OFFICE OF WASTEWATER MANAGEMENT
WASHINGTON, D.C. 20460

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MEMORANDUM

SUBJECT: Incorporating Resiliency Considerations in NPDES Permitting

FROM: Christopher Kloss, Director
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TO: Regional Water Division Directors, Regions 1-10

More frequent and intense storm events, floods, droughts, storm surges, sea level rise, and altered waterbody temperatures and flows are occurring across the United States. These changes and the accompanying impacts to water quality can adversely impact communities and the water infrastructure on which they rely. This memorandum provides recommendations about how EPA permit writers can use existing Clean Water Act (CWA) authorities and discretion to build resiliency into EPA's National Pollutant Discharge Elimination System (NPDES) permit program to account for long-term shifts in weather patterns[1] and receiving water conditions.[2]

Permit conditions that more accurately reflect current conditions and consider projected changes in long-term weather patterns and receiving water conditions will ensure continued progress towards achieving the Clean Water Act goal of protecting water quality. New or renewed permits may need to be updated to consider the best available data (e.g., most recent precipitation and receiving waterbody parameters) to ensure permit conditions, such as numeric water-quality based effluent limitations, reflect current receiving waterbody conditions and protect future conditions.[3] Where appropriate, 40 CFR 122.21(e) provides permitting authorities with discretion to determine when or what information is needed for a permit application to be considered complete.

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[1] Shifts in long-term weather patterns include changes to, among others, temperature, precipitation, humidity, sea level rise, and other receiving water impacts.

[2] This memorandum does not impose legally binding requirements on EPA, states, Tribes, or the regulated community, nor does it confer legal rights or impose legal obligations upon any member of the public. The CWA provisions and EPA regulations described in this document contain legally binding requirements. This memorandum does not change or substitute for any CWA provision or EPA regulation.

[3] 40 CFR 122.44(d)(1)(ii) "When determining whether a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for […] the variability of the pollutant or pollutant parameter in the effluent […] and where appropriate, the dilution of the effluent in the receiving water." For more information, see Section 3 of EPA's Technical Support Document for Water Quality-based Toxics Control and Chapter 6 of the NPDES Permit Writers' Manual (6-19).

In addition, EPA permit writers may consider whether it would be appropriate for permittees to assess the impacts from changing long-term weather patterns and receiving water conditions on a permitted system, its discharges, and resulting water quality to comply with permit conditions, including standard conditions like Duty to Mitigate (see 40 CFR 122.41(d)) and Proper Operation and Maintenance (see 40 CFR 122.41(e)). Further, this assessment provides adequate assurance that permitted systems' treatment or control systems "shall at all times properly operate" to effectively manage discharges and reduce the likelihood of upset conditions.[4] Pairing this assessment with the identification of adaptative measures (e.g., plans, best management practices) can help bolster a permitted system's ability to comply with permit conditions under current conditions and protect infrastructure for its expected lifespan. Where appropriate, Clean Water Act section 402(a)(2) and 40 CFR 122.43 provide the authority for EPA to establish permit conditions, including conditions on data and information collection, to ensure compliance with all applicable Clean Water Act requirements and regulations.

Recommended Practices for Integrating Resiliency Considerations into NPDES Permits

1. Identify Best Available Data Sources and Resources

It is best practice for NPDES permit terms and conditions to be developed using the best available data at the time of permit issuance or renewal, including the most current observed data and available data projections. This helps to ensure that NPDES permits incorporate resiliency to protect water quality under current and future conditions.

Permit writers may find that permit applications and local, state, or federal resources already contain data and information (including climate data and information) sufficient to inform permit conditions, but where data are insufficient, data collection may be appropriate. This information may include data on observed and projected changes that are likely to have a significant impact on discharges and water quality. Examples include data on precipitation and storm events, sea level rise, storm surge, stream characteristics (e.g., streamflow, water temperature), discharge monitoring (e.g., effluent volume, pollutants discharged), and inspection and maintenance schedules. Because the impacts from current and projected changes in long-term weather patterns and receiving water conditions are localized and facility-specific, obtaining the best available data on the most local scale is important. In general, permit writers should communicate expectations for what data and data collection methods will be necessary to inform and fulfill permit application and monitoring requirements.[5]

Examples of available public tools and resources for evaluating observed and projected environmental and resiliency data or information across the country include:

- The National Oceanic and Atmospheric Administration's (NOAA) **Atlas 14 Precipitation Frequency Data Server** provides precipitation frequency estimates and is periodically updated. NOAA Atlas 15 will be the first iteration that will (1) account for changing long-term weather patterns, and (2) develop precipitation frequency estimates for the entire United States and its territories.[6]
- EPA's **Creating Resilient Water Utilities** (CRWU) initiative provides water sector utilities with data tools, training, and technical assistance to help utilities understand climate data, identify potential adaptation strategies and implementation options, and understand infrastructure financing to

[4] 40 CFR 122.41(n).
[5] 40 CFR 122.21(e) and 122.43.
[6] For more information, view the NOAA Atlas 15 Informational Page.

increase system resilience. CRWU has developed the **Climate Resilience Evaluation and Awareness Tool (CREAT)** and various mapping tools that feature both observed and projected data.[7]

- The Federal Emergency Management Agency's (FEMA) **Flood Mapping Products and Tools** use observed data to help communities better understand their level and type of flood risk. Examples include the **National Flood Hazard Layer** and the **National Risk Index**. To assist federal agencies, non-federal partners, and grantees of federal funding, FEMA launched the **Federal Flood Standard Support Tool** to assess if projects are located in a floodplain and their vulnerability to future flooding scenarios.
- NOAA's **Sea Level Rise Viewer** visualizes sea level rise and coastal flooding scenarios.[8]
- NOAA's **Climate Mapping for Resilience & Adaptation** (CMRA) includes an **Assessment Tool** that shows climate-related hazards (i.e., extreme heat, drought, wildfires, flooding, and coastal inundation) based on modeled history and projected time periods.[9]
- **U.S. Climate Resilience Toolkit** provides **tools**, data, training courses, case studies, and a framework to help build resilience in communities and businesses. The **Climate Explorer Tool** provides interactive graphs and maps of past and projected climate data by city or county in the United States.[10]
- EPA's **Locating and Selecting Scenarios Online** (LASSO) tool helps users select which climate projections are applicable using multiple variables (e.g., annual precipitation, temperature).
- The United States Geological Survey's (USGS) **National Water Information System** is a publicly available portal in which users can access current and historical surface water data.
- EPA's **Low Flow Statistics Tools Handbook** provides guidance to permit writers on strategies for finding and evaluating appropriate streamflow data sources using the StreamStats web application as well as obtaining estimates needed for NPDES permit development.

2. Conduct a Preliminary Screening

Before issuing or reissuing an NPDES permit, EPA permit writers are encouraged, as appropriate, to conduct a preliminary screening to assess if a permitted system and its related operations[11] are potentially located in a geographic area at risk of adverse impacts that would likely affect any discharges from a point source and their ability to meet permit terms and conditions. This preliminary screening is intended to: (1) determine the current and projected impacts from changes in long-term weather patterns that may affect the permitted system across its lifespan, and (2) provide a basis for establishing appropriate permit conditions informed by the best available observed and projected climate data, where appropriate. The results of the preliminary screening can be included in the fact sheet or administrative record.

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[7] For mapping tools, see CRWU's Climate and Weather Data Maps. For more information on these data and methodology used, see CRWU's CREAT Methodology Guide.

[8] For more information on these data and how to use the tool, visit NOAA's Sea Level Rise- Map Viewer.

[9] CMRA was developed by the United States Global Change Research Program (USGCRP) and is managed by NOAA's Climate Program Office (CPO). For more information about these data, visit the CMRA Assessment Tool Data Sources. For more information on how to use CMRA, visit the CMRA User Guide.

[10] The tool was developed by the USGCRP and is managed by NOAA's CPO. For more information about the data used, visit the About the U.S. Climate Resilience Toolkit Climate Explorer.

[11] "Permitted system" refers to any dischargers (e.g., municipal wastewater, industrial wastewater, stormwater discharges) and their related operations (e.g., projects, designs, procedures, investments) covered under an NPDES permit.

Relevant resources for conducting a preliminary screening may include local or state adaptation, mitigation, resiliency plans or equivalent documents; laws, directives, and policies; prior assessments completed by the permittee; or mapping tools like those described above. EPA permit writers may consider appropriate permit conditions for a more-detailed climate vulnerability assessment when the preliminary screening shows that current or projected climate-related impacts may reasonably affect a permitted system's discharges.

If it is not possible to conduct a site-specific preliminary screening, as is the case for many general permits, the permit writer is encouraged to consider whether it would be appropriate to provide a process for conducting the equivalent of a preliminary screening within the general permit framework (e.g., as a part of the Notice of Intent or the Stormwater Pollution Prevention Plan). The permit writer may establish a threshold that determines if a preliminary screening warrants a more in-depth climate vulnerability assessment.

3. Evaluate Permit Conditions Considering Climate Resiliency

Based on the results from the preliminary screening, an EPA permit writer can consider whether it would be appropriate to include a condition providing for a more in-depth climate vulnerability assessment in the next permit issuance that results in infrastructure resiliency. Climate vulnerability assessments typically include a systematic review of the vulnerabilities and risks that permitted systems and discharges may face under current and projected climate conditions. Current climate conditions should generally be assessed using the most recent observed data, using a time series that more accurately captures relevant and significant impacts, where appropriate. Choosing an appropriate timeframe for long-term weather pattern projections depends on many factors, including site-specific needs, conditions, and the expected lifespan of the permitted infrastructure.[12] There are many possible approaches and variations in the scope and scale of assessments, so the elements should generally be tailored to the different types of permitted systems, as appropriate. Broadly, a climate vulnerability assessment could include the following steps:

1. Creating an inventory of critical assets and operations that determines the size and complexity of the permitted system and an appropriate timeframe for the climate vulnerability assessment.
2. Assessing the likely magnitude and frequency of current and projected climate-related impacts to critical assets and the ability to maintain operations and meet permit terms and conditions under various scenarios.[13]
3. Identifying a range of adaptive measures or best management practices (BMPs) that would increase resilience and minimize impacts on critical assets and operations. These could be included within the permit(s).
4. Developing an implementation plan for applicable and appropriate adaptive measures or BMPs identified and recommended in the vulnerability assessment.

Adaptive measures or BMPs proposed by the permittee in a climate vulnerability assessment can be used to inform permit conditions in subsequent permit renewals, as appropriate.

[12] For example, CRWU's CREAT Methodology Guide discusses time period in the CREAT Risk Assessment Application in Chapter 4.
[13] The National Climate Task Force's Federal Flood Risk Management Standard Climate-Informed Science Approach recommends using multiple climate scenarios. For more information, visit their 2023 State of the Science Report.

Permit writers can consider, when appropriate, other permit conditions that incorporate considerations for climate resiliency. Examples can include:[14]

- **Emergency Response Plans or Procedures:** A plan that outlines procedures, strategies, resources, and plans to prepare for, and respond to, incidents (e.g., extreme or catastrophic events, power outages, equipment failures) that result in a loss of operations. These plans and procedures can better enable a permitted system to operate in accordance with an NPDES permit and protect public health during an extreme or catastrophic event.[15] If the permittee already has one in place, the permitting authority could consider whether any updates to the Emergency Response Plan or procedures would be appropriate, considering the specific climate impacts anticipated at a given permitted system.
- **Asset Management Plans:** This can include inventorying relevant assets (current and planned); conducting condition and capacity assessments; defining performance goals and desired level of service for current systems and relevant assets; and planning maintenance, rehabilitation, replacement, and finances.[16] These can be used to forecast relevant needs and costs associated with current and projected climate conditions. For example, asset management can include the use of smart data infrastructure to enhance the collection, storage, and analysis of water-related data which can be used to inform operation decisions that improve the efficiency, reliability, and lifespan of physical assets.[17]
- **Special Studies or Additional Monitoring Requirements**: These can be considered, when appropriate, to address foreseeable changes to discharges and collect data that were not previously available to a permit writer.[18] Examples of additional monitoring requirements could include monitoring receiving waterbody temperatures by an industrial discharger or tracking precipitation or storm events in conjunction with combined sewer overflow frequency and volume. A special study could include assessing the impact of increased precipitation on inflow and infiltration at a publicly owned treatment works, and more specifically, its impact on treatment plant efficacy.
- **Best Management Practices**: Examples of climate resilient BMPs and ways to support resilient BMPs include:
    - **BMP Designs Using Best Available Data:** Require or encourage permittees to incorporate the best available observed and projected climate data when designing their selected control measures or BMPs. For example, a stormwater construction permit could require stormwater controls to account for design factors, such as the expected amount, frequency, intensity, and duration of storms using the most recent precipitation data available.[19] Another example could include an industrial stormwater permit requiring enhanced pollution prevention measures to minimize discharges from major storm events, such as requiring certain materials or wastes be

[14] Several issued NPDES permits have included resiliency considerations in permit conditions; they can be identified by using the "Special Topics" filter in the NPDES Permit Writers' Clearinghouse. For more resources, see EPA's Tools to Enhance Resiliency in the NPDES Program.
[15] For example, see EPA's Wastewater Utility Emergency Response Plan Template and Instructions.
[16] Region 9 2014 Report on Incorporating Asset Management Planning Provisions into NPDES Permits.
[17] More information and examples can be found at EPA's Smart Sewers and Smart Data Infrastructure for Wet Weather Control and Decision Support Report.
[18] CWA section 402(a)(2) authorizes EPA to prescribe conditions for permits to assure compliance with the requirements in section 402(a)(1) of the Act, including conditions on data and information collection, reporting, and such other requirements as it deems appropriate. For more information on special conditions, refer to the NPDES Permit Writers' Manual: Chapter 9.
[19] See, e.g., EPA's 2022 Construction General Permit, Part 2.1.1(a), which is based on 40 CFR 450.21(a)(5).

stored above the base flood elevation to reduce the risk of pollutant discharges during flooding events.[20]

- **Update Maintenance Manuals or Procedures**: Encourage permittees to update maintenance methods and schedules depending on climate impacts to BMPs, informed by a climate vulnerability assessment, additional monitoring, or inspections. This could be paired with encouraging employee training or workforce development on climate-related impacts, such as planning for what to do in the event of major storms.
- **Increase Inspection Requirements and Resources:** Require or encourage permittees to evaluate and update their infrastructure inspection frequency and prioritization to account for relevant changing climate impacts to ensure that BMPs are maintained and performing as intended. To aid the inspector with these requirements, provide tools and resources for what each permit condition entails to ensure that the inspection adequately assesses compliance. For example, a permit could require inspections of critical stormwater infrastructure after major storm events, in addition to routine inspections.
- **Public Education, Outreach, and Engagement**: Require or encourage permittees to incorporate considerations for climate resiliency into education, outreach, and engagement activities depending on the type of discharger and applicable legal authorities. For example, a small municipal separate storm sewer system permit could require that the permittee's public education and outreach activities incorporate educating the public and customers on (1) the impacts of precipitation changes on stormwater discharges, (2) what strategies and actions the permittee is planning to implement to minimize those impacts, and (3) how the public can assist in those efforts.[21]

Permit writers should also consider the following permitting options where appropriate:

- **Encourage Green Infrastructure:** EPA permit writers can allow permittees to identify opportunities to use green infrastructure to meet permit requirements.[22,23]
- **Update Numeric Effluent Limitations**: When developing water quality-based numeric effluent limitations, permit writers should consider using EPA's Low Flow Statistics Tools Handbook and Thermal Discharges in NPDES Permits: Overview of Resources and Tools, where appropriate. Specifically, when permit writers conduct a reasonable potential analysis to determine if a discharge will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, it is generally advisable that permit writers use the most reasonable range of recent data. The range of data should generally be sufficient to represent current climate conditions and other relevant conditions (e.g., temperature profile, streamflow levels).[24] Using full historical records may not accurately represent conditions for the upcoming permit term.

[20] See, e.g., EPA's 2021 Multi-Sector General Permit.
[21] 40 CFR 122.34(b).
[22] CWA section 402(s) and CWA section 519. CWA Section 519 states "The Administrator shall promote the use of green infrastructure in, and coordinate the integration of green infrastructure into, permitting and enforcement under this Act, planning efforts, research, technical assistance, and funding guidance of the Environmental Protection Agency."
[23] For examples, see EPA's Compendium of MS4 Permitting Approaches Part 6: Green Infrastructure, the Green Infrastructure and Clean Water Act Requirements Resources, and the NPDES Permit Writers' Clearinghouse.
[24] See footnote 3 on p. 1.

- **Incorporate Permittees' Current or Ongoing Resiliency Work into Permits**: Many communities or permittees may have already completed or are in the process of completing resilience-related activities relevant to a permitted system's activities. EPA permit writers can incorporate relevant and robust resiliency work (in whole or in part) that a permittee has identified to satisfy relevant NPDES permit requirements. EPA permit writers can also consider how to build on prior work if needed.

Generally, it is best practice to include supporting information, including data and resources considered, in the administrative record and fact sheet to explain why permit conditions are necessary to avoid an unlawful discharge.

4. Coordinate Conditions with Other Permit Programs

EPA permit writers should consider communicating proposed permit conditions across other relevant program areas (e.g., relevant municipal contacts and other regulatory authorities, which can include combined sewer overflows, stormwater, wastewater, and industrial) to identify areas of potential collaboration and, where appropriate, utilize an integrated planning or a watershed planning approach to permitting.[25] Both of these would enable a holistic permitting approach to address the impacts from changing climate conditions and may result in more effective long-term resiliency. Integrated planning, for example, is designed to help municipalities identify efficiencies in implementing requirements in wastewater and stormwater programs, including how to best prioritize capital investments and facilitate sustainable and comprehensive solutions.[26]

[25] For more information on implementing integrated planning, visit EPA's Integrated Planning Implementation Documents. For more information on watershed-based permitting, visit EPA's Permit Limits-Watershed-Based Permitting.
[26] For case studies, see the Leveraging the Integrated Planning Framework for Advancing Climate Resilience and Environmental Justice report and the EPA's Report to Congress on Integrated Plans and Interactive StoryMap.