HARRIS-GALVESTON SUBSIDENCE DISTRICT

Determination of Groundwater Withdrawal and Effects on Subsidence – 2019

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Harris-Galveston Subsidence District Report 2020-01

Harris – Galveston Subsidence District
Friendswood, TX
2020

Executive Summary

Groundwater was the primary source of water for the municipal, agricultural, and industrial users over the last century. Rapid increase in population in the 1950s due to the expansion of the industrial complex in the Houston Ship Channel area led to a dramatic increase in water demand and groundwater withdrawal. The reliance on groundwater and subsequent subsidence that was caused by its regional development resulted in the creation of the Harris-Galveston Subsidence District (District) in 1975 and the Fort Bend Subsidence District in 1989. The District's mission is to regulate the use of groundwater in Harris and Galveston counties, to cease ongoing and prevent future subsidence that can lead to infrastructure damage and contribute to flooding.

This report comprises the 44th Annual Groundwater Report for the District. Pursuant to District Resolution No. 2020-1052 passed on February 12, 2020, and amended on April 8, 2020, the Board of Directors held the Annual Groundwater Hearing beginning at 10:00 a.m. on May 28, 2020. This report provides an overview of the information presented during the Public Hearing, including climatic conditions, groundwater use, groundwater levels and measured subsidence within the District through December 31, 2019.

Climate

Annual variations in precipitation can have a significant impact on the total water demand of the District. Water use patterns change during periods of climatic variation, which results in changes in water levels and potentially in subsidence rates. During periods of excessive rainfall, total water demand can decline, conversely, during prolonged dry periods, water use can increase resulting in declining water levels in the aquifer and increasing subsidence. Overall, the 2019 calendar year started out with below normal rainfall accumulations, followed by Tropical Storm Imelda, which resulted in significant flooding across the region. Rainfall totals ended up being at, or slightly above, normal across the District.

Water Use

Since 1976, water users in the District have been working to change their source water from primarily groundwater to alternative sources of water that will not contribute to subsidence, primarily treated surface water. The percent of total water demand sourced from groundwater has dropped from about 60 percent in 1976 to about 23 percent in 2019. Most of the current groundwater use occurs in Regulatory Area Three where the regulatory compliance timeline will not be completed until 2035. The three primary water uses in the District are public supply, industrial, and irrigation. The overall groundwater use within the District is 228.1 MGD, which is a 2 percent increase in pumpage from 2018. Public supply groundwater use remains the largest single use category at 209.2 million gallons per day (MGD), a 2 percent increase from 2018, and accounts for 92 percent of groundwater used in the District. Since the last regulatory conversion milestone in 2010, public supply and industrial uses are generally unchanged where irrigation uses have decreased by about 49 percent.

The District's Regulatory Plan requires permittees to convert to alternative water supplies in order to reduce their reliance on groundwater sources. The primary alternative water supply used in our region is surface water sourced from three river basins, the Brazos River Basin, the San Jacinto River Basin and the Trinity River Basin. Total alternative water use for 2019 was 746.7 MGD, with the Trinity River

remaining the single largest source of alternative water providing a total of 531.5 MGD in surface water supply. Groundwater remains the second largest source of water supply within the District as a whole. The total water use for the District was determined to be 974.8 MGD in 2019, which is 3 percent lower than 2018.

Groundwater Levels

Annually, since 1975, the United States Geological Survey (USGS) has measured the water level in hundreds of wells throughout the Houston region in cooperation with the District through a joint funding agreement along with additional cities, subsidence districts and groundwater conservation districts to monitor and provide reports on groundwater level altitude data for the Chicot, Evangeline and Jasper aquifers. Since aquifer water level is the best measure of the pressure in the aquifer, this information is also of vital importance to understanding the impact of changes in water use on subsidence.

The change in water-level in the Chicot and Evangeline aquifers since 1977 clearly shows the impact of District regulation on the aquifers. Generally, Regulatory Areas One and Two have seen a significant rise in the potentiometric water-level up to 200 feet and 240 feet in the Chicot and Evangeline aquifers, respectively. The area of rise is a result of the reduction of groundwater use required by the District's Regulatory Plan. Conversely, in Regulatory Area Three and nearby in northern Fort Bend and southern Montgomery Counties, water-levels continue to be significantly lower than the historical benchmark, declines of nearly 280 feet in the Evangeline and Jasper aquifers. These areas are growing rapidly and the conversion to alternative sources of water will not be completed in the District until 2035 and in the Fort Bend Subsidence District until 2025.

Subsidence

Since the late 1990s, the District has been utilizing global positioning system (GPS) to monitor the land surface deformation in the area. Working collaboratively with the University of Houston researchers, the monitoring network has grown to over 200 monitoring sites throughout the region that area operated by the District, the Fort Bend Subsidence District, the University of Houston, the Lone Star Groundwater Conservation District, and the Brazoria County Groundwater Conservation District.

The average annual rate of movement is a useful measure to show the current activity at a monitoring site. The annual rates of subsidence observed in Regulatory Areas One and Two are generally stable, since both areas have reached their full regulatory conversion level (1990 and 1995, respectively) and potentiometric water-levels have risen. Subsidence rates are generally above 0.5 centimeters per year (cm/yr) throughout Regulatory Area Three as this area is still undergoing conversion to alternative water supply.