Regulatory Impediments to Implementing One Water in Texas

Report: 2019-12
December 2019

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Acknowledgments

Funding for this report was provided by the Cynthia and George Mitchell Foundation, in addition to Peter and Mary Faye Way. The authors would also like to thank the following people who assisted in the development of this report:

Robert Stefani, Environmental Program Coordinator, Austin Water Utility

Katherine Jashinski, Engineer, Austin Water Utility

Louis Herrin, Water Quality Division, Texas Commission on Environmental Quality

Joel Klumpp, Water Supply Division, Texas Commission on Environmental Quality

Chris Herrington, Environmental Officer, City of Austin

Matt Hollon, Austin Watershed Protection, City of Austin

Chris Maxwell Gains, P.E.

David Venhuizen, P.E.

Susan Parten, P.E.

Jay Garland, National Exposure Research Laboratory, U.S. Environmental Protection Agency

Russ Porter, Project Manager Bullitt Center, Seattle

Paula Kehoe, Director of Water Resources, San Francisco Public Utilities Commission

Taylor Chang, Water Resources Analyst, San Francisco Public Utilities Commission

Tom Hegemier, P.E., D.WRE, CFM; Doucet & Associates

Ellen T. McDonald, Ph.D., PE; Alan Plummer Associates, Inc.

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EXECUTIVE SUMMARY

As more and more people move to Texas, the way cities manage water within an urban environment is changing. Traditionally, cities employ a "one-way use of water" approach, where freshwater from a reservoir or an aquifer is treated, conveyed to customers, used, then treated again, and ultimately discharged to a river. Increasingly, however, cities are recognizing that to develop sustainable and resilient water systems, they must treat all water within an urban environment as a resource and encourage the development of onsite, building-scale reuse systems, where buildings and communities become the water source. Indeed, within the "wastewater" that makes its way to municipal water treatment plants, there are many sources of water that people can use – such as graywater from washing machines and showers and air conditioning condensate. Even actual wastewater, referred to as blackwater, can be reused for numerous purposes. Rainwater and stormwater are additional sources of water that buildings can capture to reduce water supply demands. This holistic, often decentralized, approach to managing water is referred to as One Water.

The majority of laws and regulations that govern water use in the United States and Texas, however, are not based on a One Water framework. Current laws and regulations were adopted under the traditional water management framework, where water management is centralized and to protect public health, regulations require that cities remove wastewater from an urban environment. Although, in general, Texas has an accommodating regulatory environment for water reuse projects and has adopted regulations that allow for reuse of alternative onsite waters, the state has expressed a preference for regional management of water resources. One Water projects are still not the norm. This is, in part, due to the current regulatory framework's inability to accommodate more innovative water reuse strategies, where the risk to public health is significant or not well understood. For example, federal drinking water regulations are necessary to protect public drinking water supplies, but they create onerous regulatory hurdles for smaller, onsite systems that may seek to use alternative sources, such as rainwater. Additionally, although onsite non-potable reuse of blackwater is a hallmark of the One Water approach, existing regulations in Texas make it extremely difficult for developers to construct onsite blackwater reuse systems. Finally, the lack of regulations that govern water reuse in Texas could actually stymie the development of One Water projects as developers often prefer clear regulatory and permitting paths over case by case decision making by regulators.

To facilitate development of One Water projects in Texas, the state's regulatory framework must transition to support decentralized strategies. Policymakers need to tailor regulations to each water source and the specific end use as the types of treatment and the risk to public health varies with different source waters and the intended use. The City of Austin's Water Forward Plan and the City's efforts to develop an onsite non-potable water reuse ordinance will likely pave the way for similar local efforts as well as highlight the need for the state to develop consistent statewide regulatory guidance.

INTRODUCTION

WHAT IS ONE WATER?

One Water is a holistic approach to managing water resources – one where communities value all sources of water as a resource and manage these different sources of water as a single system. One Water is integrated urban water management where communities use all sources of water in the urban landscape – from surface water, groundwater, rainwater, stormwater, and wastewater to promote sustainability, increase water quality, and decrease reliance on source waters important to our environment. The Water Research Foundation defines One Water as an integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability, meeting both community and ecosystem needs.[1]

WHY IS ONE WATER IMPORTANT?

In Texas and across the country, freshwater sources are dwindling. Yet the demand for freshwater continues to grow. The Texas State Demographer estimates that Texas is growing by 1,000 people per day. Cities searching for additional sources of water are exploring innovative ways to increase water supply within an urban setting. Under the traditional urban water model, we convey freshwater from a river, a lake, or an aquifer to communities through expensive pipelines and infrastructure, often miles from the water source. Once we flush the toilet or wash our hands, we perceive this water as a waste product that must be disposed of as quickly as possible. Under the traditional approach to managing water, we wash our hands of this water. We cast it away, building more miles of expensive pipes and infrastructure to dispose of it. The One Water model, on the other hand, treats this wastewater, as well as other types of locally generated

1 Paulson, et al., *Blueprint for One Water*, WRF Project #4660 (2017).

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water like rainwater, stormwater, graywater, or AC condensate, as sources of water that can be reused. Under a One Water approach, communities are a water source – allowing communities to offset their demand for freshwater, to manage water resources in a more sustainable manner, and to increase their resiliency in the face of water supply shortages.

PURPOSE OF THIS STUDY

One Water is a relatively new approach to managing water resources, but it is gaining momentum across the country. As discussed throughout this report, many cities across the United States are thinking progressively and embracing the One Water approach, however, the regulatory framework for managing water resources in many places, including Texas, was built under the traditional urban water model where water resources are segregated and not always reused.

The question is whether the traditional urban water model has created nonsensical regulatory roadblocks to implementing One Water in the state. The purpose of this study is to examine the laws and regulations in Texas that govern water use and to determine whether any regulatory roadblocks exist that impede Texas's ability to implement One Water projects. The 2017 State Water Plan projects that municipal water demands will surpass all other water demands in Texas. Therefore, for purposes of this study, we focused on water use in a municipal setting, as opposed to industrial or agricultural use.[2] Additionally, the report highlights the efforts the City of Austin has taken to advance an integrated water management plan to secure the City's water supply for the next 100 years, referred to as the Water Forward Plan, and analyzes how state and local regulations impact the plan's One Water-inspired recommendations. The authors would like to acknowledge that although this report focuses on local efforts by the City of Austin, the City of San Antonio has also been a leader in innovative water reuse strategies.

2 Water for Texas, 2017 State Water Plan, Texas Water Development Board at 7 (2017).

A One Water Approach to Urban Water Management

THE NATURAL WATER CYCLE

As early as elementary school, children learn about the water cycle, also referred to as the hydrogeologic cycle, and how all water is connected through condensation, precipitation, infiltration, run-off, transpiration, and evaporation. Water falls from the atmosphere as rain, it travels over and under the ground, infiltrating and running off the land, recharging aquifers, filling creeks and rivers - ultimately flowing to the coast where it enters the ocean and, through evaporation, becomes part of the atmosphere again.

The natural water cycle does not segregate water once it falls to the ground. As Texas water expert Charles Porter explains, "surface water, diffused surface water, and groundwater are, have been, or will be ultimately in union with one another; water exists in a conjunctive relationship in all three geological containers all the time."[3] In other words, in the natural water cycle, all water – from rainwater, to water flowing in a river, to groundwater in an aquifer – is part of a natural, integrated system.

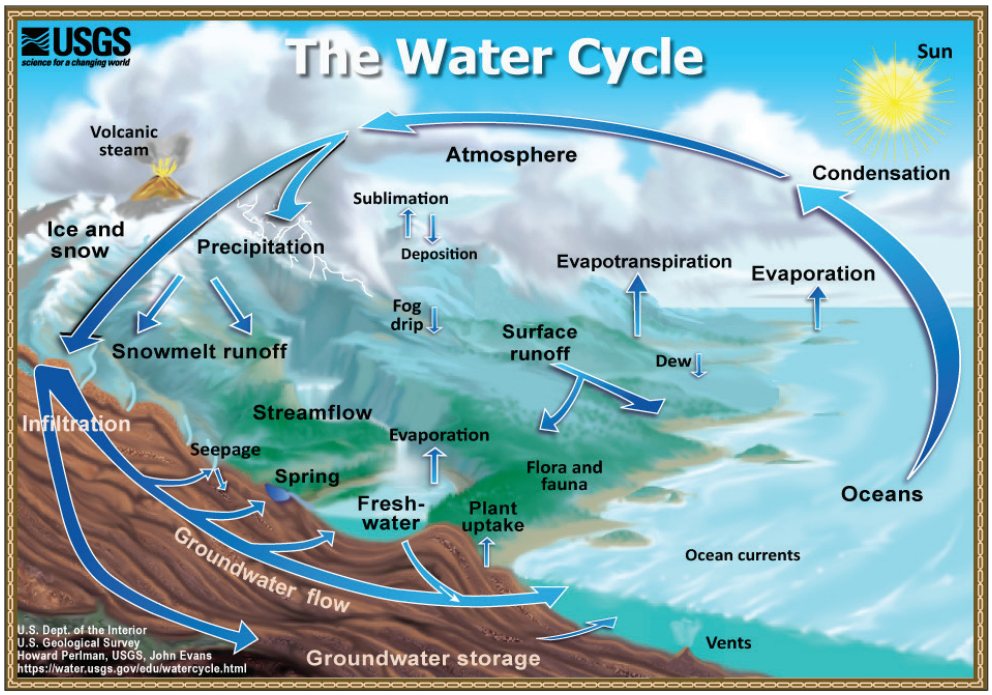

Figure 1. The Water Cycle (Source: United States Geological Service)

THE URBAN WATER CYCLE

The urban water cycle is a water cycle engineered by humans to manage water in cities, altering the natural water cycle within an urban landscape. It is "a unique water cycle characteristic of water intake, water conveyance, water use, water drainage, wastewater treatment and recycling."[4] To protect public health in an urban environment, "[w]ater management systems endeavor to assure access to high-quality potable water free of contaminants and to guarantee that waste streams—graywater, wastewater and fecal

3 Charles R. Porter, *Sharing the Common Pool, Water Rights in the Everyday Lives of Texans* 8 (2014).

4 Huaibin Wei, Yimin Wang, Mingna Wang, *Desalination and Water Treatment*, Characteristics and patterns of urban water cycle: theory 110 (2018) 349–354 at 349 (April 2018).

sludge—are adequately conveyed and treated, in order to minimize their contact with humans and protect the environment."[5] Traditionally, this has meant that urban "water systems are centralized and often managed in silos according to the service provided: water treatment, distribution, sewerage and storm drainage, and wastewater treatment."[6] For example, groundwater from an aquifer is pumped, treated, and conveyed to households where it is used, and then conveyed away, treated, and discharged into a surface waterway. Essentially, freshwater goes into the system and wastewater goes out. This traditional approach to urban water management "perpetuate[s] a one-way use of water, from sourcing and treating, to polluting it through a diversity of uses before discharging it downstream."[7]

In Texas, there are many examples of this "one-way" use and siloed approach to water management. Any wastewater treatment facility that is treating and discharging wastewater, rather than reusing it, is subscribing to this traditional approach.

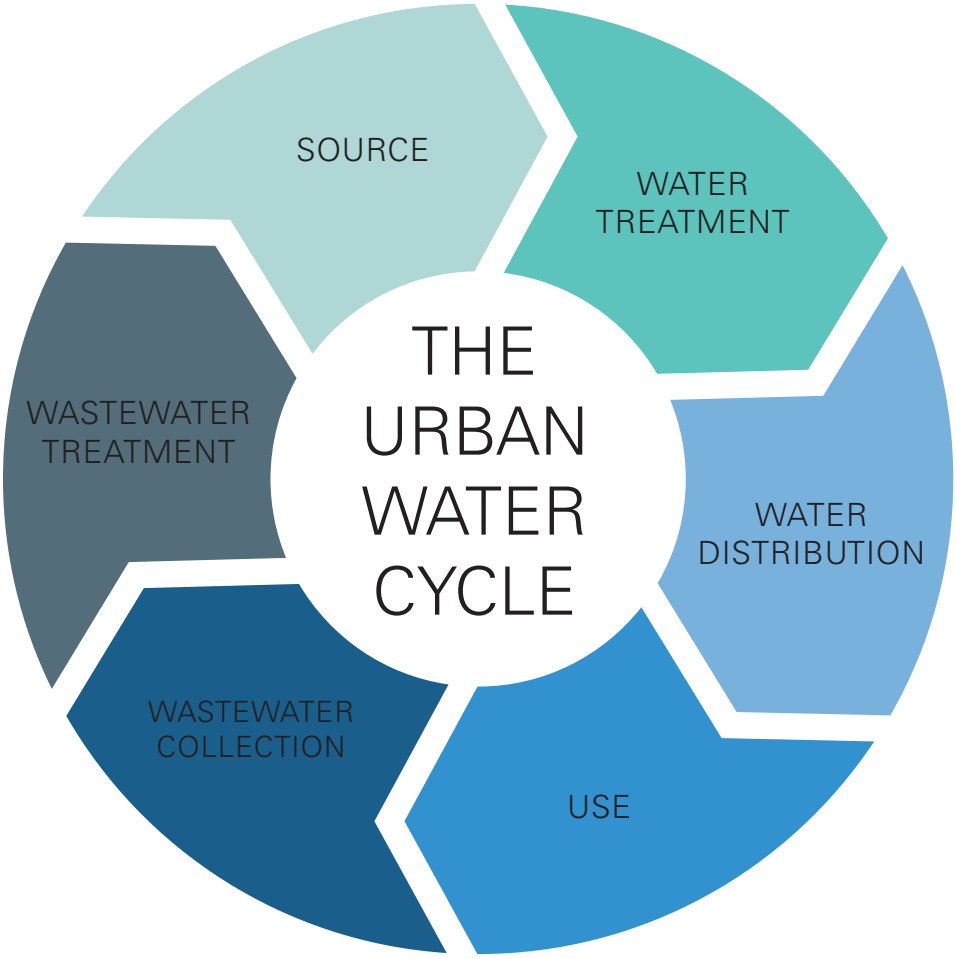

Figure 2. The Urban Water Cycle (Source: Adapted from National Geographic)

5 L.C. Reitveld et. al., *Improving health in cities through systems approaches for urban water management*, Environmental Health, 15 (Suppl 1) 31 (2016).

6 Ashmore et al., *Integrated Urban Water Management in Texas: A Review to Inform a One Water Approach for the Future*, 13 (Boston University Institute for Sustainable Energy April 2018).

7 Rachel Cardone & Carol Howe, *Advancing One Water in Texas*, (The Cynthia and George Mitchell Foundation Feb. 2018).

THE ONE WATER CYCLE

While the siloed, "one-way use of water" approach to water management has been justifiable to protect public health in the past, given increased urbanization, population growth, and climate change, traditional water management strategies are unlikely to provide growing urban centers the water security they need to protect public health into the future. Consequently, cities are recognizing that to develop sustainable and resilient water management systems, they must re-envision the urban water cycle as an integrated system in alignment with the natural water cycle, where all water is viewed as a resource and the "interconnectedness of surface water and groundwater supply, stormwater, wastewater, and energy" is acknowledged.[8] This holistic, One Water approach to water management is a "more sustainable water management plan that not only provides basic services but also uses water to preserve and enhance ecosystems, provide urban amenities, and connect people more closely to their water resources."[9]

A One Water approach to managing water resources within an urban environment can take many forms – from decentralized water reuse projects at the building scale level, to centralized city-wide reclaimed water projects, from the development of green infrastructure to promote stormwater retention, to the capture of rainwater to offset a building's water use. A One Water approach can aim for total water reuse, such as a "net zero" project, where all water is created and reused on site, or it can employ *a la carte* methods, such as a non-potable reuse system that collects rainwater to use for irrigation or toilet flushing. There are many ways, both large-scale and small-scale, that cities can implement One Water methodologies, but the core component of a One Water approach is the reuse of locally-generated sources of water.

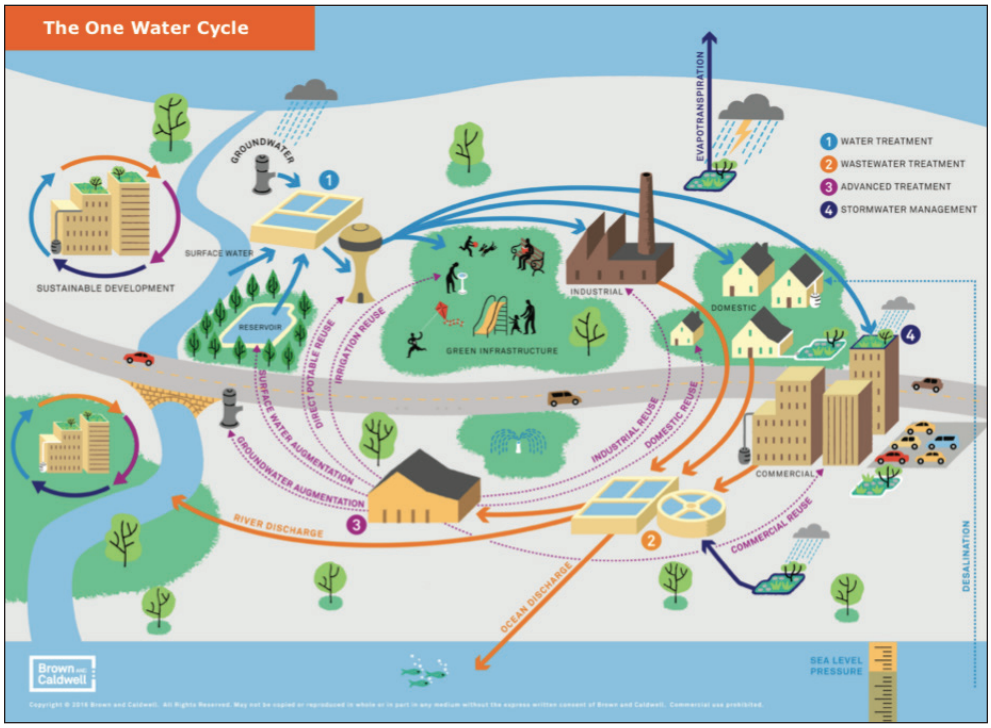

Figure 3. The Water Cycle (Source: Blueprint for One Water, Water Research Foundation)

8 Water Research Foundation, Blueprint for One Water Project #4660 at 4 (2016).

9 Rachel Cardone & Carol Howe, *Advancing One Water in Texas*, (The Cynthia and George Mitchell Foundation Feb. 2018).

The City of Austin has taken progressive steps and adopted a 100-year water plan – the Water Forward Plan – that is premised on a One Water approach. A guiding principle of the plan is to "[s]trengthen long-term sustainability, reliability, and diversity of Austin's water supply through maximizing local water resources."[10] To accomplish this, the Water Forward Plan recommends numerous demand management strategies, such as lot scale rainwater, graywater, and stormwater harvesting; building scale wastewater reuse; and air conditioning condensate reuse. In addition, the Water Forward Plan also includes water-supply strategies, such as community-scale stormwater harvesting, distributed wastewater reuse, direct non-potable reuse, and indirect potable reuse through Lady Bird Lake.[11] The City of Austin is currently revising its Land Development Code, and, in an effort implement some of the Water Forward Plan's recommendations related to reuse and to foster a One Water approach to managing water in Austin, the Austin Water Utility and the Watershed Protection Department have proposed changes to various provisions in the Land Development Code. These proposed changes are discussed later in this report.

10 Austin Water, Water Forward Integrated Water Resource Plan, (October 2018), http://austintexas.gov/sites/default/files/files/Water/WaterForward/Water_Forward_Plan_Report_-_A_Water_Plan_for_the_Next_100_Years.pdf.

11 *Id.*

© San Antonio Riverwalk, SeanPavonePhoto

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ONE WATER SOURCES AND USES OF WATER

Below is a list of ways in which various water sources can be reused in an urban environment under a One Water management approach. Potable use means water that is used for drinking, bathing, or handwashing – anything that comes out of a sink or a shower. Non-potable use means water that is treated to a quality not appropriate for drinking or bathing, but that can be used to flush toilets or for outdoor irrigation.

Rainwater » potable use

Rainwater is harvested from a roof top system and used either in an individual domestic setting or by a public water system.

Wastewater/Blackwater » direct non-potable reuse

Wastewater, also referred to as blackwater, which includes sewage, from a building or from a centralized wastewater treatment plant, is collected, treated, and reused for toilet flushing or landscape irrigation.

Wastewater/Blackwater » indirect potable reuse

Treated wastewater effluent is used to augment drinking water supplies by discharging it to a water body, such as groundwater or surface water, and subsequently treated for potable consumption.[12]

Wastewater/Blackwater » direct potable reuse

Wastewater effluent is piped directly from an enhanced wastewater treatment facility to a distribution system for potable consumption. It can either be used onsite or conveyed for use offsite through a centralized system.

Alternative Onsite Waters » non-potable use

Rainwater, condensate from a building's air conditioning system and stormwater are collected onsite and used for landscape irrigation or toilet flushing.

Graywater » non-potable use

Water from washing machines, showers, and bathroom sinks is collected, treated, and reused for toilet flushing and landscape irrigation.

12 See http://www.twdb.texas.gov/publications/shells/WaterReuse.pdf.

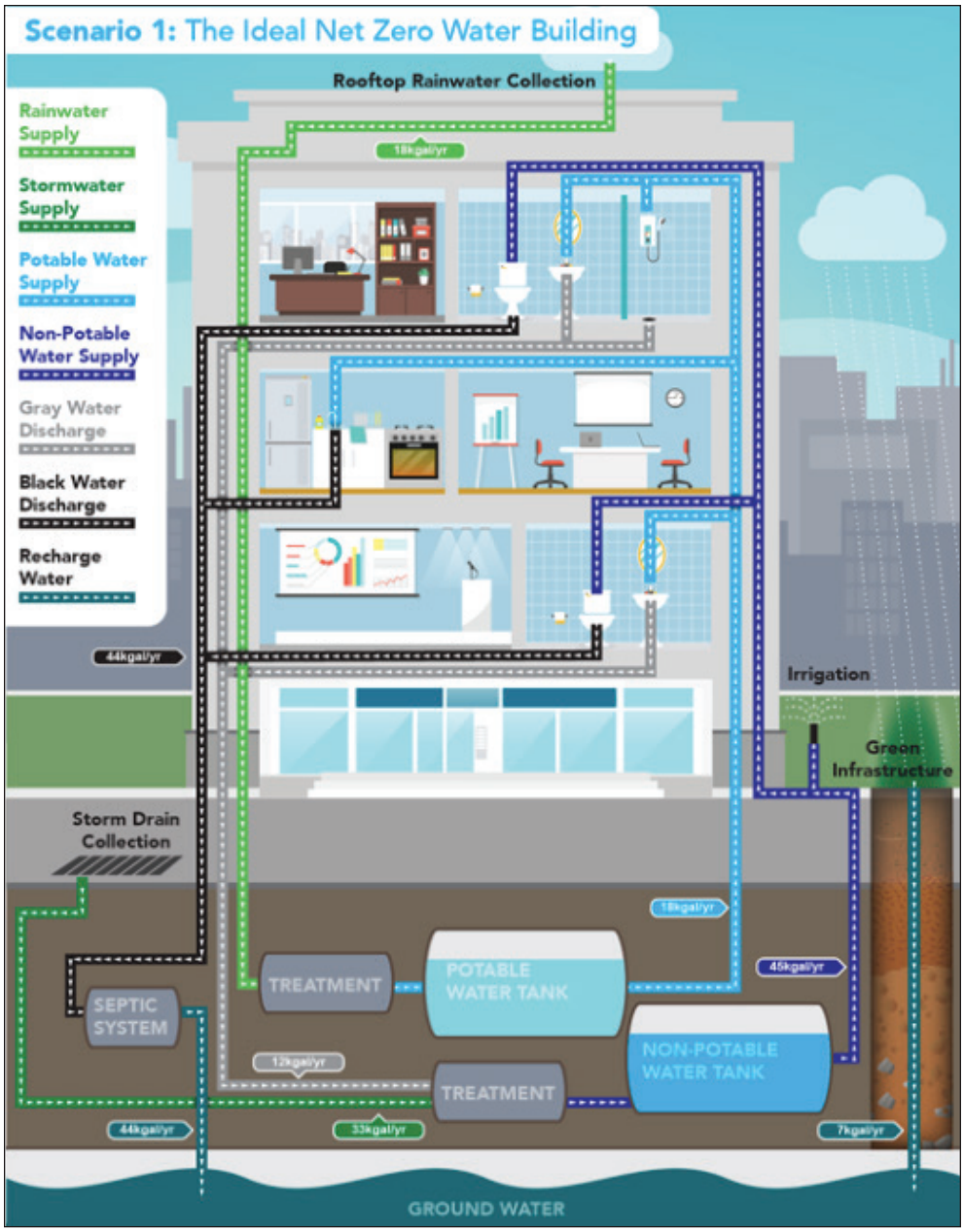

Figure 4. The ideal net zero water building (Source: U.S. Office of Energy Efficiency and Renewable Energy)

Figure 4 illustrates how water is used in an ideal "net zero" building. While it does not portray all reuse strategies, it is a good illustration of how locally generated water sources can be reused. For example, stormwater and graywater are collected onsite, treated, and used for non-potable purposes, such as irrigation and toilet flushing. Rainwater harvesting provides all of the potable water supplies for the building. In this particular net-zero building, wastewater or blackwater is treated and returned to the local aquifer but treated blackwater could also be used for non-potable purposes within the building. Finally, stormwater is treated onsite through green infrastructure features incorporated into the building's landscape, which allows it to slowly recharge the aquifer. The question is: Are there regulatory impediments in Texas that would make building a project like this or implementing Water Forward recommendations difficult or impossible? The next section discusses applicable laws and regulations for each water source and the intended use.

One Water in the Texas Regulatory Framework

An important factor in moving forward with any One Water project is whether the regulatory framework supports it. Federal and state laws and regulations governing water use in Texas were not specifically designed to address all of the ways water may be used in an urban environment under an integrated, holistic management framework. Therefore, cities, developers, and engineers desiring to move forward with One Water projects have concerns about potential regulatory obstacles.

Federal and State regulations that govern water use in Texas primarily apply to the water going into the urban water cycle and the water going out of the urban water cycle. An important point is that the government regulates water sources in an urban environment to ensure that public health and the environment are safeguarded. Each level of government – from the federal government to the state government to local governments – has a distinct range of oversight and responsibility. The current regulatory framework in Texas addresses public health concerns that arise from managing water resources in the traditional urban water cycle, and, like the traditional urban water cycle, these laws regulate water sources in separate silos.

There are no federal regulations that govern water reuse, although the U.S. Environmental Protection Agency has recently released a draft National Water Reuse Action Plan to foster consideration and implementation of water reuse projects across the country and has developed recommendations and guidelines for states to use in adopting water reuse regulations.[13] Texas, and other states, have taken steps to specifically allow and regulate the reuse of treated wastewater, alternative onsite water, and graywater for non-potable purposes. According to the 2017 State Water Plan, reuse is expected to provide 1.2 million acre-feet per year to water user groups, which is approximately 14 percent of the total recommended strategy supplies in 2070.[14] Texas laws and regulations, however, don't always provide regulatory guidance for more innovative strategies, such as direct potable reuse of wastewater, indirect potable reuse, or rainwater harvesting for potable use, leaving the regulatory framework for One Water projects rather unclear.

It is important to note that, in the United States, federal laws and regulations governing water management only concern the protection of water quality. This is in contrast to Europe, where all types of water management – from water rights allocation, surface and groundwater pollution, land development, and preservation of aquatic ecosystems – are managed holistically.[15] There are two main federal laws that govern water use, setting the foundation for implementation and enforcement requirements for state and local governments and impacting how water is managed in an urban environment: The Safe Drinking Water Act[16] and the Clean Water Act.[17] The Safe Drinking Water Act regulates drinking water supply, whereas the Clean Water Act regulates wastewater and stormwater discharges.

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13 Draft National Water Reuse Action Plan, U.S. Environmental Protection Agency, 84. Fed Reg. 48612 (Sept. 16 2019).

14 Water for Texas, 2017 State Water Plan, Texas Water Development Board at 90 (2017).

15 See generally, EU Water Framework Directive; Water Quality Law in the US and EU: A Comparison of the Clean Water Act and Water Framework Directive, Council for European Studies (Dec. 11 2018) https://www.europenowjournal.org/2018/12/10/water-quality-law-in-the-us-and-eu-a-comparison-of-the-clean-water-act-and-water-framework-directive/.

16 42 U.S.C. §300(f) et seq. (1974).

17 33 U.S.C. §1251 et seq. (1972).

Federal Law and Regulations

Federal law is silent on the use of rainwater for potable purposes, but it provides comprehensive requirements for the treatment of drinking water. Congress passed the Safe Drinking Water Act in 1974 to protect the quality of drinking water in the United States. The Safe Drinking Water Act establishes standards and treatment requirements as well as operating, monitoring, and reporting requirements for public water systems to protect drinking water from contaminants that are harmful to public health. When the Safe Drinking Water Act was originally passed, its focus was primarily on ensuring the safety of drinking water through the establishment of water quality standards for contaminants. Through later amendments to the Safe Drinking Water Act, however, Congress has recognized that source water protection, operator training, water system improvements, and public education are integral components to ensuring that drinking water is protected.

A fundamental aspect of the Safe Drinking Water Act is that the Act's requirements apply to all public water systems. As we discuss later in this paper, these requirements, while profoundly necessary to protect public health, can be onerous and, consequently, can hinder the development of certain One Water projects that qualify as a public water system. The Safe Drinking Water Act and U.S. Environmental Protection Agency regulations define a public water system as "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at last fifteen service connections or regularly serves at least twenty-five individuals daily at least 60 days out of the year."[18] A public water system may be publicly or privately owned and is either a community water system or a non-community water system. A community water system is essentially a public water system that supplies water to the same population year-round.[19] A municipal water utility is an example of a community water system. There are two types of non-community water systems: transient and non-transient. A transient non-community water system is a public water system that regularly supplies water to at least 25 of the same people at least six months per year.[20] For example, schools, factories, office buildings, and hospitals using their own water systems as opposed to receiving water from a municipal source are transient and non-community water systems. A non-transient non-community water system is a public water system that provides water in a place where people do not remain for long periods of time, such as a restaurant or a campground.[21]

Under the Safe Drinking Water Act, the U.S. Environmental Protection Agency promulgates National Primary Drinking Water Regulations for contaminants that pose public health risks and are likely to be present in public water-supply systems.[22] The regulations are found in 40 CFR §141. The U.S. Environmental Protection Agency has adopted regulations setting mandatory water quality standards, called maximum contaminant levels, for ninety contaminants.[23] A maximum contaminant level is the

18 42 U.S.C. § 300f(4) and 40 CFR §141.2.

19 *Id.*

20 *Id.*

21 *Id.*

22 Mary Tiemann, Safe Drinking Water Act: A Summary of the Act and its Major Requirements, Congressional Research Service (March 1, 2017).

23 40 C.F.R. . §141; *see also* https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.

legal limit or maximum allowable amount of a contaminant in drinking water that the U.S. Environmental Protection Agency has determined does not pose a threat to human health and that water systems can achieve using the best available technology.[24] When it is not feasible for a water system to achieve a required contaminant level, the U.S. Environmental Protection Agency sets a required treatment technique, which specifies a way to treat the water to remove the contaminants.[25]

The U.S. Environmental Protection Agency specifies treatment and disinfection requirements for surface water and groundwater under the influence of surface water in 40 CFR §141, Subchapter H, referred to as the Surface Water Treatment Rule. Because the Safe Drinking Water Act imposes requirements on public water systems and not on product manufacturers, there is no disinfectant product approval, registration, or license under the Act. Some states, including Texas, require that products used for treating drinking water be certified by the National Sanitary Foundation, an independent, third-party certification organization that has developed a certification and rating process for products used to treat drinking water.

Under the Safe Drinking Water Act, a state is delegated primary enforcement and implementation authority pursuant to a state drinking water program, provided that a state can demonstrate it will adopt water quality standards that are as least as stringent as the U.S. Environmental Protection Agency's standards. The Texas Commission on Environmental Quality (the Commission) administers the Public Drinking Water Program in Texas.

Texas Law and Regulations

Texas is the only state in the United States that specifically allows the capture of rainwater for potable purposes. Chapter 341, Subchapter C of the Texas Health and Safety Code sets forth the overarching standards for the protection of public drinking water and the protection of public water supplies and bodies of water in Texas. It prescribes the Commission's duties relating to the regulation and control of public drinking water systems in Texas. Among other things, the statute requires that the Commission ensure public water systems supply safe drinking water in adequate quantities and are financially stable and technically sound. Interestingly, the Health and Safety Code expresses a preferred policy for "regional and area-wide drinking water systems," which, obviously, is in contrast to One Water methodologies, which promote decentralized approaches to managing water resources. In addition to establishing standards for drinking water and public water systems, Section 341.039 of the Health and Safety Code establishes criteria for other sources of water increasingly used in an urban environment, such as graywater and rainwater, that could potentially degrade public water supplies

The Commission has promulgated rules to protect public drinking water under Title 30, Chapter 290 of the Texas Administrative Code (30 TAC, Chapter 290). The definition of a public water system is the same in Texas as it is in federal law under the Safe Drinking Water Act. See 30 TAC §290.38. 30 TAC, Chapter 290, Subchapter D establishes rules and regulations for public water systems that include requirements to protect and treat specific sources of water supply, specifically groundwater and surface water, and establishes detailed minimum operating requirements for public water systems.[26]

24 See https://www.epa.gov/dwreginfo/drinking-water-regulations.

25 See https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.

26 See 30 Texas Administrative Code §290.41, 30 Texas Administrative Code §290.42, 30 Texas Administrative Code §290.46; (Section 341.033 of the Health and Safety Code states that only a licensed water works operator under Chapter 37 of the Texas Water Code may operate a public water system.)

Subchapter F of 30 TAC, Chapter 290 establishes specific drinking water standards governing drinking water quality and establishes reporting requirements for public water systems in accordance with the Safe Drinking Water Act. As mentioned above, the Act does not specify how a public water system is supposed to achieve water quality standards. The Commission requires that a public water system demonstrate that the components and chemicals for the proposed treatment process conform to specific American National Standards Institute/National Sanitation Foundation International standards.

Domestic Use of Harvested Rainwater

In addition to establishing the framework for the regulation of public water systems, Section 342.042 of the Health and Safety Code requires the Commission to set standards related to the domestic use of harvested rainwater for drinking, cooking, or bathing. However, the Commission does not regulate the quality of rainwater that will be used as a drinking water source for a single household except when a domestic rainwater harvesting system is connected to a public water system. In this case, the Commission requires the homeowner to install cross connection controls to ensure that the public water system is not contaminated by rainwater that may be of a lesser quality. These rules apply whether the homeowner is using the rainwater for potable purposes or non-potable purposes. See Tex. Health and Safety Code 341.042. Section 341.042 and Commission rules promulgated in accordance with 341.042, do not apply to the domestic use of rainwater when the system is not connected to a public water system.

An individual homeowner outside of a city who is not connected to a public water system has the unrestricted ability to collect rainwater for drinking water purposes. All over the Texas Hill Country, individual landowners are choosing to harvest and drink rainwater from their own roofs. In this situation, no regulatory impediment exists. Within the City of Austin, a homeowner is permitted to collect rainwater and use it for potable purposes, but under Section 601.1.1 of the City of Austin's Plumbing Code, the homeowner must connect to the City's water supply if they are within 100 feet of the City's water line. As explained above, this means the homeowner must comply with cross-contamination requirements to ensure the rainwater does not contaminate the City's public water supply.

Rainwater and Public Water Systems

The Commission only regulates rainwater for potable use when the rainwater is used by a public water system. There is nothing in Texas law or Commission regulations that forbids a public water system from using rainwater as a water supply, but the Commission does not have specific rules that relate to rainwater as a public water supply source. Instead, the Commission treats rainwater as surface water for public drinking water purposes and regulates its quality under the state's public drinking water rules in 30 TAC, Chapter 290, discussed above. This means that an entity who meets the definition of a public water system and who wishes to use rainwater as a water supply must comply with all of the regulations that are applicable to public water systems, such as treatment, disinfection, monitoring, reporting, and operating requirements. These requirements can be onerous for a small system, such as a small business, a school, or a church.

As a result of increased interest in rainwater as a potential public drinking water supply, the Commission has published a rainwater guidance document to help water systems navigate the regulatory environment. Essentially, the guidance document explains

that all of the regulations that apply to public water systems, apply to a water system that is collecting and using rainwater as the primary drinking water source. However, according to the Commission, because roof-based rainwater contains "much less particulate matter than the surface water obtained from lakes, reservoirs, and ponds that are subject to land-based runoff, "specialized treatment facilities are needed to treat rainwater."[27] Because these alternative treatment facilities do not meet the conventional design standards specified in state regulations, the public water system, usually through its engineer, must obtain an exception under 30 TAC §290.39(l) to the Commission's standard design requirements. This rule provides the Commission with the flexibility to evaluate exceptions on an individual basis. The public water system must demonstrate that the exception will not compromise the public health or result in a degradation of service or water quality.

Even though rainwater is relatively clean, the Commission requires that all water systems disinfect treated water before it enters the storage tank and requires all water systems to maintain a disinfectant residual in the tank and throughout the distribution system. This requirement originates from the federal, Surface Water Treatment Rule. Some experts in the rainwater industry argue that requiring a public water system using rainwater to comply with overly burdensome and unnecessary treatment and disinfection standards, such as a chlorine disinfection requirement, that are designed for much dirtier water, might make a project unfeasible for smaller businesses. Other regulators believe that rainwater, even when collected off a roof, can contain harmful contaminants and, therefore, should be treated to the same standards as surface water.[28] Additionally, the Commission rules require that a licensed operator operate a public water system, which can also create burdens for entities wanting to do onsite potable rainwater collection. It is important to note that the definition of a public water system and the drinking water standards that apply are established in federal law, not state law. Once a system meets the definition of a public water system, the Commission has no discretion to alter the regulations that apply to drinking water, as these originate from the Safe Drinking Water Act.

Although Texas allows rainwater to be used as a public water supply, currently, the Commission has not permitted a public rainwater system. There have been attempts by businesses and developers to do so, but either their inability or unwillingness to comply with state and federal drinking water regulations thwarted these efforts. There is currently a pending public water system application at the Commission for a youth camp to provide rainwater as the primary drinking water source.

The Bullitt Center in Seattle, Washington, a Living Building demonstration project, is currently the only public water system in the United States that collects rainwater to supply to occupants in the building for drinking water purposes.[29] Navigating federal and state drinking water requirements was challenging for the engineers. Because the rainwater comes in contact with solar panels on the building's roof, the Washington State Department of Health, required the Bullitt Center to use solar panels that had National Sanitation Foundation ratings; however, none existed. As a result, engineers had to conduct their own tests to ensure that the solar panels achieved National Sanitation Foundation ratings. The Bullitt Center also had to hire a licensed public water-supply

27 TCEQ Regulatory Guidance, Water Supply Division, Rainwater Harvesting: Guidance for Public Water Systems, RG-445 (January 2007).

28 Texas Commission on Environmental Quality, Harvesting, Treating, and Storing Rainwater for Domestic Use (2007).

29 The Bullitt Center, Rainwater-to-Potable Water System, White Paper. (February 1, 2019): http://www.bullittcenter.org/wp-content/uploads/2019/04/Bullitt-Center-Water-System-FINAL.pdf.

operator on a contract basis, and the cost for this, according to the building's engineer, is more than the cost to use the City of Seattle's potable water supply.[30] Because the Bullitt Center is meant to be a demonstration project, the building's developers were willing to assume this expense.[31] Many other private developers, however, would likely not.

The biggest hurdle, however, was related to the Safe Drinking Water Act's requirement that the Bullitt Center disinfect the rainwater in the distribution system using chlorine. The Bullitt Center initially resisted this requirement because chlorine is a hazardous chemical, but eventually acquiesced. According to the Bullitt Center, "after significant exploration we learned that chlorine is a statutory requirement" and that "[a]ll water on the potable side of the system must include a small amount of chlorine to prevent bacterial growth that could harm public health."[32]

30 *Id.*

31 Phone interview with Russ Porter, Bullitt Center Engineer (September 19, 2019) by Vanessa Puig-Williams.

32 The Bullitt Center, Rainwater-to-Potable Water System, White Paper. (February 1, 2019)http://www.bullittcenter.org/wp-content/uploads/2019/04/Bullitt-Center-Water-System-FINAL.pdf.


© Ullrich Treatment Plant in West Austin, Austin Water

WASTEWATER

Wastewater can be reclaimed or recycled and reused for non-potable purposes to off-set and conserve potable water use. Traditionally, wastewater includes any sources of water that people flush down their toilets, wash down their sinks or showers, or that drains from a washing machine. However, as more and more entities capture graywater (water from washing machines and bathroom sinks) prior to it entering wastewater lines, experts are differentiating sewage derived wastewater from other types of wastewater, referring to it as blackwater. Increasingly, cities and utilities are considering treating wastewater to use for potable purposes. Regardless of the end use for wastewater, regulations that govern the disposal of wastewater apply. In general, federal and state laws set the standards for wastewater discharges into surface water ways, but Texas has developed regulations that permit the reuse of wastewater. In general, the goal of these laws and regulations is to ensure that wastewater is not harmful to public health or the environment.

Federal Law

The traditional and the most common way of managing wastewater in an urban environment is to get rid of it as quickly as possible – to treat it to ensure it is not harmful to public health or the environment and to dispose of it in a river where it can be carried out of sight. Cities have massive systems of pipes that convey wastewater to centralized treatment plants that treat wastewater before it is discharged. These treatment and discharge plants are regulated under federal law that states, like Texas, have authority to administer and implement.

As a result of growing concern over the pollution of surface water in the United States, Congress passed the Federal Pollution Control Act in 1948. In 1972, Congress substantially amended this law, reshaping it into the modern Clean Water Act. The overarching goal of the Clean Water Act is to protect the nation's surface waters from pollution: "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[33]

Under the Clean Water Act, it is unlawful for a person to discharge any pollutant from a point source into navigable waters, unless a permit is obtained under the National Pollutant Discharge Elimination System program. "Navigable waters" is defined as "the waters of the United States, including the territorial seas."[34] The meaning of "waters

33 33 U.S.C. §1251(a) or §101(a).

34 Clean Water Act § 502(7).

of the United States" is still being litigated, but in general, surface waterways, such as creeks and rivers, are considered "waters of the United States." A pollutant includes any type of industrial, municipal, and agricultural wastewater.[35] A point source is defined as "any discernible, confined, and discrete conveyance," such as a pipe, ditch, channel, or conduit, from which pollutants are or may be conveyed.[36] The Clean Water Act requires the U.S. Environmental Protection Agency to establish national, technology-based wastewater discharge standards, called effluent limitations, as well as recommended water quality criteria and guidelines for point source discharges.

Section 402 of the Clean Water Act provides states with the authority to administer National Pollutant Discharge Elimination System permits programs. The Commission administers the National Pollutant Discharge Elimination System program in Texas. According to the U.S. Environmental Protection Agency, "an [Nation Pollutant Discharge Elimination System] permit will generally specify an acceptable level of a pollutant or pollutant parameter in a discharge (for example, a certain level of bacteria)" and ensures "that a state's mandatory standards for clean water and the federal minimums are being met."[37]

Texas Laws and Regulations

In Texas, wastewater discharges are governed under Chapter 26 of the Texas Water Code, which generally concerns water quality controls and implements Clean Water Act requirements in state law. The Commission has adopted rules dealing with wastewater discharges pursuant to Chapter 26. The Commission has adopted Texas's surface water quality standards – legal standards for the quality of surface water in the state – in Title 30, Chapter 307 of the Texas Administrative Code (30 TAC, Chapter 307). The Commission applies these standards when issuing permits for wastewater discharges to surface waters of the state under the Texas Pollutant Discharge Elimination System program (Title 30, Chapter 305 of the Texas Administrative Code governs the National Pollutant Discharge Elimination System permit program in Texas, referred to as the Texas Pollutant Discharge Elimination System program). In accordance with the Clean Water Act, the rules require a permit for discharges from point sources, such as municipal wastewater treatment facilities. The City of Austin has two wastewater treatment plants – Walnut Creek and South Austin Regional – that have a total permitted capacity of 150 million gallons a day. The plants receive wastewater from Austin Water Utility's sewer collection system and treat it pursuant to the Texas Pollutant Discharge Elimination System permit before discharging it into the Colorado River.

As an alternative to discharge, Title 30, Chapter 222 and Chapter 309 of the Texas Administrative Code, create a process for applicants seeking to dispose of treated wastewater, to apply to the Commission for a permit to dispose of the treated wastewater through subsurface area drip dispersal systems or through irrigation. The Commission refers to these permits as Texas Land Application Permits. The Commission rules under 30 TAC, Chapter 222 and 30 TAC § 309.20 governing Texas Land Application Permits establish requirements related to the size of effluent storage and the amount of land required to dispose of treated wastewater depending on the volume of treated wastewater a facility generates.

Finally, for smaller onsite sewage facilities which do not discharge into a surface waterway, the state delegates oversight authority to local governments. An onsite sewage

35 40 C.F.R. § 122.2.

36 40 C.F.R. § 122.2.

37 See https://www.epa.gov/npdes/npdes-permit-basics.

facility is defined as a system that does not treat or dispose of more than 5,000 gallons of sewage a day. Chapter 366 of the Health and Safety Code requires the Commission to develop standards for onsite sewage facilities. These standards are found in Title 30, Chapter 285 of the Texas Administrative Code. A person operating an onsite sewage facility must obtain a permit from the local government, either a county or a city, that is authorized to administer the onsite sewage facility program.

WASTEWATER » DIRECT NON-POTABLE REUSE

Direct non-potable reuse refers to the use of reclaimed water that is piped directly from a wastewater treatment facility to a distribution system for beneficial use, such as for landscape irrigation or for toilet flushing. Reclaimed water can be reused through a centralized distribution system or it can be treated and reused onsite. Texas has extensive rules that govern the reuse of wastewater, but these rules only apply to wastewater permittees – in other words, entities that have either a Texas Pollutant Discharge Elimination System permit or a Texas Land Application Permit. Texas does not have any rules in place to govern the onsite reuse of wastewater (blackwater).

Beneficial Reuse Under Chapter 210 Reclaimed Water Rules

Commission rules (30 TAC § 210.3) define reclaimed water as "domestic or municipal wastewater that has been treated to a quality suitable for a beneficial use." Reclaimed water can either be used onsite where it is produced, or it can be conveyed for use offsite through a distribution system. Only the Commission can authorize the treatment and reuse of domestic blackwater as defined in 30 TAC, Chapter 210. The prerequisite to do this is a wastewater discharge permit. In other words, to treat and reuse domestic wastewater or blackwater, you must have a Texas Pollutant Discharge Elimination System permit from the Commission. Under the current Chapter 210 rules, you cannot obtain a reuse authorization for a site served by an onsite sewage facility.

30 TAC, Chapter 210 establishes rules for the use of reclaimed water. The state's reclaimed water rules apply to reclaimed water producers, providers, and users. Pursuant to Section 26.0271 of the Texas Water Code, Chapter 210 authorizes a wastewater discharge permittee to beneficially reuse reclaimed water, provided that the permittee complies with requirements under Chapter 210. According to the Commission, there are approximately 446 Chapter 210 authorizations in Texas.[38] 30 TAC § 210.1, states, "if the entity producing the water is the same as the user, then the use of the reclaimed water is permissible only if the use occurs after the wastewater has been treated in accordance with the producer's wastewater permit, and the permit provides an alternate means of disposal when there is no demand for the reclaimed water." This alternate means of disposal is the permittee's wastewater permit. The Commission requires that reclaimed water be provided on a demand basis to ensure that all reclaimed water can be beneficially used (30 TAC § 210.7).

Commission rules specify two types of reclaimed water uses and corresponding levels of treatment. Type I includes irrigation in areas where the public may be present during the time when the irrigation takes place or where the public may come into contact with the reclaimed water, for example, residential irrigation, golf course or park irrigation, irrigation for food products where the reclaimed water comes into contact with the edible part of the crop, or toilet or urinal flushing. Type II includes irrigation where the public would not come into contact with the reclaimed water, such as irrigation in

38 Email correspondence from Louis Herrin, Water Quality Division, Texas Commission on Environmental Quality (September 16, 2019) (on file with author).

remote areas, cooling tower water, or irrigation for food crops where the edible part of the crop is not likely to come into contact with the reclaimed water. Under 30 TAC § 290.33, a permittee must treat reclaimed water used for Type I purposes to a higher standard to ensure public health is protected.

Texas Land Application Permits and Beneficial Reuse of Reclaimed Water

Critics of the Commission's wastewater rules maintain that the state is not sufficiently encouraging the beneficial reuse of treated wastewater. For example, an entity can either apply for a discharge permit under the Texas Pollutant Discharge Elimination System or apply for a Texas Land Application Permit to dispose of treated wastewater through irrigation, and then obtain a beneficial reuse authorization from the Commission under Chapter 210. Under prior Commission rules, if an entity needed to double the allowable volume treated with a Texas Land Application Permit, then the entity would also have had to generally double the required amount of dedicated disposal area required under the permit. Because the cost of land is increasing in many parts of Texas, entities are turning more and more to surface water discharge permits rather than Texas Land Application Permits. Increased land prices are disincentivizing entities from expanding existing Texas Land Application Permits or even applying for new a permit, and this disincentive is compounded when land application permittees also reliably maintain a robust reuse program such that all of the required disposal area for effluent disposal by irrigation is not necessary. Although many entities who apply for Texas Pollutant Discharge Elimination System permit also obtain a Chapter 210 authorization to reuse the reclaimed water they produce, many landowners, environmental groups, and governmental entities downstream of the permitted discharge point are concerned that the Chapter 210 authorization does not obligate a permittee to reuse effluent, and that the Commission's water quality standards do not provide adequate protections for certain streams.

To address these concerns, in December 2019, the Commission adopted rules amending 30 TAC, Chapter 222 and 30 TAC, Chapter 309 to allow a Texas Land Application Permit applicant to receive a credit for the beneficial reuse of reclaimed water that can be demonstrated to be consistently used. In other words, reclaimed water that will not go to the applicant's irrigation disposal area and that, instead, will be beneficially used on a continual basis, can be removed from the calculations used to determine the required minimum size of the applicant's irrigation disposal area. The credit allows the applicant to reduce the amount of land she would otherwise be required to purchase or lease under current rules. Under the new rules, the beneficial reuse credit is based on the firm reclaimed water demand demonstrated by water use data from the applicant's reclaimed water users.

City of Austin's Centralized Reclaimed Water

The City of Austin has a reclaimed water distribution line that supplies Type I effluent to customers to use for irrigation, cooling, and toilet flushing. Under current City of Austin regulations, new commercial developments and redevelopments that are within 250 feet from the reclaimed water line must dual plumb the building and hook up to the City's reclaimed water line. Under new proposed language for the Land Development Code, the City has extended the requirement to include buildings over 250,000 square feet that are within 500 feet of the City's reclaimed water line. Additionally, the proposed regulations require buildings less than 250,000 square feet and within 250 feet of the reclaimed water line to connect to the reclaimed water line.

Onsite Reuse of Reclaimed Wastewater

Although there are no state or local regulations that govern onsite reuse of wastewater or blackwater, the City of Austin has been evaluating how wastewater or blackwater can be safely treated and reused onsite for non-potable purposes. The City is currently building a new permit center in North Austin that will have its own onsite wastewater treatment plant. The intent is for the building to reuse all of the locally generated blackwater for toilet flushing and landscape irrigation. Since the City is the owner of the downstream wastewater treatment plant and has a Texas Pollutant Discharge Elimination System permit, the Commission has authorized the City to treat and reuse blackwater at the permit center as a reclaimed production facility under 30 TAC, Chapter 321, Subchapter P.

Within the City of Austin, it would be extremely difficult, if not impossible, for a private entity to treat and reuse blackwater onsite. Under the Uniform Plumbing Code, all properties within 100 feet of the city sewer system must connect their building drains to the sewer.[39] It is possible for the City to amend the Uniform Plumbing Code to remove this requirement, but under state regulations, to reuse reclaimed wastewater, an entity must have a wastewater permit and an alternative means of disposal. The process for obtaining a wastewater permit is expensive and time consuming. It does not make sense, therefore, for a building within the City of Austin that is within 100 feet of the City's sewer line to construct an onsite blackwater reuse system. It is just easier to connect to a municipal sewer system. A building that is located beyond 100 feet of the City sewer line can obtain its own wastewater treatment permit from the Commission or if flows are less than 5,000 gallons per day, an onsite sewage facility permit from the local governmental entity that oversees onsite sewage facilities. However, as stated earlier, under the current Chapter 210 rules, you cannot obtain a reuse authorization for a site served by an onsite sewage facility. Most developers within the City of Austin choose to pay to extend their wastewater lines to the City's sewer collection system.

The regulatory environment in Texas for onsite reuse of wastewater is more restrictive than in California, which has recently taken steps to permit local governments to regulate onsite wastewater reuse systems. In 2018, California passed Senate Bill 966, which requires the State Water Resources Control Board to issue comprehensive regulations, including risk-based health and safety standards, to guide local governments in creating onsite non-potable water reuse programs. The City of San Francisco has been a leader in California in terms of promoting onsite treatment and reuse of wastewater.

To encourage onsite non-potable reuse of blackwater in Texas, the Legislature could amend the reclaimed water regulations in Chapter 210 to allow onsite sewage facilities to beneficially reuse blackwater; however, without standardized and comprehensive treatment and operating requirements and appropriate oversight by local governments, there would be serious health risks associated with allowing smaller systems to treat and reuse blackwater onsite. A better alternative could be for the state to first establish a framework to authorize local governments to adopt onsite non-potable reuse programs that include the reuse of blackwater, and then to allow onsite treatment and reuse of blackwater without the need to obtain a Texas Pollutant Discharge Elimination System permit or Texas Land Application Permit from the Commission provided the systems comply with local regulations.

WASTEWATER » INDIRECT POTABLE REUSE

Indirect potable reuse refers to the use of treated reclaimed water to augment drinking

39 City of Austin Plumbing Code § 304.2.

water supplies by discharging it to a natural buffer like a water body or an aquifer, and subsequently treating it for potable consumption.[40] Texas does not have specific standards for indirect potable reuse. An indirect reuse project that involves discharge to navigable waters must comply with federal and state requirements under the Clean Water Act and obtain a Texas Pollutant Discharge Elimination System permit. Indirect reuse projects that involve a watercourse also require a bed and banks permit from the state, which authorizes the permit holder to convey and subsequently divert water.[41] If the reclaimed water is transferred or piped directly to the user or to a holding pond or vessel and never enters a state watercourse, then the Commission does not require a bed and banks permit.

Treated wastewater can also be injected through a well into an aquifer, where it is stored and then later recovered through the same well. This is referred to as Aquifer Storage and Recovery. The Commission regulates Aquifer Storage and Recovery wells under the Class V Injection Well Program. The quality of the water injected must meet requirements under the federal Safe Drinking Water Act. Generally, the water injected must be of the same or better quality than the water in the receiving aquifer. Aquifer Storage and Recovery is a form of Managed Aquifer Recharge, one of many methods to proactively introduce additional water into the subsurface of the earth. Other methods include enhanced surface infiltration and vadose zone well infiltration.[42] The City of Austin is currently considering Aquifer Storage and Recovery as a water supply strategy under the Water Forward Plan.

There are numerous entities in Texas who have turned to indirect potable reuse to augment drinking water supplies. For example, the Tarrant Regional Water District and North Texas Municipal Water have developed indirect potable reuse projects through the construction of wetlands. Pursuant to the entities' Texas Pollutant Discharge Elimination System permits, treated wastewater effluent is discharged from the wastewater treatment facilities into the Trinity River and conveyed for several miles, where, as authorized by a bed and banks permit, it is then diverted from the river and pumped into an engineered wetland and undergoes a natural treatment and filtration process. The water from the wetland is then pumped into a surface water reservoir, where it is combined with other inflows, and ultimately treated and reintroduced into the water supply system.[43] The wetlands not only increase water quality, but they also provide habitat for wildlife, such as migratory birds, and are a frequent tourist attraction.

For decades, the City of El Paso has treated wastewater to drinking water quality standards and then injected the treated wastewater underground into the Hueco Bolson Aquifer. When the plant was constructed in 1985, "it was the nation's first full-scale wastewater reclamation plant to use tertiary treatment to restore wastewater to national and state potable water standards, and inject back into the groundwater aquifer."[44] This has reduced the depletion of the Hueco Bolson Aquifer from three feet per year to one foot per year.[45]

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40 See http://www.twdb.texas.gov/publications/shells/WaterReuse.pdf.

41 See Tex. Water Code §11.042.

42 See Texas Water Development Board, An Assessment of Aquifer Storage and Recovery in Texas – Report # 0904830940 (Feb 2011).

43 Timothy Noack et al, Constructed Wetlands Play Integral Role in Providing Water Supply through Indirect Potable Reuse in North Texas. https://texanbynature.org/wp-content/uploads/2018/06/Constructed-Wetlands-Play-Integral-Role-in-Water-Reuse-in-Texas.pdf.

44 Sanchez, Mark, P.E., 32 Years of Indirect Potable Reuse in El Paso at 1 (2017) http://www.team-psc.com/wp-content/uploads/2017/06/32-Years-of-Indirect-Potable-Reuse-in-El-Paso_paper_FINAL_5May2017.pdf.

45 *Id.* at 6.

WASTEWATER » DIRECT POTABLE REUSE

Direct potable reuse refers to the use of treated reclaimed water without exposure to the environment, for example, piped directly into the distribution system or blended with the raw water supply with infrastructure before entering the water treatment plant. Direct potable reuse is commonly referred to as "toilet to tap." Currently, Texas has no regulations specifically governing Direct potable reuse facilities, but they are not prohibited under the law. This past August, the California State Water Resources Control Board adopted a proposed framework for regulating direct potable reuse.

The Commission permits direct potable reuse projects on a case by case basis. The Colorado River Municipal Water District began operating the first direct potable reuse facility in Texas and the nation in 2013 and the second biggest in the world. The District reclaims two million gallons a day of the wastewater effluent from Big Spring and treats it through microfiltration, reverse osmosis, and ultra violet disinfection. The reclaimed water is then merged with a raw water pipeline conveying water from a source water lake and then transmitted to pre-existing surface-water treatment facilities.[46] In June 2014, the City of Wichita Falls laid the groundwork to treat wastewater effluent to drinking water standards for emergency water supply shortages – constructing a 13 mile pipeline from the City's existing wastewater treatment facility to the City's water treatment plant, which already used microfiltration and reverse osmosis technology to treat brackish water.

The City of El Paso, motivated by drought and a lack of reliable drinking water sources, is currently developing a pilot direct potable reuse project that, once complete, will be the second true direct-to-distribution potable reuse facility in the world. The treatment plant will recycle 10 million gallons per day of treated wastewater effluent to supplement the City's current water supplies. Unlike other direct potable reuse facilities, like the Big Springs plant, which returns treated wastewater to a treatment plant or blends treated water with a raw water source before entering the distribution system, El Paso's direct potable reuse facility, referred to as the Advanced Water Purification Facility, will use a "direct-to-distribution approach." In other words, the facility purifies their wastewater to drinking water quality and then it flows directly into the drinking water distribution system.[47]

GRAYWATER AND ALTERNATIVE ONSITE WATER » NON-POTABLE USE

Alternative onsite waters and graywater are important sources of water that can be used to offset traditional freshwater supply sources, such as groundwater and surface water. Studies have found that "[r]eplacing the demand for toilet and urinal flushing with non-potable water can offset approximately 25 percent of the total potable water use in a residential building, and up to 75 percent in a commercial building."[48] The use of alternative onsite water sources and graywater are integral components to One Water Projects, especially in Texas, where surface water and groundwater resources are dwindling.

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46 See https://www.epa.gov/sites/production/files/2016-09/documents/final_texas_poi2.pdf.

47 See https://www.arcadis.com/en/united-states/what-we-do/our-projects/north-america/united-states/el-paso-advanced-water-purification-facility/.

48 San Francisco's Non-potable Water Program, A Guidebook for Implementing Onsite Water Systems in the City and County of San Francisco (2015) https://sfwater.org/modules/showdocument.aspx?documentid=4962.

Texas Regulations

There are no federal regulations that govern the use of alternative onsite waters or gray water. To ensure that public water supplies are protected, Texas has established standards for the use of alternative onsite waters and graywater under Section 341.039 of the Health and Safety Code. The statute directs the Commission to adopt and implement minimum standards for the indoor and outdoor use, and reuse of treated graywater and alternative onsite water. Section 341.039(a-1) specifies that Commission rules must allow graywater and alternative onsite water for toilet and urinal flushing, and under Section 341.039(c), if certain conditions are met, the Commission may not require a permit for the domestic or commercial use of graywater or alternative onsite water. Section 341.037(d) encourages builders to install plumbing in new housing in a manner that provides the capacity to collect graywater or alternative onsite water.

Under section 341.037(e), alternative onsite water is defined as rainwater, air-conditioner condensate, foundation drain water, stormwater, cooling tower blowdown, swimming pool backwash and drain water, reverse osmosis reject water, or any other source of water considered appropriate by the Commission. Graywater is defined as wastewater from clothes-washing machines, showers, bathtubs, hand-washing lavatories, and sinks that are not used for disposal of hazardous or toxic ingredients. Graywater does not include wastewater that has come in contact with toilet waste, wastewater from the washing of diapers soiled with human excreta, or wastewater from sinks used for food preparation or disposal.

The Commission has adopted rules establishing criteria for graywater and alternative onsite water in Title 30, Chapter 210, Subsection F of the Texas Administrative Code. State regulations permit entities to use alternative onsite waters for non-potable purposes, such as for irrigation and toilet flushing without a permit. Many residences and buildings in Texas have taken advantage of these lenient regulations and constructed systems that collect alternative onsite water and that are used for non-potable purposes.

City of Austin Regulations

The City of Austin has promulgated regulations governing local system design, construction, installation and permitting requirements for alternative onsite water reuse systems – not blackwater systems. They are based on the Commission's reclaimed water regulations in 30 TAC, Chapter 210, Subchapter F that are applicable to alternative onsite water and graywater. These regulations are found in the City's Plumbing Code. State law requires municipalities to adopt either the Uniform Plumbing Code or the International Plumbing Code and permits municipalities to adopt local amendments to address local concerns.[49] The City of Austin has adopted the Uniform Plumbing Code, 2015 edition, and has made numerous local amendments to the Code to further refine the requirements in the Uniform Plumbing Code related to the reuse of alternative onsite waters and graywater. The Uniform Plumbing Code provides the context for local governance of alternative onsite water reuse systems. It is important to note that many of the City of Austin's requirements related to plumbing are products of the Uniform Plumbing Code, and therefore, require local amendments to change.

In the City of Austin, permitting requirements for onsite water reuse systems vary by the water source and by the intended use of the water. Treatment and disinfection are required for all onsite water reuse systems that use alternative onsite water and graywater for toilet and/or urinal flushing or clothes washing, as well as stormwater, condensate, and other non-sewage originated water that is used for above-grade irrigation, and could

49 See section 1301.255 of the Texas Occupations Code.

come in contact with people. Alternative onsite water and graywater must be treated pursuant to the Commission's regulations in 30 TAC, Chapter 210, Subchapter F. The City does not require entities to treat rainwater if it is used for irrigation. For, graywater, the city does not require a permit if it is used for subsurface irrigation, but for spray irrigation of graywater, the city requires a permit. Under the City's plumbing code, onsite water reuse systems must install cross connection controls, such as backflow prevention assemblies, to ensure that the City's potable water system is not contaminated, and all non-potable pipes must be purple and labeled "Non-Potable Water."

The City does not require a permit for rainwater or condensate systems unless the rainwater or condensate system has a pump and collects more than 500 gallons, the system has components interior to a building, or the system has backup connection from another water source. The City requires a permit for onsite water reuse systems that collect graywater, stormwater, and other non-sewage originated water. Section 310.10 of the City of Austin's Mechanical Code requires new commercial and multi-family facilities with a cooling capacity of 200 tons or greater to install condensate recovery systems for beneficial reuse.

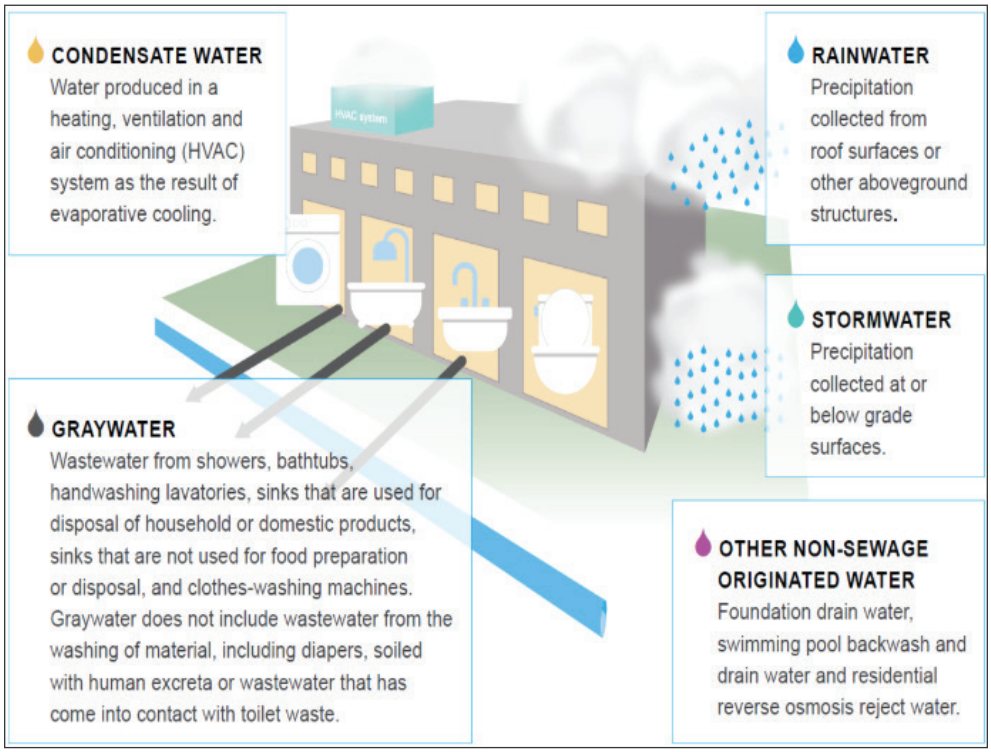

Figure 5. Different sources of water in an urban setting (Source: Austin Water)

In an effort to reduce potable water demand in the City of Austin and to implement strategies in the Water Forward Plan, the City has proposed new regulations that apply to alternative onsite waters. These proposed regulations are similar to the City of San Francisco's Onsite Water Reuse for Commercial, Multi-family, and Mixed-Use Development Ordinance adopted in 2012.[50] Upon adoption, the proposed regulations will require new commercial and multi-family buildings to submit a water balance before the City approves the building's site plan. New buildings that are larger than 250,000 square feet will be required to meet with Austin Water staff to discuss the water balance and opportunities and incentives to use alternative onsite waters. Under

50 *Id.*

the proposed regulations, by 2023, the City will require that all new buildings over 250,000 square feet incorporate onsite water reuse and dual plumb the building. If a building is required to connect to the reclaimed water line (because the building is greater than 250,000 square feet and within 500 feet of the reclaimed water line), under the proposed regulations, the City will not also require the building to install an onsite reuse system. If the development needs to collect stormwater to meet the City's water quality control requirements, then the proposed regulations allow the development to use the onsite reuse system for non-potable purposes and to use the City's reclaimed water line as a back-up supply.

Alternative Onsite Water and Graywater at the Austin Central Library

The City has constructed an onsite water reuse system at the new Central Library. A pre-existing 373,000-gallon cistern collects roof rainwater and air-conditioning condensate. The cistern serves both as rainwater storage and as a water quality control pursuant to the City's watershed protection ordinance (discussed below). The water collected is filtered and then disinfected with an ultraviolet light filter and is used for non-potable purposes, such as toilet flushing and outdoor irrigation. The water must be treated to Type I water quality standards, but, as discussed above, the State does not require a permit for alternative onsite water and graywater collection systems.

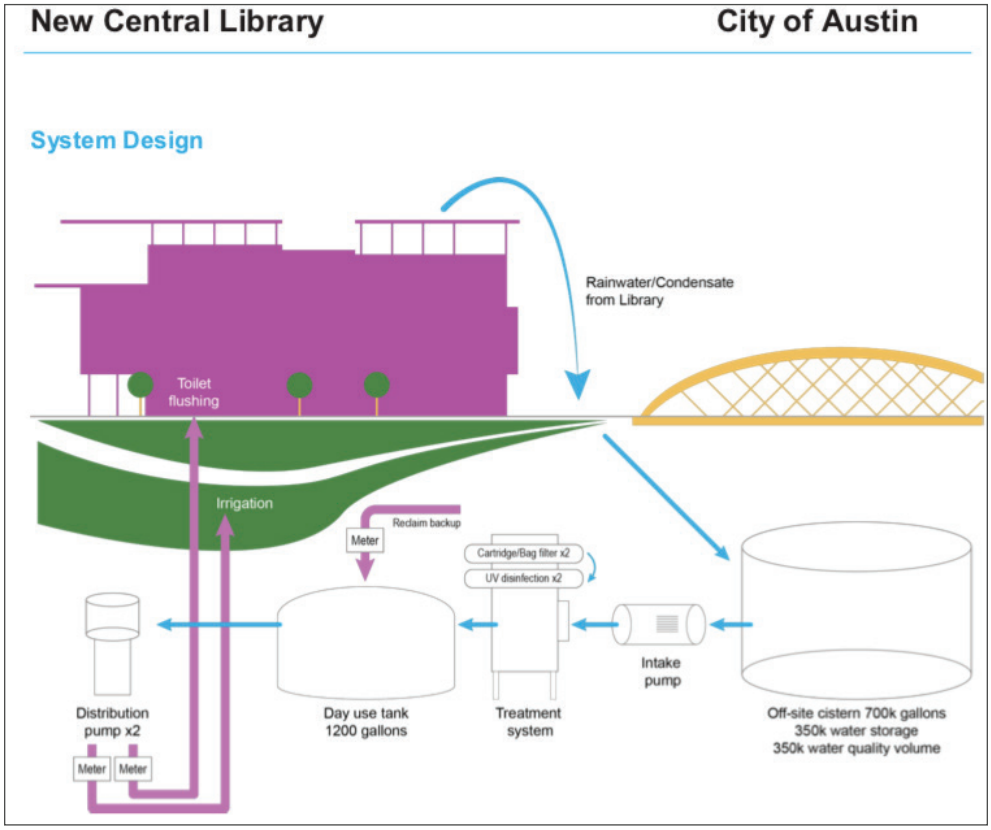

Figure 6. Rainwater and AC condensate collection and treatment system at the City of Austin's Central Library (Source: Austin Water, Alternative Water Systems)

The cisterns are actually located on Austin Energy's property, which means that to pipe the water from the cistern to the library, City officials at Austin Water had to work around the prohibition in the Uniform Plumbing Code that a building's water

supply line must not cross property boundaries. According to Section 609.6 of the Uniform Plumbing Code, "[n]o building supply shall be located in a lot other than the lot that is the site of the building or structure serviced by such building supply." Section 721.1 of the Uniform Plumbing Code also prohibits sewer lines from crossing property boundaries. To work around this prohibition, Austin Energy agreed to grant the City of Austin an underground easement where the water line from the cistern to the building is constructed. Although these prohibitions are important to ensure that other property owners cannot access or impact a building's water supply or sewer, they potentially create obstacles to developing district-scale reuse of water, also referred to as eco-districts, where several buildings collect and reuse a shared alternative water source. It is important to point out that while these prohibitions originate in the Uniform Plumbing Code, they apply to alternate water systems in Austin because the City has defined an alternate water system as a plumbing system under section 218.1 of the local amendments to the Uniform Plumbing Code. Currently, the City of Austin works around these prohibitions by addressing the need for water and sewer lines to cross property boundaries on a case by case basis through the use of underground easements, but the City is considering regulatory amendments to promote the creation of eco-districts as part of implementing the Water Forward Plan in the future.

Standards for Onsite Water Reuse Systems

Although cities and developments are increasingly turning to onsite water reuse systems to offset potable water demand, as discussed above, there are no federal standards that govern onsite water reuse. State rules that were designed under the traditional urban water management approach of removing wastewaters from the water cycle are not always appropriate for onsite reuse systems, where specific water sources and specific end uses should be considered in establishing treatment and monitoring standards. Current regulations in some states focus more on water quality protections and treatment requirements from an endpoint/discharge assessment rather than from an actual risk-based assessment of possible health concerns to people from exposure to specific water sources. Industry experts agree that onsite water reuse systems, "have been regulated to achieve water quality goals without consideration of the source water and end use combination" and that "fit for purpose" regulations are better suited for states to effectively regulate onsite water reuse systems. While Texas has adopted reuse regulations that differentiate between sources of water (alternative onsite and graywater versus wastewater), the treatment requirements are still tied to the water quality at the end point rather than an assessment of the varying levels of health risks associated with each type of water and the intended use of that water. For example, blackwater that will be reused inside a building for toilet flushing may have different pathogen reduction targets than alternative onsite waters that are used outdoors.

Consequently, to establish consistent water quality and monitoring criteria for onsite reuse projects, the Water Research Foundation created the Blue-Ribbon Commission for Onsite Non-potable Water Systems. The Blue-Ribbon Commission, which is comprised of public health and water utility leaders, has developed a risk-based framework and model regulations for states and utilities. The City of Austin intends to adopt many of the Blue-Ribbon Commission's treatment and monitoring recommendations as it implements its new onsite and reclaimed water regulations moving forward.

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STORMWATER

Stormwater is rainwater that touches the ground. In Texas, stormwater is defined as an alternative onsite water, so as discussed above, the rules and regulations that apply to alternative onsite water reuse impact stormwater management. This means that "onsite water systems can boost compliance with local stormwater management ordinances while simultaneously providing other water quality benefits to local receiving waters."[51] Additionally, more and more cities are utilizing green infrastructure to capture stormwater onsite and slow it down before it enters surface waterways, allowing it to infiltrate into the ground, which provides both irrigation and recharge benefits. Cities can use green infrastructure to satisfy requirements under the Clean Water Act's stormwater management program.

Federal Law

While the National Pollutant Discharge Elimination System permit program under the Clean Water Act protects water quality by regulating point sources that discharge pollutants into surface-water bodies, it also establishes requirements for nonpoint sources under the NPDES program. The most common form of nonpoint source pollution in an urban environment is stormwater runoff. Nonpoint source pollution "represents 50% of the nation's water pollution problems and according to the U.S. Environmental Protection Agency, 85% of impaired rivers and streams and 80% of impaired lakes and reservoirs are polluted by nonpoint sources."[52]

Although the Clean Water Act does not establish effluent limitations or water quality

51 National Blue-Ribbon Commission for Onsite Non-Potable Water Systems, Making the Utility Case for Onsite Non-Potable Water Systems at 10 (March 2018).

52 See https://www.epa.gov/sites/production/files/2016-10/documents/nps_program_highlights_report-508.pdf and Claudia Copeland, Clean Water Act: A Summary of the Law at 3, Congressional Research Organization (2016).

standards for nonpoint sources of pollution, such as stormwater, it addresses pollution caused by stormwater through two avenues. Section 319 of the Clean Water Act requires states to identify waters that do not meet water quality standards due to pollution from nonpoint sources and requires states to prepare management plans identifying controls and programs for specific sources. Under Section 319, the U.S. Environmental Protection Agency provides funding to states to implement nonpoint source programs (non-point source programs) designed to prevent runoff from polluting waters. In Texas, the Commission administers Section 319 grants for municipal nonpoint sources pursuant to Texas's U.S. Environmental Protection Agency approved Nonpoint Source Management Program.[53] Additionally, to prevent pollution from stormwater runoff in urban environments, Section 402(p) of the Clean Water Act and 40 CFR §122.26 require states to issue National Pollutant Discharge Elimination System permits for discharges from municipal separate stormwater sewers (MS4s), under a National Pollutant Discharge Elimination System stormwater program that is designed to prevent stormwater runoff from washing harmful pollutants into local surface waters.

Texas Regulations

Like wastewater, stormwater discharges are governed under Chapter 26 of the Texas Water Code, which generally concerns water quality controls and implements Clean Water Act requirements in state law. The Commission has adopted rules dealing with stormwater discharges pursuant to Chapter 26. Under the state Texas Pollutant Discharge Elimination System program, the Commission authorizes the discharge of stormwater from municipal separate stormwater sewers (MS4s) provided that the municipality obtains a permit. There are different classes of MS4 permits, but in general MS4 permits require municipalities to develop comprehensive Stormwater Management Programs. Stormwater Management Programs require permittees to implement minimum control measures designed to minimize the discharge of pollutants into surface water bodies. Under 30 TAC, Chapter 205, the Commission issues general permits for small MS4s, whereas larger MS4s must obtain an individual Texas Pollutant Discharge Elimination System permit.

STORMWATER » GREEN INFRASTRUCTURE

According to the U.S. Environmental Protection Agency, "[a]n increasing number of cities and states are integrating green infrastructure provisions into their MS4 permits."[54] For example, California, Massachusetts, and Washington, D.C. have incorporated green infrastructure requirements, such as rainwater harvesting, evapotranspiration, infiltration, and green roof construction, in their MS4 permits.[55] To combat issues with combined sewer overflows, Philadelphia is pursuing a One Water approach to managing stormwater by developing a long-term plan to reduce stormwater flows and protect watersheds by managing stormwater through green infrastructure. The city has a goal to build 10,000 acres of green infrastructure by 2036.

The City of Austin has not incorporated green infrastructure requirements into its MS4 permit or as part of its Watershed Protection Ordinance; however, in the proposed

53 See https://www.tceq.texas.gov/assets/public/waterquality/nps/mgmt-plan/2017_NPSManagementProgram.pdf.

54 See https://www.epa.gov/green-infrastructure/integrating-green-infrastructure-federal-regulatory-programs#MS4%20Permits.

55 *Id.*

revisions to the Land Development Code, certain developments will be required to install green infrastructure as water quality controls.

STORMWATER » ONSITE NON-POTABLE REUSE

To protect the water quality of creeks within the City, the City of Austin has enacted a Watershed Protection Ordinance that requires developments with over 8,000 square feet of impervious cover to implement water quality controls. In general, these controls are designed to retain stormwater onsite for a period of time after a rainfall event and then to slowly release the stormwater. Generally, the Watershed Protection Ordinance requires developments to capture a minimum volume of stormwater runoff for treatment and to release the treated volume over time. This reduces flooding and water quality concerns related to runoff that occurs during storm events and ensures that cisterns have storage available before the next rain event. Developments must construct retention ponds to hold stormwater, but a development may also satisfy the water quality control requirements by capturing rainwater from a roof *before* it hits the ground and then use this rainwater for irrigation or for non-potable purposes pursuant to the alternative onsite water regulations discussed above. The City of Austin's Central Library is an example of a building that uses rainwater cisterns for both water quality controls and for non-potable use.

Alternative onsite water enthusiasts take issue with the requirement in the Water Protection Ordinance that water in rainwater cisterns must be released within a certain amount of time, which is usually faster than it can be reused for non-potable purposes within a building. Most developments that capture rainwater want to store this rainwater for future use, but the Watershed Protection Ordinance requires that they slowly release it to prepare for the next storm event. Although this conflict has not been resolved through regulatory changes, developments have found ways around it, either by constructing larger or more cisterns. Moving forward, for the City of Austin to really manage stormwater and onsite water reuse under a One Water Approach, the regulations will need to require the city and developers to factor water quality controls into a building's overall water balance.

CONCLUSION

In general, Texas has a very flexible and accommodating regulatory environment for One Water projects. In Texas, homeowners and public water systems are allowed to harvest rainwater for drinking water purposes. The state has adopted regulations authorizing permittees to beneficially reuse wastewater for non-potable purposes, and the state has adopted a suite of regulations that provide the foundation for local governments to regulate the reuse of rainwater, stormwater, air conditioning condensate, and graywater for non-potable purposes. Furthermore, although the Commission does not expressly regulate more innovative water reuse strategies, such as direct potable reuse or indirect potable reuse, the Commission does not prohibit these strategies. Where there is no specific regulatory guidance, the Commission's policy is to permit projects on a case by case basis, so while this may not provide developers with a clear path forward, it does mean that most water reuse projects are open to consideration. The Commission even indicated it would be open to allowing the collection of air conditioning condensate for public drinking water purposes provided that the public water system applies for an exception and complies with state and federal drinking water regulations.

Protection of public health and the environment are paramount, and as discussed throughout this report, are the justification for almost every federal and state regulation that concerns water. While the Commission has an open mind when it comes to most types of water reuse, the regulations that govern the quality of this water are non-negotiable. Public water systems must treat and disinfect drinking water pursuant to the Safe Drinking Water Act, and wastewater permittees must treat wastewater effluent pursuant to federal water quality standards under the Clean Water Act. If the Commission has authorized a wastewater permittee to beneficially reuse wastewater, then the permittee must abide by the Commission's treatment regulations in Chapter 210, Title 30 of the Texas Administrative Code. While these federal and state regulations may create regulatory burdens, they are crucial to protect public health.

Despite the fact that Texas appears to have a flexible regulatory setting, One Water projects, unfortunately, are still not the norm--likely for several reasons. First, although onsite non-potable reuse of blackwater is a hallmark of the One Water approach, existing regulations in Texas make it extremely difficult for developers to construct onsite blackwater reuse systems. Another hinderance to One Water projects in Texas, ironically, may be Texas's flexible regulatory framework, and the lack of regulatory prescriptions and guidance. Some developers are hesitant to embark on projects where there is regulatory uncertainty and an unclear permitting path. Since the City of San Francisco adopted its onsite non-potable reuse ordinance in 2012, there has been an uptick in the number of onsite reuse systems constructed (however, the City also mandated that buildings over 250,000 square feet construct onsite non-potable water reuse systems). Like San Francisco, the City of Austin, intends to make onsite reuse for alternative water sources mandatory for large buildings in the next few years and, in the future, plans to refine existing regulations to facilitate district-scale reuse. Moreover, as Austin and other cities begin implementing "fit for purpose" risk-based standards for onsite water systems, a more standardized regulatory path will likely unfold, paving the way for onsite water reuse projects to become more mainstream. To further encourage onsite non-potable reuse, Texas, like California, could enact additional regulatory guidance that requires local governments to adopt risk-based treatment standards for onsite non-potable reuse systems for alternative onsite waters, graywater, and ultimately, blackwater.

To ensure a resilient and sustainable water supply in the wake of increased drought


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and population growth, Texas, in partnership with local governments, must continue to expand and refine the regulatory framework to accommodate decentralized water management strategies, including all forms of water reuse, such as onsite reuse of blackwater. To encourage onsite blackwater reuse, both the Legislature and local governments need to work together to develop a streamlined, incentive driven permitting process for onsite blackwater reuse systems that protects public health and provides local governments with the authority to regulate and permit onsite blackwater reuse systems. Additionally, as the City of Austin is a clear leader in onsite water reuse, to pave the way for more One Water projects, the City could amend its plumbing code to permit alternative water lines from crossing property boundaries, and work with state leaders on developing a blackwater reuse program that is protective of public health.

Decentralized water management strategies will be a key component to cities' future water resiliency. As "more and more people want to live and work in green buildings that have lower water, energy, and carbon footprints," like Seattle's Bullitt Center or the City of Austin's Central Library, "the next generation of efficient buildings will need to incorporate onsite reuse at some level to meet this demand and bring forth the sustainable cities of tomorrow."[56] Texas has long been a pioneer in its approach to water management. But to meaningfully advance One Water projects in Texas in the future, the state must transition from a water management policy that favors "regionalization" to one that embraces a decentralized and integrative framework - where the regulatory structure supports the vision that all water sources in the urban water cycle are resources that must be holistically managed.

56 National Blue-Ribbon Commission for Onsite Non-Potable Water Systems, Making the Utility Case for Onsite Non-Potable Water Systems at 11 (March 2018).

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