonable potential to cause or contribute to, excursions above WQS. 40 C.F.R. § 122.44(d)(l). The proposed MSGP fails to require that any of these types of effluent limitations are set for every discharge that has the reasonable potential to cause or contribute to a violation of WQS.

Moreover, while the EPA may claim that it is infeasible to develop numeric WQBELs in this context, EPA has not demonstrated that it is infeasible, either from a technical or from a practical standpoint. Numeric WQBELS are both feasible and necessary.

*d. Technology/BMP Based Effluent Limitations Expressed in the Proposed Permit Have Failed and Will Continue to Fail to Ensure Compliance with Water Quality Standard.*

Industrial dischargers have been operating under a MSGP since 1995. This permit, in its various iterations, has relied, and continues to rely, on narrative technology based effluent limitations (BMPs to achieve BCT/BAT) in order to reduce or prevent the discharge of pollutants in storm water discharges from thousands of industrial facilities, and under the proposed reissuance of the Permit, to achieve WQS. The technology-based effluent limitations first contained in the 2000 MSGP, and now again in the proposed MSGP, have not and cannot ensure that all permitted industrial discharges comply strictly with WQS as required by the CWA. In fact, the Permit's BMP/technology based effluent limitations have resulted in widespread failure of industrial discharges to comply with WQS, strictly or otherwise. (See subsection that follows immediately below).

In addition, subjectively deeming a discharger in compliance with WQS just because a permittee is implementing BMPs to meet technology-based standards is tantamount to providing a compliance schedule of indefinite duration. 33 U.S.C. section 1342(p)(4)(A) provides that permits must require compliance with WQS as expeditiously as practicable, but in no event later than 3 years after the issuance of the permit. By allowing dischargers to simply implement more BMPs in response to WQS violations, the Permit does not require compliance from permittees within 3 years as required by the CWA.

Given the failure of narrative BMP/technology-based effluent limitations to achieve strict compliance with WQS and the difficulties associated with applying narrative requirements to achieve strict compliance with WQS, EPA must adopt and include within the proposed permit numeric effluent limitations for all pollutants in industrial discharges which cause, or have the reasonable potential to cause or contribute to WQS violations. Numeric WQBELs are the most reliable vehicle by which to achieve strict compliance with WQS and are necessary given the variety and extent of industrial discharges and the variety and extent of impairing pollutants present in waters.

*e. Available Monitoring Data Shows Widespread Noncompliance with Water Quality Standards Under Current General Permit.*

EPA possesses a wealth of information and evidence relating to discharges from industrial stormwater dischargers, including most relevantly the sampling data collected by the dischargers themselves since 1995. However, the proposed MSGP fails to reflect any attempt by EPA to analyze this wealth of data and incorporate responsive requirements in a meaningful fashion. In the face of EPA's failure to conduct an analysis of industrial stormwater compliance data, the Commenters are compelled to undertake such an analysis, below.

*i. Compliance Data Under California's General Industrial Stormwater Permit Demonstrate Massive Exceedances of WQS.*

In 2005, Waterkeeper Alliance member programs in California conducted an analysis for industrial dischargers permitted under that state's General Industrial Storm Water Permit, which is similar to EPA's current MSGP. Industrial dischargers have been operating under the California statewide permit since 1992. As with the MSGP, the permit relies on narrative technology based effluent limitations (BMPs to achieve BCT/BAT) in order to reduce or prevent the discharge of pollutants in storm water discharges.

California dischargers have submitted over ten years of sampling data (representing thousands of samples) under the current General Permit. While the California State Water Quality Board staff apparently failed to consider any of this data in preparing the state's own draft General Permit, between 1993 and 1995 the San Francisco Regional Board entered General Permit sampling data into a database, between 2001 and 2002 the Los Angeles Regional Board created a similar database, and between 1996 and 2001 the Orange County Regional Board created its own database. Waterkeeper Alliance's analysis of the available electronic data supports the following conclusions:

- For all industrial dischargers sampling for Cu, Pb, and Zn, concentrations of pollutants discharged have increased rather than decreased between 1993 and 2002.

- For dischargers in the Los Angeles Region sampling for Cu, Pb and Zn (chosen because all major receiving waters in the Los Angeles Region are impaired for those pollutants), 99.5% exceed WQS for Cu, 99.9% exceed WQS for Pb, and 92.4% exceed WQS for Zn.

As demonstrated by this limited analysis of monitoring data in the Los Angeles area, extensive evidence (i.e., monitoring data) shows that concentrations of pollutants discharged pursuant to the General Permit routinely cause or contribute to exceedances of the chemical specific numeric criteria inapplicable water quality standards.

*ii. Compliance Data Under the Current EPA MSGP Also Demonstrates Numerous Exceedances of WQS.*

Dischargers have submitted over five years of sampling data under the current General Permit. While EPA staff apparently failed to compare any of this data to the applicable Water Quality Standards in preparing the proposed MSGP, the docket includes data collected between 1999 and 2004 in Alaska, Arizona, Idaho, Maine, Massachusetts, New Hampshire, New Mexico and the District of Columbia. The Commenters analyzed this data in an effort to gain a better understanding of the effectiveness of the narrative and technology-based BMP standards in the current MSGP. This effort examined data from 1,642 total monitoring events for the priority pollutants arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver, and zinc. A thorough analysis of this data was frustrated by its poor quality, incomplete nature, and variations within reporting methodologies between the states and permittees. These limitations aside, the information collected by the above states, and submitted to EPA presents a compelling portrait of the current MSGP's failure to adequately prevent WQS violations by industrial stormwater discharges.

On average, discharges of industrial stormwater covered under the 2000 MSGP violated each state's acute toxicity water quality standards for dissolved metals over 45% of the time. With the unexplained exception of Idaho, the highest "success rate" for the MSGP is found in Alaska, where only one in five discharges of industrial stormwater violate water quality standards. In Arizona, by contrast, violations occur in over 65% of discharges. (See Table 1, below)

Table 1: Percentage of Reported Stormwater Discharges Exceeding each State's Acute Toxicity WQS

| State | Exceedances (percent) |
|---|---|
| Alaska | 20.51 |
| Arizona | 65.52 |
| Idaho | 5.22 |
| Maine | 49.66 |
| Massachusetts | 50.71 |
| New Hampshire | 51.20 |
| New Mexico | 23.29 |
| Total | 46.63 |

Based upon even this limited review of stormwater sampling data collected and submitted by General Permittees, EPA cannot ensure that the BMP based approach continued in the draft General Permit will achieve compliance with the applicable WQS on an acceptable basis. Furthermore, EPA' s failure to account for the performance of its current MSGP in developing a successor program is arbitrary and capricious.

*f. The Proposed MSGP Fails to Control Discharges to Impaired Waterways, Particularly of Pollutants Generally Responsible for These Impairments.*

The CWA requires all discharges authorized by any NPDES permit, including the MSGP, the comply with the water quality standards of the receiving water, but there are additional requirements applicable to discharges to impaired waters, to waters that have a TMDL, and to waters of exceptional quality to ensure that discharges into those waters receive additional scrutiny in the permitting process. In addition to the substantive comments below, we also have a process suggestion for enhancing the ability of the public to assist the permitting authority in identifying discharges likely to violate these requirements. The NOI should identify not only the name of the receiving water into which the discharge will be made, but should also indicate whether the receiving water is classified as impaired, and if so, for what pollutants, whether TMDLs have been finalized for any of the pollutants causing that impairment, and, if so, for which pollutants, and whether it is classified as a Tier I, Tier II or Tier IHI water for purposes of anti-degradation analysis and if so, for which pollutants.

*i. Impaired Waters with TMDLs Will Not Be Adequately Protected by the Proposed MSGP.*

The proposed permit deletes language requiring that discharges must "be consistent with" a TMDL and instead includes new eligibility provisions for discharges into impaired waters with TMDLs and impaired waters for which a TMDL has not yet been completed. The proposed changes contravene the CWA's presumptive ban on new discharges into impaired waters unless there are specific remaining pollutant loads to allow for the discharge. See 40 CFR § 122.4(i). Instead, the proposed MSGP operates on the opposite assumption, i.e., that storm water discharges from industrial sites are authorized unless the TMDL expressly states that the discharge is not permitted, either by "specifically articulat[ing] a wasteload allocation requiring more stringent controls than can be achieved with this permit" or by expressly "appl[ying] a wasteload allocation of zero to a discharge (either specifically or categorically)." (Fact Sheet p. 31). EPA itself acknowledges that "most TMDLs do not include these kinds of wasteload allocations of stormwater" and that as a result, "this provision is not likely to preclude authorization ... of very many industrial stormwater discharges." Id. Thus, as EPA itself admits, the proposed provisions fail to protect impaired waters with TMDLs from most polluted storm water discharges.

*ii. The Proposed MSGP Fails to Protect Impaired Waters for which TMDLs Have Not Yet Been Established*

The proposed permit's treatment of impaired waters for which TMDLs have not yet been established ("pre-TMDL waters") is just as problematic. Ignoring the presumptive ban of 40 CFR § 122.4(i) on new discharges into impaired waters absent a specific load allocation, the proposed MSGP authorizes new discharges into pre-TMDL impaired waters without requiring any demonstration that the impaired water can handle the additional pollutant load and still comply with water quality standards. This presumption that a new discharge will not cause or contribute to a violation of water quality standards is unlawful and completely divorced from reality, since new discharges will necessarily add to the pollution of impaired waters. Under 40 CFR 122.4(i), "there cannot be a new source or a new discharger if the waterbody is a [water quality limited segment] impaired waterway unless the state completes a TMDL beforehand." San Francisco Baykeeper, Inc. v. Browner, 147 F. Supp 2d 991, 995 (N.D. Cal. 2001) (emphasis added); Friends of Pinto Creek v. EPA, 504 F.3d 1007, 1012 (9th Cir. 2007).

### *11. EPA Must Reject its Proposal to Weaken Monitoring Requirements for Permittees that Discharge Pollution to Impaired Waterways without an EPA-Approved or Established TMDL.*

EPA must also reject its own proposal to weaken monitoring requirements in the 2020 MSGP for permittees that discharge pollution to impaired waterways without an EPA-approved or established TMDL.[64] EPA proposes to roll back the requirement in the 2015 permit that permittees monitor for "all pollutant(s) causing the impairment or their surrogate(s)."[65] Instead, EPA proposes to "narrow[] the list of pollutants that operators must monitor for" by only requiring operators to only monitor for those pollutants or surrogate constituents that correspond to <u>both</u> the pollutant(s) or surrogate(s) for which the receiving waterway is impaired <u>and</u> the list of sector-specific benchmark pollutants applicable industrial activities or appear on the industrial pollutants listed on the operator's own self-reporting (Part 6.2.3.2).

EPA fails to assert a technical or legal justification for narrowing the scope of required monitoring and must not include this revision in the issuance of the final MSGP. This proposal is flawed, in part, because it will exclude operators from monitoring for pollutants that are present at their facilities and that contribute to waterway impairments only as a result of the operator failing to affirmatively include the constituent in its self-reporting or, while not associated with industrial activities as defined by EPA and assigned to operator's facility, the pollutant(s) is otherwise still present in detectable quantities.

For example, an operator may not be aware that a particular pollutant, which contributes to a receiving waterway impairment, is present at its facility in any quantity, and that pollutant is not otherwise included in the list of applicable sector-specific benchmark constituents. Under the requirements in the 2015 MSGP, the operator would be required to monitor for the pollutant pursuant to its inclusion in the impairment listing, thereby allowing the EPA and states to ascertain and subsequently address the contribution from the facility to the impairment and violation of water quality standards. Pursuant to the proposal in the draft 2020 MSGP, the facility's contribution to the ongoing waterway impairment and violation of a water quality standard would continue unknown to the operator and EPA, absent required monitoring, and unabated.

In the alternative, EPA should strengthen the provision from the 2015 MSGP by aligning required TMDL monitoring with benchmark monitoring requirements by requiring quarterly sampling coincident with benchmark monitoring. The additional data will improve EPA's effort to develop TMDLs and to ensure compliance with water quality standards and applicable waste load allocations.

Commenters do, however, urge EPA to adopt its proposal to impose an assumption that operators that discharge to impaired waters <u>with</u> an EPA-approved or established TMDL

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[64] Draft Permit at 33-34, Part 4.2.4.1.a.
[65] Fact Sheet at 75.

must monitor for pollutants corresponding to the TMDL, rather than relying upon an affirmative order or notice by to EPA to conduct such required monitoring.[66]

[66] *See* Fact Sheet at 75; Draft Permit at 34, Part 4.2.4.1.b.

## 12. *EPA Should Not Adopt Certain Proposals to Revise Benchmark Values and Adopt Other Proposals, with Certain Revisions.*

The NAS recommended that EPA review benchmark levels for certain pollutants, namely aluminum, arsenic, cadmium, copper, iron, magnesium, selenium, and PAHs.[67] The fact sheet explains how EPA responded to the NAS recommendations,[68] and we provide comment on each decision below. As a general matter, we note that the Clean Water Act is designed to progressively ratchet pollution limits down over time. The "national goal" of the Clean Water Act is that "the discharge of pollutants into the navigable waters be eliminated." Short of that zero-discharge goal, the Clean Water Act allows for water-quality based limits, but it is important to remember that maintaining water quality is only an "interim goal" on the path to zero discharge.[69] EPA's role is to progressively tighten pollution limits. This is reflected in various provisions of the CWA and its implementing regulations, including "anti-backsliding" provisions that generally serve to prevent the weakening of pollution limits,[70] and technology-based limits that represent "a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges."[71]

In light of EPA's mandate under the Clean Water Act, any relaxation of pollution limits should be rare or exceptional, and supported by a strong evidentiary record. We support some of EPA's decisions with respect to the derivation of benchmark levels, but we oppose others. In particular, we oppose the removal of the iron benchmark. And we are troubled by EPA's mischaracterization of the NAS report with respect to PAHs. The NAS strongly urged EPA to require PAH monitoring and <u>did not</u> support the idea that COD could be a useful surrogate for PAHs. EPA must require PAH monitoring.

**Aluminum.** The NAS recommended that EPA update the aluminum benchmark to reflect the most recent water quality criteria for aluminum.[72] The fact sheet explains that EPA is not changing the aluminum benchmark because the underlying criteria document is not yet final.[73] Although we support EPA's stated rationale – we agree that it would be inappropriate to relax a benchmark on the basis of a draft document – it appears that EPA did finalize the criteria document in 2018.[74] However, this should not change EPA's decision. As explained below, EPA would be justified in retaining the existing benchmark even after considering the 2018 criteria document. EPA would <u>not</u> be justified in setting a benchmark any higher than 980 µg/L.

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[67] NAS at 31-34.
[68] *See, e.g.*, Fact Sheet at 3. The Fact Sheet cites the NAS report as the "NRC Study," using the acronym for the National Research Council, once a subunit of the National Academies of Sciences, Engineering and Medicine.
[69] 33 USC §1252(a)(2).
[70] 33 USC §1342(o).
[71] *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74 (1980).
[72] NAS at 33.
[73] Fact Sheet at 64.
[74] U.S. Envtl. Prot. Agency, Final Aquatic Life Ambient Water Quality Criteria for Aluminum 2018, EPA-822-R-18-001 (Dec. 2018).

The 2018 aluminum criteria document does not provide single values for either the criteria maximum concentration (CMC) or the criterion continuous concentration (CCC). Instead, the new criteria document presents a calculator for deriving site-specific criteria based on pH, hardness, and dissolved organic carbon (DOC) conditions.[75] Both EPA and the NAS cite the 2017 draft criteria document as recommending an "acute criteri[on] of 1,400 µg/L based on a pH value of 7, hardness value of 100 mg/L, and DOC value of 1 mg/L."[76] This value now appears to be outdated, and EPA should not adopt this value.

In keeping with past practice, EPA should set the aluminum benchmark equal to the CMC. The NAS recommended adopting the draft aluminum criteria document approach.[77] If EPA did take this approach, using the same default pH, hardness and DOC values cited in the draft document – pH of 7, hardness of 100 mg/L, and DOC of 1 mg/L – then the criteria calculator would yield a CMC (and benchmark) of 980 ug/L.

However, if EPA is choosing to select a fixed benchmark that will protect all receiving streams, it would make more sense to select a lower bound value. The aluminum criteria calculator states that "EPA aluminum criteria recommend staying within specified limits for pH (5.0-10.5), total hardness (0.01-430 mg/L as $CaCO_3$) and DOC (0.08-12.0 mg/L) for generating criteria." Applying these parameter ranges yields aluminum CMC values as low as 0.0014 µg/L.[78] These conditions are of course very unlikely to occur in the real world, but this example serves to demonstrate that a static value would have to be significantly lower than 1,400 µg/L to be protective of all or even most receiving streams.

To take a much more realistic example, at a pH of 6.5, hardness of 45 mg/L, and DOC level of 3 mg/L, the CMC would be 750 µg/L – equal to the current benchmark. The same result can be achieved by adjusting the three parameters to various levels near the middle of their recommended ranges. This means that the current benchmark is appropriate for ordinary, real-world scenarios. The aluminum criteria document therefore supports EPA's decision to retain the existing benchmark. It should be noted, however, that neither the 750 µg/L benchmark nor a benchmark of 980 µg/L would be protective in all cases.

To summarize, the current aluminum criteria document supports EPA's decision to retain the existing aluminum benchmark of 750 µg/L. If EPA does choose to revise the aluminum benchmark, it should adopt a value no greater than 980 µg/L.

**Arsenic.** The arsenic benchmarks are currently 150 and 69 µg/L for fresh and saltwater, respectively. The freshwater benchmark is based on a chronic freshwater criterion, supported by concerns about stormwater flowing into saline water, where arsenic is

[75] U.S. Envtl. Prot. Agency, Aluminum Criteria Calculator V2.0, https://www.epa.gov/sites/production/files/2018-12/aluminum-criteria-calculator-v20.xlsm (last accessed Apr. 7, 2020).
[76] Fact Sheet at 64; NAS at 33.
[77] NAS at 33.
[78] Where pH = 5, hardness = 0.01 mg/L, and DOC = 0.08 mg/L.

more toxic.[79] The NAS recommended that EPA adopt the current acute freshwater aquatic life criterion for arsenic (340 µg/L) as the freshwater benchmark.[80] EPA declined to change the arsenic benchmark, reasoning that "it prefers not to weaken a discharge requirement unless good scientific evidence exists that a pollutant is less toxic than previously believed."[81]

We strongly support EPA's decision and reasoning. As discussed above, the CWA is designed to achieve progressively tighter pollution limits, working toward a goal of eliminating pollution entirely. EPA should not relax benchmarks without a good reason for doing so.

**Cadmium.** The cadmium benchmarks are currently hardness-dependent for freshwater and 40 µg/L for saltwater. The effective default freshwater benchmark is 2.1 µg/L, corresponding to a hardness of 100 mg/L.[82] NAS recommended that EPA update these benchmarks to reflect 2016 EPA water quality criteria. EPA agreed and proposes to revise the benchmarks. The new freshwater benchmark would continue to be hardness-dependent; at a hardness of 100 mg/L the benchmark would be 1.8 µg/L.[83] The new saltwater benchmark would be 33 µg/L .[84]

We support EPA's decision with respect to cadmium.

- *We note that EPA appears to have made a typographical error on page 65 of the fact sheet: In "Request for Comment 16" EPA refers to the "acute chronic life criteria." We presume that this should read "acute aquatic life criteria."*

**Copper.** The current benchmarks for copper are hardness-dependent for freshwater and 4.8 µg/L for saltwater. The most recent EPA water quality criteria document for copper uses a "Biotic Ligand Model" that requires 10 input parameters to calculate site-specific freshwater criteria.[85] The NAS approved of EPA's prior decision to retain a simpler, hardness-dependent benchmark.[86] EPA now proposes to continue this approach, retaining the hardness-dependent freshwater benchmark and the static saltwater benchmark. We support this decision for the reasons articulated in the NAS report.

EPA is also requesting comment on whether the Agency "should allow facilities that repeatedly exceed the copper benchmark to use the latest recommended aquatic life criteria to evaluate water quality risk on a site-specific basis."[87] We do not support this

[79] NAS at 32; Fact Sheet at 65.
[80] NAS at 32.
[81] Fact Sheet at 65.
[82] *See, e.g.*, NAS at 33; Fact Sheet at 70.
[83] Fact Sheet at 65, 70.
[84] *Id*. at 70.
[85] Fact Sheet at 66; NAS at 33.
[86] NAS at 33 ("Given the extra sampling burden, the 2015 MSGP did not recommend using the biotic ligand model for copper benchmark monitoring, which is reasonable for a national permit").
[87] Fact Sheet at 66.

idea because it would introduce considerable complexity into the compliance framework, and EPA has not explained how it would work. The very brief request for comment fails to shed any light on numerous critical questions:

1. What does it mean to "repeatedly exceed" the benchmark?

2. Would the use of an alternative, site-specific benchmark be subject to prior EPA approval?

3. Would that EPA approval process include a public comment period?

4. What would happen if a permittee opted to use a site-specific benchmark, but failed to do it correctly?

5. Would EPA then require the permittee to return to the use of the default benchmark?

6. How often would a permittee be allowed (or required) to update the derivation of a site-specific benchmark?

EPA cannot finalize the site-specific alternative copper benchmark without a more substantial proposal that answers these and other critical questions. At this point in time, given the lack of clarity, we oppose the idea. EPA should retain the existing copper benchmarks and apply them consistently and uniformly to all permittees.

- *We note that EPA appears to have made a conversion error on page 70 of the fact sheet. The saltwater benchmark for copper should be 4.8 µg/L, not 48 µg/L.*

**Iron.** The current iron benchmark is 1 mg/L. The NAS recommended removing the iron benchmark based on a lack of evidence showing acute toxicity.[88] EPA is proposing to remove the iron benchmark for the same reason.[89] We oppose this part of the proposal, because the scientific literature does in fact show evidence of iron toxicity, including evidence of acute toxicity at concentrations well below the current benchmark.

One recent study observed that "[i]n neutral waters, [iron] has been found to increase turbidity, reduce primary production, and reduce interstitial space in the benthic zone, which smothers invertebrates, periphyton, and eggs. Iron precipitates also physically clog and damage gills causing respiratory impairment."[90] That same study evaluated iron toxicity in several species over a period of 30 days. The authors found that iron was lethal in boreal toad tadpoles, and also caused a variety of sublethal effects, including "reduced growth for boreal toad tadpoles and mountain whitefish, reduced development

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[88] NAS at 32.
[89] Fact Sheet at 66.
[90] P. Cadmus et al., Chronic Toxicity of Ferric Iron for North American Aquatic Organisms: Derivation of a Chronic Water Quality Criterion Using Single Species and Mesocosm Data, 74 Arch. of Envtl. Contamination and Toxicology 605, 611 (2018) (attached).

for boreal toad tadpoles, and reduced reproduction for *Lumbriculus* [blackworm]."[91] Using the results of their study, combined with other chronic toxicity literature values, the authors derived a Final Chronic Value (FCV) of 499 µg/L. Although this result is not directly relevant to the question of acute iron toxicity, it does suggest that EPA's current chronic criterion for iron (1 mg/L) may be too high.

The same authors performed a separate, 10-day "mesocosm" experiment in which they exposed naturally colonized communities of benthic macroinvertebrates in experimental streams to various iron concentrations.[92] These experiments yielded $EC_{20}$ values as low as 234 µg/L, and the authors derived a FCV of 251 µg/L, again suggesting that EPA's current water quality criterion for iron may be too high.

In a study focused on acute effects, Shuhaimi-Othman et al. describe a series of four-day toxicity tests on eight freshwater aquatic species.[93] For iron, species-specific $LC_{50}$ values ranged from 0.12 to 8.49 mg/L. Following EPA guidance, the authors derived a Final Acute Value (FAV) of 74.5 µg/L, and a CMC of 37.2 µg/L. This is of course much lower than the current iron benchmark of 1 mg/L.

We are not suggesting that EPA should use these studies, by themselves, to derive a new benchmark. The derivation of a new iron benchmark would presumably take years of research and analysis. What we <u>are</u> suggesting is that it would be unreasonable to eliminate a benchmark where EPA has evidence of toxicity, including acute toxicity, at levels significantly lower than the current benchmark. To repeat EPA's reasoning with respect to arsenic, the Agency should choose "not to weaken a discharge requirement unless good scientific evidence exists that a pollutant is less toxic than previously believed."[94] This reasoning applies with added force to iron. Not only is there a lack of evidence that iron is <u>less</u> toxic than previously believed, there is in fact evidence that iron is <u>more</u> toxic than previously believed.

In sum, the predicate for NAS's recommendation and EPA's proposed decision with respect to iron – that there is no evidence of acute or subchronic toxicity – is false. We cite and attach two studies showing iron toxicity over periods of 4 and 10 days at levels well below the current benchmark. In light of this evidence, it would irresponsible and unreasonable for EPA to remove the iron benchmark. We support the idea that EPA should derive new water quality for iron, but in the meantime, EPA should continue to require iron monitoring using the current iron benchmark.

**Magnesium.** We are not aware of significant evidence of magnesium toxicity to aquatic life at levels found in industrial stormwater and defer to the NAS and EPA on whether a magnesium benchmark is useful or necessary.

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[91] *Id*.
[92] *Id*; see also C.J. Kotalik et al., Indirect Effects of Iron Oxide on Stream Benthic Communities: Capturing Ecological Complexity with Controlled Mesocosm Experiments, 53 Envtl. Sci. Technol. 11532 (2019).
[93] M. Shuhaimi-Othman et al., Deriving Freshwater Quality Criteria for Iron, Lead, Nickel, and Zinc for Protection of Aquatic Life in Malaysia, Scientific World Journal (2012) (attached).
[94] Fact Sheet at 65.

**Selenium.** The current benchmarks for selenium are 5 μg/L (freshwater) and 290 μg/L (saltwater), based on chronic water quality criteria and taking into consideration selenium's bioaccumulative properties. EPA revised the freshwater selenium criteria in 2016, and the new criteria are 1.5 μg/L (for still water) and 3.1 μg/L (for flowing water).[95] EPA did not derive acute criteria for selenium, but the criteria document does provide a method for translating the chronic criteria to acute or intermittent exposure.[96] The NAS implied that EPA should revise the benchmark to be consistent with the new criteria, noting that "[t]he selenium benchmark based on chronic aquatic life criteria is now outdated."[97] However, the NAS also suggested that EPA should allow for site-specific benchmarks, based on the translation of the chronic criteria for acute or intermittent exposure, for facilities with repeated benchmark exceedances.[98]

EPA is proposing to retain the existing selenium benchmarks. We fail to see why EPA would not revise the freshwater benchmark to reflect the revised water quality criteria. The Agency previously determined that the chronic criterion was a suitable basis for the benchmark and has not provided any indication that its position on this issue has changed. The selenium benchmark for freshwater should be revised to 3.1 μg/L (or, to the extent that any permittees are discharging into lakes or ponds, 1.5 μg/L for those permittees).

EPA has tentatively decided against allowing for site-specific alternative benchmarks as described above, reasoning that "the translation of the chronic criteria would require gathering additional data, including background base-flow concentration of selenium in the receiving water and the length of exposure."[99] We agree with EPA's reasoning. Furthermore, as with copper, we are opposed to the idea of site-specific benchmarks because the idea lacks detail in the draft fact sheet. EPA cannot finalize the site-specific alternative selenium benchmark without a more substantial proposal that answers critical questions, including those raised with respect to copper above. At this point in time, given the lack of clarity, we oppose the idea.

EPA should revise the selenium benchmark to 3.1 μg/L and should not adopt a site-specific alternative for facilities that repeatedly exceed the benchmark.

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[95] *Id*. at 64.
[96] *Id*. at 65.
[97] NAS at 33.
[98] *Id*.
[99] Fact Sheet at 65.

### 13. *EPA Must Require PAH Monitoring for Sectors I, P, R, C, F and Q, in Accordance with the Recommendations by the National Academies and for Other Reasons.*

EPA must require PAH monitoring for at least Sectors I, P and R (based on NAS recommendations) and Sectors C, F and Q (based on the analysis in EPA's fact sheet). The NAS recommendations are clear, and the NAS does not support using COD as a surrogate. More fundamentally, while we recognize that it would be outside the scope of the current rulemaking, EPA must establish water quality criteria for PAHs, as Canada has done.[100] In the meantime, the very least EPA could do is require the monitoring data necessary to characterize the pollution problem and stormwater treatment capabilities.

The NAS notes that "PAHs have been shown to be extremely toxic to fish and aquatic invertebrates and are known to bioaccumulate," and that "PAHs are expected at industrial sites with petroleum hydrocarbon exposure."[101] In the draft fact sheet, EPA itself discusses the risks associated with PAH pollution.[102]

The NAS report and the EPA fact sheet barely scratch the surface of what we know about the risks of PAH exposure. Many PAHs are carcinogenic, cause organ damage, and/or suppress the immune system. They also comprise one of the most ubiquitous classes of compounds that industrial facilities discharge into the air and water.[103] EPA lists 17 PAHs as Priority Pollutants, including a number of chemicals commonly found in NPDES permits associated with Sector C, F, and Q facilities: acenaphthene, anthracene, benz(*a*)anthracene, benzo(*k*)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene[FN] phenanthrene, and pyrene.[104]

The toxicity of PAHs has long been known. The scientific community first identified the carcinogenic nature of benzo(*a*)pyrene in 1918. Albers 2003 and a 1987 U.S. Fish and Wildlife Service Biological Report called PAHs "among the most potent carcinogens known to exist, producing tumors in some organisms through single exposures to microgram quantities."[105] When metabolized, PAHs byproducts can cause a host of problems in humans and animals, including inflammation, suppressed immune system function, endocrine (hormone) system disruption, genotoxicity, embryotoxicity, mutation,

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[100] *See, e.g.*, NAS at 43.
[101] NAS at 33 (internal citations omitted).
[102] Fact Sheet at 21.
[103] Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Aquatic Life: Polycyclic Aromatic Hydrocarbons (CWQG PAHs) (1999).
[104] U.S. Envtl. Prot. Agency, 2014, Priority Pollutant List, https://www.epa.gov/sites/production/files/2015-09/documents/priority-pollutant-list-epa.pdf; Collier, T. K. et al., Effects on fish of polycyclic aromatic hydrocarbons (PAHs) and naphthenic acid exposures, 33 Organic Chemical Toxicology of Fishes 195 (2014); Eisler, R., Polycyclic aromatic hydrocarbon hazards to fish, wildlife, and invertebrates: a synoptic review, U.S. Fish & Wildlife Serv. Biological Report 85(1.11) (May 1987); Kannan, K. & E. Perrotta, Polycyclic aromatic hydrocarbons (PAHs) in livers of California sea otters, 71 Chemosphere 649 (2008).
[105] Eisler 1987, at 4.

developmental malformations, tumors, and cancer (specifically, lung, skin, gastrointestinal, and bladder cancers).[106]

As in humans, PAHs induce a wide variety of detrimental effects in aquatic organisms, including reproductive harm, compromised immune system function, cancer, and death.[107] These harms impact species across taxa, from bacteria to invertebrates, fish to reptiles, birds to mammals. Aquatic organisms exposed to PAHs may exhibit reduced growth; deformities; endocrine disruption; inhibited reproduction and reduced survival of young; toxicity to embryos; suppressed immune systems; liver and kidney toxicity; cancers; and mortality.[108] The most striking evidence for the effect of PAHs on marine mammals comes from an eight-year study on St. Lawrence Estuary beluga whales (*Delphinapterus leucas*). A quarter of adult St. Lawrence Estuary belugas—which are exposed to PAHs through the ingestion of contaminated worms—die from cancer.[109]

In short, PAHs are extremely toxic and their discharge in industrial stormwater must be controlled. It should go without saying that PAHs must also be monitored.
The NAS goes on to observe that "PAHs were not previously monitored as part of the MSGP process, but aquatic impacts of PAHs are now better understood and analytical technologies have advanced significantly since the 1992 group application,"[110] before concluding that "[a]dditional information and data gathering for polycyclic aromatic

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[106] Abdel-Shafy, Hussein I. & Mona S.M. Mansour, A review on polycyclic aromatic hydrocarbons: source, environmental impact, effect on human health and remediation. 25 Egyptian J. Petroleum 107 (2016); Albers, P., *Petroleum and Individual Polycyclic Aromatic Hydrocarbons, Ch. 14 in* HANDBOOK OF ECOTOXICOLOGY (David J. Hoffman et al. eds. 2nd ed. 2003); Albers, P.H. & T. R. Loughlin, *Effects of PAHs on Marine Birds, Mammals and Reptiles, Ch. 13 in* PAHS: AN ECOTOXICOLOGICAL PERSPECTIVE (Peter E.T. Douben ed. 2003); Collier et al. 2014; Kabir, Eva Rahman et al., A review on endocrine disruptors and their possible impacts on human health, 40 Envtl. Toxicology & Pharmacology 241 (2015); Kannan & Perrotta 2008; Rengarajan, T. et al., Exposure to polycyclic aromatic hydrocarbons with special focus on cancer, 5 Asian Pacific J. Tropical Biomedicine 182 (2015); Troisi, G. et al., Impacts of oil spills on seabirds: unsustainable impacts of non-renewable energy, 41 Int'l J. Hydrogen Energy 16,549 (2016).
[107] Eisler 1987; Albers 2003.
[108] Albers 2003; Albers & Loughlin 2003; Bell, Barbara et al., High incidence of deformity in aquatic turtles in the John Heinz National Wildlife Refuge, 142 Envtl. Pollution 457 (2006), at 463-64; Eisler 1987; Collier et al. 2014; Cousin, Xavier and Jérôme Cachot, PAHs and fish—exposure monitoring and adverse effects—from molecular to individual level, 21 Envtl. Sci. & Pollution Research 13,685 (2014); CWQG PAHs 1999; Goodale, Britton C., PH.D. DISSERTATION: DEVELOPMENTAL TOXICITY OF POLYCYCLIC AROMATIC HYDROCARBONS: DEFINING MECHANISMS WITH SYSTEMS-BASED TRANSCRIPTIONAL PROFILING (Aug. 12, 2013); Malcolm, H. M. & Richard F. Shore, *Effects of PAHs on Terrestrial and Freshwater Birds, Mammals and Amphibians*, *in Ch. 12* PAHS: AN ECOTOXICOLOGICAL PERSPECTIVE (Peter E.T. Douben ed. 2003); Meador, J.P. et al., Bioaccumulation of Polycyclic Aromatic Hydrocarbons by Marine Organisms, 143 Review of Envtl. Contamination & Toxicology 79 (1995); Payne, J. F. et al., *Ecotoxicological Studies Focusing on Marine and Freshwater Fish*, *in Ch. 11* PAHS: AN ECOTOXICOLOGICAL PERSPECTIVE (Peter E.T. Douben ed. 2003); Reynolds, J. & D. Wetzel, *PowerPoint presentation: Polycyclic Aromatic Hydrocarbon (PAH) Contamination in Cook Inlet Belugas* (undated); Troisi et al. 2016; Zychowski, G. V. et al., Reptilian exposure to polycyclic aromatic hydrocarbons and associated effects, 36 Envtl. Toxicology & Chemistry 25 (2017).
[109] Albers & Loughlin 2003; Martineau, Daniel, *Contaminants and Health of Beluga Whales of the Saint Lawrence Estuary*, *in Ch. 17* ECOSYSTEM HEALTH AND SUSTAINABLE AGRICULTURE 2 (Norrgren, L. & J. Levengood eds. 2012).
[110] NAS at 31.

hydrocarbons (PAHs) could help EPA determine if benchmark monitoring is needed for sectors that have the potential to release PAHs."[111]

The NAS also recommends PAH monitoring for two specific sectors. Regarding the Oil and Gas sector (Sector I), the NAS noted that "[s]pills and leaks can also lead to petroleum hydrocarbon contaminants in stormwater, including PAHs, which have been shown to be highly toxic to aquatic life. Chemical-specific monitoring is appropriate for this sector to ensure that stormwater is appropriately managed."[112] The NAS said the same thing about the Motor Freight and Transportation sector (Sector P),[113] and EPA notes that the same reasoning applies to Sector R (Ship and Boat Building and Repair Yards).[114]

EPA also presents "industrial process wastewater discharges" of PAHs from various MSGP sub-sectors "as a proxy" for stormwater loads.[115] This analysis suggests that EPA should also require PAH monitoring for Sectors C, F and Q, which contain the top five subsectors for process wastewater PAH loads.

EPA's suggestion[116] that the NAS approves of COD as a surrogate for PAHs is plainly false. The NAS said no such thing. To the contrary, the NAS repeatedly said the opposite:

- "While both COD and TOC are gross measures of organic pollution, they are not specific enough or sensitive enough to detect possible excursions of toxic pollutants (e.g., polycyclic aromatic hydrocarbons [PAHs]) at moderate/low concentrations."[117]

- "Analytical methods for determination of PAHs are standardized and readily available (EPA, 2015c). It may <u>appear</u> that [Chemical Oxygen Demand] can be used as a surrogate for PAHs, but PAHs can be toxic at concentrations orders of magnitude lower than the [Chemical Oxygen Demand] benchmark (120 mg/L). Canadian water quality guideline values for PAHs for the protection of aquatic life range from 0.012 µg/L (anthracene) to 5.8 µg/L (acenaphthene) (Canadian CME, 1999). Currently, EPA has no recommended aquatic life criteria for individual or total PAHs. [118]

What the NAS actually recommended with respect to PAHs and COD is that EPA <u>first</u> require PAH monitoring, and then evaluate whether COD could be an adequate

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[111] *Id*. at 3; see also *id*. at 33 and 42.
[112] *Id*. at 29 (internal citations omitted).
[113] *Id*. at 30.
[114] Fact Sheet at 62.
[115] *Id*. at 67-68.
[116] *Id.* at 69.
[117] NAS at 28.
[118] Id. at 43 (emphasis added).

surrogate.[119] Based on the information available now, and the NAS's discussion, it should be clear that COD is not an adequate surrogate.

In light of the known toxicity of PAHs, the clear NAS recommendations for sector-specific monitoring, and the fact that COD is not a reliable surrogate for PAHs, EPA must require PAH monitoring for Sectors I, P and R, and also for sectors C, F and Q while it works on developing water quality criteria for PAHs.

[119] Id. at 33.

## *14. EPA Should Adopt its Proposal to Establish Sector-Specific Benchmark Monitoring for Sector I (Oil and Gas Extraction), Sector P (Land Transportation and Warehousing), and Sector R (Ship and Boat Building and Repair Yards) in Accordance with the Recommendations by the National Academies and Other Certain Revisions.*

Commenters urge EPA to adopt its proposal to include new sector-specific benchmark monitoring requirements for Sector I (Oil and Gas Extraction), Sector P (Land Transportation and Warehousing), and Sector R (Ship and Boat Building and Repair Yards).[120] However, EPA should also revise its proposal to require PAH benchmark monitoring for Sectors I, P, and R in accordance with the recommendations of the National Academies and by the Commenters, as discussed more fully in the preceding comment section. EPA should also include additional benchmark monitoring requirements for Sectors I, P, and R as described below.

EPA should require operators in Sector I (Oil and Gas Extraction) to conduct benchmark monitoring for radium and other radionuclides, radioactive constituents, or appropriate surrogate or indicator for technologically enhanced naturally occurring radioactive material associated with oil and gas extraction. Studies have demonstrated significant and widespread radioactive contamination by drilling fluids and wastewaters (including "brine") from hydraulic fracturing and other conventional methods of oil and gas extraction.[121] The land application of wastewaters from oil and gas extraction is permitted within several jurisdictions, including New Mexico, for dust suppression, road deicing, road maintenance, and/or for disposal onto or within the land upon which oil and gas extraction facilities are located.[122] Permitted land applications or other pathways for stormwater exposure of wastewater at oil and gas extraction facilities covered by the MSGP may result in stormwater discharges contaminated by radioactive constituents that reach receiving waterways and contribute to violations of applicable surface and drinking water standards. EPA must adopt stormwater controls to address discharge of radioactive constituents by facilities in Sector I.[123]

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[120] Fact Sheet at 62.
[121] Tasker TL, Burgos WD, Piotrowski P, et al. Environmental and Human Health Impacts of Spreading Oil and Gas Wastewater on Roads. *Environ Sci Technol*. 2018;52(12):7081-7091. doi:10.1021/acs.est.8b00716 (attached); Lauer NE, Warner NR, and Vengosh A. Sources of Radium Accumulation in Stream Sediments near Disposal Sites in Pennsylvania: Implications for Disposal of Conventional Oil and Gas Wastewater. *Environ Sci Technol.* 2018 *52* (3), 955-962. DOI: 10.1021/acs.est.7b04952; Nelson AW, May D, Knight AW, Eitrheim ES, Mehrhoff M, Shannon R., Littman R, and MK Schultz. Matrix Complications in the Determination of Radium Levels in Hydraulic Fracturing Flowback Water from Marcellus Share. *Environ Sci Technol. Lett.* 2014; *See also*, Justin Nobel. America's Radioactive Secret. *Rolling Stone*, Jan. 21, 2020. Available at https://www.rollingstone.com/politics/politics-features/oil-gas-fracking-radioactive-investigation-937389/.
[122] Tasker TL, et al.; *also* Troutman MA. Still Wasting Away: The Failure to Safely Manage Oil and Gas Waste Continues (May, 2019) at 18 and 60-63. Available at https://earthworks.org/cms/assets/uploads/2019/06/National-Phase-1_WastingAway_2.0-5-2019.pdf.
[123] Conference of Radiation Control Program Directors, Inc. E-42 Task Force Report Review of TENORM in the Oil & Gas Industry, (June, 2015) at 24, 73-76 (attached), Publication No. CRCPD E-15-2. Available at https://www.epa.gov/radtown/radioactive-waste-material-oil-and-gas-drilling.

The Transportation and Warehousing Sector (P) has quite literally an outsized footprint in the Chesapeake Bay watershed, for example, especially in Pennsylvania – and also likely in other states which host key shipping and goods distribution centers along, or at multiple intersecting Interstate highways. Break-bulk and major warehouse and highway-related trucking facilities are a dominant land use in parts of Pennsylvania where several Interstate highways intersect, where major north-south interstate routes (I-95, I-81) carry freight along the heavily populated East Coast corridor, and where east-west routes connect East Coast shipping ports with Midwestern population centers.

Land transportation and warehouse facilities of 50-75 acres in size are not unusual, and additional attention is required for their stormwater loads. While the Commonwealth of Pennsylvania issues its own stormwater permits for Pennsylvania's industrial facilities, its industrial stormwater general permits have regularly hewed very closely to EPA's MSGP -- just as the MSGP serves as a basic template for many other states across the country. As such, the MSGP should attend closely to this sector.

Sector-specific benchmarks appropriately include total recoverable lead and mercury benchmarks (e.g. 1.4micrograms/L for the former, depending on water hardness, which is listed); these are important toxic pollutants and relate directly to various types of transportation equipment and fuels.[124] But these alone are insufficient. Benchmarks should be established for more prosaic stormwater runoff pollutants, such as nitrogen, phosphorus, total suspended solids, and indeed, water volume itself -- since the massive impervious surfaces, from rooftops to parking and service areas in these sizeable warehousing and shipping centers, generate extensive runoff subject to large and fast-moving volumes of water, which either carry nutrient (N and P) and sediment or contribute to such loading by blowing out stream banks and beds. These physical configurations lead to significant adverse water quality impacts in streams and rivers and should require specific controls related to those specific pollutants.

Sector-specific benchmarks for Sector R (Ship and Boat Building and Repair Yards) are long overdue and must be included in the Final MSGP. Copper-based bottom paint is customarily applied to the bottom of ships and boats for its anti-fouling properties. Blasting, refinishing, and painting activities at ship and boat yards often result in the release of copper laden overspray, paint chips, and dust, which can easily pollute stormwater and receiving waters. Additionally, ship and boat yards often engage in engine maintenance and repair, parts cleaning, metal working, welding, cutting and grinding – industrial activities which are known to produce heavy metals pollution.[125] Despite the fact that heavy metals are often associated with Sector R's industrial activities, previous iterations of the MSGP have failed to require ship and boat yards to analyze their stormwater samples for heavy metals. Commenters appreciate that the Agency has adopted NAS's recommendations[126] in favor of including sector-specific benchmarks for Sector R in the 2020 MSGP.

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[124] Draft Permit at 93, Part 8.P.6.
[125] NAS at 30.
[126] *Id.* at 30.

In response to the Agency's Request for Comment 12[127] for any data related to Sector R, Commenters have attached a compilation of self-reported industrial stormwater sampling results from Sector R facilities located in California for the heavy metals chromium, copper, lead, nickel, and zinc.[128] Of the more than 80 Sector R facilities in California, approximately 30 analyzed their industrial stormwater samples for heavy metals in the past five years. As evidenced by the attached sampling results, heavy metals are present in stormwater discharged from Sector R facilities, and thus must be monitored and controlled across this entire industrial sector.

Accordingly, the Agency must include sector specific benchmarks for Sector R for chromium (III), chromium (VI), copper, lead, nickel, and zinc in the Final 2020 MSGP.

[127] Fact Sheet at 62.

[128] Commenters downloaded from California's Stormwater Multiple Application and Report Tracking System (SMARTS) database self-reported parameter results (i.e. chromium, copper, lead, nickel, and zinc) for Sector R (i.e., SIC Codes 3731 and 3732) for facilities located in California (attached).

### *15. EPA Should Adopt its Proposal for "Consideration of Major Storm Control Measure Enhancements," with Certain Revisions.*

Flood risks to industrial facilities and, in particular, the threat of flood-induced contaminated stormwater discharges and chemical disasters are a present and increasing risk and must continue to be fully addressed in the MSGP. The MSGP has long required regulated facilities that are exposed to extreme weather and flood risks to develop SWPPPs with enforceable measures to address those risks and to comply with effluent limits, water quality standards, antidegradation requirements for high quality waterways, and applicable waste load allocations. The well-documented current and increasing effects of climate change, such as increased frequency of severe storms, extreme precipitation, storm surge, and sea level rise, only intensify the risk of harm from contaminated stormwater discharges and catastrophic spills to water quality, public health and safety.[129]

While the narrative standards contained in the 2015 and prior versions of the MSGP already require permittees to take these issues into consideration and implement appropriate controls and actions at facilities, the proposed 2020 MSGP language as it currently stands is not sufficient because it appears to narrow the necessary consideration of flood risk from the 2015 version. Accordingly, the Agency should strengthen the proposed language in Part 2.1.1.8 by underscoring existing obligations requiring applicants to use good engineering practice, disclose information in their possession, consider all reasonably available data and information, and thoroughly document present-day and future flood risks, such as hurricane storm surge and high tides, extreme precipitation, known and committed sea level rise, and historic flood incidents. EPA should further underscore that applicants must include specific enforceable design, operation, and maintenance measures in their SWPPPs to fully address identified risks of pollutant discharges. Relying upon the self-reported data and information contemplated in this proposal, EPA should evaluate the universe of permitted facilities at risk of flooding and prioritize inspections, outreach, technical assistance, and compliance resources to the most vulnerable facilities.

*a. EPA Should Require Applicants to Self-Identify Risk of Flooding Conditions Resulting from Major Storms in Notice of Intent Applications for Permit Coverage*

EPA should require applicants to report identified flood risks in their NOI application following consultation with resources and data sets applicable to present and future flood risks as discussed below. As with the prior permit, the draft permit requires applicants to document their consideration of the design and selection of control measures in their SWPPP (Part 6.4), which includes consideration of the risks of major storm events and extreme flooding conditions. Consistent with good engineering

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[129] Minovi, D. Toxic Floodwaters: Public Health Risks and Vulnerability to Chemical Spills Triggered by Extreme Weather, Center for Progressive Reform (May, 2020) (attached); *also* Government Accountability Office. *Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change*. GAO-20-73: Published: Oct 18, 2019. Publicly Released: Nov 18, 2019. https://www.gao.gov/products/GAO-20-73.

practice and in order to support meaningful evaluation of an applicant's consideration of potential major storm and flood risk, EPA should make explicit that applicants must identify 1) the specific present-day flood risks and reasonably foreseeable flood risks over the design life of their facilities; 2) all of the information and analysis applicants have in their or their agents' possession relevant to flood risk; and 3) information and analysis relied upon for consideration and implementation of control measures to address identified risks.

EPA should require applicants to self-designate exposure to flood risk if any part of their facility's footprint is located within a geographic area at risk of flooding based upon the best available flood projection information and models for that area. This must include consideration of all reasonably available data and information consistent with good engineering practice.

Unfortunately, proposed Part 2.1.1.8 narrows the universe of data that must currently be considered under the MSGP by constraining the flood-risk analysis solely to "base flood elevations (BFE) shown on the Federal Emergency Management Agency's Flood Maps and on the flood profiles, which can be accessed through https://msc.fema.gov/portal/search."[130] As EPA is well aware, FEMA flood hazard designations are insufficient to capture present-day coastal flood risks, which also include hurricane storm surge and nuisance or 'sunny-day' tidal flooding, to sites discharging industrial stormwater.[131] Further, the underlying models used by FEMA to identify flood risks for flood insurance rate development were never intended for use in regulatory programs and are based upon retrospective data. Therefore, FEMA designations are outdated in many cases and even across some entire regions. These concerns are especially grave given observed increases in precipitation intensity, severe storm frequency, and sea level rise. Dramatically intensified development of impervious surfaces over the last several decades further confounds simple reliance on the FEMA designations. As a result, currently applicable spatial flood hazard designations significantly underestimate present-day risk. Reliance on FEMA BFEs alone in this proposed provision artificially constrains the 2015 MSGP requirements and would be arbitrary and unreasonable given current scientific consensus regarding both the insufficiencies of the FEMA maps and the dramatic current and certainly impending effects of climate change.

Nevertheless, FEMA flood hazard designations represent basic information that must be considered for identifying present-day flood risks and risk over the design life of a facility. EPA should make explicit that applicants must, at a bare minimum, identify areas designated by FEMA as in or adjacent to a flood risk zone with a 0.2 percent or greater annual chance of flooding. Despite their underestimation of risk and flaws, the FEMA designations of statistical probability are based upon streamflow measurements and coastal flooding data, which are available for a widespread geography.

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[130] Draft Permit at 14, Part 2.1.1.8, Note 5

[131] Highfield, W.E., Norman, S.A. and Brody, S.D. (2013), Examining the 100-Year Floodplain as a Metric of Risk, Loss, and Household Adjustment. Risk Analysis, 33: 186-191. doi:10.1111/j.1539-6924.2012.01840.x.

EPA should also make explicit that applicants are required to self-designate exposure to flood risk if any part of their facility's footprint is located within geographic areas that are projected by NOAA to be exposed to present-day risk of hurricane storm surge. NOAA has developed multiple hurricane storm surge models and projections. For example, NOAA's National Hurricane Center publishes coastal storm surge vulnerability projections based upon the agency's SLOSH (Sea, Lake, and Overland Surges from Hurricanes) model, which is based upon analysis of different tropical storm trajectories and intensities.[132] Coastal areas are already at risk of flooding due to storm surge, and that risk is growing due to increased frequency and intensity of hurricane storms and observed sea level rise.[133] Therefore, EPA should require applicants to identify a site's risk of exposure to storm surge arising from any of five categories of hurricanes (in accordance with NOAA modeled projections) and consider accordingly the necessary control measures to account for those risks.

EPA should also make explicit that applicants must self-designate exposure to flood risk if any part of their facility's footprint is located within geographic areas that are projected by NOAA to be exposed to present-day or future risk of dry-weather tidal flooding, including so-called 'king tides,' 'sunny-day,' recurrent and nuisance flooding. Tidal flooding is already impacting coastal regions, including industrial areas and public infrastructure such as storm sewers and roadways.[134] NOAA has identified coastal areas that are exposed to present-day nuisance flooding, based upon decades of observed data.[135] The risks of coastal nuisance flooding are also increasing due, for

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[132] National Hurricane Center. National Storm Surge Hazard Maps - Version 2, National Oceanic and Atmospheric Administration, US Department of Commerce (accessed May 26, 2020). Available at https://www.nhc.noaa.gov/nationalsurge/; *also,* National Hurricane Center Storm Surge Unit. National Storm Surge Hazard Maps, National Oceanic and Atmospheric Administration, US Department of Commerce (accessed May 26, 2020). Available at https://noaa.maps.arcgis.com/apps/MapSeries/index.html?appid=d9ed7904dbec441a9c4dd7b277935fad&entry=1.

[133] Fleming, E., J. Payne, W. Sweet, M. Craghan, J. Haines, J.F. Hart, H. Stiller, and A. Sutton-Grier, 2018: Coastal Effects. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 322–352. doi: 10.7930/NCA4.2018.CH8.

[134] National Ocean Service. What is high tide flooding? National Oceanic and Atmospheric Administration, US Department of Commerce (accessed May 26, 2020). Available at https://oceanservice.noaa.gov/facts/nuisance-flooding.html; *also*, Jacobs, J. M., Cattaneo, L. R., Sweet, W., & Mansfield, T. (2018). Recent and Future Outlooks for Nuisance Flooding Impacts on Roadways on the U.S. East Coast. Transportation Research Record, 2672(2), 1–10. https://doi.org/10.1177/0361198118756366.

[135] Sweet, W.V.; Duseket, G.; Obeysekera, J. and Marra, J.J. (2018) Patterns and Projections of High Tide Flooding Along the U.S. Coastline Using a Common Impact Threshold. Silver Spring, MD, NOAA NOS Center for Operational Oceanographic Products and Services, 44pp. (NOAA Technical Report NOS CO-OPS 086), DOI: http://dx.doi.org/10.25607/OBP-128; Office for Coastal Management. Sea Level Rise and Coastal Flooding Impacts – Sea Level Rise Viewer, National Oceanic and Atmospheric Administration, US Department of Commerce (accessed May 26, 2020). Available at https://coast.noaa.gov/slr/#/layer/slr.

example, to observed land subsidence and sea level rise.[136] The coincidence of high tidal conditions with major storms and related flood conditions also has the potential to exacerbate the risk of harm to industrial sites. Therefore, EPA should make clear that applicants must identify a site's risk of exposure to nuisance flooding (in accordance with NOAA modeled projections) and consider accordingly the necessary control measures to account for those risks.

Identification of flood risks based solely upon the aforementioned analyses and designations will not adequately reflect the universe of present-day flood risk at MSGP-covered facilities which are typically comprised of infrastructure with a long service life. FEMA and NOAA projections are typically based upon analysis of historical data; there is no substitute for site-specific flood data and future data-driven projections. In addition, EPA should require applicants to self-designate exposure to flood risk if any part of their facility has been flooded within the last 20 years. The past incidence of flooding is another indicator of present-day risk and should be disclosed by applicants and should also serve as a mandatory basis for selection and design of control measures.

Further, in accordance with the foregoing and good engineering practice, EPA should make explicit that applicants must identify a "Site-Specific Flood Planning Elevation". Certain sites may be exposed to more than one type of present-day flood risk, so the identified Site-Specific Flood Planning Elevation can simplify the applicant's consideration of flood risk in the selection and design of control measures. In particular, EPA should require applicants to certify that they have (1) modeled the efficiency of existing control measures; (2) designed and implemented measures in accordance with their self-reported Site-Specific Flood Planning Elevation; and (3) that their SWPPP includes a "Storm and Flood Protection Protocol," as described in the following section.

Lastly, EPA should make an explicit presumption against no-exposure certifications for facilities at-risk of flooding, as above, and should prohibit eligibility for no-exposure certification for any facility that has experienced flooding in the last twenty years. EPA should revise the form application for no-exposure certification to require applicants or a qualified professional to affirm that an applicant facility does not meet any of the flood exposure criteria described above. EPA may also allow applicants seeking no exposure certification to otherwise provide a detailed analysis prepared by a third-party engineer demonstrating that existing site-specific features and control measures will prevent inundation on any part of the site and the discharge of runoff contaminated by pollutants present on the premises.

*b. EPA Should Make Explicit that Facilities Must Implement Measures Designed to Prevent Pollutant Discharges from Floods*

In addition to requiring applicants to explicitly document and describe the process for

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[136] Sweet, W. P. J., Marra, J., Zervas, C. & Gill, S. Sea Level Rise and Nuisance Flood Frequency Changes Around the United States, NOAA Technical Report NOS CO-OPS 073 (NOAA, 2014). Available at http://tidesandcurrents.noaa.gov/publications/NOAA_Technical_Report_NOS_COOPS_073.pdf.

selection and design of control measures that is responsive to identified flood risks, the Agency should also make clear that operators of facilities at-risk of flooding must implement such measures concurrent with their annual SWPPP update. EPA should explicitly require operators to assess and report on the flood vulnerability of sites and pollution control measures in the initial submission and subsequent updates of SWPPPs. As a component of this required self-evaluation, operators must continue to model the efficiency of existing control measures and design additional control measures in accordance with their self-reported Site-Specific Flood Planning Elevation.

EPA should explicitly require operators of facilities at-risk of flooding to implement additional pollution prevention and mitigation measures necessary to address site-specific flood vulnerabilities as necessary to comply with effluent limits, applicable water quality standards, and other requirements of the MSGP. EPA should require operators to submit engineering designs for control measures within 6 months of SWPPP completion or update; implement necessary control measures within 12 months; and commence post-construction monitoring within 24 months.

EPA should require applicants to include a Storm and Flood Protection Protocol for safe full/partial shutdown of facility and application of temporary stormwater pollution control measures during an emergency caused by forecasted storm or flooding and the site-specific risks of flooding (as above). The protocol may be copied from or incorporated by reference to other emergency planning documents applicable to the facility. If so incorporated by reference, those other documents will become integrated into a site's SWPPP. EPA should also require operators to indicate on proposed publicly-accessible signage whether a site is exposed to any risk of flooding, while the more detailed information about flood risk and a facility's plan for control measure changes and flood response protocols would be made accessible its SWPPP.

EPA should explicitly require operators to monitor and report on flooding impacts to sites and pollution control measures. EPA should require visual assessment for flooding impacts as part of required routine facility inspections (Part 3.1) and quarterly visual assessments (Part 3.2), for example. Visual assessment of flooding impacts should also be required as part of required procedures for monitoring (i.e. measurable storm events, Part 4.1.3). Operators should be required to document "Adverse Weather Conditions," and, in doing so, assess and document flooding impacts (Part 4.1.5).

EPA should use facility-reported information and data, as well as other relevant resources, to evaluate the universe of permitted facilities at risk of flooding and to prioritize inspections, outreach, technical assistance, and compliance assistance to the most vulnerable facilities. If EPA adopts the proposed requirements, as above, in the final MSGP, then the Agency will have more robust site-specific information and analysis with which to deliver compliance assistance to flood vulnerable facilities during the permit cycle, while also collecting valuable nation- and sector-wide data for the purpose of revising future permit requirements responsive to flood risks. This information would include, for example, self-identification of Exposure to Flood Risk (NOI), including data for historic, site-specific incidents of flooding; Site-Specific Flood

Planning Elevation (NOI); certification and modeling of control measures in accordance with the Site-Specific Flooding Planning Elevation (NOI and SWPPP); certification and submission of Storm and Flood Protection Protocol (NOI and SWPPP); and site-specific incident documentation for flooding and adverse weather conditions.

## *16. EPA Must Adequately Define the Terms "Feasible" and Feasibility," or Adopt an Appropriate Alternative Standard.*

*"Feasible" and "feasibility"* – These terms are used repeatedly, usually within the phrase "where determined to be feasible" and connected to stormwater controls recommended as examples to be implemented within specific industrial sectors. While the controls offered as examples are generally good ones, and they are usually closely connected to that sector's type of potential stormwater pollution, the phrase and the concept require a complete definition to be operable. Without objective criteria in a definition, this concept is entirely subjective and thus ineffective. What are some factors that would make something "infeasible?" Is cost a relevant factor, and how much is too much? Is too much effort with a small or limited staff another criterion? Is technical practicability a third? Are there others? In addition to the necessity for fully *defining* this concept within this regulation, leaving its *determination* wholly to the permittee is a form of flexibility which may not legally be granted.

For example, in **8.N.3.1.5 Scrap and Recyclable Waste Processing Areas**, operators are directed to minimize the discharge of runoff with control measures (examples given), "where determined to be feasible". Or, for **Automobile Salvage Yards**, **8.M.2.3. - Management of Runoff**, "Implement control measures to minimize discharges of pollutants in runoff such as the following, where determined to be feasible." Without a clear definition of feasibility and how it is to be determined, this is an impermissibly broad standard.

The opposite (and effective) way to phrase such a directive, is to simply state the minimization standard and provide examples. This is found, for example, under **8.N.3.1.3, Stockpiling of Turnings Exposed to Cutting Fluids (Outdoor Storage)**: "Minimize contact of surface runoff with residual cutting fluids by storing all turnings exposed to cutting fluids under some form of permanent or semi-permanent cover, or establishing dedicated containment areas…." The requirement goes on to describe how containment areas should be constructed, and if runoff is discharged from such areas, that it must be collected and treated by an oil and water separator, or its equivalent.

A third, but much less than optimal, option for stating such a regulatory standard is to simply end each of these types of sentences, across the regulation, with the words "shall be minimized," and then providing clear examples of some of the possible controls that might be deployed which meet the minimization concept. Leaving "feasibility" to be determined solely by the permittee is legally fraught, especially with no definition or criteria by which neither the permittee nor the Agency may judge its attribution in particular circumstances.

### *17. EPA Should Revise Certain Provisions for Corrective Actions.*

*a. EPA Should Revise its Proposed "Too Late in the Work Day" Exception for Corrective Action*

Section 5.1.2.1 requires permittees to minimize or prevent the unauthorized discharge of pollutants "immediately," and defines the word "immediately" to include an exception for problems that occur "too late in the work day to initiate corrective action," in which case "immediately" means the next day. EPA should limit the "too late in the work day" exception to immediate actions in order to prevent unnecessary harm from spills and leaks that go unaddressed overnight. The exception for "too late in the work day" should not apply to an unauthorized release or discharge (5.1.1.1), because spills should be controlled and leaks or other unauthorized discharges abated as soon as possible so as to limit discharge of pollutants to receiving waterways during overnight (12+ hours) periods.

*b. EPA Should Strengthen Notification, Documentation, and Reporting Requirements for Corrective Action*

EPA should require operators to provide timely and complete notifications for conditions or events requiring corrective actions, as well as reporting for any and all subsequent efforts to implement corrective actions, because the Agency acknowledges that such conditions have the potential to be violations of the permit. Parts 5.1 and 5.3. EPA acknowledges that conditions or events requiring corrective actions (5.1.1) may include permit violations. See Part 5.1.3. However, the Agency proposes a requirement that operators report these potential permit violations and subsequent corrective actions in an annual report only. See Parts 5.3.1 and 5.3.3. At that reporting timescale, potential permit violations and harm to downstream water quality may continue for an unjustifiably long period of time.

In all cases, EPA should require operators to notify the Agency of conditions or events requiring corrective actions pursuant to Parts 5.1.1, 5.1.2.1-2, and 5.1.4, and then provide the required documentation for corrective actions through NeT-DMR, so that the Agency may ensure that potential permit violations are adequately and timely addressed. EPA should require submission of notification for corrective action conditions or events and required documentation for corrective actions within a defined period no greater than 14 days.

*c. EPA Should Shorten Unreasonably Long Extension Periods for Corrective Action*

EPA should reduce the proposed extension period for required "Subsequent Actions" and require operators to provide adequate justification for extensions.[137] After immediately taking all reasonable steps to correct with interim controls a discovered problem, the proposed rule requires the basic control to be modified as necessary, before the next storm event and within 14 calendar days, to complete the repair and

[137] Draft Permit at 36, Part 5.1.2.2.

eliminate the problem. If the 14-day period is infeasible for reasons fully documented by the permit holder, the proposed rule requires corrective action within 45 days after discovery. First, this unreasonably long *initial* extension period should be reduced to 30 days. If the permit holder then finds that a longer period is still necessary due to necessary design or construction delays, such should be fully justified to EPA, and that period should be specified as 45 days without beginning to incur Clean Water Act penalties for permit violation. Only extraordinary circumstances might be cited to justify a 60-day period during which no penalties would be incurred.

### 18. *EPA Should Adopt its Proposal for Additional Implementation Measures, with Certain Revisions.*

*a. Reporting and Documentation Requirements*

EPA should substantially strengthen the reporting and documentation requirements for the proposed Additional Implementation Measures provisions. The Agency states that a "[…] benchmark exceedance is not definitive proof that water quality standard has been exceeded." Pg. 77 of Fact Sheet. However, where required AIM reporting is limited to notification of benchmark exceedances and annual reporting, the Agency will have limited information with which to timely ensure that exceedances and other incidents have not caused or contributed to an episodic or ongoing violation of water quality standards, for example, or other requirements of the MSGP and Clean Water Act.

EPA should require operators to provide timely and complete documentation for (1) notifications of all incidents that have or are likely to meet the criteria for any AIM Tier trigger and (2) reporting for any and all required efforts to review, implement, and/or modify stormwater control measures, including exceptions proposed by the operator.[138] The Agency acknowledges that such conditions have the potential to be violations of the permit or of an applicable water quality standard. re: Part 5.3 and Request for Comment 26, among other relevant provisions cited below. The notification and reporting of documentation within the specified deadlines for action will allow EPA to identify permit violations at a comparatively reasonable time-scale (e.g. within weeks or months instead of annually) and guard against noncompliance or bad-faith efforts to comply. In all cases, EPA should require operators to submit this documentation to NeT-DMR within the deadline specified in Part 5.3 <u>in addition to</u> the proposed requirement for reporting a summary of corrective action and/or AIM responses in the annual report per Part 7.5.

EPA should require operators to document the information and technical analysis supporting the rationale for not implementing certain sector-specific stormwater control measures because the measures are counter-productive or would not result in <u>any</u> reduction in the discharge of the pollutant of concern. This documentation is necessary for the Agency to evaluate whether adoption of this exception is technically appropriate and will have the added benefit of guarding against noncompliance or bad-faith efforts to comply. As above, EPA should require operators to submit documentation supporting the claim exception to NeT-DMR within the specified deadline (i.e. 14 days at Part 5.2.2.3).

*b. Natural Background, Run-On, and Aberrant Event Exceptions*

*i. Proposed Exception for "Natural Background" Pollutant Levels*

[138] Provisions in the Draft Permit that should be subject to improved reporting and documentation requirements include Parts 5.2.1.1, 5.2.1.2, 5.2.1.3, 5.2.2.1, 5.2.2.2, 5.2.2.3, 5.2.3.1, 5.2.3.2, 5.2.3.3, and 5.2.4.

EPA proposes to waive "AIM or additional benchmark monitoring" for pollutants whose benchmark exceedances are "solely attributable to the presence of [a] pollutant in natural background sources,"[139] and solicits comment on whether the proposed approach should be applied "throughout the permit."[140]

EPA's proposed section 5.2.4.1 is arbitrary and capricious, mathematically flawed, and contrary to law, and must not be finalized in any form, in any part of the MSGP.

*1. EPA's proposed methodology is mathematically flawed*

EPA purports to be waiving monitoring for pollutants whose benchmark exceedances are "solely" attributable to background, yet the draft permit language would do something very different. The draft permit would actually waive monitoring unless the exceedances are solely attributable to the permittee:

> You are not required to perform AIM or additional monitoring . . . provided that the following conditions are met: (a) The four-quarter average concentration of your benchmark monitoring results minus the concentration of that pollutant in the natural background is less than or equal to the benchmark threshold.[141]

This language is not at all limited to exceedances "solely" attributable to background. In fact, it would exempt a wide range of benchmark exceedances, including exceedances with a trivial natural background contribution. Consider the following hypothetical examples:

| | Pollutant | Benchmark | Average benchmark monitoring result | Natural background concentration | Net contribution from permittee |
|---|---|---|---|---|---|
| Ex. 1 | TSS | 100 mg/L | 120 mg/L | 10 mg/L | 110 mg/L |
| Ex. 2 | TSS | 100 mg/L | 120 mg/L | 60 mg/L | 60 mg/L |
| Ex. 3 | TSS | 100 mg/L | 105 mg/L | 6 mg/L | 99 mg/L |

- Example 1 illustrates EPA's proposal working as we presume the Agency intended. After subtracting the natural background concentration, the permittee's net contribution to the benchmark monitoring result is 110 mg/L. This exceeds the benchmark, and this permittee would not be eligible for the monitoring exemption.

[139] Draft Permit at 49, Part 5.2.4.1.
[140] *Id.*, Request for Comment 24.
[141] *Id.*, Part 5.2.4.1.

- In Example 2, the benchmark monitoring result exceeds the benchmark by the same amount, but in this case half of the TSS load is coming from natural sources. Here, the benchmark exceedance is clearly *not* “solely” attributable to natural background – again, only half of the TSS is coming from natural sources. Yet the language would exempt the permittee from further monitoring.

- Example 3 present a more extreme, though by no means unrealistic, scenario. In this case, virtually all of the TSS load is coming from the permittee, and only a small fraction is coming from natural sources, yet the permittee would still be exempt from further monitoring because its net contribution is less than the benchmark.

EPA’s proposal completely inverts its stated intent. It does not limit the exemption to situations where exceedances are solely attributable to natural sources. Instead, it asks whether an exceedance is solely attributable <u>to the permittee</u>. If not, the exceedance is ignored.

The discussion in the fact sheet suffers from basic mathematical and logical mistakes. In EPA’s example,[142] the natural contribution is 80 mg/L, and the industrial contribution is 40 mg/L, for a total concentration of 120 mg/L. In this case, the exceedance would not occur without the natural contribution, so EPA concludes that the natural contribution is “solely” responsible. The problem with EPA’s logic is that it applies equally to the permittee – the exceedance would not occur without the permittee, so EPA would have to also conclude that the permittee is solely responsible. This is of course impossible. The reality is that neither source is solely responsible, but both sources are contributing to an exceedance.

Or consider this thought experiment: There are two sources of pollution. They combine to cause an exceedance, but neither one would cause an exceedance by itself (i.e., EPA’s example, or example 2 above). One is natural and one is industrial, but we don’t reveal which is which. We simply say ‘both samples have 60 mg/L of TSS.’ How would one decide which source is “solely” responsible? Again, the fact is that neither source would be solely responsible; both would be partially responsible.

Mathematically, the only time an exceedance can be “solely” attributable to natural background is when natural background is the only source. The net contribution from the permittee in such a case would be zero. In order for EPA’s proposal to reflect its stated intent, the proposed condition in 5.2.4.1(a) would have to read ‘*[t]he four-quarter average concentration of your benchmark monitoring results minus the concentration of that pollutant in the natural background is less than or equal* ***<u>to zero.</u>***’

*2. EPA’s proposal is contrary to law*

The idea that polluters are only responsible for their pollution load when that load is <u>by itself</u> enough to cause water quality problems is directly contrary to the Clean Water Act.

[142] Fact Sheet at 84.

The “national goal” of the Clean Water Act is that “the discharge of pollutants into the navigable waters be eliminated.” Short of that zero-discharge goal, the Clean Water Act allows for water-quality based limits, but it is important to remember that maintaining water quality is only an “interim goal” on the path to zero discharge.[143] Polluters – including industrial stormwater permittees – are required by the Clean Water Act to minimize their pollution loads, regardless of water quality impacts. This is why the Act requires technology-based effluent limitations (TBELs), which include the narrative requirements in the MSGP.[144] TBELs “represent[] a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.”[145] TBELs represent the floor, or minimum level of effort that EPA must require, again regardless of water quality impacts. EPA is not permitted to waive TBELs just because a polluter is not the sole source of pollution.

Even within the context of water-quality based effluent limitations, the Clean Water Act clearly applies to every source of pollution that might be contributing to a water quality impairment, regardless of whether it is the sole source. This can be seen, for example, in the Act’s provisions for Total Maximum Daily Loads (TMDLs), which start from the goal of restoring a certain level of water quality, and then work backward to estimate the extent to which each polluter in a given watershed contribute to the problem, and the level of reduction that each polluter must make. The TMDL framework does not require that any individual source be solely responsible, or that any individual source have a pollution load that would, by itself, be enough to cause water quality impairments. The operative question is simply whether the cumulative pollution load is too high:

> [W]here the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) <u>the cumulative effect</u> of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.[146]

Indeed, the CWA’s TMDL provisions illustrate exactly why EPA’s current ‘natural background’ proposal is illegal. Consider Example 2 above, where a natural source and an industrial source each add equal amounts of pollution to a waterway. Assume that the receiving stream is impaired for the pollutant in question. If a TMDL were established, the regulatory agency would have to calculate the necessary pollution reductions and allocate the reductions among the various sources. In Example 2, there is nothing that can be done about the natural source; the industrial source would be

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[143] 33 USC §1252(a)(2).
[144] *See, e.g.*, NAS at 11 (“Under the MSGP, TBELs are provided either through a limited number of ELGs or through a suite of narrative requirements”).
[145] *EPA v. Nat’l Crushed Stone Ass’n*, 449 U.S. 64, 74 (1980).
[146] 33 U.S.C.A. § 1313 (emphasis added).

required to reduce its pollution load and would in fact be required to make all of the necessary reductions, even though it is not the sole cause of the impairment.

To sum up and simplify, the Clean Water Act requires pollution reductions from all polluters, and the Act holds polluters responsible whenever they cause or contribute to water quality problems. EPA cannot waive benchmark monitoring just because a permittee is not the sole cause of a benchmark exceedance.

Finally, we note that EPA's proposed change from the "no net facility contribution" language in the 2015 MSGP to the proposed 2020 MSGP method would have the effect of making the benchmark monitoring requirements less stringent. This constitutes impermissible backsliding, in violation of the CWA's anti-backsliding prohibition.[147]

*3. EPA's proposal is impracticable*

EPA solicits comment on "appropriate methods to characterize natural background concentrations."[148] The request reflects how difficult it is to conceptualize, define or characterize "natural background" in the context of industrial stormwater. By process of elimination, we conclude that it is effectively impossible. According to EPA, none of the following options are available:

> ***The National Stormwater Quality Database.*** We strongly agree with EPA that the NSQD cannot be used as a source of background values, because it "does not accurately represent pollutant concentrations that are attributable only to natural background sources."[149] There are two specific problems with using the NSQD in this way. First, the NSQD does not reflect "natural" stormwater, but instead reflects stormwater with municipal and industrial contributions. Second, it should go without saying that the NSQD, which is by definition a "national" database, cannot be a reliable proxy for site-specific background water quality data. It would be entirely inappropriate for any permittee to compare its discharge to other industrial (or partially industrial) stormwater, and only log an exceedance if the difference between the two exceeded a benchmark. This would theoretically (but realistically) waive monitoring even for permittees that are the sole source of an exceedance. If, for example, a permittee is discharging 140 mg/L of TSS, but some subset of the NSQD – from totally different locations – shows an average TSS concentration of 50 mg/L, the permittee would be exempt from further monitoring. This is of course an absurd outcome that precludes the use of the NSQD.
>
> ***Legacy pollutants from the site.*** According to EPA, "[n]atural pollutants do not include legacy pollution from earlier activity on your site." We agree with EPA on this point. It would be antithetical to the CWA to allow a permittee to remove itself from liability for pollutants originating on its property, regardless of when those

[147] 33 U.S.C. §1342(o).
[148] Draft Permit at 50, Request for Comment 25.
[149] *Id*.

pollutants were deposited at the site. It would also be technically challenging, to say the least, to segregate pollution loads according to the pollutants' date of origin.

***Run-off from neighboring sources.*** We also agree with EPA that it would irresponsible to allow permittees to subtract runoff from neighboring, non-natural sources such as other industrial facilities or roadways. Again, the technical challenge of segregating pollution loads should by itself take this option off the table. Furthermore, allowing permittees to subtract industrial run-on would undermine and contradict other sections of the permit, including run-on controls.[150]

Since natural background cannot include offsite municipal/industrial stormwater, onsite legacy pollution, or non-natural run-on, there are very few remaining sources of "natural background." Perhaps EPA imagines that facilities will want to subtract the pollutants running onto a site from a neighboring forest (or other natural land use), or from on-site natural land uses. We presume that these situations are very rare, to the point that we see no value in creating an option with such a dubious technical foundation. It will be virtually impossible for permittees to segregate pollution loads among different natural and non-natural sources. The only sure-fire way to do this would be to physically separate the component stormwater flows through run-on and run-off controls, so that each component can be sampled separately. But if a permittee is separating the stormwater flows, then there is no need for netting out the natural contribution, because there is no commingling.

In short, EPA's proposal is mathematically unsound, contrary to law, and technically impracticable.

*ii. Proposed Exception for "Run-On" Contributions to Exceedances*

EPA proposes to waive "AIM or additional benchmark monitoring" where "run-on from a neighboring source . . . is the cause of the exceedance."[151] For all of the reasons set forth in the preceding section, we object to this waiver.

It is not clear what EPA means by "the cause," but we suspect that EPA intends for this section to mirror section 5.2.4.1, such that EPA would apply the same flawed logic with respect to exceedances "solely attributable" to natural background. Again, for all of the reasons set forth above, EPA cannot waive monitoring just because run-on contributes to a benchmark exceedance. If a permittee is causing or contributing to a benchmark exceedance, then that permittee must continue the AIM process and additional benchmark monitoring.

[150] Draft Permit at 15, Part 2.1.2.1(a); *See also* Draft Permit at 13, Part 2.1 ("Regulated stormwater discharges from your facility include stormwater run-on that commingles with stormwater discharges").
[151] *Id.* at 50.

The only theoretical scenario in which a permittee might legitimately be exempt is where the pollutant load is entirely attributable to run-on (i.e., where the contribution from on-site industrial stormwater is zero). However, we question whether there is any value in a carve-out for this scenario. If a permittee is able to separately monitor run-on, then the permittee should be able to avoid commingling, and no net calculations should be necessary.

*iii. Proposed Exception for an "Aberrant Event"*

EPA should eliminate the proposed "aberrant event" exception entirely or, alternatively, adopt a well-defined regulatory term of art, as described below. EPA proposes that an "*aberration*" or *"aberrant event*" (noted within "Request for Comment 22") should be one of the three exceptions to one of the triggering events described for requiring Tier 2, "Additional Implementation Measures" (AIM's), at Part 5.2.2.1.c.i.
The triggering event is where one sampling event is more than eight times the benchmark threshold. But this exception to that trigger states that such an instance may be characterized as an "aberration" if (1) immediate documentation is undertaken; (2) the documentation includes a description of how measures taken will prevent a recurrence; and (3) the next qualifying rain event sampling is either less than the benchmark (and therefore one is excused entirely from any Tier triggering), or the sample is less than four times the benchmark, wherein one is excused from triggering Tier 2, but still triggers Tier 1. An industrial source may only avail itself of this excuse one time per parameter per discharge point.

"Aberration" or "aberrant event" are not, to our knowledge, terms found anywhere in the federal Clean Water Act or elsewhere in other CWA regulations or guidance. They require a clear definition or better, a substitution (together with a definition). Such a substitution might be to use the more common term, "upset," as found throughout federal CWA (and other environmental) permitting. For example, the "Glossary" in the *U.S. EPA NPDES Permit Writers' Manual* contains this definition for the "upset:'

> An exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.[152]

This definition hearkens back to 40 C.F.R. §122.41(n)(1), which contains it, and which sets conditions necessary for its demonstration (among others, submitting notice of the upset within 24 hours of the occurrence) as well as a burden of proof related to any subsequent enforcement proceeding. Qualifying exceedances caused, even in part, by human action likely indicate deficiencies in control measures requiring modifications, which should not fall within the definition of an upset. With the exception of the addition

[152] U.S. Envtl. Prot. Agency, *NPDES Permit Writers' Manual*, EPA 833-K-10-001 (September 2010), Exh. A-2, at A-17. The definition cites to 40 C.F.R. §122.41(n)(1).

of a requirement for immediate mitigation (with which Commenters agree), the MSGP should not attempt to invent a wholly new, previously undescribed standard, new, untested words, or new conditions of applicability, to describe essentially the same thing.

*c. AIM Triggers, Deadlines, and Other Exceptions*

EPA should require an AIM Tier 1 trigger for “facility changes,” including those described in the Request for Comment 21 and specified in Part 4.2 of the 2015 MSGP. Response to Request for Comment 21. The 2015 MSGP includes “facility changes” as a corrective action condition requiring operators to conduct a SWPPP review and implementation of modifications, if necessary. Failing to include “facility changes” as an AIM Tier 1 trigger or condition for corrective action in the 2020 MSGP would effectively roll back the effluent limitation as it is contained in the 2015 MSGP. At the very least, EPA must provide a legal and technical justification for not including “facility changes” as a corrective action condition or AIM trigger, in accordance with the anti-backsliding requirements of the Clean Water Act. CWA Section 402(o) and CFR 122.44(l).

EPA should not limit the Tier 2 trigger in Part 5.2.2.1.a. to only consecutive annual exceedances. EPA should provide the technical basis for limiting this trigger to specifically consecutive annual average exceedances. For example, the Agency should offer a technical justification for excluding a Tier 2 trigger in the event that a facility experienced below-average rainfall during an intervening year, resulting in comparatively lower precipitation quantity and intensity with the potential to cause on-site contamination of stormwater discharges.

EPA should clarify the requirements and deadlines for operators seeking to except substantially similar discharge points from Tier 3 requirements for installation of permanent controls. Part 5.2.3.2.a. As drafted, the provision requires operator to “individually monitor” these discharge points and “demonstrate that Tier 3 requirements are not triggered” at those points. However, the Agency does not specify requirements for: (1) how and by when an operator must conduct this monitoring; (2) which data and analysis, at a minimum, are required to make the demonstration; and (3) by which date the data and the demonstration must be made available to the Agency.

EPA should shorten proposed deadlines and timeframes for implementation in each of the three proposed tiers and require operators to provide adequate justification when seeking extensions. In general, the proposed deadlines are too generous and fail to promote timely effort by operators to identify modifications that would mitigate or prevent ongoing exceedances. For example, if there is a Tier I trigger, and if the 14-day deadline is infeasible for documented reason(s), modifications should be implemented within 30 days. A permittee may seek a 45-day period if extraordinary circumstances explain why action could not be taken sooner, such as special difficulties obtaining design and construction assistance.

EPA should also shorten the 31-day deadline extensions in Part 5.2.1.3 and Part 5.2.3.3 and the 60-day deadline extension in Part 5.2.3.3. In the alternative, EPA should provide a justification for the length of these proposed extensions, which includes, in part, reference to the specific information that provides the basis for 31 and 60-day periods. EPA should also address concerns about the use of the term “feasibility” (as discussed fully in Comment Section 16 above) as it relates to implementation of modifications to control measures that an operator has deemed “infeasible” for implementation within the 14-day deadline.

Installing permanent “structural” controls (including GI), as required by Part 5.2.3 for Tier 3, should not be considered a “penalty” or “consequence,” rather, undertaking such actions should be what permittees must do in any case.

EPA should not adopt its proposed exception for “discharges not resulting in any exceedances of water quality standards” available to other AIM Tier levels or triggering events. Response to Request for Comment 23. Permittees should be required to undertake all efforts required pursuant to Tier 1 and 2 in order to resolve exceedances of benchmark standards and ensure that control measures are operating as required by the permit.

*d. Other Terms and Provisions.*

As described below, EPA should revise the proposed Additional Implementation Measures in order to clarify a number of vague or undefined terms in the draft provisions.

EPA should clarify that the One Annual Average Over the Benchmark Threshold is defined as the average of any four sequential quarterly samples, irrespective of the calendar year in which the samples were collected. Part 5.2.1.1.a. In other words, EPA should clarify whether the average or mathematically certain average exceedance may be based upon four or fewer sequential quarterly samples collected in two different calendar years.

EPA should clarify how the requirement to “Review Stormwater Control Measures” in Part 5.2.1.2.a. is different from the requirement for “SWPPP Review and Revision,” for example, in Part 5.1.1.

EPA should clarify whether the “next year” is the following four quarters or all of the four quarters in the following calendar year, or whichever is longer. Parts 5.2.1.2.c., 5.2.2.2.b., and 5.2.3.2.c.

EPA should revise the language in Parts 5.2.1.2.a. and b. to note that, in addition to the requirement for operators to document their determination that nothing needs to be done with control measures in response to an AIM Tier 1 trigger, operators are also required to document their (a.) review of stormwater control measures and (b.) implementation and/or modifications of control measures, in accordance with Part 5.3.3.

As discussed above, EPA should require operators to submit this documentation to NeT-DMR within the deadline specified in Part 5.3.3 in addition to the proposed requirement for reporting a summary of corrective action and/or AIM responses in the annual report per Part 7.5.

### *19. EPA Must Revise or Eliminate its Proposal for Stormwater Retention in Order to Protect Groundwater Resources, in Accordance with the Recommendations of the National Academies of Sciences.*

The NAS suggested that it might be appropriate for EPA to encourage stormwater retention and infiltration systems by developing retention system guidance, but cautioned that retention and infiltration poses serious risks that must be carefully managed:[153]

> When evaluating the potential for stormwater retention at an industrial facility, extreme caution should be used to ensure that infiltration does not result in groundwater contamination or mobilization of existing soil or groundwater contamination. Many common pollutants found in stormwater, such as heavy metals and toxic organics, have some mobility in the soil column (Armstrong and Llena, 1992; Clark et al., 2010; Treese et al., 2012). Without appropriate treatment, as well as spill prevention and containment, industrial stormwater retention can lead to groundwater contamination well beyond the site boundary that is difficult and costly to remediate.[154]

And indeed, "[g]roundwater contamination from stormwater infiltration has been documented in various locations around the country."[155]

EPA has not taken the NAS recommendations seriously. The Agency proposes to encourage the use of retention and infiltration as an alternative to structural or treatment controls in Tier 3 AIM responses, but without carefully protecting groundwater.[156] EPA states that it "intends to develop guidance on determining the feasibility of an infiltration/retention approach" at some unspecified future time.[157] This is entirely inappropriate and backward. EPA cannot allow for a risky practice prior to developing guidance for ensuring that the practice is implemented safely.

The NAS provided very specific guidelines for how the promotion of retention and infiltration could be done safely. Ensuring groundwater protection requires, among other things:[158]

- Rigorous permitting
- Pretreatment
- Monitoring. Among other things, "water quality should be monitored and evaluated in the infiltration device or at the base of the vadose zone."
- Site characterization

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[153] NAS at 6-7, 67-80.
[154] *Id.* at 71.
[155] *Id.* at 72.
[156] Fact Sheet at 8, 83.
[157] *Id.* at 83.
[158] *Id.* at 78-79.

- "In lieu of other information on the attenuation of contaminants in groundwater . . . infiltrated groundwater should be required to meet primary drinking water standards for inorganic chemicals and organic chemicals, and secondary standards for chloride and total dissolved solids."
- And, again, EPA guidance, including guidance "for demonstrating that exceeding the benchmark during storms with precipitation amounts greater than the design storm do not result in exceedance of water quality standards."

None of these things are in the draft permit or the fact sheet. Instead, EPA offers a retention/infiltration alternative that is virtually unlimited by any criteria whatsoever. EPA merely states that permittees:

> may install infiltration or retention controls (e.g., through green infrastructure) for your industrial stormwater, if such an approach is appropriate and feasible for your site-specific conditions. If this approach is feasible, the execution must be compliant with regulations for ground water protection and underground injection control (UIC). The analysis that shows infiltration/retention is appropriate for your site-specific conditions and is compliant with other applicable regulations must be provided to the EPA Regional Office in Part 7 BEFORE you can choose this option and the EPA Regional Office must concur with your conclusions.[159]

The only truly limiting factor in this broad grant of flexibility is the approval of an EPA regional office. But that approval is itself unlimited by any of the criteria recommended by the NAS, or any other criteria.

EPA cannot simply encourage a practice that poses a serious threat to groundwater without any assurances of groundwater protection. This would only move pollution from surface water to groundwater, at a net environmental cost (relative to what would happen under AIM implementation without the infiltration alternative). EPA must require the all of the NAS recommendations, including the following:

- Monitoring of water in the infiltration device or at the base of the vadose zone.
- Pretreatment sufficient to ensure that stormwater complies with primary and secondary drinking water standards "either before the stormwater is applied to the infiltration area or after passing through the infiltration/treatment media at the base of the unsaturated zone."[160]
- Site characterization sufficient to demonstrate that there is no potential to "mobilize existing contaminants in the subsurface."[161]

[159] Draft Permit at 44, Part 5.2.3.2.b.
[160] NAS at 76.
[161] *Id.* at 72.

These must be required of permittees in applications for infiltration under section 5.2.3.2.b, and EPA approval must be contingent on a finding that all of the NAS-recommended conditions have been met.

### *20. EPA Must Strengthen and Adopt Other Provisions for Monitoring and Control of Plastics Pollution.*

Many facilities that EPA proposes to cover under the 2020 MSGP (Permit Parts 1-9 with related appendices)[162] discharge plastic pellets, powders, granules, and flakes into surface waters during the process of transferring plastic pellets internally and while packaging and preparing plastic pellets for transport between facilities.[163] This industry is also in the midst of a boom. According to the American Chemistry Council, the plastics and chemical industry is investing more than $204 billion in the United States for an estimated 333 projects (including new facilities and expansions) designed in large part to convert plentiful and affordable natural gas from shale into petrochemical and plastic products).[164] The industry aims to increase North American plastics production by at least 35 percent by 2025.[165] These new plastics will be used to manufacture a variety of products, including water bottles, straws, utensils, food wrappers, packaging, shopping bags, and other single-use items that account for approximately 40 percent of plastic use.[166]

Plastic pollution that escapes via stormwater from facilities that produce and handle pre-production plastic can adversely impact the aquatic environment in numerous ways, including from: ingestion by marine animals, including fish, sea turtles, birds, and marine mammals; becoming embedded in sediments and plant matter; introducing toxic plastic additives to the environment, such as bisphenol a and nonylphenol; and accumulating other toxic chemicals on pellet surfaces, such as PCBs and dioxin, which end up in the aquatic food chain when ingested.

The measures proposed by the 2020 MSGP are unchanged from those in the 2015 MSGP and are entirely inadequate to address this problem and eliminate (or even

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[162] Including many listed in Appendix D, Table D-1 under Sector B: Paper and Allied Products Manufacturing (e.g. SIC 2673 Plastics, Foil, and Paper Bags), Sector C: Chemicals and Allied Products (e.g. C4, SIC 2821-2824 Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers) and Sector Y: Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries (e.g. Y2, 3081-3089 Miscellaneous Plastic Products).

[163] U.S. Envtl. Prot. Agency, 1993, Plastic Pellets in the Aquatic Environment Sources and Recommendations, A Summary, EPA 842-S-93-001; California Environmental Protection Agency (CalEPA), State Water Resources Control Board, *Preproduction Plastic Debris Program*, https://www.waterboards.ca.gov/water_issues/programs/stormwater/plasticdebris.shtml (last updated April 14, 2014).

[164] American Chemistry Council, U.S. Chemical Investment Linked to Shale Gas: $204 Billion and Counting (May 2019), https://www.americanchemistry.com/Policy/Energy/Shale-Gas/Fact-Sheet-US-Chemical-Investment-Linked-to-Shale-Gas.pdf.

[165] Center for International Environmental Law, et al., How Fracked Gas, Cheap Oil, and Unburnable Coal Are Driving the Plastics Boom (2017), https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-How-Fracked-Gas-Cheap-Oil-and-Unburnable-Coal-are-Driving-the-Plastics-Boom.pdf; Center for International Environmental Law, Plastic & Health: The Hidden Costs of a Plastic Planet (Feb. 2019a), https://www.ciel.org/plasticandhealth/. [CIEL 2019a]; Center for International Environmental Law, Plastic & Climate: The Hidden Costs of a Plastic Planet (May 2019b), https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf. [CIEL 2019b].

[166] Geyer, R. et al., Production, use, and fate of all plastics ever made, 3 Sci. Adv. (2017), doi:10.1126/sciadv.1700782.

reduce) the discharge of plastic materials into waters of the United States. They are inadequate for the jurisdictions and facilities over which EPA retains permitting authority,[167] and they set too low of a bar for programs delegated to the majority of states. EPA's 2020 MSGP has two options: (1) it must include a zero-discharge standard for plastic pellets, powders, flakes, granules, and other plastic material from industrial sources of stormwater and monitoring and enforcement provisions to ensure this standard is met; or (2) EPA must exclude facilities that handle pre-production plastic from coverage under the 2020 MSGP.

*Plastic pollution from industrial facilities harms water quality and the environment.*

Plastic production and use in industrial facilities results in the loss of millions of plastic pellets to the environment. These plastic pellets are often spilled in outdoor areas, picked up in stormwater runoff, and discharged to surface waters. Once in the environment, plastic pellets are persistent and can be transported long distances from their source in flowing surface waters such as streams, rivers, and oceans. Similarly, user plastic accumulating on shorelines and in the oceans has become a staggering pollution problem.

Trillions of pieces of plastic float in the world's oceans.[168] The vast majority of marine debris—including plastic—originates from land-based sources like urban runoff; inadequate waste disposal and management; and industrial activity.[169]

Unfortunately, the plastic pollution problem continues to grow. Global trends reveal increasing plastic accumulations in aquatic habitats, consistent with the increasing trend in plastic production: a 560-fold increase in just over 60 years.[170] Tragically, under a business-as-usual scenario, the ocean is expected to contain one ton of plastic for every three tons of fish by 2025, and more plastics than fish (by weight) by 2050.[171] We

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[167] These include the District of Columbia, Idaho (authority for general and stormwater permits transferring in 2020-21), Massachusetts, New Hampshire, and New Mexico and the territories of American Samoa, Guam, Johnston Atoll, Midway Island, Northern Mariana Islands, Puerto Rico, and Wake Island. U.S. EPA, NPDES State Program Information, available at https://www.epa.gov/npdes/npdes-state-program-information.

[168] Eriksen, Marcus et al., Plastic pollution in the world's oceans: more than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea, 9 PLoS ONE e111913 (2014); van Sebille, Erik et al., A global inventory of small floating plastic debris, 10 Environ. Res. Letters 124006 (2015); Derraik, José G.B., The pollution of the marine environment by plastic debris: a review, 44 Marine Pollution Bull. 842 (2002); Barnes, David K.A. et al., Accumulation and fragmentation of plastic debris in global environments, 364 Phil. Trans. R. Soc. B 1985 (2009); Rodrigues, Alyssa et al., Colonisation of plastic pellets (nurdles) by E. coli at public bathing beaches, 139 Marine Pollution Bull. 376 (2019).

[169] Gordon, Miriam, Eliminating Land-Based Discharges of Marine Debris in California: A Plan of Action from the Plastic Debris Project (June 2006), https://www.coastal.ca.gov/publiced/coordinators/Plastic_Debris_Action_Plan.pdf

[170] Thompson, Richard C. et al., Lost at Sea: where is all the plastic? 304 Science 838 (2004); Goldstein, Miriam C. et al., Scales of spatial heterogeneity of plastic marine debris in the northeast Pacific Ocean, 8 PLos ONE e80020 (2013).

[171] World Economic Forum, Ellen MacArthur Foundation, The new plastics community: Rethinking the future of plastics (Jan. 2016), http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf.

must find ways to stem the tide of plastic pollution, including pollution with the microplastic pellets that petro-plastics facilities produce.

Microplastic Impacts - Local

*Microplastic Pollution, Source: NOAA Office of Response and Restoration*

Of the 51 trillion plastic particles currently floating in the world's oceans,[172] 92 percent are microplastics.[173] Microplastics, generally defined as plastic particles less than five millimeters in length or diameter, constitute a major threat to marine wildlife and water quality. While some microplastics are the result of larger pieces breaking down, up to 30 percent of the ocean's microplastics originate as plastic pellets, or nurdles, that are used as a raw material to make plastic products.[174] Microplastics are ubiquitous to coastal and marine environments, found at sites worldwide from the poles to the equator and from the ocean surface to the sea floor.[175] One California survey reported 118,705,732 plastic pellets on the state's beaches, and in the Los Angeles area alone, 20 tons of microplastics are carried into the Pacific Ocean every day (Moore et al. 2011).[176]

Plastic pellets—also known as primary microplastics—have caused documented damage to freshwater, coastal, and marine ecosystems. They also represent one of the

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[172] van Sebille et al. 2015.
[173] Eriksen et al. 2014.
[174] Boucher, Julien & Damien Friot, Primary microplastics in the oceans: a global evaluation of sources, IUCN (2017), https://portals.iucn.org/library/sites/library/files/documents/2017-002.pdf; Karkanorachaki, Katerina et al., Plastic pellets, meso- and microplastics on the coastline of Northern Crete: Distribution and organic pollution, 133 Marine Pollution Bull. 578 (2018).
[175] Barnes et al. 2009; Bergmann, Melanie, Lars Gutow & Michael Klages (eds.), MARINE ANTHROPOGENIC LITTER (2015); Browne, Mark Anthony et al., Accumulations of microplastic on shorelines worldwide: sources and sinks, 45 Envtl. Sci. & Tech. 9175 (2011); Ferreira, Guilherme V.B., Mário Barletta & André R.A. Lima et al., Use of estuarine resources by top predator fishes. How do ecological patterns affect rates of contamination by microplastics?, 655 Sci. Total Envt. 292 (2019); Ivar do Sul, Juliana A. & Monica F. Costa, The present and future of microplastic pollution in the marine environment, 185 Envtl. Pollution 352 (2014); Obbard, Rachel W. et al., Global warming releases microplastic legacy frozen in Arctic Sea ice, 2 Earth's Future 315 (2014); O'Donovan, Sarit et al., Ecotoxicological Effects of Chemical Contaminants Adsorbed to Microplastics in the Clam *Scrobicularia plana*, 5 Frontiers in Marine Sci. (2018), doi: 10.3389/fmars.2018.00143; Woodall, Lucy C. et al., The deep sea is a major sink for microplastic debris, 1 R. Soc'y Open Sci. 140317 (2014).
[176] Moore, C.J., G.L. Lattin & A.F. Zellers, Quantity and type of plastic debris flowing from two urban rivers to coastal waters and beaches of Southern California, 11 Revista da Gestão Costeira Integrada 65 (2011).

most common types of plastic pollution in these environments.[177] Pellets frequently spill during handling at plastic factories as well as during loading and transportation both on land and at sea.[178] Road runoff and wind transfer also lead to pellet pollution.[179]

Extant protective measures, including U.S. federal regulations, appear insufficient to curb the flow of pellet pollution. Formosa Plastic's Point Comfort, Texas, plastics manufacturing facility continues to release plastic pollution in violation of its discharge permit.[180] The company explained that plastic can escape in loading areas, which "unavoidably happens when billions of tiny polyethylene pellets are produced and are transferred from one materials handling unit to another."[181]In a recent federal court decision holding Formosa liable for its plastic pollution discharges, the court noted that the company and the Texas Commission on Environmental Quality had repeatedly failed to prevent discharges of plastics.[182] Absent updated and more stringent regulations monitoring that reflect best available technology, plastic pollution from these facilities will continue.

Microplastic Impacts – Global

a. The scale and expanse of microplastic pollution

A rapidly growing body of research suggests there is not one square mile of ocean surface anywhere on earth not polluted with microplastics.[183] Microplastics comprise the majority of plastic pollution in the global ocean.[184] Ocean currents rapidly disperse microplastic particles, and scientists have found microplastics accumulating in remote locations far from population centers, including Arctic and Antarctic waters .[185] Given the alarming amount of plastic polluting coastal and marine ecosystems worldwide, we must seek ways to reduce the flow of primary microplastics into our oceans. Existing regulatory schemes have proven insufficient to prevent this pollution, and continuing to

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[177] Moore et al. 2011; Anbumani, Sadasivam & Poonam Kakkar, Ecotoxicological Effects of Microplastics on Biota: A Review, 25 Envtl. Sci. & Pollution Res. 14,373 (2018); Karkanorachaki et al. 2018; O'Donovan et al 2018; Rodrigues et al. 2019..
[178] Ashton, Karen et al., Association of metals with plastic production pellets in the marine environment, 60 Marine Pollution Bull. 2050 (2010).
[179] Rodrigues et al. 2019.
[180] Sneath, S., *Former Formosa worker finds plastic pellets in bay*, VICTORIA ADVOCATE, Feb. 20, 2016, https://www.victoriaadvocate.com/news/business/former-formosa-worker-finds-plastic-pellets-in-bay/article_45c91c0e-f8dd-586b-9acc-5b4f0a969d49.html.
[181] *Id.*
[182] *San Antonio Bay Estuarine Waterkeeper, et al., v. Formosa Plastics Corp., Texas, et al.*, Civil Action No. 6:17-CV-0047 Order and Consent Decree (2019).
[183] Eriksen et al. 2013.
[184] To illustrate, a recent study on plastic particles flowing from two rivers into coastal areas in southern California found that microplastic particles were 16 times more abundant and had a cumulative weight three times greater than larger particles (Moore et al. 2011); *see also* Boucher & Friot 2017.
[185] Isobe, Atsuhiko, Percentage of microbeads in pelagic microplastics within Japanese coastal waters, 110 Marine Pollution Bull. 432 (2016); Cózar, Andrés et al., The Arctic Ocean as a dead end for floating plastic in the North Atlantic branch of the Thermohaline Circulation, 3 Sci. Advances e1600582 (2017); O'Donovan et al. 2018; Chen, Q. et al., Marine microplastics bound dioxin-like chemicals: model explanation and risk assessment, 364 J. Hazardous Materials 82 (2019).

permit new petro-plastics facilities under these schemes will only exacerbate the ongoing plastic pollution catastrophe.

b. Microplastic impacts on aquatic wildlife

*1. In General*

Plastics harm fish and wildlife both through physical effects of ingestion (e.g. intestinal blockage) and by acting as a transfer agent for toxic chemicals.[186] Many plastics—including pellets—adsorb persistent environmental chemicals,[187] such as polychlorinated biphenyls (PCBs), pesticides like dichlorodiphenyltrichloroethane (DDT), polycyclic aromatic hydrocarbons ("PAHs"), heavy metals, and dioxins.[188] Scientists began acknowledging plastic's role as a toxin vector as early as 1973 .[189] Because of their large surface-area-to-volume ratio and their tendency to attract contaminants more readily than natural sediments, plastic fragments concentrate organic pollutants; these concentrations can be up to 1,000,000 times higher than that of the surrounding seawater.[190] The two types of plastic that the petro-plastics facilities discussed in this petition will primarily produce—polyethylene and polypropylene—show a particularly strong adsorption capacity for harmful chemicals, including PAHs and DDT.[191]

Aquatic species may ingest these pollutant-laden plastic particles, resulting in lethal and sublethal harms. The absorbed toxins—as well as plastic additives such as bisphenol A ("BPA"), phthalate plasticizers, and flame retardants—can leach from ingested plastics into animal tissues,[192] inducing adverse effects such as endocrine disruption (that is, the disruption of hormone systems), neurotoxicity, and carcinogenesis.[193]

[186] Hammer, Jort, Michiel H.S. Kraak & John R. Parsons, Plastics in the Marine Environment: The Dark Side of a Modern Gift, 220 Rev. Envtl. Contamination & Toxicology (2012); CIEL 2019b.
[187] Adsorbed toxins are toxins that are "stuck" to plastic particles. Interestingly, toxin adsorption to plastic surfaces may reduce contaminant biodegradation—meaning the contaminants do not break down and persist for an even longer time in the environment than they would were they not adsorbed to plastic (Hammer et al. 2012).
[188] Teuten, Emma L. et al., *Transport and release of chemicals from plastics to the environment and to wildlife*, 364 Phil. Trans. R. Soc'y B 2027 (2009); Rochman, Chelsea M. et al., Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress, 3 Scientific Reports 3263 (2013); Wright, Stephanie L. et al., Microplastic ingestion decreases energy reserves in marine worms, 23 Current Biology R1031 (2013); Hammer et al. 2012; O'Donovan et al. 2018; Chen et al. 2019.
[189] CIEL 2019b.
[190] Guzzetti, Eleonora et al., Microplastic in Marine Organisms: Environmental and Toxicological Effects, 64 Envtl. Toxicology & Pharmacology 164 (2018); Rios, Lorena M., Charles Moore & Patrick R. Jones, Persistent organic pollutants carried by synthetic polymers in the ocean environment, 54 Marine Pollution Bull. 1230 (2007); Bakir, Adil et al., Enhanced desorption of persistent organic pollutants from microplastics under simulated physiological conditions, 185 Envtl. Pollution 16 (2014); Anbumani & Kakkar 2018; Karkarnorachaki et al. 2018.
[191] O'Donovan et al. 2018.
[192] These contaminants can be released into animal digestive tracts up to 30 times faster than to seawater (CIEL 2019b).
[193] Teuten at al. 2009; Hammer et al. 2012; Rochman et al. 2013; Anbumani & Kakkar 2018; O'Donovan et al. 2018.

Scientists have documented over 2200 species impacted by ocean plastic pollution and at least 690 that have ingested microplastics.[194] Because of their small size and environmental persistence, microplastics remain readily available to ingestion by a wide variety of marine organisms for an extended period of time.[195] Plankton, invertebrates, fish, sea birds, sea turtles, and marine mammals all are known to adsorb, ingest, or otherwise uptake microplastics.[196] Trophic transfer of microplastics (*i.e.,* transfer up the food chain) also occurs, with the potential transfer of microplastics to humans when they eat shrimp, bivalves, fish, or other marine organisms containing these pollutants .[197]

Smaller and larger microplastic particles harm wildlife in different ways. Larger particles may have longer residence time in the digestive tract, in turn leading to increased toxicant release.[198] Smaller micro- and nanoplastics may move into an organism's cells, causing a variety of harms discussed in more detail below.[199] Smaller particles may also carry more of a toxicant load, as their increased surface area to volume ratio allows them to adsorb more contaminants .[200] Documented harms from ingestion of microplastics and adsorbed contaminants include but are not limited to decreased feeding and growth; increased stress; behavioral modifications; reproductive harms; immunotoxicity; neurological harms; alteration of gene expression; cancer; and increased mortality.[201]

### 2. *Plankton*

Microplastics inhibit growth of planktonic marine microalgae; they also decrease growth, fertility, and fecundity, and increase mortality of copepods, an important zooplankton species .[202] Scientists observed a similar reproductive response, as well as reduced feeding, growth, and survival rates, in freshwater *Daphnia* species.[203] These impacts not only affect the planktonic organisms themselves, but also higher trophic level organisms that rely on plankton as a primary food source.[204]Finally, impacts to plankton species that uptake $CO_2$ from the atmosphere may significantly reduce the ocean's

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[194] Gall, S.C. & R.C. Thompson, The Impact of Debris on Marine Life, 92 Marine Pollution Bull. 170 (2015); Litterbase: Online Portal for Marine Litter (2019), https://litterbase.awi.de/; CIEL 2019b; *see also* Table 2, "Observed Ecotoxicity of Microplastics in Different Model Systems," *in* Anbumani & Kakkar 2018.
[195] Nelms, S.E. et al., Microplastics in marine mammals stranded around the British coast: ubiquitous but transitory?, 9 Scientific Reports 1075 (2019).
[196]Duncan, Emily M. et al., Microplastic ingestion ubiquitous in marine turtles, 25 Global Change Biology 744 (2019); Herrera, A. et al., Microplastic ingestion by Atlantic chub mackerel (Scomber colias) in the Canary Islands coast, 139 Marine Pollution Bull. 127 (2019); Donohue, Mary J. et al., Evaluating exposure of northern fur seals, Callorhinus ursinus, to microplastic pollution through fecal analysis, 138 Marine Pollution Bull. 213 (2019); Anbumani & Kakkar 2018; Gall & Thompson 2015; Guzzetti et al. 2018; O'Donovan et al. 2018.
[197] O'Donovan et al. 2018; CIEL 2019b; Ferreira et al. 2019; Herrera et al. 2019.
[198] O'Donovan et al. 2018.
[199] *Id.*
[200] Anbumani & Kakkar 2018; O'Donovan et al. 2018.
[201] O'Donovan et al. 2018.
[202] Anbumani & Kakkar 2018; Guzzetti et al. 2018.
[203] *Id.*
[204] *Id.*

ability to absorb and store greenhouse gases, with serious implications for atmospheric warming .[205]

### *3. Marine Invertebrates*

Scientists report microplastic ingestion in a variety of marine invertebrate species, including molluscs, sea worms, and crabs.[206] Effects include inflammation; reduced feeding activity; suppressed immune system function; reproductive harms; damage to gills and digestive tract; increased mortality; and possible DNA damage.[207] Microplastics also harm corals by reducing calcification and inducing bleaching and tissue death.[208]

### *4. Fish*

Freshwater, estuarine, and marine fish ingest microplastics and their adsorbed pollutants either directly or through contaminated prey.[209] Such ingestion induces physiological effects and harm, including liver toxicity, endocrine disruption, behavioral changes, and intestinal effects.[210]

### *5. Seabirds*

Seabirds are among the most sensitive wildlife species to microplastics pollution due to high frequency of ingestion, impacts on body condition, and transmission of toxic chemicals .[211] Ingested plastic may stay in seabirds' stomachs for months, potentially interfering with feeding behavior and increasing leached contaminant loads .[212] Laboratory studies show that contaminants (including PCBs and DDT) from microplastics ingested by shearwater chicks are released once inside the bird's body.[213] Plastic contaminants like endocrine-disrupting phthalates affect seabirds across the

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[205] CIEL 2019b.
[206] Graham, Erin R. & Joseph T. Thompson, Deposit and suspension-feeding sea cucumbers (*Echinodermata*) ingest plastic fragments, 368 J. Experimental Marine Biology & Ecology 22 (2009); Gall & Thompson 2015; Guzzetti et al. 2018; CIEL 2019b; Duncan et al. 2019.
[207] Mearns, Alan J. et al., Effects of Pollution on Marine Organisms, 85 Water Envt. Research 1828 (2013); Browne, Mark A. et al., Ingested microplastic plastic translocates to the circulatory system of the mussel, *Mytilus edulis* (L.), 42 Envtl. Sci. & Tech. 5026 (2008); Anbumani & Kakkar 2018; Duncan et al. 2019; Guzzetti et al. 2018; Herrera et al. 2019; O'Donovan et al. 2018; Wright et al. 2013.
[208] Chapron, L. et al., Macro- and microplastics affect cold-water corals growth, feeding and behavior, 8 Sci. Reports 15,299 (2018); Reichert, Jessica et al., Responses of reef building corals to microplastic exposure, 237 Envtl. Pollution 955 (2018); Gall & Thompson 2015; Donohue et al. 2019.
[209] Anbumani & Kakkar 2018; Duncan et al. 2019; Herrera et al. 2019.
[210] Anbumani & Kakkar 2018; CIEL 2019b; Guzzetti et al. 2018.
[211] Wilcox, Chris, Erik Van Sebille & Britta Denise Hardesty, Threat of plastic pollution to seabirds is global, pervasive, and increasing, 112 Proc. Nat'l Acad. Sci. 11899 (2015); CIEL 2019b.
[212] Gall & Thompson 2015.
[213] Ryan, P.G., A.D. Connell & B.D. Gardner*,* Plastic ingestion and PCBs in seabirds: is there a relationship? 19 Marine Pollution Bull. 174 (1988); Teuten et al. 2009; Hammer et al. 2012; Gall & Thompson 2015; O'Donovan et al. 2018.

globe, even in remote environments like the Arctic.[214] Scientists estimate that by 2050, the percentage of seabird species ingesting plastic will reach 99.8 percent, resulting in increased mortality and decreased reproduction.[215]

### *6. Sea Turtles*

Plastic pollution also poses a serious risk to sea turtles.[216] Scientists have documented ingestion of microplastic particles in all seven species of sea turtles .[217] This microplastic consumption exposes sea turtles to dangerous toxins and pathogens that affect reproduction and survival.[218]

### *7. Marine Mammals*

Marine mammals, including whales and seals, likewise ingest and may be harmed by microplastics and adsorbed contaminants. Such ingestion occurs directly as a consequence of feeding activity or through predation on contaminated prey.[219] There also exists the possibility that whales inhale microplastics when they surface to breathe .[220] In addition to leaching contaminants, microplastics can clog baleen, which impedes feeding behavior, reduces body condition, and suppresses immune response.[221] Nelms et al. (2019) found evidence of a possible relationship between a cetacean's body burden of microplastics and cause of death—specifically that animals dying from infectious disease contained a higher number of plastic particles than those dying from other causes.[222]

### c. Human health risks associated with marine microplastic pollution

Marine species from plankton to invertebrates to large pelagic fishes have been shown to ingest microplastics (or prey that contain them).[223] Thus, people who ingest aquatic plants or seafood may be exposed to dangerous levels of contaminants. Scientists have yet to fully investigate the human health implications of microplastic ingestion from

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214 Sample, Ian, *Plastics Reach Remote Pristine Environments, Scientists Say*, THE GUARDIAN, Feb. 17, 2019, https://www.theguardian.com/science/2019/feb/17/plastics-reach-remote-pristine-environments-scientists-say.
215 Wilcox et al. 2015.
216 CIEL 2019b.
217 Garrison, Samantha R. & Mariana M.P.B. Fuentes, Marine Debris at Nesting Grounds Used by the Northern Gulf of Mexico Loggerhead Recovery Unit, 139 Marine Pollution Bull. 59 (2019); Guzzetti et al. 2018; Duncan et al. 2019.
218 Schuyler, Qamar et al., To eat or not to eat? Debris selectivity by marine turtles, 7 PLoS ONE e40884 (2012); Duncan et al. 2019; Garrison et al. 2019; Guzzetti et al. 2018.
219 Zhu et al., Cetaceans and microplastics: First report of microplastic ingestion by a coastal delphinid, *Sousa chinensis*, 659 Sci. Total Envt. 649 (2019).
220 Nelms et al. 2019.
221 Guzzetti et al. 2018.
222 *See also* Donohue et al. 2019; Gall & Thompson 2015) (discussing microplastics' effects on seals and sea lions).
223 Romeo, Teresa et al., First evidence of presence of plastic debris in stomach of large pelagic fish in the Mediterranean Sea, 95 Marine Pollution Bull. 358 (2015).

fishes and other seafood, but it stands to be serious, especially given the prevalence of microplastics in fish caught and sold for human consumption both nationally and internationally.[224]

Robust medical evidence links various persistent organic pollutants commonly found on microplastics with a host of human illnesses, including cancers (e.g., breast cancer, pancreatic cancer, non-Hodgkin's lymphoma, adult-onset leukemia, and soft tissue sarcomas), neurological disorders (e.g., attention deficit disorder, impaired memory, learning disabilities, and behavioral problems), and reproductive disorders (e.g., menstrual disorders, abnormal sperm, miscarriages, pre-term delivery, low birth weight, altered sex ratios, and shortened lactation periods).[225] Many of these persistent organic pollutants bioaccumulate and biomagnify up the food chain, posing a risk of harm for higher trophic-level organisms, including humans.[226]

An additional human health concern from microplastic pollution relates to plastics' ability to harbor infectious agents.[227] Both viruses and bacteria, including *Escherichia coli* and *Vibrio* (which cause gastrointestinal illness in humans), find refuge on pellets. The potential for microbial contamination-related impacts grows as coastal regions warm from climate change; such warming increases both the range of pathogenic microbes and the likelihood that storm surges and other events bring contaminated pellets into contact with humans.[228]

Another concerning development is the discovery that microplastic is contaminating drinking water supplies. Scientists have only recently studied plastic pollution in freshwater, but it is now documented in groundwater,[229] and it is at least as ubiquitous in rivers and streams as it is in marine environments.[230] For example, a scientist recently swam the length of the Tennessee River—the drinking water source for 4.7 million people—and found one of the highest concentrations of microplastics in the world.[231] Samples showed 18,000 particles per cubic meter of water, which is 8,000

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[224] *See,* e.g., Van Cauwenberghe, Lisbeth & Colin R. Janssen, Microplastics in bivalves cultured for human consumption, 193 Envtl. Pollution 65 (2014); Bergmann et al. 2015; Rochman, Chelsea M. et al., Anthropogenic debris in seafood: plastic debris and fibers from textiles in fish and bivalves sold for human consumption, 5 Sci. Reports 14,340 (2015); Herrera et al. 2019.
[225] CIEL 2019a.
[226] Wassermann, M. et al., World PCBs map: storage and effects in man and his biologic environment in the 1970s, 320 Ann. N.Y. Acad. Sci. 69 (1979); Gobas, Frank A.P.C. et al., Time response of the Lake Ontario ecosystem to virtual elimination of PCBs, 29 Envtl. Sci. & Tech. 2038 (1995); Rochman et al. 2013.
[227] Wright et al. 2013; Donohue et al. 2019; Mearns et al. 2013; CIEL 2019a; Rodrigues et al. 2019.
[228] Rodrigues et al. 2019.
[229] Panno, Samuel V. et al., Microplastic Contamination in Karst Groundwater Systems, 57 Groundwater 189 (2019).
[230] Koelmans, Albert A. et al., Microplastics in freshwaters and drinking water: Critical review and assessment of data quality, 155 Water Res 410 (2019); McCormick, Amanda R. et al., Microplastic in surface waters of urban rivers: concentration, sources, and associated bacterial assemblages, 7(11) Ecosphere e01556 (2016).
[231] Tennessee Aquarium, *A Plastic Pandemic - German Scientist's Analysis Finds Staggering Levels of Microplastic Pollution in Tennessee River* (Oct. 18, 2018), https://www.tnaqua.org/newsroom/entry/a-

percent higher than measurements in the Rhine and 80 percent higher than measurements in the Yangtze River—the source of 55 percent of all river-born microplastic entering the ocean.[232]

Recent studies have also found microplastics at the outflows of drinking water treatment facilities, and in tap water, bottled water, and even domestic beer.[233] The first study that looked at microplastics in bottled water found concentrations as high as 10,000 plastic pieces per litre of water, with only 17 of 259 bottles testing free of microplastics.[234]

d. Ecological impacts from microplastics

In addition to the wildlife and human health impacts just described, microplastic pollution impacts ecosystem structure and function.[235] For example, microplastics affect seafloor and open ocean habitats by altering biogeochemical cycles, including carbon storage (with implications for climate change).[236]

Microplastics affect nearshore and inshore environments—such as sandy beaches—through sediment contamination.[237] The presence of microplastics also alters physical properties of beaches, including heat transfer and water movement.[238] These changes may have broad ecological implications for a wide variety of beach dwelling organisms and their eggs—including crustaceans, molluscs, fish, and sea turtles—and climate change may exacerbate these impacts.[239] These concerns are not merely theoretical: researchers recently found anthropogenic marine debris, including plastics, at 10 loggerhead sea turtle nesting beaches—including protected areas.[240]

In addition, because plastics do not readily degrade, they become vehicles for invasive species dispersal—effectively serving as a raft for exotic species transport and as a

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plastic-pandemic-german-scientists-analysis-finds-staggering-levels-of-microplastic-pollution-in-tennessee-river.

232 *Id.*

233 Eerkes-Medrano, Dafne et al., Microplastics in drinking water: A review and assessment, 7 Envtl Sci & Health 69 (2019); Novotna, Katerina et al., Microplastics in drinking water treatment – Current knowledge and research needs, 667 Sci Total Environ 730 (2019); Pivokonsky, Martin et al., Occurrence of microplastics in raw and treated drinking water, 43 Sci Total Environ 1644 (2018); Kosuth, Mary et al., Anthropogenic contamination of tap water, beer, and sea salt, 13(4) PLoS ONE e0194970 (2018); Koelmans et al. 2019.

234 Kosuth et al. 2018.

235 Guzzetti et al. 2018; CIEL 2019b.

236 *Id.*

237 Oehlmann, Jörg et al., A critical analysis of the biological impacts of plasticizers on wildlife, 364 Phil. Trans. R. Soc'y B 2047 (2009); Rios et al. 2007; Gall & Thompson 2015.

238 Carson, Henry S. et al., Small plastic debris changes water movement and heat transfer through beach sediments, 62 Marine Pollution Bull. 1708 (2011); Gall & Thompson 2015.

239 Carson et al. 2011; Valenzuela, N. et al., Extreme Thermal Fluctuations from Climate Change Unexpectedly Accelerate Demographic Collapse of Vertebrates with Temperature-Dependent Sex Determination, 9 Nature Sci. Rep. 4254 (2019), https://www.nature.com/articles/s41598-019-40597-4.pdf.

240 Garrison et al. 2019.

colonizing surface in areas otherwise lacking one.[241] These invasive organisms can prove devastating when they move into a new area, wiping out native species, and also harming human health and local economies (*see* discussion on viruses and bacteria, *supra*).[242]

Environmental plastic pollution also directly contributes to climate change.[243] When plastic particles are exposed to the elements, they slowly break down. Photodegradation (*i.e.,* degradation caused by exposure to sunlight) of plastic triggers the production of greenhouse gases; this off-gassing increases as the plastic particles become smaller. The breakdown of low-density polyethylene, in particular, releases methane, ethylene ($C_2H_4$), ethane, and propylene at a high rate. As more plastic accumulates in the environment, so too will greenhouse gas emissions from this source increase.[244]

Finally, plastic pollution litters our beaches, harming the aesthetic, recreational, tourism, and economic values of our waterways and seashores.

*a. Proposed Sector-Specific Revisions for Plastics*

As described above, microplastics are an increasing threat to human health and the environment. Currently, the only restrictions or treatment requirements for stormwater are found in the Best Management Practices contained in either state- or EPA-issued industrial stormwater permits, including the expiring MSGP.[245] This is an entirely unreasonable and insufficient response to this pollution problem.

Best Management Practices, which typically include measures such as minimizing exposure of pollutants to precipitation or managing runoff via swales and filtration devices, have been wildly ineffective at preventing plastic particles produced at plastics facilities from entering the nation's waterways. Plastic pellets, flakes, and powders regularly escape from petro-plastics facilities, contaminating nearby beaches and waterways, and harming wildlife and communities.[246] The toxins from these substances leach into the environment, exposing wildlife and human communities to hazardous compounds that can result in cancer, neurotoxicity, and death. Prohibiting the discharge of *any* plastic debris from these facilities is necessary to safeguard our rivers, coasts,

[241] Gregory, Murray R., Environmental implications of plastic debris in marine settings—entanglement, ingestion, smothering, hangers-on, hitch-hiking and alien invasions, 364 Phil. Trans. R. Soc'y B 2013 (2009); Barnes et al. 2009; Hammer et al. 2012; Mearns et al. 2013; Wright et al. 2013; Gall & Thompson 2015; Guzzetti et al. 2018.
[242] Barnes et al. 2009.
[243] CIEL 2019b.
[244] *Id.*
[245] For example, EPA has not established numeric effluent limitations for contaminated runoff/stormwater for the Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers industry group, including the Organic Chemicals, Plastics, and Synthetic Fibers (40 C.F.R. § 414) or Plastics Molding and Forming (40 C.F.R. § 463) point source categories. Stormwater is only covered under Part 414 if it is combined with process wastewaters (EPA 1987; EPA 2004) 40 C.F.R. Part 414.
[246] *San Antonio Bay Estuarine Waterkeeper, et al., v. Formosa Plastics Corp., Texas, et al.*, Civil Action No. 6:17-CV-0047 Order and Consent Decree (2019).

and communities from harmful pollutants. This is particularly true due to increasing threats from major storm events that can cause extreme flooding conditions.

The 2019 NAS study included a section titled "Overarching Message" that summarizes our concerns with EPA's stale approach to the regulation of industrial stormwater discharges generally and plastic pellets and other materials specifically:

> [T]he [Multi-Sector General Permit] should incorporate the best available science in the MSGP process. Science continues to improve our understanding of the environmental and human health impacts of industrial stormwater. Technologies for water quality monitoring, stormwater treatment, and modeling are advancing at rapid rates, and new data can inform understanding of the performance of stormwater control measures. New tools are being developed to improve toxicological assessments and data management and visualization… In general, EPA has been slow to adopt new knowledge into its [Multi-Sector General Permit] permit revisions, but the [Multi-Sector General Permit] should not be a static enterprise. Both permitted facilities and the nation's waters would be best served by a progressive and continuously improving [Multi-Sector General Permit] based on analysis of new data and focused data-gathering efforts, advances in industrial stormwater science and technology, and structured learning to develop and evaluate permit improvements. (NAS 2019).

EPA has the authority and obligation in the 2020 MSGP to ensure that our nation's waterways, wildlife, and communities are not polluted by pre-production plastic, including but not limited to pellets, resins, flakes, granules, and powders. Not only is the MSGP important for facilities that EPA continues to directly regulate,[247] but it also serves as the model (and floor) for states with delegated permitting authority (NAS 2019). As technology advances and industry changes, the Clean Water Act requires EPA to revise its regulations to advance the Act's ultimate objective of eliminating pollution into our nation's waters. [248] This fundamental goal is not reflected in the 2020 MSGP's proposed regulation of stormwater from Sector B (Paper and Allied Products Manufacturing, including single-web and multi-web plastic bags), Sector C (Chemical and Allied Products Manufacturing) or Sector Y (Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries). With respect to plastic pollution, the MSGP appears to be utterly unchanged from the prior MSGP.

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[247] EPA Office of Water, EPA-833-F-06-018, December 2006, Industrial Stormwater Fact Sheet Series, Sector C: Chemical and Allied Products Manufacturing and Refining, https://www.epa.gov/sites/production/files/2015-10/documents/sector_c_chemical.pdf. *See also* National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47,990 (Nov. 16, 1990) (codified at 40 C.F.R. § 122.26).

[248] *See* U.S. EPA, Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 80 Fed. Reg, 67,837 (Nov. 3, 2015); California NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, effective July 1, 2015, Part XVIII, https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/industrial/2014indgenpermit/wqo2014_0057_dwq_revmar2015.pdf.

*i. EPA must require a zero discharge of plastic standard in lieu of the ineffective and unenforceable standard of "best management practices" in the MSGP*

The proposed regulations rely on "good housekeeping" to allegedly "eliminate such plastic discharges in stormwater."[249] Specifically, the regulation provides that "best management practices" be used:

> e. Plastic Materials Requirements: Facilities that handle pre-production plastic must implement best management practices to eliminate discharges of plastic in stormwater. Examples of plastic material required to be addressed as stormwater pollutants include plastic resin pellets, powders, flakes, additives, regrind, scrap, waste and recycling.[250]

The proposed MSGP then gives examples of those best management practices just for Sector Y "where determined to be feasible:"

> **8.Y.2.2** Controls for Plastic Products Manufacturers. Minimize the discharge of plastic resin pellets in your stormwater discharges through implementation of control measures such as the following, where determined to be feasible (list not exclusive): minimizing spills; cleaning up of spills promptly and thoroughly; sweeping thoroughly; pellet capturing; employee education; and disposal precautions.[251]

The "best management" guidance has limited value and contains no engineering, monitoring or discharge requirements and no effective enforcement mechanism. No standards are set for the quantity of plastics that can be discharged ("minimize" is not a standard). Industry is given total discretion regarding whether to adopt the "best management," because industry can determine that certain measures are not "feasible" (EPA provides no standards to determine feasibility). Furthermore, the control examples are vague and unenforceable.

Additionally, source control – stopping plastics from hitting the ground – is in the economic interest of those with plastics at their facilities, provided there are rules prohibiting the eventual discharge of those plastics, which this regulation lacks. Rather than maintain vague ideas about how to manage plastics inside the plant, EPA should prohibit the discharge of plastics from these facilities.

Draft permit, Part 2.1.2.2(e) should be amended to state.

> e. Plastic Materials Requirements: Facilities that handle pre-production plastic ~~must implement best management practices to eliminate~~ shall not discharges ~~of~~ plastics in stormwater. Examples of plastics ~~material~~ required to be addressed as

[249] Draft Permit at 16, Part 2.1.2.2 Good Housekeeping.
[250] *Id.*, Part 2.1.2.2(e).
[251] Draft Permit - Part 8 Sector Requirements for Industrial Activity at 117-118, Part 8.Y.2.2.

stormwater pollutants include plastic resin pellets, powders, flakes, additives, regrind, scrap, waste and recycling. <u>No discharge of plastics will be permitted.</u>

To ensure compliance with a zero-discharge standard, monitoring and enforcement provisions must be added. The following language should be added:

(e) All facilities that handle pre-production plastics shall comply with the following:

(i) zero discharge and zero release of preproduction plastics of may occur from the facility,
(ii) the facility will conduct monthly monitoring outside the property line of the facility and in any receiving waters for stormwater discharges to confirm that the zero discharge requirements are being met, with stormwater monitoring conducted within 8 hours of a rainfall event,
(iii) any preproduction plastics found outside the property line of a facility will be presumed to have been released or discharged by that facility,
(iv) the facility will report any exceedance of the zero discharge to the regulatory agency within 2 working days, and
(v) the facility will be given an opportunity to prove that preproduction plastics found outside the property line of the facility did not originate from that facility;
(vi) violations of the zero discharge are a violation of the permit; and
(vii) a permittee shall be required to clean up any discharged or released plastics in a manner that cleans up the most plastics possible without causing harm to the ecosystem.

*ii. EPA must define microplastics as a "pollutant," not a "significant material."*

The proposed regulations define microplastics as a "significant material."

> Significant Materials – includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, **and plastic pellets**; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical the facility is required to report pursuant to section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges. See 40 CFR 122.26(b)(12).[252]

"Significant materials" are less regulated than pollutants. Current regulations merely require the facility to "estimate" and give a "narrative description" of "Significant materials that in the three years prior to the submittal of this application have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of such materials; materials management practices

[252] Draft Permit - Appendix A, definitions A-7 of 10 (emphasis added).

employed, in the three years prior to the submittal of this application, to minimize contact by these materials with storm water runoff; materials loading and access areas…."[253]

Plastic nurdles, powders and flakes are pollutants and should be regulated as such. 40 C.F.R. §122.2 should be amended to state:

> Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, ~~and~~ agricultural waste, **and plastics (including plastic nurdles, powder and flakes)** discharged into water.

The vast expansion of the plastics industry will add billions of plastic pellets and other materials into stormwater runoff unless EPA takes action now. The health of our birds, fish, and mammals, as well as our own human health, depends on clean waterways free of hazardous plastic pollution. In accordance with its authority under the Clean Water Act, EPA must therefore promulgate regulations ensuring that the plastics industry does not discharge any more plastic waste through stormwater and wastewater runoff.[254]

*iii. EPA must in the alternative require individual stormwater permits for facilities that produce or handle pre-production plastic*

If the above-noted measures are not included in this MSGP, EPA should exclude these facilities from coverage and instead require individual stormwater permits that incorporate the recommendations noted above at (e)(i)-(vii). Individual permits can be tailored specifically towards the plastic materials these facilities are producing, handling, transporting, and releasing in order to achieve the zero-discharge standard.
Clean Water Act regulations recognize that the MSGP benchmark monitoring requirements, Stormwater Pollution Prevention Plans, and Stormwater Control Measures may be inadequate to address pollution from industrial stormwater. Given the scope of the plastic pollution problem from facilities that produce and handle pre-production plastic, EPA (as well as State Directors) can and should exclude facilities from industrial General Permits and require individual NPDES permits if they cannot be held to the zero discharge standard via an MSGP.[255] An individual stormwater permit can be required for any number of reasons, including a change in demonstrated technology or practices that better control pollutants, Effluent Limitation Guidelines promulgated for point sources, and the nature of the discharge.[256] Here, as

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[253] 40 C.F.R. § 122.26(c)(1)(i)(B).
[254] 40 C.F.R. § 122.26(a)(4).
[255] 40 C.F.R. § 122.28(b)(3) (General permits (applicable to State NPDES programs) subsection on requiring an individual permit).
[256] *Id.*

demonstrated above, the nature of the discharge and inadequacy of the MSGP to address the pollution problem supports the requirement of individual NPDES permits.

Individual permits could better regulate these facilities by requiring an enforceable zero discharge criterion for plastic and more effective monitoring that can detect permit violations when the zero-discharge standard is exceeded. As the NAS concluded in its 2019 review of EPA's stormwater regulations, "[t]his stricter enforcement of pollutant exceedances can be helpful for sites that represent a high public concern or that raise environmental justice issues."[257] Plastics facilities are of high public concern, and their proliferation in low-income communities of color raises environmental justice concerns. Each facility should be required to receive an individual NPDES permit if the MSGP is not strengthened in the ways suggested above.

The only way EPA can mitigate the dangers posed by microplastics conveyed far and wide from their original presence in industrial stormwater is to ensure they are not discharged in the first place. We request that the EPA remedy the ongoing failure of "best management practices" to meaningfully reduce plastic in stormwater discharge by adopting these measures.

[257] NAS at 76.

### *21. EPA Should Revise Deadlines for Maintenance and Repairs of Control Measures.*

For maintenance, repairs, and development of most control measures, the 14 day timeframe is appropriate.[258] However, if meeting that time frame is infeasible or impracticable ("feasible" is not defined but must be if the concept remains in the final regulation, given its frequent use in these regulations – see Comment Section 16 for an additional discussion of "feasibility"), the amount of time to deploy maintenance or repairs should be set at 30, not 45 days (note that even 30 days, during an especially rainy month in a watershed or sub-watershed severely stressed by various stormwater pollutants and high water volumes, can do substantial damage to water quality in that waterbody and beyond). Then, if completion must take longer due to certain engineering and design or unavoidable construction delays, the notification to EPA specified in the draft language should be made, and the rationale for a 45-day timeframe adequately documented.

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[258] Draft Permit at 17, Part 2.1.2.3(b)(ii)

### 22. EPA Should Clarify and Strengthen Required Routine Inspections of Control Measures.

With respect to exceptions to routine inspection frequency,[259] it is not clear which facilities may need to conduct monthly inspections to ensure the proper functioning of control measures. Additionally, while it is perhaps appropriate for certain facilities (i.e. where neither equipment nor industrial materials are exposed to the elements), to conduct inspections once/year *when stormwater discharges are occurring*, for any and all others, where discharges may routinely carry pollutants into control structures, an (approximate) quarterly inspection should be required during storm events.

[259] Draft Permit at 22 and 23, Parts 3.1.4 and 3.1.5, respectively.

### *23. EPA Should Adopt its Proposed Revision for Authorized Non-Stormwater Discharges of Wash Water.*

EPA should require control measures to minimize discharges of pollutants from wash water related to routine external wash-downs and power washing, because, as the Agency acknowledges, it is important to minimize particulates and other industrial residues that accumulate during dry-weather conditions from discharging to receiving waterways. However, the proposed revision to Part 1.2.2.1.g. should be worded to include the exterior of structures other than buildings, such as storage tanks, for example, that also have the potential to accumulate pollutants associated with industrial activity on their surfaces.

### *24. EPA Should Adopt Certain Revisions for Sector-Specific Requirements*

**8.C - Chemical and Allied Products (Sub-sectors of importance to Chesapeake Bay watershed: industrial organic chemicals, fertilizer mixing)[260]**

In the Chesapeake Bay watershed of six Mid-Atlantic states and the District of Columbia, this sector is one of about a half-dozen industrial sectors or sub-sectors that are a small subset (<1%) of all industrial facilities subject to industrial stormwater permits, *but whose pollutant loadings are more than 10x the Waste Load Allocations* in the Chesapeake Bay Total Maximum Daily Load (TMDL),[261] at least as measured in one major jurisdiction, the Commonwealth of Virginia.[262] It is possible -- even likely – that, upon investigation, other states across the country might also find this sector/sub-sector contributing a disproportionate amount of nutrient pollution to waterways. These regulations, however, do not provide any focus on these sub-sectors, or these pollutants.

Given that there is a Chesapeake Bay TMDL with Waste Load Allocations for Nitrogen, Phosphorus, and Sediment, and follow-on state-developed Watershed Implementation Plans with a year-2025 deadline; given the fact that in the Bay watershed, this sector and those specific sub-sectors are among the few producing a substantial proportion of stormwater pollutants into the Bay (29% of the overall phosphorus load and 20% of the overall nitrogen load coming from stormwater);[263] and given that many other states outside the Chesapeake Bay watershed have similarly-sized, similarly-characterized industrial sectors -- and similarly challenged waterways -- we believe this MSGP should contain such a focus. In fact, there is no discussion nor are there any examples provided of possible controls related to various components or activities unique to this sector as a whole, as there are for most other sectors in these regulations.

**8.M- Automobile Salvage Yards[264]**

**8.M.3.2 Potential Pollutant Sources –** This section states that the potential for pollution from certain activities needs to be assessed, but it does not say what is to be done if the potential is assessed to be moderate to high and such activities or equipment need to be isolated, buffered or otherwise controlled.

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[260] Draft Permit - Part 8 Sector Requirements for Industrial Activity at 6-8, Subpart C - Sector C.

[261] U.S. Envtl. Prot. Agency, *Chesapeake Bay Total Maximum Load for Nitrogen, Phosphorous and Sediment* (December 29, 2010), https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document

[262] Letter from Joseph D. Wood, Ph.D. and Margaret L. Sanner to Matt Richardson (December 18, 2018) (commenting upon Virginia Industrial Stormwater Permit and discussing extensive research conducted by the Chesapeake Bay Foundation pertaining to state data on various industrial stormwater pollution sources) (attached). Note that the Commonwealth issues its own NPDES permits for Industrial Stormwater. This MSGP, however, can and does generally set a floor for such regulations in the Bay watershed and elsewhere across the country, and should reflect the most complete industrial stormwater pollution information and standards available.

[263] *Id.*

[264] Draft Permit - Part 8 Sector Requirements for Industrial Activity at 79-80, Subpart M - Sector M.

**8.Q - Water Transportation (sub-sector of importance to Chesapeake Bay watershed: Marine Cargo Handling)[265]**

**8.Q.3.1 Good Housekeeping Measures –** Some of the specific areas of control do have a clear "minimize" directive (e.g., blasting and painting areas, material storage areas). Others, (e.g. engine maintenance and repair areas, material handling areas, and dry-dock activities) use the ineffective "where determined to be feasible" language. As noted previously, such language is inappropriate without further definition, and providing even clearer direction is a better approach in this sub-section and in following sub-sections with the same phrase.

**8.S - Air transportation (sub-sector of importance to Chesapeake Bay watershed: Airports, Flying Fields and Services)[266]**

**8.S.4.1.1 Good Housekeeping –** Subsections concerning aircraft; ground vehicle and equipment maintenance and storage areas; material storage areas; and fuel systems and fueling areas all require that control measures should be used "where determined to be feasible."

**8.S.4.1.6 Source Reduction** – This section pertains to deicing operations for both runways and aircraft; the nitrogen pollution impacts of urea-based fluids is discussed above. The "where determined to be feasible" language should be removed and substituted as noted above. Nitrogen should be added as a benchmarked pollutant.

**8.S.4.1.7 Management of Runoff** – Eliminate the "where determined to be feasible" language and substitute as noted above.

**8.U – Food and Kindred Products (subsectors of importance to Chesapeake Bay watershed: Meat Packing Plants, Canned and Cured Fish and Seafood, Prep Feeds and Ingredients for Animals)[267]**

These sub-sectors are among the SICs presenting the highest runoff pollutant loading rates of any industrial sector in parts of the Chesapeake Bay watershed. The noted sub-sectors may also present runoff pollution problems in other states and regions where similar industrial profiles are prevalent and where this MSGP applies or is used as a model for state regulation. The draft regulations do not provide any focus on these sub-sectors, however, nor is there any discussion of possible controls related to various components or activities unique to this sector as a whole, as there is for other sectors. There should be.

**8.U.6 Sector-Specific Benchmarks –** Phosphorus should be added to the list of benchmarks to be measured in Table 8.U-1, as it is a limiting pollutant in the Chesapeake Bay and is part of the TMDL developed for the Chesapeake Bay states.

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[265] *Id.* at 94-96, Subpart Q - Sector Q.
[266] *Id.* at 101-107, Subpart S - Sector S.
[267] *Id.* at 110-111, Subpart U - Sector U.

**8.P.3.1. Good housekeeping measures (required).**[268] While these measures are required for important activity areas (vehicle and equipment storage areas, fueling areas, material storage areas, vehicle and equipment cleaning areas, and vehicle and equipment maintenance areas), the proposed rule inappropriately states that such facilities must implement these practices "where determined to be feasible" (note comments on the definition of "feasibility," below).

[268] *Id.* at 91-92.

### *25. EPA Should Require Additional Monitoring of Source Control Methods in Accordance with the Recommendations of the National Academies of Sciences.*

The NAS recommended that EPA require additional monitoring specifically focused on the capacity of Source Control Methods (SCMs) to reduce stormwater pollution.[269] EPA declines to adopt this recommendation yet fails to provide a legitimate rationale for its decision.

EPA's stated rationale for not requiring SCM performance data is that it "would be very complicated to do in context of a permit and possibly expensive for operators in balance with other proposed requirements."[270] It is painfully obvious that EPA never took the NAS recommendation seriously. Among other things, EPA failed to estimate the cost of collecting SCM performance data, and merely speculates that it is "possibly expensive."[271] The Agency also responds to the recommendation as if the only purpose of SCM performance data is to inform new numeric effluent limitations, when the NAS clearly recommended SCM performance data for two reasons – to identify sectors for which new national effluent limits are necessary, and to inform periodic reviews of benchmarks.[272] Finally, while EPA speculates about cost to permittees, it arbitrarily ignores the corresponding benefit to public health and the environment of learning more about SCM performance.

EPA has a statutory obligation to ensure that industrial stormwater permittees are minimizing their pollution loads using the best available technology. It should go without saying that the Agency cannot fulfill its obligation without learning more about the pollutant removal capabilities of various SCMs. EPA's stated rationale for ignoring the NAS recommendation is wholly unsupported by reasoned analysis. The Agency must require SCM performance data to address the concerns raised by the NAS and to fulfill its statutory obligations under the CWA.

[269] NAS at 4, 43.
[270] Fact Sheet at 6.
[271] *Id.*
[272] NAS at 4.

***26. EPA Should Prepare a Full Environmental Impact Statement for the Issuance of the MSGP and Re-evaluate its Unsupportable Environmental Justice Conclusions.***

Section VII of EPA's March 2, 2020 Notice contends that "reissuance of the MSGP is eligible for a categorical exclusion requiring documentation under 40 CFR 6.204(a)(1)(iv)." 85 Fed. Reg. at 12294. This subsection applies to actions involving the "re-issuance of a NPDES permit for a new source providing the conclusions of the original NEPA document are still valid, there will be no degradation of the receiving waters, and the permit conditions do not change or are more environmentally protective." 40 CFR § 6.204(a)(1)(iv). EPA notes that it completed an Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for the 2015 MSGP and contends that the "analysis and conclusions regarding the potential environmental impacts, reasonable alternatives, and potential mitigation included in the EA/ FONSI are still valid for the reissuance of the MSGP because the proposed permit conditions are either the same or in some cases are more environmentally protective." 85 Fed. Reg. at 12294.

EPA must reconsider its invocation of this categorical exclusion and to instead at a bare minimum prepare an EA to determine whether a full Environmental Impact Statement (EIS) is required. 40 C.F.R. § 1501.4. As an initial matter, this categorical exclusion on its face does not squarely apply to the issuance of this MSGP. It references "a NPDES permit" and "a new source" not thousands of permits and sources. The sheer number of industries and facilities covered by the 2020 MSGP counsel for a full environmental review under NEPA. In addition, in the intervening five years since issuance of the 2015 MSGP, much has changed both in terms of the society, regional, and local context of the sources and intensity of the proposed action.

There are changes that EPA must evaluate, including in the type and number of facilities covered, the nature of the pollutants covered (including but not limited to plastic), the receiving environment (including direct, indirect, and cumulative impacts to and uncertain or unknown risks), and the best available technical and scientific information. *See, e.g.,* 40 C.F.R. § 1508.27; *see also* 40 C.F.R. § 1502.24 (agencies must use high quality, accurate scientific information and ensure the scientific integrity of this analysis). In its cumulative impacts analysis, EPA may not brush aside "individually minor but collectively significant actions taking place over a period of time" regardless of what agency or person undertakes such other actions." *Id*. § 1508.7. This is especially important when considering cumulative industrial discharges that can harm water quality, biological resources, functioning ecosystems, historic and cultural resources, and public health.

EPA should also consider the likelihood and environmental impacts of unpermitted discharges, spills, and other accidents from sources covered by the MSGP. 40 C.F.R. § 15022.22(b)(4). EPA has a duty to evaluate the impacts of this vast MSGP with fresh eyes and fresh science. To do otherwise would violate the tenets of NEPA and fail to be the "hard look" required.

Agencies must also consider the environmental justice implications of a proposed project. Under Section VIII of its March 2, 2020 Notice, EPA includes just one cursory paragraph on environmental justice:

> The EPA believes that this action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations and/or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). The EPA has determined that the proposed permit will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because the requirements in the permit apply equally to industrial facilities in areas where the EPA is the permitting authority, and the proposed provisions increase the level of environmental protection for all affected populations.

85 Fed. Reg. at 12294. It is unclear how EPA can conclude that in applying the same standards to every facility, there can be no disproportionate impact. The issue is the density of industrial facilities in these communities. A recent EPA report concluded that African-Americans and individuals living below the poverty level are more likely than others to live near pollution-emitting facilities, and that the racial correlation was stronger than the poverty-based one.[273] Studies dating back to the 1970s have documented a consistent pattern of siting facilities disproportionately where poor people and people of color live.[274] In the fence-line zones around industrial facilities that use or store hazardous chemicals, the percentage of Latinos is 60 percent greater and percentage of blacks 75 percent greater than for the United States as a whole.[275]

Furthermore, the 2019 NAS report noted that an individual permit can better regulate facilities by requiring more extensive monitoring and coverage of a greater number of pollutants relative to a General Permit, where benchmark monitoring is determined by standard industrial classification (SIC) code.[276] Individual permits can also be structured with enforceable discharge criteria expressed as numerical effluent limits, which then trigger a permit violation when exceeded. As the report concluded, "[t]his stricter enforcement of pollutant exceedances can be helpful for sites that represent a high public concern or that raise environmental justice issues."[277] Many of the facilities that

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[273] Mikati, I. et al., Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status, 108 Am. J. Pub. Health 480 (2018), https://doi.org/10.2105/AJPH.2017.304297.
[274] Brown, P. Race, class, and environmental health: a review and systematization of the literature. 69 Envtl. Res. 15 (1995).
[275] Environmental Justice and Health Alliance for Chemical Policy Reform, Who's in Danger? Race, Poverty, and Chemical Disasters (2014), https://comingcleaninc.org/assets/media/images/Reports/Who's%20in%20Danger%20Report%20FINAL.pdf.
[276] NAS at 76.
[277] *Id.*

would be covered by the MSGP are of high public concern, and their proliferation in low-income communities of color raises environmental justice concerns.

These concerns are not addressed or alleviated by EPA's statement that the MSGP provides an increase in protection. The MSGP is still permitting pollution that has direct, indirect, and cumulative impacts on these communities – impacts that are harmful. It is not acceptable for EPA to dismiss this with one paragraph that contains EPA's "belief" but is devoid of analysis.

### *27. EPA Should Clarify or Revise Certain Features of Required Forms.*

Appendix G, NOI form: not clear on the paper form what information regarding TMDLs the permittee is expected to provide if their receiving water is subject to a TMDL.

Appendix I, annual report form: should be beefed up by adding the following requirements:

- report any changes to outfalls (number, area drained, etc)
- provide the dates that routine inspections were completed and identify the wet weather inspection date
- provide the dates that quarterly visual assessments of stormwater were completed
- Certify via checkbox that: SWPPP is up to date

A more robust approach to the annual report is exemplified by the New York DEC's Annual Certification Report.[278]

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[278] New York State Dept. of Environmental Conservation. Annual Certification Report GP-0-17-004. Stormwater Compliance Coordinator NYSDEC, Bureau of Water Compliance (attached).

In its current form, EPA's proposed Multi-Sector General Permit makes some progress since the development and issuance of the 2015 MSGP. However, still many issues that concern legal and technical compliance with the requirements of the Clean Water Act and other federal law are not adequately addressed or resolved in the Draft Permit. As explained above, EPA must adopt and revise a number of provisions in the final draft of the 2020 MSGP.

We thank you for the opportunity to provide these comments and are happy to discuss them with you in further detail.

Sincerely,

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CHESAPEAKE ACCOUNTABILITY PROJECT

October 5, 2020
*Via Electronic Mail*

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RE: Feedback on Corrective Action Section of Pre-TD Draft General Permit for Discharges of Stormwater Associated with Industrial Activity

Dear Mr. Hlavinka and Mr. Stone,

Thank you for the opportunity to provide pre-Tentative Determination (TD) feedback to the Maryland Department of the Environment (MDE) regarding the corrective action section of the draft General Permit for Discharges of Stormwater Associated with Industrial Activity (the "Permit," or "Permit No. 20SW") that we understand was submitted to U.S. EPA Region 3 ("Region 3") for review on July 15, 2020. We understand that MDE has been in communication with Region 3 and that an updated draft is due back to Region 3 by October 12, 2020. In this letter, we aim to provide feedback that could be incorporated into such an updated draft. This feedback applies specifically to the section of the draft Permit, titled "Part IV. Corrective Actions and Additional Implementation Measures (AIM)" (hereinafter the "Corrective Action Section"), that Mr. Paul Hlavinka shared on September 2, 2020 requesting our courtesy review and feedback no later than October 12, 2020.

As we have expressed, we would welcome the opportunity to provide feedback on additional sections of the draft Permit, including those addressing permit eligibility, universal benchmark monitoring, pollutant trading, and overall enforceability. This would allow us to alert MDE to the issues we view as critical and to attempt to resolve them with the agency prior to the comment period.

We appreciate MDE's willingness to work through these issues in the Corrective Action Section. The Corrective Action Section includes considerable improvements from the comparable section in the prior version of the Permit ("Permit No. 12-SWA"), including enforceable deadlines for certain corrective action requirements and the increased public accessibility of documentation.

However, as discussed in more detail below, we have significant concerns with several aspects of the Corrective Action Section. Most importantly, there are two fatal flaws with the structure of the Additional Implementation Measures (AIM) Levels that render the levels arbitrary. First, the triggering events do not have a technical basis, as they do not require action upon the exceedance of a benchmark. Second, the AIM Levels are independent of one another not cumulative, with the triggers differentiated by the timing of the triggering events, rather than the frequency or severity of exceedances. Relatedly, the AIM Responses do not escalate as the levels increase. On top of these structural issues, the Corrective Action Section as drafted has overlooked essential opportunities to impose enforceable obligations that would encourage and achieve higher rates of compliance.

Though this letter outlines concerns and comments that range in severity from minor typos to major deficiencies, our most significant concerns with the Corrective Action Section of the Permit are as follows (including the critical defects noted above):

- The AIM Triggering Events do not have a technical basis to justify the failure to require action upon first exceedance of a benchmark. MDE's failure to include annual average exceedance of benchmarks as an Additional Implementation Measures (AIM) Level 1 Triggering Event is an impermissible rollback from Permit No. 12-SWA and less protective than the EPA Proposed Multi-Sector General Permit (MSGP).
- AIM Levels should be cumulative, triggered by a single exceedance in the benchmark threshold for a given pollutant, and escalating in severity of the response required.
- MDE should improve the enforceability of the Corrective Action Section of the Permit.
- Benchmark monitoring should continue throughout the permit term.
- Permittees should not be allowed to satisfy applicable restoration requirements of Permit Part III.A with marketable credits received for impervious surface restoration as an AIM Level 3 corrective action.
- Corrective Action documentation should be consistent and made publicly available online.
- MDE should provide definitions of terms and standards for corrective action requirements and extensions.

## I. The AIM Triggering Events Are Not Justified.

The benchmark monitoring and corrective actions of an industrial stormwater general permit are key permit components to ensure compliance with the effluent limitations in the Permit. The triggering events for each AIM Level are indicators that the permittee's control measures are insufficient. A permittee's participation in the corrective action process should inform the permittee, MDE, and the public that the permittee is taking additional steps to correct the control measures and ensure compliance with the Permit terms. With the current AIM Triggering Events, MDE likely could not demonstrate that the current draft Corrective Action Section would ensure compliance with water quality standards ("WQS"), as the Clean Water Act (CWA) requires. *See In re Gov't of the Dist. Of Columbia, MS4 System,* 10 E.A.D. 323, 2002 WL 257698, *1 (2002); 40 C.F.R. § 122.4(d) (prohibiting issuance of a permit "when imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected states.").

### A. MDE's failure to include annual average exceedance of benchmarks as an AIM Level 1 Triggering Event is an impermissible rollback from Permit No. 12-SWA and weaker than the EPA Proposed MSGP.

The only triggering event for AIM Level 1 would allow many permittees, in Year 1, who regularly exceed benchmarks, to avoid corrective action requirements. The triggering event for the Permit's AIM Level 1 is when one single sampling event in Year 1 for a parameter is over four times the benchmark threshold. This excludes all permittees that regularly exceed the benchmark but do not have one single sampling event rise to the level of four times the benchmark.[1] Because AIM Level 1 is the only corrective action level based on Year 1 sampling events, MDE essentially

[1] For example, if a benchmark is 8 and the four quarter samples for Year 1 are 20, 25, 14, and 18, the average of the results will clearly be far greater than 8 (19.25), but no one value is greater than 32, so that permittee would not be in AIM Level 1.

is giving permittees a free pass for benchmark exceedances in Year 1, provided that no one sampling event is greater than four times the benchmark.

The absence of the annual average exceedance as an AIM Level 1 triggering event makes the Corrective Action Section of Permit No. 20SW less protective than Permit No. 12-SWA Permit and the EPA Proposed MSGP. A triggering event for corrective action occurred in Permit No. 12-SWA when the average of four quarterly sampling results exceeded an applicable benchmark. EPA Proposed MSGP also includes the exceedance of a benchmark by the annual average as an AIM Tier 1 triggering event.[2] Therefore, MDE's failure to include such a trigger in Permit No. 20SW for AIM Level 1 is an impermissible rollback and legally constitutes backsliding. *See* 33 U.S.C. 1342(o)(1); EPA, NPDES Permit Writers' Manual (Sept. 2010), 7-2 ("In general, the term anti-backsliding refers to statutory and regulatory provisions that prohibit the renewal, reissuance, or modification of an existing NPDES permit that contains effluent limitations, permit conditions, or standards less stringent than those established in the previous permit."). Because MDE has eliminated this trigger for corrective action, the agency must provide its technical basis for the change and how its analysis demonstrates that anything less than a sampling event greater than four times the benchmark ensures that control measures are adequate to protect water quality.

### B. Exceedance of any benchmark should trigger AIM.

To simplify the Permit while ensuring that it is at least as protective as the EPA Proposed MSGP, and complies with CWA requirements, MDE should adopt triggering events that begin with a single exceedance of the benchmark threshold for a single parameter. Each additional occurrence of a benchmark exceedance for that parameter in a permit term should then trigger the next AIM Level.[3] As discussed in more detail in section II.A below, this approach would be consistent with the purpose of benchmark thresholds, to indicate when existing control measures are not effective in ensuring that downstream WQS will be met.

## II. The Structure and Timing of the AIM Levels Must Be Clarified and Strengthened.

The structure and timing of certain aspects of the Corrective Action Section are unclear, and the AIM Levels are duplicative, as AIM Levels 2 and 4 Responses allow the same actions as AIM Levels 1 and 3. These structural issues would likely cause significant confusion in implementation. First, although the Permit includes four AIM Levels, the triggering events for each level are independent, not cumulative, as currently written. A permittee does not advance to the next AIM Level based on benchmark exceedances accumulating over the course of the permit term but only based on a triggering event occurring during the corresponding year. Second, the actions required at each level do not necessarily escalate as the levels increase. As a result, the distinctions between the AIM Levels are arbitrary. To ensure that the AIM Levels are cumulatively impactful, as intended, and that the Permit complies with the CWA,

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[2] AIM Tier 1 Triggering Events in the EPA Proposed MSGP include: "One Annual Average Over the Benchmark Threshold. If one annual average for a parameter is over the benchmark threshold, you are in AIM Tier 1.…" (EPA Proposed 2020 MSGP, Page 37 of 66.)

[3] This is consistent with Washington state's approach in its Industrial Stormwater General Permit, effective January 1, 2020. The following are the Level One, Two, and Three triggers from that permit:

1. "Permittees that exceed any applicable benchmark value(s) . . . for any quarter during a calendar year shall complete a Level 1 Corrective Action for each parameter exceeded…"
2. "Permittees that exceed an applicable benchmark value . . . (for a single parameter) for any two quarters during a calendar year shall complete a Level 2 Corrective Action . . ."
3. "Permittees that exceed an applicable benchmark value . . . (for a single parameter) for any three quarters during a calendar year shall complete a Level 3 Corrective Action . . ." Washington Industrial Stormwater General Permit, Effective January 1, 2020, pages 35, 36, 37. For another example, see Oregon's recent Draft Industrial Stormwater Permit, triggering events for Tiers 1 and 1.5. Oregon 1200-Z Stormwater Permit Rulemaking, Draft NPDES 1200-Z Industrial Stormwater Permit, issued Aug. 17, 2020, page 19, 20.

corrective action requirements should be triggered when quarterly monitoring shows that any sampling event exceeds the applicable benchmark threshold, and the extent of the requirements should be related to prior years' compliance with benchmarks or number of exceedances.[4] Commenters recommend including only three AIM Levels, as provided in Section II.B of this letter, to eliminate duplicative elements and retain only the escalating components of each AIM Level.

Finally, the timing set forth in AIM Level 4 Responses for submitting an action plan and a demonstration that the discharge does not result in an exceedance of WQS poses several issues, including allowing the permittee too much time before any action is required.

**A. AIM Levels should be cumulative, not independent of one another, and should begin with any exceedance of a benchmark threshold.**

The triggering events for each AIM Level apply to the first, second, third, and "fourth or subsequent" year the permittee is subject to benchmarks, respectively. The higher levels do not require that a permittee was subject to the lower AIM Levels, just that a triggering event occurred in the second, third, fourth or subsequent years, respectively. Therefore, a permittee could have annual average discharges under benchmark levels the first and second years and then an annual average exceedance over the benchmark in the third year triggers AIM Level 3, although AIM Levels 1 and 2 responses were never required. This raises the question of why the corrective action responses are different across the AIM Levels at all, given that only the timing of the exceedance matters for triggering a particular level, not the severity or repeated nature of the exceedances. Relatedly, a permittee that only triggers corrective action beginning in Year 3 will be treated the same under the Corrective Action Section as a permittee that triggered AIM Levels 1, 2, and 3, despite its control measures successfully controlling pollutants for the first two years of the permit term. The distinctions MDE is making, based on timing of exceedances rather than severity or frequency, are arbitrary and differ substantially from the EPA Proposed MSGP approach.[5]

The benchmark thresholds MDE established must be derived from technical analysis. These benchmarks represent the level necessary to protect water quality, above which water quality cannot be assured. An exceedance of a benchmark threshold therefore indicates that the control measures in place are ineffective to ensure that downstream WQS will be met. Accordingly, the trigger for corrective action should not be greater than (i.e., weaker than) the benchmark thresholds. Any exceedance of a benchmark threshold, even once, warrants corrective action because the control measures must be adjusted to correct whatever problem led to the exceedance. Each subsequent occurrence of a benchmark exceedance should then trigger the next AIM Level. This approach not only

[4] Consider the following extreme hypothetical to illustrate the flaws of triggering events that are independent of one another: Each of a permittee's quarterly benchmark samples in the first year are greater than 4 times the benchmark threshold, triggering only AIM Level 1 Responses. In the second year, the quarterly samples of the same permittee are again greater than 4 times the benchmark threshold, subjecting the permittee to only AIM Level 2 Responses. Assuming the same level of exceedances in the quarterly samples during the permittee's third year of the Permit, the permittee would be subject to AIM Level 3 Responses. Therefore, although each of the first 12 quarterly samples for that permittee were greater than 4 times the benchmark threshold, the permittee still would not be subject to AIM Level 4 Responses. Both the severity and the frequency of the permittee's exceedances should be enough to trigger the strictest AIM, but under the current proposed scheme, even this permittee would not be subject to AIM Level 4 Responses unless a triggering event occurred in Year 4 or subsequent years.

[5] The EPA Proposed MSGP AIM Tiers are cumulative because the triggers for Tiers 2 and 3 are based on increasing periods of time of continued exceedances or increasing severity. For example, the triggers for AIM Tier 2 include two consecutive annual averages over the benchmark and two sampling events in a 2-year period each over 4 times the benchmark, which both reflect a longer period of exceedances than the triggers for AIM Tier 1 (one annual average over the benchmark threshold). The third trigger for AIM Tier 2 is that one single sampling event is over 8 times the benchmark threshold, which reflects increased severity compared to the corresponding AIM Tier 1 trigger (one single sampling event over 4 times the benchmark threshold). (*See* EPA Proposed 2020 MSGP, Page 37, 39 of 66.)

ensures compliance with CWA requirements but also maintains simplicity in the triggering events for each AIM Level and ensures equity among permittees.

The triggering events for the AIM Levels should be as follows:

1. AIM Level 1: One single sampling event above the benchmark threshold. If one single sampling event for a parameter is over the benchmark threshold during the permit term, you are in AIM Level 1.

2. AIM Level 2: Two sampling events above the benchmark threshold. If two sampling events for a parameter are each over the benchmark threshold during the permit term, and the second exceedance occurred after you completed AIM Level 1 Responses, you are in AIM Level 2.

3. AIM Level 3: Three sampling events above the benchmark threshold. If three sampling events for a parameter are each over the benchmark threshold during the permit term, and the third exceedance occurred after you completed AIM Level 2 Responses, you are in AIM Level 3.

These triggering events are simple and consistent with the purpose behind benchmark thresholds, requiring the permittee to take action when a discharge exceeds the benchmark threshold.

**B. The AIM Level Responses should increase in severity as the AIM Level increases.**

The AIM Levels as proposed are arbitrary not only due to their unsubstantiated triggering events, but also due to the lack of escalation in the AIM Responses as the levels increase. For example, AIM Level 2 Responses are duplicative of AIM Level 1 review and control measures. AIM Level 2 Responses include as an option that a permittee may "Repeat [its] review and then implement additional stormwater control measures as described in AIM Level 1..." (Part IV.B.2.b.i.) The permittee should not be allowed to repeat the same process from AIM Level 1, as this does not reflect increased severity from the first level. This is particularly problematic because AIM Level 1 Responses include that a permittee may "determine nothing further needs to be done with [its] control measures," provided that the permittee documents in the Stormwater Pollution Prevention Plan (SWPPP) and in the annual report why it expects existing control measures to be sufficient. (Part IV.B.1.b.i.) Because AIM Level 1 allows a permittee to choose to do nothing, repeating this as an option in AIM Level 2 could result in no corrective action after two consecutive instances of significant benchmark exceedances.

AIM Level 4 Responses are also duplicative, allowing a permittee to take the same action as provided in AIM Level 3 Responses: install structural source controls and/or treatment controls. (*Compare* IV.B.3.b.i *with* IV.B.4.b.i.) This gives the permittee another bite at the apple to meet the benchmark for a given pollutant for no apparent reason. MDE should not allow permittees so many opportunities to take the same action and take another 4 quarters to assess its effectiveness. Instead, MDE should use the following proposal, which eliminates redundancy and includes control measures that escalate and are technically justifiable:

1. AIM Level 1: require review of control measures and implementation of additional non-permanent and/or non-structural control measures necessary to abate benchmark exceedances (in accordance with the permit and, as appropriate, from among the sector-specific stormwater control measures (SCMs) in the EPA MSGP Appendix Q).

2. AIM Level 2: require review of control measures and implementation of permanent, structural source and/or treatment controls necessary to abate benchmark exceedances.

3. AIM Level 3: require an individual National Pollutant Discharge Elimination System (NPDES) permit and/or the technical demonstration, subject to Department approval, that the benchmark exceedance is not contributing to a violation of WQS in receiving waterways.

**C. The schedule for AIM Level 4 Responses should be tightened.**

The timing provided in AIM Level 4 for planning and carrying out the responses are inconsistent and unreasonably long, considering this is the 4th stage of corrective action. By this point, the permittee's efforts to prevent benchmark exceedances have repeatedly failed, and the lengthy timeframes for AIM Level 4 Responses would exacerbate the problems at the site by allowing even more time to pass without requiring further action. The AIM Level 4 Deadlines require the permittee to install the appropriate structural source and/or treatment control measures within 30 days, unless it is not feasible, while the permittee may take up to 90 days to prepare an action plan. That action plan sets forth milestone dates for carrying out the installation of structural source controls and/or treatment controls, therefore, it does not make sense that it is due 60 days after the completion of the installations. Presumably the permittee will have already met (or failed to meet) all the milestones by the time MDE receives the action plan. If the document is meant to be an action plan with enforceable milestones, as opposed to a summary of actions already taken, it must be due prior to the deadline for the corrective action itself. Accordingly, the deadline for submitting an action plan should be reduced to 14 days. Additionally, as discussed in more detail in the next section regarding Permit enforceability, the Permit must state that the action plan, and the milestone dates it sets forth, are enforceable (i.e, violations of the plan constitute enforceable violations of the Permit).

Furthermore, as the AIM Level 4 Responses section is currently written, a permittee claiming that its discharge does not result in an exceedance of WQS has 90 days within which to prepare its demonstration to MDE with the enumerated minimum elements. Upon receipt of the demonstration, to be included in the permittee's action plan, MDE may take up to 180 days to consider the demonstration (within 90 days or up to 180 days with notice to the permittee of the need for extra time). If MDE disapproves, the permittee then has 30 days, or 90 days if infeasible in 30 days, to install structural source controls and/or treatment controls. This means that up to a total of 360 days may pass before any action must be completed. This timeline is far too long, given that the failure of the permittee's control measures has already triggered AIM Level 4. All the deadlines in this section should be reduced. We propose the following alternative schedule for AIM Level 4 Responses:

- 14 days from the AIM Level 4 triggering event for permittee to submit action plan with, if applicable, a demonstration to MDE that the discharge does not result in any exceedance of WQS
- 45 days from receipt, MDE must approve or disapprove such demonstration, if applicable. MDE may take an additional 15 days upon notice to permittee before the 45th day that MDE needs such extra time
- If MDE disapproves the demonstration, permittee must prepare an action plan within 14 days of such disapproval and install structural source controls and/or treatment controls within 30 days of such disapproval.
- Permittee may request an extension from MDE of an additional 15 days if it is infeasible to install the controls within 30 days.

The Corrective Action Section already gives permittees leniency by allowing them to comply with a series of corrective action requirements rather than immediately subjecting them to enforcement and potential penalties. Once a permittee has reached AIM Level 4, the deadlines for submitting documents and implementing corrective actions should be strict because the permittee has been polluting outside the scope of its permit and the CWA for at least four monitoring periods. Continuing to allow pollution in excess of benchmarks is also inconsistent with MDE's repeated commitments to reduce toxics, including in the 2014 Chesapeake Bay Watershed Agreement.[6]

## III. MDE Must Improve Permit Enforceability.

Enforceability of the Permit continues to be a high priority for Commenters. We have been dismayed to observe extraordinarily high levels of noncompliance by industrial stormwater permit holders year after year and this obvious regulatory failure must serve as the backdrop for the development of this Permit and the opportunity to substantially improve the Permit's enforceability. MDE inspection and compliance data show that the industrial stormwater sector's noncompliance rate consistently ranks as among the highest of any permit sector, often well in excess of 50%. This unacceptable degree of noncompliance is likely a result of the lack of incentive to comply, which could be created with greater penalties, or more effective Corrective Action provisions and more enforceable terms. Although the draft Corrective Action Section improves the enforceability of this section, additional improvements are necessary to remove barriers that MDE and the public may otherwise encounter in attempting to enforce the Permit. MDE should clarify definitions and other standards, use mandatory rather than permissive language to create permit requirements, and make additional revisions to permit language (as specified in section IV.C below) to strengthen permit enforceability and clarify the Permit.

### A. Definitions and standards should be clearer and set forth mandatory requirements.

For the permittee and the public to know when and how certain sections apply, MDE must clarify standards and definitions. First, MDE should use mandatory language, rather than permissive, to hold the permittee to the actions specified. For AIM Level 4 Responses, the Permit requires the permittee to prepare an action plan and states that the permittee may take up to 90 days to prepare the plan. With respect to the contents of the action plan, MDE uses language that is unclear as to whether either of the two listed elements are required. Additionally, the Permit should state that the action plan, and the deadlines within it, are enforceable. We propose the following changes to the language in Part IV.B.4.b:

> "...You may take up to 14~~90~~ days to prepare the action plan for the Department, which must ~~to~~ include milestone dates~~,~~ and ~~which may include~~ either i or ii below:…. The deadline for submittal and the milestones contained in the action plan are enforceable obligations under this permit."

The AIM Level 2 Responses subsection relies on the definition of feasible,[7] which Permit No. 12-SWA did not define. Although that permit did define "infeasible," defining both terms would clarify when sector-specific stormwater control measures must be implemented. The EPA Proposed MSGP defined both terms.[8]

MDE should also provide a standard or process for when a permittee's request for extension of the corrective action deadlines will be approved. The current standard is that MDE may grant an extension "based on an appropriate demonstration…"[9] While we appreciate that additional extensions require MDE approval, a definition or explanation

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[6] Chesapeake Bay Watershed Agreement, Chesapeake Bay Program (2014), 8, https://www.chesapeakebay.net/documents/FINAL_Ches_Bay_Watershed_Agreement.withsignatures-HIres.pdf

[7] Part IV.B.2.b. AIM Level 2 Responses requires the permittee to implement all feasible sector-specific stormwater control measures that are "feasible."

[8] EPA Proposed MSGP, Appendix A - Definitions, Abbreviations, and Acronyms, Page A-4 of 10.

[9] *See* IV.B.2.c: "...The Department may also grant you an extension beyond 45 days, based on an appropriate demonstration by you, the operator.…"; IV.B.3.c: "...The Department may also grant you an extension beyond 90 days, based on an appropriate demonstration by you, the operator."

of “appropriate demonstration” would assist the permittee and the general public in understanding what is required and hold permittees accountable for achieving permit obligations in a timely manner.

**B. MDE should use mandatory language rather than permissive language.**

MDE should make mandatory the revocation of permit coverage upon failure to meet benchmarks after corrective actions and clarify the language. Specifically, in the AIM Level 4 Responses, MDE should make the failure to successfully meet benchmarks after Level 4 result in automatic termination of the Permit and require an individual NPDES permit. We appreciate the inclusion of subsection IV.B.4.b.iii in the Permit,[10] as it presents the possibility that MDE will revoke permit coverage if the permittee continues to exceed the benchmark threshold for the same parameter after installation of structural source controls or treatment controls. However, this revocation should be mandatory because under these circumstances, the permittee’s actions clearly are not effective, and the site-specific requirements of an individual permit are warranted.

MDE should not only require a permittee to obtain individual permit coverage upon failure to stay below benchmark thresholds at AIM Level 4 but also make the permittee ineligible to reapply for future iterations of the Permit. A permittee that has failed to correct the problems that result in consistent benchmark exceedances should not be allowed to avoid the heightened scrutiny of an individual permit in subsequent permit terms by simply applying for the next version of Permit No. 20SW.

The language also does not specify at what point a permittee is deemed to “continue to exceed the benchmark threshold for the same parameter even after installation of structural source controls or treatment controls…” (Part IV.B.4.b.iii.) Is this based on the next 4 quarters of monitoring after the controls were installed pursuant to AIM Level 4? Based on one quarter? What if the controls were installed pursuant to AIM Level 3? This should be clarified.

Additionally, MDE should use the mandatory language “must” rather than “should” throughout the Permit to create enforceable requirements. For example, in AIM Level 3 Responses the Permit states that “[t]he treatment technologies or treatment train you install should be appropriate for the pollutants that triggered AIM Tier 3 and should be more rigorous than . . . .” (IV.B.3.b.i. Emphasis added.) MDE should replace “should” with “must” to improve enforceability.

**C. MDE could make additional minor adjustments to permit language to make the Permit more enforceable and/or clear.**

The following list are recommendations for revisions that could strengthen the Permit with minimal adjustments:

- IV.A.2.b. (mislabeled as IV.A.1.b)
    - “You must also identify your schedule for completing the work,~~which~~ and the corrective action must be ~~done~~completed as soon as practicable after the 14-day timeframe but no longer than 45 days after discovery.” MDE should clarify that the corrective action/work is what must be completed as soon as practicable, not the schedule.
    - “These time intervals are not grace periods, but are enforceable deadlines, the violation of which constitutes a permit violation~~ schedules considered reasonable for documenting your findings and for~~

[10] IV.B.4.b.iii: “If you continue to exceed the benchmark threshold for the same parameter even after installation of structural source controls or treatment controls, the Department may revoke coverage under this permit, unless you are under a consent order or you have obtained an individual permit. to consider site specific water quality based limits.”

~~making repairs and improvements~~." MDE should characterize the time intervals and schedules as enforceable deadlines.

- MDE allows the permittee to simply notify the Department Compliance program of its intention to exceed the 45-day deadline, along with providing a rationale and a completion date. Since it does not require MDE approval, this approach fails to create a backstop deadline and allows the permittee to take as much time as it chooses, while it continues to exceed effluent limits or allow other pollution.
  - This could be strengthened by requiring MDE approval for an extension beyond 45 days, and approval of the completion date, which should then become an enforceable term of the permit.
  - **Proposed**: ". . . you may request an extension from the Department Compliance program to take the minimum additional time necessary to complete the corrective action~~, provided that you notify~~ by sending a written request for approval to the Department Compliance program ~~of~~explaining ~~your intention to exceed 45 days,~~ your rationale for an extension~~,~~ and providing a completion date, which you must also include in your corrective action documentation (see Part IV.C). If approved by the Department, the requested completion date shall become an enforceable deadline under this permit."
  - Additionally, the notification to the Department that the permittee plans to take beyond the 45 days, along with the rationale and completion date, should be made publicly available. This could be done by MDE posting it online or requiring its inclusion in an attachment to the permittee's next DMR. This is critical for the public to be able to ensure a permittee is meeting the self-assigned completion date for its corrective action.

- IV.A.2: "~~Additionally,~~ Each failure~~ing~~ to take corrective action in accordance with this section and/or within the prescribed deadlines constitutes~~is~~ an additional permit violation."
- IV.B Additional Implementation Measures (AIM)
  - "If you were covered under the 12-SW, and had not yet achieved the benchmark, then you consider the last year of benchmark monitoring of coverage under the 12-SW as a year you were subject to benchmarks." This provision is not clear and MDE should provide a few examples of scenarios when this provision would and would not apply. Additionally, it is not clear what MDE means by the permittee "had not yet achieved the benchmark," which could be determined by a single exceedance, a four-quarter average, or some other standard. MDE should clarify this in its explanation as well.
  - add to this section language comparable to A.2, providing that "Each failure to perform the required Additional Implementation Measures in accordance with this section and/or within the prescribed deadlines constitutes a permit violation."
- IV.B.1.b.ii: "…you must document per Part III.C and include in your annual report why you expect your existing control measures to bring your exceedances below the parameter's benchmark threshold ~~for the next 12-month period~~." Use of the preposition "for" makes this requirement unnecessarily vague. It is not clear whether it is intended to require the permittee to bring discharges below benchmark threshold for (a) the duration of the 12-month period or each of the subsequent 4 quarterly samples; or (b) within the 12-month period, such that the fifth quarterly sample must not exceed the benchmark threshold. MDE should clarify its use of "for the next 12-month period" here or delete the phrase.
- MDE should clarify whenever a deadline is provided that the timeframe begins when the triggering event occurs

- E.g., IV.B.1.c: "If any modifications related to control measures are necessary, you must implement those actions or modifications within 14 days of the occurrence of the triggering event under Part IV.B.1.a. . . ."

- IV.B.4.b: add a provision to make the action plan and the milestones in AIM Level 4 Responses enforceable. Proposed revisions:

    - ...You may take up to 14~~90~~ days to prepare the action plan for the Department, which must ~~to~~ include milestone dates~~,~~ and ~~which may include~~ either i or ii below:…. The deadline for submittal and the milestones contained in the action plan are enforceable obligations under this permit."

**IV. Benchmark Monitoring Should Continue Throughout the Permit Term.**

Though the Corrective Action Section provided does not specifically address the duration of required benchmark monitoring, we are concerned about this related issue in Permit No. 20SW. We are concerned that the Permit may exempt the permittee from further benchmark monitoring during the permit term when the average of the first four quarterly samples for a given constituent does not exceed its respective benchmark threshold. As described in our prior pre-TD feedback letter (dated July 7, 2020) and in our comment letter to EPA regarding the EPA Proposed MSGP, this approach to monitoring ignores the National Academy of Sciences (NAS) recommendation for ongoing annual monitoring for all benchmarks.[11] These monitoring data are critical for allowing the permittee, MDE, and the public to assess the adequacy of stormwater management at the facility for the permit term and determine whether the facility is complying with the technology-based effluent limitations (TBELs) required by the permit during the entire length of the permit term. These data are also critical for assessing the effectiveness of the permit and its required controls for ensuring compliance with WQS, supporting future technical improvements to this permit by Maryland regulators.

Only requiring quarterly monitoring for one year is insufficient to ensure compliance with the permit. The NAS stated that four quarterly samples are insufficient to assess the adequacy of stormwater management at a facility over the course of a permit with a term of five years. The CWA requires every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit. 33 U.S.C. § 1342(a)(2). A NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. *See* 40 C.F.R. § 122.44(i)(1) ("[E]ach NPDES permit shall include conditions meeting the following . . . monitoring requirements . . . to assure compliance with permit limitations."); 40 C.F.R. § 122.26(d)(2)(i)(F) ("Permit applications for discharges from large and medium municipal storm sewers . . . shall include . . . monitoring procedures necessary to determine compliance and noncompliance with permit conditions . . . .").

**V. The Alternative Option for AIM Level 3 Responses Must Be Clarified and the Permittee Should Not Be Able to Satisfy Other Applicable Restoration Requirements with Marketable Credits Received from Compliance with this Subsection.**

The Alternative Option provided in the AIM Level 3 Responses does not provide sufficiently concrete requirements, as the EPA Proposed MSGP includes, and allows permittees the potential to receive double credit for their actions. AIM Level 3 Responses allow the permittee to select the alternative option to "increase impervious surface restoration for [the permittee's] industrial stormwater," rather than installing permanent controls, "if such an

[11] Comment Ltr. to EPA re EPA Proposed MSGP, 15-17; Ltr. from CAP to Mr. Hlavinka and Mr. Stone re Feedback on General Permit for Discharges of Stormwater Associated with Industrial Activity, July 7, 2020, 10.

approach is appropriate and feasible for the site-specific conditions." (Part IV.B.3.b.ii.) This section presents two significant problems.

**A. The Permit must provide a standard for when the Alternative Option is available and require MDE approval before the option is selected.**

First, the section does not indicate what would make this option "appropriate and feasible" for the site-specific conditions or what amount of impervious surface restoration would be sufficient to meet this requirement. The comparable section of the EPA Proposed MSGP requires that the execution of the infiltration or retention controls "be compliant with regulations for ground water protection and underground injection control (UIC)." Before a permittee can select the alternative option under the EPA Proposed MSGP, the permittee must also provide the EPA Regional Office with an analysis showing that infiltration/retention is appropriate for the permittee's site-specific conditions and is compliant with other applicable regulations.[12] For the alternative option to be permissible under the EPA Proposed MSGP, the EPA Regional Office must concur with the permittee's conclusions in its submitted analysis. The MD Permit includes no such requirements or any external validation.

**B. MDE should not allow permittees to satisfy applicable restoration requirements of Permit Part III.A with marketable credits received for impervious surface restoration as an AIM Level 3 corrective action or avoid benchmark monitoring requirements based on such corrective action.**

Second, the Permit provides that successful compliance with the Alternative Option provisions may allow MDE to waive or lessen benchmark monitoring requirements and may generate marketable credits under Part III.A (Chesapeake Bay Restoration Requirements in Permit No. 12-SWA). Compliance with the Alternative Option should not generate marketable credits that may be used to satisfy a permittee's restoration requirement, if applicable, under Part III.A.

The Chesapeake Bay Restoration Requirements are intended to implement the Chesapeake Bay TMDL, while the corrective action responses are meant to ensure compliance with WQS. To the extent the impervious surface restoration as an AIM Level 3 Response is in addition to any restoration a permittee performs to meet its Chesapeake Bay Restoration Requirements, this requirement is acceptable. However, a permittee should not be allowed to use impervious surface restoration pursuant to AIM Level 3 to satisfy its requirements, if applicable, under Part III.A. Meeting the restoration requirements of Part III.A should be the baseline level of restoration, and any restoration under the corrective action program should go beyond that baseline. MDE should clarify this.

Additionally, we do not support MDE's position that it may waive or lessen benchmark monitoring requirements at all, in response to this corrective action or based on 4 quarters of monitoring that do not exceed benchmarks. These data are critical to ensuring continued compliance with the Permit. Without such monitoring, the permit does not meet CWA requirements.

[12] Section 5.2.3.2.b of the EPA Proposed MSGP provides in relevant part: "As an alternative or adjunct to structural source controls and/or treatment controls, you may install infiltration or retention controls . . . for your industrial stormwater, if such an approach is appropriate and feasible for your site-specific conditions. If this approach is feasible, the execution must be compliant with regulations for ground water protection and underground injection control (UIC). The analysis that shows infiltration/retention is appropriate for your site-specific conditions and is compliant with other applicable regulations must be provided to the EPA Regional Office in Part 7 BEFORE you can choose this option and the EPA Regional Office must concur with your conclusions." EPA Proposed MSGP, page 44 of 66.

## VI. Documentation requirements should be strengthened and consistent across the Corrective Action Section.

We greatly appreciate MDE's efforts in the Corrective Action Section of the Permit to allow public access to corrective action documentation online by requiring the permittee to attach its updated Comprehensive Annual Report to the next DMR. Building off of that requirement, MDE could make a few additional minor changes to documentation requirements that would make public access and enforcement more effective.

The Corrective Action Section should consistently require the permittee to include corrective action documentation in an updated annual report, which is made available to the public on DMRs. Whereas each AIM Level Response section requires that an updated annual report be attached to the permittee's next DMR, other subsections only require documentation in an updated SWPPP.[13] Updated SWPPPs are not yet required to be publicly available online. While we continue to support any efforts to make updated SWPPPs available online, for consistency based on the current draft Corrective Action Section, all documentation should be made on an updated annual report and attached to the permittee's next DMR. Each subsection that requires any corrective action documentation, and the AIM Documentation section itself (Part IV.C) should reiterate that the updated annual report should be submitted with the permittee's DMRs. Specifically, the Permit should provide in each of these subsections that the permittee must attach its updated annual report to "the DMR that follows your implementation of the AIM." This change clarifies which DMR is considered the "next" DMR, as used in the current draft Corrective Action Section.

Additionally, in the AIM Level 2 Responses, MDE should require technical documentation that a SCM would be counterproductive or not result in reduction of the target pollutant to be included in the updated annual report. Because the Permit allows the permittee to implement fewer control measures under these circumstances, MDE should hold the permittee accountable for this finding by requiring documentation.

MDE should also specify how demonstrations of non-exceedance of WQS will be made publicly available. The AIM Level 4 Responses section of the Permit requires any demonstration to MDE of non-exceedance of WQS to be made publicly available, but does not specify how it should be made available. (Part IV.B.4.b.ii.) MDE should clarify whether MDE plans to post the demonstration online, or otherwise make it publicly available, or if the permittee must make it publicly available. If MDE requires the permittee to make the demonstration publicly available, consistent with MDE's approach of requiring an updated annual report to be attached to the next DMR, MDE could also require the permittee to attach its demonstration with the next DMR.

We understand that around November 2020 MDE plans to make available a new environmental enforcement tracking system to improve transparency. When this system goes into effect, requiring submission of corrective action documentation on this system could make these documents immediately accessible to the public. This could significantly reduce time and resources spent by MDE in responding to PIA requests and serve as a more long-term fix to our ongoing transparency concerns.

In contrast to the subsections outlined above, when a facility has an unauthorized release or discharge, such as a spill, leak or discharge of non-stormwater not authorized by a NPDES permit, MDE should require the permittee to immediately report this event to MDE, and submit documentation to MDE, within 24-hours of discovery. The current draft Permit instead only requires a permittee to summarize its findings in the annual report and specifically states that the permittee is not required to submit documentation to the Department. (Part IV.C.1.) This contravenes

[13] Part IV.B.3.c provides that if it is infeasible to install the AIM Level 3 permanent control within 30 days, the permittee must document in the SWPPP why it is infeasible, rather than in the annual report pursuant to Part IV.C. Part IV.B.4.b.ii and c also require documentation of why it is infeasible to install structural source controls and/or treatment controls within 30 days in the permittee's SWPPP, rather than in the annual report.

MDE's duty to protect public health and the environment, as such spills, leaks, and other non-stormwater discharges may be harmful.

## VII. AIM Exceptions

MDE's Corrective Action Section of the draft Permit No. 20SW adopts the AIM Exceptions nearly word for word from the EPA Proposed MSGP. Commenters caution MDE not to rely on the exceptions EPA set forth because there are several significant problems with EPA's approach, including mathematical errors. If the Corrective Action Section of the final Permit uses EPA's approach, MDE will most likely need to revise the Permit to remedy these issues. Therefore, MDE should not adopt the AIM Exceptions from the EPA Proposed MSGP. Commenters reiterate the comments we sent to EPA on the AIM Exceptions of the EPA Proposed MSGP, as applicable to the MD AIM Exceptions, below:

### A. Proposed Exception for "Natural Background" Pollutant Levels

MDE proposes to waive "AIM or additional benchmark monitoring" for pollutants whose benchmark exceedances are "attributable solely to the presence of that pollutant in the natural background." MDE's proposed section IV.B.5.a is arbitrary and capricious, mathematically flawed, and contrary to law, and must not be finalized in any form, in any part of the Permit.

#### 1. MDE's proposed methodology is mathematically flawed.

MDE purports to be waiving monitoring for pollutants whose benchmark exceedances are attributable "solely" to background, yet the draft Permit language would do something very different. The draft Permit would actually waive monitoring unless the exceedances are solely attributable to the permittee:

> You are not required to perform AIM or additional benchmark monitoring . . . provided that all the following conditions are met . . . : (i) The four-quarter average concentration of your benchmark monitoring minus the concentration of that pollutant in the natural background is less than or equal to the benchmark threshold. (IV.B.5.a)

This language is not at all limited to exceedances attributable "solely" to background. In fact, it would exempt a wide range of benchmark exceedances, including exceedances with a trivial natural background contribution. Consider the following hypothetical examples:

| | Pollutant | Benchmark | Average benchmark monitoring result | Natural background concentration | Net contribution from permittee |
|---|---|---|---|---|---|
| Ex. 1 | TSS | 100 mg/L | 120 mg/L | 10 mg/L | 110 mg/L |
| Ex. 2 | TSS | 100 mg/L | 120 mg/L | 60 mg/L | 60 mg/L |
| Ex. 3 | TSS | 100 mg/L | 105 mg/L | 6 mg/L | 99 mg/L |

- Example 1 illustrates MDE's proposal working as we presume the agency intended. After subtracting the natural background concentration, the permittee's net contribution to the benchmark monitoring result is

110 mg/L. This exceeds the benchmark, and this permittee would not be eligible for the monitoring exemption

- In Example 2, the benchmark monitoring result exceeds the benchmark by the same amount, but in this case half of the TSS load is coming from natural sources. Here, the benchmark exceedance is clearly not attributable “solely” to natural background – again, only half of the TSS is coming from natural sources. Yet the language would exempt the permittee from further monitoring.
- Example 3 presents a more extreme, though by no means unrealistic, scenario. In this case, virtually all of the TSS load is coming from the permittee, and only a small fraction is coming from natural sources, yet the permittee would still be exempt from further monitoring because its net contribution is less than the benchmark.

MDE’s proposal completely inverts its stated intent. It does not limit the exemption to situations where exceedances are attributable solely to natural sources. Instead, it asks whether an exceedance is attributable solely to the permittee. If not, the exceedance is ignored.

Or consider this thought experiment: There are two sources of pollution. They combine to cause an exceedance, but neither one would cause an exceedance by itself (i.e., example 2 above). One is natural and one is industrial, but we don’t reveal which is which. We simply say ‘both samples have 60 mg/L of TSS.’ How would one decide which source is “solely” responsible? Neither source would be solely responsible; both would be partially responsible.

Mathematically, the only time an exceedance can be attributable “solely” to natural background is when natural background is the only source. The net contribution from the permittee in such a case would be zero. In order for MDE’s proposal to reflect its stated intent, the proposed condition in IV.B.5.a.i would have to read ‘[t]he four-quarter average concentration of your benchmark monitoring results minus the concentration of that pollutant in the natural background is less than or equal to zero.’

**2. MDE’s proposal is contrary to law.**

The idea that polluters are only responsible for their pollution load when that load is by itself enough to cause water quality problems is directly contrary to the CWA.

The ″national goal″ of the CWA is that ″the discharge of pollutants into the navigable waters be eliminated.″ Short of that zero-discharge goal, the CWA allows for water-quality based limits, but it is important to remember that maintaining water quality is only an ″interim goal″ on the path to zero discharge.[14] Polluters—including industrial stormwater permittees—are required by the CWA to minimize their pollution loads, regardless of water quality impacts. This is why the Act requires TBELs, which include the narrative requirements in the MSGP. TBELs “represent[] a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.″[15] TBELs represent the floor, or minimum level of effort that MDE must require, again regardless of water quality impacts. MDE is not permitted to waive TBELs just because a polluter is not the sole source of pollution.

Even within the context of water-quality based effluent limitations, the CWA clearly applies to every source of pollution that might be contributing to a water quality impairment, regardless of whether it is the sole source. This

[14] 33 U.S.C. § 1252(a)(2).
[15] *EPA v. Nat’l Crushed Stone Ass’n*, 449 U.S. 64, 74 (1980).

can be seen, for example, in the Act's provisions for Total Maximum Daily Loads (TMDLs), which start from the goal of restoring a certain level of water quality, and then work backward to estimate the extent to which each polluter in a given watershed contribute to the problem, and the level of reduction that each polluter must make. The TMDL framework does not require that any individual source be solely responsible, or that any individual source have a pollution load that would, by itself, be enough to cause water quality impairments. The operative question is simply whether the cumulative pollution load is too high:

> [W]here the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) <u>the cumulative effect</u> of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.[16]

Indeed, the CWA's TMDL provisions illustrate exactly why MDE's current 'natural background' proposal is illegal. Consider Example 2 above, where a natural source and an industrial source each add equal amounts of pollution to a waterway. Assume that the receiving stream is impaired for the pollutant in question. If a TMDL were established, the regulatory agency would have to calculate the necessary pollution reductions and allocate the reductions among the various sources. In Example 2, there is nothing that can be done about the natural source; the industrial source would be required to reduce its pollution load and would in fact be required to make all of the necessary reductions, even though it is not the sole cause of the impairment.

To sum up and simplify, the CWA requires pollution reductions from all polluters, and the Act holds polluters responsible whenever they cause or contribute to water quality problems. MDE cannot waive benchmark monitoring just because a permittee is not the sole cause of a benchmark exceedance.

**3. MDE's proposal is impracticable.**

It is difficult to conceptualize, define or characterize "natural background" in the context of industrial stormwater. By process of elimination, we conclude that it is effectively impossible. According to MDE, none of the following options are available:

> **Legacy pollutants from the site.** According to MDE, "[n]atural background pollutants do not include legacy pollutants from earlier activity on your site."[17] We agree with MDE on this point. It would be antithetical to the CWA to allow a permittee to remove itself from liability for pollutants originating on its property, regardless of when those pollutants were deposited at the site. It would also be technically challenging, to say the least, to segregate pollution loads according to the pollutants' date of origin.
>
> **Run-off from neighboring sources.** We also agree with MDE that it would irresponsible to allow permittees to subtract runoff from neighboring, non-natural sources such as other industrial facilities or roadways. Again, the technical challenge of segregating pollution loads should by itself take this option off the table. Furthermore, allowing permittees to subtract industrial run-on would undermine and contradict other sections of the permit, including run-on controls.

Since natural background cannot include offsite municipal/industrial stormwater, onsite legacy pollution, or non-natural run-on, there are very few remaining sources of "natural background." Perhaps MDE imagines that facilities

[16] 33 U.S.C. § 1313 (emphasis added).
[17] IV.B.5.a.

will want to subtract the pollutants running onto a site from a neighboring forest (or other natural land use), or from on-site natural land uses. We presume that these situations are very rare, to the point that we see no value in creating an option with such a dubious technical foundation. It will be virtually impossible for permittees to segregate pollution loads among different natural and non-natural sources. The only sure-fire way to do this would be to physically separate the component stormwater flows through run-on and run-off controls, so that each component can be sampled separately. But if a permittee is separating the stormwater flows, then there is no need for netting out the natural contribution, because there is no commingling.

In short, MDE's proposal is mathematically unsound, contrary to law, and technically impracticable.

### B. Proposed Exception for "Run-On" Contributions to Exceedances

MDE proposes to waive "AIM or additional benchmark monitoring" where "run-on from a neighboring source . . . is the cause of the exceedance . . ." (IV.B.5.b.) For all of the reasons set forth in the preceding section, we object to this waiver.

It is not clear what MDE means by "the cause," but we suspect that MDE intends for this section to mirror section IV.B.5.a, such that MDE would apply the same flawed logic with respect to exceedances "attributable solely" to natural background. Again, for all of the reasons set forth above, MDE cannot waive monitoring just because run-on contributes to a benchmark exceedance. If a permittee is causing or contributing to a benchmark exceedance, then that permittee must continue the AIM process and additional benchmark monitoring. Otherwise, the permit creates a giant loophole that would be very difficult, practically, technically, and legally to refute.

The only theoretical scenario in which a permittee might legitimately be exempt is where the pollutant load is entirely attributable to run-on (i.e., where the contribution from onsite industrial stormwater is zero). However, we question whether there is any value in a carve-out for this scenario. If a permittee is able to separately monitor run-on, then the permittee should be able to avoid commingling, and no net calculations should be necessary.

## VIII. Formatting/Typos/Errors

The Corrective Action Section of the Draft Permit also included several typos, errors, or formatting issues that will likely be corrected prior to MDE's issuance of the TD, but we set forth these errors here just to bring them to MDE's attention.

- IV.A.1: Duplicate of A.1, rather than moving to A.2
- IV.B.1.a.i, IV.B.2.a.ii: missing word between "If one single sampling event" and "Year [1/2]..." - should probably be "during"
- IV.B.3.a.ii, IV.B.4.a.ii: Levels 3 and 4 triggering event for single sampling event over 4 times the benchmark is based on sampling events during the second year of coverage when presumably they should be 3rd and 4th years respectively.[18] If this was not a typo/error, then why would the triggers for Levels 2, 3, and 4 all refer to sampling events during the second year of coverage, rather than successive years?

[18] IV.B.3.a.ii: "One Single Sampling Event Over 4 Times the Benchmark Threshold. If one single sampling event during your second year of coverage for a parameter is over 4 times the benchmark threshold, you are in AIM Level 3."; IV.B.4.a.ii: "One Single Sampling Event Over 4 Times the Benchmark Threshold. If one single sampling event during your second year of coverage for a parameter is over 4 times the benchmark threshold, you are in AIM Level 4."

- IV.B: "If any of the following events in Parts V.B.1, V.B.2, V.B.3, or V.B.4 occur…" should be Parts IV.B.1, IV.B.2, etc. Additional references to Part V are included in IV.C.1[19] and IV.C.3.[20] These references are likely in error as well.

- IV.B.2.c: References to the documentation section should be to Part IV.C, not IV.D, which does not exist. "You must implement all feasible SCMs within 14 days and document per Part IV.~~D~~C how the measures will achieve benchmark thresholds...You must document per Part IV.~~D~~C why it was infeasible to implement such a measure in 14 days."

- IV.B.2.c: MDE may grant an extension beyond 45 days "based on an appropriate demonstration by you, the operator.(violation)" What is the text "(violation)" intended to address? What text should be there instead, assuming that it was a placeholder?

- IV.B.4.b.iii: "If you continue to exceed the benchmark threshold for the same parameter even after installation of structural source controls or treatment controls, the Department may revoke coverage under this permit, unless you are under a consent order or you have obtained an individual permit. to consider site specific water quality based limits." The period between "permit" and "to" was likely supposed to be a comma.

Thank you again for this opportunity to provide feedback on these issues from the Corrective Action Section of the Permit in advance of the TD. We hope that the agency will find these comments useful as you update the draft to provide to EPA again. Please do not hesitate to contact us if you have any questions about the topics raised in this letter or our concerns with regard to the Permit more generally.

Sincerely,

David Flores, Senior Policy Analyst
Center for Progressive Reform

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Kristin Reilly, Director
Choose Clean Water Coalition

Alison Prost, Vice President for Environmental Protection and Restoration
Chesapeake Bay Foundation

[19] IV.C.1: "However, you must summarize your findings in the annual report per Part V.A.2…"
[20] IV.C.3: "However, you must summarize your corrective actions and/or AIM responses in the annual report required in Part V.A.2."

July 7, 2020
*Via Electronic Mail*

Mr. Paul Hlavinka and Mr. Ed Stone
Water and Science Administration
Maryland Department of the Environment
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RE: Feedback on General Permit for Discharges of Stormwater Associated with Industrial Activity

Dear Mr. Hlavinka and Mr. Stone,

Thank you for providing us the opportunity to hear from you on Friday, June 19 about Maryland's initial plans and considerations for renewal of the industrial stormwater general permit. As you likely observed from the number of individuals on the call, the number of organizations represented, and the level of discourse, there is substantial interest within the Maryland public interest environmental community in producing a more protective permit.

However, our organizations represent only a portion of those around the state that are eager to reduce the amount of hazardous pollution running off of industrial sites within our communities. We are particularly concerned about this permit due to the substantial health risk permitted sites present to communities adjacent to and surrounded by industrial dischargers. Residential communities in Prince George's County, Baltimore City, and Wicomico County, for example, where many of these permitted facilities are located, are often the same communities that bear a disproportionate burden from other sources of pollution and environmental stressors and face the greatest need for assistance from Maryland environmental regulatory authorities.[1] Maryland must directly and meaningfully engage those communities whose health, safety, and well-being depend on a protective and enforceable industrial stormwater permit. We call on Maryland to engage these communities early in the permit renewal process *before* a tentative determination draft of the permit is issued for public notice and comment. Indeed, affected communities should be heard by Maryland directly so that state regulators understand their needs, their concerns, the pollution events they experience, and obstacles they face in accessing effective ways to address and eliminate stormwater discharges that impact their health, safety, and daily lives.

What follows is a broad, but non-exhaustive list of issues with the current general permit and ideas for improvement, including topics discussed on the June 19 web-conference and other topics we were unable to cover. We appreciate your invitation for us to present these topics in this letter as a follow-up to the call. Obviously, this is not meant to replace continued discussion and engagement during the process of developing the renewal permit nor the full comment letter that we - and many other individuals and public interest organizations - plan to file during the public comment period. For the sake of brevity, we are only briefly introducing these ideas and concerns in this letter without a full exploration of associated legal and policy issues, technical justifications, or recommendations for reform of the permit.

We also would like to express an overarching concern regarding the abrupt change in the timeframe for the reissuance of this general permit. While we acknowledge that the reissuance of this general permit is long overdue, we also view the sudden acceleration of the permit renewal process as a potentially serious problem. A permit as lengthy and

[1] Toxic Runoff from Maryland Industry, Inadequate Industrial Discharge Protections Threaten Marylanders' Health and the Environment, EIP/CPR (Nov. 2017), 7-9, 14-15.

complex as this general permit requires substantial staff time and attention in order to fully review and evaluate present deficiencies and craft effective improvements. With the national Multi-Sector General Permit (MSGP) undergoing its own reissuance process, following the release of the National Academy of Sciences (NAS) report on industrial stormwater, as well as the ongoing process of reissuing Maryland's General Permit for Stormwater Associated with Construction Activity, there is a significant risk that the Maryland Department of the Environment (MDE) will be unable to give full and reasoned consideration to all aspects of this general permit and improvements being adopted nationwide. Unless significant additional permitting staff assistance is made available to contribute to this permit's reissuance, we believe it would be prudent to return to the more reasonable timeframe previously shared with us and to fully evaluate reforms proposed by the NAS and those incorporated into EPA's issuance of the final MSGP.

The following are a list of the recommendations for the draft industrial stormwater general permit (the "permit") discussed in more detail below:

- Enforceability – all sections of this permit must be made more enforceable

- Reopener – include a reopener clause to allow for changes after EPA MSGP is finalized and clarify existing reopener language regarding incorporating new information from Total Maximum Daily Loads (TMDLs)

- Impervious Restoration – retain 20% restoration requirement and require on-site projects except under certain circumstances

- Climate – require applicants to identify potential flood risks, incorporate identified risks and control measures into their SWPPPs, and implement these measures; adapt design storm standards and other practices to account for changed precipitation and temperature conditions

- Control Measures and Effluent Limits – clarify provisions and make them more specific, measurable, and enforceable

- WQBELs – strengthen, clarify, and make more enforceable existing narrative WQBELs and include additional WQBELs to comply with CWA and Maryland regulations

- Corrective Actions – include concrete deadlines and make enforceable at every level, require permittees to obtain an individual permit if corrective actions do not result in benchmark achievement, and require notification of corrective action being triggered and documentation of corrective action activities be submitted through NetDMR

- Monitoring – require universal benchmark monitoring for flow, TSS, TN, and TP, increase duration of quarterly monitoring requirement, and include additional groundwater monitoring requirements

- Transparency and Accessibility – make permit documents and other information accessible online, require signage posted at each facility with key information, and engage the Maryland Commission in Environmental Justice and Sustainable Communities to consult on permit's environmental justice impact

- Permit Process and Coverage – exclude certain enumerated categories of applicants from general permit coverage, expand coverage for nonindustrial facilities, limit application of no exposure certification, expand information required of applicants in NOI, and increase required fee for coverage

## I. General Enforceability

As an overarching issue that cuts across all aspects of this permit, we urge MDE to create clearly enforceable obligations and adopt language in the permit itself that specifically identifies each enforceable requirement. Unless the permit is enforceable, by creating clear requirements that, when ignored or unfulfilled, constitute violations of both the permit and the Environment Article and Clean Water Act ("CWA"), compliance and reduction in pollution from industrial stormwater permittees will not be assured. Moreover, MDE should include language in the permit that notifies permittees that in addition to potential enforcement measures, failure to comply with the general permit could result in the suspension of coverage and require the permittee to submit an application for an individual permit.

## II. Reopener

To the extent that MDE proceeds with the reissuance of this permit along the recently accelerated timeframe described in the June 19 web-conference, we urge MDE to include a reopener clause in the reissued general permit to reflect changes made by EPA in the finally issued MSGP. As discussed on the recent web-conference, several changes MDE is considering may depend on the final outcome of the MSGP.

Additionally, we urge MDE to clarify language on page 34 in the current permit, which discusses reopening of the permit to incorporate new information from TMDLs. The language refers to the Maryland Administrative Procedure Act, but not to any particular statutory citation. We believe it would be appropriate to include either a specific citation or a description of the process MDE will follow.

## III. Effluent Limitations and Pollution Controls

*A. Impervious Surface Restoration Standard.*

We appreciate that MDE is planning to maintain the 20 percent impervious surface restoration (ISR) requirement, with some additional nuances to incentivize greater participation for those permittees that are not currently subject to the ISR requirement. However, to the extent that these incentives are established through a nutrient credit exchange, we urge MDE to ensure that credits are not traded outside of a small watershed boundary (e.g. HUC 8 or smaller) and/or outside of the same sector. It is important to avoid exchanges between permittees with vastly different effluent compositions or water quality in receiving waters.

We also appreciate that MDE is expanding the ISR requirement to permittees located within urban areas newly subject to the ISR requirement in the recently reissued Phase II MS4 permit. We recognize that the ISR requirement was created to be consistent with the level of treatment required in the MS4 permit. To the extent MDE proposes to weaken the level of restoration in the next round of Phase I MS4 permits, we urge against this plan to avoid backsliding regarding this critical permit condition.

As we stated on the June 19 web-conference, we urge MDE to tighten language allowing for permittees to complete their ISR compliance projects off site. Controlling industrial runoff from permitted sites obviously requires on-site projects to retain and treat runoff. We do not believe that off-site ISR projects should be allowed unless an independent, third-party engineer certifies that on-site projects would be technically impossible without substantial disruption to business operations or impacts to the health and safety of workers. The permit should make clear that off-site ISR compliance projects are not equivalent to on-site projects and, as such, must be supplemented with the restoration of greater surface areas off-site and/or additional non-structural pollution control projects or practices on-site.

Finally, we urge MDE to evaluate the utility of including a provision that prioritizes ISR projects in outfall drainage areas that permittees have designated as having the potential to discharge spills or leaks (page 18) and those that are "likely to be significant contributors of pollutants to stormwater discharges." (Page 20).

*B. Climate Considerations / Major Storms*

MDE should adopt EPA's proposal for "Consideration of Major Storm Control Measure Enhancements" in the agency's proposed draft MSGP, with certain revisions, as set forth in our comments to the MSGP. In incorporating revisions to account for climate change and major storms, MDE should underscore existing obligations requiring applicants to use good engineering practice, disclose information in their possession, consider all reasonably available data and information, and thoroughly document present-day and future flood risks. The permit should require permittees to include specific enforceable design, operation, and maintenance measures in their SWPPPs to fully address identified risks of pollutant discharges associated with major storm events. Specifically, MDE should adopt two key requirements into the permit: requiring applicants to self-identify risk of flooding conditions from major storms in their notice of intent applications and explicitly require facilities to implement measures designed to prevent pollutant discharges from floods. These two proposals are described in detail in our comments to the MSGP.

Considerable evidence has come to light since the issuance of the previous permit that regionally-downscaled climate change models project more frequent and more intense rainfall events and other extreme weather in Maryland. Indeed, Maryland has experienced such events in recent years. Maryland's industrial stormwater general permit must reflect already changed and still changing precipitation conditions by adapting design standards to capture and treat higher runoff volumes associated with these storm events, increasing the impervious surface retrofit requirement to reduce additional runoff volume, or some combination of the two. Moreover, industrial stormwater discharges may have a more severe biological impact as ambient air and aquatic temperatures increase and reach new extremes, changing the physiological stress responses in aquatic and marine organisms either as a single stressor or combined with nutrient enrichment or toxic effects of discharge constituents. The industrial general permit must include measures to compensate for expected increases in discharge temperature.

*C. Control Measures and Effluent Limits*

A number of provisions pertaining to control measures and effluent limitations suffer from vagueness. The control measures and effluent limits in this general permit are far too important to be controlled by vague and unenforceable language. For example, we urge MDE to clarify "technologically available and economically practicable and achievable in light of best industry practice" found on page 12, including by providing some illustrative examples for the benefit of the public and the regulated sector.

Similarly, we urge MDE to enhance clarity in the provision regarding dust control and vehicle tracking. This provision on page 16 is similarly vague and unenforceable and is important to strengthen in light of the need to protect fence-line communities from hazardous particulate pollution that becomes airborne due to vehicle traffic, other site operations, and wind. Overall, we urge MDE to include suitably stringent requirements to minimize particulates and other industrial residues that accumulate during dry-weather conditions from discharging to receiving waterways.

Another example of vague language that must be made more clear, specific, measurable, and enforceable are the provisions pertaining to the management of runoff. Specifically, the current permit states "You must divert, infiltrate, reuse, contain, or otherwise reduce stormwater runoff, <u>to minimize pollutants in your discharges</u>." (Emphasis added). While we recognize that the term "minimize" is defined in the permit, the definition is unhelpful for several reasons, including that, as noted above, it refers to another vague term “technologically available and economically practicable and achievable in light of best industry practice.” The term “minimize” in this section on page 15 is also unenforceable in that it is impossible for a permittee or member of the public to know whether or when the permittee has done enough of the referenced activities to have effectively “minimized” pollutants in its discharges. We urge MDE to include or reference a numeric standard or specific goal and as previously noted, specifically identify enforceable points of compliance.

*D. Water Quality-Based Effluent Limitations*

As you know, permitting authorities must consider the impact of every proposed surface water discharge on the receiving water so that all Clean Water Act (CWA) permits contain requirements to ensure the elimination of this contribution. For receiving waters listed as impaired, a permit with the reasonable potential to cause or contribute to further impairment must include Water Quality-Based Effluent Limitations ("WQBELs"). The current permit appropriately contains a section that makes reference to WQBELs (on page 16), but unlike the ISR condition, this section of the current permit is virtually devoid of any actual limitations beyond a prohibition on visible oil sheens or foam that does not dissipate within half an hour of the discharge. Aside from those narrative limitations, the remainder of this short section contains vague and concerning language.

For example, the statement that “[t]he Department expects that compliance with the other conditions in this permit *will control discharges as necessary to meet applicable water quality standards*…” is more akin to a safe harbor provision than an effluent limitation. This conclusory language should be removed as it essentially creates a permit shield. Additionally, the phrase “the Department will inform you if any additional monitoring, limits or controls are necessary” must be amended to remove the unnecessary discretion and replaced with clear language that requires adherence to the CWA’s directive to *ensure compliance* with water quality standards and consistency with the assumptions of TMDLs.

The condition applicable to Tier 2 antidegradation requirements is similarly toothless, does not incorporate the antidegradation requirements of the CWA, and is not consistent with the process set forth in Maryland regulations. We urge MDE to include clear and enforceable requirements in the permit and to follow the permit development procedures established in MDE regulations.

Finally, while we acknowledge that the ISR condition is designed in part to assist the state in meeting the targets associated with the Chesapeake Bay TMDL and Maryland’s WIP, we believe that it would be appropriate for the reissued permit to contain additional WQBELs in specific sectors with a greater likelihood of discharging a disproportionate volume of nutrients or sediment, especially where a local TMDL for nutrients and sediment may signal significant contribution to Bay TMDL loads.

## II. Corrective Actions

**Key Priorities for Corrective Action:**

- Clear language stating that failure to meet corrective action requirements by a date certain creates an enforceable permit violation.
- Notification through NetDMR that a corrective action tier is triggered; post-corrective action report at the conclusion of each level/tier, to be posted on electronic database, submitted with DMRs, and/or made available upon request within 14 days.
- Concrete deadlines with no loopholes, language based on practicability, or other language that renders the requirements practically unenforceable.

- Concrete deadlines for applying for an extension, with no automatic extensions, requiring external verification of the schedule or approval of extension by agency, no unreasonably long deadlines for extended period.
- Clear trigger for each tier of corrective action that allows permittee, agency, and public to know from a review of DMRs whether sampling results trigger corrective action.
- Upon failure to achieve benchmarks at the conclusion of corrective action program results, permittee is no longer eligible for general permit and must obtain an individual permit.

*A. Levels/Tiers of Escalating Corrective Actions*

**MDE should adopt a tiered approach with escalating enforceable requirements and deadlines as exceedances of benchmark values continue, and if exceedances continue after completion of corrective actions, the permittee should be required to obtain an individual permit.**

EPA's proposed MSGP and several states have adopted an escalating approach to corrective actions required in response to exceedance of benchmark values. This approach ensures that the corrective action required meets the severity level of the benchmark exceedance and offers some certainty as to which actions a permittee must take after continuing to exceed benchmark values.

The Washington Industrial Stormwater General Permit[2] and the Rhode Island Multi-Sector General Permit for Storm Water Discharge Associated with Industrial Activity[3] both include three levels of corrective action, each requiring the permittee to add a form of Best Management Practice (BMP) to its SWPPP to achieve applicable benchmark values in future discharges: 1st Level - Operational Source Control BMPs, 2nd Level - Structural Source Control BMPs, and 3rd Level - Treatment BMPs. A chart showing a comparison of the required actions and other key provisions of the corrective action section across several states, including Washington and Rhode Island, is attached as Exhibit A. The three-level approach allows the permittee flexibility in choosing the most effective source control or treatment for its site, while also creating a structure that requires specific, more significant corrective actions as benchmark exceedances continue.

Because the WA and RI approaches include specific requirements to add a certain type of BMP to its SWPPP at each level, and to implement the revised SWPPP, the corrective actions are enforceable. Particularly, if MDE makes corrective action documents available publically online, citizens would have the opportunity to confirm that the facility is meeting the corrective action requirements. Additionally, this approach would not require the agency to create a lengthy appendix spelling out specific control measures for each sector, as EPA has done in its Proposed MSGP. However, if MDE plans to adopt Appendix Q from the Proposed MSGP, it could be easily incorporated into the WA and RI approaches, as part of Level 1.

We recommend that MDE adopt a tiered approach to corrective action requirements, similar to that of WA and RI. The permit should state that a violation of the terms of, or compliance deadlines set forth in, any level of corrective action constitutes an enforceable permit violation. Additionally, if a facility continues to exceed benchmark values after completion of all the tiers, the permit should provide that the permittee is no longer eligible for the general permit and must obtain an individual permit.

*B. Trigger for Corrective Actions*

**One benchmark exceedance should be sufficient to trigger corrective action, to allow MDE, permittees, and the public to determine easily when corrective action is triggered based on NetDMR submissions.**

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[2] https://fortress.wa.gov/ecy/ezshare/wq/permits/ISGP_PermitFINAL.pdf
[3] http://dem.ri.gov/programs/benviron/water/pn/ripdes/msgp.pdf.

EPA also offers one option for what activity triggers each tier of corrective action, in the Proposed MSGP. It provides a complex combination of consecutive annual averages of benchmark sampling results and using multiple sampling results over the course of the 1, 2, or 3 years that each exceed a multiple of the benchmark value (2x, 4x, 8x).

Two possible approaches would be simpler and effective and could be used in conjunction with NetDMR to flag a facility as requiring corrective action. The WA permit again provides a helpful example, with the simplest triggers for each level. Level one corrective action is required when the permittee exceeds any applicable benchmark value for any quarter during a calendar year. Maintaining this simplicity, Levels 2 and 3 are triggered when the permittee exceeds any applicable benchmark value for any 2 and 3 quarters, respectively, during a calendar year. The Oregon Stormwater Discharge General Permit[4] takes a similarly immediate approach for a trigger for its Tier 1, which applies when "stormwater monitoring results exceed any of the applicable statewide benchmarks . . ." If Maryland's permit adopted this approach, MDE, the permittee, and the public could readily determine from DMRs whether a facility would be subject to corrective action.

The RI permit relies on a four-quarter average of monitoring to determine whether each level of corrective action should apply, similar to MDE's current trigger for corrective action and one part of EPA's approach in the proposed MSGP. Level 2 corrective action is triggered if an average of four monitoring results from the second year of monitoring exceeds an applicable benchmark. The OR permit also takes this approach as the trigger for its Tier 2, which applies when the geometric mean of qualifying sampling results collected during the second monitoring year exceeds an applicable benchmark. Finally, Level 3 corrective action in RI is triggered if an average of four monitoring results, conducted after Level 2 corrective actions have been implemented and completed, exceeds an applicable benchmark. Because this approach relies on a simple average from a year of monitoring results to trigger each corrective action level, all interested parties could easily use DMRs to determine whether corrective action is required.

Regardless of what MDE decides as the trigger for corrective action, the permit should require the permittee to notify MDE through NetDMR when benchmark monitoring has triggered any tier of corrective action, to ensure that the public has access to this information.

*C. Timeframe for Completing Corrective Action Requirements*

1. Deadlines

**The permit should establish specific, reasonable and enforceable deadlines, without loopholes.**

The current permit does not provide a deadline for corrective action or any accountability to perform the action in a reasonable timeframe. Even one level of additional accountability, providing a concrete deadline, would make the permit significantly more enforceable. The New York State SPDES MSGP for Stormwater Discharges Associated with Industrial Activity[5] provides this level of accountability, requiring implementation of additional non-structural and/or structural BMPs "before the next anticipated storm event, if practicable, but not more than 12 weeks after discovery." This hard backstop is key to enforceability of the corrective action section.

The EPA Proposed MSGP also provides concrete deadlines, for each Tier of corrective action—14 days for Tier 1 and 2 and 30 days for Tier 3. However, the permittee can take additional time for each corrective action without EPA approval by documenting why the initial timeframe is infeasible, allowing up to 45 days for Tier 1 and 2 and 90 days for Tier 3.

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[4] https://www.oregon.gov/deq/FilterPermitsDocs/Final1200Zpermit.pdf.
[5] https://www.dec.ny.gov/docs/water_pdf/msgppermit.pdf.

WA, RI, and OR each include hard deadlines, in some cases with a separate deadline for the phase of investigation and revision of the SWPPP and the implementation phase. While the deadlines for the corrective actions in each of these states frequently include “as soon as possible” language, they also include a hard backstop deadline, beyond which would be considered a permit violation. (e.g., WA Level 2 Deadline: revised SWPPP should be fully implemented “as soon as possible, but no later than August 31st of the following year.”) A comparison of these deadlines is shown in the chart in Exhibit A. Any of the deadlines used by these states would improve the enforceability of Maryland’s permit.

2. Extensions

**If the permit allows extensions for compliance with corrective action requirements, extensions should not be automatic, they should be for a specified duration of reasonable length, and they should require approval.**

Any extensions available to a permittee for complying with corrective action deadlines should have specified time periods and require agency approval. For example, the NY permit requires a permittee to submit a proposed schedule for completion of the corrective actions if implementation will take longer than the initial 12-week deadline and to obtain written approval from the Regional Water Engineer. This external verification by the Regional Water Engineer is helpful to ensure that the extra time is actually warranted and that the proposed schedule is reasonable. Similarly, in WA and RI for Levels 2 and 3 the permits each provide processes for requesting agency approval for an extension or modification of coverage. In both states, the agency must approve or deny the request within 60 days. As another example, for Tier 2, the OR permit does not provide a specific process for an extension, but the permit requires the deadlines to be met unless DEQ or its agent approved a later date in writing.

Extensions should not overtake the rule, allowing the permittee to justify its extended timeframe and rely on “as soon as practicable” language to avoid enforcement. For example, the OR permit provides a concrete deadline for complying with corrective actions for Tier 1, but if the permittee fails to meet the deadline, it must only document its reasoning in the Tier 1 Report that is kept on-site and “corrective actions must be completed as soon as practicable.” This acts as an automatic extension that allows the permittee to fail to meet its deadline without any real consequence. Enforcement of this extension would then be challenging, even if the permit defined the term “practicable.”

Similarly, as noted in the prior section, the EPA’s proposed MSGP creates automatic extensions that are available to a permittee by documenting why an action is infeasible in the required timeframe. Though these extensions are for a specified time period (45 days for Tiers 1 and 2, 90 days for Tier 3), the lack of accountability is concerning because there is no requirement for the justification or mechanism to ensure that the permittee’s justification is reasonable. Additionally, as raised in our comments to the proposed MSGP, the extensions should not be for unreasonably long periods. Given an initial 14-day timeframe, it is unclear why a permittee that cannot meet the original deadline should be allowed a period of time over three times as long as the original period. The same rationale applies to the Tier 3 timeframe, which initially provides a 30-day deadline, with an extension to 90 days. However, EPA’s process for providing an additional extension beyond the 45/90 days does require EPA approval based on an “appropriate demonstration” by the permittee. This external approval is vital for accountability.

If MDE chooses to allow extensions to deadlines for corrective actions, it should do so in limited circumstances, where an extension is actually warranted. The most effective way to ensure this is to require agency approval for a request for extension and allow an extension of only an additional 14 days.

*D. Documentation*

**The permit should require a permittee to notify MDE when a corrective action is triggered and submit post-corrective action reports through NetDMR and/or make such reports publicly available.**

Maryland's current general permit requires the permittee to document the discovery of any triggering condition for corrective action within 24 hours of discovery and then to document any corrective action to be taken, or the basis for determining that no action is needed, within 14 days of discovery. This documentation must be included in the facility's annual report. Several other states have taken similar approaches, requiring revisions of the SWPPP and documentation of corrective actions only in the annual report. However, without public access to the updated SWPPP and the annual report, as discussed in the Transparency and Accessibility section below, enforceability and accountability for the adequacy of these documents is limited. Accordingly, requiring a permittee to provide required documentation for corrective actions through Net-DMR or another online document portal would improve accountability. RI, WA, and CA have each taken this approach, requiring submission of annual reports and other documentation to their respective electronic reporting systems, NeT, Water Quality Permitting Portal, and Storm Water Multiple Application and Report Tracking System (SMARTS), respectively. In CA, the public can access this online database and view documents as soon as they are submitted by permittees.

Additionally, to facilitate review of corrective actions specifically, MDE should require the permittee to submit corrective action reports that summarize the results of investigations, discuss actions taken or to be taken, and provide justifications in support of their conclusions, as part of a tiered corrective action program. While several states require such information to be included in the facility's annual report, CA and OR each require specific reports associated with each corrective action level. CA requires these reports to be submitted to SMARTS, making them publicly accessible immediately.

As described in our comments to the EPA's proposed MSGP, when corrective action information is only included in the annual report, harm to downstream water quality could be occurring for long periods before enforcement is possible. Therefore, MDE should make required corrective action documentation, tied to each tier of corrective action, timely available online or at the very least make the tier-specific corrective action reports available to members of the public upon request within 14 days or less. Additionally, the permit should require the permittee to notify MDE through NetDMR whenever a corrective action level has been triggered, allowing the agency and the public to ensure that the permittee's corrective action complies with the deadlines and other requirements.

## III. Monitoring

*A. Universal Benchmark Monitoring*

1. Flow

The Maryland permit should require industry-wide benchmark monitoring and reporting for flow because without flow rate there is no way to determine pollution loads. As explained in our comments to the EPA's proposed MSGP, the NAS report states that a "pollutant concentration measured at a single time during a stormwater event cannot be considered to be representative of the [event mean concentration]," which is necessary for determining pollutant loads and therefore downstream water quality impacts and impairments. Given that there are several low- to medium-cost monitoring technologies and methodologies for measuring flow-rates, requiring flow measurements industry-wide would not be a significant burden on permittees.

The Kentucky Pollutant Discharge Elimination System Permit to discharge stormwater runoff associated with industrial activities includes flow, in addition to TSS, oil & grease, and pH, in its list of effluent monitoring requirements that must be reported twice each year for all point source discharges of stormwater runoff associated with industrial activity. (KPDES Permit, Section 2.1, pg. 10.[6]) Delaware also requires flow measurements to be submitted for each representative sampled storm event, including: the date and duration of the storm event sampled; rainfall measurements or estimates of runoff of the storm event; the duration between the storm event sampled and the end of the previous measurable storm event; and an estimate of the total volume of the discharge sampled. (Code Del. Regs. 7 7000 7201, 9.1.4.2.5, pg. 74-75[7]).

Maryland should adopt industry-wide benchmark monitoring for flow, to generate data on the quantity of stormwater and pollutants discharged by both individual sites and the industrial stormwater sector statewide.

2. TSS, TP, TN

Maryland should adopt universal monitoring for nitrogen, phosphorus, and sediment, at least for facilities in the Chesapeake Bay watershed. In the first issuance of the Virginia industrial stormwater permit after the adoption of the Chesapeake Bay TMDL, the Virginia State Water Control Board required all owners of facilities in the Chesapeake Bay watershed to monitor their discharges for TSS, TN, and TP. Facilities were required to collect samples during each of the first four monitoring periods (first two years of permit coverage). (9 Va. Admin. Code 25-151-70, Part I B 8 a.[8]) The Chesapeake Bay Foundation (CBF) analyzed the data collected from this monitoring and determined that a small number of high-loading facilities accounted for 29 percent of the overall phosphorus load and 20 percent of the overall nitrogen load of all facilities, despite accounting for less than one percent of the overall acreage of facilities covered under the VPDES permit. (Letter from Joseph D. Wood, Ph.D. and Margaret L. Sanner to Matt Richardson (December 18, 2018), 2, attached as Exhibit B). This analysis demonstrates the importance of water quality monitoring in identifying the largest contributors of pollutants, which enables the agency to focus regulatory and enforcement efforts where they will be most effective at reducing pollutant loads to the Chesapeake Bay.

*B. Frequency of Benchmark Monitoring*

Maryland should require quarterly benchmark monitoring beyond the first year of the permit to ensure that sufficient data are collected to assess the adequacy of stormwater management at the facility for the permit term. The Maryland general permit currently requires collection of four quarterly samples, and if the average of the four samples does not exceed a benchmark value the permittee has fulfilled its monitoring requirements for that parameter for the entire permit term. (Part V.B.3.a.) The NAS recommended that EPA require benchmark monitoring for four quarters at the beginning of the permit term and annually for the duration of the permit term. (NAS at 50.) It stated, "four quarterly samples are insufficient to assess the adequacy of stormwater management at a facility over the course of a permit term of 5 years," largely because with more samples the acceptable error decreases. (*Id.*) Additionally, conditions at a site may change over time and routine monitoring over the five-year term is the only way to provide a "consistent representation of stormwater discharge as operations and personnel change over the duration of a permit term." (*Id.*) Without more regular monitoring, we cannot ensure that permittees "continue to implement and maintain SCMs." (*Id.*)

The WA Industrial Stormwater permit requires quarterly sampling, but if a permittee achieves benchmark values for 8 consecutive quarterly samples, it may reduce monitoring to once a year for three years. (Condition S4.B.7.) At a minimum, Maryland should incorporate this requirement, to ensure the facility collects enough data to establish that its stormwater management practices are sufficient while also allowing the facility to decrease sampling once it has met benchmark requirements for at least two years.

[6] https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Documents/FinalPermitKYR00.pdf.
[7] https://regulations.delaware.gov/AdminCode/title7/7000/7200/7201.pdf#page=57.
[8] https://law.lis.virginia.gov/admincode/title9/agency25/chapter151/section70/.

*C. Groundwater Monitoring*

Groundwater contamination from stormwater infiltration has been documented in various locations around the country and NAS has urged greater monitoring of water in infiltration devices. Given that the ISR requirement is designed to infiltrate more runoff into groundwater, it is important for the reissued permit to include additional groundwater monitoring requirements, as well as pretreatment sufficient to ensure that stormwater complies with primary and secondary drinking water standards "either before the stormwater is applied to the infiltration area or after passing through the infiltration/treatment media at the base of the unsaturated zone." (NAS at 76.)

## IV. Transparency and Accessibility

*A. Web Accessibility of Permit Documents and Information*

We believe it is critical to provide the public with greater access to permit information. Ideally, a single database should be created to allow for the collection, storage, analysis, and posting of information. The e-Permit database for the construction stormwater general permit provides one potential template. The MDE's wastewater permit portal could serve as another model, although it is somewhat less user-friendly for the public. Another MDE database concept that could be useful to draw from would be the Microsoft Access and associated geodatabase applicable to municipal stormwater regulated entities; this database provides critical geospatial data to allow MDE to conduct important analytical research and is also used to store basic inspection information as well. Finally, we would encourage MDE to look outside of Maryland for some other examples of functional and well-designed databases, including those used in California and Rhode Island.

A few of the elements that we urge MDE to include in whichever database is used would be: SWPPPs and their updates, annual reports, public notice, notices associated with corrective action, geospatial data, including for outfalls and monitoring points, and any additional information that MDE requires an applicant to submit separately from the SWPPP and annual report. In the event that a unified database cannot be built in time for the next permit's issuance, we urge MDE to simply consider adding layers to the state's already existing and well-known Open Data Portal. This portal is familiar to the public, user-friendly, and supported by the state budget and state information technology professionals. We see no reason not to use the Open Data portal as a temporary solution.

In the event that MDE is unable to make facilities' SWPPPs and annual reports available to the public through an electronic database, ***at the very least*** MDE should include a requirement that permittees make updated SWPPPs publically available within a definite timeframe. WA's permit requires permittees to provide access to, or a copy of, the SWPPP to the public when requested in writing. The permittee must provide a copy of the SWPPP to the requestor within 14 days of receipt of the request, make the SWPPP available for viewing within 14 days of the request, or provide a URL in the NOI where a current SWPPP will be maintained. (Condition S9.G, pg. 42.) In NY, the industrial stormwater general permit also requires the owner or operator to make a copy of the SWPPP available to the public within 14 days of receipt of a written request. (Part III.C.2.c, pg. 27.) Although MDE should make these documents available through an electronic database, if for some reason it cannot, MDE must require the permittee to make SWPPPs and other key documents (including corrective action reports, as described above) available to the public within 14 days.

*B. Signage*

We applaud your decision to consider requiring applicants to post standardized signs on the exterior of their sites. Signs are essential public health tools that protect and empower the residents living in communities surrounded by industrial facilities. We believe MDE benefits when the public knows that the agency is there to protect their health and well-being. The public deserves to know what pollutants are being discharged into their communities, and MDE has an obligation under the law to facilitate the dissemination of environmental information.

To this end, we urge MDE to consider the inclusion of at least a few key elements into the signs: (1) standardized design incorporating best practices for public signage; (2) inclusion of Spanish and any other non-English language known to be common in the surrounding community; (3) a URL where the permit and related documents (e.g. SWPPP) can be accessed; and (4) a phone number and web-form to report pollution concerns. We applaud the idea you shared about the creation of a "hotline" for reporting pollution concerns related to the site. We agree that perhaps the best approach to establishing a hotline is to have either an automated system or simply a voicemail option where a concerned individual can leave their name, contact information, and description of the concern. This way, MDE can make clear to those providing complaints that the only appropriate basis for delivering a complaint to this hotline is pollution from the site. Another alternative to a telephone hotline would be an email address or web-based form where complaints can be filed electronically.

Finally, we would like to reiterate that we believe that some or all outfalls or discharge points should be indicated with either a small sign or through stenciling around the discharge point. These signs can warn community members not to loiter or recreate on public property directly adjacent to these points during or after rain events. Such signs can also help educate members of the community about the nature of industrial stormwater runoff. For example, an average person not aware of the difference between stormwater and wastewater may see a stream of water from an outfall or discharge point at an industrial facility and think it is either illegal or an extremely dangerous spill or leak, rather than stormwater deliberately engineered to channel water from the site. This education could reduce fear and mistrust and perhaps improve the quality and quantity of public complaints. The current permit requires reporting of spills and leaks, including the outfalls where potential spills and leaks would go. Because permittees are already required to designate the location where potential spills and leaks would discharge, we believe this provision would be significantly enhanced by requiring permittees to place signage next to these outfalls to provide a basic warning to the public, including to children that may otherwise play nearby.

*C. Environmental Justice*

We are hopeful that MDE has already consulted with the Maryland Commission in Environmental Justice and Sustainable Communities (CEJSC) regarding this impending permit reissuance. If not, we strongly urge you to contact the staff and chair of the Commission and ask to provide a presentation regarding the permit, impacts of industrial stormwater, particularly in areas of the state where clusters of permitted sites are located, and opportunities to provide input. As you know, the CEJSC exists to review and analyze the impact of State laws and policies on the issue of environmental justice and to advise MDE and other agencies. The CEJSC cannot provide their input if they are not consulted, and we believe that few permits or policies present as clear and substantial risks to environmental justice communities as the industrial stormwater general permit. We recommend that MDE seek input from the commissioners on the permit reissuance and invite the commission to host an informal hearing where the public can present their perspectives.

## V. Permit Process and Coverage

*A. Limitations on Coverage*

Stormwater general permits are not sufficiently protective or suitably tailored for all applicants. In many cases, whether due to the condition of the receiving water, proximity to a contaminated site designated for cleanup, current compliance status, or due to the nature of pollutants to be discharged, an individual permit should be used in place of a general permit. We urge MDE to include in the reissued permit a requirement for applicants to provide advance notice to the agency, to EPA, and to the public if the site presents specified, clearly enumerated risks to allow MDE to fully evaluate whether additional controls and/or an individual permit should be required instead.

A few circumstances that we believe warrant advance notice from applicants, as well as consideration of additional controls and/or individual permit coverage include, but are not limited to: (1) ongoing noncompliance as identified by MDE or EPA inspectors and for sites that are not in compliance with the ISR requirement; (2) new facilities that would discharge the same pollutant for which the receiving water is listed as impaired or new facilities that propose to discharge within a catchment that drains to a Tier II water body; (3) sites located within close proximity (e.g. 0.5 miles) of a site on the National Priority List or in the State's Voluntary Cleanup Program; (4) sites that have applied a coal tar or high-PAH sealant within the previous year and ones that plan to apply such sealants (unless otherwise affirmed in the permit application); (5) location within an environmental justice community as defined in the permit, which could include either census tracts above a certain threshold (e.g. top quintile) in the U.S. Census Bureau's Social Vulnerability Index or an EPA EJSCREEN block group with more than one environmental or demographic indicator with an index score in the top quintile; (6) sites at greater risk of inundation, including those that have flooded within the previous decade and those within a FEMA 100-year flood zone.

Finally, we urge MDE to address some problematic language on page 3 of the current permit, which states that "***if*** the Department determines that a discharge may cause water quality standards to be exceeded in the receiving water, then the Department ***may*** require you to take ***additional actions*** including getting an individual permit." Rather than this conditional language, it would be appropriate to simply indicate under which circumstances and the Department would make this determination, as well as which "additional actions," if any, MDE would take other than requiring an individual permit. We reiterate, that it is critical for the reissued permit to be clear of vague language that is unenforceable by MDE and the public and creates needless uncertainty for the permit-holder.

*B. Expansion of Coverage for Nonindustrial Facilities*

The NAS recently recommended that EPA extend MSGP classification to "nonindustrial facilities with activities similar to those currently covered." The EPA has previously determined that there is a large universe of facilities and activities that fall outside of the regular MSGP sectors, many of which could be subject to coverage under Sector AD. We urge MDE to begin the process of identifying additional sectors for coverage for subsequent issuances of this permit, because there is no reasoned basis for continuing to ignore all nonindustrial facilities with activities similar to those currently covered.

*C. No Exposure Certification*

We urge MDE to address a deficiency with the "no exposure" certification. MDE should not allow any new certifications unless the applicant demonstrates that ***all*** stormwater is retained on-site; otherwise, this certification is not taking into consideration the potential for discharge of pollutants from deposition or run-on. Whether or not a pollutant was generated on site is irrelevant to whether pollutants are actually discharged in stormwater from the site.

If a site cannot meet this threshold then they should simply not be exempt from the requirement to be covered by a permit. At a minimum, MDE should commit to applying this enhanced "no exposure" standard to ***new*** facilities or ***newly covered*** facilities, thus providing an incentive to fully retain stormwater and/or pre-treat runoff. Additionally, we want to reiterate our strong recommendation that any and all attestations by an applicant from an engineer or similar professional be made by an ***independent*** engineer or professional to avoid self-certification and the potential for impermissible self-regulation.

*E. NOI Information*

While not critically important, we believe that MDE should expand the information required of applicants (on page 5 of the current permit). For example, we urge MDE to include additional and more specific geographic information about the permit. Instead of an 8-digit watershed identifier, the applicant should include the 12-digit watershed code. MDE should require the applicant to refer to the agency's interactive maps for Water Quality Assessments and TMDLs and for Tier II waters and to provide the name, GIS_ID, and any other location information associated with the receiving water body, as well as the geographic coordinates of each discharge point on the site and for the storm drain collection point and outfall, if any.

Additionally, the NOI requirements and NOI form provided by MDE should be amended to include the latest sampling data from a site covered under the previous permit. This data provides important information to MDE staff documenting that the site is conducting sampling on the required schedule and in compliance with proper sampling procedures and that any benchmarks are not being exceeded. Such information should be a critical component of the permitting process so that MDE can ensure compliance by the permitted entity with all state and federal requirements. MDE could consider exploring the NOI processes of other states. One state with robust reporting requirements is New York.

*F. Fees*

One of the most common and frequent criticisms of nearly all MDE programs is a lack of resources. As you know, MDE is required by statute to "set a reasonable permit fee schedule for industrial users based on … the cost of monitoring and regulating the permitted facility … the flow of effluent discharge ... and … the anticipated needs for program development activities that relate to management of the discharge of pollutants into the waters of this State." Md. Code Ann., Envir. § 9-325(c)(1). Thus, resource constraints should never be an issue for MDE in writing permits or ensuring compliance associated with the industrial stormwater general permit. We urge MDE to increase the fee to account for inflation and the cost of enhancing the agency's regulation of industrial stormwater. And because "the flow of effluent discharge" is a mandatory consideration, we urge MDE to establish a fee schedule that accounts for the volume and impacts of the pollutants from individual sectors and for sites of different sizes.

Thank you once again for the opportunity to provide advance pre-draft feedback during the June 19 web-conference between MDE and staff from the Center for Progressive Reform, Chesapeake Bay Foundation, Chesapeake Legal Alliance, and Environmental Integrity Project, as well as staff from several Waterkeeper organizations in Maryland. If you have any questions about the information presented in this document please do not hesitate to contact us.

## Key Provisions for Enforceability of Correction Action Section of Industrial Stormwater General Permits

| | Lvl | Triggers | Required Actions | Deadlines | Extensions (ext.) | Exceptions |
|---|---|---|---|---|---|---|
| **MD**[1] | n/a | Among others: violation of numeric effluent limit and when avg. of 4 quarterly sampling results exceeds applicable benchmark.[2] | Review selection, design, installation, and implementation of control measures to determine if modifications are necessary to meet effluent limits.[3]<br>For numeric effluent limit violation, must review and revise same to ensure that condition is eliminated and will not repeat.[4] | Document any planned corrective action w/i 14 days. Implement: before next storm event if possible, or as soon as practicable following that storm event.[5] | If deficiency cannot be addressed fully w/i 30 days, must inform Dept Compliance program.[6] | Natural Background Pollutant Levels: permittee determines that exceedance of the benchmark is attributable solely to the presence of a pollutant in the natural background, when avg. concentration of benchmark results is ≤ concentration of that pollutant in natural background.[7] |
| **NY**[8] | n/a | Visual examination indicates presence of pollution or benchmark or numeric effluent limit sampling results indicate exceedances of the pollutants.[9] | Inspect facility for potential sources of SW contamination and/or causes of the exceedance; implement add'l non-structural and/or structural BMPs to address sources of contamination id'ed to prevent recurrence; revise facility's SWPPP; and continue efforts to implement add'l BMPs at facility if corrective actions do not result in achieving benchmarks/numeric effluent limits.[10] | Before next anticipated storm event, if practicable, but not more than 12 wks after discovery[11] | If implementation will take >12 wks, must submit proposed schedule for completion and obtain written approval from Regional Water Engineer.[12] | None |
| **EPA**[13] | Tier 1 | 1 annual avg. > benchmark; 1 sampling event >4x benchmark.[14] | Review selection, design, installation and implementation of control measures to determine if modifications necessary to meet benchmark; implement additional implementation measures to ensure effectiveness of control measures; continue quarterly benchmark monitoring into next yr.[15] | 14 days[16] | If 14 days is infeasible, document why infeasible and implement modifications w/i 45 days.[17] | **Natural Background Pollutant Levels:** demonstrate that exceedance solely attributable to presence of pollutant in natural background sources, submit documentation to EPA;[18]<br>**Run-On:** for parameters you demonstrate and obtain EPA agreement that run-on from a neighboring source is the cause of the exceedance.[19] |
| | Tier 2 | 2 consecutive annual avgs. each > benchmark; 2 sampling event results in 2yrs each >4x benchmark; 1 sampling event >8x benchmark.[20] | Implement all feasible sector-specific stormwater control measures from App. Q; continue quarterly benchmark monitoring into next yr.[21] | 14 days[22] | If 14 days is infeasible, document why infeasible and implement w/i 45 days. EPA may grant ext. beyond 45 days based on an appropriate demonstration.[23] | **Aberration:** A single sampling event >8x benchmark does not trigger Tier 2 if event was aberration;[24]<br>**Natural Background Pollutant Levels**: demonstrate that exceedance solely attributable to presence of pollutant in natural background sources, submit documentation to EPA;[25]<br>**Run-On:** for parameters you demonstrate and obtain EPA agreement that run-on from a neighboring source is the cause of the exceedance.[26] |
| | Tier 3 | 3 consec. annual avgs. each > benchmark; 3 sampling event results in 3yrs each >4x benchmark; 2 sampling events in 3yrs each >8x benchmark; 4 consecutive samples each > benchmark, w/ avg. >2x benchmark.[27] | Install structural source controls and/or treatment controls w/ pollutant removal efficiencies sufficient to bring exceedances below benchmark; must have PE/geologist assist with installation.[28] Alternatively, or in addition, install infiltration or retention controls for ind. SW if appropriate and feasible, if EPA concurs (in advance) w/ conclusions that it is appropriate for site; successful compliance may allow EPA to waive or lessen benchmark monitoring requirements.[29]<br>After compliance, continue quarterly benchmark monitoring into next yr.[30] | 30 days[31] | If 30 days is infeasible, may take up to 90 days, document in SWPPP why 30 days infeasible. EPA may grant ext. beyond 90 days based on an appropriate demonstration.[32] | Adequately demonstrate to EPA w/i 30 days of trigger that discharge does not result in any exceedance of WQ stds, EPA approves demonstration w/i 90 days of receipt.<br>**Natural Background Pollutant Levels:** demonstrate that exceedance solely attributable to presence of pollutant in natural background sources, submit documentation to EPA;[33]<br>**Run-On:** for parameters you demonstrate and obtain EPA agreement that run-on from a neighboring source is the cause of the exceedance.[34] |

## Key Provisions for Enforceability of Correction Action Section of Industrial Stormwater General Permits

| | Lvl | Triggers | Required Actions | Deadlines | Extensions (ext.) | Exceptions |
|---|---|---|---|---|---|---|
| **WA**[35] | Lvl 1 | Exceed any applicable benchmark for any qtr[36] | Operational Source Control BMPs: Conduct inspection to investigate cause; review SWPPP, ensure compliance with permit requirements and contains applicable BMPs from appropriate SW Mgmt Manual; revise SWPPP to incl. add'l operational source control BMPs, w/ goal to achieve benchmark in future.[37]<br><br>Fully implement revised SWPPP | Investigate and revise SWPPP: later of 14 days or end of qtr;[38]<br><br>Implement SWPPP: ASAP, no later than DMR due date[39] | None | None |
| | Lvl 2 | Exceed any applicable benchmark value for any 2 qtrs during a calendar yr (permittee may skip Lvl 2 and complete Lvl 3)[40] | Structural Source Control BMPs: Review SWPPP, ensure compliance with permit requirements; revise SWPPP to incl. add'l structural source control BMPs, w/ goal to achieve benchmark in future.[41]<br>Fully implement revised SWPPP | Implement SWPPP ASAP, no later than 8/31 of following yr[42] | If not feasible by 8/31, may request ext., submit Mod. of Coverage form by 5/15, Ecology will approve/deny w/i 60 days[43] | If structural source control BMPs not feasible or necessary to prevent discharges that may cause or contribute to violation of WQ std, permittee may request waiver, submit Mod. of Coverage form by 5/15, Ecology will approve/deny w/i 60 days.[44] |
| | Lvl 3 | Exceed any applicable benchmark for any 3 qtrs during a calendar yr[45] | Treatment BMPs: Review SWPPP, ensure compliance w/ permit requirements; revise SWPPP to include add'l treatment BMPs, w/ goal to achieve benchmark in future, revisions shall include add'l operational and/or structural source control BMPs if necessary for proper performance and maintenance of treatment BMPs.<br>Qualified industrial SW professional must review revised SWPPP and certify it is reasonably expected to meet benchmarks.[46]<br><br>Before installing treatment BMPs requiring site-specific design or sizing, etc., permittee must submit engineering report to Ecology, to meet series of specified requirements.[47] Must submit O&M Manual to Ecology[48] | Implement SWPPP ASAP, no later than 9/30 of following yr<br><br>Report:5/15, yr of Lvl 3 deadline[49]; O&M: w/i 30 days of construction complete[50] | If not feasible by 9/30, permittee may request ext., submit Mod. of Coverage form by 5/15, Ecology will approve/deny w/i 60 days.[51]<br><br>Unless alternate due date specified in an order[52] | If permittee demonstrates to Ecology's satisfaction that proposed Lvl 3 treatment BMPs are reasonably expected to meet benchmarks, Ecology may waive ind. SW professional requirement on case-by-case basis, 1x in permit cycle.[53]<br>If treatment BMPs not feasible or necessary to prevent discharges that may cause or contribute to violation of WQ std, permittee may request waiver, submit Mod. of Coverage form by 5/15, Ecology will approve/deny w/i 60 days.[54] |
| **RI**[55] | Lvl 1 | Avg. of 4 monitoring results exceeds an applicable benchmark and permittee determines exceedance not attributable solely to presence of pollutant in natural background.[56] | Operational Source Control BMPs: Review SWMP, ensure it fully complies w/ permit; conduct inspection to investigate cause of exceedance and evaluate industrial pollutant sources that are or may be related to exceedances; revise SWMP and implement add'l operational source control BMPs, w/ goal of achieving benchmark in future.[57] | 14 days[58] | If infeasible to complete w/i 14 days, document why and identify schedule for completing work; must be as soon as practicable after 14 days but no longer than 45 days.[59] | If permittee determines exceedance attributable solely to presence of pollutant in natural background.[60] |
| | Lvl 2 | Avg. of 4 monitoring results from second yr of monitoring exceeds an applicable benchmark[61] | Structural Source Control BMPs: Review SWMP, ensure it fully complies w/ permit; revise SWMP to incl. add'l structural source control BMPs, w/ goal of achieving benchmark in future; fully implement SWMP and structural source control BMPs.[62] | ASAP, no later than 6 months after 2nd benchmark monitoring yr.[63] | If not feasible w/i 6 months, permittee may request ext., RIDEM will approve/deny request w/i 60 days.[64] | If permittee determines installation of structural source control BMPs is not necessary to prevent benchmark exceedance(s), permittee may request a waiver from RIDEM, no later than 30 days after end of 2nd benchmark monitoring yr. RIDEM will approve/deny request w/i 60 days.[65] |
| | Lvl 3 | Avg. of 4 monitoring results, conducted after Lvl 2 corrective actions implemented and completed exceeds applicable benchmark.[66] | Treatment BMPs: Review SWMP, ensure it fully complies w/ permit;[67] submit Lvl 3 Corrective Action Report that incl. at least one of two demonstrations (Industrial Activity Demonstration and Non-Industrial Pollutant Source Demonstration);[68] and revise SWMP to incl. mods. to existing treatment BMPs and/or installation of add'l treatment BMPs, w/ goal of achieving applicable benchmark in future, fully implement SWMP and mods.[69] | 90 days after monitoring yr that triggered Lvl 3, before treatment BMP constructed[70]<br>Implement: ASAP, no later than 6 | If not feasible w/i 6 months, permittee may request ext., RIDEM will approve/deny request w/i 60 days.[72] | If permittee determines mods of existing treatment BMPs or installation of treatment BMPs is not necessary to prevent benchmark exceedance(s), permittee may request a waiver from RIDEM, no later than 30 days after end of Lvl 3 benchmark monitoring yr. RIDEM will approve/deny request w/i 60 days.[73] |

# Key Provisions for Enforceability of Correction Action Section of Industrial Stormwater General Permits

| | Lvl | Triggers | Required Actions | Deadlines | Extensions (ext.) | Exceptions |
|---|---|---|---|---|---|---|
| | | | | months after Lvl 3 monitoring yr.[71] | | |
| **OR**[74] | Tier 1 | Exceed applicable benchmarks or reference concentrations for impairment pollutants id'ed in permit assignment letter.[75] | Investigate cause of elevated pollutants, incl. conducting pollutant source tracing activities, develop plan to ensure known or discovered materials from previous operations are controlled, removed or otherwise not exposed; review SWPCP and selection design, installation and implementation of control measures to ensure compliance with permit and manufacturers' specifications; evaluate previous removal or pollutant source isolation actions for completeness, determine if add'l removal or mods. to pollutant source isolation are necessary; evaluate any treatment measures and whether maintenance, corrections, or mods. to treatment measures are necessary; revise SWPCP to incorporate any add'l measures/changes, submit to DEQ w/ schedule for implementing measures. Summarize investigation and corrective actions taken or to be taken in Tier I Report, to be kept on-site unless requested by DEQ [76] | w/i 30 days;[77] implement measures: whichever first of - before next storm event, if possible, or w/i 30 days of receiving monitoring results[78] | If permittee fails to meet deadline, document reasoning in Tier 1 Report (kept on-site) and complete as soon as practicable.[79] | Exceedances of benchmark addressed by proposed Tier II corrective action requirements, from end of 2nd monitoring yr through Tier II implementation deadline. Tier I investigation and reporting must resume once Tier II implemented.[80] |
| | Tier 2 | Geometric mean of qualifying sampling results collected during 2nd monitoring yr exceeds applicable benchmark[81] | Submit a Tier II report and revisions to SWPCP to DEQ;[82] Tier II report must incl. proposal for active or passive treatment, may be combination of source removal, control and treatment measures, w/ goal of achieving benchmarks; report to incl. rationale, reduction of pollutants, and implementation schedule.[83] An OR PE must design and stamp the control measures portion of SWPCP[84] | By 12/31 of 3rd yr of permit.<br>DEQ to notify if corrective action response is accepted or denied w/i 60 days;[85] | DEQ may approve a later date in writing[86] | **Mass reduction waiver:** may request this waiver if permittee implements volume reduction measures that will result in reductions of mass load of pollutants in discharge, below mass equivalent of applicable benchmarks; an OR PE or CEG must design and stamp relevant portion of SWPCP;[87]<br>**Natural background waiver:** may request this waiver if benchmark exceedance attributed solely to presence of pollutant in natural background and is not associated with industrial activities at the site.[88] Natural background pollutants incl. substances naturally occurring in soils or GW, not legacy pollutants from earlier activity on the site, or pollutants in run-on from neighboring sources that are not naturally occurring.[89] |
| | | | Tier II corrective action must be installed and implemented;[90] W/i 30 days of implementing Tier II corrective actions/mass reduction measures, permittee must submit written confirmation to DEQ w/ implementation date.[91] | Implement: by 6/30 of 4th monitoring yr[92] | | |

# Key Provisions for Enforceability of Correction Action Section of Industrial Stormwater General Permits

[1] Maryland General Permit for Discharges from Stormwater Associated with Industrial Activities, No. 12-SWA.
[2] Part IV.A.2, B.2, pg. 22.
[3] Part IV.B, pg. 22.
[4] Part IV.A, pg. 22.
[5] Part IV.C, pg. 22.
[6] Part IV.C, pg. 22.
[7] Part V.B.3.c, pg. 26.
[8] New York State Department of Environmental Conservation SPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, No. GP-0-17-004.
[9] Part V.A, pg. 42.
[10] Part V.A.1-7, pg. 42.
[11] Part V.A.5.a, pg. 42.
[12] Part V.A.5.b, pg. 42.
[13] U.S. EPA NPDES Proposed Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Parts 1-7.
[14] Part 5.2.1.1, pg. 37.
[15] Part 5.2.1.2.a-c, pg. 37.
[16] Part 5.2.1.3, pg. 37.
[17] Part 5.2.1.3, pg. 37.
[18] Part 5.2.1.3.a, 5.2.4.1, pgs. 38, 49.
[19] Part 5.2.4.2, pg. 50.
[20] Part 5.2.2.1, pg. 39.
[21] Part 5.2.2.2.a-b, pg. 40.
[22] Part 5.2.2.3, pg. 40.
[23] Part 5.2.2.3, pg. 40.
[24] Part 5.2.2.1.c.i, pg. 39.
[25] Part 5.2.2.3.a, 5.2.4.1, pgs. 40, 49.
[26] Part 5.2.4.2, pg. 50.
[27] Part 5.2.3.1.a-d, pg. 43.
[28] Part 5.2.3.2.a, pg. 44.
[29] Part 5.2.3.2.b, pg. 44.
[30] Part 5.2.3.2.c, pg. 44.
[31] Part 5.2.3.3, pg. 44.
[32] Part 5.2.3.3, pg. 44.
[33] Part 5.2.3.3.a, 5.2.4.1, pgs. 44, 49.
[34] Part 5.2.4.2, pg. 50.
[35] Washington Industrial Stormwater General Permit.
[36] Condition S8.B, pg. 35.
[37] Condition S8.B.1.a-c, pgs. 35-36.
[38] Condition S8.B.1, pg. 35.
[39] Condition S8.B.3, pg. 36.
[40] Condition S8.C, pg. 36.
[41] Condition S8.C.1-2, pg. 36.
[42] Condition S8.C.4, pg. 36.
[43] Condition S8.C.4.a,c, pg. 36.
[44] Condition S8.C.4.b, pg. 36.
[45] Condition S8.D, pg. 37.
[46] Condition S8.D.2, pg. 37.
[47] Condition S8.D.3, pg. 37.
[48] Condition S8.D.3.c, pg. 37.
[49] Condition S8.D.3.b, pg. 37.

[50] Condition S8.D.3.c, pg. 37.
[51] Condition S8.D.5.a, c, pg. 38.
[52] Condition S8.D.3.b, c, pg. 37.
[53] Condition S8.D.2, pg. 37.
[54] Condition S8.D.5.b,c, pg. 38.
[55] Multi-Sector General Permit Rhode Island Pollutant Discharge Elimination System Storm Water Discharge Associated with Industrial Activity, No. RIR500000.
[56] III.A.1, pg. 23.
[57] III.A.1.a.1-3, pg. 23.
[58] III.A.1.a, pg. 23.
[59] III.A.1.a, pg. 23.
[60] III.A.1, pg. 23.
[61] III.A.2, pg. 24.
[62] III.A.2.a, b, c, pg. 24.
[63] III.A.2.c, pg. 24.
[64] III.A.2.c.1, pg. 24.
[65] III.A.2.c.2, 3, pg. 24.
[66] III.A.3, pg. 24.
[67] III.A.3.a, pg. 24.
[68] III.A.3.b.1-2, pg. 24-25.
[69] III.A.3.c, pg. 25.
[70] III.A.3.b, pg. 24.
[71] III.A.3.c, pg. 25.
[72] III.A.3.c.1, 3, pg. 25-26.
[73] III.A.3.c.2, 3, pg. 26.
[74] Oregon NPDES Stormwater Discharge General Permit, No. 1200-Z.
[75] Schedule A.10.a, pg. 19.
[76] Schedule A.10.a.i-iv, pg. 19
[77] Schedule A.10.a, pg. 19.
[78] Schedule A.10.b, pg. 19.
[79] Schedule A.10.b, pg. 19.
[80] Schedule A.10.c, pg. 19.
[81] Schedule A.11.a,f, pg. 20.
[82] Schedule A.11.f, pg. 20.
[83] Schedule A.11.j.i, pg. 20-21.
[84] Schedule A.11.j.ii, pg. 21.
[85] Schedule A.11.f, pg. 20.
[86] Schedule A.11.f, g, pg. 20.
[87] Schedule A.11.k.i, iii, pg. 21.
[88] Schedule A.11.l.i, pg. 21.
[89] Schedule D.3.r., pg. 32.
[90] Schedule A.11.g, pg. 20.
[91] Schedule A.11.h, pg. 20.
[92] Schedule A.11.g, pg. 20.

# CHESAPEAKE BAY FOUNDATION
*Saving a National Treasure*



December 18, 2018

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Please accept these comments regarding the reissuance of the Industrial Stormwater General Permit. The Chesapeake Bay Foundation (CBF) appreciates the opportunity to participate in the technical advisory committee process and this opportunity to provide comments. Included here are several recommendations which we believe will benefit the effectiveness of these permits and help the state manage pollutant loads from industrial facilities across the commonwealth.

Virginia is currently in the process of developing the phase III Watershed Implementation Plans to achieve nitrogen, phosphorous and sediment reductions to the Chesapeake Bay; a long-standing priority for the commonwealth of Virginia. Chesapeake Bay restoration has made tremendous progress to date, with substantial pollution reductions over the past several decades. Still, substantial work remains, and the state is eagerly searching for opportunities to reduce nutrient and sediment pollution across the bay watershed.

Reducing pollution from the stormwater sector represents a substantial challenge due to financial constraints, technical requirements and limited access opportunities. Local governments along with other partners across the state have been diligently working to outline strategies for reducing pollution loads on both regulated and unregulated lands. Achieving nutrient reductions from industrial stormwater has the potential to play a critical role in helping Virginia achieve Chesapeake Bay pollution reductions for the stormwater sector.

1. **Recommendation # 1: Require continued nutrient monitoring for all facilities with enhanced monitoring requirements for facilities with higher documented loads; and require individual permits for facilities which demonstrate clear water quality problems (i.e. facilities with loads greater than ten times the WLA basis).**

In the most recent issuance of this permit, which was the first issuance since the adoption of the Chesapeake Bay TMDL, the State Water Control Board ("Board" hereafter) required all permittees to collect four water quality samples at each stormwater outlet over the course of 5 years to be analyzed for nitrogen, phosphorous and sediment. CBF appreciates this requirement and the data acquired as a result of this effort provides critical insights for identifying facilities with the largest impact to water quality. This information will help DEQ effectively reduce pollution loads at the highest pollutant loading facilities.

This data set indicates current protections at most facilities (~2/3 of all monitored facilities) are resulting in loading rates consistent with the sector's aggregate current Waste Load Allocation (WLA) of 12.3 lbs. per acre for nitrogen 1.5 lbs. per acre for phosphorous and 440 lbs. per acre for TSS, which represents a positive evaluation of current management. However, a substantial proportion of facilities (~1/3 of all monitored facilities) have pollution loading rates above the WLA and further, a small subset of facilities (<1% of all monitored facilities) have pollution loads that are substantially (>10x) greater than the WLA. This small proportion of high loading facilities accounts for 29% of the overall phosphorous load and 20% of the overall nitrogen load of all facilities despite accounting for less than 1% of the overall acreage of facilities covered under this permit. These facilities discharge approximately one third of the overall nitrogen and phosphorous load (Figure 1) corresponding to more than 8,000 lbs. P per year above the WLA. To put this number into context, Virginia's total Stormwater Local Assistance Fund grant program, which represents an investment of over $120,000,000 in local and state tax dollars, have achieved only approximately 14,000 lbs. of P reductions since its inception with an average cost efficiency of $8-15,000 per lb P.[1] Governor Northam just announced that $50 Million would be included in his budget for 2020 in the coming session. If this investment were to achieve 8,000 lbs, of phosphorous reductions it would be widely viewed as a success. And yet these water quality monitoring results demonstrate actions at just 6 facilities could achieve similar results.

Thus the pollutant loads coming from these facilities are substantial relative to the state's overall efforts to address stormwater pollution and will produce a benefit that has

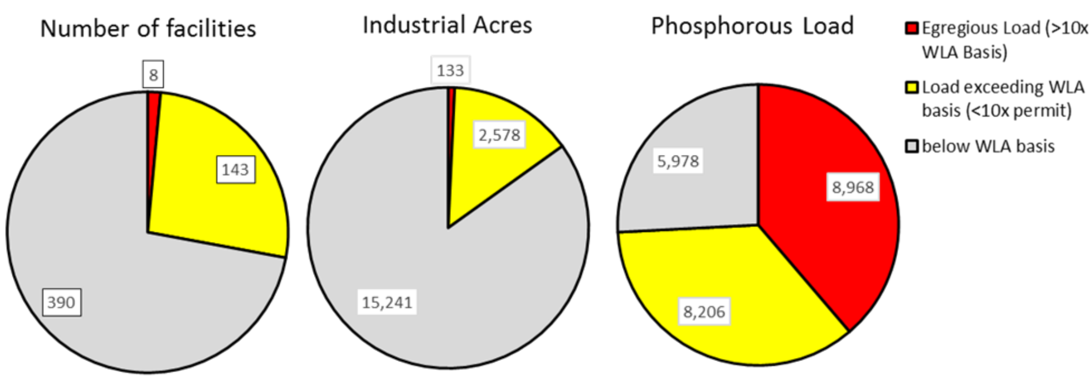



Figure 1, Facilities, industrial acres and phosphorous loads (lbs/acre/year) categized by monitoring results

[1] The average project cost efficiency has from 2014-2017 was $15,534 per lb. P while the project size weighted average was $8,700 per lb. P.

tremendous value for Chesapeake Bay clean-up efforts. Even if there is capacity to address these pollutant loads via credit acquisition (as suggested by DEQ at TAC Meetings), such an action would deplete available credits and thus exacerbate challenges for storm water entities working to address pollutant loading. Further, addressing problematic facilities which are accounting for a large proportion of the sector's WLA will help ensure sufficient allocations to allow for future growth.

Now that these facilities have been identified, there is a clear plan for addressing these loads through TMDL action plans. However, it is important to recognize that water quality monitoring was an essential part of this process. The small proportion of high loading facilities across N P & S. represents 20 different Standard Industrial Classification (SIC) codes across the state, and there would have been no obvious way to identify these facilities in the absence of this data. Simply put, the state would not know about these highly concentrated pollution sources in the absence of facility wide monitoring. This clearly demonstrates the value that comprehensive water quality monitoring of stormwater can provide.

These monitoring results are a promising start to effective management of this permit, but over the next 5 years and subsequent permit cycles, innumerable factors which don't qualify facilities for new required monitoring (i.e. facility operating procedures and conditions, precipitation patterns, etc.) will change and have the potential to alter stormwater discharges in ways that cannot be predicted. As such, the data collected to date will become outdated and less effective at guiding the state, unless it is supplemented with continued monitoring. Continued efforts to monitor effluent can be used to identify where problematic changes to nutrient loads occur. Furthermore, for facilities which must develop TMDL action plans, monitoring has the capacity to comprehensively ground truth the success of clean-up efforts and improve the precision of the reduction target.

In summary, monitoring results indicate several attributes about the role industrial stormwater plays in nutrient and sediment loads to Chesapeake Bay. First, it is clear that industrial facilities of many different types have the capacity to operate under conditions that are consistent with the WLA established for this sector in the Chesapeake Bay TMDL. Second, this limited frequency of sampling has provided meaningful results despite substantial variability across date, facility type, and individual operations. Finally, the distribution of data demonstrates that a small number of problematic facilities can substantially influence the overall pollutant loading associated with this permit thus highlighting the importance of reducing pollution at these facilities and continued screening of facilities through nutrient monitoring to identify future problematic facilities.

Despite the critical insights provided by this data, the current proposed draft permit does not include any nutrient monitoring requirements for any facility that has already collected samples required in the previous permit, including those facilities which have documented very high loads. The lack of continued monitoring in these permits is highly problematic and will negatively impact the state's ability to effectively manage nutrient loads from these facilities going forward. Water quality monitoring results, as demonstrated here, clearly provides a critical and unreplaceable tool for the state to utilize in managing future pollution reductions from industrial stormwater.

As such, CBF recommends the Board require nutrient monitoring for all facilities in this permit with variable frequency on the basis of previous results (see table 1). An explanation for how we derived this list of sampling frequencies is found in the attached memo as discussed at a meeting with the Technical Advisory Committee for this permit. This would result in only a single sample per outfall for all facilities which have previously demonstrated low potential for pollutant loading rates (which represents the majority of facilities). For facilities with higher loading rates, increased monitoring should be used to refine TMDL action plan targets and to ensure progress. Finally, we recommend facilities with extremely high nutrient loads (>10x WLA basis) be transitioned to individual permits. Management of such facilities is critical to the states effort to reduce pollution and thus should receive more dedicated, individualized attention due to their propensity for impacting water quality.

Table 1 Recommended Sampling Frequencies for Industrial General Permit Reissuance

| Facility average based upon 4 samples per outfall (or fewer samples if justified by special conditions) | Proposed N & P sampling frequency over the next 5 year permit per outfall | Rational |
|---|---|---|
| New Facility | 4 | This represents an equitable bar to document stormwater loads from the facility as demonstrated with the current data set |
| < WLA Basis | 1 | A single sample in combination with previous results will provide some assurance that any condition change is not driving a pollution problem. In the occurance of a sample exceeding some threshold value (i.e. 2-4x WLA basis), additional investigative sampling would occur prior to TMDL Action Plan implications. This would be repeated in every future permit cycle. Finally, a single sample per outfall doest not represent an unwarranted burden given the high risk previously shown by industrial facilities. |
| > WLA Basis, < 2x WLA basis | 2 | Previous analyses indicate more variability and so an additional sample is warranted. This data could also help confirm action plan targets, or positive responses to management actions. As with the category above, no changes to action plans would be necessary unless new samples yielded valued above an established threshold value. |
| >2x WLA basis, < 10x WLA Basis | 4 | With increasing variability, additional samples is warranted, specifically to ensure the target load reduction is accurate. While slight changes would not warrant a change to TMDL action plan efforts, substantial changes should guide future management decisions about what is necessary. Lastly, such monitoring is especially important to ensure these facilities do not worsen. |
| >10x WLA Basis | 10+, IP* | These facilities represent tremendous pollutant loads and deserve individualized attention (IP* individual permits) as well as continueed tracking through enhanced monitoring to ensure these loads are addressed and don't worsen. |
| Insufficient samples obtained | 4, ESV/I** | **These facilities did not comply with previous permit requirements and thus enhanced site visits and inspections (ESV/I) are warranted |

2. **Develop SIC specific guidance on managing nutrient loads for SIC codes with high loading rates and for highly impervious facilities.**

While no combination of the monitored factors fully explained high pollutant loads, there were a few factors that correlated with higher pollutant loading rates. Several SIC codes had average loading rates well above the WLA basis across all facilities (See Table 2, averages above 5x WLA). The data suggests a select number of industry types (i.e. SIC Codes) produce loading rates that present higher risks (Figure 3). These facility types represent a large proportion of the overall pollution load covered under this permit (Figure 4). As such we recommend DEQ provides specific guidance for management strategies that might be utilized at such facilities.

Facilities with high proportions of impervious surfaces also had higher pollutant loading rates across facilities (Figure 5). While this is not a surprising finding, imperviousness clearly represent a risk factor which can be used to improve management of these facilities. As such, we recommend DEQ provides specific guidance for how to best prevent nutrient loading rates under conditions of high imperviousness (i.e. > 60% impervious) and also recommend efforts to validate reporting data related to imperviousness, through maps and other means necessary.

Table 2 Standard Industrial Classifications with the highest pollutant loading rates (SIC average > 5x WLA Basis).

| STANDARD INDUSTRIAL CLASSIFICATION (SIC) | N | P | TSS |
|---|---|---|---|
| *FERTILIZERS, MIXING ONLY* | *X* | *X* | *X* |
| *PETROLEUM BULK STATIONS & TERM* | *X* | | |
| *INDUST. ORGANIC CHEMICALS NEC* | *X* | *X* | |
| *MEAT PACKING PLANTS* | | *X* | |
| *CORRUGATED/SOLID FIBER BOXES* | | | *X* |
| *CANNED & CURED FISH & SEAFOOD* | *X* | *X* | |
| *PREP FEEDS & INGRED FOR ANIMA* | | *X* | |
| *ELECTRICAL SERVICES* | *X* | | |
| *NATIONAL SECURITY* | *X* | | |
| *EQUIPMENT RENTAL AND LEASING,* | | | *X* |

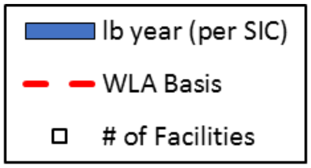
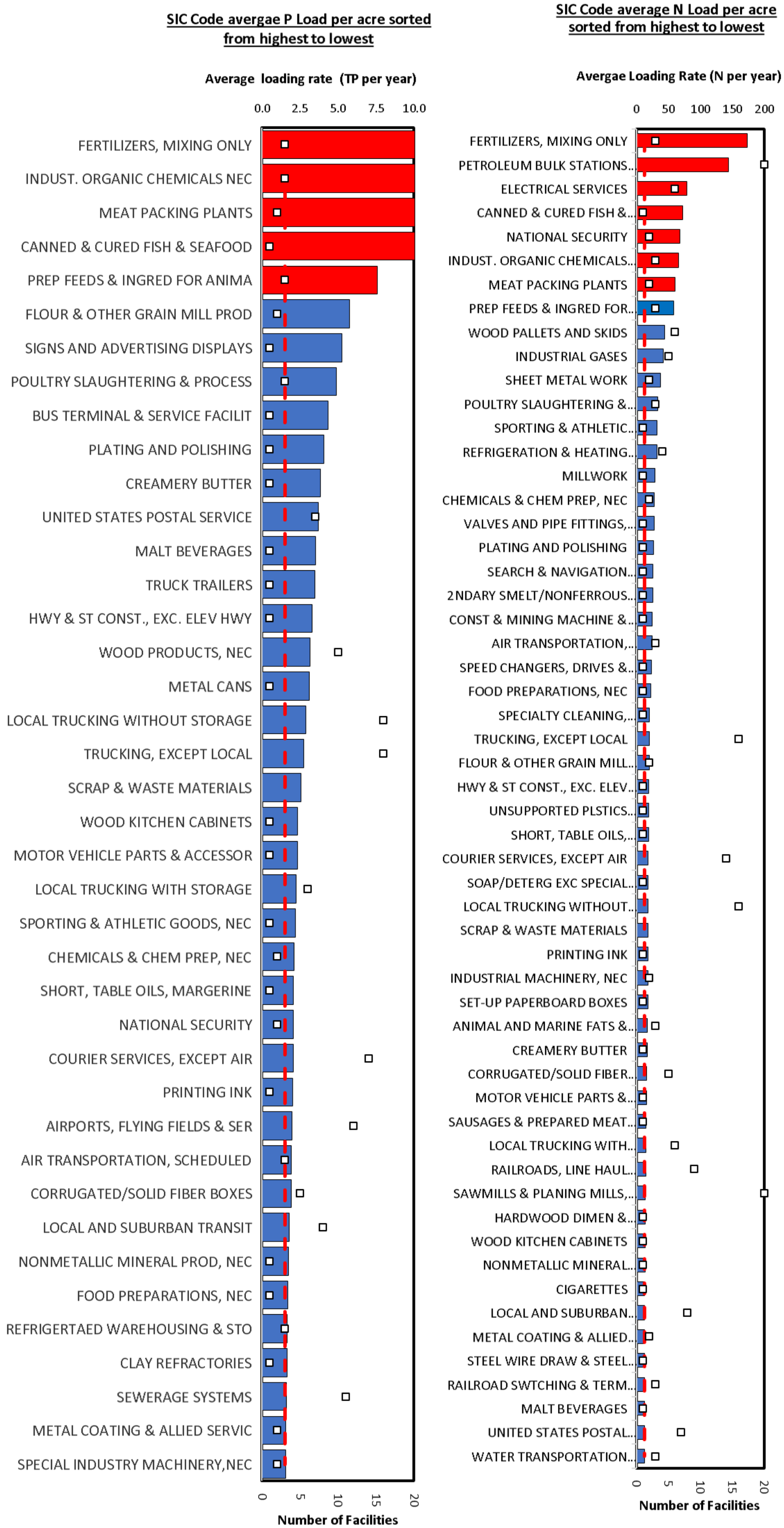



Figure 3, Average pollutant load (N & P, lb per acre per year) for Standard Industrialized Code with average values exceeding the WLA Basis.



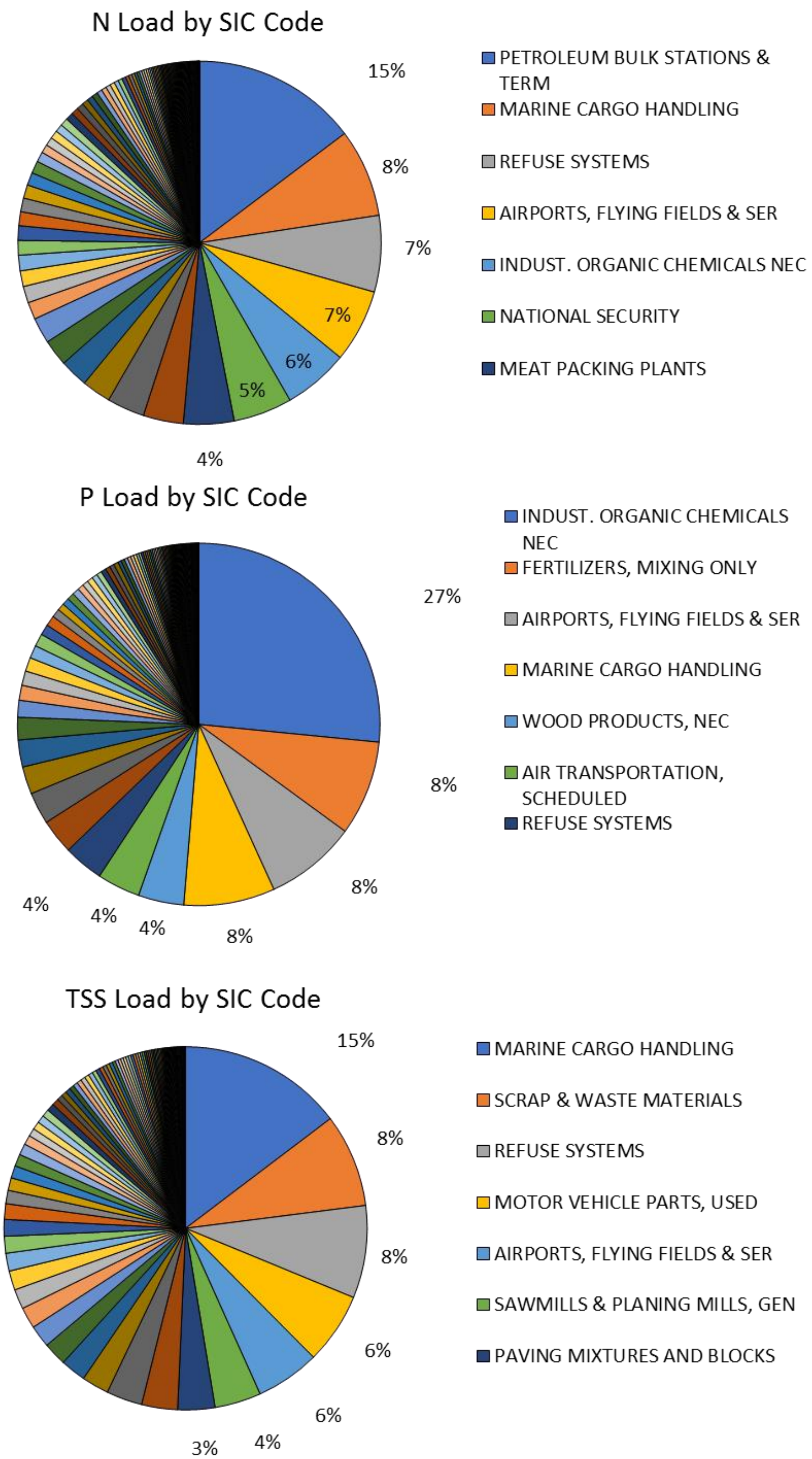



Figure 4, Proportional overall pollutant loads (N & P, lb per acre per year) by SIC Code

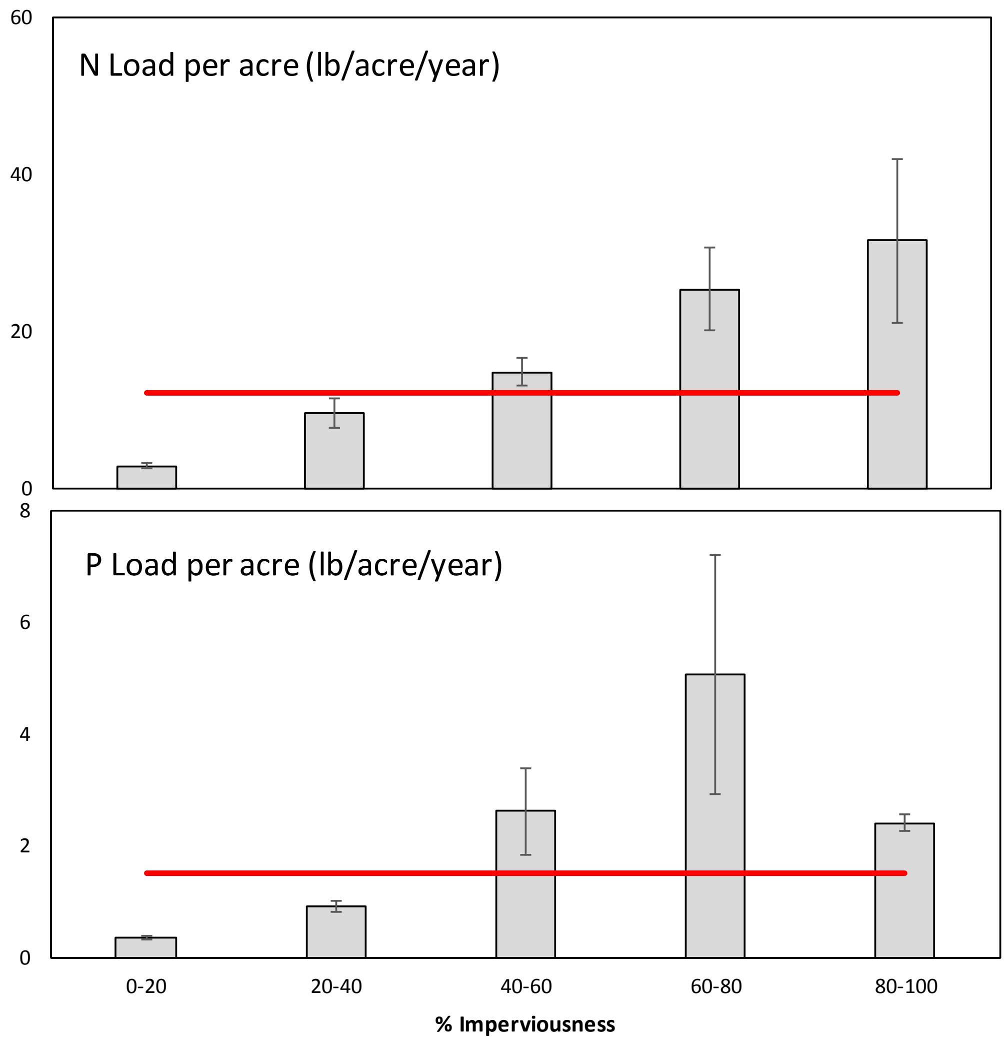



Figure 5, Average pollutant load (N & P, lb per acre per year) by imperviousness

**3. Enhanced enforcement is needed to ensure compliance with permits; a large proportion of facilities did not submit monitoring data however this did not result in any known enforcement action.**

In review of the data submitted by permittees, perhaps the most striking finding was the number of facilities which simply did not submit data despite the permit requirements. This was referenced several times by our industrial partners in the technical advisory committee who requested for DEQ to step up enforcement actions against facilities not complying with the current permit. In response, DEQ has enhanced what calculations will be required to be submitted in the next permit cycle, however, there needs to be a stronger response from the agency to ensure all appropriate facilities are covered under and comply with the permits. As a result of this non-compliance, the state lacks valuable information for managing pollution loads from these facilities.

CBF appreciates consideration of these recommendations. Maintaining water quality sampling and improving enforcement within this permit is fully consistent with Executive Order 6, in which Governor Northam identified water quality monitoring as critical to DEQ's ability to protect water quality. Water quality sampling is invaluable in identifying industry-driven water quality problems and Executive Order 6 provides a directive to raise the bar on monitoring rather than lower it. Industrial activity often involves the use of many harmful materials which can produce very high concentrations of nutrients. The monitoring data collected to date clearly show that there are permitted facilities which discharge very large pollutant loads and can therefore present a significant threat to water quality.

While analyses of reported data suggest the aggregate WLA appears to be sufficient across all facilities; water quality monitoring has identified highly problematic facilities which may have impacts to local water quality. Furthermore, a large proportion of facilities have not yet reported data which makes this assessment tentative. Also, the pollution load from the stormwater sector, as a whole, is largely behind schedule and identifying high loading facilities may represent an opportunity for substantial pollution reductions. Continued nutrient monitoring and enhanced enforcement under this permit will identify further opportunities to address concentrated loads and to protect waterways from industrial stormwater discharges.

Thanks again for all your work on this issue for considering our comments.

Sincerely.

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# Additional Implementation Measures (AIM) for benchmark exceedances

| Level | Trigger | Responses | Deadlines | Reset | Exceptions |
|---|---|---|---|---|---|
| 3 | In Level 2 and annual average is exceeded (or fewer than 4 samples but exceedance is certain) | ✓ Install permanent controls<br>✓ Continue monitoring | ID schedule in 14 days; install in 60, up to 90 days | All Levels:<br>* AIM responses have been met<br>* Continued quarterly benchmark monitoring does not indicate an exceedance | All Levels:<br>* Natural background sources<br>* Run-on sources<br>* One-time abnormal event<br>* Discharge does not result in exceedance of WQS<br>* Site-specific analysis for Al or Cu shows no exceedance |
| 2 | In Level 1 and annual average is exceeded (or fewer than 4 samples but exceedance is certain) | ✓ Implement pollution prevention / good housekeeping measures<br>✓ Continue monitoring | 14 days; if infeasible, 45 days | | |
| 1 | In baseline and annual average is exceeded (or fewer than 4 samples but exceedance is certain) | ✓ Review SWPPP/SCMs<br>✓ Implement additional SCMs, if necessary<br>✓ Continue monitoring | 14 days; if infeasible, 45 days | | |
| Baseline Status | All facilities start at baseline status | | | | |