OLD WATER BECOMING NEW AGAIN: REUSE OF TREATED WASTEWATER EFFLUENT IN TEXAS

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I. INTRODUCTION

The reuse of treated wastewater effluent for municipal supply is not a new idea in Texas, having been contemplated for at least sixty years. However, its importance has grown in recent decades as traditional surface water sources have become fully subscribed. Reuse is recognized as a significant source of future supply for Texas in the 2017 Texas State Water Plan.[1] The law related to reuse is, however, still very much a developing subject. Recent administrative actions and judicial decisions have better defined the contours of the entitlements necessary to reuse effluent discharged to state-owned water courses.[2] In the midst of this continued legal evolution, water suppliers in the Trinity River basin are actively implementing reuse projects using the river as a conveyance for the indirect reuse of discharged effluent.

II. GENERAL OVERVIEW OF WATER REUSE IN TEXAS

A. *What is Effluent, How is it Treated, and is it Safe?*

Effluent is the treated water that results from the wastewater treatment process. For households connected to central sewage service, once water is flushed down a drain, it travels to a wastewater treatment plant ("WWTP"). After treatment by a WWTP, the resulting effluent can be: (1) discharged to a waterbody; (2) pumped to a location for use (e.g., cooling water, agricultural or landscape irrigation, or mineral recovery activities); or (3) pumped directly to a municipal water treatment facility for treatment to drinking water standards.

While in a WWTP, wastewater undergoes three major phases of treatment. In the first preliminary phase, water is separated from non-digestible solids.[3] Several preliminary stages allow non-digestible solids to separate from the water, but generally the treatment involves a preliminary screening phase that extracts things like wet wipes (most of which do not degrade), rags, plastics, and many other solids that are

1. TEX. WATER DEV. BD., 2017 STATE WATER PLAN, 8.

2. *See, e.g.*, Tex. Comm'n on Envtl. Quality, *Order Granting in Part the Amended Application by the Brazos River Authority for Water Use Permit No. 5851 and Approving its Water Management Plan*, TCEQ Docket No. 2005-1490-WR, SOAH Docket No. 582-10-4184 (Sept. 16, 2016) [hereinafter *BRA SysOps Final Order*]; R.E. Janes Gravel Co. v. Tex. Comm'n on Envtl. Quality, No. 14-15-00031-CV, 522 S.W.3d 506, 2016 WL 7323307, at *9 (Tex. App.—Houston [14th Dist.] Dec. 15, 2016, pet. filed).

3. GEORGE TCHOBANOGLOUS, FRANKLIN L. BURTON, & H. DAVID STENSEL, WASTEWATER ENGINEERING: TREATMENT AND REUSE 11 (Metcalf & Eddy, Inc., 4th ed. 2003).

not intended to go down a drain and can block or damage treatment machinery. Next, wastewater is further mechanically treated to separate more solids such as grit, gravel, eggshells, coffee grounds, and other large particles.[4] Once non-digestible solid-liquid separation is complete, the still-untreated water enters a primary phase clarifier, which uses gravity to separate additional digestible solids.[5]

With preliminary and primary treatment complete, wastewater enters secondary treatment, usually in the form of "aerobic biological oxidation," i.e., digestion.[6] In digestion, clarified wastewater is mixed with oxygen and microorganisms that consume organic material.[7] The goal of digestion is to further break down organic matter with bacteria with the use of significant added oxygen to the wastewater. That breakdown allows more water to be separated from digestible solids.

The third and final phase of processing is tertiary treatment, which clears the water of remaining solids, bacteria, and viruses by using filters (sand or cloth), disinfecting chemicals, or ultraviolet light.[8] After this phase, the water is ready for discharge but is not considered potable. To become potable for domestic use, the water must undergo additional treatment to meet drinking water standards at a drinking water treatment facility.

Discharged effluent may be used in one of two ways: directly or indirectly. Direct reuse involves the delivery of treated effluent through a pipe to its place of use.[9] Indirect reuse involves the use of existing surface water bodies to transport effluent for subsequent diversion and reuse.[10]

1. Direct Reuse Standards

Direct reuse is divided into two different use classes that require different levels of effluent quality. The rules of the Texas Commission on Environmental Quality ("TCEQ") divide direct reuses of effluent into Type 1 and Type 2.[11]

Type 1 direct reuse purposes involve the potential for unintentional human exposure.[12] Examples include residential landscape or public recreational area irrigation, irrigation of food crops, and toilet flushing water.[13] This water must pass stringent requirements for bacterial con-

4. Robert F. Adams et al., *Water Reuse*, *in* 4 ESSENTIALS OF TEXAS WATER RESOURCES 24-1, 24-6 (Mary K. Sahs ed., 4th ed. 2016).
5. TCHOBANOGLOUS, *supra* note 3, at 607.
6. *Id.* at 11.
7. Adams et al., *supra* note 4, at 24-6.
8. *Id.*
9. *Id.* at 24-2.
10. *Id.* at 24-3.
11. 30 TEX. ADMIN. CODE § 210.32(1), (2) (1997) (Tex. Comm'n on Envtl. Quality, Specific Uses of Reclaimed Water).
12. *Id.* § 210.32(1)(H).
13. *Id.* § 210.32(1)(A), (B), (G).

tent and biochemical oxygen demand ("BOD").[14] BOD is a function of microbial metabolism, and the remaining microbial content of treated effluent may be indirectly gauged by BOD.[15]

Type 2 direct reuse purposes include those where no public access would take place during irrigation activities or "uses where the public would not come in contact with the reclaimed water."[16] Examples include irrigation of areas with restricted access (e.g., highway medians and rights-of-way), irrigation of animal feed crops, and cooling water for steam electric generation.[17] The required BOD and other characteristics for Type 2 direct reuse are less stringent than those for Type 1.[18]

2. Indirect Reuse Standards

The water quality standards associated with effluent for indirect reuse do not depend on the ultimate purpose of use but instead upon the requirements for discharge to a receiving water body. Water quality requirements for effluent discharge depend on the characteristics of the receiving stream, i.e., the receiving stream's existing quality and uses (e.g., contact recreation).[19] The controlling standards are a function of the Clean Water Act, which authorizes delegation of point-source discharge regulation to the states under certain circumstances.[20] The TCEQ is the Environmental Protection Agency's delegated primary authority over point-source discharge regulation, including WWTP discharges to streams, in Texas.[21] The TCEQ regulates WWTP discharges to surface water principally through specific numeric criteria for chemical and bacteriological effluent characteristics.[22]

B. *Is Reuse a New Idea? History of Water Reuse in Texas*

Reusing effluent is far from a new concept in Texas. Since the 1800s, Texas has reused wastewater in the San Antonio region. From use of acequias (canals) for both sewage and water transportation for irriga-

14. *Id.* § 210.33(1).
15. TCHOBANOGLOUS, *supra* note 3, at 81.
16. 30 TEX. ADMIN. CODE § 210.32(2) (1997) (Tex. Comm'n on Envtl. Quality, Specific Uses of Reclaimed Water).
17. *Id.* § 210.32(2)(A), (C), (F).
18. *Id.* § 210.33(1)–(2).
19. 33 U.S.C. §§ 1311(a), 1312(a), 1342(a); TEX. WATER CODE ANN. § 26.027 (West 2008) (authorizing the TCEQ to issue permits for the "discharge of waste or pollutants.").
20. TEX. WATER CODE ANN. § 26.027.
21. Memorandum of Agreement between the Tex. Nat. Res. Conservation Comm'n & the U.S. EPA, Reg. 6, Concerning the National Pollutant Discharge System [hereinafter Memorandum] (May 5, 1998), https://www.tceq.texas.gov/assets/public/permitting/wastewater/general/c1.pdf [https://perma.cc/Q3SD-FHWT].
22. 30 TEX. ADMIN. CODE §§ 307.4 to .5 (2014) (Tex. Comm'n on Envtl. Quality, General Criteria & Antidegradation).

tion and consumption from the 1720s–1830s, to the first wastewater treatment facility that routed effluent to the local lake in 1930, reuse is a part of Texas water history.[23] The first record of a legal entitlement to reuse dates to 1901, when the San Antonio Irrigation Company was given rights to sewage (present and future), except sewage already committed to the City of San Antonio for irrigation purposes.[24] Since the 1960s, areas near El Paso and Lubbock have relied upon reuse for irrigation of agricultural crops, golf courses, parks, and similar landscaped areas.[25]

Indirect reuse of effluent discharged by upstream WWTPs has been underway in Texas since the first upstream WWTPs were constructed, albeit without a legal framework. Treated effluent is most often discharged to a receiving stream or river and is eventually diverted downstream along with river flow for municipal and other uses. The practice became formalized when the TCEQ (and its predecessor agencies) recognized and granted water rights to return flows.[26] Permitted reuse rights in the Dallas-Fort Worth Metroplex currently exceed 1 million acre-feet per year.[27] An acre-foot of water is 325,851 gallons, and most households use between one-half to one acre-foot of treated water per year, that range largely dependent upon landscape watering activities.

A review of the 1968 Texas State Water Plan, prepared by the Texas Water Development Board ("TWDB"), reveals more evidence that reuse has long been contemplated.

> [T]he trend in Texas is toward a higher degree of treatment for both municipal and industrial wastes and a re-use of this water, rather than the use of impounded fresh waters for dilution or as a means of waste disposal. Many municipalities, to avoid dumping of waste in streams, are selling sewage for use in industry and to irrigate crops not destined for human consumption.[28] Present municipal and industrial waste-water releases are estimated at 0.8 and 1.3 million acre-feet per year, respectively, and are projected to reach 5.9 million acre-feet by 2020.[29]

In the 1968 State Water Plan, water reuse was a State Water Plan Objective, and the plan expressed that, the state should "[u]se return flows and reclaimable waste waters to the maximum feasible ex-

23. *History & Chronology*, SAN ANTONIO WATER SYS., http://www.saws.org/who_we_are/history/index.cfm [https://perma.cc/B39R-AR7G] (last visited Sept. 11, 2017).

24. Adams et al., *supra* note 4, at 24-4.

25. *Id.* at 24-5.

26. *Id.* at 24-6.

27. *See infra* Table 1.

28. JOHN J. VANDERTULIP, TEX. BD. OF WATER ENG'RS, A PLAN FOR MEETING THE 1980 WATER REQUIREMENTS OF TEXAS, 183 (1961).

29. TEX. WATER DEV. BD., THE TEXAS WATER PLAN SUMMARY 12 (1968).

tent."[30] In its 1984 State Water Plan, the TWDB suggested the Texas Water Code be amended to require water users to discharge treated effluent for subsequent reuse, unless the TWDB adopts a no discharge rule or if the discharge permit specifically provides for land application.[31] No such requirement has been adopted to date.

C. *Wastewater Reuse in Texas's Future*

The population of Texas is expected to increase from 29.5 million in 2020 to 51 million in 2070—an increase of more than 70%.[32] State water planning Regions C and H, home to the Dallas-Fort Worth and Houston metropolitan areas respectively, are expected to experience most of this increase, with over half of the state's projected population growth.[33] As population grows significantly, the demand for water is projected to increase only 17% from 2020 to 2070, going from 18.4 million acre-feet per year to 21.6 million acre-feet per year.[34] However, the existing water supply in Texas is projected to decrease from 15.2 million acre-feet in 2020 to about 13.6 million acre-feet in 2070.[35] That projected 11% decrease affects surface water, groundwater, and reuse water taken together.[36]

The State Water Plan addresses this shrinking supply with "water management strategies" to meet increased demand. Among those strategies is reuse, which is expected to provide approximately 14% of all water supplies statewide in 2070.[37] In 2020, the total annual reuse supply is expected to be less than 4% of total supplies, with 41% of that limited supply coming from Region C.[38] This number is expected to increase as more wastewater is generated by the growing population.[39] Of the sixteen state water planning regions, it is anticipated that Regions C and H will rely most upon reuse supplies. This is consistent with increases in effluent discharges associated with those regions' projected population increases.[40]

The State Water Plan sets forth recommended strategies for conserving and reusing water to meet growing demand. Specifically, direct potable reuse, the delivery of treated wastewater directly to a water treatment facility for treatment for human consumption, is expected to increase from approximately 33,000 acre-feet per year in

30. *Id.* at 9.
31. TEX. DEP'T OF WATER RES., GP-4-1, WATER FOR TEXAS: A COMPREHENSIVE PLAN FOR THE FUTURE VOL. I, 60 (1984).
32. TEX. WATER DEV. BD., 2017 STATE WATER PLAN, 49.
33. *Id.*
34. *Id.*
35. *Id.*
36. *Id.* at 6.
37. *Id.* at 8.
38. *Id.* at 71.
39. *Id.* at 72.
40. *Id.* at 91.

2020 to a projected 87,000 acre-feet per year in 2070.[41] Indirect reuse, discharging treated wastewater into a water body to be diverted downstream, is expected to increase from 2020's projected 230,000 acre-feet per year to 649,000 acre-feet per year in 2070.[42] Other direct reuse (*e.g.*, for irrigation) is expected to increase from 2020's projection of 163,000 acre-feet per year to 371,000 acre-feet per year in 2070.[43]

III. LAW AND POLICY OF WATER REUSE IN TEXAS

A. *Who Controls Water in Texas?*

Regulation and control over surface water use entitlements, including the power to grant permits to divert and reuse discharged effluent, is vested in the TCEQ.[44] Surface water in Texas is owned by the state, held in trust for the public.[45] TCEQ controls the use of state water through its surface water right permitting program. The rights granted by TCEQ to divert and use state water are usufructory in nature.[46] A usufruct is "the right to use, enjoy and receive the profits of property *that belongs to another*."[47] The "other" in this case are the people of Texas.

Additionally, Texas has been granted primacy in implementing the Clean Water Act and the Safe Drinking Water Act,[48] which provides TCEQ with responsibility for permitting WWTP discharges.[49] TCEQ implements this delegation through its Texas Pollutant Discharge Elimination System program, which regulates all point-source pollutant discharges into Texas streams and rivers,[50] except those from oil, gas, or geothermal exploration and development.[51]

River authorities, special districts, and major municipalities lead in water planning, financing, and construction related to water supply and wastewater treatment. Each river authority and special district

41. *Id.* at 92, table 8.3.
42. *Id.*
43. *Id.*
44. TEX. WATER CODE ANN. § 11.026 (West 2008).
45. *Id.* §§ 11.021, 11.0235(a).
46. Texas Water Rights Comm'n v. Wright, 464 S.W.2d 642, 649 (Tex. 1971).
47. In re Water Rights of the Upper Guadalupe, 642 S.W.2d 438, 444 (Tex. 1982) (citations omitted) (emphasis added).
48. Memorandum, *supra* note 21.
49. Shana L. Horton & Constance Courtney Westfall, *State and Federal Governmental Entities with Water Resource Jurisdiction*, *in* 4 ESSENTIALS OF TEXAS WATER RESOURCES 6-1, 6-2 (Mary K. Sahs ed., 4th ed. 2016).
50. A "point source" is "Any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants or wastes are or may be discharged into or adjacent to any water in the state." 30 TEX. ADMIN. CODE § 307.3(47).
51. *Id.*

(e.g., Tarrant Regional Water District) has specific powers and duties conferred by enabling legislation.[52] River authorities frequently encompass many counties, and their jurisdictions extend to all or major portions of river basins.[53] Except as limited by enabling legislation, Texas Water Code Chapter 49 confers broad powers upon river authorities and special districts, including eminent domain,[54] construction and operation of works for water and wastewater treatment,[55] commissioning of peace officers,[56] and operation and maintenance of parks, among other duties.[57]

As a matter of history, the Texas river authorities are major water rights holders in the basins in which they operate. River authorities, major municipalities, and other special districts represent the largest municipal water rights holders in Texas.[58] Those three classes of entities effectively control the vast majority of rights available to satisfy current and future domestic and municipal water demands in Texas.

B. *Return Flow Ownership*

As with the ordinary yield of Texas's rivers, Water Code Chapter 11 also governs rights to reuse effluent delivered to those water bodies.[59] The characteristics of rights to reuse discharged effluent depends largely on the source water from which the effluent was derived.[60] The reuse of effluent may require both a right of diversion (with an associated, permitted use) and right to use a state watercourse for transport to a point of diversion, i.e. a "bed and banks" authorization. The need for either or both of these rights relates to the original source of the water from which the effluent is derived (i.e., surface water or groundwater). An analysis of the right to reuse effluent begins with the question of what is, and what is not, state water under Texas Water Code Chapter 11.

52. Lyn Clancy, Howard Slobodin, & Stacie Dowell, *River Authorities and Regional Water Districts*, *in* 4 ESSENTIALS OF TEXAS WATER RESOURCES 8-1 (Mary K. Sahs ed., 4th ed. 2016).

53. *Id*.

54. TEX. WATER CODE ANN. § 49.222 (West 2008).

55. *Id.* § 49.213.

56. *Id.* § 49.216(a).

57. *Id.* § 49.463.

58. TCEQ ACTIVE WATER RIGHTS DATABASE, https://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/applications/wractive.xlsx [https://perma.cc/7334-YKFS] (last visited Sept. 11, 2017).

59. TEX. WATER CODE ANN. §§ 11.046 & 11.042 (West 2016).

60. *Compare* TEX. WATER CODE ANN. § 11.042(b) (West 2016) (governing the use of bed and banks to convey groundwater-derived return flows), *with* § 11.042(c) (governing use of bed and banks to covey surface-water derived effluent).

1. State Water

Texas Water Code Section 11.021 defines "state water," which requires a TCEQ-issued water rights permit to divert.[61] Notably, all water in natural watercourses is presumed to be state water, as is water imported and discharged into natural watercourses in the state.[62] Once surface water is permitted, diverted, used, treated by a WWTP, and discharged into a waterway, any person or entity desiring to subsequently divert that effluent (i.e., to indirectly reuse it) must secure an appropriation right, a bed and banks authorization, or both, to do so. Effluent derived from "developed water," water *imported from a one river basin to another or that is derived from groundwater,* receives special treatment and ordinarily requires only a bed and banks authorization for reuse.[63] A party seeking to appropriate *surface-water derived effluent* must apply both for a new appropriative right and for a bed and banks authorization.[64]

2. Groundwater

Groundwater *in situ* is not "state water" in Texas and is instead owned by the owner of the surface estate. The Texas Supreme Court has held that "a landowner has absolute title in severalty to the water in place beneath his land."[65] Once groundwater is discharged into a natural watercourse, however, it becomes state water,[66] in the absence of a bed and banks authorization under Chapter 11.[67] Groundwater (and surface water imported from one in-state basin to another) is considered "developed water" because it is not natural to the receiving basin. Developed water does not require a new appropriative right to divert it, but once developed water is discharged into a watercourse, it becomes state water in the absence of a bed and banks authorization.[68] To retain ownership of groundwater-derived effluent, a discharger must get a bed and banks authorization under section 11.042(b).[69] To retain ownership of imported surface water, a discharger must get a bed and banks authorization under section 11.042(c).[70]

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61. *Id.* § 11.021.
62. *Id.*
63. R.E. Janes Gravel Co. v. Tex. Comm'n on Envtl. Quality, No. 14-15-00031-CV, 522 S.W.3d 506, 2016 WL 7323307, at *9 (Tex. App.—Houston [14th Dist.] Dec. 15, 2016, pet. filed) (indicating that interbasin imported surface water is not "state water" for purposes of appropriation).
64. TEX. WATER CODE ANN. § 11.042(c) (West 2008).
65. Edwards Aquifer Auth. v. Bragg, 421 S.W.3d 118, 137 (Tex. App.—San Antonio 2013, pet. denied) (citing Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 831 (Tex. 2012)).
66. TEX. WATER CODE ANN. § 11.021(b) (West 2016).
67. *Id.* § 11.042(b).
68. *Day*, 369 S.W.3d at 822.
69. TEX. WATER CODE ANN. § 11.042(b).
70. *Id.* at § 11.042(c).

3. Surplus Water

Texas Water Code section 11.046(c) provides that "once [surface] water has been diverted under a permit and then returned to a watercourse or stream, it is considered surplus water."[71] The narrow scope of this section in practice warrants consideration. This section's reference to "[w]ater [that] has been diverted under a permit" indicates that the section refers only to permitted, state-owned surface water. This limitation excludes "developed water" from the scope of section 11.046(c), which does not require an appropriative right to divert, only a bed and banks authorization.[72] Once state water is used and returned, it is considered surplus *state water*, which means that it may be appropriated by others. To retain ownership of state surface water that has been diverted, used, treated, and discharged into a watercourse, a person must apply for a water rights permit for a new appropriation to appropriate the now surplus state water.

The retention of ownership of discharged surface-water-derived effluent is, in a sense, a fiction. Because it requires a new appropriative right, the indirect reuse of surface-water-derived effluent brings with it a new priority date for purposes of determining the right to divert in low-flow conditions under Texas's prior appropriation system.[73] That system assigns priority for use of surface water to the most senior rights-holders in times of scarcity, with seniority based on "priority date." Accordingly, new rights to reuse surface-water-derived effluent become subject to the claim of senior water rights holders. While this seems to be at odds with section 11.042(c), which can be read to allow a discharger to retain ownership of discharged water through a bed and banks permit, the two sections coexist in harmony.[74]

In practice, section 11.046's treatment of surface-water-derived effluent return flows also means that parties other than the discharger of those flows may secure rights to it through a new appropriation.[75] Such an appropriation was recently perfected by the Brazos River Authority ("BRA") in the BRA SysOps Final Order. In that order, the TCEQ granted BRA appropriative rights to both surface-water-based and groundwater-based effluent discharged by third-party WWTPs.[76] With regard to both surface and groundwater-derived return flows, the TCEQ provided, however, that the rights granted to BRA are sub-

71. *Id.*

72. R.E. Janes Gravel Co. v. Tex Comm'n on Envtl. Quality, No. 14-15-00031-CV, 522 S.W.3d 506, 2016 WL 7323307, at *9 (Tex. App.—Houston [14th Dist.] Dec. 15, 2016, pet. filed).

73. TEX. WATER CODE ANN. § 11.027 (West 2016).

74. *Id.* at §§ 11.042(c), 11.046(c).

75. *See BRA SysOps Final Order*, *supra* note 2.

76. *Id.* at 22, Finding of Fact No. 165 (finding that "The System Operation Permit should authorize: (1) the appropriation of current return flows discharged by others (Texas Water Code §§ 11.046(c), 11.121) once they are discharged into a watercourse . . . . ").

ject to limitation or termination in the event the discharging third party obtains a bed and banks authorization for the discharges.[77]

4. Direct Reuse

Direct reuse, the pumping of effluent directly to the location of reuse without discharge to a watercourse, is controlled by Texas Administrative Code Chapter 210.[78] That chapter governs the transfer, storage, and use of "reclaimed water."[79] A discharger generally owns un-discharged, treated effluent without the need of a permit, but the "direct" reuse of reclaimed water may require a Texas Pollutant Discharge Elimination System ("TPDES") permit if a manmade receiving impoundment is deemed waters of the state or of the United States. This may be the case where manmade storage constructed for treated effluent prior to direct reuse is inundated by or becomes intermingled with floodwaters in high-flow conditions.

IV. REGION C REUSE STRATEGIES

A. *Overview of Region*

In 1997, the Texas Legislature enacted Senate Bill 1 ("SB 1"), establishing the state's current water planning process.[80] SB 1 called for the designation of regions across the state to encourage local stakeholder participation in creating regional water plans that form the basis for the state water plan.[81] The TWDB divided the state into regions based on factors such as county lines, geographic boundaries, river basins, aquifer delineations, water utility development patterns, socioeconomic characteristics, and political subdivision boundaries.[82] There are sixteen TWDB-designated regional water planning areas ("RWPAs") in Texas, each of which is associated with a regional water planning group ("RWPG").[83] RWPGs are responsible for creating regional water plans on an ongoing, five-year cycle, which are sent to the

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77. *Id.* at 27, Finding of Fact No. 167 (observing that "Permit No. 5851 [the BRA final SysOps permit] has a special condition that states that BRA's storage, diversion, and use of the portion of the appropriation based on others' surface water-based return flows is interrupted by direct reuse and is terminated by indirect reuse upon issuance of a bed and banks authorization to the discharging entity.").

78. 30 TEX. ADMIN. CODE §§ 210.1–.60.

79. *Id.* § 210.2(a) (defining "reclaimed water as "[d]omestic or municipal wastewater which has been treated to a quality suitable for a beneficial use, pursuant to the provisions of this chapter and other applicable rules and permits." *Id.* § 210.3(24)).

80. Act of June 1, 1997, 75th Leg., R.S., ch. 1010, § 1.01, 1997 Tex. Gen. Laws 3610 (relating to "the development and management of the water resources of the state.").

81. TEX. WATER CODE ANN. § 16.053(b) (West 2008).

82. *Id.* § 16.053(b).

83. Cynthia Smiley, *State Water Planning*, *in* 4 ESSENTIALS OF TEXAS WATER RESOURCES 20-1, 20-4 (Mary K. Sahs ed., 4th ed. 2016).

TWDB for approval and are finally incorporated in each TWDB state water plan, which is also updated every five years.[84]

B. *Region C*

Region C includes all or parts of sixteen counties in north-central Texas, including Cooke, Grayson, and Fannin to the north; Jack and Parker to the west; and Freestone, Navarro, and Henderson to the south.[85] Dallas-Fort Worth and the surrounding counties are located in the center of Region C. The region is highly urbanized, with Dallas and Tarrant Counties holding 65% of the Region's population.[86] Region C includes parts of the Red, Brazos, Sulphur, and Sabine River basins, but its principal supply comes from the upper Trinity River.[87] Some notable Region C lakes include Lewisville, Ray Hubbard, Ray Roberts, Lavon, Cedar Creek, and Richland-Chambers. The two major aquifers in Region C are the Trinity and the Carrizo-Wilcox.[88]

C. *Projected Water Demands and Recommended Water Reuse Projects*

While the available water supplies in Region C are projected to remain at a consistent 1.7 million acre-feet per year over the next five decades, the projected water supply demand is expected to almost double.[89] How can a relatively static water supply serve a region that is predicted to be one of the fastest growing in Texas?[90] Reuse. About 90% of the region's current water supply is used for municipal purposes,[91] and return flows increase with population.[92]

Of the 90% of Region C water supplies used for municipal purposes, about half returns to the sewer, is treated, and is discharged as effluent.[93] This 50% "return-flow factor" makes reuse a potentially significant source of future supply for the region. There are thirty-three existing reuse projects in Region C, projected to total 283,893 acre-feet of supply per year by 2020.[94] These existing reuse projects

84. TEX. WATER CODE ANN. § 16.053(e) (West 2008).

85. *Region C Planning Group*, TEX. WATER DEV. BD., https://www.twdb.texas.gov/waterplanning/rwp/regions/c/ [https://perma.cc/E37E-TFUY] (last visited Sept. 11, 2017).

86. REGION C WATER PLANNING GRP., 2016 REGION C WATER PLAN VOL. I, ES.3 (2015).

87. *Region C Planning Group*, TEX. WATER DEV. BD., *supra* note 78.

88. 2016 REGION C WATER PLAN, *supra* note 79, at 1.7, Figure 1.1.

89. *Id.* at ES.6, Figure ES.3 (showing that by 2070, the water supply demand is expected to reach 3 million acre feet per year).

90. 2016 REGION C WATER PLAN, *supra* note 79, at 2.1 (showing the population of Region C is projected to grow from 6,477,835 in the year 2010 to 9,908,572 in 2040 and 14,347,915 in 2070.).

91. *Id.* at ES.3.

92. *Id.* at ES.5.

93. *Id.* at ES.4.

94. 2016 REGION C WATER PLAN, *supra* note 79, at 5E.27–.28.

are expected to supply 427,011 acre-feet per year by 2070.[95] The 2016 Region C Regional Water Plan recommends twenty-four new reuse projects; ten are direct reuse projects and fourteen are indirect reuse projects.[96]

V. TRINITY RIVER AUTHORITY AND NORTH TEXAS MUNICIPAL WATER DISTRICT MAIN STEM REUSE TRANSACTION

A. *Trinity Basin Indirect Reuse*

The Trinity River basin is the most developed watershed in Texas and is located in the eastern third of the state. It is home to two major metropolitan areas: Dallas-Fort Worth and Houston. Approximately half of the Texas population relies on the Trinity Basin for part of its water supply. The reuse of treated effluent as a source of water supply in the region has been contemplated since the 1950s.

1. Trinity River Authority Reuse History

The Trinity River Authority of Texas ("Authority") was created in 1955 by an act of the Texas Legislature.[97] Shortly after its creation, the Authority was approached by a number of small Dallas and Tarrant County municipalities desiring wholesale wastewater collection and treatment service. In response, the Texas legislature enacted Texas Revised Civil Statutes Article 1109i,[98] which enabled the Authority to contract with those municipalities for that purpose. Article 1109i permitted the Authority to enter into contracts with the customers of what would become its five regional wastewater treatment systems.[99]

Pursuant to Article 1109i, as amended and codified as Texas Local Government Code Section 552.023, the Authority "becomes [the] owner of sewage accepted by it for transportation and treatment," and its customers are "not entitled to credit of any type, either in the exchange of water, money, or other consideration, for any effluent delivered to the Authority."[100] The Authority constructed five regional wastewater treatment systems with over thirty municipal customers in the following forty years, and accordingly became the owner of a significant amount of effluent discharged by its five upper-basin WWTPs.

95. *Id.*

96. *Id.* at 5E.33–.34.

97. *See* Act of June 24, 1955, 54th Leg., R.S., ch. 518, § 1, 1954 Tex. Gen. Laws p. 1314 (codified as TEX. REV. CIV. STAT. ANN. art. 8280-188).

98. Act of June 6, 1957, 55th Leg., R.S., ch. 430, §§ 1–7, 1957 Tex. Gen. Laws 1288, 1288–90 (current version at TEX. LOC. GOV'T CODE § 552.023).

99. *Id.*

100. TEX. LOC. GOV'T CODE ANN. § 552.023(e) (West 2015).

2. Upper Trinity Indirect Reuse Rights

While the value of reuse has been long recognized, owners of effluent (water suppliers that reserved rights to effluent by contract) and WWTP operators did not seek water rights to effluent until the last twenty years. That lack of action is likely because major water rights holders relied on already-permitted firm yield in existing impoundments for water supply. As those stored supplies became fully subscribed, attention to perfecting indirect reuse water rights commenced.

Major reuse permitting efforts began in the Trinity River basin in the late 1990s and early 2000s. The Authority, Tarrant Regional Water District ("TRWD"), the Cities of Dallas, Houston, and Irving, and the North Texas Municipal Water District ("NTMWD") sought reuse permits. While not the first reuse permits sought in Texas,[101] these applications represented the largest concurrent effort to seek diversionary rights to discharged effluent for indirect reuse. The foregoing parties cross-protested each other's applications, and those protests were all ultimately settled. In light of those settlements, no contested hearings or subsequent judicial appeals took place.

As a condition of many of the foregoing settlements, parties agreed to dedicate a certain portion of return flows for the protection of downstream water rights and environmental purposes. In some cases, an annual quantity of discharged effluent was dedicated to those purposes.[102] In others, a percentage of discharged effluent volumes was set aside.[103]

As a result of the parties' agreements, significant indirect reuse rights have been issued in the upper Trinity River basin. A summary of those rights is reflected in the following table:

101. *See, e.g.*, Permit to Appropriate State Water No. 3985, City of Lubbock, granted May 23, 1983 (authorizing Lubbock's reuse of 22,910 acre-feet per year of treated effluent for steam electric cooling and agricultural irrigation).

102. *See, e.g.*, Certificate of Adjudication No. 08-2462G, City of Dallas (Lake Ray Hubbard), Special Condition D (requiring City of Dallas "to discharge 114,000 acre-feet of water per year of treated effluent from Dallas' Central and Southside WWTPs and allow that amount to remain in the Trinity River Basin for instream flows.").

103. *See, e.g.*, Certificate of Adjudication No. 08-4976C, Tarrant Regional Water District (Cedar Creek Reservoir), Special Condition A (limiting reuse diversions to 70 percent of discharged return flows.).

TABLE 1: UPPER TRINITY BASIN REUSE AUTHORIZATIONS

Entity	Permitted Return Flows (af/y)	Permit Number
NTMWD	71,882	08-2410E
	157,393	08-2410F
DALLAS	97,200	08-2456E
	150,000	08-2462G
	247,200	PM 12468(A)
TRA	3,695	08-5021B
	4,368	08-3404D
	246,519	08-4248B
TRWD	52,500	08-4976C
	63,000	08-5035C
IRVING	31,600	03-4799C

3. The Authority's Original Reuse Authorization

The Authority obtained a reuse water right permit, Permit No. 08-4248B, in 2006. That permit entitled the Authority to divert from storage in Lake Livingston up to 246,519 acre-feet per year of effluent discharged by the Authority's Central, Ten Mile, and Red Oak Creek Regional WWTPs. That permitted volume reflected the then-expected full utilization of those systems. Current return flow volume is, however, significantly less.

As part of the SB 1 regional water planning process, the Region C Regional Water Plan has reflected in each of its five-year iterations some reliance on the Authority's original reuse entitlement as an upper-basin source of supply.[104] In order to effectuate the upper-basin reuse of its effluent, the Authority was required to amend its water right to enable a diversion of effluent above Lake Livingston. Pursuant to its settlement agreement with the City of Houston regarding Permit No. 08-4248B, the Authority could only divert 70% (172,563 acre-feet per year) of its total entitlement (246,519 acre-feet per year) above Lake Livingston. In June 2015, the Authority applied to amend its reuse water right to enable it to divert 70% of its discharged effluent for use in the upper Trinity River basin.

104. TEX. WATER DEV. BD., REGION C WATER PLANNING GRP., 2006 REGION C WATER PLAN, 4B-19–4B-20, table 4B.6 (2006); TEX. WATER DEV. BD., REGION C WATER PLANNING GRP., 2011 REGION C WATER PLAN VOL. I, 4E.37–4E.39 (2010); TEX. WATER DEV. BD., REGION C WATER PLANNING GRP., 2016 REGION C WATER PLAN VOL. I, 5C.25 (2015) (describing North Texas Municipal Water District/Authority water sale for Main Stem Pump Station).

B. *NTMWD Wetlands Project*

1. Overview of Project

Among the existing reuse projects in the upper Trinity River basin is the NTMWD East Fork reuse project. NTMWD commenced construction of the 1,840-acre manmade wetlands project in 2004, and completed the wetlands in 2009 at a cost of $280 million.[105] The wetlands system receives effluent diverted from the East Fork of the Trinity River, and acts as a natural filter to remove nutrients and sediment.[106] NTMWD estimates that the natural treatment the wetlands provide removes approximately 95% of sediment, 80% of nitrogen, and 65% of phosphorus before the water is pumped from the wetlands to storage in Lake Lavon.[107] From Lake Lavon, the water is diverted for treatment by NTMWD for municipal purposes.

In 2014, NTMWD approached the Authority regarding a purchase of Authority effluent as an additional supply for the constructed wetlands. The additional effluent would be diverted downstream of the wetlands on the main stem of the Trinity River. NTMWD plans to construct a 100 million gallon per day Main Stem Pump Station to pump additional effluent to its existing constructed wetlands. The pipeline to deliver Authority effluent to the wetlands would run approximately seventeen miles.

2. Reuse Permit Amendment

To enable the use by NTMWD of Authority effluent, the Authority sought the above-described water rights amendment to its existing reuse right in June 2015. It was protested by both the City of Dallas and the City of Houston. Both of those parties ultimately withdrew their protests, and TCEQ issued the required amendment in October 2016.

The amendment, Permit No. 08-4248E, granted the Authority the right to divert up to 172,563 acre-feet per year in an upper-basin diversion reach. As an amendment to an existing right, the new entitlement maintained the existing year 2000 priority date associated with Permit No. 08-4248B. The amendment did, however, trigger the imposition of instream flow requirements, as were adopted for the Trinity River Basin by the TCEQ in 2011.[108]

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105. *East Fork Reuse Project*, N. TEX. MUN. WATER DIST., https://www.ntmwd.com/east-fork-water-reuse-project/ [https://perma.cc/679S-QKDC] (last visited Sept. 11, 2017).

106. *Id.*

107. *Id.*

108. *See* 30 TEX. ADMIN. CODE §§ 298.200–.225(a)(b) (2011) (Tex. Comm'n on Envtl. Quality, Envtl. Flow Standards).

3. Option Contract

In March 2015, the Authority and NTMWD entered into an option contract under which NTMWD optioned the right to purchase up to 56,050 acre-feet per year (50 million gallons per day) of Authority effluent for diversion at NTMWD's planned Main Stem Pump Station. Based on its settlement agreement with the City of Houston, the Authority's commitment to NTMWD requires that NTMWD's use be "once-through," meaning it can only be used by NTMWD once and not subsequently reused. The option contract is for a five-year term, and lays out the basic terms of the ultimate sale contract should the parties elect to proceed.

VI. CONCLUSION

While the legal specifics regarding reuse rights are still evolving, as evidenced by the BRA SysOps Final Order, parties with existing indirect reuse rights are working to implement reuse projects contemplated by the Region C Regional Water Plan. The additional clarity provided by recent decisions of the TCEQ and Texas courts provide a useful roadmap to parties contemplating new efforts to permit both the reuse of surface water and groundwater-derived WWTP return flows. Given the anticipated reliance on reuse as a major component of future supplies in the Texas State Water Plan, additional permitting efforts, reuse project implementations, and legal developments are on the horizon in Texas. The value of used "old" water, made new by treatment, is too great for Texas to ignore.