

# Water Conservation Plan 2019

City of Corpus Christi, Texas



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# Water Conservation Plan

## 1. Introduction

This Water Conservation Plan (WCP) is a guidebook and reference manual for the City of Corpus Christi Water Utilities, its partners and customers. This introduction chapter outlines the background of the City of Corpus Christi's Water Utilities, the purpose and reasoning of the WCP, expected results, and an overview of its layout and organization.

### 1.1 Background of the Water Department

The City of Corpus Christi Water Utilities has been in operation for over 100 years. It currently serves nearly 500,000 residents of Corpus Christi and the Coastal Bend Region.

Its mission is to effectively manage the City's water supply, production, and distribution system through the operation and maintenance of the water supply system in order to meet water supply needs; to provide safe drinking water; to review design and construction of water facilities that will ensure water system quantity and reliability to meet projected growth; and to identify and meet consumer needs and expectations.

The Water Utilities supplies water for municipal and industrial use in a seven-county service area. Major raw (untreated) water customers include municipalities (Alice Water Authority, Beeville Water Supply District, City of Mathis, and San Patricio Municipal Water District) and industries (Celanese and Flint Hills Resources). Treated water customers include Nueces County Water Improvement District No. 4 (Port Aransas), San Patricio Municipal Water District, South Texas Water Authority, and the Violet Water Supply Corporation. The Water Utilities operates a water laboratory and water maintenance activity that oversees the repair and replacement of transmission and distribution service water lines. .

The Water Utilities also has a well-established conservation program. The City was the first in Texas to develop a Drought Contingency Plan in 1986, which served as a guide for state officials. Since 1988 there has been a conservation coordinator and/or team of professionals developing and implementing outreach programs to help reduce water waste and improve efficiency. Conservation outreach includes everything from school education to the Xeriscape Garden and is explained in detail in Chapter 5.

## 1.2 Purpose of the Plan

The purpose of this WCP is to ensure long-term water security and efficiency for the residents and businesses served by the City of Corpus Christi Water Utilities. This long-term planning and management is critical so that supplies of water will always meet and exceed the demands of Coastal Bend customers. It allows water supplies to be sustainable as the region grows. Short-term water security and planning during dry times is explained in a separate Drought Contingency Plan, which is included as a supporting document.

As a water supplier, the City of Corpus Christi is also required to have its Plan adhere to Title 30, of the Texas Administrative Code (TAC) Chapter 288 (30 TAC § 288). This Plan contains all of the provisions required in 30 TAC § 288, including conservation plans for municipal users and wholesale providers, and a drought contingency plan.

General and specific goals of the Plan are explained in Chapter 4.

## 1.3 Public Involvement

The City provided opportunity for citizens to receive information about the Plan, to make comments and to provide input into the preparation of the WCP at a public meeting held on April 17, 2013. A Public Notice was published in the Corpus Christi Caller-Times with the date, time and location of the meeting. Notice was also posted on the City's website ([www.cctexas.com](http://www.cctexas.com)).

In addition, copies of the Water Conservation Plan draft were distributed to several public locations around the City and were published on the City's website.

## 1.4 Organization of the Water Conservation Plan

This revised WCP is organized in a way to make information easy to find and understand. This plan is a separate document from the Drought Contingency Plan (DCP). The chapters guide the reader through the most important issues and are shown below. The end of the WCP contains appendices of other documents that are useful for the reader to understand main chapters.

- **Chapter 1:** Introduction – the basics of the Water Department, purpose of the Plan, and organization of the Plan.
- **Chapter 2:** Supply Profile – details of the supply of the Water Department including the water sources, distribution system, and water treatment plant.
- **Chapter 3:** Demand Profile – details of the current customer population and demand, and estimated projections of future population and demands. Demands are provided in totals and divided into sectors.

- **Chapter 4:** Goals – benefits of conservation; overall water planning and conservation goals; quantifiable five- and ten-year conservation goals and water loss goals based on per capita consumption.
- **Chapter 5:** Water Conservation Practices – efforts that encourage and/or enforce the conservation of water, or that increase the efficiency of water use.
- **Appendices:** includes the Utility Profile, Summary of TCEQ 2001 Agreed Order Provisions, Water Rates, and Reservoir Operating Plan.
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## 2. Supply Profile

This Chapter explains the four sources from which the City gets water supply to its customers in the Coastal Bend region. In addition to the supply sources, the distribution system, water treatment plant, and the wastewater utility profile are briefly explained.

### 2.1 Supply Sources

The City of Corpus Christi Water Utilities obtains its raw water solely from surface water sources. These surface water bodies are Lake Corpus Christi, Choke Canyon Reservoir, Lake Texana and the Colorado River of each of these water bodies are explained below.

#### *Lake Corpus Christi*

Lake Corpus Christi is a water storage reservoir located approximately 33 miles northwest of the City. It was completed on April 26, 1958 with the dedication of the Wesley Seale Dam. When full, the lake level is 94 feet above sea level and has a capacity of 256,339 acre-feet (83.5 billion gallons). The surface area of the reservoir is 19,748 acres (30.8 mi<sup>2</sup>).

Lake Corpus Christi is part of the Nueces River Basin (or watershed). It receives inflow from the Nueces, Frio, and Atascosa Rivers. Inflow from the Frio River also goes through the Choke Canyon Reservoir. Supply in Lake Corpus Christi relies on rainfall from the whole Nueces/Frio River basin. These two watersheds covers a combined area of 16,764 square miles and reach as far north as Rocksprings in Edwards county, and west close to Eagle Pass in Maverick County.

#### *Choke Canyon Reservoir*

Choke Canyon Reservoir is located approximately 70 miles northwest of Corpus Christi. It has a capacity of 662,821 acre-feet (215 billion gallons). When it is full, the water level is 220.5 feet above sea level, and the surface area is 25,989 acres (39.7 mi<sup>2</sup>).

The United States Bureau of Reclamation financed, designed, and built the reservoir, which was dedicated on June 8, 1982. The City operates and maintains the facility.

Choke Canyon Reservoir receives inflow from the Frio River Basin. This watershed covers an area of 5,529 square miles from Three Rivers in the south to Kerr County in the north. Water from the reservoir drains into the Frio River, which drains into the Nueces River and then Lake Corpus Christi.

### *Lake Texana*

The third surface source of water for the City is Lake Texana in Jackson County, located approximately 90 miles northeast of Corpus Christi. When full, the lake has a capacity of 161,085 acre-feet (52.5 billion gallons) and the water level is 44 feet above sea level. Its surface area when full is 9,727 acres (15.2 mi<sup>2</sup>).

Lake Texana was formed with the completion of the Palmetto Bend Dam in 1980 by the U.S. Bureau of Reclamation. It is on the Navidad River, which is part of the Lavaca River Basin and mainly flows through Lavaca and Jackson Counties. The Lake is currently owned and operated by the Lavaca-Navidad River Authority (LNRA).

The City contracted 41,840 acre-feet from LNRA in the 1990s after a severe drought between 1993 and 1996. During that time, Nueces River Basin stream-flows were the lowest recorded, even lower than the much-remembered 1950s Drought. The current water supply contract is for 31,440 acre-feet after the LNRA recalled 10,400 acre-feet.

To deliver that water to Corpus Christi, the City, the Nueces River Authority, the Port of Corpus Christi and the Lavaca-Navidad River Authority worked together to deliver water via a new pipeline from Lake Texana. The 101-mile-long pipeline was named for the late Mary Rhodes, mayor of Corpus Christi from 1991 to 1997, in recognition of her special contribution to the development of water resources for the residents and industries of the Coastal Bend. The pipeline came online in September 1998. It pumps water through a 64-inch pipeline from Lake Texana directly to the O.N. Stevens Water Treatment Plant in Calallen. Approximately 40 to 70 percent of the water used by Corpus Christi comes from Lake Texana through the Mary Rhodes Pipeline.

### *Colorado River*

On September 22<sup>nd</sup> 1992 the City of Corpus Christi entered into a contract with the Gar wood Irrigation Company to purchase up to 35,000 acre-foot per year portion of the Garwood's 168,000 acre-foot per year water right. In 2010 the City of Corpus Christi began the initial steps of planning and designing Mary Rhodes Pipeline Phase II and construction of the 42-mile pipeline started in April 2014. The project consisted of a pipeline, pump station and a sedimentation basin that starts at the Colorado River near Bay City and connect to Phase I of the pipeline at Lake Texana.

A map of the regional water supply system and watershed is show on the next page in Figure 2.1.



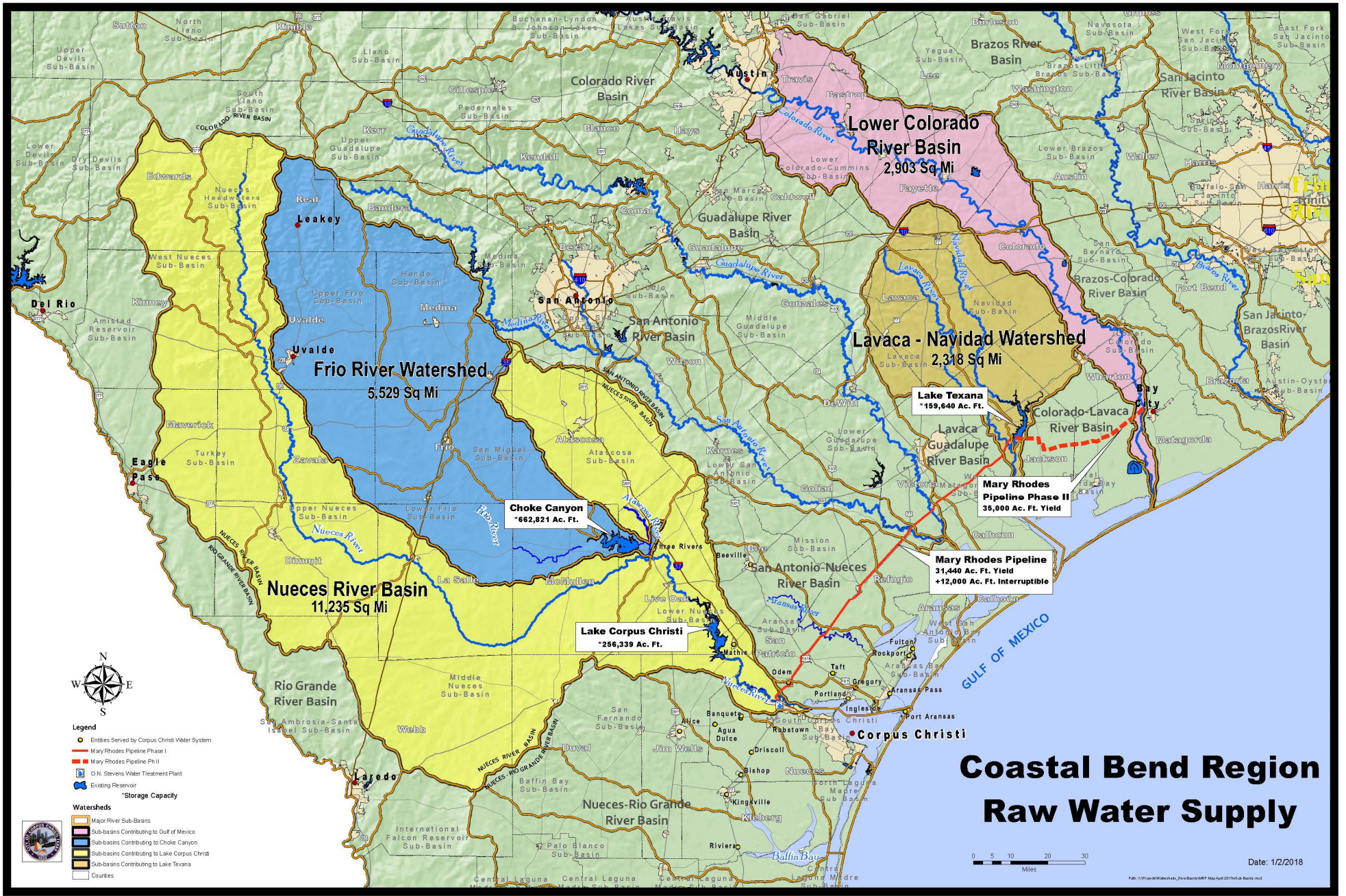


Figure 2.1. Map of the Coastal Bend Regional River Water Supply, including the three surface water supply reservoirs.



## **2.2 Potential Future Sources (Undeveloped Sources)**

To meet the demands of a growing community, the City has been taking steps to ensure future water supplies.

The City is involved with the Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD). This groundwater conservation district was formed in 2005 by the 79<sup>th</sup> Texas Legislature and is:

*“...dedicated to protecting groundwater supplies within the District, developing and maintaining an aquifer storage and recovery program, providing the most efficient use of groundwater resources to supplement existing supplies, while controlling and preventing waste of groundwater.”*

The CCASRCD is currently exploring the possibility of using groundwater aquifers as storage for extra supply for the City. During wetter-than-normal years, the City would pump excess, partially-treated water into the aquifer storage area, which is not subject to water loss from evaporation. Water from the storage area could then be used during drought periods. A similar project by the San Antonio Water System stores over 90,000 acre-feet of water as an emergency supply.

The City of Corpus Christi is also working on the early development activities for a procurement of a Seawater Desalination project with a base design output from 10 to 20 MGD produced at either 1 or 2 plants located on the Corpus Christi Ship Channel or La Quinta Channel area in the Coastal Bend.

Other potential future sources of water supply are still being researched and explored. A detailed list of water management solutions for the Coastal Bend Region can be found in the Region N 2016 Regional Water Plan, found at:

<https://www.twdb.state.tx.us/waterplanning/rwp/regions/n/>.

## **2.3 Water Customers**

The City has both wholesale and retail customers who purchase water from the supply system.

### *Wholesale Customers*

The wholesale customers are water utilities or businesses who purchase the water in bulk, and then bill their own respective customers. The City provides both raw and treated water to wholesale customers. Those wholesale customers receiving raw water pump it directly from the source. The following wholesale customers receive raw water: Alice, Beeville, Mathis, Robstown, and San Patricio Municipal Water District (MWD). In addition, Celanese and Flint Hills Resources receive raw water, but are industrial, not wholesale customers. Those utilities/companies have their own water treatment facilities to treat the water to potable levels.

Other wholesale customers purchase the water from the City after it has been treated at the O.N. Stevens Water Treatment Plant (explained in next section). These customers include: Port Aransas, San Patricio MWD, South Texas Water Authority, and Violet Water Supply.

### *Retail Customers*

The remaining customers receive their water directly from the City. These retail customers are billed individually. They receive their water after it has gone through the O.N. Stevens Water Treatment Plant.

## **2.4 Water Treatment Plant**

The O.N. Stevens Water Treatment Plant, located in Calallen, is the only water treatment facility for the City. All raw water is pumped directly to the Plant from either the Nueces River or Lake Texana (via the Mary Rhodes Pipeline). Once in the Plant, Nueces River water is blended with Lake Texana water and then treated to meet drinking water standards of the Texas Commission on Environmental Quality (TCEQ). After being treated for human consumption, large master pumps help to distribute water into the City and to its wholesale water customers.

Approximately 25 billion gallons of water are treated each year. The O. N. Stevens Water Treatment Plant has a rated capacity of 167 million gallons per day, well above the current peak summer demand of around 100 million gallons per day.

## **2.5 Distribution**

The Water Department has an extensive distribution network that transports water from the O.N. Stevens Water Treatment Plan throughout the City to every customer, both individual and wholesale. The Water Department operates five pumping stations and four elevated storage tanks, and maintains 1,600 miles of pipeline.

## **2.6 Master Meter**

In order to keep track of diverted water, the City uses a series of Master Meters from its points of diversion. The City itself uses meters to track water use from the Nueces River system and Mary Rhodes Pipeline. In addition, City staff keeps monthly records through meters of seven other wholesale and industrial customers who divert raw water from City's water supply.

## **2.7 Wastewater Utility Profile**

The Utility Profile, a detailed summary of the City's water and wastewater systems is included in Appendix A.

### 3. Demand Profile

This chapter explains demands placed on the water supply system of the City. Water demand is a measure of how much water is being used. Knowing current demand is critical for the City's daily operations. Projecting future demands helps City workers plan for future growth.

The region's population provides the basis of its water demands. Therefore this chapter will begin in 3.1 with an overview of current population figures of Corpus Christi and the Coastal Bend Region.

The water demands in the Coastal Bend area are complex because of the various customers that the City serves. Besides its own retail customers in and around Corpus Christi, the City provides wholesale water to utilities that serve 18 *other* cities and 2 businesses. These people and businesses have their own unique water demands. In addition, there are other demands on the supply system, including evaporation from the reservoirs and environmental inflows into the Nueces Bay and Delta.

Because the demands on the supply system are so complex, the next sections are divided as follows: Section 3.2 will discuss demands based on *raw water* diversions, or water taken directly from the supply source. Section 3.3 will include evaporation and environmental inflows. Section 3.4 will discuss demand on *treated water*, or water that is consumed in the City. This section will also look at demand based on customer type. Section 3.5 will discuss seasonal demand, including summertime peaks. In Section 3.6, projected demands and populations will be discussed.

#### 3.1 Current Population

According to the Texas demographic Information the population of the Water Department's total customer area was close to a half a million people. The majority of this was in the City of Corpus Christi with a population of 305,215. The other 18 cities that depend on Corpus Christi for their water, and their estimated 2017 populations, are show in Table 3.1.

**Table 3.1 Estimated 2017 populations for the cities in the Coastal Bend serviced by the City of Corpus Christi Water Department.**

City	Population (2010)	City	Population (2010)
Alice	18,499	Kingsville	25,595
Aqua Dulce	830	Mathis	4,821
Aransas Pass	8,952	Odem	2,423
Banquete	774	Port Aransas	4,206
Beeville	12,224	Portland	21,619
Bishop	3,222	Riviera	1,960
Driscoll	738	Robstown	11,392
Fulton	1,588	Rockport	10,635
Gregory	1,967	Taft	2,999
Ingleside	9,748	Three Rivers	1,925

### 3.2 Raw Water Diversions

The raw water demand is the amount of water taken directly (diverted) out of the water supply system. It provides the most basic view of demand on the system and gives an overview of where the water is going. As was explained in Chapter 2, the City has several raw water customers in addition to diverting its own water.

After raw water has been diverted from either the Nueces River System or Lake Texana, it is pumped to a water treatment plant. All of the raw water customers have their own water treatment facilities, which clean and disinfect the water before sending it to *their* customers. Each have their own demands, based on retail customer characteristics (Treated water demands are explained in Section 3.4).

In 2017, the total amount of raw water diverted from the City’s water supplies for consumption was 104,824 acre-feet (34.1 bil gal). This included water from both the Nueces River System and Lake Texana. The raw water demands of each customer from the Nueces River System are shown below in Table 3.2.

**Table 3.2 Raw water demands (diversions) in 2017 from Nueces River System by customer (acre-feet and million gallons).**

<b>Raw Water Customer</b>	<b>Diversion Amount (ac-ft)</b>	<b>Diversion Amount (MG)</b>
Alice	6,501	2,118
Beeville	3,593	1,170
Mathis	773	251
Celanese	1,536	500
Flint Hill Resources	2,915	949
San Patricio MWD	8,800	2,867
Corpus Christi	34,343	11,190

The raw water demands of the San Patricio MWD and Corpus Christi from Lake Texana and Mary Rhodes Pipeline are shown below in Table 3.3.

**Table 3.3. Raw water demand (diversions) in 2011 from Lake Texas & Mary Rhodes Pipeline by Customer (acre-ft and million gallons).**

<b>Raw Water Customer</b>	<b>Diversion Amount (ac-ft)</b>	<b>Diversion Amount (MG)</b>
San Patricio MWD	11,614	3,784
Corpus Christi	34,728	11,316

In 2017, the City of Corpus Christi received 60% of its raw water from the Nueces River System and 40% from Lake Texana and the Mary Rhodes Pipeline.

### 3.3 Other Raw Water Demands

One uncontrolled demand of water placed on the supply system is evaporation. As mentioned in Chapter 2, the two reservoirs of the Nueces River supply system cover a large surface area of 45,186 acres when full. Because of this large area, combined with high evapotranspiration rates, water loss to evaporation is high, especially in recent hot, dry years.

Another raw water demand is environmental flow. After the impoundment of Choke Canyon Reservoir in 1982, freshwater flowing in the Nueces River Delta decreased dramatically. In order to maintain an ecosystem balance in the Delta, the City worked with TCEQ, the Nueces River Authority, and the City of Three Rivers to develop an Agreed Order in 1995. This document, revised in 2001, outlines required monthly freshwater inflows by the City into the Delta (Table 3.4). The 2001 Agreed Order is included in Appendix B.

**Table 3.4. Target Inflows to Nueces Bay from the 2001 Agreed Order (\*When lake levels are above 70%)**

Month	Target Inflows (ac-ft)	Month	Target Inflows (ac-ft)
January	2,500	July	6,500
February	2,500	August	6,500
March	3,500	September	28,500
April	3,500	October	20,000
May	25,500	November	9,000
June	25,000	December	4,500

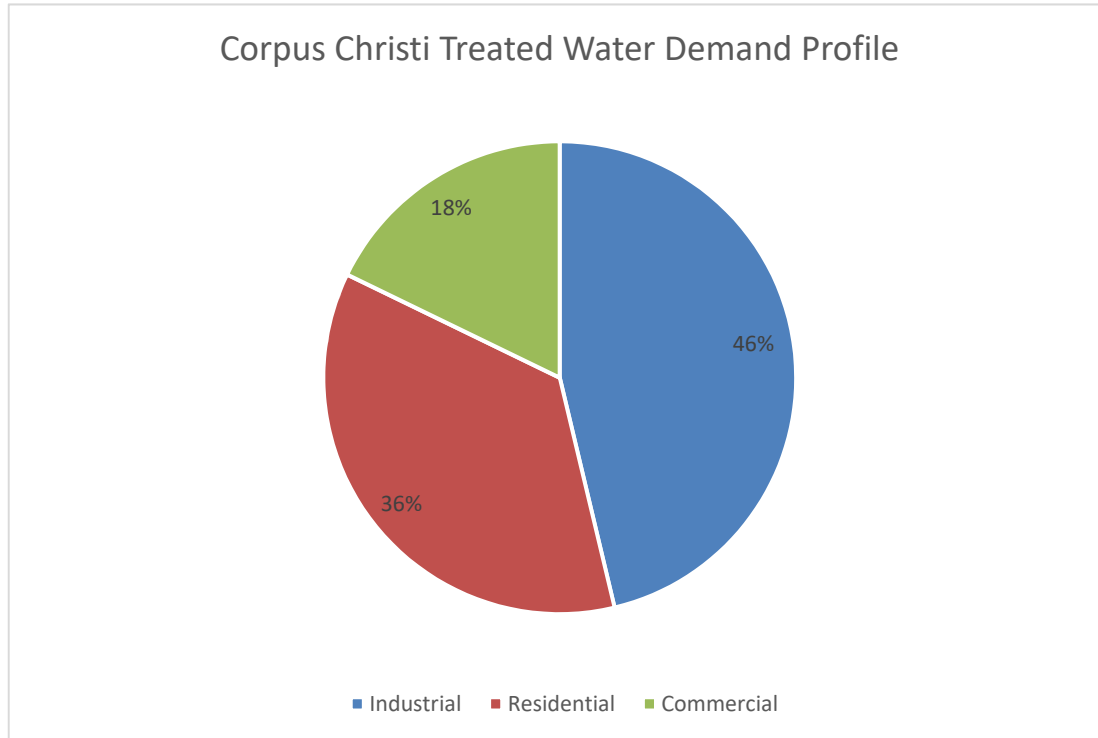
### 3.4 Treated Water Demands

In 2017, the Corpus Christi Utility Business Office billed the use of 65,143 ac-ft (21.2 bil gal) of water, coming from the O.N. Stevens Water Treatment Plant in Calallen.

Separating treated demand by customer class, industrial customers represent the highest demand. Of the 65,143 ac-ft billed usage in 2017, industrial customers used just over 30,000 ac-ft or 46 percent of the total. Residential customers consumed 23,264 ac-ft (7.6 bil gal), representing 36 percent of the total. See Figure 3.4 below.

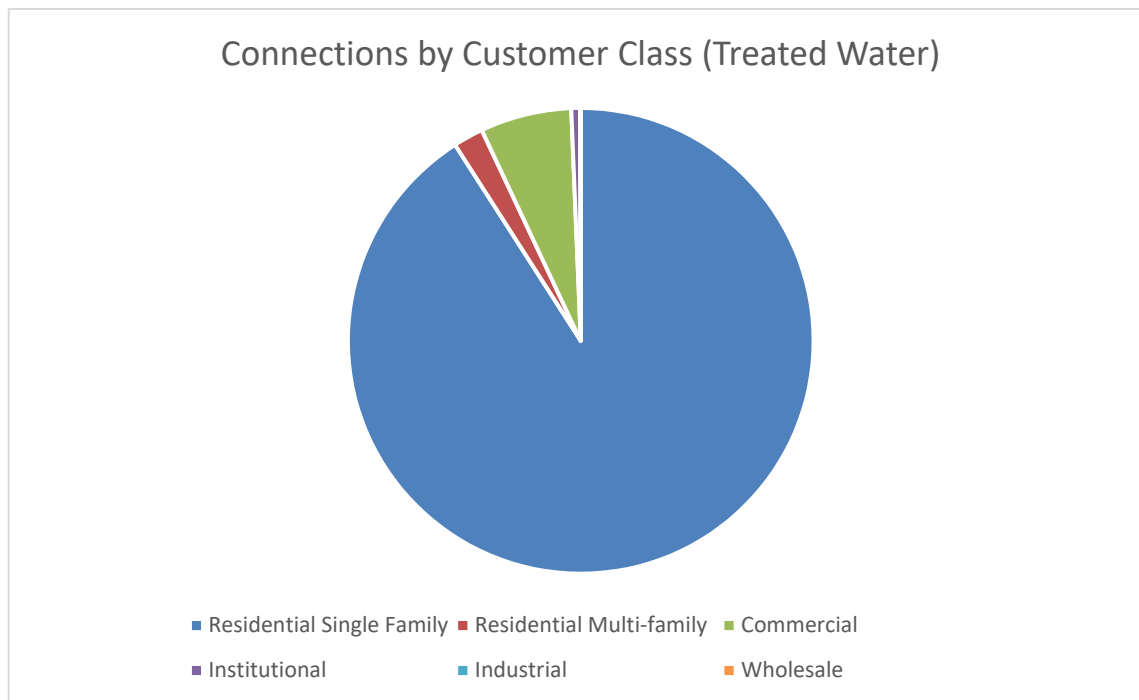


**Figure 3.4. Treated Water Use by Customer Class**



In Fiscal year 16-17, there was approximately 88,054 treated water connections. These connections can be divided into the customer classes of residential, multi-family, commercial, industrial, wholesale, and government use. Figure 3.4.1. below shows a breakdown of connections by customer type. Both wholesale (5 connections) and industrial (23 connections) customers have so few connections that they constitute far less than one percent each of the total connections. Residential Single Family customers make up the largest percentage of connections with 91 percent. Following residential single family are commercial customers with 6 percent of the connections and multi-family and institutional, with two percent and less of the connections.

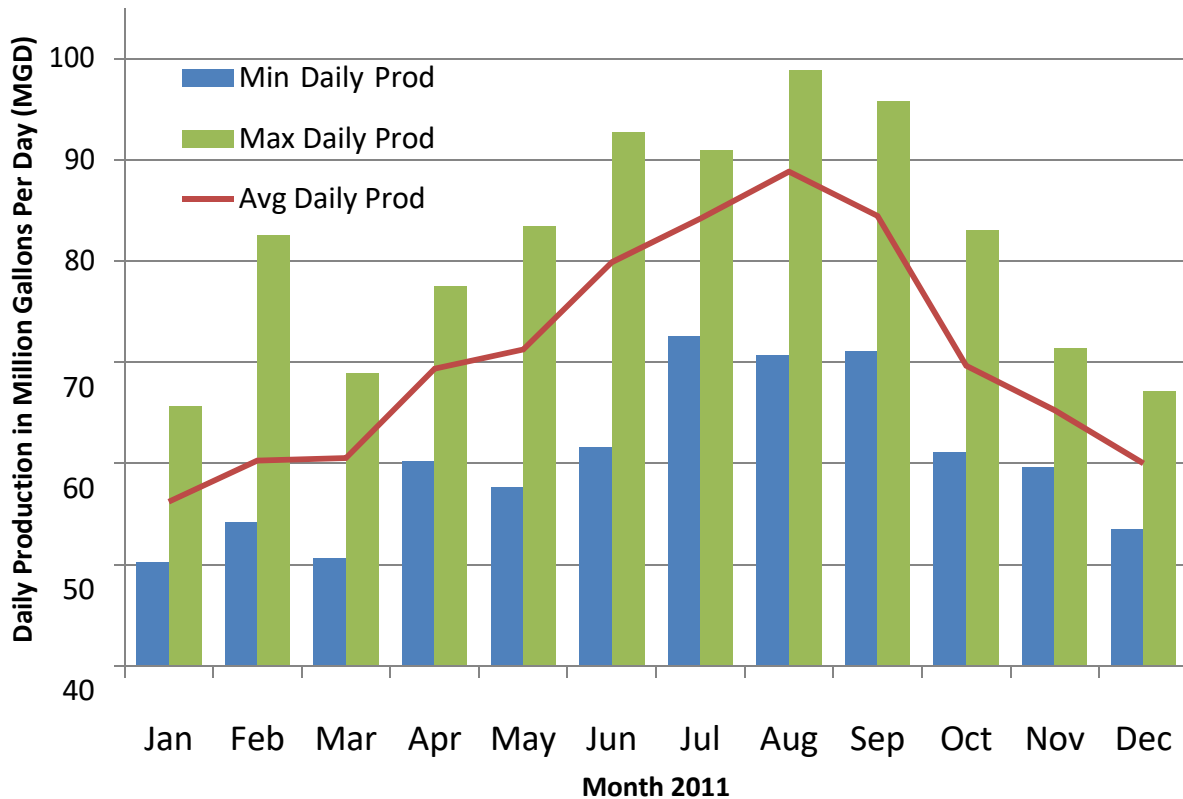
**Figure 3.4.1 Fiscal year 16-17, Connections by Customer Class (Treated Water)**



### 3.5 Seasonal Demands

Though the treated water demand for 2011 was 78,146 ac-ft (25.5 bil gal), the consumption was not evenly distributed throughout the year. The drought of 2011 was one of the worst in recorded history for Texas, so water demands for irrigation were high, especially during summer months. This can be seen below in Figure 3.3, which shows seasonal demand of treated water in 2011. Customer demand on water ranged from 1.6 billion gallons in February to 2.7 billion gallons in September.

Seasonal demands by customers lead to “peak demands.” These peak demands put the most amount of stress on operations, including distribution and treatment. It is extremely important that peak demand for the city remains under 167 million gallons per day, which is the maximum volume that the O.N. Stevens Water Treatment Plant can treat. Figure 3.5 below shows daily treatment plant production volumes for each month of 2011 as minimums, maximums, and averages. The maximum values of each month (in green) represent the peak demand volume for that month. Even though 2011 was one of the hottest and driest years on record, maximum production never reached above 100 MGD.



**Figure 3.5. Daily production volumes of the O.N. Stevens Water Treatment Plant, showing seasonal demand as minimums, maximums, and averages for each month of 2011.**

### 3.6 Projected Populations and Demands

The Texas Water Development Board estimates population projections for regional water planning groups. For Corpus Christi, they estimate that the population could reach 470,000 by the year 2060. This increase in population will result in an increase in water demand.

The TWDB estimates that municipal water demand (residential and commercial) for Corpus Christi will increase 40% by 2060, reaching 86,962 ac-ft per year. These projections are for the City of Corpus Christi only. Other cities that rely on Corpus Christi for water will also have increases in population and demand, resulting in an even higher demand on the supply system.

However, these projections only factor in a minor decrease in per capita water use from conservation measures. A more aggressive conservation program could help municipal demand level off or decrease, even with an increase in population. A goal of 1% annual reduction in municipal consumption (greater than the 0.9% population growth) would defer the need for additional supplies, at least for the next 15 years. This goal, along with others, is explained next in Chapter 4.

Projecting industrial consumption, which comprises over 30% of the City's water use, is challenging considering the large volumes that one additional customer can demand. The Region N Water Planning Group projects treated industry water demand could increase by

15,422 acre-feet by 2060. Other industrial demands not receiving treated water from the City are expected to increase by 29,000 acre-feet by 2060.

## 4. Goals

This Chapter explains the water conservation goals of the City. These goals are what the City aims to achieve by the implementation of this Plan. Included in these goals are both qualitative goals and measurable, quantifiable goals. Before these goals are discussed, the first section (4.1) explains the benefits of conservation. This will give reason and justification for the City's conservation efforts and provide a driving factor for the goals.

### 4.1 Benefits of Conservation

There are several benefits to having a strong conservation program for Corpus Christi. These benefits not only include maintaining the City's water supply, but also include saving the City and residents money by deferring capital expenses. Other benefits may be more difficult to quantify or may take years to materialize, but that does not lessen their importance. Each benefit of conservation listed below will help the City of Corpus Christi grow and thrive at a sustainable rate. The benefits of conservation include:

- **Sustainable Water Supply** – By reducing per capita water use, the City can grow without compromising supplies for future generations.
- **Reduces Peak Demand** – Peak demand puts the most stress on the Water Department's operations. Conservation measures would help to reduce this peak demand.
- **Reduces Energy Costs** – The City spends a significant portion of its electric bill on moving water through its distribution system. Conservation would reduce the amount of water pumped, thus reducing electric costs.
- **Reduces Wastewater Costs** – Less water being used by residents equals less wastewater that needs to be treated. Having less wastewater will save the City in treatment costs.

### 4.2 Water Planning/Conservation Goals and Objectives

The main, overall goal of this Plan is to *reduce total per capita consumption by one percent annually over the next decade*. This goal uses the 2017 figure of 192 gallons per capita per day (gpcd) as the benchmark for reduction. Another related goal is to reduce summertime peak



demand. To achieve these goals, the City has several specific conservation objectives. Those objectives include:

- Reduce water loss by one percent annually
- Educate the public on water conservation practices
- Educate the public on the City’s water resources
- Implement incentive and/or rebate programs to encourage conservation
- Convert some drought restrictions into regular conservation measures
- Adopt new water conservation regulations
- Enforce the conservation regulations
- Implement conservation measures at city-owned facilities

### 4.3 Five and Ten-Year Quantifiable Conservation Goals

As mentioned in the previous section, the goal of the Plan is to decrease total per capita water consumption by one percent each year. To track the progress of the goal, the City records the gpcd every year and sets five and ten year goals. This gpcd is measured by taking the volume of water produced by the O.N. Steven Water Treatment Plant, excluding water sold to treated wholesale customers, and dividing it by the permanent population and then dividing it by 365 days. Because industry uses close to 46% of the treated water, Corpus Christi’s gpcd is greater than most Texas cities. In addition, there is high variability in annual consumption due to changes in weather. Residents tend to use much more water in dry years to keep landscape vegetation alive. The total gpcd, residential gpcd, and water loss are show in Tables 4.1-4.3 below. The five and ten year goals listed below in Table 4.4, and are based on a 1% annual reduction from the 2017 consumption of 192 gpcd.

**Table 4.1. Total Gallons Per Capita Per Day (gpcd) in 2017**

Total System Input in Gallons <sup>1</sup>	Permanent Population	Total gpcd <sup>2</sup>
22,768,621,649	325,733	192

1. Equals water produced + wholesale imported – wholesale exported  
 2. Equals system input ÷ permanent population ÷ 365 days

**Table 4.2. Residential Gallons Per Capita Per Day (gpcd) in 2017**

Residential Use in Gallons (single + multi-family)	Residential Population	Residential gpcd <sup>2</sup>
7,490,230,335	325,733	63

1. Single family + multi-family  
 2. Equals residential use ÷ residential population ÷ 365 days

**Table 4.3. Total Water Loss (Fiscal Year 2012)**

Total Water Loss in Gallons <sup>1</sup>	Permanent Population	Water Loss <sup>2</sup>	
		GPCD	Percent
1,968,883,749	325,733	17	8.65

1. Equals real + apparent + unidentified losses
2. Equals total water loss ÷ permanent population ÷ 365 days

**Table 4.4. Targets and Goals**

<b>Achieve Date</b>	<b>Target for Total GPCD</b>	<b>Target for Residential GPCD</b>	<b>Target for Water Loss</b>	<b>Target for Water Loss Percentage</b>
<b>Five-Year Target Date: 2018</b>	<b>195</b>	<b>73</b>	<b>1,782,000,000</b>	<b>7.1</b>
<b>Ten-Year Target Date: 2023</b>	<b>184</b>	<b>69</b>	<b>1,695,000,000</b>	<b>6.7</b>

#### 4.4 Schedule for Implementing Plan

In order to achieve the targets and goals of the plan, the City will use the schedule below in Table 4.5 to gradually introduce new or strengthen existing conservation measures and programs. These programs will utilize all and possibly additional measures as detailed in Chapter 5. The measures aim to reduce per capita water use through changes in habit, improvements in efficient devices, decreases in water waste, and smart planning. This schedule is not all inclusive and is a living document and is therefore subject to change.

<b>Conservation Measure</b>	<b>Purpose</b>	<b>Target Date</b>
Plumber to people	Reduce leaks in homes of lower-income residents	Planning
School education	Educate youth about water resources and the importance of conservation	Ongoing
Public information	Educate the public about water conservation through several media outlets	Ongoing
Xeriscape education	Educate the public about Xeriscaping through the Xeriscape garden, fliers, and the annual symposium	Ongoing
Use of Reclaimed Water	Reduce potable demand by increasing the number of golf courses, parks, etc. that are using reclaimed water for irrigation	Ongoing;
System Water Audit and Water Loss	To identify areas of water loss to target remediation efforts	Annually
Park Water Conservation	Reduce consumption by the City by improving irrigation	Ongoing;

	efficiency and Xeriscape landscaping	
Prohibition on wasting water	Reduce consumption by prohibiting the wasting of water, regardless of drought conditions (see 5.2.1)	Ongoing
Irrigation Timing	To reduce evaporative loss and waste by prohibiting sprinkler irrigation between 10 am and 6 pm, regardless of drought conditions	Ongoing
Restaurant water saving	Reducing water waste by requiring restaurants to only serve water upon request	Ongoing
Rainwater harvesting rebate	Reduce potable demand by encouraging rainwater harvesting	Ongoing
Changes to Unified Development Code (UDC)	Make change in the UDC to include certain requirements in new construction for rainwater harvesting, condensate collection, car washes, cooling towers, laundry facilities and site-appropriate turfgrass.	March 1, 2020

## **5. Water Conservation Practices**

### **5.1 Introduction**

Water conservation is any practice that reduces the use of water, whether through changes in practices or improvements in the efficiencies of water devices. Reducing the use of water reduces the stress placed on water supplies and their ecosystems. It also frees up water supplies to allow for population and economic growth without having to search for “new” water. Conservation is a cost-effective and commonsense approach to ensuring a sustainable water supply for generations to come.

The City has a long-standing commitment to promoting water conservation in the community. It has adopted several practices, ranging from public education to conservation pricing, that encourage a reduction in excessive water use. As was mentioned in Chapter 4 (Goals), the long term goal of the conservation program is to *reduce per capita water use by one percent per year over the next decade*. This Chapter highlights all of the ways that the City intends to reach that goal.

Chapter 5 begins with conservation measures (5.2). These are regulated best-management practices that are in effect year-round, regardless of the drought condition or the levels of the City’s reservoirs. Section 5.3 explains planned changes to development and building codes that would make buildings and landscapes more water efficient, while Section 5.4 explains the current code related to landscaping. Section 5.5 explains Rebates and Incentives, which include Plumbers to People, Rainwater Harvesting Rebate, and an Irrigation Consultation Program. Section 5.6, discusses City-Led Programs, including reclaimed water use, improvements to City-Owned properties, park water conservation, metering, system audits, and a water conservation staff. This is followed by Section 5.7, which highlights the educational efforts by the City, including both schools and public programs, and Section 5.8 on water conservation pricing. The last two parts of Section 5 explain coordination with the Region N Water Planning Group, methods to monitor the effectiveness of the various conservation practices, and means of implementation and enforcement.

### **5.2 Water Conservation Measures**

As water demands increase and water supplies become less available, it is critical that water conservation measures become regular, year-round best management practices. They are common sense approaches that reduce water waste and improve efficiency. This section lists those water conservation measures that are regulated and enforceable. They are the only measures in the WCP that are enforceable. The Water Resource Management Ordinance (Section 55) gives the City the authority to enforce these measures and is included in Appendix A. Explanations of each of these conservation measures are shown below:

### *5.2.1 Prohibition on Wasting Water*

Under the Prohibition on Wasting Water Conservation Measure, it is unlawful to waste water. Actions leading to the wasting of water are prohibited and will be enforced. No person shall:

1. Allow water to run off property into gutters or streets.
2. Permit or maintain defective plumbing in a home, business establishment or any location where water is used on the premises. Defective plumbing includes out-of-repair water closets, underground leaks, defective or leaking faucets and taps.
3. Allow water to flow constantly through a tap, hydrant, valve, or otherwise by any use of water connected to the City water system.
4. Use any non-recycling decorative water fountain.
5. Allow irrigation heads or sprinklers to spray directly on paved surfaces such as driveways, parking lots, and sidewalks in public right-of-ways;
6. Operate an irrigation system at water pressure higher than recommended, causing heads to mist, or to operate with broken heads.

### *5.2.2 Irrigation Timing*

Landscape irrigation is most efficient during early-morning or nighttime hours, when there is less potential for evaporation from the sun. This conservation measure prohibits irrigation by spray or sprinklers between the hours of 10 am and 6 pm. It is still permissible to water by hand or by drip irrigation at any time of the day.

### *5.2.3 Restaurant Water Saving*

Under this conservation measure, commercial dining facilities must only serve water upon request. In addition, any hand-held dish-rinsing wand must have an automatic shut-off.

### *5.2.4 Voluntary Conservation Measures*

When the combined storage in the Choke Canyon/Lake Corpus Christi reservoir system falls below 50% of the total system storage capacity, the City of Corpus Christi shall issue public notice advising and informing the water users of the region of voluntary conservation measures that are requested immediately and required drought management measures to be taken should the Reservoir System Storage fall to under 40% and/or 30% of the total system storage capacity.



### **5.3 Future Updates to Codes**

Another water conservation practice that will help to conserve water in the long term is updates and improvements to codes. The City has adopted several codes for development and construction, which are updated on a regular basis. There are several codes which could be updated or amended to include requirements for water conservation. A list of *potential* updates to codes is included below. The process of updating these codes is ongoing and will be included

in the WCP as an amendment when complete. *These bulleted items are proposed updates only and are listed here as a placeholder.*

- **Car Wash Water Conservation** – Many commercial car washes in the region do not recycle water in their operations. Under this proposed measure, new car washes using an automatic system would need to reuse a minimum of fifty (50) percent of water from vehicle rinses in subsequent washes. All car washes that are self-service would have to have spray wands that do not emit more than three (3) gallons of water per minute.
- **Water Saving Plumbing Fixtures** – This proposed conservation measure would require plumbing fixtures to meet or exceed the standards set by the WaterSense label of the Environmental Protection Agency (EPA). The fixtures would include gravity flush toilets, bathroom aerators, showerheads, and urinals. This measure would apply to new plumbing installations
- **Laundry Facility Conservation** – Under this proposed measure, any new installation of a coin-operated washing machine would have to meet or exceed the standards for the most current Energy Star label of the EPA and Department of Energy. This measure applies to any location that may have a coin operated facility, such as laundromats, apartment communities, or university residential buildings.
- **Cooling Tower Recycling** –This proposed conservation measure would require newly constructed cooling towers to utilize recycled water for a minimum of four (4) cycles.
- **Rainwater Harvesting** –This proposed conservation measure would require any new building construction with a minimum roof surface area of ten-thousand (10,000) square feet to install a rainwater collection system. The stored water could be used for non-potable indoor use and/or outdoor irrigation.
- **Condensate Collection** –Under this proposed measure, any new commercial building with an air conditioning system would be required to divert and collect the condensate water. This water could be used in cooling tower operation or landscape irrigation.
- **Xeriscape Landscaping** –This proposed measure would allow xeriscaping as an option for landscaping in any residential neighborhood or subdivision, regardless of deed restrictions. It also would require homebuilders and/or developers who are constructing new, single-family residential homes to offer a xeriscaping option.
- **Turfgrass Species Requirement**–This proposed conservation measure would promote the use of turfgrass appropriately suited for a particular site in order to save on irrigation water. For any new construction, the turfgrass species/variety installed on a property would have to be chosen from a list of approved species. In addition, irrigated turfgrass would not be able to exceed 50% of the landscaped area.

## **5.4 Landscaping Standard**

The City adopted a Landscape Standard as part of its Unified Development Code (Section 7.3 of the UDC). This standard requires landscape plantings within commercial developments to enhance the beauty of the City. The ordinance assigns points to the various plant materials. To encourage the use of water-wise landscaping, drought-tolerant and low-water-use species are assigned a higher point value. To comply, a landscape design must surpass an established threshold number of points, which is achieved more easily with the water-wise and drought-tolerant plants.

## **5.5 Rebates and Incentive Programs**

This section explains the programs that the City offers to provide assistance to customers who wish to implement water conserving practices. These programs include the current Plumbers to People program and is planning an Irrigation Consultation Program. Additional rebate and incentive options are being researched.

### *5.5.1 Plumbers to People*

Plumbers to People is an affordability program to provide plumbing assistance to low-income residential customers seeking to repair plumbing fixtures in their homes. The intent of the program is two-fold: (1) to eliminate the cycle of uncollected high water bills resulting from water leaks; (2) to promote water conservation.

Persons eligible for the program must contact the Utility Business Office (UBO) to identify their eligibility for the program. Eligibility is based on the individual's income limits and need for assistance.

The UBO office arranges for a contracted plumber to do repairs at the individual's home. The plumber will fix minor leaks or other issues, then send a report and invoice back to the UBO office.

### *5.5.2 Irrigation Consultation Program*

The City is planning an Irrigation Consultation Program to reduce water waste and improve efficiency on large, existing irrigation systems. The service will be free to commercial sites and tells property owners how they can make meaningful changes to

their irrigation system. It will begin with a consultation request from the property owner of a large irrigation system. The Water Department will coordinate a consultation with a contracted, licensed irrigator for that property. The licensed irrigator will perform a thorough inspection of the irrigation system's performance.

A report with recommendations will be provided to the property owner and the Water Department. The recommendations may include ways that the property owners can drastically reduce water consumption. The Water Department will analyze each report and may provide assistance with the recommended changes, depending on the cost and benefits. One year after the inspection, a follow-up will be performed to see if recommendations were implemented and how much water consumption was decreased.

## **5.6 City-Led Water Conservation Programs**

This section explains the programs that the City has initiated in order to improve its own efficiency and promote conservation to its residents. These programs include the use of reclaimed water, improvements in City-owned properties, park water conservation, accurate water metering, and a system to audit water loss. It also includes the use of a permanent, full-time water conservation staff.

### *5.6.1 Use of Reclaimed Water*

Reclaimed water by definition is, "Domestic 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" (30 TAC §210.3(24)). The City currently has five reclaimed water use customers and recognizes that the direct use of reclaimed water is an effective method of reducing potable water usage. Corpus Christi reclaimed water is used primarily for irrigating recreational tracts.

Historically, Corpus Christi began its reuse program in the early 1960s when it began delivering reclaimed effluent to its first customer, the Gabe Lozano Golf Course. Over the next several decades, the City acquired additional reuse customers which include other golf courses, parks, and recreational areas. Approximately 2.5 percent of the City's overall effluent flows are reused as reclaimed water.

In 2017, the City supplied 63 million gallons of reclaimed water to its irrigation customers, saving an estimated 100% of the same amount in potable water.

To facilitate expansion of its reuse program in the future, the City will identify and rank industrial, commercial, and institutional (ICI) customers according to volume of water use, and investigate the feasibility of using reclaimed water. The City will also investigate reuse opportunities within its own accounts or with third parties outside its service area. The City owns several public areas that are candidates for reuse.

### *5.6.2 Improvements in City-owned Properties*

In order to be a representative of its conservation message, the City has pushed for increased Xeriscape landscaping of City-owned properties. This includes water-wise landscaping at the Water Department building, and the Xeriscape Design Garden and Learning Center at the Museum and Science and History in downtown Corpus Christi (see Section 5.6.3). The Water Department will encourage the future conversion of City landscaping to more water-wise design.

Also, the City has been proactive in replacing out-dated, inefficient plumbing fixtures in its buildings. In addition, the City plans to install a rainwater harvesting system at the Water Utilities building to be used for on-site irrigation.

### *5.6.3 Identifying and Repairing Leaks*

The Water Department has a full team of employees committed to identifying and repairing leaks in water distribution throughout the City. A crew of round-the-clock responders follow the procedure below to find and fix a leak:

1. A first responder is sent to the location to identify and mark the priority of the leak. Response time is 30 minutes to an hour.
2. Crews begin to turn the needed valves to isolate the leaking line. Line locates are called in to mark all other utility lines in the area of the leak prior to repairs. Depending on the severity of the leak these locates can take up to approx. 24 hours
3. After line locates are complete, Distribution Leak crews respond to the leak and make all needed repairs.
4. After repairs are complete, the D & D crews back fill the area and replace grass as needed.

### *5.6.4 Park Water Conservation*

The City of Corpus Christi Parks and Recreation Department manages two golf courses, two large City-wide parks, five recreation centers, four decorative fountains, eight public swimming pools, and more than 200 neighborhood parks, some with irrigated athletic fields.

Because many of the parks in the City require irrigation, it is critical that proper conservation measures are in place so the City demonstrates and promotes those measures to the public. The Water Department works with the Parks and Recreation

Department to implement several water conservation practices within the park system. Some of these measures include:

1. Converting manual irrigation systems to automatic irrigation systems.
2. Including the parks properties in the water system audit.
3. Voluntarily adopting Landscape Ordinance provisions of the Corpus Christi Zoning Ordinance (explained in Section 5.2.12).
4. Replacing several spray irrigation heads with drip irrigation.

Some of the conservation measures that the City is pursuing for the future include:

1. Updating automatic irrigation systems with a “smart” Baseline Controller, which can remotely control up to 50 irrigation zones with 10 different programs. These include moisture sensors in the soil.
2. Implementing an irrigation consultation program to target specific areas where water efficiency improvements can be made.
3. Converting turfgrass species to more site-appropriate varieties to reduce water use.

To track the progress of water conservation in the parks, the Water Department will gather the following:

1. Water savings resulting from the offset of potable water use by irrigating with reclaimed waste water.
2. Water savings attributable to the repairs of leaks
3. Changes to irrigation systems, retrofits, or upgrades; regular leak detection; maintenance policies, and estimated water savings from conservation practices.
4. Estimated water savings attributable to the changes implemented.
5. Costs of repairs, equipment upgrades, or new equipment installed.

The Water Department will evaluate data from sites before and after significant irrigation system changes or upgrades. The City maintains performance measure software to monitor the progress of leaks repaired. The Maximo software will identify individual categories to estimate the volume of water savings attributable to repairs of leaks.

#### *5.6.5 Metering All Connections*

Metering is a critical aspect in water conservation. It provides a method for customers to relate their water usage to their utility bill. For the City, meters help keep track of water use in order to target areas of inefficiency or locate areas where there may be potential leaks. New technology allows the city to track water use remotely and alert employees when there are spikes in water use among customers.

The following elements are part of the City’s on-going metering program:

1. Required metering of all connections.

2. A policy for installation of adequate, proper-sized meters as determined by a customer's current water use patterns.
3. Direct utility metering of each duplex, triplex, and four-plex unit, whether each is on its own separate lot or there are multiple buildings on a single commercial lot.
4. Metering of all utility and publicly owned facilities.
5. Use of construction meters and access keys to account for water used in new construction.
6. Implementation of the State requirements in HB 2404, passed by the 77<sup>th</sup> Legislature Regular Session and implemented through Texas Water Code 13.502, which requires all new apartments be either directly metered by the utility or submetered by the owner.
7. Annual testing and maintenance of all meters larger than two inches. Regular replacement of 5/8" and 3/4" meters after 15 years of service.
8. Replacement of meter registers or entire meter every eight years.
9. An accounting of water savings and revenue gains through the implementation of the Water Department's meter repair and replacement procedures.

Each year the Water Department estimates its annual water savings from the program. Savings can be estimated based upon a statistical sample analyzed as part of the meter repair and replacement program.

The City maintains a meter replacement policy based upon a customer's concern about the accuracy of his meter. Annual records of replaced meters are maintained through the City's Maximo software. Meter replacement takes precedence over meter repair due to the cost of repairing old meters. The City has improved efficiency and cut water loss by purging old meters and converting standard meters to automated meter reading (AMR.). The AMR program is a metering system that remotely records usage and accurately integrates that data into the billing system. Around 99 percent of the City's water meters have been installed with the AMR, benefiting the City by improving meter accuracy and reducing the cost of reading meters manually.

#### *5.6.6 Record Management*

The City's has a system of record management to classify customers by sector for billing purposes and to keep track of water consumption by class. The billing system has the ability to categorize customers into sectors that can be summarized into those required by the Texas Water Development Board and the Texas Commission on Environmental Quality. These sectors include: residential (including single-family and multi-family); commercial; institutional; industrial; and wholesale (the City does not have any agricultural customers).

#### *5.6.7 System Water Audit and Water Loss*

As with any aging infrastructure system, the City does have water loss between the treatment plant and the point of use. In order to reduce this water loss, the City performs an annual system water audit. This estimate of system water efficiency is achieved by

comparing water delivered to the treatment plant, potable water produced, and water sold. The Water Department tracks numerous leak detection and repair activities and is able to evaluate its success using the asset management software to compile and track work orders. Using this data from the audit, the City is able to focus on specific areas where improvements in efficiency can be achieved.

#### *5.6.8 Water Conservation Staff*

The Water Department has two staff members who coordinate and implement water conservation programs for the City and its service area. These employees include the Water Resource Planner and the Management Assistant. They are critical to ensuring the success of the City's overall conservation program.

The *Water Resource Planner* is responsible for planning conservation programs; seeking and identifying new opportunities in conservation and water supply; program analysis; contributions as a member of regional workgroups (BBACS, GMAs, Region N, Nueces Feasibility, CCASRCD); assistance with educational/promotional material; planning Irrigation Consultation Program; meetings with stakeholders; assistance with marketing strategies for conservation programs; assistance with annual conservation budget; assistance to the Water Resource Advisory Committee; preparation and submittal of annual conservation status reports to Water Department management.

The *Management Assistant* is responsible for the City's water public relations and marketing; implementing conservation programs; conservation education and marketing; coordinating with other departments and wholesale customers; coordinating programs within the Water Department; development of marketing strategies for conservation programs; management of consultants, and contractors, when appropriate; preparation of annual conservation budget; assistance to the Water Resource Advisory Committee.

This conservation team takes part in several educational events and programs, which are explained in detail in section 5.7.

## **5.7 Education**

One of the most effective ways to improve conservation and water-use efficiency is through education. The Water Department is very active in educating its customers and has several programs to do so. The Water Department has two purposes for its educational programs: to disseminate information and to change behavior. Information dissemination is education that makes the public aware of something timely, such as a current drought stage and its implications. A change in behavior occurs when education teaches the public practices that should be permanently adopted. Behavioral changes take place over a longer span of time than information dissemination, but both purposes are critical to a well-informed public.

This section highlights the educational programs that the Water Department plans, manages, and



implements. These programs include school education, public information, and the water-wise landscape and conservation program.

### *5.7.1 School Education*

School education programs increase the viability of water conservation efforts, enhance the utility's public image, contribute to the attainment of Texas state education goals by students, and increase customer goodwill. The message conveyed by students to their families based upon greater knowledge of water sources and conservation can lead to behavioral changes resulting in both short- and long-term water savings.

The Water Department offers various school educational programs to all grade levels throughout the City of Corpus Christi. These programs include:

- Major Rivers – Part of the 4th grade curriculum, the program educates students on water conservation, supply, treatment, distribution and conservation. The self-contained program offers academic and hands-on activities in math, language arts, science, and social studies, with teacher's guide geared to the interdisciplinary curriculum, as well as an introductory video and home information leaflets.
- Learning to be Water Wise – This program is used in 5th grade classrooms to connect science, math, language arts, and social studies with water conservation activities. Boxed kits, which include a toilet water displacement bag, toilet leak detector tablets, showerhead and faucet aerators, and instructions for repairing common toilet leaks, are given to each student.
- Water Source Book – The Water Source Book, developed by the Water Environment Federation, reinforces water resource issues with hands-on classroom activities and experiments for grades 6 through 8. The classroom activities feature water, wastewater, and storm water experiments. This book is provided by the City to all local school resource libraries. Continuing education workshops introduce local classroom teachers to the Water Source Book. Teachers can utilize this teaching aid to satisfy certain TEKS objectives as established by the Texas Education Agency.
- Coastal Bend Teacher Resource Extravaganza – As a member of the Coastal Bend Informal Educators (CBIE), the City Water Department sponsors this event, which brings environmental resources to teachers throughout the Texas Education Agency Region 2 area. The City Water Department also participates in this annual event, offering valuable opportunities and resources for teachers, students and the general public.
- Museum of Science and History – The Corpus Christi Museum of Science and History houses an educational gazebo, targeted to children, featuring various showcases and an 8-foot interactive topographic map of the Nueces River Basin. The touch of a button activates lights and sound to explain the area's water resources. Displays throughout the Xeriscape Learning Center and Design Garden are used as teaching tools for children and adults.
- Other educational events – The Water Department provides age-appropriate water resources teaching materials at several public events. Materials include *Splash Activity Book*, *My Book About Water and How to Use it Wisely*, and *The*

*Story of Drinking Water.* Spanish material is also available upon request.

The Water Department continues to offer the programs mentioned above, being sure to stay up-to-date on any changing information related to water. They also continue to stay connected to local schools in order to identify any new potential opportunities.

To keep track of the impact of these various programs, the Water Department records:

- The number of presentations made
- The number and type of curriculum materials developed and/or provided
- The number and percent of students reached by presentations and by curriculum
- Annual budget related to conservation.

### *5.7.2 Public Information*

The Water Department employs several types of media resources and modes of mass communication to present a compelling and consistent message about the importance of conservation and water use efficiency. The overall goal of the public information program is to raise awareness among customers of the regional water resources and the importance of conservation. The public information is also used to convey urgent messages, such as those about drought or emergencies. Each year in June, the Water Department mails a Consumer Confidence Report to every customer. This report is available online to anyone including new customers. It explains water quality and explains to customers where they can get more information on water conservation.

The Water Department employs the following methods to raise water resources awareness and to instill the importance of conservation in the community:

- Multi-tiered media campaign – Annual television, radio, and print campaigns promoting water use efficiency. Agreements with radio and television stations provide for matching airtime for each ad purchased by the City.
- Billboard advertisement – Ads on billboards, bus benches, and other public spaces are used to promote water conservation and water quality.
- Website – The Department's Water Conservation website includes tips on outdoor and indoor conservation, Xeriscape landscaping, irrigation regulations, and educational materials for youth.
- Printed brochures – The City provides the public with printed brochures on various topics ranging from Xeriscaping to indoor water conservation. They are produced by several entities, including the Water Department, the Texas Water Development Board, and Texas A&M AgriLife Extension and are available at multiple City locations and programs.
- School Education – Programs targeted to grade schools.
- Xeriscape Learning Center and Design Garden – As part of the Corpus Christi Museum of Science and History, the Xeriscape Corpus Christi Steering Committee, in partnership with the City, maintains a Xeriscape demonstration garden with more than 100 plant varieties. Within the garden an educational gazebo, The Water Story Exhibit, showcases an 8-foot interactive topographic map of the Nueces River Basin. A second gazebo named the Learning Center features practical landscape ideas and

photographs. Educational Walk 'n' Talk Tours are held annually to enhance public education.

- City Call Center and Request Line – The City's Call Center (361 826-CITY) was created to encourage customers to report water line breaks and to request service calls. Customers may also utilize a dedicated Water Hotline number (361 826-1600) to request water conservation kits and other information.

To track the progress and effectiveness of this educational effort, the Water Department collects and tracks the following information:

- Number of activities, pieces of information distributed, and number of customers at an activity or program;
- Number of public school children who received instruction in water resources or water conservation;
- Number of news programs or advertisements that featured the water conservation message and how many customers had the opportunity to receive each message;
- Total budget by category for public information; and
- Results of annual or biannual customer survey and/or focus groups to determine the reach and impact of the program.

Water savings due to public information efforts are difficult to quantify. Water savings for other public information programs that result in specific actions by customers, such as changes in irrigation scheduling or reduction in water waste occurrences, may be quantified through surveys or analysis of water waste reporting in future years.

### *5.7.3 Water-Wise Landscape Design and Conservation Program*

The use of water for outdoor irrigation can often account for over 50% of a customer's consumption. The purpose of this program is to decrease both peak summertime water consumption and overall water use through the installation of water-wise landscapes at residential and commercial properties, and through improved efficiency of existing landscapes. Water-wise landscaping involves not only plant selection, but continued attention to appropriate irrigation and landscape maintenance. The program is multifaceted, implemented through a landscape standard (Section 5.4), school education (Section 5.7.1), public outreach (Section 5.7.2), and city-implemented measures (Section 5.6).

Below are some public-outreach programs explained in more detail that specialize in water-wise landscaping or emphasize the importance of using less outdoor water.

- Xeriscape To-Go: Planning and Designing a Gardener's Dream – This brochure, available in both print and online, was designed to educate local residents on the benefits of Xeriscape landscaping. It features a list of plants suitable for the Coastal Bend and an explanation of the seven principles of Xeriscaping.
- Xeriscape: Landscape with Less Water – A brochure detailing the seven principles of Xeriscape.

- Purple Water-Wise Plant Labels – A brochure produced in cooperation with Xeriscape Corpus Christi, commercial nurseries, and Texas A&M AgriLife Extension to bring public awareness to lists of plants that are proven performers in the Coastal Bend since 2004. Water-wise plants are labeled with purple tags at commercial nurseries for easy identification. Purple labels are affixed to water- wise and drought-tolerant plants offered at retail nurseries.

To encourage the seven principles of Xeriscape landscaping, the non-profit organization, Xeriscape Corpus Christi, was formed. The organization built and maintains a demonstration Xeriscape garden at the Museum of Science and History. The steering committee's members include the City of Corpus Christi Water Department, Storm Water Department, Park and Recreation Department, Corpus Christi Museum of Science and History, Friends of the Museum, Mayor's Water Conservation Advisory Committee, Nueces County Master Gardeners, and Texas A&M AgriLife Extension of Nueces County.

## **5.8 Water Conservation Pricing**

One of the most effective methods to influence water consumption is through changes in price structure. Water conservation pricing is a type of structure that promotes conservation by making the water rate higher as consumption increases. Another term for this type of structure is increasing block rate. The City has an increasing block rate structure for residential customers which is not “promotional.” It ensures that residents receive their most basic needed water at a reasonable price, which covers the fixed costs of the Water Department. They are billed on actual metered water use. As consumption goes into discretionary amounts, the price per gallon increases, resulting in a higher bill. A copy of the current water rate structure is attached as Appendix C.

At least annually, the Water Department staff will review consumption patterns (including seasonal use) and the income and expense levels to determine if the conservation rates are effective. They then make appropriate, regular rate structure adjustments as needed. In the past, such studies resulted in an elimination of the decreasing block rate for industrial accounts and increasing block rates for residential customers. In order to further encourage conservation, the Water Department will examine the follow potential pricing measures:

1. Seasonal rates to reduce peak demands during summer months.
2. Increasing block rates for other customer classes.
3. Restructuring of commercial rate structure to an increasing block rate.

The successful transition to a new rate structure will include public input and a process to educate the community about the new rate structure. Public involvement in the development and implementation of conservation rates helps to assure that the goals of the conservation pricing initiatives are met and accepted by local constituents. Public meetings, advisory groups, and public announcements are among ways to generate public involvement.

## **5.9 Coordination with Region N (Coastal Bend) Regional Water Planning Group**

The service area of the City of Corpus Christi is located within the Coastal Bend, designated as Region N Planning area, and the City has provided a copy of its Water Conservation and Drought Contingency Plan to the Coastal Bend Regional Water Planning Group (RWPG). The Region N Planning Group was initially appointed by the Texas Water Development Board (TWDB), under the authority of Senate Bill 1, and includes representatives from 12 interests including the public, counties, municipalities, industries, agriculture, the environment, small businesses, electric-generating utilities, port authorities, river authorities, water districts, and water utilities from across the region. This Plan is consistent with the City's role as a leader in water supply planning in Region N, and meets the standards for water conservation planning in TAC Chapter 288.

## **5.10 Method to Monitor the Effectiveness of Conservation Measures**

The best way to monitor to the effectiveness of the conservation measures of this chapter is to track the per capita water use. As was mentioned in Chapter 4, the goal of this Plan is to reduce per capita water use (gcpd) by one percent each year over the next decade. Successful water conservation measures will result in a reduction of that per capita water use. Because water use can vary each year due to weather conditions, the City will consider rainfall amounts when analyzing water use.

## **5.11 Means of Implementation and Enforcement**

This Water Conservation Plan was approved by the Corpus Christi City Council on **May 28, 2013**. The passage of this WCP provides the Water Utilities the authority and guidance to implement the included conservation measures and programs.

The Water Resource Management Ordinance provides the legal authority for the City of Corpus Christi to enforce certain conservation measures and all drought contingency measures. A copy of the Water Resource Management Ordinance (Section 55) is attached as a supporting document.

## **5.12 Reservoir System Operating Plan**

Because all customers rely on the reservoir systems for their supplies, they are subject to the Reservoir Operating Plan. A copy of this is included in Appendix D. Wholesale Customer Conservation

## 6.1 Introduction

The City of Corpus Christi serves four wholesale customers with treated water and seven wholesale customers with raw water. As part of the 2019 Water Conservation Planning Process, the City has organized and held meetings with the customers to receive feedback on the revised Plan. Because these customers use the same source water as the City, it is important that they are kept informed and provide input into the City's decision making processes.

This chapter explains the conservation goals that the City encourages its wholesale customers to adopt. Though wholesale customers outside of city limits are not legally bound by the ordinances of Corpus Christi, the City requires the wholesale customers to adopt conservation measures outlined in the Plan. It helps to ensure the region's water security and also ensures that customers, both inside and out of the City, are treated equitably. Section 6.5 explains the contractual requirements between the City and its wholesale customers.

## 6.2 Wholesale Customer Targets and Goals

The best way to reduce water waste and increase conservation is to set targets and goals. As was mentioned in Chapter 4, the City of Corpus Christi has set a water conservation goal of one percent annual reduction in consumption. This amounts to 184 gpcd in 2023. The City, though it has no authority to require it, suggests to each its wholesale customers to also try to achieve a one percent annual reduction in consumption. The Coastal Bend Regional Water Planning Group recommends consumption reductions and they are shown below in Table 6.1. The gpcd of each wholesale customer is shown with the 2017 and 2024 consumption goals. Though the group's targets are not as aggressive as the City's, they still help in conserving the region's water supplies.

**Table 6.1 Wholesale Customer Consumption and Goals of Regional Water Planning Group (gpcd)**

<b>Wholesale Customer</b>	<b>2017 Consumption</b>	<b>2024 Consumption Goals</b>
<b>Alice Water Authority</b>	<b>155</b>	<b>135</b>
<b>Beeville Water Supply District</b>	<b>140</b>	<b>100</b>
<b>City of Mathis</b>	<b>119</b>	<b>112</b>
<b>Nueces County WCID 4 (Port Aransas)</b>	<b>187</b>	<b>179</b>
<b>San Patricio Municipal Water District</b>	<b>118</b>	<b>111</b>
<b>South Texas Water Authority</b>	<b>155</b>	<b>152</b>
<b>Violet Water Supply Corporation</b>	<b>151</b>	<b>148</b>

### **6.3 Metering, Monitoring, and Records Management**

The City meters all water diverted from the raw water supply to its wholesale customers. The City also meters all treated water delivered to its wholesale customers. By contrast, these meters are calibrated on a semiannual basis, and must be accurate within 2 percent. The meters are read on a monthly basis for billing purposes.

A summary report is prepared, which aggregates all meter readings from wholesale raw water meters, wholesale treated water meters, and all retail customers, as well as the readings from the meters at the intake to the O. N. Stevens Water Treatment.

### **6.4 Leak Detection and Repair**

The treated water wholesale customers are supplied from portions of the City's distribution system. The meter location is the point of sale at which the water enters the customer's system. From there, it is the customer's responsibility to operate and maintain. The portions of the City's distribution system that serve these wholesale customers are subject to the same leak detection and repair program described Section 5.4.5, System Water Audit and Water Loss.

All raw water delivery systems to the wholesale customers are owned and operated by those customers. Therefore, they are responsible for any leak detection and repair programs as well as for unaccounted-for water. Wholesale customers are encouraged to voluntarily report their results to the City in order to promote cooperative efficiency efforts.

In addition, wholesale customers are encouraged to keep their water loss rates below ten percent.

### **6.5 Contractual Requirements**

The City has in place valid contracts with various wholesale customers including raw water contracts with municipal water suppliers: Alice Water Authority, Beeville Water Supply District, City of Mathis, and San Patricio Municipal Water District. Treated water customers include Nueces County Water Improvement District No. 4 (Port Aransas), San Patricio Municipal Water District, South Texas Water Authority, and the Violet Water Supply Corporation. Industrial wholesale customers include Celanese and Flint Hills Resources. All of these contracts contain language related to water use restrictions in drought situations. Each contract has a section

requiring the customer to accept shortages in supply, should natural or unforeseen circumstances prevent the City from delivering the water. With the exceptions of the Beeville Water Supply District and San Patricio Municipal Water District contracts, the contracts further stipulate that should there be a shortage in the basic supply of water which requires the restriction or curtailing of any consumer of water within the city limits of Corpus Christi, *that the wholesale customer limit and restrict all of its customers to the same extent.*

The Beeville Water Supply District requires the district to reduce its average raw water consumption by specific percentages whenever the City declares water shortage conditions. The district is required to reduce its average raw water consumption by 10% when the reservoirs fall below 50% (Stage 1), 20% when the reservoirs fall below 40% (Stage 2), 30% when the reservoirs fall below 30% (Stage 3), and to cease raw water withdrawals when reservoir storage levels drop below 20% (Stage 4). In exchange, the District is excused from contract minimum payments during the time of shortage; and it has the discretion to supplement river water with groundwater in lieu of imposing water use restrictions on its customers.

The San Patricio Municipal Water District has the discretion to either implement water conservation and drought measures similar to those imposed by the City or to reduce the water it takes from the City's water supply system. If the district elects to reduce the amount of water it takes from the City's water supply system, the reductions are based on the average deliveries for the same month of the year over the three previous years. The percent of the reduction is based on the available water in the City's reservoir system. The required decrease in the amount of water that can be taken is 10% when the reservoirs fall below 50% (Stage 1), 20% when the reservoirs fall below 40% (Stage 2), 30% when the reservoirs fall below 30% (Stage 3), and 60% when the reservoirs fall below 20% (Stage 4). In the most recent contract with San Patricio Municipal Water District, language concerning year-round water conservation is included. As the need to renegotiate other contracts arises, the City will include contract language requiring conformance with applicable state and federal regulations concerning water conservation.

The City will require in every wholesale water supply contract entered into or renewed after official adoption of this Plan (by either ordinance, resolution, or tariff), including any contract extension, that each successive wholesale customer develop and implement a water conservation plan and drought contingency plan or water management measures using the applicable elements in this Plan and City's Drought Contingency Plan (City Ordinance 55-151). If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation and drought contingency requirements so that each successive customer in the resale of the water will be required to implement water conservation measures and drought contingency measures in accordance with the provisions of this Plan and the Drought Contingency Plan.

## **6.6 Reservoir System Operating Plan**

Because all of the wholesale customers rely on the reservoir systems for their supplies, they are subject to the Reservoir Operating Plan. A copy of this is included in Appendix D.