Utilities

Providing efficient and cost-effective utilities to City residents and businesses

8.1 Introduction

Over time, the supply of basic utilities for the City of Round Rock has expanded along with the City's population. Adequate provision of utilities is important for the City as it strives to maintain a desired level of service for residents and businesses. Utilities represent substantial financial outlays. As such, utilities must be planned well in advance to meet projected peak community demands and must be commensurate with City financial capabilities.

One of the most difficult periods for City utilities was the 1970's. From 1970 to 1980, the population of Round Rock rose by 353 percent, from 2,811 in 1970 to 12,740 in 1980. The rapid rise in population placed tremendous pressures on City utilities and, in 1978, City wells ran dry. The 1978 crisis prompted the City to expand its water resources and aggressively plan for future growth.

Population growth continued unabated through the 1980's. To ensure adequate service for a burgeoning population and prevent the reoccurrence of the 1978 water shortage, a study of the basic utility structure and community needs was undertaken in 1986. The resultant 1986 City of Round Rock Master Water and Wastewater Study now forms the basis for utility planning in Round Rock. The 1986 study has been subsequently evaluated and updated to meet current growth needs.

8.2 Water

System History

Much of the current water system can be traced to the early 1970's. During the 1970's, the City initiated the construction of water wells, ground storage, and standpipe facilities to provide adequate water supplies and storage for a growing population.

Prior to 1982, the sole water source for Round Rock was the Edwards Aquifer. In 1981, the City began construction of a six million gallon per day (MGD) water treatment plant that took water from Lake Georgetown. The first phase of construction was completed in 1982. Major plant improvements occurred in 1988 and 1997. Additional plant improvements are scheduled for 1999 through 2000. Since the first phase of construction in 1982, the plant, as of December 1998, has been expanded to 24 MGD. Major storage and pumping facility improvements occurred in 1987, and additional storage improvements are scheduled for 1999 through 2000. Table 8.1 lists the capacities of Round Rock facilities as of December 1998.

Table 8.1 Water System Capacities

Type Facility	*Number*	*Total Capacity*
Ground Storage Tanks	5	7.93 million gallons
Elevated Storage Tanks	10	4.17 million gallons
Pump Stations	5	38,700 gallons per minute (firm capacity)

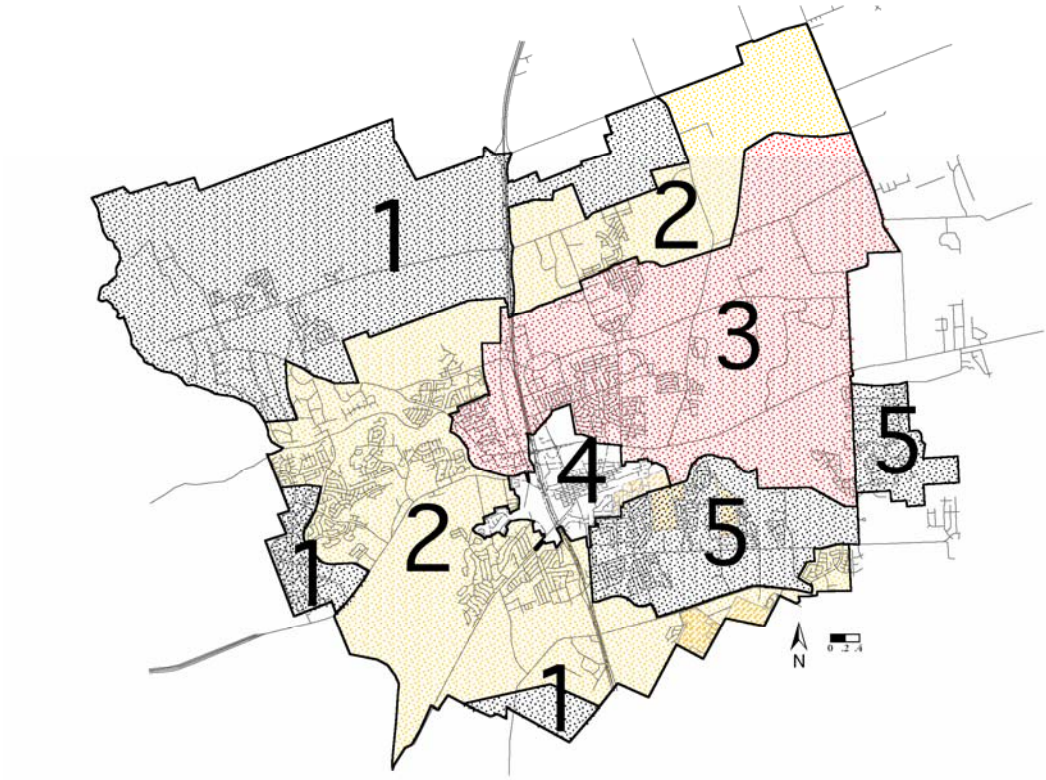
Source: City of Round Rock Public Works Department

The City also entered into several agreements to guarantee sufficient future supply. The first is with the Brazos River Authority (BRA) to take surface water from Stillhouse Hollow Lake. Another agreement with the City of Austin allows Round Rock to draw water from Austin's Martin Hill Tank in northern Austin on an emergency basis.

Pressure Zones

The topography of Round Rock requires the establishment of several water pressure zones to provide consumer service within desired maximum and minimum water pressure limits. The existing water system service area is divided into five water pressure zones based on topography (see Map 8.1 below).

Map 8.1 Pressure Zones



Source: City of Round Rock Public Works Department

WATER SUPPLY DESIGN CRITERIA

The Public Works Department uses the following guidelines for the City water supply system:

WATER SUPPLY SYSTEM

- *Average Daily Demand* - 218 gallons per capita
- *Peak Daily Demand* - 2.5 times average daily demand
- *Maximum Daily Demand* - 450 gallons per capita
- *Minimum Pressure Requirements* - 35 pounds per square inch (psi) at flow rates not less than 1.5 gallons per minute (GPM) per connection; 20 psi under fire flow with 1.5 GPM per connection
- *Metering* - Accurate metering devices at each service connection
- *Valves* - Sufficient number of valves to allow repairs, pressure division, and flushing without undue service interruption
- *Circulation* - Minimal number of dead ends and maximum number of circulation loops; limits of no more than 50 connections on dead end

lines with provisions, as practicable, to ultimately connect them for circulation

PUMP STATIONS

- *For areas with less than 200 gallons of elevated storage per connection* - Two or more pumps at each station with a capacity of two GPM per connection or a total capacity of 1,000 GPM and the ability to meet peak hourly demands with the largest pump out of service, whichever is less
- *For areas with at least 200 gallons of elevated storage per connection* - Two pumps at each station with a minimum combined capacity of 0.6 GPM per connection

MINIMUM TEXAS STATE BOARD OF INSURANCE FIRE FLOW REQUIREMENTS

- Principal mercantile and industrial areas - 3,000 GPM
- Light mercantile areas - 1,500 GPM
- Dense residential areas - 750 GPM
- Scattered residential areas - 500 GPM

All City design criteria exceed the minimum State criteria established by the Texas Natural Resource Conservation Commission.

WATER DEMAND

Current water demand per capita varies from a low value of approximately 150 gallons per day (GPD) to a high value of 375 GPD, depending on the season. Variation is due to pronounced increases in water usage for landscaping and other special purposes during hot, dry periods.

Although estimates of future water demand depend largely on population forecasting, large recreational, commercial, and industrial users also affect system demands. Once demand projections are made, the Public Works Department explores alternative methods of obtaining appropriate water supplies and more effectively utilizing current supplies. Overall, future water supplies should be readily accessible, sufficiently reliable, and efficiently used to meet water demands. Table 8.2 shows population projections and projected demands. Forecasted population figures denote the population for the entire Planning Area. Ultimately, the City expects to serve everyone in the Planning Area, either through direct City service or through contracts with neighboring governmental agencies.

Table 8.2 Water Demand Requirements

Year	*Population Estimate/Projection*[1]	*Average Daily System Demand*[2] *(MGD)*
2000	78,394	17.1
2005	89,230	19.5
2010	99,836	21.8
2015	110,213	24.0
2020	120,361	26.2

Source: City of Round Rock Public Works Department
[1] Population figures denote the entire Planning Area. See Chapter 3 for details.
[2] Average Daily System Demand is based on 218 gallons per capita.

WATER SUPPLY

WELLS

Wells that draw water from the Edwards Aquifer are one source of City water. Water from these wells is treated through gas chlorination prior to pumping into ground storage tanks and the water distribution system. Existing City water wells have a combined capacity of 13.5 MGD, but only 4.5 MGD can be counted on during drought conditions as a "safe yield" rating.

SURFACE WATER

Because the amount of water that can be taken from the Edward's Aquifer is limited, additional water supplies are provided by surface water reservoirs. Surface water sources include both Lake Georgetown and Stillhouse Hollow Lake.

Round Rock's dependence on well water was alleviated in 1982 with the completion of the water treatment plant, which draws water from Lake Georgetown. The treatment plant is located near the intersection of Westinghouse Road and Interstate 35 at the extreme north end of the City. An intake structure at Lake Georgetown draws raw surface water and pumps it approximately nine miles to the plant where it is treated, stored, and ultimately pumped into the City's distribution system. Treated water is temporarily stored at the plant in two large chambers, or clearwells. A booster pump station is located at the plant to deliver treated water to the distribution network, as needed. The water treatment plant capacity was expanded to 24 MGD in 1997. Round Rock has a supply contract with the Brazos River Authority (BRA) for 9 MGD from Lake Georgetown. This contract allows a peak diversion of 30 MGD. All water in Lake George-town has been committed by the BRA and no additional capacity is available.

Stillhouse Hollow Lake is approximately 35 miles north of Round Rock. Round Rock's contract with the BRA will allow Round Rock to draw 16.2 MGD from the reservoir on an average annual basis with a peak diversion rate of 81.0 MGD. Ultimately, the City expects the construction of two 36 inch lines from Stillhouse Hollow Lake to Lake Georgetown, where the City can readily access the water. The City expects completion of the lines in 2002. Round Rock, Georgetown, Jonah, Leander, and the Brushy Creek Municipal Utility District (MUD) will fund the construction of the lines.

INTERCITY AGREEMENT

Round Rock has an emergency use agreement with the City of Austin to draw a limited amount of water from the Martin Hill Tank, located in northern Austin.

The total raw water supply is shown in Table 8.3.

Table 8.3 Raw Water Supply

Source	*Average Yield (MGD)*	*Peak Yield (MGD)*
Wells (Drought Yield)	4.5	4.5
Lake Georgetown	9.0	30.0
Stillhouse Hollow Lake	16.2	81.0
TOTAL[1]	**29.7**	**115.5**

Source: City of Round Rock Public Works Department
[1] Round Rock can also draw a limited amount of water from Austin's Martin Hill Tank on an emergency basis.

8.3 Wastewater

WASTEWATER COLLECTION

The City of Round Rock's existing wastewater collection system is based on the concept of aligning major wastewater interceptors along creek beds to allow service through gravity mains for all areas within a particular creek's watershed. This concept is the most cost-effective in terms of minimizing areas which must be served by lift stations due to the varying ground elevations in and around the City.

There are four main creeks within the City of Round Rock: Brushy, Chandler, Lake, and Onion. Currently, major development exists in all of these watersheds. Major wastewater interceptors are installed along all four creeks. The interceptors in Brushy, Lake, and Onion Creeks flow by gravity to the existing wastewater treatment plant located along Brushy Creek. Flows from the interceptor in Chandler Creek are pumped to the

wastewater treatment plant by a wastewater lift station. The lift station is scheduled to be retired by 2001 as the Chandler Creek interceptor is extended to the wastewater treatment plant.

SYSTEM HISTORY

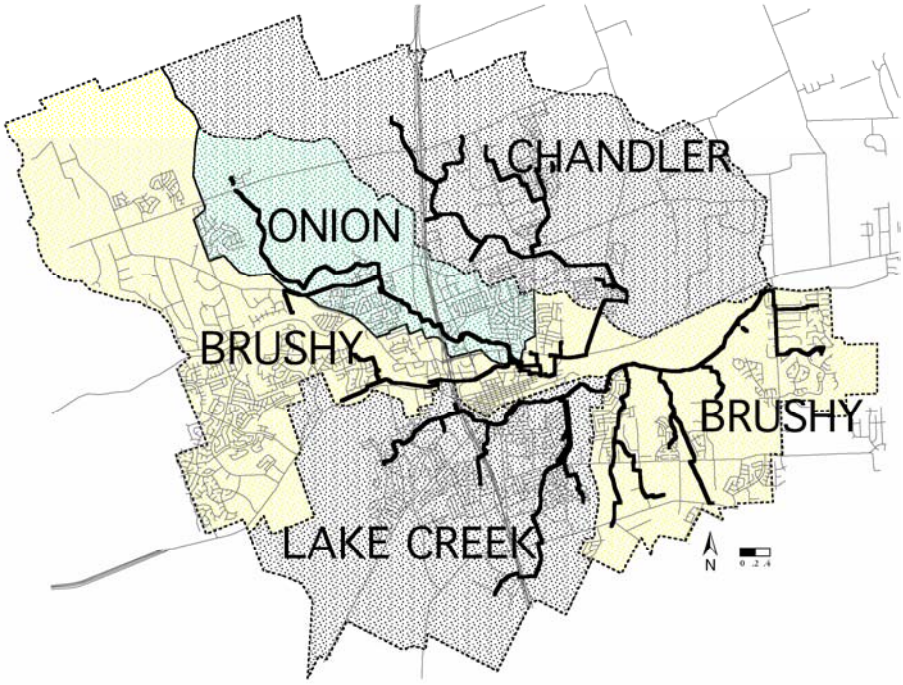
The City's original wastewater system was constructed in the late 1930's under the Works Progress Administration (WPA), a depression era government agency. The system serviced the original downtown area and the residential area immediately adjacent to the downtown.

Major improvements to the City's wastewater system were made during the 1970's and 1980's in response to increased demands for wastewater service. To meet increased demand, the City extended wastewater collection lines in the Lake Creek Watershed and the Chandler Creek Basin. As mentioned above, a lift station was constructed to pump the Chandler wastewater flows over a drainage divide into the Onion Creek Basin. The wastewater then gravity flows to the City's wastewater treatment plant.

Numerous improvements were made to the City's wastewater collection and treatment facilities under the 1977 and 1981 Capital Improvements Programs. These improvements included wastewater treatment plant expansions to a capacity of 1.4 MGD in 1977 and 3.0 MGD in 1981. The 1977 Capital Improvements Program also included the construction of additional wastewater interceptor lines in Lake Creek.

Since 1981, the planning and construction of major wastewater improvements have been extensive. A 42 inch diameter interceptor was constructed in the Chandler Creek watershed in 1986 and a 36 inch interceptor was completed in the Lake Creek watershed in 1988. Map 8.2 shows the major wastewater lines and drainage basins in Round Rock.

Map 8.2 Drainage Basins & Major Wastewater Lines



Source: City of Round Rock Public Works Department

REGIONAL WASTEWATER PLAN

In response to increasing development within the Brushy Creek watershed, various municipalities and governmental agencies have implemented a regional wastewater system. The system was first conceived in the early 1980s but only recently enacted. The regional concept affects the Upper Brushy Creek Watershed. The regional plan provides wastewater service to those entities in and around the Watershed that want the service and are willing to contribute funds to construct the required facilities. Customers include Round Rock, the Brushy Creek MUD, Austin, and Cedar Park. Under the regional system, an Alliance of the Lower Colorado River Authority (LCRA) and the BRA is responsible for the treatment of all wastewater in the Brushy Creek basin. To this end, ownership of the City's two wastewater treatment plants passed to the Alliance in 1997. The City recognized that a regional sewage system was best handled by a river authority that had control over an entire basin. The regional system is a means to get small, less effective wastewater plants off our creeks to improve the water quality and protect the environment. Currently, each municipality treats wastewater in separate municipal facilities and

discharges the treated water into nearby creeks. Under the regional plan, all wastewater will be treated at the regional plant in Round Rock and safely discharged from a single location.

The regional wastewater treatment plant is at the confluence of Brushy and Chandler Creeks in the City of Round Rock. Wastewater will reach the plant via wastewater interceptors along Brushy Creek. Segments connecting Cedar Park to Round Rock will be complete by 2001. The total area currently served by the regional plan is approximately 140 square miles. The regional wastewater treatment plant will have an ultimate capacity of 52 MGD, and will be capable of serving 520,000 people. The Alliance owns the two wastewater treatment plants in Round Rock, a major wastewater collection line along Brushy Creek, and a regional collection line in the Brushy Creek drainage basin. Round Rock controls the remainder of the City wastewater collection system.

DEMAND CALCULATION

The amount of wastewater service required by an area depends primarily upon the development and population density of that area. To facilitate the sizing of wastewater mains, the Public Works Department converts land area into living unit equivalents (LUE). An LUE is defined as that unit of development which produces the same peak wet weather wastewater flow as is produced by a single-family dwelling using 350 gallons per day average flow. It should be noted that a given number of LUEs within an area does not necessarily reflect the actual population that resides within the area. Commercial, industrial, and recreational areas may have elevated LUE numbers even though these areas have no permanent residents. To compare dissimilar land uses, Public Works uses a corresponding LUE conversion factor for each of six land use categories. (See Table 8.4).

Table 8.4 LUE Conversion Factors

Land Use	*Living Unit Equivalents*[1]
Single Family	1.0 per unit
Duplex	0.9 per unit
Multi-Family	0.7 per unit
Commercial/Industrial	$\frac{\text{Building Area (square feet)}}{\text{Land Area (square feet)}}$ x 6 x Land Area (acres)
Open Space[2]	0.9 per acre

Source: City of Round Rock Public Works Department
[1] A unit refers to a single-family residence, half a duplex, or one apartment unit.
[2] Open space encompasses parks, greenbelts, and floodplains. Open space is assumed to add 0.9 LUE per acre due to stormwater inflow and infiltration.

RESIDENTIAL

There are three residential land use categories: single-family, duplex, and multi-family. Single-family homes are calculated as one LUE. Duplex units are calculated as nine tenths of an LUE. Multi-family units are calculated as seven tenths of an LUE. Existing duplex developments average 7.0 LUE per acre and multi-family developments average 14.0 LUE per acre.

COMMERCIAL AND INDUSTRIAL

Single story commercial and industrial uses which are not heavy water users result in approximately 2.4 LUE per acre.

OPEN SPACE

Open space is assumed to add 0.9 LUE per acre due to stormwater inflow and infiltration.

STORMWATER INFLOW AND INFILTRATION

Future wastewater treatment demand is calculated using an average daily wastewater demand of 100 gallons per capita per day. Stormwater inflow and infiltration can substantially increase wastewater treatment demand. Accordingly, a program to minimize stormwater inflow and infiltration into the wastewater system has been implemented to reduce operations costs and keep utility rates low.

INDUSTRIAL AND HAZARDOUS WASTE

The treatment of wastewater is adversely affected when certain industrial or hazardous materials are added. Because Round Rock's wastewater treatment system capacity exceeds 5 MGD, federal law requires the development of a wastewater pretreatment program for industrial wastes. The purpose of the pretreatment program is to ensure that discharged industrial wastes do not interfere with the operation of the treatment system and can be treated properly by the City's system. The City's pretreatment program has been approved by the U.S. Environmental Protection Agency (EPA).

8.4 Regional Stormwater Detention

It is the general policy of the City of Round Rock to encourage a regional stormwater detention system rather than provide small on site detention facilities. Regional stormwater detention is provided by several U.S. Soil Conservation Service (SCS) reservoirs located throughout the Planning Area, quarry structures west of town, and channelization. SCS Dam Number 14, located north of Old Settlers Boulevard and east of Settlement Drive, is an example of a regional detention site. The use of a regional stormwater detention system provides centralized control of stormwater flows, reduced space requirements, and reduced maintenance requirements.

8.5 Solid Waste Collection and Recycling

Round Rock Refuse, an independent contractor, provides solid waste collection for Round Rock. Round Rock Refuse deposits the waste in the Williamson County landfill, which is located outside the Round Rock extraterritorial jurisdiction north of Hutto. Recycling is provided by a drop off center on Deepwood Drive as well as a voluntary curbside subscription program offered by Round Rock Refuse. The City has operated the recycling center since 1991. The curbside program started in 1999. Recycled materials include newsprint, magazines, steel cans, aluminum cans, plastic milk bottles, plastic soda bottles, oil, and antifreeze. Each year approximately 640 tons of these materials are recycled that would otherwise have been dumped in the landfill. Recycling helps fill the landfill at a slower rate, extends the life of the landfill, precludes early construction of new landfills, and keeps garbage rates low. Although recent recycling efforts in Round Rock have increased slightly with the enactment of a curbside recycling program, the potential exists for much higher levels of recycling in the City.

8.6 Future Considerations

WATER CONSERVATION

Water treatment and supply is driven by the City's peak demand. Peak demand is the most intense one-time use that the water system will ever experience. The City must plan and build new facilities based on peak demand even though average use is substantially less. Conservation measures are a means to flatten the peak demand and more efficiently utilize existing facilities. A lower peak water demand extends the life of current facilities before costly upgrades or new facilities are required. Delaying new construction and better utilizing current capacity helps keep water rates low.

The City of Round Rock, in partnership with the City of Austin and other Central Texas cities, participates in two water conservation programs. The first of these is a voluntary water conservation program. Based on the last two digits of their street address, residents are asked to water their lawns only on days and at times specified by a regional calendar. The second program is a Drought Management Program, which features three drought response stages. The program recognizes that drought is a recurring event in Texas. The three stages represent a phased response to droughts based on drought severity. While each municipality follows the same actions within a particular stage, neighboring cities might not announce stages at the same time. Stages are driven by both the severity of the drought and a municipality's ability to meet demands during a drought.

REUSE WATER UTILITY

The City is exploring a water reuse utility as another conservation measure. Water reuse would entail building separate water lines for treated waste-water effluent and using the water for golf course, park, and stadium irrigation. Water reuse offers a low cost alternative to the unnecessary use of fully treated water for irrigation and landscaping. Water reuse limits the burden placed on water treatment plants, preserves their capacity, and offers an opportunity to efficiently use what is becoming an increasingly scarce resource.

8.7 Summary

Round Rock's steady population growth is not expected to subside in the near future. The City of Round Rock, therefore, anticipates the need for increased capacity coupled with strong conservation initiatives to meet the peak demands generated by a growing population. The City anticipates the completion of the regional wastewater facility to meet much of the waste-water treatment demand and various agreements to meet water supply needs. When taken together, capacity improvements, consistent system monitoring and upgrades, usage projections, and initiatives to promote the efficient use of existing supplies are expected to provide cost-effective and dependable utility service for residents and businesses into the next century.