

ORDINANCE NO. 2019-1304

AN ORDINANCE OF THE CITY OF FULSHEAR, TEXAS, REPEALING AND REPLACING ORDINANCE NO 2011-1037; ADOPTING A DROUGHT CONTINGENCY PLAN; ADOPTING A REGIONAL WATER PLAN; PROVIDING FOR A PENALTY; PROVIDING FOR SEVERABILITY; PROVIDING FOR REPEAL AND PROVIDING FOR AN EFFECTIVE DATE.

* * * * *

WHEREAS, under section 11.1272 of the Texas Water Code and 30 Tex. Admin. Code § 288.20, the City of Fulshear, Texas ("City"), is required to adopt a drought contingency plan and to review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan; and

WHEREAS, the City previously adopted a drought contingency plan by the adoption of Ordinance No. 2011-1037; and

WHEREAS, since the adoption of Ordinance No. 2011-1037, there has been an adoption or revision of the regional water plan; and

WHEREAS, based on such new or updated information, and after providing the opportunity for public input, the City finds it appropriate to update its drought contingency plan by repealing and replacing Ordinance No. 2011-1037;

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF FULSHEAR, TEXAS:

Section 1. Ordinance No. 2011-1037 is hereby repealed.

Section 2. The Drought Contingency Plan attached hereto as Exhibit A is hereby adopted and is incorporated herein for all purposes.

Section 3. The 2016 Regional Water Plan prepared by Region H Water Planning Group is hereby adopted and incorporated herein by this reference for all purposes, the same being available at:
http://www.twdb.texas.gov/waterplanning/rwp/plans/2016/H/Region_H_2016_RWP.pdf.
For informational purposes, a summary of the 2016 Regional Water Plan is attached hereto as Exhibit B.

Section 4. To the extent of any conflict between the Drought Contingency Plan adopted herein and the 2016 Regional Water Plan adopted herein, and to the extent allowed by law, the provisions of the Drought Contingency Plan shall apply.

Section 5. **Penalty.** Any person who violates or causes, allows, or permits another to violate any provision of this ordinance, rule, or police regulation of the city shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine or penalty not to exceed five hundred dollars (\$500.00), provided that if such rule, ordinance, or police regulation governs fire safety, zoning, or public health and sanitation, other than the dumping of refuse, the fine or penalty shall not exceed two thousand dollars (\$2,000.00), and further provided that if such rule, ordinance, or police regulation governs the dumping of refuse, the fine or penalty shall not exceed four thousand dollars (\$4,000.00). Each occurrence of any violation of this ordinance, rule, or police regulation shall constitute a separate offense. Each day on which any such violation of this ordinance, rule, or police regulation occurs shall constitute a separate offense.

Section 6. **Severability.** In the event any clause, phrase, provision, sentence or part of this Ordinance or the application of the same to any person or circumstances shall for any reason be adjudged invalid or held unconstitutional by a court of competent jurisdiction, it shall not affect, impair or invalidate this Ordinance as a whole or any part or provision hereof other than the part declared to be invalid or unconstitutional; and the City Council of the City of Fulshear, Texas declares that it would have passed each and every part of the same notwithstanding the omission of any part thus declared to be invalid or unconstitutional, or whether there be one or more parts.

Section 7. **Repeal.** All other ordinances or parts of ordinances inconsistent or in conflict herewith are, to the extent of such inconsistency or conflict, hereby repealed.

Section 8. **Effective date.** This Ordinance shall be and become effective immediately upon its adoption.

PASSED, APPROVED, and ADOPTED this, the 27th day of August, 2019.





Aaron Groff, Mayor

ATTEST:



Kimberly Kopecky, City Secretary

EXHIBIT "A"
CITY OF FULSHEAR
DROUGHT CONTINGENCY PLAN

SECTION 1: Introduction and Objectives

Water supply has always been a key issue in the development of Texas. In recent years, the increasing population and economic development in Regional Planning Group H have led to growing demands for water. At the same time, local and less expensive sources of water supply are largely developed. Additional supplies to meet higher demands will be expensive and difficult to develop. Therefore, it is important that we make efficient use of existing supplies and make them last as long as possible. This will delay the need for new supplies, minimize the environmental impacts associated with developing new supplies, and delay the high cost of additional water supply development.

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of drought contingency plans for public water suppliers.

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part I, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code. For the purpose of these rules, a drought contingency plan is defined as:

"A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s)."

The City of Fulshear has adopted this drought contingency plan pursuant to TCEQ guidelines and requirements.

The purpose of this drought contingency plan is as follows:

- To conserve the available water supply in times of drought and emergency
- To maintain supplies for domestic water use, sanitation, and fire protection
- To protect and preserve public health, welfare, and safety
- To minimize the adverse impacts of water supply shortages
- To minimize the adverse impacts of emergency water supply conditions

SECTION 2: State Requirements for Drought Contingency Plans

This drought contingency plan is consistent with Texas Commission on Environmental Quality (TCEQ) guidelines and requirements for development of drought contingency plans by public drinking water suppliers, contained in Title 30, Part I, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code, and contained in Section 11.039 of the Texas Water Code.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this document:

- 288.20(a)(1)(A) Provisions to Inform the Public and Provide Opportunity for Public Input
Section 11.903
- 288.20(a)(1)(B) Provisions for Continuing Public Education and Information
- 288.20(a)(1)(C) Coordination with Regional Water Planning Group

- 288.20(a)(I)(D) Criteria for Initiation and Termination of Drought Stages
- Section 11.039 TWC - Initiation of Drought Response Stages
- 288.20(a)(1)(E) Drought and Emergency Response Stages
- 288.20(a)(1)(F) Specific, Quantified Targets for Water Use Reductions
- 288.20(a)(I)(G) Water Supply and Demand Management Measures for Each Stage
- 288.20(a)(1)(H) Procedures for Initiation and Termination of Drought Stages
- 288.20(a)(1)(I) Procedures for Granting Variances
- 288.20(a)(1)(J) Procedures for Enforcement of Mandatory Restrictions
- 288.20(a)(3) Consultation with Wholesale Supplier
- 288.20(b) Notification of Implementation of Mandatory Measures
- 288.20(c) Review and Update of Plan

SECTION 3: Provisions to Inform the Public and Opportunity for Public Input

Notice of the adoption of this Ordinance at a regular City Council meeting was posted, and interested members of the public were given an opportunity to express opinions and concerns regarding the plan.

SECTION 4: Provisions for Continuing Public Education and Information

The City of Fulshear will inform and educate the public about its drought contingency plan by the following means:

- Making the plan available to the public through the City of Fulshear's web site.
- Notifying local organizations, schools, and civic groups that City of Fulshear staff members are available to make presentations on the drought contingency plan.

At any time that the drought contingency plan is activated or the drought stage changes, the City of Fulshear will notify local media of the issues, the drought response stage, and the specific actions required of the public. The information will also be publicized on the City of Fulshear's web site. Billing inserts or mail outs will also be used as appropriate.

SECTION 5: Initiation and Termination of Drought Response

a) Initiation of Drought Response Stages

The Mayor or his/her official designee may order the implementation of a drought response stage or water emergency when one or more of the trigger conditions for that stage is met. The following actions will be taken when a drought stage is initiated:

- The public will be notified through local media.
- If any mandatory provisions of the drought contingency plan are activated, the City of Fulshear will notify the Executive Director of the TCEQ within five business days.

For other trigger conditions, the Mayor or his/her designee may decide not to order the implementation of a drought response stage or water emergency even though one or more of the trigger criteria for the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, the anticipation of replenished water supplies, or the anticipation that additional facilities will become available to meet needs.

b) Termination of Drought Response Stages

The Mayor or official designee may order the termination of a drought response stage or water emergency when the conditions for termination are met or at his/her discretion. The following actions will be taken when a drought stage is terminated:

- The public will be notified through local media.
- When any mandatory provisions of the drought contingency plan that have been activated are terminated, the City of Fulshear will notify the Executive Director of the TCEQ within five business days.

The Mayor or his/her designee may decide not to order the termination of a drought response stage or water emergency even though the conditions for termination of the stage are met. Factors that could influence such a decision include, but are not limited to, the time of the year, weather conditions, or the anticipation of potential changed conditions that warrant the continuation of the drought stage.

SECTION 6: Drought and Emergency Response Stages

1) Stage 1, Mild

a) Triggering and Termination Conditions for Stage 1, Mild

- When total daily water demand equals or exceeds **60%** of total water well pumpage.
- Water demand for all or part of the delivery system approaches delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

Stage 1 can be terminated when the circumstances that caused the initiation of Stage 1 no longer prevail.

b) Goal for Use Reductions and Actions Available Under Stage 1, Mild

The goal for water use reduction under Stage 1, Mild is a 0 percent reduction of the use that would have occurred in the absence of drought contingency measures. The purpose of actions under Stage 1, Mild is to raise public awareness of potential drought problems. The Mayor or his/her designee can order the implementation of any of the actions listed below, as deemed necessary:

- Request voluntary reductions in water use by the public.
- Increase public education efforts on ways to reduce water use.
- Review the problems that caused the initiation of Stage 1.
- Notify major water users and work with them to achieve voluntary water use reductions.
- Intensify efforts on leak detection and repair.
- Reduce non-essential city government water use, including street cleaning, vehicle washing, and operation of ornamental fountains.
- Reduce city government water used for landscape irrigation.
- Ask the public to follow voluntary landscape watering schedules

2) Stage 2, Moderate

a) **Triggering and Termination Conditions for Stage 2, Moderate**

- When total daily water demand equals or exceeds **65%** of total water well pumpage.
- Water demand for all or part of the delivery system equals delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

Stage 2 can terminate when the circumstances that caused the initiation of Stage 2 no longer prevail. Stage 1 becomes operative on termination of Stage 2.

b) **Goal for Use Reduction and Actions Available Under Stage 2, Moderate**

The goal for water use reduction under Stage 2, Moderate is a 2 percent reduction of the use that would have occurred in the absence of drought contingency measures. The Mayor or his/her designee can order the implementation of any of the actions listed below, as deemed necessary:

- Continue or initiate any actions available under Stage 1.
- Initiate engineering studies to evaluate alternatives should conditions worsen.
- Further accelerate public education efforts on ways to reduce water use.
- Halt non-essential city government water use, including street cleaning, vehicle washing, and operations of ornamental fountains.
- Encourage the public to wait until the current drought or emergency situation has passed before establishing new landscaping.

3) Stage 3, Severe

a) **Triggering and Termination Conditions for Stage 3, Severe**

- When total daily water demand equals or exceeds **70%** total water well pumpage.
- Water demand for all or part of the delivery system exceeds delivery capacity because delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system is unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply

Stage 3 can terminate when the ~~circumstances~~ that caused the initiation of Stage 3 no longer prevail. Stage 2 becomes operative on termination of Stage 3.

b) **Goal for Use Reduction and Actions Available Under Stage 3, Severe**

The goal for water use reduction under Stage 3, Severe, is a reduction of 5 percent of the use that would have occurred in the absence of drought contingency measures. If the circumstances warrant, the Mayor or his/her designee can set a goal for greater water use reduction.

The Mayor or his/her designee can order the implementation of any of the actions listed below, as deemed necessary. Measures described as "requires notification to TCEQ" impose mandatory

requirements on retail and wholesale customers. The City of Fulshear staff must notify TCEQ within five business days if these measures are implemented.

- Continue or initiate any actions available under Stage 1 and 2.
- Implement viable alternative water supply strategies.
- Requires Notification to TCEQ - Initiate mandatory water use restrictions as follows:
 - Prohibit hosing of paved areas, buildings, or windows
 - Prohibit operation of ornamental fountains
 - Prohibit washing or rinsing of vehicles by hose
 - Prohibit using water in such a manner as to allow runoff or other waste
- Requires Notification to TCEQ - Limit landscape watering at each service address to once every five days based on the last digit of the address. (Exceptions: Foundations, new plantings {first year} of trees and shrubs may be watered for up to two hours on any day by a hand-held hose or a soaker hoses without restrictions).
- Requires Notification to TCEQ - Prohibit draining and filling of existing pools and filling of new pools. (Pools may add water to replace losses during normal use.)
- Requires Notification to TCEQ - Prohibit establishment of new landscaping
- Discontinue city government water use for landscape irrigation, except as needed to prevent foundation damage and preserve new plantings

4) Stage 4, Emergency

a) Triggering and Termination Conditions for Stage 4 - Emergency

- When total daily water demand equals or exceeds **80%** of total water well pumpage.
- Water demand for all or part of the delivery system seriously exceeds delivery capacity because the delivery capacity is inadequate.
- Supply source becomes contaminated.
- Water supply system unable to deliver water due to the failure or damage of major water system components.
- Water demand is approaching the limit of the permitted supply.

Stage 4 can terminate when the circumstances that caused the initiation of Stage 4 no longer prevail. Stage 3 becomes operative on termination of Stage 4.

b) Goal for Use Reduction and Actions Available Under Stage 4, Emergency

The goal for water use reduction under Stage 4, Emergency, is **a reduction of 10 percent** of the use that would have occurred in the absence of drought contingency measures. If circumstances warrant, the Mayor or his/her designee can set a goal for greater water use reduction.

The Mayor or his/her designee can order the implementation of any of the actions listed below, as deemed necessary. Measures described as "requires notification to TCEQ" impose mandatory requirements on retail and wholesale customers. The City of Fulshear staff must notify TCEQ within five business days if these measures are implemented.

- Continue or initiate any actions available under Stages 1, 2 and 3.
- Implement viable alternative water supply strategies.
- Requires notification to TCEQ - Prohibit washing of vehicles except as necessary for health, sanitation or safety reasons, including car washes.

- Requires notification to TCEQ - Prohibit commercial and residential landscape watering, except that foundations may be watered for 2 hours each day with a hand-held hose or soaker hose.
- Requires notification of TCEQ - Prohibit any filling of private pools. Commercial and public pools may refill to replace losses during normal use.
- Requires notification of TCEQ - Require all commercial water users to reduce water use by a percentage established by the Mayor and his/her designee

SECTION 7: Procedure for Granting Variances to the Plan

The Mayor and his/her designee may grant temporary variances for existing water uses otherwise prohibited under this drought contingency plan if one or more of the following conditions is met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.

Variances shall be granted or denied at the discretion of the Mayor or his/her designee. All petitions for variances should be in writing and should include the following information:

- Name and address of the petitioner(s)
- Purpose of water use
- Specific provisions from which relief is requested
- Detailed statement of the adverse effect of the provision from which relief is requested
- Description of relief requested
- Period of time for which the variance is sought
- Alternative measures that will be taken to reduce water use
- Other information as required

SECTION 8: Procedure for Enforcement of Mandatory Restrictions

Mandatory water use restrictions may be imposed in Stage 3 and Stage 4 drought stages. These mandatory water use restrictions will be enforced by warnings and penalties as follows:

- On the first violation, customers will be given a written warning that they have violated the mandatory water use restriction.
- On the second and subsequent violations, citations may be issued to customers, with fines not less than \$500 and not to exceed \$4,000 per incident.
- After two violations have occurred, the City of Fulshear may install a flow restrictor in the line to limit the amount of water that may pass through the meter in a 24-hour period.
- After three violations have occurred, the City of Fulshear may cut off water service to the customer.

SECTION 9: Coordination with the Regional Water Planning Group

The City of Fulshear is located within the Region H water planning area. A letter will be sent to the Chair of the Region H Water Planning Group (RCWPG) with this drought contingency plan.

SECTION 10: Review and Update of Drought' Contingency Plan

As required by TCEQ rules, the City of Fulshear will review this drought contingency plan every five years to coincide with RCWPG. The plan will be updated as appropriate based on new or updated information. As the plan is reviewed and subsequently updated, a copy of the revised drought contingency plan will be kept on file on the City of Fulshear's website, and submitted to the RCWPG for their records.

2016 Regional Water Plan

Prepared by:

Region H Water Planning Group

With assistance from:

Freese and Nichols, Inc.

TBPE Reg. No. F-2144

Leggette Brashears & Graham, Inc. DBA LBG-Guyton Associates

TBPE Reg. No. F-4432

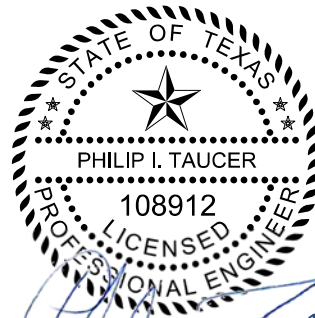
TBPG Reg. No. 50111

Ekistics Corporation



11/13/2015

Jason D. Afinowicz, PE
Project Manager, Freese and Nichols, Inc

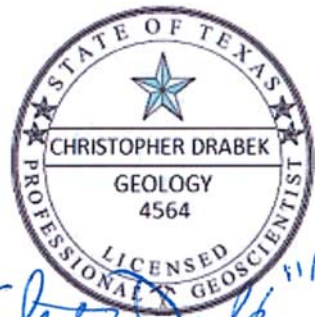


11/13/2015

Philip I. Taucer, PE
Project Manager, Freese and Nichols, Inc



11/10/15
William J. Seifert Jr.
W. John Seifert, Jr., PE
Principal, LBG Guyton Associates



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Chris Drabek, PG
Hydrogeologist, LBG Guyton Associates

Glenda Callaway
Glenda Callaway
Principal, Ekistics Corporation

November 2015

ES – Executive Summary

ES.1 INTRODUCTION

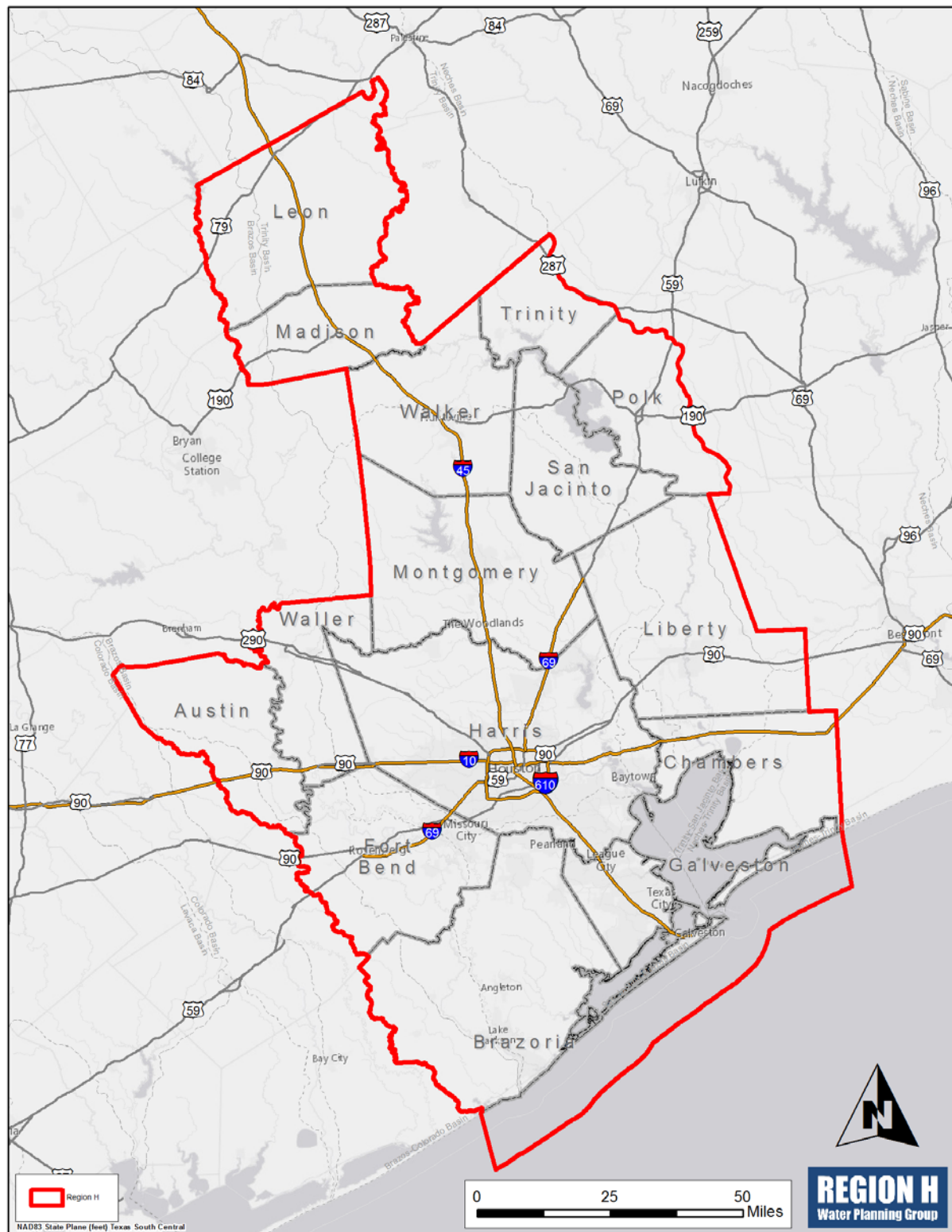
In 1997 the State Legislature, through Senate Bill 1, determined that the Texas State Water Plan for the 2000 - 2050 time frame would be developed through a regional water planning approach. To accomplish this task, the Texas Water Development Board (TWDB) divided the state into 16 regional water planning areas and appointed representational Regional Water Planning Groups (RWPG) that have guided the development of each region's plan. In 2001 a new set of rules and guidelines from the TWDB were enacted through Senate Bill 2. With the help of the Senate Bill 2, the 2002 State Water Plan received enormous public involvement compared to previous plans. The planning process is cyclic, with updated Regional Water Plans (RWPs) and State Water Plans (SWPs) produced every five years. The 2011 Region H Water Plan and the 2012 State Water Plan were created during the third planning cycle and are now being updated and extended to the 2070 decade as part of the fourth round of regional planning

Region H encompasses all or part of fifteen counties in southeast Texas and includes the majority of the San Jacinto River basin and the lower reaches of the Brazos and Trinity River basins. A location map showing the regional boundaries is included in *Figure ES-1*. The Region H Water Planning Group (RHWPG) consists of 26 voting and 10 non-voting members that represent a diverse range of backgrounds and interests. Additional information about Region H and the RHWPG can be found in **Chapter 1** of the 2016 RWP or on the Region H Water website, <http://www.regionhwater.org>. Regional Water Planning is conducted under the oversight of the TWDB. Information on Region H and the State Water Plan can be found at the TWDB website, <http://www.twdb.texas.gov>.

Region H is an economic powerhouse crucial to the Texas and national economies. Adequate water supplies are essential to continued economic health and to the region's future growth. Two thirds of all U.S. petrochemical production and almost a third of the nation's petroleum industries are located in Region H. The area provides some of the state's most popular vacation spots that generate hundreds of millions of dollars in annual tourism revenues. The Port of Houston is the second busiest port in the nation. Region H is generally characterized by urbanizing land uses and broad-based economic development. In areas outside of the urban core, agriculture dominates economic activities.

Any large-scale water supply or conveyance projects will require the close cooperation of political entities in the affected areas. While municipal and county governments are most visible in Region H, there are numerous other governmental and regulatory agencies with jurisdiction over aspects of water supply development in the region. These include approximately 14 river and water authorities, six groundwater-regulating entities, three councils of governments, eleven soil and water conservation districts, and hundreds of utility districts and water supply corporations that outnumber any other region in the state.

Figure ES-1 – Region H Location Map



ES.2 PROJECTED POPULATION AND WATER DEMANDS

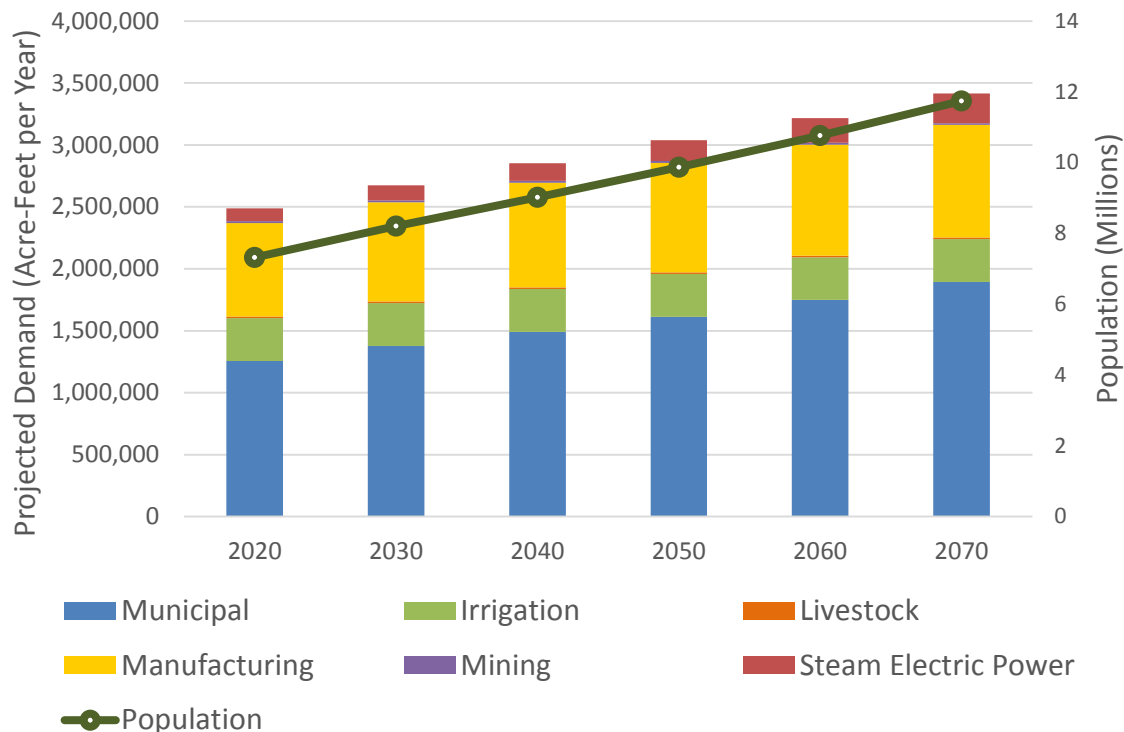
Population in Region H is projected to grow from approximately 7.3 million in 2010 to approximately 11.7 million in 2070. The almost doubling of population over the fifty-year planning period represents an annual growth rate of slightly less than one percent.

Population data are presented for each of the fifteen counties in the region, for cities of more than 500 persons, water districts providing 280 ac-ft/yr or more (0.25 mgd), and for collective reporting units (CRUs) consisting of grouped utilities having a common association. Demands are divided and allocated across accounting units known as Water User Groups (WUGs). Within Region H, there are numerous municipal WUGs plus 15 county-other WUGs, further divided by basin and county. All smaller communities and rural areas, aggregated at the county level, are considered a WUG and are referred to as “County-Other” for each county.

Population projections for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties were developed through an outside study to examine population growth based on the 2010 United States Census and projected on the basis of an economically-driven growth model. This five-county area accounts for almost 95 percent of the region’s population. Population projections for other areas were developed based on a standard cohort-component methodology applied by TWDB. Population-based demands were developed from these population projections based on recorded water use information compiled by TWDB and adjusted for future adoption of passive water conservation measures. It was observed that the mean and median per-capita water use in the 2016 RWP were 152 and 127 gallons per-capita-per-day. These values were reduced from 154 and 140 for the same identified water users in the 2011RWP.

Water use in other sectors also represents significant demands within Region H. This is most notably true for the Irrigation and Manufacturing sectors. Projections from the 2011 RWP for these demands, along with Livestock, Mining, and Steam Electric Power segments, were reviewed and amended to generate the 2016 RWP projections based on observed historical trends in water use. Irrigation demands were found to be significantly lower than previous projections. This trend is consistent with recent trends in crop acreage that have dwindled in the region as farm area has been reduced as population growth occurs.

Population and water demand projections by WUG category are shown in *Figure ES-2*. Additional information regarding the projection of population and demand can be found in **Chapter 2** of the 2016 RWP.

Figure ES-2 – Population and Water Demand Projections by WUG Category

ES.3 ANALYSIS OF CURRENT WATER SUPPLIES

The total water supply currently available to Region H from existing water sources is approximately 3.3-million acre-feet per year (ac-ft/yr) in 2020. Of that amount, about two-thirds is surface water. By the year 2070, the available supply will be approximately 3.15-million ac-ft/yr. The reduction in supply between 2010 and 2070 reflects restrictions on the use of the Gulf Coast Aquifer, instituted to combat subsidence in a large part of the region. Reduced reservoir yields due to sedimentation also contribute to the reduction in supply over time. The predominant sources of surface water supply are derived from three reservoirs: Lakes Conroe and Houston within the San Jacinto River Basin and Lake Livingston within the lower Trinity River Basin.

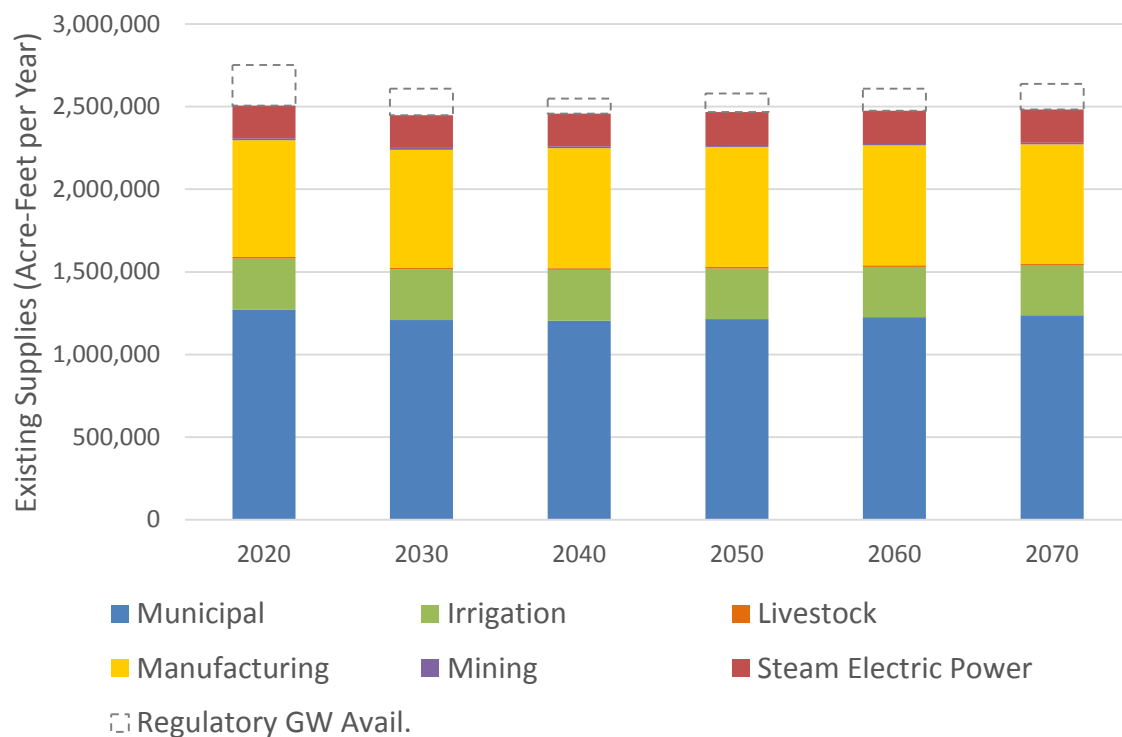
Surface water supply was determined using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM), which analyzes permitted diversions against the historic rainfall record, which includes the drought of record period in the 1950's. In the Trinity and Brazos River Basins, limited wastewater return flows were included in the model, based on expectations that full reuse would not occur during the planning period. For all other basins, the yields are based upon the no-return-flow scenario used for water rights permitting.

Groundwater supply projections were largely derived from estimates of Modeled Available Groundwater (MAG) that are developed as a result of the Groundwater Management Area (GMA) process. Regional planning groups are required to use these availabilities for planning purposes for all applicable aquifer layers. During the development of the 2016 RWP, Region H recognized that these availabilities do not correspond well with the actual, regulatory availabilities permitted in Region H. This issues poses a risk of potentially overestimating needs for new water supplies and

artificially inflating the need for water projects. In order to avoid this issue, Region H made the decision to disregard the artificial needs brought about by this Rule-Based Groundwater Disparity. Additional information regarding this issue can be found in **Chapter 3**.

A detailed analysis of the entire water supply is found in the **Chapter 3** of the 2016 RWP. A summary of available water supply allocated by WUG category is provided in *Figure ES-3*.

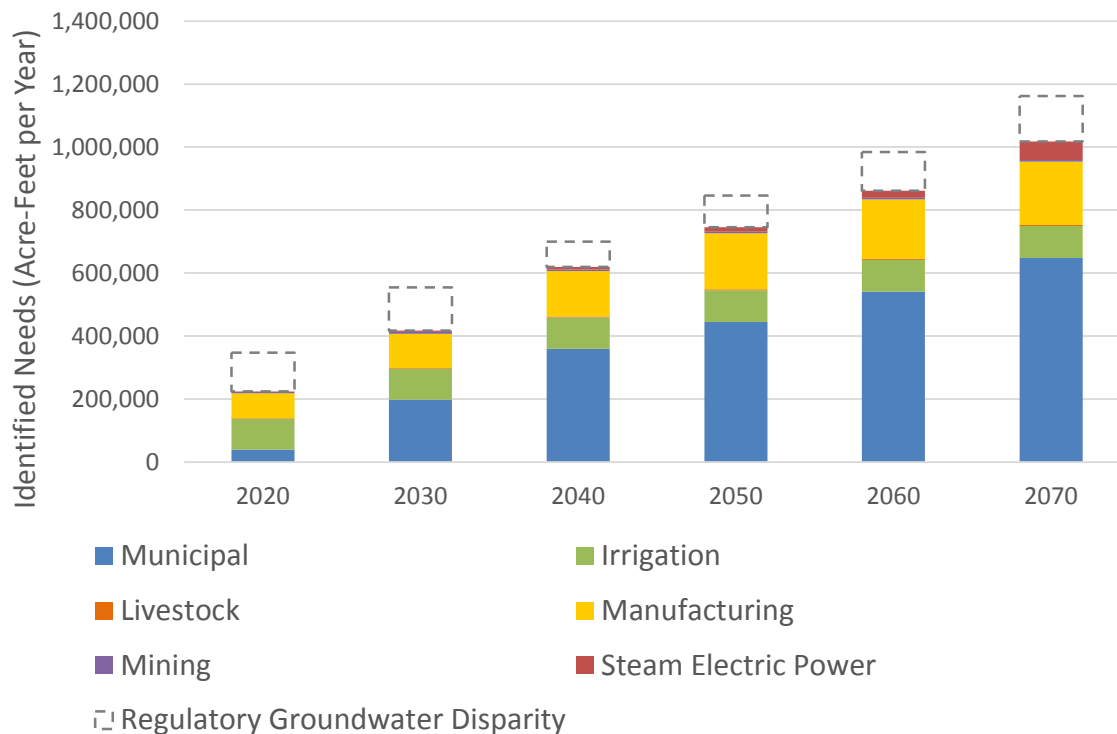
Figure ES-3 – Existing Water Supplies by WUG Category and Decade



ES.4 ANALYSIS OF NEEDS

Water supplies were compared to water demands to determine if any areas in the region are expected to experience water shortages during the planning period. Despite adequate overall water supplies for Region H through the year 2070, the RHWPG has identified communities that will experience water shortages during the planning period unless they take action to increase their supplies. Some of these communities will be able to meet their demands simply by extending or increasing existing water supply contracts.

The projected shortages identified in the year 2020 totaled 224,047 acre-feet per year, increasing to as much as 1,017,549 acre-feet per year in the year 2070. These needs are exclusive of the needs identified with the Rule-Based Groundwater Disparity identified during the evaluation of existing water supplies. Overall needs are shown in *Figure ES-4*. The projections estimate lower needs compared to the 2011 RWP, largely due to the implementation of infrastructure projects such as Groundwater Reduction Plans (GRPs) in the 2010 decade. Needs identified in the 2016 RWP are discussed in further detail in **Chapter 4**.

Figure ES-4 – Identified Water Needs by WUG Category by Decade

ES.5 WATER MANAGEMENT STRATEGIES

State statute and TWDB rules specify that RWPGs shall identify potentially feasible Water Management Strategies (WMS) for all WUGs and Wholesale Water Providers (WWPs) with future water supply needs. As a growing region with expanding populations and increased economic development, Region H projects substantial needs over the planning horizon through the 2070 decade. In order to address these needs, consideration was given to a wide range of data in developing recommendations for WMS and associated projects (specific infrastructure or measures used to increase or manage water supplies). Potentially feasible WMS were identified in three ways. First, strategies recommended in the 2011 Region H Water Plan for either implementation or additional study were considered potentially feasible. Next, new strategies were solicited during the scope development period for the 2016 Water Plan. Finally, sponsoring agencies that conducted independent strategy studies could bring their reports to the planning group and request they be considered in the plan. The list of potentially feasible WMs and projects considered by the RHWPG are listed in *Table ES-1*.

Table ES-1 – Region H Potentially Feasible WMS and Projects

Conservation

Industrial Conservation
Irrigation Conservation
Municipal Conservation

Contractual Transfer

TRA to COH Transfer

Conveyance

CHCRWA Transmission and Distribution Expansion
COH, NHCRWA, and CHCRWA Shared Transmission
East Texas Transfer
GCWA Treated Water from LNVA
Lake Livingston to SJRA Transfer
Luce Bayou Interbasin Transfer
NFBWA Phase 2 Distribution Segments
NHCRWA Distribution Expansion
NHCRWA Transmission Line
Old Galveston Road Transmission Improvements
WHCRWA Distribution Expansion
WHCRWA/NFBWA Transmission Line

Groundwater Development

Aquifer Storage and Recovery
Brackish Groundwater Development
BWA Brackish Groundwater
Conroe Brackish Groundwater Desalination
Expanded Use of Groundwater
Forestar Houston County Project
Forestar Liberty County Project
Groveton Groundwater Expansion
SJRA Catahoula Aquifer Supplies

Groundwater Reduction Plans

CHCRWA GRP
City of Houston GRP
City of Missouri City GRP
City of Richmond GRP
City of Rosenberg GRP
City of Sugar Land GRP
Fort Bend County MUD 25 GRP
Fort Bend County WC&ID No. 2 GRP
NFBWA GRP
NHCRWA GRP
Panorama Village and Shenandoah Joint GRP
Porter SUD Joint GRP
River Plantation and East Plantation Joint GRP
SJRA GRP
WHCRWA GRP

Reuse

City of Conroe Reuse
City of Houston Reuse
City of Pearland Reuse
GCWA Reclaimed Water from COH
Grand Lakes Reclaimed Water System

Montgomery County MUDs #8 and #9 Reuse
San Jacinto Basin Regional Return Flows
SJRA Conroe Reuse Project
Wastewater Reclamation for Industry
Wastewater Reclamation for Municipal Irrigation

Surface Water Development

Allens Creek Reservoir
BRA System Operation Permit
Dow Reservoir and Pump Station Expansion
Freeport Seawater Desalination
Lake Somerville Augmentation
Little River Off-Channel Reservoir
Lone Star Lake

Treatment

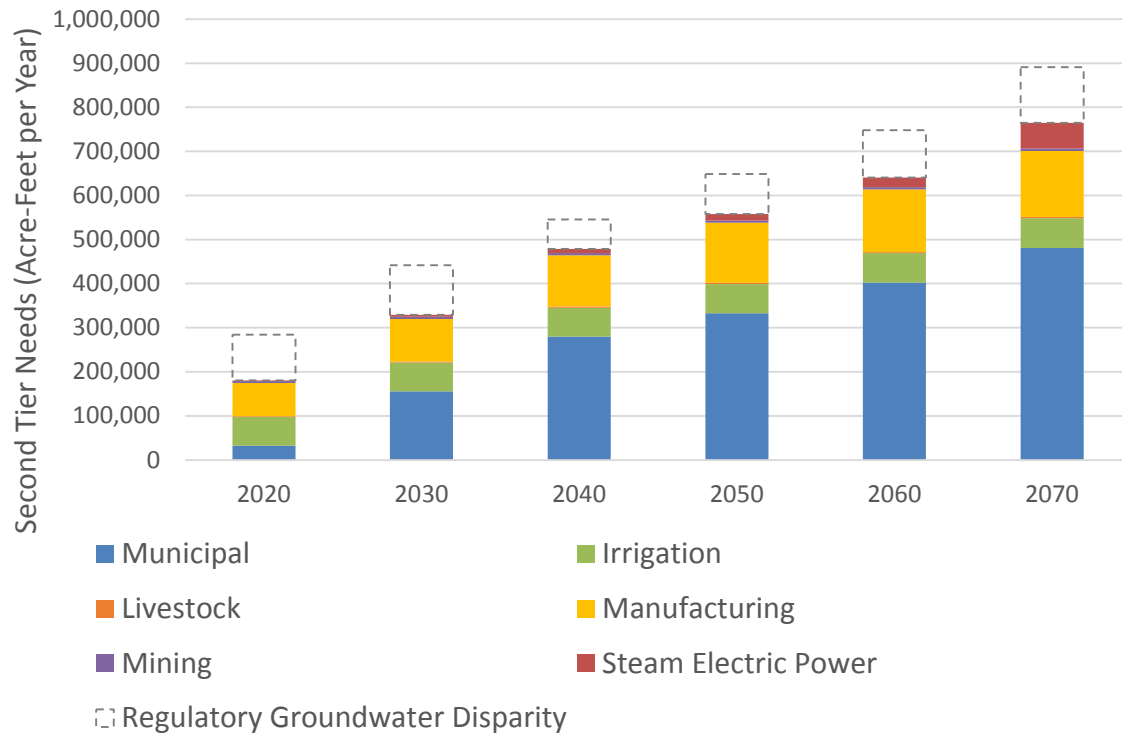
BWA Treatment Plant Expansion
City of Houston Treatment Expansion
CLCND West Chambers System
Northeast Water Purification Plant Expansion
Pearland Surface Water Treatment Plant

Other Infrastructure

Brazos Saltwater Barrier

Depending on the information available, Region H may adapt data directly from detailed studies developed by project sponsors or develop a high-level analysis of a concept for inclusion in the RWP. In other cases, Region H has performed more in-depth planning studies to evaluate the potential of projects that may yield great regional benefits to water supply. Evaluations of potentially feasible WMS included assessment of supply quantity and reliability, cost, and impacts to cultural and environmental resources. WMS evaluation and selection for recommendation also incorporated a dual-phased selection process, with one phase focused on the applicability of a WMS or project to the needs of individual WUGs and the other phase focused on evaluating a set of criteria applied to the overall WMS or associated projects.

Due to extensive geographic area within Region H and the diverse nature of demands, a variety of WMS were recommended to meet needs including water conservation, development of conveyance infrastructure and contracts to more fully utilize existing supplies, development of groundwater resources within areas with sufficient groundwater availability, reuse, development of new surface water supplies, development of treatment infrastructure, and a number of other approaches. Needs remaining after the application of certain WMS such as conservation and direct reuse are known as second tier needs. These needs are shown in *Figure ES-5*. A summary of source allocations and remaining unallocated volumes is shown in *Table ES-2*. *Table ES-3* below summarizes the key projects selected as part of recommended WMS along with their total potential yield, capital cost, and decade of implementation. WMS and project evaluation and recommendation in the 2016 RWP are discussed in further detail in **Chapter 5**.

Figure ES-5 – Second Tier Needs After Application of Conservation and Direct Reuse WMS**Table ES-2 – Source Water Balance Summary**

Source Type	2070 Existing and Future Allocations (ac-ft)	2070 Unallocated Source Balance (ac-ft)
Reservoirs		
Allens Creek Lake/Reservoir	79,819	19,831
Conroe Lake/Reservoir	75,500	0
Houston Lake/Reservoir	169,300	0
Livingston-Wallisville Lake/Reservoir System	1,344,000	0
Other Surface Water		
Brazos-Colorado Run-Of-River	3,211	0
Brazos Run-Of-River	586,530	0
San Jacinto-Brazos Run-Of-River	38,826	0
San Jacinto Run-Of-River	12,652	0
Trinity-San Jacinto Run-Of-River	35,316	0
Trinity Run-Of-River	139,186	0
Neches-Trinity Run-Of-River	37,700	0
Gulf Of Mexico Saline	11,200	0

Source Type	2070 Existing and Future Allocations (ac-ft)	2070 Unallocated Source Balance (ac-ft)
Groundwater		
Brazos River Alluvium Aquifer	0	19,971
Carrizo-Wilcox Aquifer	8,367	12,571
Gulf Coast Aquifer	573,603	65,492
Gulf Coast Aquifer (Regulatory Groundwater Availability)	165,592	0
Queen City Aquifer	859	344
San Bernard River Alluvium Aquifer	0	520
San Jacinto River Alluvium Aquifer	0	1,450
Sparta Aquifer	3,326	2,660
Trinity River Alluvium Aquifer	0	3,913
Yegua-Jackson Aquifer	2,670	4,817
Reuse		
Direct Reuse	55,944	69
Indirect Reuse	12,219	5,108
San Jacinto COH Reuse	231,179	0
San Jacinto Conroe Reuse Permit	2,623	1,071
San Jacinto Huntsville Effluent	1,354	886
San Jacinto Montgomery MUDs 8 and 9 Reuse Permit	326	218
San Jacinto Regional Return Flows	150,349	645
San Jacinto SJRA Reuse Permit	6,807	0
Conservation		
Industrial Conservation	65,261	0
Irrigation Conservation	86,123	0
Municipal Conservation	101,203	0
Water Loss Reduction	49,457	0

Table ES-3 – Key Project Overview

Project	Potential Volume ¹ (ac-ft)	Capital Cost (\$)	Unit Cost (\$/ac-ft)		Start Decade
			Start Decade	2070	
Conservation					
Industrial Conservation ²	65,261	\$0	\$0	\$0	2020
Irrigation Conservation	86,123	\$1,155,709	\$113	\$112	2020
Municipal Conservation (Advanced Conservation)	101,203	\$564,424,030	\$822	\$113	2020
Municipal Conservation (Water Loss Reduction)	49,457	\$1,135,494,180	\$555	\$554	2020
Contractual Transfer					
TRA to COH Transfer	150,000	\$0	\$5	\$5	2020

Project	Potential Volume ¹ (ac-ft)	Capital Cost (\$)	Unit Cost (\$/ac-ft)		Start Decade
			Start Decade	2070	
Conveyance					
CHCRWA Transmission and Distribution Expansion	4,682	\$23,207,659	\$409	\$44	2020
COH, NHCRWA, and CHCRWA Shared Transmission	148,042	\$150,325,381	\$83	\$9	2020
East Texas Transfer	250,000	\$388,064,210	\$145	\$15	2040
Lake Livingston to SJRA Transfer	50,000	\$166,710,892	\$311	\$32	2050
Luce Bayou Interbasin Transfer	450,000	\$360,004,806	\$143	\$23	2020
NFBWA Phase 2 Distribution Segments	62,496	\$65,450,062	\$95	\$7	2020
NHCRWA Distribution Expansion	143,360	\$922,549,086	\$307	\$50	2020
NHCRWA Transmission Line	143,360	\$155,993,406	\$86	\$6	2020
Old Galveston Road Transmission Improvements	24,300	\$99,886,253	\$322	\$25	2020
WHCRWA Distribution Expansion	91,896	\$293,290,000	\$299	\$32	2020
WHCRWA/NFBWA Transmission Line	154,392	\$642,986,052	\$340	\$34	2020
Groundwater Development					
Brackish Groundwater Development ³	Varies	Varies by project	\$278-1,557	Varies	2020
BWA Brackish Groundwater	3,136	\$34,016,950	\$600	\$346	2020
Conroe Brackish Groundwater Desalination	5,600	\$40,691,342	\$857	\$323	2020
Expanded Use of Groundwater ³	30,000+	Varies by WUG	Varies by WUG	Varies by WUG	2020
Groveton Groundwater Expansion	161	\$2,195,000	\$1,277	\$136	2020
SJRA Catahoula Aquifer Supplies	7,840	\$10,980,367	\$213	\$96	2020
Groundwater Reduction Plans					
CHCRWA GRP ⁴	4,682	\$0	\$0	\$0	2020
City of Houston GRP ⁴	130,544	\$0	\$0	\$0	2020
City of Missouri City GRP	12,656	\$50,959,636	\$329	\$33	2020
City of Richmond GRP	1,465	\$32,167,109	\$1,761	\$146	2020
City of Rosenberg GRP	826	\$12,469,012	\$1,242	\$131	2020
City of Sugar Land GRP	20,160	\$148,650,964	\$900	\$283	2020
Fort Bend County MUD 25 GRP	744	\$2,148,043	\$282	\$40	2030
Fort Bend County WC&ID No. 2 GRP	6,720	\$36,668,844	\$800	\$343	2020
NFBWA GRP ⁴	62,496	\$0	\$0	\$0	2020
NHCRWA GRP ⁴	143,360	\$0	\$0	\$0	2020
Panorama Village and Shenandoah Joint GRP	472	\$1,619,114	\$399	\$112	2040
Porter SUD Joint GRP	2,240	\$22,061,536	\$1,250	\$426	2020
River Plantation and East Plantation Joint GRP ⁵	92	\$0	\$0	\$0	2030
SJRA GRP	100,000	\$834,931,018	\$245	\$81	2020
WHCRWA GRP ⁴	91,896	\$0	\$0	\$0	2020
Reuse					
City of Conroe Reuse ⁴	3,694	\$0	\$0	\$0	2020
City of Houston Reuse	197,467	\$78,121,149	\$56	\$12	2040

Project	Potential Volume ¹ (ac-ft)	Capital Cost (\$)	Unit Cost (\$/ac-ft)		Start Decade
			Start Decade	2070	
City of Pearland Reuse	1,154	\$5,895,808	\$517	\$90	2020
GCWA Reclaimed Water from COH	33,712	\$56,379,232	\$187	\$47	2020
Grand Lakes Reclaimed Water System	661	\$13,148,843	\$2,276	\$612	2020
Montgomery County MUDs #8 and #9 Reuse	1,680	\$15,351,774	\$1,360	\$595	2020
San Jacinto Basin Regional Return Flows ⁴	150,994	\$0	\$0	\$0	2020
SJRA Conroe Reuse Project ⁴	6,807	\$0	\$0	\$0	2020
Wastewater Reclamation for Municipal Irrigation	38,940	\$103,454,114	\$290	\$161	2030
Surface Water Development					
Allens Creek Reservoir	99,650	\$316,226,894	\$321	\$33	2020
BRA System Operation Permit ⁴	25,350	\$0	\$0	\$0	2020
Dow Reservoir and Pump Station Expansion	80,000	\$255,865,694	\$303	\$36	2020
Freeport Seawater Desalination	11,200	\$132,937,747	\$2,454	\$1,461	2040
Treatment					
BWA Treatment Plant Expansion	8,400	\$15,951,976	\$353	\$194	2020
City of Houston Treatment Expansion	116,258	\$288,529,429	\$386	\$183	2040
CLCND West Chambers System	2,800	\$24,657,839	\$1,354	\$617	2020
COH Northeast Water Purification Plant Expansion	358,400	\$1,263,612,418	\$784	\$489	2020
Pearland Surface Water Treatment Plant	22,400	\$112,947,347	\$839	\$230	2020
Other Infrastructure					
Brazos Saltwater Barrier	72,396	\$55,771,408	\$69	\$5	2020

1. Volumes listed in this table represent the maximum anticipated volume associated with the projects rather than new increments of yield. Volumes shown in this table may overlap and are not necessarily additive.

2. Insufficient information to determine cost.

3. Includes brackish groundwater projects implemented under Expanded Use of Groundwater. Costs vary by WUG.

4. Costs included under associated infrastructure projects.

5. Supply generated through expanded use of existing infrastructure. Cost estimated to be minimal.

Following the application of WMS and key projects, some identified needs were found to remain. Under drought of record scenarios, it was determined that needs would persist in the Irrigation and Livestock demand sectors within some portions of Region H without the availability of some interruptible water supply to provide a low-cost options for meeting demands. These sectors are particular sensitive to the cost of water and are also unable to easily develop long-term contracts for water on a firm yield basis that are required for development of water supply projects. Each of these sectors will continue to rely on low-cost, interruptible supplies of water as well as local supplies and conjunctive groundwater and surface water resources when they are available. However, according to the guidelines for RWP development, these supplies are not permissible for planning purposes and may not be shown in the RWP. For this reason, the needs identified in *Table ES-4* are shown as unmet although, in reality, cost-effective solutions exist that may provide water to these demands and the development of firm yield projects within the RWP may also provide additional interruptible supplies to meet these demands in most, if not all, years.

Table ES-4 – Remaining Unmet Needs

WUG Name	County	Basin	Unmet Needs (ac-ft)					
			2020	2030	2040	2050	2060	2070
IRRIGATION	BRAZORIA	B-C	0	0	0	0	-217	-479
		SJ-B	-49,022	-49,539	-49,906	-50,308	-50,743	-51,143
	FORT BEND	SJ-B	-1,186	-1,186	-1,186	-1,186	-1,186	-1,186
	GALVESTON	N-T	-11	-11	-11	-11	-11	-11
		SJ-B	-4,300	-4,300	-4,300	-4,300	-4,300	-4,300
LIVESTOCK	BRAZORIA	B	-9	-17	-23	-29	-35	-42
		B-C	-137	-159	-175	-192	-211	-228
		SJ-B	-93	-164	-216	-272	-332	-388
	GALVESTON	N-T	-51	-51	-51	-51	-51	-51
		SJ-B	-177	-177	-177	-177	-177	-177
	HARRIS	SJ	-522	-939	-1,213	-1,214	-1,214	-1,215
		T-SJ	-112	-114	-120	-119	-119	-118

N-T = Neches-Trinity, T-SJ = Trinity-San Jacinto, SJ = San Jacinto, SJ-B = San Jacinto-Brazos, B = Brazos, B-C = Brazos-Colorado

ES.5.1 Conservation Recommendations

Water conservation plays an important role in meeting future water needs across the State of Texas. Because of this, guidance for the 2016 round of regional water planning dedicates a subchapter of **Chapter 5** to conservation recommendations for each region. This section contains information related to not only the importance of water conservation implementation but its challenges within Region H and the state as a whole.

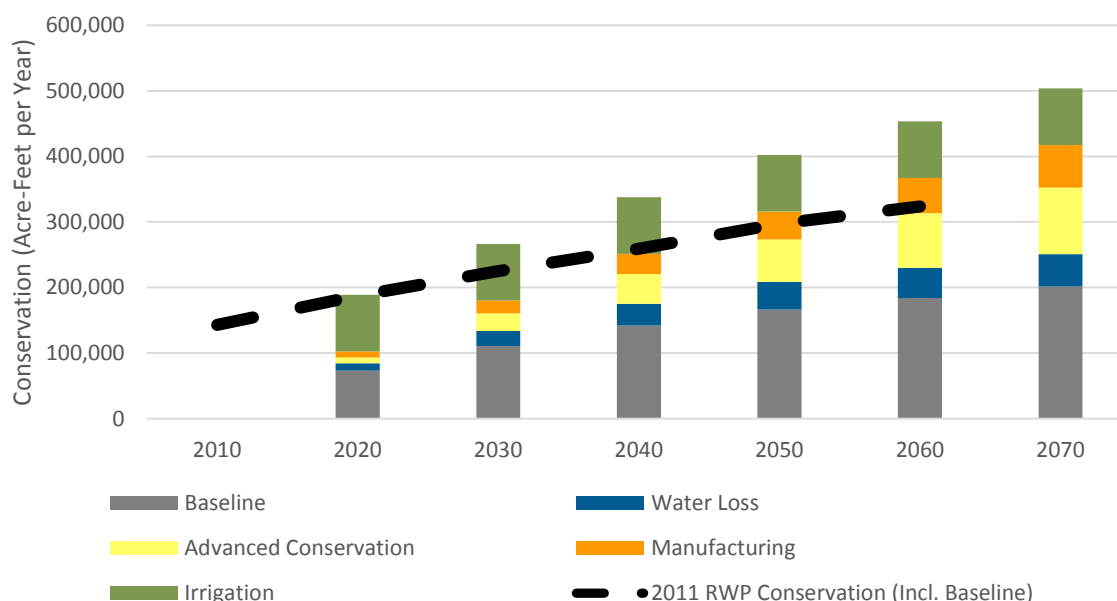
Current conservation efforts were evaluated for the region using the conservation plans developed for each water utility. This analysis demonstrated that Region H focuses much of its conservation resources toward outreach, conservation rates, and water system audits, leak detection, and repair.

Water conservation in the 2016 RWP was developed in conjunction with the efforts of the Goldwater Project of the Texas Water Foundation. The project is an ongoing effort to reach out to water utilities in Region H and gather information on their existing conservation practices and achievements and use this information to guide future, cost-effective approaches to meeting the region's conservation targets. Long-term projections developed from the Goldwater Project were combined with estimates of potential savings related to water loss reduction to provide a comprehensive water conservation program for WUGs in Region H.

Conservation was also applied to non-population-based demands such as Irrigation and Manufacturing. Region H enhanced the approach to Irrigation conservation applied in the 2011 RWP by evaluating the extent of existing conservation measures in the region in order prevent overestimation of potential saving. Region H also adopted its first comprehensive conservation strategy for Manufacturing water use through evaluation of long-term trends in industrial water use within the region. Both of these practices provide a significant water savings due to the magnitude of these demands in Region H.

The comprehensive water conservation applied in the 2016 RWP is compared against the conservation in the 2011 RWP in *Figure ES-6*. Additional information related to conservation can be found in **Chapter 5** and **Chapter 5B**.

Figure ES-6 – Total Region H 2016 RWP Conservation vs 2011 RWP



ES.6 IMPACTS OF THE REGIONAL WATER PLAN

Both surface and groundwater in Region H are generally of good quality, and can be used with conventional treatment only. Advanced treatment measures are recommended to develop direct wastewater reuse projects and the utilization of non-traditional water supplies such as brackish groundwater. The management strategies recommended in the plan are not anticipated to directly affect water quality in most basins, although the reduction of in-stream flows due to full use of water rights may indirectly increase the concentration of some contaminants (by reducing the overall volume of water). However, plan development was guided by the principal that the designated water quality and related water issues as shown in the state water quality management plan shall be improved or maintained. The Brazos Saltwater Barrier is specifically recommended to improve water quality in the lower Brazos basin by preventing seawater from migrating above Freeport during periods of low flows. The Luce Bayou Interbasin Transfer and the transfer of water to the San Jacinto River Authority (SJRA) from Trinity River supplies will introduce Trinity River water into the San Jacinto River Basin. It should be noted that Trinity River water is currently transferred into Harris County via other conveyances. Similarly, the East Texas Transfer will also introduce water from basins as far east as the Sabine River into western basins on a path toward the Houston area. The reuse of wastewater and other treatment projects will produce a brine concentrate, which must be judiciously discharged to prevent adverse environmental impacts.

Agricultural areas in Region H are generally served by a combination of groundwater and surface water supplies depending primarily on the location of use and the application. The groundwater use is not projected to change during the planning period. Surface water used for irrigation is typically contracted on a year-to-year basis and often originates from supplies that are not firm during the

drought of record. The 2016 RWP recognizes this trend in water use by irrigation and the sensitivity of agriculture to more expensive water supplies that are not available on a regular basis during these conditions. Although these supplies cannot be used in the RWP per planning guidance, these interruptible supplies will continue to be an important resource in meeting the needs of irrigation users in Region H.

The management strategies recommended in this plan will fully utilize the currently available water rights in all basins. Virtually all projects in the plan will require some environmental mitigation due to habitat impacts. However, the plan strives to identify the most feasible projects from standpoints of economics and sustainability. The recommended reuse of wastewater will further reduce instream flows, particularly during drought conditions. Some of this reduction will be mitigated by an overall increase in wastewater discharges beyond the current level and the reduction in need for developing new raw water supplies.

Groundwater use in the region is projected to increase within the sustainable yield of the aquifers or the regulated withdrawal cap, as applicable. The export of groundwater from its county of origin is not recommended in this plan.

Additional information related to impacts of the plan can be found in **Chapter 6** of the RWP.

ES.7 DROUGHT RESPONSE

Drought is the primary driver behind water planning in Texas. The drought of record serves as a fundamental basis for evaluating the supplies and needs in the development of each RWP and, in the 2016 guidance for RWP development, TWDB has added additional material related to preparation for and response to drought conditions.

The drought of record in Region H has consistently been the drought of the 1950s. Although recent dry years have eclipsed the severity of the 1950s drought for short periods of time, the long-term severity of the 1950s drought has, so far, not been exceeded. Current drought contingency plans for surface water supplies take into account this drought as a basis for assigning triggers and responses to drought. Region H recommends adoption of the triggers and responses prescribed by project owners and sponsors for management of surface water supplies such as reservoirs. For groundwater supplies, identification of drought conditions generally requires evaluation of other factors in order to recognize and respond to drought. For these supplies, Region recommends the regular review of the Palmer Drought Severity Index (PDSI) as a basis for recognizing drought conditions and taking appropriate measures to respond.

Some drought conditions are of a severity that they pose risks to life, safety, and economy. This is particularly true for small water system that have limited sources of water available or rural communities that are distant from alternative supplies that may serve to meet needs during emergency conditions. As part of the evaluation of drought response, Region H proposed a number of emergency measures for these utilities to consider, should drought conditions deem emergency response necessary. These measures include use of additional surface water supplies, development of additional local groundwater or brackish groundwater, or utilization of existing or potential interconnections with neighboring systems. It should be noted that these approaches may become necessary during either hydrologic drought periods or emergency conditions brought about by failure of water source or infrastructure.

Additional information related to drought response can be found in **Chapter 7** of the RWP.

ES.8 UNIQUE STREAM SEGMENTS, RESERVOIR SITES, AND OTHER RECOMMENDATIONS

The Texas Water Code guides the RWPGs to adopt recommendations on Unique Stream Segments, Unique Reservoir Sites, and legislative policy. **Chapter 8** of the 2016 RWP describes these recommendations in depth and a summary is provided below.

ES.8.1 Unique Stream Segments

The Texas Water Code offers the opportunity to identify river and stream segments of unique ecological value. Stream segments designated by the legislature as having unique ecological value cannot be developed as reservoir sites by the State or any political subdivision of the State. After consideration of the above factors during the development of the 2011 RWP, the eight streams listed in *Table ES-5* were recommended as Streams of Unique Ecological Value in Region H. These segments were subsequently designated by the Texas State Legislature. No additional sites were nominated for designation in the 2016 RWP. Additional information is contained in **Chapter 8**.

Table ES-5 – Recommended Unique Stream Segments

Stream Segment	County
Armand Bayou	Harris
Austin Bayou	Brazoria
Bastrop Bayou	Brazoria
Big Creek	Fort Bend
Big Creek	San Jacinto
Cedar Creek Lake	Brazoria
Menard Creek	Liberty and Polk
Oyster Bayou	Chambers

ES.8.2 Unique Reservoir Sites

The Texas Water Code offers an opportunity to designate sites of unique value for use as surface water supply reservoirs. Designation by the Legislature as a unique reservoir site prevents the State from constructing major infrastructure (such as major highways) within the project limits. Through use of a decision-based water management strategy analysis and selection process, the RHWPG selected two reservoir projects for meeting needs in the 2016 RWP: Allens Creek Reservoir and the Dow Expansion to Harris Reservoir. Region H chose to select Allens Creek Reservoir as a recommendation for any future reaffirmation of Unique Reservoir Sites. This site is described below in *Table ES-6*. Additional information is contained in **Chapter 8**.

Table ES-6 – Recommended Unique Reservoir Sites

Name	County	General Location
Allens Creek	Austin	1 mile north of the City of Wallis

ES.8.3 Regulatory, Administrative, and Legislative Recommendations

Guidance for regional water planning requires that a regional water plan include recommendations for regulatory, administrative, and legislative changes. These recommendations are addressed to each governmental agency that has the appropriate jurisdiction over each subject. It is generally assumed that regulatory recommendations are directed toward the TCEQ, that administrative recommendations are directed toward the TWDB, and that legislative recommendations are directed toward the State of Texas Legislature.

The Region H Water Planning Group has currently adopted the following regulatory, administrative, and legislative recommendations:

Regulatory and Administrative Recommendations

- The Region H Water Planning Group recommends that the TWDB determines, in conjunction with the TCEQ and the Texas Parks and Wildlife Department (TPWD), which specific environmental studies and analysis are required for each category of management strategy (i.e., new water right, new reservoir, etc.). Furthermore, the guidance should be added to the Planning Guidelines, so that RWPGs can reflect the cost of those requirements in their budgets and scopes of work. Adding environmental guidelines will also make water plans consistent across the State.
- The Region H Water Planning Group recommends that the TCEQ clarify the TPDES rules for wastewater permitting so that the environmental impacts of reuse and reclamation facility discharges are assessed in conjunction with appurtenant reductions in discharges for their source water facilities. This will eliminate double-counting of waste loads and remove a potential obstacle for some wastewater reuse projects in the State.
- The Region H Water planning Group recommends that TCEQ rules be amended to include a reasonable timeline for the update of WAMs associated with significant changes to water rights conditions in each basin and also on a routine basis as the historical period of record grows over time. Furthermore, these rules should require that the most recent model for each basin be made available through the TCEQ website for use by both the RWPGs and the public.

Legislative Recommendations

- Allow RWPGs to work with local regulatory bodies to develop appropriate, dry-year groundwater supplies for use in regional water planning that are consistent with local conditions and regulation.
- The Region H Water Planning Group recommends that the legislature revise the current law on interbasin transfers and remove the unnecessary and counterproductive barriers to such transfers that now exist.
- The Region H Water Planning Group recommends establishment of additional and dedicated funding to pursue necessary future efforts of the Galveston Bay Estuary program.
- The Region H Water Planning Group supports continued usage of the Rule-of-Capture as the basis of groundwater law throughout the State of Texas except as modified through creation of certified groundwater conservation districts.
- The Region H Water Planning Group supports creation of GCDs, as necessary, by local subarea water interests. The RHWPG supports development of truly regional GCDs as opposed to

single county districts to recognize the regional expansiveness of underground aquifers and to provide the greatest degree of regional water supply protections.

- The Region H Water Planning Group wishes to recognize the Legislature's efforts in implementing the SWIFT program and also supports ongoing and expanded support for financing methods by the State of Texas for development of water supply projects recommended within adopted RWPs.
- The Region H Water Planning Group supports continued funding for the GAM effort and recommends comprehensive analysis of all groundwater resources within the state.
- The Region H Water Planning Group supports funding of research and development studies associated with the efficient usage of irrigation technologies and practices.
- Region H Water Planning Group supports water conservation and recommends that the legislature continue to address and improve water conservation activities in the state.
- The Region H Water Planning Group recommends that the State fund research into advanced conservation technologies.
- Consider State legislation clarifying the liability exposure of reservoir operators for passing storm flows through water supply reservoirs.
- The Region H Water Planning Group recommends that the State direct the State Demographer's office to explore the potential changes in population distribution made possible by rapid advancements in information technology.
- The Region H Water Planning Group recommends that the TWDB request additional and adequate funding and the adoption of the appropriate administrative procedures from the legislature to facilitate ongoing activities of the RWPGs. Funding should be made available throughout the entirety of the planning cycle without funding "gaps" that make it difficult for planning groups to accomplish their ongoing efforts.

Infrastructure Financing Recommendations

- Increase funding of the Board Participation Program as needed to allow development of these water supply projects.
- Increase the funding of the State Revolving Funds Program in future decades, and expand the program to include coverage for system capacity increases to meet projected growth for communities.
- Increase funding of the State Loan Program to meet near-term infrastructure cost projections.
- Provide a mechanism to leverage Federal grant programs for agriculture by providing the local matching share. Increase funding of associated loan programs and consider adding a one-time grant or subsidy component to stimulate early adoption of conservation practices by individual irrigators. Provide opportunities for joint cooperation between growers and land owners to facilitate the use of funding programs for property under long-term lease agreements.
- Continue State and Federal support of the Texas Community Development Program, and increase the allocation of funds for the Small Town Environment Program.
- Increase funding of the Regional Water Supply and Wastewater Facilities Planning Program in anticipation of upcoming development throughout the state, and expand the program to include the preliminary engineering design costs for recommended facilities.
- Support continued and increased funding of Water and Waste Disposal Loans and Grants from USDA Rural Utilities Service at the Federal level, and fund the State Rural Water Assistance Fund.

- Provide research grants for the study of current and upcoming desalination technologies available to wholesale and retail water suppliers. Continue to fund appropriate demonstration facilities to develop a customer base, and pursue Federal funding for desalination programs. Focus particular attention to “near-term” efforts such as brackish groundwater desalination as a way of bridging current and long-term seawater desalination alternatives.
- Provide increased research grants to study and better develop drought-resistant crop species and efficient irrigation practices.
- Region H supports the forming of regional partnerships and encourages the State to allow them the greatest possible latitude for financing in their governing regulations. Additionally, the State Participation Program should be made available to these public/private partnerships and to private nonprofit water supply corporations.

Additional information is contained in **Chapter 8**.

ES.9 REPORTING OF FINANCING MECHANISMS FOR WATER MANAGEMENT STRATEGIES

Approximately \$10.9 billion in capital costs were identified for meeting needs throughout the planning period. These capital costs primarily represent infrastructure (wells, pump stations, treatment facilities, transmission mains, etc.) required to implement water management strategies at the WWP and WUG levels. These costs do not include annual costs and debt service associated with the new projects. Additionally, these costs do not represent improvements that will be required within individual WUGs for providing adequate water supply.

With the assistance of the RHWPG, the TWDB will conduct a survey of water utilities related to the anticipated cost of infrastructure and approaches to fund these projects. Anticipated costs developed as part of the RWP will be submitted to WUGs in order to determine their interest in pursuing one or more of the financial assistance programs offered by TWDB. Please see **Chapter 9** for an overview of this methodology. Results of the survey will be contained in the final, adopted 2016 RWP.

ES.10 ADOPTION OF PLAN AND PUBLIC PARTICIPATION

During the course of developing the 2016 RWP, the RHWPG conducted numerous public meetings corresponding with various phases of plan development. In addition, the group provided notice for a public hearing corresponding to the initiation of the planning cycle.

After the submittal of the IPP to TWDB by May 1, 2015, the RHWPG will also conduct three public hearings to receive comment from the public. Details of these meetings and comments from the public and interested agencies are provided in **Chapter 10** of the RWP.

ES.11 IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

A new requirement for the 2016 round of RWP development is the inclusion of a comparison to the previous plan including the implementation of projects and the development of water demands,

supplies, and strategies associated with each RWP. A detailed comparison of the 2011 and 2016 RWPs is provided in **Chapter 11**.

Nearly 50 projects in the 2011 RWP were identified as implemented, partially implemented, or in-progress at the time of development of the 2016 RWP. Many of these are GRP projects that provide for new water supply beginning in the 2010 decade. In addition, numerous projects, such as the SJRA Water Resources Assessment Plan (WRAP), now known as the GRP, received funding from TWDB to facilitate their completion.

Overall, the two plans differed slightly in relation to water demands. Municipal demands in Region H have remained relatively similar between the two RWPs but the distribution of this population has changed considerably in the 2016 RWP with higher levels of growth in the suburban counties in the near-term. Although all non-population demands varied somewhat from the 2011 RWP, the greatest change was found in Irrigation, where demands were reduced dramatically due to the reduction in crop acreage in the region over time.

A change to the assumptions used in developing current water supplies in Region H caused somewhat of a reduction in availability from the reservoir and run-of-the-river supplies although this is a small deviation in the overall scale of Region H surface water supplies. Estimates of the MAG for each aquifer layer and county are required for use in development of 2016 RWPs. Early in the process, Region H identified issues related to the use of these numbers that may cause unintentional inflation of the true water needs for the region. As a result, Region H adapted its methodology to deal with needs brought about by this Rule-Based Groundwater Disparity. The end result is a revision to groundwater needs in response to the artificial reduction of available groundwater supply in the 2016 RWP when compared to the 2011 RWP.

The identified WUG needs in the 2016 RWP were reduced due to the development of regional infrastructure recommended in the 2011 RWP for the 2010 decade. Needs for each decade in the 2016 RWP were consistently lower than the identified needs in the 2011 RWP and the final, 2070 need in the 2016 RWP was found to be nearly 75,000 acre-feet per year less than the identified 2060 needs at the end of the 2011 RWP planning horizon.

In total, the RHWPG recommended 70 WMSs and 717 projects for the 2016 RWP. This compares to 468 WMSs and 870 projects identified in the 2011 RWP. Much of the variation in WMS count is related to the way in which WMS are defined in the two RWPs. In the 2016 RWP, more strategy connections could be detailed through the use of WMSs and projects rather than the 2011 RWP structure that was built around WMSs and then, later, projects were developed from this list of WUGs and WMSs. Allocations of WMS supplies in the 2016 RWP differ from those in the 2011 RWP for a number of reasons, including differences in projected WUG demands, establishment of new existing contracts between water providers and WUG customers, implementation of 2011 WMSs as existing supplies, changes in recommended WMS, and changes to associated project schedules. A comparison of allocated WMS volume and active project count for the two Plans is presented in *Figure ES-7* below.

Figure ES-7 – WMS Supply and Active Projects by Decade