Navigating the NPDES Permitting Process For Water Reuse Projects:
Strategies to Enable Recycling And Protect Water Quality

(Note to Reviewers: This draft paper is an outgrowth of our prior effort to develop a Question and Answer document addressing NPDES permitting issues associated with water recycling and stormwater capture projects. Based on comments received from reviewers of the draft Q&A and discussion among the Action lead organizations, we decided to develop more of a “White Paper” type approach, focusing in large part on illustrative examples of how specific permits have addressed challenging issues with recycling activities.

This draft paper addresses many but not all the issues raised in the draft Q&A document because several issues did not seem to be of significant concern to practitioners. As you review this draft paper, please think about whether we are touch on all the reuse-permitting issues and challenges that concern your organizations, and please help us identify specific illustrative examples of permitting flexibilities. Where possible, please include specific permit names/numbers/contacts when you mention a specific permit. Also, please keep in mind that an example illustrating how a particular permitting strategy was applied need not be for a recycling project, though we would like to include many examples that do address recycling-related settings. Please make your comments in track changes format with comments. Thank you in advance for your comments.)

Draft, 3.20.21

NOTE: This draft White Paper does not necessarily represent the policies or positions of the US EPA or any group participating in the development of WRAP Action 2.2.6. Please do not distribute without authorization from the Action co-leads.
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Introduction

Throughout the U.S. and abroad, there is increasing interest in recycling wastewater and stormwater to augment scarce water supplies, strengthen resilience of water systems, improve water quality, and yield other benefits. Thousands of water recycling projects have already been implemented that collect, treat, and distribute water for potable and non-potable uses. These projects range from large catchment-scale efforts to small building-scale projects. While some projects manage recycled water entirely on the surface, others direct recycled water to groundwater aquifers for later extraction and use. Practitioners are learning a great deal from their implementation experiences, and through the national Water Reuse Action Plan and other efforts, a major effort is underway to assist water managers in developing and implementing safe, effective recycling projects across the nation.

Some water reuse projects involve or affect discharges regulated through NPDES permits. Recycling project treatment systems may create new discharges subject to permit requirements, and wastewater recycling and stormwater harvesting practices may cause changes in the quantity and quality of wastewater and stormwater discharges. Depending upon the specific project details and associated permitting approaches, NPDES permitting requirements may enable or hamper water reuse. Many reuse practitioners have cited permitting (including NPDES permitting in many cases) as a challenge in developing and implementing reuse projects. Fortunately, early adopters of wastewater reuse and stormwater capture projects have generally found it possible to work successfully with permitting authorities to devise workable permitting approaches to authorize and facilitate these practices.

Action 2.2.6 of the Water Reuse Action Plan is addressing NPDES permitting challenges associated with water recycling through cooperative efforts by a diverse group of permittees, permitting authorities, recycling experts, and other stakeholders to explore permitting concerns and opportunities, identify promising approaches to address permitting challenges, and highlight case studies where reuse proponents have successfully navigated the NPDES permitting process.¹ This paper summarizes the key permitting challenges and associated permitting strategies that can effectively address these challenges, drawing upon specific case studies that illustrate how these strategies can work. The paper will provide a basis to conduct outreach and training with permitting authorities, wastewater and stormwater managers, and reuse proponents in the future. It is not the intent of this action to expand NPDES permitting

¹ While researchers have generally explored the effects of permitting and regulation on use of innovative water management practices including reuse, little work has directly explored NPDES permitting implications of wastewater reuse and stormwater harvesting. A reference list of relevant research publications is included at the conclusion of this paper. In particular, we recommend Kiparsky, et al., 2016, Sherman et al., 2020, and Ajami, Thompson and Victor, 2014.
coverage or requirements, create formal guidance, or to create new interpretations of existing NPDES requirements in any way. The intent is to identify NPDES permitting challenges that may be of concern to reuse practitioners and discuss how these challenges have been addressed in permits developed across the U.S. Discussing approaches taken to address these challenges may also help permitting authorities and permittees better understand the range of approaches available to develop permits that incentivize recycling activity.

NPDES permits regulate water discharges to protect the quality of receiving waters; they do not directly regulate water recycling activities. Water reuse projects are generally regulated through state-based requirements that vary from jurisdiction to jurisdiction. As discussed above, recycling projects can, in some cases, involve new discharges to receiving water that are subject to NPDES requirements. In other cases, recycling wastewater or stormwater may change the characteristics or timing of discharges that affect associated NPDES permits. Currently, 47 states are authorized to operate the NPDES permits program within their states. This means that EPA has approved a state-developed permitting program as meeting NPDES permitting requirements. In some authorized states, the permitting authorities elect to incorporate provisions in facility permits both under the authority of the federal NPDES program, and under state-based authorities. EPA neither encourages nor discourages this practice, as authorized states have discretion to determine the structure of facility permits, as long as they meet NPDES requirements. In this paper, discussion of situations where states incorporate state-based provisions in permits that go beyond minimum NPDES requirements does not imply EPA or other organization endorsement of these approaches. Rather, examples identified are merely intended to illustrate the range of methods states have used to address reuse challenges in the context of NPDES permits.

NPDES permitting involves more than just the permitting rules. It is important to view NPDES permitting as a process involving (1) the permitting rules themselves, along with the information and analysis supporting permit development, (2) the individual and institutional characteristics of regulators and their relationships with the regulated community, and (3) the broader regulatory context within which recycling project, wastewater utility, and stormwater managers (as applicable) and regulators operate, encompassing regulation under the CWA, and other federal, state, and local laws (Sherman, et al., 2020). This action focuses on the first of these process elements, clarifying application of NPDES permitting rules, with the intent of creating information that will inform the second element concerning regulator and permittee relationships. We also touch briefly on the third element of this process concerning the broader regulatory context in the next section. Considering each of the elements of the permitting process should enable permitting authorities, permittees, and stakeholders to work better together to solve potential challenges that arise during permit development.
The Broader Regulatory Context

This WRAP action does not seek to address in detail the broader regulatory context in which reuse projects impact NPDES permitting requirements. However, a brief review of other regulatory processes that can affect the ability to pursue water reuse will help inform a broader understanding of the regulatory challenges and opportunities project proponents face in navigating the project approval process.

In some cases, NPDES permitting directly intersects with other regulatory programs (e.g., in cases where states elect to include non-NPDES requirements under state law within their NPDES permits), and this paper explores some of those points of intersection. Some types of recycling projects may also affect multiple NPDES permits. For example, a project to recycle wastewater as potable water may affect the permit for the wastewater treatment plant that supplies water for recycling, and require a separate permit for residuals discharges from the potable water treatment plant (EXAMPLE, possibly Valley Water in SF Bay area). A project to route water from storm drains into sanitary sewer collection systems during dry weather may affect both the POTW and MS4 permits (EXAMPLE, maybe Las Virgenes Municipal Water District).

Some NPDES permitting authorities have developed innovative permitting approaches that combine different types of permits to improve coordination in wastewater and stormwater management, assist recycling project development, align permit application and reporting requirements, and enable flexible, innovative approaches to facility design and operation. For example, Oregon DEQ issued one watershed scale NPDES permit for Portland Clean Water Services that regulates 4 wastewater treatment plants and the municipal stormwater system, and enables more coordinated water management (including water recycling) within the watershed (see https://www.oregon.gov/deq/FilterPermitsDocs/MS4CWS-PER.pdf).

Some regulatory authorities have developed permitting resources and procedures intended to help streamline water-related permitting process (ECOS, 2017). (WOULD LIKE TO INCLUDE AN EXAMPLE OF WHERE A STATE HAS DONE SO FOR NPDES PERMITTING).

While compliance with NPDES permitting requirements affecting recycling projects can be daunting enough, many recycling projects need to obtain regulatory approvals from multiple federal, state, and/or local agencies (Ulibarri, et.al., 2017). In situations where NPDES and other regulatory mechanisms do not specifically connect, project proponents generally address regulatory requirements through a sequential, uncoordinated approach that can add substantial time, complexity, and information needs to the overall project development process. Processes like the BRRIT may enable pursuit of a more streamlined approach to multipermit coordination.

In addition to water rights, recycling, and residuals discharge permits, these projects may require additional permits associated with facility siting that involve interactions with the Army Corps of Engineers, federal and state fish and wildlife agencies, coastal and local land use
regulatory bodies, and historical resource preservation offices. Table 1 below summarizes different types of permitting and regulatory processes that may affect recycling projects; see also National Research Council, 2012.

Table 1: Regulatory Processes Potentially Applicable to Recycling Projects

<table>
<thead>
<tr>
<th>Type of Regulation</th>
<th>Basis</th>
<th>Effects on Reuse Projects</th>
<th>Application Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Rights</td>
<td>State water rights laws</td>
<td>May constrain ability to recycle wastewater or harvest stormwater, often require obtaining a water right determination</td>
<td>State water rights law and application vary widely, no national standards or guidelines</td>
</tr>
<tr>
<td>Water Recycling Regulations</td>
<td>State laws and rules</td>
<td>Regulate design and operation of recycling projects to ensure protection of human health and environment; often specify treatment requirements and operational procedures</td>
<td>State recycling rules vary widely. Some specify use-specific treatment and operational requirements; others require case-by-case determinations. States vary in establishing acceptable risk levels for human health protection, provisions to protect groundwater quality, and provisions to require minimum environmental flows.</td>
</tr>
<tr>
<td>Drinking Water System Regulations</td>
<td>Safe Drinking Water Act, associated state laws and rules</td>
<td>For potable use projects, establish treatment and operational requirements. May have different requirements for public water supply systems and smaller scale potable reuse projects</td>
<td>Basic SDWA framework is nationally consistent, but practical application varies across the US.</td>
</tr>
<tr>
<td>Groundwater discharge/aquifer recharge</td>
<td>SDWA Underground injection Control permitting, state groundwater protection rules</td>
<td>Establishes treatment and operational requirements for different types of groundwater recharge and injection; may not clearly address all forms of aquifer recharge (e.g. stormwater BMPs)</td>
<td>SDWA UIC framework is nationally consistent, but states vary widely in whether and how they regulate other types of aquifer recharge and infiltration</td>
</tr>
<tr>
<td>Food safety regulations</td>
<td>FDA Food Safety Modernization Act, produce safety rules, state recycling rules</td>
<td>Working under discretionary federal and state guidelines, states vary in whether and how they authorize use of recycled water on food crops.</td>
<td>FSMA creates nationally consistent risk-based framework</td>
</tr>
<tr>
<td>Onsite water recycling rules</td>
<td>Mostly local, some state-level onsite recycling rules, local plumbing codes</td>
<td>Local and some state onsite reuse rules authorize different types of reuse and establish treatment and operational requirements. These are often codified in local plumbing and building codes.</td>
<td>Communities are increasingly codifying onsite reuse regulations, often informed by the regulatory frameworks and guidance developed by the Blue Ribbon Commission</td>
</tr>
</tbody>
</table>
Facility land use and siting regulations

Local land use regulations, CWA Section 404 permits for discharges of fill to waters, state coastal zone rules

Planning and construction of many recycling projects, especially adjacent to water bodies, may require a variety of permits and clearances from land use regulatory bodies including Army Corps of Engineers (CWA Section 404 permits), local planning bodies, and coastal zone agencies. Clearances from federal and state fish and wildlife protection and historic preservation agencies may also be required.

While the CWA Section 404 permitting process follows national rules and procedures, state and local land use and siting rules vary widely across the US. Expectations of fish and wildlife agencies and historic preservation offices also vary substantially.

Environmental impact rules

National Environmental Policy Act project reviews, state environmental impact assessment rules

Many states require preparation of environmental impact assessments of large scale public and private projects under state law. Some projects require preparation of NEPA documents depending upon their funding sources.

While the NEPA process follows nationally-applicable rules and procedures, state environmental impact assessment requirements vary substantially.

Obtaining regulatory approvals from multiple agencies can be frustrating and time-consuming for project proponents. In most cases, the different regulatory agencies do not effectively coordinate their regulatory processes, making the permitting process more complicated for local project proponents. Different regulatory agencies often request similar data and information for permit applications in different formats, making it difficult for project proponents to efficiently compile needed data and information. Permitting time-tables and procedures are usually uncoordinated among regulatory agencies, which makes it difficult to efficiently prepare applications and supporting materials. Ideally, there should be early coordination among different permitting authorities that issue different permits and environmental clearances for these projects to aid in creating consistent data and information requirements.

Fortunately, some progress has been made in creating permit coordination processes intended to streamline the regulatory process for projects requiring multiple regulatory clearances (Ulibarri, et al 2017). These streamlining processes have generally been motivated in response to pressure from project proponents interested in reducing the difficulty of obtaining permits to comply with multiple regulatory requirements. However, in some states regulatory agencies are working to proactively align and coordinate regulatory processes with an eye toward streamlining the process of obtaining needed project authorizations and permits. For example, the San Francisco Bay Restoration Regulatory Integration Team (BRRIT, 2019) provides coordinated permitting services for restoration and water quality improvement projects.
through a dedicated team of permitting specialists from Army Corps of Engineers, the Regional Water Quality Control Board, the Regional coastal agency, and federal and state fish and wildlife agencies. Two wastewater management utilities are currently working with the BRRIT to clarify and streamline the regulatory process that will apply to proposed projects to discharge wastewater in ways that support wetlands augmentation and increase climate resiliency along the margins of San Francisco Bay. Some regulatory authorities have also sought to streamline issuance of other permitting processes affecting recycling projects. For example, the California State Water Resources Control Board implemented streamlined procedures for obtaining water rights authorization to divert high flows for groundwater augmentation (CA SWRCB, 2016). In 2020, the Army Corps of Engineers proposed a new nationwide Section 404 permit 54.E, designed to expedite permitting of water recycling projects involving relatively small impacts to jurisdictional waters (85 FR 57298, September 15, 2020).

These examples serve to illustrate that NPDES permitting fits within broader regulatory contexts that can complicate the process of recycling project implementation. Efforts by some regulatory authorities to align or streamline regulatory processes suggest there is significant potential to make individual permitting processes, and the overall challenge of obtaining multiple required permits, more efficient. However, the remainder of this paper focuses on NPDES permitting. For now, clarifying how to navigate NPDES permitting affecting water reuse is a sufficient challenge.

**Important Caveats**

NPDES permitting is not a “one size fits all” endeavor. While NPDES permits are based on a common underpinning of Clean Water Act and associated federal regulatory provisions designed to ensure protection of receiving water quality, many of these provisions provide flexibility to enable permitting authorities to best address individual discharge and receiving water situations. Moreover, 47 states are authorized to implement the NPDES program in their states. Over the last 50 years, states have established different implementing rules and procedures, which has resulted in a diversity of state approaches to permitting different types of discharges. Likewise, state and federal courts have weighed in where ambiguity and uncertainty were viewed as problematic. Finally, the specific facts of the purpose and local planning considerations of individual facilities and their discharge circumstances vary widely. For these reasons, we caution readers that this paper does not attempt to create new interpretations of permitting requirements that would be applicable in all situations nor assume that all facilities seek the same outcomes. This paper does not constitute EPA guidance and is not intended to replace or supplement existing permitting rules and guidance developed by EPA, states, or other permitting authorities. Rather, by discussing the types of permitting challenges that may arise in reuse project development and the approaches our peers have taken to address them, we hope the paper will improve understanding of permitting challenges and possibilities, and help prepare permitting authorities and permittees to work together effectively to navigate these situations.
How Do NPDES Permitting and Water Reuse Intersect?

Water recycling projects may identify several types of NPDES permitting challenges. For this paper, those challenges are divided as follows:

1. Challenges associated with permits for municipal and industrial wastewater treatment facilities.
2. Challenges associated with municipal and industrial stormwater management permits.
3. Challenges associated with discharges from water recycling facilities (e.g., plants producing potable or non-potable water from recycled wastewater).
4. Generally applicable or cross-cutting questions and challenges.

The sections that follow briefly review how specific recycling situations present different NPDES permitting challenges and opportunities. Permitting strategies that may offer promise in addressing difficult-to-permit situations are summarized. Example permits and permitting procedures illustrate how these strategies have been applied in specific recycling settings.

Wastewater Permitting Challenges and Strategies

How Does Recycling Affect Wastewater Permitting?

Recycling wastewater may result in changes in effluent volume and characteristics, increased variability in effluent quality, and potential to affect the health of effluent-dependent receiving waters. Municipal and industrial wastewater recycling facilities usually divert treated wastewater for recycling prior to discharge. This can result in production of a lower volume of higher strength, more concentrated effluent since the effluent carries much of the pollutant loading present in influent in a lower volume of water. Effluent characteristics may vary more than normal in situations where diversion of reclaimed water for recycling changes seasonally due to variation in recycled water demand. As some receiving waters are dependent upon effluent discharges to maintain their ecosystem functions, reducing the amount of effluent discharged can adversely affect the ability of receiving waters to maintain their designated ecosystem uses.

NPDES wastewater permits commonly contain both technology based and water quality-based requirements. NPDES permits incorporate applicable technology-based effluent limitations (TBELS) tailored for municipal and different types of industrial discharges. Secondary treatment TBELS for municipal wastewater permits are designed to control solids and organic content in effluent, and Effluent Limit Guidelines for industrial discharges control pollutants of concern for specific industrial categories. Many permits also contain mass and/or concentration-based
water quality-based effluent limitations (WQBELS) with specified averaging periods that vary depending upon the type of discharge and the applicable water quality. More information on different types of wastewater permit limitations can be found in EPA, 2010.

Changes in wastewater effluent characteristics due to water recycling may in some cases make it difficult to meet conventional permit limits. In particular, pollutant concentrations may be elevated in higher strength effluents and concentration-based limitations may be more difficult to achieve. In addition, some facilities include additional treatment to support effluent recycling needs that create new waste streams (e.g., highly saline concentrated brines or filtrate from reverse osmosis filtration).

Some pollutants that can create human health risk are of concern in potable recycling operations because they are difficult to treat through conventional wastewater treatment methods (e.g., low molecular weight solvents, some pesticides, and some other organic compounds). Special source control approaches may be warranted to ensure these contaminants are not introduced into wastewater collection and treatment systems.

Finally, municipal wastewater treatment plants are generally classified as either major (usually greater than 1 MGD discharge) or minor (less than 1 MGD). This classification usually has ramifications in terms of monitoring and reporting requirements. Implementation of a recycling project may substantially reduce the volume of discharged effluent and could create interest in reclassifying the facility as a minor discharger.

**How Can Permits Address These Recycling-Related Challenges?**

**More Concentrated Effluents**

EPA regulations authorize but do not require concentration-based limits; however, permits must include limitations as necessary to meet applicable water quality standards. In cases where effluent concentrations are elevated, some permits set only mass-based WQBELS that are adequately protective of receiving waters, meet applicable water quality standards, and are consistent with the requirements of federal regulations. Expressing limits solely in terms of mass where concentration-based limits would be difficult to meet EPA can address situations where local concentration exposures are not a principal concern in meeting applicable water quality standards. For example, it may be feasible to set only a mass-based limitation that implements applicable standards for toxicants in a case where the underlying concern is long term bioaccumulation through the food chain in a receiving water with long residence times (meaning that pollutant concentration within a particular time period is less of a determinant of bioaccumulation potential than long term mass loading). Include example here.

WQBELs are also commonly based on applicable wasteload allocations established through Total Maximum Daily Loads (TMDLs) for particular NPDES-regulated facilities. In some cases, TMDLs have established protective mass-based wasteload allocations for NPDES facilities that are less stringent than concentration-based WQBELs that would be calculated in the absence of
the TMDLs (personal communication with Tom Mumley, San Francisco Bay Water Quality Control Board, 1.21.21). Example, potentially SF Bay Hg

Our review of permitting challenges associated with recycling projects did not indicate significant concerns about meeting secondary treatment requirements for municipal discharges. However, industrial dischargers could have different challenges in meeting technology-based requirements expressed through some Effluent Limitation Guidelines (ELGs). Many ELGs are based on mass per unit production (e.g. 40 CFR 409, 419, and 430). In these cases, there is likely no potential change in technology-based limits (TBL) with a reduction in process flow due to recycling. However, some ELGs establish other methods for developing technology-based limits. For example, the ELG for Organic Chemicals, Plastics and Synthetic Fibers (OCPSF) (40 CFR 414) generates mass-based effluent limits based on a concentration limit and a process flow. If an OCPSF facility were to recycle process flow, in its next permit renewal the process flow used in the TBL calculation could be lower and result in more stringent mass-based permit limits. This approach could create a disincentive to recycle process water. If the portion of process water recycled is counted as process flow in the TBL calculation this potential penalty for reuse can be mitigated. In calculating effluent limits for municipal discharges, permit writers generally apply the facility design flow, even if actual flow is lower due to recycling activity. Example:

**Variable Effluent Quality**

In some cases, permits include different limit averaging periods in ways that reduce the impact of discharging higher strength effluents that vary in quality over time. Under certain circumstances where daily, weekly, or monthly-based limits are impracticable, it is permissible to express effluent limitations in averaging periods other than daily, weekly, or monthly time steps. Permitting authorities have greater flexibility to determine appropriate averaging periods for limits addressing non-continuous dischargers as long as the applicable water quality standards are met. For example, it may be unnecessary to set daily limits for nutrient discharges to lakes if the underlying water quality concern is prevention of long-term eutrophication. This approach could aid permitting wastewater discharges in cases where effluent quality varies due to changes in water recycling. Example

Seasonal limits have been utilized for many years in the NPDES program and can be developed utilizing standard permitting procedures. Seasonal water quality-based effluent limitations have been developed for wastewater and stormwater permits that account for differences in loadings and receiving water effects. For example the permit for the Cottage Grove OR wastewater facility discharge incorporates seasonal WQBELs [https://www.deq.state.or.us/wqpr/3250_A1101140851303003408.PDF](https://www.deq.state.or.us/wqpr/3250_A1101140851303003408.PDF). The Denver MS4 permit includes seasonal and flow-based requirements for bacteria control that account for variability in bacteria loadings. Other examples of longer averaging period/seasonal permit limitations here. Setting seasonal effluent limitations may aid permitting in cases where recycled water demand varies seasonally. In addition, in areas where receiving water dilution capacity varies seasonally, it may be feasible to schedule the timing of discharges to take full
advantage of available dilution capacity of receiving waters to better assimilate discharges of higher strength effluents. **Example here**

**Difficult-To-Treat Pollutants and Source Control**

Water managers and regulatory authorities are increasingly interested in using source control methods to avoid introduction of difficult-to-treat pollutants into wastewater or stormwater collection systems. The State of Washington, for example, includes in its water reclamation regulations a section focusing on source control through pretreatment ([https://apps.leg.wa.gov/WAC/default.aspx?cite=173-219-300](https://apps.leg.wa.gov/WAC/default.aspx?cite=173-219-300)), which references federal pretreatment regulations applicable to industrial wastewater. As part of its process to develop regulations for direct potable reuse, Colorado is considering creation of “enhanced” pretreatment requirements to enable more effective source control of difficult-to-treat industrial pollutants discharged to collection systems (Carollo Engineers, 2018) (BETTER CITATION?) (SPECIFIC PERMIT EXAMPLE?)

POTW pretreatment requirements are designed to ensure a consistently treatable quality of influent wastewater, and therefore can be adapted to protect the operation of advanced water treatment processes, which may help enhance the quality and reliability of effluents that are recycled. WRAP Action 2.2.4 is exploring how to better use pretreatment program tools to help enhance the quality and reliability of effluents that are recycled. In addition, two recent reports discuss in greater detail pretreatment program mechanisms that could be used to achieve improved source control (NWRI, 2020 and WE&RF, 2017).

**Effects of Industrial Water Recycling on Industrial Pretreatment**

When industrial facilities recycle more of their process wastewater, it may reduce the amount of wastewater discharged to sanitary sewers. Many categorical pretreatment standards already account for the possibility of onsite recycling of wastewater and were designed assuming it would occur. **Example.** Categorical pretreatment standards would not change in these circumstances. With respect to non-categorical industrial users, local pretreatment programs have flexibility in allocating local limits and could potentially re-allocate according to individual industrial users’ recycling operations (as long as the influent at the downstream wastewater treatment plant is maintained at a consistently treatable quality). **Example**

**Minimum Receiving Water Flows**

Several states have established minimum flow requirements on rivers and streams for many reasons, often related to downstream water rights preservation, aquifer protection, and ecosystem protection. These provisions are generally incorporated pursuant to state law and policies. Many receiving streams and rivers in drier parts of the country rely on wastewater effluent discharges to maintain flows necessary to support aquatic habitat and other designated beneficial uses (Luthy, et. al., 2015). In some areas, there is concern that reducing or ceasing wastewater discharges could lower receiving water flows below levels necessary to
protect these uses. While there is no federal requirement to incorporate permit provisions designed to ensure that a minimum level of receiving water flow is maintained, some state permitting authorities include minimum flow requirements in permits designed to protect receiving waters and/or ensure the integrity of the permit’s reasonable potential calculation. For example, the AZPDES permit for City of Flagstaff, AZ’s discharge to Rio de Flag (from a facility that recycles much of its effluent) includes a minimum discharge provision designed to maintain instream flows in this effluent dependent river (https://static.azdeq.gov/pn/191128_flag_fs.pdf). Other states are currently evaluating whether and how instream flow needs should inform NPDES permitting. The State of California is currently evaluating minimum flow needs for the Los Angeles River to inform decision-making on whether to include minimum discharge requirements for NPDES discharges to the River (SCCWRP, 2020).

Some communities are also exploring the reuse of treated effluent to provide sufficient flows to create or restore aquatic ecosystem services or offset increased upstream flow diversions for consumptive use. Newly discharging effluent to receiving waters for this purpose may require new NPDES permits. For example, a proposed project to discharge treated municipal effluent to Hillsborough River, near Tampa, FL to offset increases in upstream diversions for potable use was not implemented in part due to difficulties in obtaining an new NPDES permit for the new proposed discharge (Luthy, et. al., 2015).

Pursuant to applicable state water rights, some states have limitations on diversions of water for recycling purposes if those diversions impair downstream water rights. In some cases, these limitations apply to recycling stormwater and wastewater that would, in the absence of a recycling project or practice, be discharged to a receiving water. For example, Colorado Water Rights Law limits some forms of wastewater recycling because effluent is generally required to be discharged. (THIS IS OVERSIMPLIFIED- EDITS AND CITATIONS INVITED). Federal NPDES requirements do not address state water rights requirements, but we note that some states incorporate provisions in NPDES permits to implement these state law requirements.

EXAMPLE

**Permitting Strategies to Enable and Incentivize Wastewater Recycling**

In some situations, NPDES permits include approaches and provisions that incentivize wastewater recycling. First, by establishing effluent limitations that are sensitive to changed characteristics of wastewater effluents and other provisions that clarify operational expectations associated with recycling operations, some permits help ensure permittees know how best to design wastewater treatment and recycling facilities that will meet regulatory requirements. EXAMPLE?

Some states issue general NPDES permits that ease the process of obtaining permit coverage that are applicable to recycling situations. For example, North Carolina DEQ issued a general permit for discharges of small amounts of water from reclaimed water storage and irrigation
operations (https://files.nc.gov/ncdeq/Surface%20Water%20Protection/NPDES/permits/General-Permit-NCG580000-Final-2018.pdf). Other states issue “low threat” general permits that authorize de minimus or short-term discharges that could be associated with recycling facility operations (e.g. filter backwash-related discharges). For example, Arizona DEQ issued a de minimus general NPDES permit that applies to some discharges associated with water recycling operations (http://www.azdeq.gov/node/686).

Some states establish permits specifically designed to provide operational flexibility or to account for several related facilities. Some permitting authorities have issued regional or sector permits that address several facilities within a geographical area, which may help neighboring facilities work with each other to establish connections and manage discharges in aggregate. For example, the San Francisco Bay Regional Nutrient Permit regulates nutrient discharges from 35 municipal wastewater facilities under a group permit, which provides flexibility for participating permittees to pursue discharge trading arrangements and other collaborative approaches (https://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2019/R2-2019-0017.pdf). This type of approach could enable a municipal wastewater facility and neighboring recycled water treatment facility to cooperate in managing discharges from each facility in ways that reduce their overall compliance challenges.

**Stormwater Permitting Challenges and Strategies**

**How Does Stormwater Capture and Use Affect Stormwater Permitting?**

Municipal Separate Storm Sewer System (MS4) permits include provisions to implement measures, including post-construction stormwater management in new development and redevelopment and, in many cases, water quality-based provisions to reduce the discharge of pollutants in stormwater from the MS4. Increasingly, permits for combined sewer systems are also including provisions aimed at encouraging stormwater capture to reduce the volume of wet weather runoff reaching CSO collection systems. Many municipalities are finding that implementing green infrastructure, including stormwater practices designed to infiltrate stormwater to groundwater aquifers or use retained stormwater for consumptive uses, can be effective in reducing the volume of stormwater discharged to water bodies and the pollutants contained in the stormwater. Depending upon how these practices are designed and considering local conditions and applicability, they can significantly augment aquifer recharge and/or provide treated stormwater for consumptive uses like landscape irrigation and reducing demand on potable water supplies.

Many practitioners have noted the importance of ensuring stormwater infiltration practices incorporate effective treatment where necessary to protect aquifer water quality (see, e.g., Musik and Job, 2021). Some stormwater infiltration through injection wells is regulated by the
Underground Injection Control (UIC) program and UIC programs may be able to assist municipalities in protecting groundwater as well as surface water when implementing green infrastructure and aquifer storage and recovery projects. Other stormwater infiltration practices are regulated under state rules that vary substantially among states.

**How Can Permits Address These Recycling-Related Challenges?**

*Addressing and Incentivizing Stormwater Capture and Use Through Permits*

Permitting authorities have substantial flexibility in establishing effluent limitations and other provisions in MS4 and CSO permits. EPA’s MS4 Permit Compendium series provides many examples of how different permitting approaches have been implemented in NPDES permits (see [https://www.epa.gov/npdes/municipal-sources-resources](https://www.epa.gov/npdes/municipal-sources-resources)). In particular, post-construction standards and water quality-based provisions in MS4 permits have been structured to reduce polluted stormwater discharges by requiring or encouraging implementation of retention and detention practices that enable capture and use of stormwater.

The San Diego Regional MS4 permit provides for inclusion of stormwater capture and use projects to help meet permit requirements in two ways. First, as part of the permit’s land development requirements, all projects are required to maximize use of low impact development practices, including but not limited to stormwater and rainwater harvesting and reuse practices. Second, the San Diego permit incorporates alternative compliance provisions consistent with the State Water Resources Control Board’s precedential Order WQ 2015-0075, which discusses how alternative compliance options can be incorporated in MS4 permits. The Order incorporates seven principals to encourage implementation of watershed-based management strategies such as stormwater capture and use that yield multiple benefits. The San Diego Regional MS4 permit incorporates these provisions by requiring co-permittees to include strategies in watershed Water Quality Improvement Plans (WQIPs) required in the permit that address the highest priority water quality conditions. Through these WQIP provisions, co-permittees can implement stormwater capture and reuse projects as a strategy to address high priority pollutants. The flexibility in the permit allows for but does not require inclusion of stormwater capture and reuse projects in this way.

Several existing MS4 permits are structured to focus on implementation of actions that have been shown to be effective in reducing or preventing stormwater discharges in lieu of including discharge limitations that focus on performance outcomes (e.g., concentrations of certain pollutants in stormwater discharges). For example, see District of Columbia Permit ([https://www.epa.gov/sites/production/files/2018-10/documents/2018_permit.pdf](https://www.epa.gov/sites/production/files/2018-10/documents/2018_permit.pdf))
Other MS4 permits are specifically designed to incentivize investments in stormwater capture and use. See, for example, the Los Angeles Regional MS4 permit featured in the text box.

Some MS4 permits require permittees to demonstrate that stormwater management practices or projects designed to ensure permit compliance are likely to be effective in controlling specific pollutants of concern (e.g., pollutants addressed in TMDLs or for which receiving waters are impaired). Permitting authorities have taken different approaches to providing demonstration of effectiveness of stormwater capture practices in controlling pollutants of concern, including the use of modeling and evaluation of data concerning the effectiveness of specific stormwater management practices including onsite stormwater capture. (For further information, see Paradigm Environmental, 2017, PG Environmental, 2018.)

Conveying Water Through Storm Drains for Downstream Recycling

MS4 permits generally prohibit dry-weather discharges to storm drain systems since they are often indicators of illicit discharges of non-stormwater. However, some permitting authorities have authorized certain planned stormwater discharges to storm drain systems for the purpose of downstream recycling prior to the point of discharge to jurisdictional waters, or after the point of discharge to jurisdictional waters if applicable permit discharge limitations can be met. (EXAMPLES?)

Setting Stormwater Performance Expectations To Address Capture and Use

Some MS4 permits incorporate provisions that track implementation of larger scale centralized detention and infiltration facilities and/or smaller scale, distributed practices that may result in capture and recharge across the permitted jurisdiction. (EXAMPLE, perhaps DC or LA) Municipal stormwater permits may address activities designed to capture stormwater for use in several ways. MS4 permits can be designed to authorize compliance with permit requirements

Los Angeles MS4 Permit Encourages Stormwater Capture Through Alternative Compliance Path

As Southern California faces substantial water supply challenges, there is strong interest in encouraging stormwater harvesting for use to help supplement existing water supplies. The 2016 Los Angeles County MS4 Permit enables dischargers to implement compliance approaches based on development of watershed management plans (WMPs) that specify long-term stormwater control strategies and projects to meet water quality-based requirements in the permit as an alternative to meeting receiving water limitations for individual pollutants.

One variation on this alternative compliance approach provides additional flexibilities for "Enhanced" WMPs that explicitly commit to implementation of stormwater harvesting projects. The Regional Water Board added this option to help advance its objectives of enabling more stormwater capture for use and encouraging more integrated water management planning.

through demonstration that specified practices and controls are implemented that are sufficient to implement required minimum measures and any applicable water quality based requirements (e.g. TMDL-based requirements related to specific pollutants and wasteload allocations) (EXAMPLE, perhaps Middle Rio Grande). In cases where retention/detention of stormwater is a key element of the stormwater control plan, permits may enable permittees to demonstrate compliance by tracking and reporting implementation of specific projects that accomplish specified amounts of flow detention/retention (and associated capture for use, where appropriate) (EXAMPLE, perhaps Denver MS4 PERMIT COS000001, December 2020). Permits usually do not require detailed monitoring of individual practices once the effectiveness of specified practice designs is established and documented.

**Water Recycling Facility Permitting Challenges and Strategies**

Many water recycling operations use reverse osmosis treatment, which can generate high strength brine residuals. In many cases, these brine residuals are high in salts and other pollutants. Recycling operators have used 4 main pathways for managing and discharging these residuals:

1. Surface discharge to a receiving water subject to an individual facility or general industrial NPDES permit.
2. Discharge to a POTW collection system for treatment at POTW subject to POTW’s NPDES permit.
3. Underground injection or recharge of residuals subject to Underground Injection Control (UIC) or other state groundwater protection/land application permit (if applicable).
4. Evaporation of residuals, possibly subject to state permitting requirements.

A reverse osmosis permitting roadmap developed for the State of Texas provides a useful listing of permitting considerations and pathways for desalination projects; much of this framework may be applicable in evaluation of permitting options for discharges of concentrated residuals associated with recycling projects (R.W. Beck, 2004).

*Discharging Concentrated Residuals to Saline Waters or Waters with Dilution Capacity*

Development of NPDES permit limits for direct discharges or indirect discharges of concentrated residuals is generally more straightforward in situations where the ultimate receiving water is saline and/or subject to substantial dilution with non-discharge water flows. For example, North Carolina’s permit for reverse osmosis concentrate discharges from Brunswick County’s Northwest Water Treatment Plant to Cape Fear River takes advantage of the large dilution capacity made available by discharging into this large, tidally influenced river (https://edocs.deq.nc.gov/WaterResources/DocView.aspx?id=1090539&dbid=0&repo=WaterResources). As state mixing zone policies applicable for NPDES permitting vary, it will be important for project developers to work closely with permitting authorities in advance to determine whether a mixing zone is feasible in a particular discharge setting.
Discharging Concentrated Residuals to Inland Waters

Permitting discharges to inland waters with less dilution capacity may be more challenging. As discussed in section 2 above, for facilities that discharge lower volumes of treated wastewater with higher pollutant concentrations, it may be feasible to develop WQBELs expressed solely in terms of mass loads. In some circumstances it may be permissible to modify or not include concentration-based limits if it can be demonstrated that the mass-based limits are sufficient to meet applicable WQSs, consistent with applicable permitting requirements. It is important to ensure that the permit fact sheet provides a clear explanation of the basis for such limits. (EXAMPLE?)

A more detailed discussion of permitting-related challenges associated with discharge and permitting of high strength brines is found at WE&RF, 2019. (NOTE: Might want to expand on some of the challenges and strategies discussed in this paper).

Discharging Concentrated Residuals to POTW Collection Systems

Industrial facilities may use reverse osmosis or other membrane treatment methods to treat water for recycling, thereby creating concentrated residuals requiring discharge. In some places, it may be feasible to discharge these residuals to the POTW collection system. However, high volumes of residuals discharges to collection systems may increase risks of POTW treatment facility upsets because high salinity pulses could interfere with biological treatment processes. Facilities considering discharges of RO concentrate to collection systems should coordinate closely with local pretreatment program managers to ensure these discharges meet categorical and local limits and pose no significant threat to treatment system operations.

Generally Applicable and Cross-Cutting Permit Challenges and Strategies

This section reviews several challenges and potential permitting strategies that may affect several types of recycling-related NPDES permits.

Anti-Backsliding Implementation

Anti-backsliding considerations may be most applicable in water reuse scenarios where the discharge effluent quality changes when a significant portion of treated flow is diverted for reuse, potentially resulting in a lower volume of more concentrated effluent. In general, anti-backsliding policy provides that effluent limits for many parameters cannot be less stringent in a new permit than they were in the previous permit unless certain exceptions apply. For example, in cases where a facility’s treatment process has undergone material and substantial
alterations in association with implementing water recycling, it may be permissible to apply less-stringent effluent limitations. In such cases, the permit fact sheet should clearly explain the rationale for setting less stringent limitations. (EXAMPLE?)

Ensuring Competent Facility Operations and Maintenance

Effective implementation of water recycling projects depends upon maintenance of highly reliable treatment facility operations to ensure consistent attainment of recycled water quality standards. As discussed above, the regulatory processes applicable to recycling operations vary substantially among states and different types of recycling operations. Some states include provisions in NPDES and other permits for recycling-related treatment facilities to help ensure reliable facility operations.

NPDES permits generally require permittees to properly operate and maintain all facilities and systems of treatment and control that are installed or used by the permittee to achieve compliance with the conditions of (the) permit.

Permitting authorities have substantial discretion in determining how this requirement is addressed in NPDES permits. Some permits incorporate detailed provisions specifying how permittees must ensure proper facility operation and maintenance, and assurance of data quality. EXAMPLE Some states include permit provisions for operator training and certification (EXAMPLE). In other cases, permits incorporate asset management provisions to help ensure facilities are properly maintained (e.g. Guam Wastewater Facility permits https://www.epa.gov/sites/production/files/2019-11/documents/gu0020141-gu0020087-gu0020222-gu0020273-guam-waterworks-authority-facilities-2019-11.pdf ). The State of Washington incorporated facility operations and operator training requirements in their water recycling regulations, which the State implements through the NPDES permit or through a separate reclamation permit. ( https://apps.leg.wa.gov/WAC/default.aspx?cite=173-219 )

Permit Monitoring, Tracking and Reporting

As discussed above, recycling wastewater and capturing stormwater for use can cause changes in effluent quantity and quality. It is possible that these changes in effluent characteristics may warrant review of monitoring, tracking and reporting provisions in related permits. Permitting authorities have substantial flexibility in designing monitoring, tracking, and reporting requirements to take into account changes in discharge characteristics, as long as basic federal requirements concerning monitoring and reporting are met and these provisions are sufficient to support evaluation of permit compliance. Federal permitting guidance recommends modifying monitoring requirements in situations where discharge characteristics including frequency, magnitude, and seasonal distribution change. See NPDES Permit Writer’s Manual, Section 8.1.3 for more information. If implementation of recycling project changes discharge characteristics (e.g., a previously continuous discharge becomes intermittent), it may be appropriate to modify monitoring requirements and methods. (FLORIDA EXAMPLE?)
Some potable water recycling projects involve engineered linkages between facilities that provide wastewater and drinking water treatment. Potable water recycling proponents have noted that monitoring requirements and analytical methods vary under NPDES permitting and Safe Drinking Water Act programs, and that these variations can create duplicative or conflicting monitoring and analysis requirements. It may be feasible to coordinate separate permits implementing NPDES and state-based recycling rules to align requirements for collection and treatment system operations, monitoring, and reporting to help avoid unnecessary duplication of effort. As discussed above, it may be permissible to align sample analysis methods to avoid the need to use different analytical methods to evaluate water quality at different points in the collection and treatment system. **EXAMPLE**

Some practitioners have asked whether drinking water analytical methods can be used in lieu of wastewater analytical methods in NPDES permits where a separate recycled water permit requires use of drinking water analytical methods. State permitting authorities are authorized to accept analytical methods different from those specified for NPDES wastewater permitting under certain circumstances; in general, EPA must approve the use of alternative test methods. *(EXAMPLE?)*

If retained, this section warrants further development.

*Diverting Stormwater Into Wastewater Collection Systems*

Although non-stormwater discharges from MS4 systems are prohibited, dry weather flows in storm drains are common. In some cities that do not have combined sewer systems, projects have been implemented for several years to divert dry weather and/or first-flush wet weather storm drain flows into wastewater collection systems to help reduce water quality impacts associated with stormwater discharges to receiving waters. For example, the City of Los Angeles implemented several dry weather diversions to help reduce dry weather impacts at coastal beaches *(reference).*

Recently, some communities have noted that these storms drain diversions can also increase flows in the wastewater management system that would be available for water recycling. Many wastewater systems have experienced substantial reductions in wastewater flows in response to successful implementation of water conservation practices and onsite water recycling measures. Significant reductions in sanitary sewer flows can cause adverse impacts on collection and treatment system operations. In some communities with existing water recycling programs, reduced wastewater inflows have made it difficult for these programs to meet their commitments to supply recycled water to recycling customers. Recent improvements in real-time monitoring and control technologies have enabled the safe implementation of projects to divert dry weather and first flush wet-weather flows from storm drains to sanitary sewers.
In designing diversion projects, it is important to ensure that there is sufficient wastewater collection system capacity to safely accept diverted flows, and that these diversions do not result in unanticipated operational challenges in the POTW collection and treatment system.

Permitting authorities have taken different approaches to addressing diversion of water from storm drains into wastewater collection systems. Some permits have incorporated real-time operation and monitoring provisions to ensure the diversion can be closed before or during wet weather-related flows to prevent diverted stormwater from causing sanitary sewer overflows or treatment plant upsets. (EXAMPLE, e.g. Orange County San or Las Virgenes Water District). The Los Angeles County MS4 Permit generally supports and encourages diversions to wastewater collection systems and requires mapping of diversion locations and reporting of actions to eliminate illicit discharges (which may include diversions to wastewater collection systems).

However, the three Water Boards with NPDES permitting authority in coastal Southern California have not found it necessary to include more specific permit provisions in wastewater or stormwater permits that control how storm drain diversions to wastewater collection systems operate because they concluded such provisions are unnecessary to ensure that discharge requirements are met (personal communications with Renee Purdy and Ivar Ridgeway, Los Angeles Regional Water Quality Control Board, Adam Fischer, Santa Ana Regional Water Quality Control Board, and Laurie Walsh, San Diego Regional Water Quality Control Board, 3/19/21).

**Conditioning Permits to Address Reuse**

As discussed above, some states incorporate provisions to implement NPDES and state law-based provisions in permits. Some permitting authorities have incorporated reuse-related provisions in NPDES permits pursuant to reuse regulatory provisions of state law. For example, the regional MS4 permit for the Middle Rio Grande Watershed, NM authorizes capture of stormwater from rooftops for onsite reuse ([https://www.epa.gov/sites/production/files/2018-10/documents/r6-npdes-middle-rio-grande-ms4-nmr04a000-final-permit-2014.pdf](https://www.epa.gov/sites/production/files/2018-10/documents/r6-npdes-middle-rio-grande-ms4-nmr04a000-final-permit-2014.pdf)) Other states require separate reuse permitting and do not incorporate reuse provisions in NPDES permits. (e.g. OK or NV EXAMPLE?)

In some circumstances, permitting authorities have incorporated reuse-related provisions in NPDES permits based on 401 certification conditions. In jurisdictions where EPA is the permitting authority, the state, tribal, or territory agency with 401 certification authority may include conditions designed to ensure the permit results in implementation of applicable water quality standards. These conditions are then included in the applicable NPDES permit. This approach has been used to incorporate recycling-related provisions designed to address water recycling; see the Hopi tribal permit example below.
**Addressing Groundwater Quality Protection**

Where wastewater or stormwater are infiltrated or injected to groundwater (often with an eye to later using that groundwater for consumptive use), it is important to ensure that groundwater quality is protected. Concerns have arisen that many groundwater recharge projects may not be designed to adequately protect aquifer quality (GWPC, 2007, Musik and Job, 2021). The regulatory framework for addressing aquifer recharge is complex; WRAP Action 2.7.4 is exploring challenges associated with safe aquifer storage and recovery.

As discussed above, some states have issued permits containing provisions that implement both NPDES and state law-based requirements. In some cases, provisions are included to help ensure aquifer water quality is protected in situations where wastewater or stormwater are injected or infiltrated to groundwater.

For example, most states incorporate provisions in municipal MS4 permits concerning implementation of retention and infiltration practices, usually in the permit section addressing implementation of stormwater controls in new and redevelopment projects. Many such permits reference stormwater management design handbooks or guides that provided detailed guidance to inform practice design and maintenance to ensure selected practices protect water quality over time. While the focus in most manuals in on protection of surface water quality, some design manuals also include design considerations designed to protect groundwater quality. For example, the 2016 Georgia Stormwater Management Manual includes provisions addressing aquifer protection (e.g. pretreatment expectations) in its Infiltration practice chapter (https://cdn.atlantaregional.org/wp-content/uploads/gsmm-2016-edition-final-v2.pdf).


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**Tribal NPDES Permit Addresses Reuse Through Section 401 Certification**

When EPA drafted a new permit for the Upper Moenkopi wastewater plant, the Hopi Tribe initially asked that provisions be added to the permit that ensured the safe reuse of treated wastewater that was diverted prior to discharge for agricultural irrigation. As federal permitting regulations did not require the permit to address reuse directly, the situation was addressed through conditions included in the tribal Section 401 certification, which were included in the final permit. (See https://www.epa.gov/npdes-permits/upper-village-moenkopi-wwtf-arizona-az0024619)
**Relationship of Regulation under Clean Water Act and Safe Drinking Water Act**

Different types of potable water recycling operations entail different types of connections between wastewater and stormwater collection and treatment systems regulated under NPDES, on one hand, and drinking water treatment and distribution systems regulated under SDWA. Many recycling proponents are seeking greater clarity concerning the relationship between regulatory frameworks affecting these facilities. A key question raised is: “where does NPDES regulation end and Safe Drinking Water Act regulation begin?” In most cases, there is an intermediate buffer (e.g. a reservoir) between the wastewater/stormwater and drinking water systems. In these cases, the NPDES permit would regulate a surface water discharge to the buffer water body if it is subject to NPDES jurisdiction. In the case of systems where there is no discharge to surface waters (e.g., in cases where buffer is in the form of aquifer recharge and storage), there may be no NPDES permit involved. In either case, SDWA regulation would begin at the point where water is drawn from a surface waterbody or aquifer.

In cases where there is no buffer between the wastewater or stormwater system and the drinking water system, the answer to this question may be less clear. There are few examples where such direct potable reuse systems have been implemented. (ADD EL PASO EXAMPLE or OTHER?) If there is no discharge to jurisdictional waters from the wastewater treatment plant, there would be no NPDES permit at all. More likely, a wastewater plant would be engineered to send treated wastewater both to the drinking water treatment plant and to a discharge outfall. In this case, NPDES jurisdiction ends and SDWA jurisdiction begins at the point water leaves the wastewater or stormwater collection and treatment system and becomes a source of supply to the drinking water system. As a practical matter, implementation of treatment, monitoring, and operational requirements designed to ensure the safety of potable water recycling may occur through treatment and other management practices applied throughout both systems. The details about where different treatment, monitoring, and operational requirements would be applied may vary depending upon the structure of state reuse requirements and the design details of different potable reuse systems.

(1-2 EXAMPLES?)

**Permitting Runoff of Recycled Water**

Recycled water is used for many purposes, some of which result in anticipated releases to the environment, and others which result in unplanned releases. For example, using recycled water for fire-fighting or for snowmaking at a ski resort will result in expected runoff. On the other hand, runoff of recycled water associated with excessive landscape irrigation is not planned but may occur. The basic concern with runoff of recycled water is that there could be human or environmental exposures which may not be protected when unplanned releases of recycled water occur. States vary in how they address these recycled water releases.

Some permitting authorities treat recycled water runoff as a discharge or sanitary sewer overflow (in the case of wastewater recycling) subject to NPDES permitting requirements (particularly in regard to unplanned runoff). (EXAMPLE) Other permitting authorities do not
regulate these types of discharges as long as the original treatment was sufficient to protect public health and the environment. *(EXAMPLE)*

Some permits explicitly authorize that runoff from these operations may reach storm drains or receiving waters as long as the recycled water receives appropriate treatment prior to use and is applied/used in ways that minimize runoff. *(EXAMPLE)* However, other permits have created a disincentive to use recycled water for these uses by treating runoff of recycled water as a sanitary sewer overflow (SSO) or otherwise creating strict prohibitions on any runoff of recycled water. *(EXAMPLE?)*

Permitting authorities have structured POTW and MS4 permits to recognize uses of properly treated wastewater for a range of recycling purposes and to authorize incidental runoff of that water (e.g. from landscape irrigation uses). Characterizing such runoff as an SSO or prohibited non-stormwater discharge in NPDES permits is not required under federal regulations and may create a significant disincentive to treat and recycle municipal wastewater and capture urban stormwater. Inclusion of provisions in wastewater and stormwater permits that ensure recycled water is properly treated before use and then applied in ways that minimize off-site runoff should adequately protect human health and the environment.

**Addressing Information and Data Needs**

Beyond applying permitting rules and policies, permit issuance requires provision of different types of data and information about the proposed discharge to inform application of those rules and policies. Facilities proposing to discharge wastewater or stormwater usually need to provide permitting authorities with detailed information about the facility, treatment system, proposed discharge points, discharge flows and pollutant content to assist developing permit provisions. The process through which dischargers and recycling project managers interact with permitting authorities can positively or negatively affect the permit development process *(Sherman, et. al., 2020)*. Ideally, there is regular, early communication and coordination to define and clarify data and information needed in the application process. It can be difficult to collect and provide data needed by permitting authorities, particularly in cases where new or newly-applied treatment technologies are involved for which performance data are not readily available *(WE&RF, 2019)*.

**Recommendations To Build Permitting Capacity**

*NOTE: We will obviously need to thoroughly discuss whether to include recommendations, and what to include.*

The process of collecting information from permitting authorities, wastewater and stormwater program managers, and other stakeholders as part of this action yielded useful examples of permitting concerns, strategies, and potential solutions. The group working on this action
identified several follow-up activities that would build on the work completed to date and help build capacity to address permitting challenges arising in connection with recycling projects.

**Develop Training Module for Permit Writers**

Partner organizations assisting in implementation of this action indicated that only limited information is currently available about different approaches used to permit recycling-related discharges. There was a strong sense that training should be developed for permit writers to build understanding of the range of available permitting approaches and that such training would also be beneficial to project proponents to inform their facility planning and participation in the permitting process. EPA’s NPDES Permits Program regularly develops training modules addressing specific permitting challenges and challenges. EPA should consider partnering with ACWA, NACWA, NMSA, and other stakeholders to develop a permit writer training module focusing on the challenges and potential strategies for addressing NPDES permitting challenges arising from wastewater recycling and stormwater capture and use projects. Training should be recorded and made available for viewing and should be regularly updated as necessary.

**Create Checklist for Review of Recycling-Related Permit**

Many permitting authorities use permit review checklists to aid the development and review of permit applications. EPA and some states are developing permit review checklists tailored to address recycling situations that are designed to support review of permit application materials and application of permitting rules for such projects. EPA and state permitting authorities should consider developing new or sharing existing permit review checklists to support permit writers and inform the efforts of permit applicants to assemble responsive applications. We recommend that permitting authorities confer with discharger associations and other stakeholders in developing such checklists. Using these checklists in the training module discussed above could be an effective way to organize the trainings.

**Coordinate Technical and Policy Actions Focused on Discharge of Concentrated Filtrate Residuals**

Our review of recycling-related permitting challenges found that discharges of concentrated residuals from reverse osmosis treatment processes are among the most challenging waste streams to permit (WE&RF, 2019). Permitting is of particular concern in settings where a discharge to inland waters with limited mixing potential is involved. Participants in this Action suggested that additional work is needed to better characterize the challenges associated with discharges (and associated permitting) of concentrated residuals, and to identify practical strategies for addressing these challenges. Through proposed WRAP Action 2.4.6, the National Alliance for Water Innovation (NAWI) Energy-Water Desalination Hub is implementing a multi-year process of evaluating desalination treatment methods, including reverse osmosis and micro-filtration methods relevant to water recycling operations. In its process to support research and development work in this space, NAWI should work with permitting authorities to sponsor work to improve understanding of desal permitting challenges and develop practical approaches to addressing these permitting challenges.
Create Working Group To Develop Tools and Strategies to Support Permitting of Innovative Technologies

Implementation of recycling projects across America illustrates the potential, and the potential difficulties of applying innovative technologies and strategies to manage water resources. Many of the permitting-related challenges with recycling projects also apply to other forms of innovative water management (e.g., resource recovery, energy efficient water systems, water conservation, and integrated water management). Evaluation of recycling-related permitting concerns has highlighted the value of better evaluating and sharing permitting-related challenges and potential solutions that can facilitate implementation of recycling projects. To build on this progress, we recommend creation of a working group involving representatives from permitting authorities, water management facility representatives, and other stakeholders to evaluate challenges with application of innovative water management technologies and strategies, and develop tools and strategies to support permitting of innovative technologies.

ARE THERE OTHER RECOMMENDATIONS WE WANT TO FORWARD?

Develop and regularly update compendium of state NPDES permits that have water reuse component.

Identify list of water reuse NPDES permit subject matter experts.

References


https://www.sccwrp.org/about/research-areas/ecohydrology/los-angeles-river-flows-project/


https://www.mdpi.com/2071-1050/9/2/180


