

## Solving Two Problems With One Solution – Beneficial Reuse Of Wastewater

The Texas Hill Country is facing multiple challenges as a result of the central Texas population boom, with many of these challenges relating to water. The Texas Water Development Board (TWDB) projects that Texas will be unable to meet its future water needs without substantial wastewater reuse.<sup>1</sup> Meanwhile, numerous developments are sprouting up across the Texas Hill Country, some with no comprehensive plan to deal with their wastewater, so they simply dump it into the nearest creek or river. This not only threatens the downstream environment, recreational activities, and drinking water supply, it also throws away a valuable potential resource: wastewater.

While wastewater has high levels of Nitrogen and Phosphorous and is therefore unsuitable for drinking or discharging into a waterway, it is well-suited for watering of public parks, golf courses, and other open spaces. Many public utilities, especially those in drought-prone areas, are designing wastewater systems as cyclical in nature, with a reuse/recycling component, rather than the outdated model of “treat and discard.” This cyclical approach reduces the demand for potable water supply, as wastewater is used instead of potable water for many different non-potable applications (fig. 1 below).

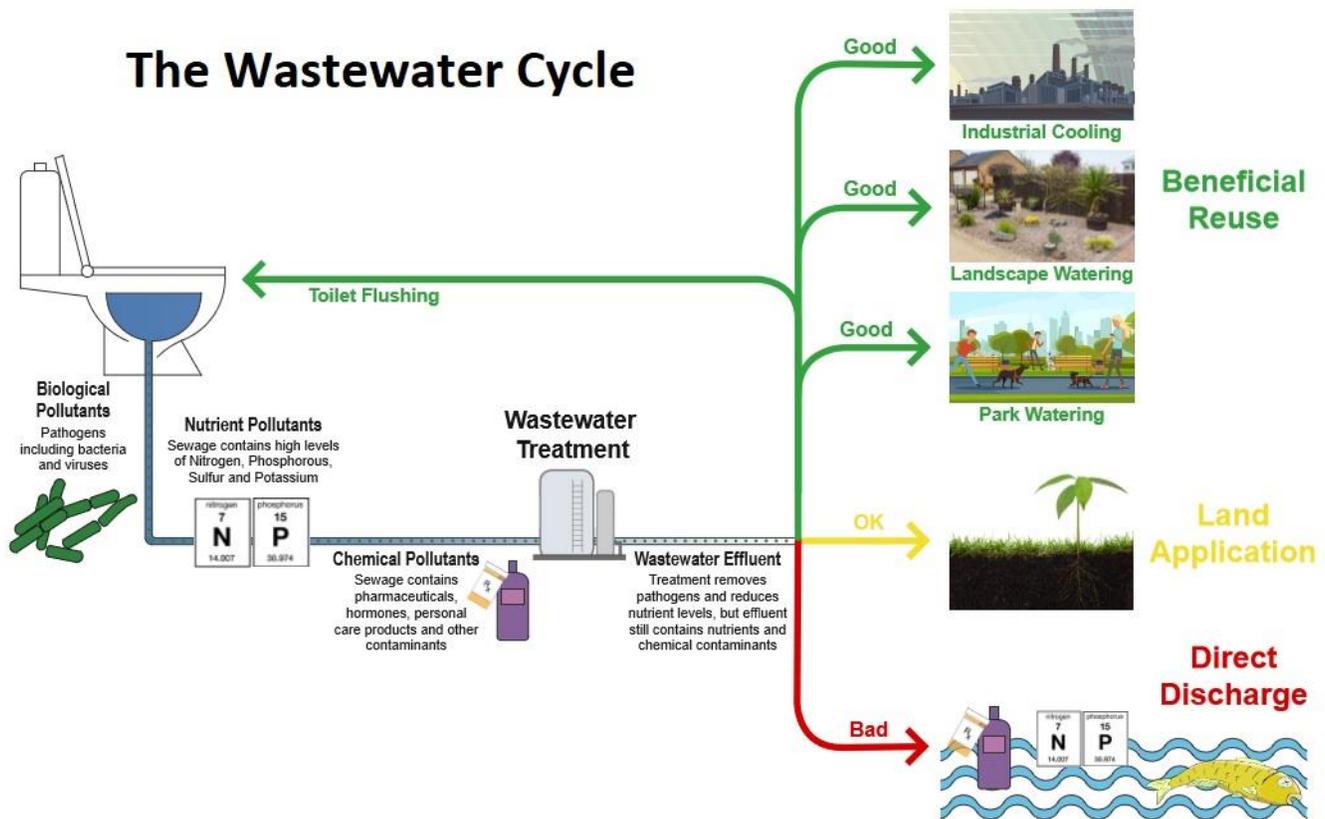


Fig. 1 A Cyclical Approach To Wastewater

Wastewater reuse can alleviate both water supply problems and the wastewater disposal issue. By addressing these two problems, water supply and wastewater, as a whole, municipalities and developments can cancel the two problems out, turning two problems into one solution – Beneficial Reuse of wastewater.

## The Water Problem

There are two main sources of drinking water for Texans: surface water supplies and groundwater supplies. Texas relies almost entirely on statewide precipitation to replenish both, so the state's water supply rises and falls with our floods and droughts. Because much of Texas has an arid climate, especially the headwater areas of our primary rivers, the state experiences frequent and often prolonged droughts. A vast network of reservoirs has been constructed throughout the state to alleviate this problem, but the "easy reservoirs" have now all been built; new reservoirs will require dislocation of local populations, expensive land purchases, and costly construction in areas that aren't ideally suited for reservoir development.<sup>2</sup>

The groundwater situation is even more challenging. There really is no way to increase groundwater supplies like there is with surface water (via reservoirs), so the groundwater supply in Texas is actually projected to decrease in the future, as a growing population taps the Edwards and Trinity Aquifers with an ever-increasing number of wells.

Even if extensive water conservation efforts are enacted, the TWDB projects that 14% of new Texas water supplies will be from wastewater reuse by 2060.<sup>1</sup> If some of the costly new reservoir projects aren't funded, and/or TWDB-recommended water conservation efforts fall short, this percent will need to be substantially higher in order to meet the state's future water needs.

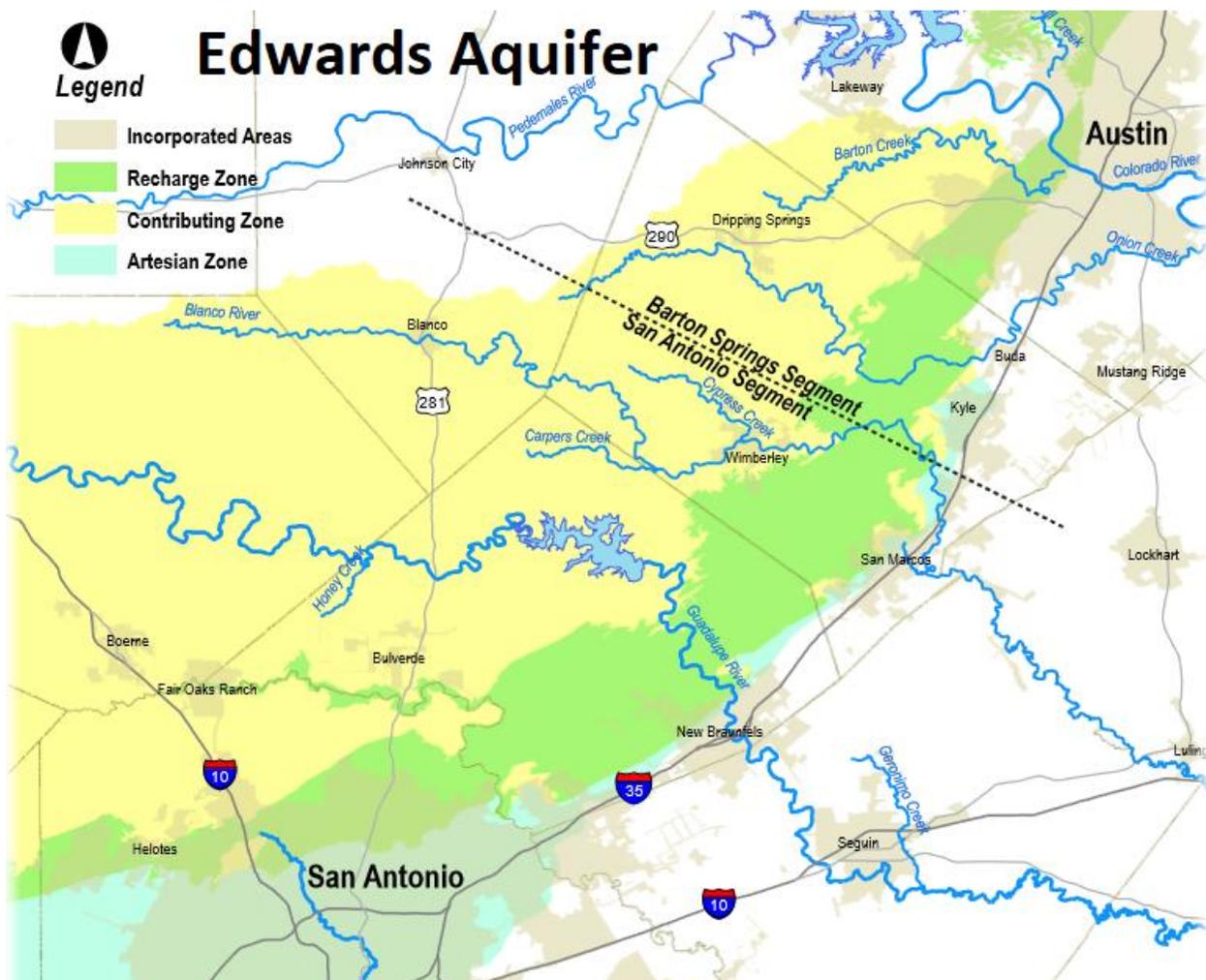


Fig 2. Edwards Aquifer Zones

## The Wastewater Problem

On the other side of the water coin, Texas is creating and discarding more wastewater than ever before, due to its booming population. But existing Texas laws are ill-suited to manage this wastewater growth. Under current Texas law, any developer or municipality can obtain a TPDES permit for discharging wastewater into their local waterway, as long as they meet fairly lax water quality standards and the discharge location isn't within the Edwards Aquifer recharge zone (see fig. 2 on previous page).

Even though many Hill Country creeks and rivers contribute to the Edwards Aquifer, it is currently legal to dump wastewater into a waterway that contributes to the Edwards or Trinity Aquifer. The concept behind the current law is that vegetation and soils in waterways will soak up excess wastewater nutrients and "naturally cleanse" discharged wastewater, but this only works in waterways that contain abundant aquatic vegetation and soil. In the Texas Hill Country, most streams have limestone beds, with very little soil or aquatic vegetation to absorb excess nutrients, thus leading to excess algae buildup (eutrophication) of the waterway when wastewater is directly discharged (fig. 3 below).



Fig 3. The San Gabriel River receives 1.2 million gallons per day wastewater discharge from the City of Liberty Hill

There are other issues with direct wastewater discharge in the Texas Hill Country, besides eutrophication of waterways. Hill Country streams have many faults and fractures, which allow surface water to flow into underground aquifers. Any contamination of surface water with wastewater will also eventually lead to contamination of groundwater and local wells. For these reasons, Hill Country towns and developments who try to discharge wastewater into local waterways are often met with stiff resistance from local landowners, environmental groups, and concerned downstream citizens, leading to protracted and costly legal battles for both sides.

## The One Solution – Beneficial Reuse of Wastewater

The solution to augment decreasing Texas water supplies while reducing wastewater discharge into waterways is wastewater recycling, or Beneficial Reuse. This isn't a new concept - many Hill Country developments and municipalities already reuse their wastewater, including the huge Belterra development in the Hill Country and the cities of Marble Falls, Lakeway, San Antonio, and Austin.

Two of the biggest residential water uses in central Texas, toilet flushing and lawn watering, can be accomplished with recycled wastewater. This is good news for Texas, where even in conservation-minded San Antonio, 40 percent of the city's water used during summer months is for lawn watering.<sup>3</sup> Fortunately, San Antonio boasts the largest direct recycled water delivery system in the nation. More than 130 miles of purple pipes (designated for recycled wastewater) deliver high-quality recycled water for use by golf courses, parks, commercial and industrial customers, and San Antonio's famous River Walk.

But wastewater reuse doesn't have to consist of a complex network of purple pipes run across large cities. Some of the most productive reuse projects consist of one large pipe from the wastewater treatment plant to a high-volume water user, such as Marble Falls' Meadowlakes project. Funded by a \$58K grant from the LCRA, the project extends a treated effluent line from the Marble Falls wastewater treatment plant to the nearby City of Meadowlakes, to irrigate the Hidden Falls Golf Course. This project allows the golf course to be completely maintained with treated effluent instead of potable water.<sup>4</sup>

Whether it be a network of purple pipes, or simpler point-to-point connections, Beneficial Reuse of wastewater is an idea whose time has come for Texas and the Hill Country. There simply is no other way to meet the water needs of a population that is expected to double by 2050,<sup>5</sup> other than by reusing the wastewater we are currently throwing away. The added benefit of preserving our beautiful Hill Country waterways by removing wastewater discharge from the equation makes Beneficial Reuse an even more attractive option for central Texas.

1 <https://www.twdb.texas.gov/waterplanning/swp/2017/>

2 <https://www.tcatexas.org/issues-outreach/marvin-nichols-reservoir/>

3 <https://www.texastribune.org/2015/03/24/report-smarter-lawn-watering-means-big-water-savin/>

4 <http://www.ci.marble-falls.tx.us/CivicAlerts.aspx?AID=171&ARC=330>

5 <https://www.texastribune.org/2015/03/05/report-texas-population-double-2050/>