

PPC Land Consultants, Inc.

An Overview of Laws and Regulations Governing Water Reuse in California, Arizona, Nevada and Texas

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ABBREVIATIONS & ACRONYMS

Active Management Areas	AMAs
Aquifer Protection Permit	APP
Arizona Corporation Commission	ACC
Arizona Department of Environmental Quality	ADEQ
Arizona Department of Water Resources	ADWR
California Department of Public Health	CDPH
California Environmental Protection Agency	Cal/EPA
California State Water Resources Control Board	SWRCB
Constituents of emerging concern	CECs
Covenants, conditions and restrictions	CC&Rs
Department of Water Resources (California)	DWR
Foundation for Community Association Research	FCAR
Homeowner’s associations	HOAs
Indirect potable reuse	IPR
Nevada Division of Environmental Protection	NDEP
Nevada Division of Water Resources	NDWR
PPC Land Consultants, Inc.	PPC
Public Utilities Commission (Nevada)	PUCN
Regional Water Quality Control Boards (California).....	RWQCBs
Texas Commission on Environmental Quality	TCEQ
Texas Water Development Board	TWDB
U.S. Environmental Protection Agency	U.S. EPA
Utility Environmental Protection Act (Nevada)	UEPA

INTRODUCTION

PPC Land Consultants, Inc. (“PPC”) was asked by the Foundation for Community Association Research (“FCAR”) to conduct research on existing laws and regulations in the State of California which affect use of recycled water, including non-potable or gray water, for irrigation purposes in residential communities. In addition, PPC was tasked with reviewing relevant laws and regulations of the states of Arizona, Nevada and Texas which affect the use of recycled water for community irrigation, and with identifying key similarities and differences with California. An analysis of how each of these states manages the use of recycled water and encourages or discourages the practice follows.

As population and demand for potable water increase, reuse of reclaimed water for landscape irrigation is becoming a more attractive practice in many communities in the arid west. It saves potable water, and provides a stable supply of irrigation water for maintaining urban greenery and recreational facilities.

In the United States, water reclamation and reuse standards are the responsibility of state and local agencies and tribal nations. There are no federal regulations for reuse. The regulations adopted by states vary widely and not all states have water reuse guidelines or regulations.¹ The states that are the subject of this report all have well established water reuse regulations. Regulations refer to actual rules that have been enacted and are enforceable by governmental agencies. Guidelines, on the other hand, are generally not enforceable, but can be used in the development of a reuse program. In some states, however, guidelines are, by reference, included in the regulations, and thus are enforceable. In addition to providing treatment and water quality requirements, comprehensive rules or guidelines also promote reuse by making compliance standards clear. They provide the certainty that if a project meets the requirements, it will be permitted.”²

Water reuse regulatory programs must be compatible with each state’s water rights laws. Water rights law provides the legal right for an entity to divert, capture, and use water within the boundaries of each individual state.³ Access to or control over reclaimed water, like formal water

¹ Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012.

² Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-1.

³ In the United States, there are two main approaches to water rights law— appropriative doctrines (common in historically water scarce areas) and riparian doctrines (common in historically water-abundant areas). Appropriative water rights are assigned or delegated to consumers, generally based on seniority of which users laid first claim to that water and not from the property’s proximity to the water source. In contrast, riparian water rights are based on the proximity to water and are acquired by the purchase of the land. In the West, reuse can be the target of legal challenges, depending on how the local system of water rights regards the use and return of reclaimed water. 2012

rights, is unique to each individual state. A special circumstance arises if the use of reclaimed water harms or impairs existing rights that depend on return flows.⁴

Although the regulation of water reuse is governed by the individual states, federal laws do address water pollution and quality. The Federal Water Pollution Control Act (Title 33) addresses water pollution prevention and control.⁵ Title 40 of the Code of Federal Regulations includes federally promulgated water quality standards and includes state-specific standards for certain waters of Arizona⁶ and California, namely the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.⁷ The U.S. Environmental Protection Agency (“U.S. EPA”) has established guidelines to encourage states to develop their own regulations. The primary purpose of federal guidelines is to protect human health and water quality. To reduce disease risks to acceptable levels, reclaimed water must meet certain disinfection standards by either reducing the concentrations of constituents that may affect public health and/or limiting human contact with reclaimed water.⁸ The EPA 2012 Guidelines for Water Reuse⁹ debuted in 1980 and were updated in 1992, 2004, and 2012.

Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-4.

⁴ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-4.

⁵ FEDERAL WATER POLLUTION CONTROL ACT TITLE 33—NAVIGATION AND NAVIGABLE WATERS CHAPTER 26—WATER POLLUTION PREVENTION AND CONTROL [As Amended Through Pub.L. 111-378, January 4, 2011]† (33 U.S.C. § 1251 et seq.).

⁶ Title 40 (Protection of the Environment) maintained by the Government Printing Office, subpart D, Federally Promulgated Water Quality Standards, includes state-specific standards for Arizona and California. The AZ provisions (§ 131.31 Arizona.) designates certain waters and used for fish consumption.

⁷ Title 40 of the Code of Federal Regulations - Code of Federal Regulations, Title 40 (Protection of the Environment) maintained by the Government Printing Office, subpart D, Federally Promulgated Water Quality Standards, § 131.37 California. (a) Additional criteria. The following criteria are applicable to waters specified in the Water Quality Control Plan for Salinity for the San Francisco Bay/ Sacramento-San Joaquin Delta Estuary, adopted by the California State Water Resources Control Board in State Board Resolution No. 91–34 on May 1, 1991.

⁸ Water Reuse: Using Reclaimed Water for Irrigation, Virginia Cooperative Extension, publication 452-014, found at <http://www.pubs.ext.vt.edu/452/452-014/452-014.html>, retrieved April 26, 2017.

⁹ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012.

DEFINING TERMS

The terms recycled water, non-potable water and gray water have different meanings. Non-potable water is the broadest term and means water that is not fit for human consumption; not suitable for drinking.¹⁰ Non-potable water sources include rainwater, reclaimed/recycled water and gray water.

Recycled water, also known as reclaimed water and/or reused water¹¹, is former domestic wastewater that has been disinfected and treated to remove solids and certain impurities. After treatment at a wastewater treatment plant¹², the cleansed water can be safely discharged into a stream, wetland, or ocean, or this water source may be piped back into communities for reuse¹³ by various residential, industrial, and commercial users. Recycled water has been widely used for agricultural and landscape irrigation, industrial processes, toilet flushing and the replenishment of ground water basins (referred to as ground water recharge).¹⁴ Recycled water cannot be used for drinking.¹⁵

Another type of recycled water is gray water, also commonly spelled graywater, grey water and greywater.¹⁶ These terms all describe reusable wastewater from residential, commercial and industrial bathroom sinks, bath tub shower drains, and clothes washing equipment drains. Gray water may be directly reused onsite after being collected with a separate plumbing system that contains no human waste. Its most common application is for landscape irrigation.¹⁷ Use of non-toxic and low-sodium soap and personal care products is suggested to protect vegetation when reusing gray water for irrigation.

¹⁰ Merriam-Webster, “potable”, found at <https://www.merriam-webster.com>, retrieved April 12, 2017.

¹¹ Water Recycling and Reuse: The Environmental Benefits, U.S. Environmental Protection Agency, found at <https://www3.epa.gov/region9/water/recycling/>, retrieved April 7, 2017.

¹² There are three stages of treatment: Primary (the sewage is temporarily held in a basin so solid waste materials can settle to the bottom and be removed), Secondary (the water left behind is further treated to remove or degrade any remaining wastes still suspended in the water) and Tertiary (advanced removal of harmful chemicals and disinfection to kill disease-causing organisms). Reclaimed Water Use in the Landscape: Frequently Asked Questions About Reclaimed Water, Gurpal S. Toor and Mary Lusk, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ss544>, retrieved 4/12/2017.

¹³ Reclaimed Water Use in the Landscape: Frequently Asked Questions About Reclaimed Water, Gurpal S. Toor and Mary Lusk, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ss544>, retrieved 4/12/2017.

¹⁴ Water Recycling and Reuse: The Environmental Benefits, U.S. Environmental Protection Agency, found at <https://www3.epa.gov/region9/water/recycling/>, retrieved April 7, 2017.

¹⁵ Reclaimed Water Use in the Landscape: Frequently Asked Questions About Reclaimed Water, Gurpal S. Toor and Mary Lusk, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ss544>, retrieved 4/12/2017.

¹⁶ Both gray water and grey water are accepted terms but the use of gray is most common in the United States while grey predominates in the United Kingdom. Gray vs. grey, found at <http://grammarist.com>, retrieved 4/12/2017.

¹⁷ Reclaimed Water Use in the Landscape: Frequently Asked Questions About Reclaimed Water, Gurpal S. Toor and Mary Lusk, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ss544>, retrieved 4/12/2017.

Nonpotable reuse systems typically have lower water quality objectives than potable systems, and the level of treatment varies depending on the end use. Recycled water for landscape irrigation understandably requires less treatment than recycled water for drinking water. Nonpotable reuse usually requires a dual distribution system (i.e., a separate system for distributing potable and non-potable water).¹⁸

NSF International developed “NSF/ANSI 350: Onsite Residential and Commercial Water Reuse Treatment” to standardize the material, design and performance criteria for water reuse systems. The 2015 International Residential Code, International Plumbing Code, Uniform Plumbing Code and International Green Construction Code now all require that water reuse systems used for residential toilet and urinal flushing comply with this standard. Under these codes, should a builder choose to use an onsite water reuse system, certification to NSF/ANSI 350 is either required or constitutes a path to acceptance under these codes. NSF/ANSI 350 certification ensures that water for toilet and urinal flushing (and in some codes for surface irrigation) is properly treated for use in these applications.¹⁹

In the United States, non-potable water pipe is always purple in color to ensure that water lines fit for human consumption are not crossed with non-potable water lines. Codes require non-potable water pipe inside the structure to be purple water distribution pipe (i.e. CPVC). When non-potable water pipe is outside the structure, purple water service pipe (i.e. PVC) is acceptable.²⁰

¹⁸ Understanding Water Reuse: Potential For Expanding The Nation’s Water Supply Through Reuse of Municipal Waste Water, The National Academies of Sciences, Engineering, Medicine, found at <http://nas-sites.org/waterreuse/what-is-water-reuse/types-of-water-reuse/>, retrieved 4/12/2017.

¹⁹ Four Plumbing and Building Codes Adopt NSF/ANSI 350 Standard for Water Reuse Systems, NSF, March 30, 2016, found at <http://www.nsf.org/newsroom>, retrieved 4/12/2017.

²⁰ Online Piping & Usage Specification, Material Purple Non-Potable Water Pipe, found at <http://opus.mcerf.org/material.aspx?id=-8665489722314078423>, retrieved 4/12/2017.

LANDSCAPE CONSIDERATIONS

Because CFAR’s focus is on the use of recycled water for irrigation purposes in residential communities we include here a brief discussion of two issues related to this use; landscape codes and suitability. Site suitability assessments should include the evaluation of existing landscape codes and maintenance practices.²¹ The covenants, conditions and restrictions (“CC&Rs”) of a common interest development, including condominiums and co-ops, regulate the use, appearance and maintenance of property. CC&Rs, most commonly drafted and enforced through homeowner’s associations (HOAs), often restrict what homeowners can do on and with their property. Some CC&Rs set lawn maintenance standards.²² The CC&Rs of a community that is going to implement water recycling may require amendment. In addition, any articles and by-laws of an HOA may require modification to allow for the intended use.

The use of reclaimed water to irrigate landscapes has increased in recent years as a way of conserving surface and groundwater resources²³ but this use involves potential risks to vegetation: foliar damage, stunted growth, early defoliation, and at times, tree mortality.²⁴ The water is disinfected and not considered a threat to public health when applied to irrigate residential areas, golf courses, public school yards and parks. However, the water quality of reclaimed water differs from drinking water or rainfall and must be considered when used to irrigate landscapes.²⁵

Reclaimed water can be safely used to irrigate turf and most other landscape plants. In fact, reclaimed water often contains nutrients (nitrogen and phosphorus) that can be considered part of the fertilizer needs of the landscape. Applying fertilizers at recommended rates without accounting for the nutrients in reclaimed water could result in applying more nutrients than is

²¹ Site Suitability for Landscape Use of Reclaimed Water in the Southwest, Authors: Seiichi Miyamoto, PhD and Ignacio Martinez (Texas A&M Agrilife Research Center at El Paso) US-TX-Landscape Study published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 490-491.

²¹ The State’s Water Reuse Law of 1974, Article 2, 461 (*Amended by Stats. 1994, Ch. 724, Sec. 3. Effective January 1, 1995*).

²² <http://realestate.findlaw.com/owning-a-home/ccrs.html>, retrieved April 20, 2017.

²³ Using Reclaimed Water for Landscape Irrigation, Christopher J. Martinez and Mark W. Clark, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ae449>, retrieved 4/12/2017.

²⁴ Site Suitability for Landscape Use of Reclaimed Water in the Southwest, Authors: Seiichi Miyamoto, PhD and Ignacio Martinez (Texas A&M Agrilife Research Center at El Paso) US-TX-Landscape Study published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 490-491.

²⁵ Using Reclaimed Water for Landscape Irrigation, Christopher J. Martinez and Mark W. Clark, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ae449>, retrieved 4/12/2017.

necessary or that can be used by the plant or retained by the soil, potentially resulting in excess nutrients running off or leaching to groundwater and degrading water quality.²⁶

Occasionally, reclaimed water contains elevated levels of salts that can harm sensitive landscape plants. Near the coast, there may be higher than normal salt levels in reclaimed water because of the influence of seawater. Reclaimed water in west Texas and southeastern New Mexico has elevated salinity, up to 1650 ppm. For comparison, salinity of reclaimed water used for landscape irrigation in California is generally less than 750 ppm, rarely exceeding 1000 ppm.

Any potential problems associated with using reclaimed water on landscape plants can usually be avoided by irrigating only when necessary, growing salt-tolerant plant species, and minimizing the use of overhead sprinkler irrigation so that high-salt water does not contact plant foliage. However, not all green areas can be irrigated with reclaimed water because: 1) many landscape plants can be very sensitive to foliar salt adsorption caused by sprinkler application of water, 2) soil permeability can be too low to achieve necessary salt leaching to avoid buildup, and 3) instituting policy changes necessary to reduce salinity and/or sodicity hazard can be difficult.

Foliar-induced salt damage is the most wide-spread problem because plants adsorb salts through leaves when sprinkled, especially under high frequency irrigation. The extent of foliar damage is species dependent, and ranges from minor leaf-tip burn to premature defoliation, and plant mortality. Because of the widespread occurrence of this problem, site suitability assessments should include identification of species sensitive to overhead irrigation with water of elevated salinity. An alternative is to convert sprinklers to low trajectory or under-canopy types.²⁷

Landscape degradation caused by soil salinization depends on plant species. Soil salinization is also soil-type dependent, the least permeable soils experience the highest levels of salinization. Upland soils with high permeability experience the least salinization, especially when the site is located on sloped topography which allows lateral salt leaching.

²⁶ Using Reclaimed Water for Landscape Irrigation, Christopher J. Martinez and Mark W. Clark, University of Florida IFAS Extension, found at <http://edis.ifas.ufl.edu/ae449>, retrieved 4/12/2017.

²⁷ Site Suitability for Landscape Use of Reclaimed Water in the Southwest, Authors: Seiichi Miyamoto, PhD and Ignacio Martinez (Texas A&M Agrilife Research Center at El Paso) US-TX-Landscape Study published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 490-491.

OTHER CONSIDERATIONS

Public Perception

The role of public perception in a water reuse project is outside of the scope of this report but is mentioned because it can torpedo a proposed project just as effectively as a change in laws or regulations. Public misperception plagues water reuse projects so much so that some public water officials have enlisted the help of psychologists to overcome perceptions of recycled water as unclean or just simply gross.²⁸

To address public worries about recycled water, it is suggested that the planners of any such project reach out to the public to address any concerns and to keep the public informed and involved in the planning process. In Redwood City, California, a proposed water reclamation project was temporarily stalled by opposition from a small citizens' group in 2002. In response, a task force was established that brought the two sides together to discuss the project, review reliable sources of information, and weigh alternative options. A modified reuse project was eventually approved that was widely supported by the community. As the Redwood City experience demonstrates, frequent and open communication among water managers, citizens, and governments can be critical for communities to address the concerns of the public and make informed decisions about water reuse.²⁹

Additional Information

The financial considerations of water recycling are outside of the scope of this report. However, CFAR may find the publication, "Water Savings and Financial Benefits Associated with Single-Family Package Graywater Systems", published in February 2017 by the Alliance for Water Efficiency, with funding from the California Department of Water Resources, to be a useful resource.³⁰ In addition, an Australian study found that homeowners who installed a graywater reuse system and subsurface irrigation system actually increased domestic water consumption. It is suspected that the homeowners rationalized that they could use more potable water because they were "making" irrigation water.³¹

²⁸ From toilet to tap, Psychologists lend their expertise to overcoming the public's aversion to reclaimed water, by Sadie F. Dingfelder, Monitor Staff, September 2004, Vol 35, No. 8, Print version: page 26, American Psychological Association, found at <http://www.apa.org/monitor/sep04/toilet.aspx>, retrieved April 12, 2017.

²⁹ Understanding Water Reuse: Potential For Expanding The Nation's Water Supply Through Reuse of Municipal Waste Water. Public Preferences and Acceptability, The National Academies of Sciences, Engineering, Medicine, found at <http://nas-sites.org/waterreuse/public-preferences-and-acceptability/>, retrieved April 12, 2017.

³⁰ Alliance for Water Efficiency, found at <http://www.allianceforwaterefficiency.org/graywater-reuse-systems-report.aspx>, retrieved April 20, 2017.

³¹ Waterwise Rebate Scheme Review 2007, Data Analysis Australia Pty Ltd, April 2008.

STATE COMPARISON

California has the longest history of water reuse management. As far back as 1906 the state adopted water quality guidance for the use of raw or settled sewage for agricultural irrigation.³² California, Arizona and Texas (as well as Florida) had well-established water reuse programs over a decade ago. Since 2004, other states have developed water reuse programs and Nevada can now be considered to have a well-established program.³³

California, Arizona, Nevada and Texas all have developed regulations that strongly encourage water reuse as a deliberate water resources conservation strategy.³⁴ These states have passed regulations that are intended to oversee water reuse, not as an incidental matter, but the reuse of water is central to their laws. This is in stark contrast with several states that have no regulations, or even guidelines, governing water reuse. States with the least amount of regulation concerning water reuse are concentrated in the Northeast including: Connecticut, Maine, New Hampshire, and New York.³⁵ Some states only have guidelines regarding water reuse including: Alabama, Georgia, Hawaii and Kansas. These differences are understandable given the chronic water shortages experienced in some states and not in others.

There are many differences in the definition and approach to water reuse between the examined states. Even within a state, the complexity of the permit process for water reuse depends on the county involved and whether the area is incorporated. California has a statutory mandate to utilize reclaimed water.³⁶ California and Arizona's water reuse laws are the most far-reaching of any states examined. Nevada's water reuse laws could be considered to be the narrowest, followed by Texas. For example, Texas recognizes two types of reclaimed water while Arizona defines five.³⁷ The four states do have in common the use of a state water plan to facilitate water use and conservation strategies between stakeholders.

³² 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-21.

³³ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-1.

³⁴ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-21.

³⁵ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at Table 4-5.

³⁶ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-3.

³⁷ Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

All states studied in this report have regulations governing: urban reuse (both restricted and unrestricted)³⁸, agricultural reuse for processed food crops and non-food crops, restricted impoundments, industrial reuse, and rainwater capture. Nevada allows only for surface irrigation of fruit or nut bearing trees. Of these states, only Texas does not specify treatment requirements for unrestricted and restricted reuse for impoundments.³⁹ California and Nevada have regulations pertaining to industrial reuse of reclaimed water. Arizona reviews industrial reuse on a case-by-case basis.⁴⁰

Nevada laws do not address: agricultural reuse (food crops), unrestricted impoundments, groundwater recharge for nonpotable reuse and indirect potable reuse.⁴¹ However, Nevada is the only state among the four examined that has regulations pertaining to the use of reclaimed water to create, enhance, sustain or augment wetlands, other aquatic habitats, or stream flows.⁴² Texas laws do not address groundwater recharge-nonpotable reuse and indirect potable reuse.⁴³

Of the four states studied, only California and Arizona have regulations pertaining to groundwater recharge-nonpotable reuse and indirect potable reuse.⁴⁴ California has guidelines for reuse with the specific intent of groundwater recharge of nonpotable aquifers. Arizona regulates groundwater recharge through their Aquifer Protection Permit process.⁴⁵

³⁸ Unrestricted urban reuse involves the use of reclaimed water where public exposure is likely in the reuse application, thereby requiring a high degree of treatment. Restricted urban reuse involves the use of reclaimed water where public exposure to the reclaimed water is controlled; therefore, treatment requirements may not be as strict as those for unrestricted urban reuse. 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-23.

³⁹ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-24.

⁴⁰ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-24.

⁴¹ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at table 4-5.

⁴² 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-24.

⁴³ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at table 4-5.

⁴⁴ Indirect potable reuse (“IPR”) involves the use of reclaimed water to augment surface or groundwater sources that are used or will be used for public water supplies or to recharge groundwater used as a source of public water supply. California has regulations specifically pertaining to IPR. 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-25.

⁴⁵ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 4-25.

Texas has the most far-reaching legislation regarding rainwater capture and is the only state among the four that allows the practice for potable uses. Texas requires that rainwater harvesting system technology for potable and non-potable indoor use and landscape watering be incorporated into the design and construction of each new state building with a roof measuring at least 50,000 square feet that is located in an area of the state in which the average annual rainfall is at least 20 inches. Texas House Bill 3391 (2011) contains this and other rainwater provisions and is very comprehensive legislation.⁴⁶

⁴⁶ State Rainwater Harvesting Laws and Legislation, National Conference of State Legislatures, November 9, 2016, found at <http://www.ncsl.org/research/environment-and-natural-resources/rainwater-harvesting.aspx>, retrieved May 3, 2017.

CALIFORNIA

The State of California has a long history of water reuse and regulatory activity and was the first to develop regulations specifically directed at the safe use of reclaimed water.⁴⁷ As early as 1974 the State recognized the importance of reclaimed water in its Water Reuse Law of that year, stating: “It is hereby declared that the primary interest of the people of the state in the conservation of all available water resources requires the maximum reuse of reclaimed water in the satisfaction of requirements for beneficial uses of water.”⁴⁸ By 1982 California had the most ambitious wastewater reclamation program in the United States.⁴⁹ The evolution of water reclamation and reuse criteria truly began in California, and the philosophy and rationale behind that State’s regulations have influenced regulations worldwide.⁵⁰

California State Agencies

The principal state regulatory agencies involved in water recycling in California are the California Department of Public Health (CDPH), the California State Water Resources Control Board (SWRCB), and the nine Regional Water Quality Control Boards (RWQCBs). In 1991, the SWRCB and RWQCBs were brought together with five other state environmental protection agencies under the newly crafted California Environmental Protection Agency (Cal/EPA).⁵¹

The nine semi-autonomous RWQCBs are divided by regional boundaries based on major watersheds. Each RWQCB makes water quality planning and regulatory decisions for its region. The SWRCB is generally responsible for setting statewide water quality policy and considering petitions contesting RWQCB actions. The SWRCB also makes water rights determinations.⁵²

⁴⁷ California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

⁴⁸ California Water Reuse Law of 1974, Article 2, §461 (*Amended by Stats. 1994, Ch. 724, Sec. 3.*) Effective January 1, 1995).

⁴⁹ Legal Issues in Implementing Water Reuse in California, Ernest C. Brown, Nathaniel Weinstock, published in Ecology Law Quarterly, Volume 9, Issue 2, January 1981 at page 249.

⁵⁰ California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

⁵¹ California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

⁵² California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

CDPH has statutory authority in two areas with respect to direct potable reuse. It regulates public water systems (drinking water purveyors) and develops and adopts water recycling criteria.”⁵³ The CDPH also permits operation of water treatment and distribution, and monitors drinking water quality.⁵⁴

Other California agencies with a role in water conservation and efficiency are the California Public Utilities Commission (regulates Investor Owned Utilities), the California Department of Water Resources (manages State Water Project, statewide water planning, *see* below) and the California Energy Commission (appliance efficiency regulations).⁵⁵

California Regulations

Current regulations in California related to water reuse are complex and have been in a state of flux as water districts and utilities look to expand their use of reclaimed water. California statutes governing water use and the protection of water quality are contained in the California Water Code, which includes varying degrees of permitting authority by the nine RWQCBs, the SWRCB,⁵⁶ and the CDPH.

The California Water Code states that:

“The Legislature hereby finds and declares that the use of potable domestic water for the irrigation of residential landscaping is a waste or an unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution if recycled water, for this use, is available to the residents and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.”⁵⁷

The California Water Code also allows for any public agency (i.e. state agency, city, county, district, etc...) to require the use of recycled water for irrigation of residential landscaping. There are several requirements that must be met:⁵⁸

⁵³ California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

⁵⁴ California- 2012 State Policy Information, Alliance for Water Efficiency, found at <http://www.allianceforwaterefficiency.org>, retrieved April 20, 2017.

⁵⁵ California- 2012 State Policy Information, Alliance for Water Efficiency, found at <http://www.allianceforwaterefficiency.org>, retrieved April 20, 2017.

⁵⁶ The State Water Resources Control Board was established in 1967 by the Legislature. The Board succeeded to the functions of the former State Water Rights Board and the State Water Quality Control Board. The nine California Regional Water Quality Control Boards were originally established in the Dickey Water Pollution Control Act of 1949. Porter-Cologne Water Quality Control Act, Water Code Division 7 and Related Sections (As amended, including Statutes 2016), California State Water Resources Control Board.

⁵⁷ California Water Code, Division 7, Water Quality, §13552.2.

⁵⁸ California Water Code, Division 7, Water Quality §13552.4.

- (1) Recycled water, for this use, is available to the user and meets the requirements set forth in Section 13550, as determined by the state board after notice and a hearing.
- (2) The use of recycled water does not cause any loss or diminution of any existing water right.
- (3) The irrigation systems are constructed in accordance with Chapter 3 (commencing with Section 60301) of Division 4 of Title 22 of the California Code of Regulations.

Each RWQCB is given authority to regulate specific reclaimed water discharges through the establishment of Water Quality Control Plans (Basin Plans), which include water quality objectives to protect beneficial uses of surface waters and ground waters within the region. Water Quality Control Plans (Basin Plans) and State Policies for Water Quality Control have the legal force and effect of regulation. Together the ten water boards have primarily responsibility for implementing and enforcing the Porter Cologne Water Quality Control Act.⁵⁹

The SWRCB is authorized to adopt statewide policies for water quality control, which are then implemented by each RWQCB. In 2009, the SWRCB adopted a Recycled Water Policy to provide uniformity in the application of a 1968 anti-degradation policy by each RWQCB for water reuse projects.⁶⁰ The policy declared, “Recycled water is a valuable resource and significant component of California’s water supply”.⁶¹ The Policy established a Science Advisory Panel to provide guidance for development of monitoring programs that assess potential threats from constituents of emerging concern (CECs) where recycled water is used for various water recycling applications including urban landscape irrigation.⁶²

The policy also includes specific requirements for salt/nutrient management plans, special provisions for groundwater recharge projects, anti-degradation, and monitoring for CECs. Salt/nutrient management plans are a critical component of the new Recycled Water Policy, as the accumulation of salts within soils and groundwater basins has been a long-term challenge in a state with little rainfall, high evaporation rates, and large agricultural and irrigation demands. The salt/nutrient management plans are being adopted by individual RWQCBs as amendments to

⁵⁹ Porter-Cologne Water Quality Control Act, Water Code Division 7 and Related Sections (As amended, including Statutes 2016), California State Water Resources Control Board.

⁶⁰ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-40-41.

⁶¹ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-40-41.

⁶² California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

their current Basin Plans.⁶³ The special provisions for groundwater recharge projects in the Recycled Water Policy require site-specific, project-by-project review and establish criteria for RWQCB approval.⁶⁴

CDPH is required to establish uniform statewide water reuse criteria for each type of reclaimed water, wherever the uses are related to public health. CDPH regulations are codified within the California Code of Regulations, with specific provisions related to reclaimed water within Title 22 and 17. Regulations governing nonpotable reuse include specific water quality, treatment, and monitoring requirements identified in Title 22 and enforced by the various RWQCBs. The RWQCBs issue the permits based on CDPH Title 22 requirements. These regulations have remained relatively static over the last 10 years, with recent changes related primarily to laboratory and operator certification requirements.

Title 22 “shall only apply to recycled water from sources that contain domestic waste, in whole or in part.”⁶⁵ ⁶⁶ ⁶⁷ Section 60304 addresses the use of recycled water for irrigation, including for parks and playgrounds and residential landscaping. It sets the disinfection requirements for recycled water used for such surface irrigation.⁶⁸

Major California cities, such as Los Angeles, have published their own guidelines for non-potable water uses, building on the CDPH guidelines. In Los Angeles, single family dwellings, apartments, hotels, commercial, institutional, and industrial facilities may use untreated greywater outdoors for mulch basin or subsurface irrigation. Treated greywater may be used for spray and drip irrigation, non-interactive water features, in addition to mulch basin and subsurface irrigation. Such uses require a Building & Safety Building Permit from the local building authority and a Public Health review and approval of the piping system, or the

⁶³ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-40-41.

⁶⁴ California State Regulations, James Crook, PhD, P.E., BCEE (Water Reuse Consultant), published in 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page D-57.

⁶⁵ California Code of Regulations, Title 22, §60302.

⁶⁶ California Code of Regulations, Title 22, §60301.550 Landscape Impoundment. It defines Landscape Impoundment as “an impoundment in which recycled water is stored or used for aesthetic enjoyment or landscape irrigation, or which otherwise serves a similar function and is not intended to include public contact.”

⁶⁷ California Code of Regulations, Title 22, §60305 Use of Recycled Water For Impoundments, provides that “recycled water used as a source of supply for landscape impoundments that do not utilize decorative fountains shall be at least disinfected secondary-23 recycled water.”

⁶⁸ California Code of Regulations, Title 22, §60304, Use of Recycled Water for Irrigation. “(a) Recycled water used for the surface irrigation of the following shall be a disinfected tertiary recycled water, except that for filtration pursuant to Section 60301.320(a) coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes.”

equivalent approval by the appropriate local agency.⁶⁹ Recycled water may be used by single family dwellings, apartments, and hotels, commercial, institutional, and industrial facilities outdoors for drip, spray and subsurface irrigation, as well as non-interactive water features. The minimum water quality standard and treatment process are found in CCR Title 22 Recycled Water. Such outdoor use requires that a Building & Safety Building Permit be obtained from the local building authority, that it be reviewed and approved by DPH and the State Water Board, as well as any other local agencies, as applicable.⁷⁰

Other cities are making large infrastructure investments in water reuse. The City of Carlsbad, California is expanding its Carlsbad Water Recycling Facility to nearly double its capacity to generate water for non-potable uses like irrigation and industrial uses (from 4,100 acre-feet per year to 7,235 acre-feet per year). The project will construct 18 miles of pipe as well as a new storage tank, and install 156 new recycled water meters. Once completed, Carlsbad will recycle and use all of its wastewater during summer months, meeting nearly 33 percent of its Water District's annual water needs. A portion of the project funding is from the U.S. EPA.⁷¹

In addition to State Law, California uses a strategic plan to manage its water resources, the California Water Plan. The Plan provides a collaborative framework for elected officials, agencies, tribes, water and resource managers, businesses, academia, stakeholders, and the public to develop findings and recommendations and make informed decisions. The most recent plan was published in 2013 and the California Water Plan Update 2018 is currently in development.⁷² The Department of Water Resources (DWR) has released the Draft Assumptions and Estimates Report for the 2018 update. The report presents key assumptions and estimates, data and data sources, and companion plans which will be considered in the preparation of Update 2018. The public comment period is open from April 5 through June 6, 2017. The Final Update 2018 will be released in December 2018.⁷³

The DWR has also proposed building standard changes to the 2016 California Plumbing Code.⁷⁴ The standards relate to potable and recycled water systems inside buildings and premises. This is being done in part to eliminate duplication and inconsistencies in the Code which resulted from having three agencies with overlapping regulatory authority (the Department of Housing and Community Development, the California Building Standards

⁶⁹ Guidelines for Alternate Water Sources: Indoor and Outdoor Non-Potable Uses, Los Angeles County Department of Public Health, February 2016, page 14.

⁷⁰ Guidelines for Alternate Water Sources: Indoor and Outdoor Non-Potable Uses, Los Angeles County Department of Public Health, February 2016, page 18.

⁷¹ U.S. EPA Announces More than \$182 Million for Drinking Water and Wastewater Infrastructure Projects in California, The Registry, January 27, 2016, found at <http://news.theregistrysf.com/u-s-epa-announces-more-than-182-million-for-drinking-water-and-wastewater-infrastructure-projects-in-california/>, retrieved May 3, 2017.

⁷² California Water Plan Update 2013, California Department of Water Resources, found at <http://www.water.ca.gov/waterplan/cwpu2013/final/index.cfm>, retrieved April 27, 2017.

⁷³ California Water Plan Update 2018, California Department of Water Resources, found at <http://www.water.ca.gov/waterplan/cwp/update2018/index.cfm>, retrieved April 12, 2017.

⁷⁴ California Code of Regulations, Title 24, Part 5.

Commission and DWR). The proposed amendments are intended to eliminate duplication and inconsistency by migrating content in Chapter 16A, Part II into Chapter 15 and harmonizing the language. The public comment period closed on May 1, 2017.⁷⁵

⁷⁵ Notice of Proposed Action to Building Standards of the California Department of Water Resources Regarding the 2016 California Plumbing Code (CPC), California Code of Regulations, Title 24, Part 5, DWR 01-16 (Recycled Water).

ARIZONA

The country's oldest dual distribution system is in Grand Canyon Village, Arizona, which has been using reclaimed water for nonpotable uses since 1926.⁷⁶ However, it was not until January 1972 that the state adopted reclaimed water regulations.

Arizona State Agencies

The principal Arizona state regulatory agencies involved in water issues are the Department of Water Resources and the Department of Environmental Quality. The Arizona Department of Water Resources (ADWR) is the primary state agency responsible for water planning, water rights administration and conservation programs. Created in 1980 to secure long-term dependable water supplies, ADWR administers and enforces Arizona's Groundwater Code. The Groundwater Code established Active Management Areas (AMAs) and requires the preparation of a series of water management plans for each AMA that includes mandatory conservation programs. AMAs represent approximately 80% of the state's population.⁷⁷ ADWR also requires conservation and drought plans from all community water systems, explores methods of augmenting water supplies, and develops policies that promote conservation and equitable distribution of water.⁷⁸

The Arizona Department of Environmental Quality (ADEQ) protects and enhances public health and the environment by ensuring safe drinking water and reducing the impact of pollutants discharged into surface and groundwater. ADEQ partners with other state agencies in programs that not only prevent pollution but conserve water resources. ADEQ also regulates the discharge and treatment of wastewater.⁷⁹ It issues permits and approves plans under three programs: the Safe Drinking Water Act, the Clean Water Act, and Aquifer Protection Permits.⁸⁰

Lastly, the Arizona Corporation Commission (ACC) has jurisdiction over the quality of services and rates of public service corporations offering water and wastewater utility service as

⁷⁶Understanding Water Reuse: Potential For Expanding The Nation's Water Supply Through Reuse of Municipal Waste Water, The National Academies of Sciences, Engineering, Medicine, found at <http://nas-sites.org/waterreuse/what-is-water-reuse/types-of-water-reuse/>, retrieved April 12, 2017.

⁷⁷ Class A+ reclaimed water in Arizona receives secondary treatment followed by filtration, disinfection, and nitrogen reduction to less than 10 mg/L total nitrogen. Table A in the regulation identifies the appropriate minimum quality for 27 categories of approved uses. Quality required for industrial reuse is industry specific and will be determined on a case-by-case basis by the ADEQ. 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-39-40.

⁷⁸ Arizona, 2012 State Policy Information, Alliance for Water Efficiency, found at <http://www.allianceforwaterefficiency.org>, retrieved April 20, 2017.

⁷⁹ Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

⁸⁰ Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

well as water-related energy policy matters. The ACC has been requiring private water companies (both inside and outside AMAs) to implement water conservation best management practices from the ADWR regulatory list.⁸¹

Arizona Regulations

The Arizona Administrative Code governs water reuse in the State. The State's current regulations were adopted in January 2001, and address reclaimed water permitting, conveyances, quality standards and allowable end uses. These rules are codified in Arizona Administrative Code Title 18 Environmental Quality, Chapter 9, Articles 6 and 7 (Reclaimed Water Quality Conveyances and Direct Reuse of Reclaimed Water, respectively), and Title 18, Chapter 11, Article 3 (Reclaimed Water Quality Standards).

The Arizona Administrative Code defines reclaimed water as “water that has been treated or processed by a wastewater treatment plant or an on-site wastewater treatment facility.”⁸² The Code defines gray water as “wastewater collected separately from a sewage flow that originates from a clothes washer, bathtub, shower, and sink, but does not include wastewater from a kitchen sink, dishwasher, or toilet.”⁸³

Under the Arizona Administrative Code, Title 18, Chapter 11 provisions regarding reclaimed water quality standards, Arizona uses five qualities of reclaimed water from A+ to C, with A+ being the highest quality.⁸⁴ The classes are expressed as a combination of minimum treatment requirements and a limited set of numeric quality criteria. Class A reclaimed water is required for reuse applications where there is a relatively high risk of human exposure to potential pathogens in the reclaimed water. For uses where the potential for human exposure is lower, Class B and Class C are acceptable.⁸⁵

⁸¹ Arizona, 2012 State Policy Information, Alliance for Water Efficiency, found at <http://www.allianceforwaterefficiency.org>, retrieved April 20, 2017.

⁸² Arizona Administrative Code, Title 18, Chapter 9, ARTICLE 7. DIRECT REUSE OF RECLAIMED WATER R18-9-701. Definitions.

⁸³ Arizona Administrative Code, Title 18, Chapter 9, ARTICLE 7. DIRECT REUSE OF RECLAIMED WATER R18-9-701. Definitions.

⁸⁴ Class A+ reclaimed water in Arizona receives secondary treatment followed by filtration, disinfection, and nitrogen reduction to less than 10 mg/L total nitrogen. Table A in the regulation identifies the appropriate minimum quality for 27 categories of approved uses. Quality required for industrial reuse is industry specific and will be determined on a case-by case basis by the ADEQ. 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-39-40.

⁸⁵ The Reclaimed Water Quality Standards include two "+" categories of reclaimed water, Class A+ and Class B+. Both categories require treatment to produce reclaimed water with a total nitrogen concentration of less than 10 mg/l. These categories of reclaimed water will minimize concerns over nitrate contamination of groundwater beneath sites where reclaimed water is applied. Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

All wastewater treatment facilities providing reclaimed water for reuse must have an individual Aquifer Protection Permit (APP), or amend their existing APP to contain certification for a particular Class (A+, A, B+, B or C) of reclaimed water.⁸⁶ The APP requires monitoring and reporting of reclaimed water quality to ensure that effluent limitations for reclaimed water quality classes are met.⁸⁷

The Arizona Administrative Code places the following restrictions on irrigating with reclaimed water. A permittee irrigating with reclaimed water shall:

1. Use application methods that reasonably preclude human contact with reclaimed water;
2. Prevent reclaimed water from standing on open access areas during normal periods of use;
3. Prevent reclaimed water from coming into contact with drinking fountains, water coolers, or eating areas; and
4. Secure hose bibbs discharging reclaimed water to prevent use by the public.⁸⁸

The Type 1 Reclaimed Water General Permit for Gray Water allows for the use of gray water from a private residence or small multi-family complex for surface or subsurface irrigation. The flow must be less than 400 gallons per day.⁸⁹

As mentioned above, the Arizona Department of Environmental Quality (ADEQ) issues permits and approves plans under three programs, the Safe Drinking Water Act, the Clean Water Act, and the Aquifer Protection Permits.⁹⁰ The ADEQ requires a Reclaimed Water Individual Permit or Reclaimed Water General permit if you are:

- An owner or operator of a sewage treatment facility that generates reclaimed water for direct reuse;
- An owner or operator of a reclaimed water blending facility;
- A reclaimed water agent;
- An end user;
- A person who uses gray water;

⁸⁶ Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

⁸⁷ Arizona Department of Environmental Quality, Water Quality Division: Permits: Reclaimed Water, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

⁸⁸ Arizona Administrative Code, Title 18, Chapter 9, ARTICLE 7. DIRECT REUSE OF RECLAIMED WATER R18-9-704. General Requirements.

⁸⁹ Arizona Department of Environmental Quality, Water Quality Division: Permits: Reclaimed Water, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

⁹⁰ Arizona Department of Environmental Quality, found at <http://legacy.azdeq.gov/environ/water>, retrieved April 20, 2017.

- A person who directly reuses reclaimed water from a sewage treatment facility combined with industrial wastewater or combined with reclaimed water from an industrial wastewater treatment facility; or
- A person who directly reuses reclaimed water from an industrial wastewater treatment facility in the production or processing of a crop or substance that may be used as human or animal food.

Cities in Arizona can pass regulations that are more restrictive than the State’s regulations. For example, in 2008, the City of Tucson adopted an ordinance requiring that:

- All new single family and duplex residential dwelling units shall include either a separate multiple pipe outlet or a diverter valve, and outside ‘stub-out’ installation on clothes washing machine hook-ups, to allow separate discharge of gray water for direct irrigation.
- All new single family residential dwelling units shall include a building drain or drains for lavatories, showers, and bathtubs, segregated from drains for all other plumbing fixtures, and connected a minimum three (3) feet from the limits of the foundation, to allow for future installation of a distributed gray water system.
- All gray water systems shall be designed and operated according to the provisions of the applicable permit authorized by ADEQ under the Arizona Administrative Code, Title 18, and Chapter 9.⁹¹

In August 2009, the Governor formed a Blue Ribbon Panel on Water Sustainability consisting of 40 panelists representing a cross-section of state interest. The purpose of the panel was “To advance statewide sustainability of water by increasing the reuse, recycling and conservation of water to support continued economic development in the state of Arizona while protecting Arizona’s water supplies and natural environment.” The Panel concluded that no new regulatory programs or major reconstruction of existing programs were needed and that current programs “constitute an exceptional framework within which water sustainability can be pursued.”⁹²

The Arizona Department of Water Resources collects and makes available water-related information in a “water atlas” which serves a function similar to a water plan. The Arizona

⁹¹ Water Recycling and Reuse: The Environmental Benefits, United States Environmental Protection Agency, Pacific Southwest, Region 9, found at <https://www3.epa.gov/region9/water/recycling/>, retrieved April 27, 2017.

⁹² 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at pages 5-39-40.

Water Atlas Volumes 1-8 were released as drafts for public comment and review between 2006 and 2008. The Department has updated Volumes 2-8.⁹³

⁹³ Arizona Department of Water Resources, Arizona Water Atlas, found at <http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/>, retrieved April 28, 2017.

NEVADA

Nevada State Agencies

The principal state regulatory agency involved in water recycling in Nevada is the Nevada Division of Water Resources (“NDWR”), a part of The Nevada Department of Conservation & Natural Resources. NDWR is responsible for water conservation and management. Its mission is to conserve, protect, manage and enhance the State's water resources through the appropriation and reallocation of the public waters. In addition, the Division is responsible for quantifying existing water rights; monitoring water use; distributing water in accordance with court decrees; and reviewing water availability for new subdivisions and condominiums, as well as other tasks.

Other state agencies with roles in water use are the Nevada Division of Environmental Protection (“NDEP”) and the Public Utilities Commission (“PUCN”). The NDEP enforces state laws and regulations to protect the human and natural environment. The NDEP’s Bureau of Water Pollution Control and of Safe Drinking Water have roles in water issues. The Bureau of Water Pollution Control regulates all discharges to waters of the State through the issuance of permits and enforcement of the state’s water pollution control laws and regulations.⁹⁴ The Bureau of Safe Drinking Water regulates public water systems.⁹⁵ “Recycled water that is directly reused or returned to the Colorado River is tested by NDEP certified testing laboratories to ensure that it meets requirement. The Environmental Protection Agency and the NDEP monitor the results of the tests.”⁹⁶

The PUCN regulates the rates, service quality, and service territories of 27 investor-owned water and wastewater utilities serving approximately 22,300 customers in Nevada. The PUCN regulates the service territories, but not the rates or service quality, of water and wastewater utilities under the control of a non-investor-owned governing body, such as a co-op or homeowner's association. The PUCN also does not have any regulatory oversight over utilities operated by governmental bodies, quasi-governmental bodies, or political subdivisions of the state, including the Southern Nevada Water Authority, the Las Vegas Valley Water District and the Truckee Meadows Water Authority. The PUCN's primary regulatory activities

⁹⁴ State of Nevada, Division of Environmental Protection, Bureau of Water Pollution Control, Home- Bureau of Water Pollution Control, found at <http://ndep.nv.gov/bwpc/>, retrieved April 28, 2017.

⁹⁵ State of Nevada, Division of Environmental Protection, Bureau of Safe Drinking Water, NDEP- Bureau of Safe Drinking Water, found at <http://www.ndep.nv.gov/bsdw/>, retrieved April 28, 2017. Nevada Revised Statute 445A.235 defines a public water system as those that provide the public with water for human consumption if the system has 15 or more service connections or regularly serves 25 or more persons.

⁹⁶ Study “Southern Nevada Regional Water Recycling Study” commissioned by the Southern Nevada Water Authority and the Clean Water Coalition, conducted by Black & Veatch, March 2009, found at https://www.snwa.com/assets/pdf/wq_lvwwac_recycling_study.pdf, page 5.

over investor-owned water/wastewater utilities include: (1) Ensuring the delivery of clean, safe and reliable water to customers at reasonable rates, (2) Ensuring reliable sewer service to customers at reasonable rates, and (3) Monitoring quality of service, environmental compliance and financial performance. The PUCN also reviews Utility Environmental Protection Act ("UEPA") permits⁹⁷ for compliance with environmental requirements for new investor-owned water and/or wastewater facilities.⁹⁸

Nevada Regulations

Nevada defines graywater as “waste water from a household or small commercial establishment which specifically excludes water from a toilet, kitchen sink, dishwasher, or water used for washing diapers.”⁹⁹ Reclaimed waste water is defined as “waste water that becomes suitable for a specific beneficial use as a result of treatment or brackish water demineralized for use.” General types of reclaimed waste water include:

Primary Effluent: reclaimed water that only has had sewage solids removed and is typically used only for surface irrigation of tree, fodder and fiber crops;

Secondary Effluent: reclaimed water that has had sewage solids removed and has been oxidized and disinfected and is used to irrigate golf courses and cemeteries and provide water for pasture and food crops; and

Tertiary Recycled Water: water produced by conventional sewage treatment followed by more advanced procedures including filtration and disinfection, providing it with the broadest range of uses.¹⁰⁰

Nevada Code, Title 48 Water, Chapter 540, Planning and Development of Water Resources, requires that every water supplier (broadly defined to include any public or private entity that supplies water for municipal, industrial or domestic purposes¹⁰¹) adopt a plan of water conservation and update the plan every five years. The plans must include provisions to encourage reduction in the size of lawns and encourage the use of plants that are adapted to arid and semiarid climates and where applicable, increase the reuse of effluent.¹⁰² A State Law gives homeowners the right to install drought tolerant landscaping.¹⁰³

⁹⁷ Nevada Revised Statute 704.865 provides that a person, other than a local government, constructing a utility facility in Nevada must obtain a Utility Environmental Protection Act permit from the PUCN. State of Nevada, Public Utilities Commission, UEPA Construction Permits, found at http://puc.nv.gov/Utilities/UEPA_Permits/, retrieved April 28, 2017.

⁹⁸ State of Nevada Public Utilities Commission, Water/Wastewater: Regulatory Duties, found at <http://puc.nv.gov/Utilities/Water/>, retrieved April 28, 2017.

⁹⁹ Division of Water Planning, Water Words, page 142, Greywater.

¹⁰⁰ Division of Water Planning, Water Words, page 265, Reclaimed Waste Water.

¹⁰¹ NRS 540.121 “Supplier of water” defined.

¹⁰² NRS 540.141 Required provisions of plan or joint plan of water conservation.

¹⁰³ Nev. Rev. Stat. Ann. §116.300.

Nevada also has guidelines for reuse in the form of Water Technical Sheets: WTS-1A (General Design Criteria for Reclaimed Water Irrigation Use), WTS-1B (General Criteria for Preparing an Effluent Management Plan), WTS-3 Guidance Document For An Application For Rapid Infiltration Basins; and WTS-7 Guidance Document for Reclaimed Water Storage Ponds. These documents describe criteria to be included in the required engineering plan for irrigation reuse projects and information to be evaluated in preparing a management plan for reclaimed water use.¹⁰⁴

In Nevada, recycled water is currently used for golf course, green belt and median irrigation, cooling water for power plants, water for dust control, and other minor uses.¹⁰⁵ Graywater systems are currently not permitted by Southern Nevada building codes.¹⁰⁶ Nevada's lawmakers take the position that, unlike recycled water, which is highly treated and regulated, graywater receives no treatment, which introduces the potential to transmit disease. Further, because Southern Nevada has the ability to recycle water both directly and indirectly, it is believed that the use of graywater would not result in water savings.¹⁰⁷

The Nevada State Water Plan is from 1999.¹⁰⁸ A State of Nevada Drought Response Plan was published in 2012 but it was short and focused on water level monitoring.¹⁰⁹

¹⁰⁴ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 5-41.

¹⁰⁵ Study "Southern Nevada Regional Water Recycling Study" commissioned by the Southern Nevada Water Authority and the Clean Water Coalition, conducted by Black & Veatch, March 2009, found at https://www.snwa.com/assets/pdf/wq_lvvwac_recycling_study.pdf

¹⁰⁶ Study "Southern Nevada Regional Water Recycling Study" commissioned by the Southern Nevada Water Authority and the Clean Water Coalition, conducted by Black & Veatch, March 2009, found at https://www.snwa.com/assets/pdf/wq_lvvwac_recycling_study.pdf, page 16.

¹⁰⁷ Study "Southern Nevada Regional Water Recycling Study" commissioned by the Southern Nevada Water Authority and the Clean Water Coalition, conducted by Black & Veatch, March 2009, found at https://www.snwa.com/assets/pdf/wq_lvvwac_recycling_study.pdf, page 21.

¹⁰⁸ Nevada State Water Plan, Nevada Division of Water Planning, Department of Conservation and Natural Resources, March 1999.

¹⁰⁹ State of Nevada, Drought Response Plan, State Climate Office, Revised April 2012.

TEXAS

Texas State Agencies

The Texas Water Development Board (“TWDB”) and the Texas Commission on Environmental Quality (“TCEQ”) are in charge of drinking water conservation. The TWDB was established in 1957 to provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas. The TWDB provides water planning, data collection and dissemination, financial and technical assistance services.¹¹⁰ The Board supports the development of regional water plans and incorporates them into a state water plan for the orderly and responsible development, management, and conservation of the state's water resources.¹¹¹

Reclaimed water use in Texas is regulated by the TCEQ based on regulations in the Texas Administrative Code.¹¹² Reclaimed water use in Texas is by authorization from the TCEQ Executive Director upon application by a reclaimed water producer.

Texas Regulations

The TCEQ defines graywater as “wastewater from clothes-washing machines, showers, bathtubs, hand-washing lavatories, and sinks that are not used for disposal of hazardous or toxic ingredients. The term does not include wastewater that has come in contact with toilet waste; or from the washing of material, including diapers, soiled with human excreta; or from sinks used for food preparation or disposal.”¹¹³

Texas allows for residential uses of graywater: around the foundation of new housing to minimize foundation movement or cracking, gardening, composting, and landscaping. Graywater use at private residences is limited to 400 gallons per day. Commercial, industrial and institutional uses of graywater are also allowed for: process water, landscape maintenance, dust control, toilet flushing, and other similar activities. Lastly, Texas allows for agricultural uses of graywater for: process water, landscape maintenance, dust control, irrigation of fields and other similar activities.¹¹⁴

¹¹⁰ About the Texas Water Development Board, found at <http://www.twdb.texas.gov/about/index.asp>, retrieved April 20, 2017.

¹¹¹ About the Texas Water Development Board, found at <http://www.twdb.texas.gov/about/index.asp>, retrieved April 20, 2017.

¹¹² 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, page 5-31.

¹¹³ Texas Commission on Environmental Quality, found at <https://www.tceq.texas.gov/permitting/wastewater/graywater/>, retrieved April 19, 2017.

¹¹⁴ Texas Commission on Environmental Quality, found at <https://www.tceq.texas.gov/permitting/wastewater/graywater/>, retrieved April 19, 2017.

The re-use of graywater is regulated by the Texas Administrative Code, Title 30 Environmental Quality. Chapter 285 regulates the re-use of graywater at private residences connected to an on-site sewage facility (septic system).¹¹⁵ Chapter 210 regulates the use of graywater at private residences connected to a wastewater collection system, commercial facilities, industrial facilities, institutional facilities, and agricultural operations.¹¹⁶ Chapter 210 was created in 1997 with additions in 2002 to add sub-chapter E specifically addressing industrial process water reuse; in 2005 with sections added at 210, 281, and 285 to describe conditions for graywater use; and in 2009 to amend section 210.33 related to bacterial limitations.¹¹⁷ This Chapter was most recently amended in December 2016 to establish standards similar to those that exist for graywater for additional water sources (alternative on-site water¹¹⁸) including rainwater, air-conditioner condensate, foundation drain water, storm water, swimming pool backwash and drain water, reverse osmosis reject water, or other sources of water that the TCEQ deems appropriate.¹¹⁹

State regulations govern the use of reclaimed water. The State defines reclaimed water as “treated wastewater that is safe and suitable for a purpose that would use other water resources. It is classified according to the source from which it originated.” Municipal reclaimed water is treated water that is primarily derived from permitted sewage treatment plants. Reuse of untreated wastewater is prohibited. Industrial reclaimed water is from a non-domestic or non-municipal source.¹²⁰

Reclaimed water use in Texas is by authorization from the TCEQ Executive Director upon application by a reclaimed water producer. The producer must have a permitted waste water treatment plant and provide reclaimed water of the quality (Type I or II) required for the intended use and meet all Chapter 210 requirements. Municipal reclaimed water is divided into two “Types” that are defined according to whether people are likely to have contact with it during or after application. Type I reclaimed water can be applied anywhere public contact is likely. Examples of Type I uses include watering: public parks, school yards, residential lawns, and athletic fields. Type I reclaimed water can also be used for: fire protection, food-crop irrigation, and application to pastures grazed by milking animals. The use of Type I reclaimed

¹¹⁵ Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 285 On-Site Sewage Facilities, Subchapter H Disposal of Graywater.

¹¹⁶ Texas Administrative Code, Title 30 Environmental Quality, Part 1 Texas Commission on Environmental Quality, Chapter 210 Use of Reclaimed Water.

¹¹⁷ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 5-31.

¹¹⁸ Cooling tower blowdown is regulated by Subchapter E of Chapter 210.

¹¹⁹ This amendment implemented House Bill 1902, 84th Texas Legislature and was adopted on December 7, 2016, Effective December 29, 2016.

¹²⁰ Requirements for Reclaimed Water, found at https://www.tceq.texas.gov/assistance/water/reclaimed_water.html, retrieved April 19, 2017. Texas Administrative Code Chapter 210 Subchapter E of the reclaimed water rules specifies the types of industrial wastewaters that are eligible and ineligible for reuse.

water to supply recreational off-channel lakes or ponds and to flush toilets or urinals may be approved upon application. Type I reclaimed water may be used for either a Type I or Type II use.¹²¹

Type II reclaimed water can be applied in remote, restricted, controlled, or limited-access areas where human contact is unlikely. This water is sometimes used at sod or tree farms, and along limited-access highway rights-of-way. This water may be used for: irrigation water that is not likely to contact edible portions of a crop, animal feed-crop irrigation that does not involve milking operations and supply to non-recreational water bodies. Further, entities may use Type II reclaimed water for: soil compaction, dust control, cooling tower makeup water, and certain applications at wastewater treatment facilities. The State may approve an entity's use of Type II reclaimed water for hydraulic fracturing.

Industrial reclaimed water can be authorized on two "Levels." These levels are classified according to the process of how they are generated and whether they will be used on-site or off-site. Industrial reclaimed water may be used for: landscape irrigation, soil compaction, fire protection, dust suppression, impoundment maintenance and irrigation for non-food crops. The State may also approve the use of industrial reclaimed water in hydraulic fracturing.¹²²

Written approval is required before Type I and Type II municipal reclaimed water can be provided to another party for reuse. A form, TCEQ-20427, must be submitted and must include a water reuse contract and an operation and maintenance plan. Producers of Type I and Type II domestic or municipal water must sample and analyze the water before distribution.¹²³

For larger systems serving a population of more than 1 million, the state legislature passed House Bill 1922 in 2009, allowing larger systems to commingle reclaimed water supplies in a common distribution system and to discharge from the reclaimed water system at any permitted discharge point.¹²⁴

Texas also uses a state water plan to manage its water resources and publishes an update every five years. The TWDB is the state's lead water planning agency.¹²⁵ The 2017 State Water

¹²¹ Requirements for Reclaimed Water, found at https://www.tceq.texas.gov/assistance/water/reclaimed_water.html, retrieved April 19, 2017.

¹²² Requirements for Reclaimed Water, found at https://www.tceq.texas.gov/assistance/water/reclaimed_water.html, retrieved April 19, 2017.

¹²³ Requirements for Reclaimed Water, found at https://www.tceq.texas.gov/assistance/water/reclaimed_water.html, retrieved April 19, 2017.

¹²⁴ 2012 Guidelines for Water Reuse, United States Environmental Protection Agency, EPA/600/R-12/618, September 2012, at page 5-31.

¹²⁵ 2017 State Water Plan, Texas Water Development Board, page 4, found at <http://www.twdb.texas.gov/waterplanning/swp/2017/>, retrieved April 28, 2017.

Plan was adopted by the Texas Water Development Board on May 19, 2016.¹²⁶ Its stated purpose is to ensure that Texas has adequate water supplies in times of drought.

¹²⁶ 2017 State Water Plan, Texas Water Development Board, found at <http://www.twdb.texas.gov/waterplanning/swp/2017/>, retrieved April 28, 2017.

APPENDIX A- Key laws & regulations

33. U.S. Code Chapter 26- Water Pollution Prevention and Control (“The Federal Water Pollution Control Act, As Amended by the Clean Water Act of 1977”)

Title 40 Code of Federal Regulations (“Protection of Environment”)

California Code of Regulations Title 22

Arizona Administrative Code Title 18 Environmental Quality

Nevada Administrative Code, Chapter 445A, Sections 274-280

Nevada Water Technical Sheets: WTS-1A General design criteria for reclaimed water irrigation use; WTS-1B General design criteria for preparing an effluent management plan; WTS-3 Guidance Document For An Application For Rapid Infiltration Basins; WTS-7 Guidance Document for Reclaimed Water Storage Ponds

Texas Administrative Code, Title 30 Environmental Quality