Port Lavaca Water Treatment Plant

CDBG-Mitigation Project

Port Lavaca Plant Hardening

On August 30, 2019, the US Department of Housing and Urban Development (HUD) published a Federal Register Notice that provides guidance for the new mitigation component of the CDBG disaster recovery program. This component, identified as CDBG-MIT, represents the first allocation solely for the purposes of mitigating the impact of future disasters funds to grantees. HUD has allocated $6.875B in CDBG-MIT funds to 14 grantees recovering from qualifying 2015, 2016 and 2017 disasters. The State of Texas has been allocated 4.2 Billion dollars to address mitigation needs. Calhoun County was listed as a "State of Texas" Most Impacted and Distressed County (MID). This designation allows entities to apply for federal funds to mitigate future events.

The Guadalupe-Blanco River Authority (GBRA) owns and operates the Port Lavaca Water Treatment Plant (WTP) which serves the City of Port Lavaca (City), Calhoun Country Rural Water Supply System (CCRWSS), and the Port O'Connor Municipal Utility District (POCMUD). The conventional WTP was constructed in 1968 and was expanded in 1991 and is the only drinking water supply for the City and CCRWSS.

The WTP water supply is also a critical safety component for the population of Calhoun County. As the provider for water for the City of Port Lavaca Fire Department, the uninterrupted operation of the WTP is critical to maintain fire safety throughout the County. This Fire Department supports several VFD's in Calhoun County: Six Mile Community, the Alamo Beach/Magnolia Beach/Indianola Beach Communities, Port O'Connor Community, Seadrift Community and Olivia Community. These have mutual aid agreements to work the City of Port Lavaca Fire Department through a City –County agreement as well as sharing Emergency Medical Services. Maintaining the functionality of the water supply is critical for County wide public fire safety.

The WTP is located near Chocolate Bay southwest of the City along the Gulf Coast and the raw water supply is a 30-mile canal system that ultimately connects to the Guadalupe River downstream of the confluence with the San Antonio River. The proximity of the plant and raw water supply to the coast, the age of the existing facilities, and variability in raw water quality from the river contribute to the following risks and treatment challenges:

- Flooding of the raw water canal and the wind damage and inundation of the WTP during storm events
- Potential loss of power
- Saline groundwater intrusion leading to corrosion of underground facilities
- High levels of disinfection byproducts (DBPs) due to highly variable TOC concentrations in raw water and older treatment technology
- Unreliable service levels due to aging infrastructure

According to the National Weather Service, the frequency of a hurricane striking any 50 mile stretch along the Texas Coast is one in every 6 years, and the annual probability ranges from about 30 to 40 percent. Due to the location of the raw water canal system and the WTP, they are at risk of partial or complete storm surge inundation in a Category 1 hurricane or greater. Plant facilities, such as the chemical storage

and maintenance buildings, are at risk of flooding in a Category 5 storm event. Chlorine gas is stored in an exterior location, susceptible to damage from high winds. Loss of access to buildings may potentially affect the plant operations during a storm and create hazardous conditions. None of the building structures from the original WTP were designed to meet current windstorm requirements.

Additionally, the plant is located at the far reaches of the electrical power distribution system. Power losses are common during normal weather and storm events. The WTP currently relies heavily on the existing backup generator – even during good weather periods. The electrical system is showing significant deterioration, which may potentially prolong any power outages that may occur, should the backup generator fail. In 2020, the electrical feed to the raw water pump station failed, requiring an emergency repair. While the backup generator may help prevent power outages at the plant, it was installed when the plant was built and has reached the end of its useful lifetime.

Due to the plant's immediate proximity to Chocolate Bay and a neighboring salt water fish hatchery, which sits at a higher elevation, saline groundwater creates a corrosive underground environment, and based on observed corrosion of underground piping of similar material and age in the plant, it is expected that some, if not all, of the underground piping is corroded to a point that warrants replacement. A leak caused by underground corrosion under the slab of the high service pump station has required a plant shutdown and an emergency repair.

The organic composition of the raw water results in elevated (and highly variable) values of total organic carbon (TOC) – in 2017 the average raw water TOC concentration was 4.5 mg/L, with a range from 2.4-7.7 mg/L. TOC combines with disinfection chemicals to form disinfection by-products (DBPs) that are potentially harmful to human health. Consequently, EPA and TCEQ regulatory requirements for TOC removal and DBPs have become more stringent since the construction of the plant. The WTP treatment process was not designed to remove this level of TOC or to prevent the formation of DBPs. The WTP and its customers have been cited by the TCEQ for not meeting the regulatory requirements for DBPs. Additionally, the available technology at the WTP is limited in its ability meet potential future regulations, such as the removal of organic compounds like polyfluoroalkyl substances (PFAS); which have been detected in the raw water.

Reducing DBP concentration is a goal for GBRA to further improve its drinking water quality. Efforts to control organics levels in the raw water canal included removing seasonal overgrown hyacinth growth and feeding powdered active carbon (PAC) into the canal during high organic events.

Much of the process equipment, such as the filters and raw water pumps, were installed when the plant was built and have reached the end of their useful life. Process equipment such as the sludge collectors have been partially updated but critical equipment has not been replaced. For example, the existing steel clearwell is severely corroded and cannot be used.

A condition assessment and performance evaluation of the WTP conducted in 2017-2018 identified multiple improvements and rehabilitation items at the WTP that will ultimately increase its reliability. The purpose of the WTP improvements project is to mitigate the damages due to saline groundwater intrusion and flooding of critical structures during storms, power loss, and to enhance finished water quality.

To address saltwater intrusion in the underground environment, the project will include replacement of raw water pumps, and corroded underground piping will be replaced with compatible materials or

installed above-ground. To address the potential for power loss and improve functionality during periods of power loss, the main electrical feed, switchgear, and backup generator will be replaced since they are more than 50 years old and are no longer reliable.

To address resiliency and protection during storm events, all new facilities will be designed to withstand a Category 5 storm event. The treatment facilities will be constructed so that the walls are above the associated storm surge elevation. The administration building will be built above the projected storm surge elevation to be protected from flood damage, and new structures will be designed to meet windstorm requirements. Chlorine storage will be moved indoors, and a chemical scrubber will be included to protect the facilities from storm events and to provide protection to the public from chlorine leaks. The WTP project includes various process improvements to improve TOC removal and to increase capability to handle raw water TOC variability The proposed project will include relocating the chlorine feed point to after filtration and installation of chlorine dioxide in the raw water piping to meet disinfection requirements, improve TOC treatment, and reduce DBP formation. The proposed project includes various improvements to the rapid mix, flocculation/sedimentation basin, and filters to replace deteriorating equipment and increase TOC and turbidity removal. Granular activated carbon (GAC) filters (underdrains, piping gallery, and air scour system) will be constructed to replace the existing filters which are severely deteriorated. GAC media removes TOC and is one of the only technologies available for removing PFAS. To improve reliability of the WTP, a new high service pump station and finished water storage tank will be included in the project. The pump station will be designed with a wet well to address the impact from corrosive groundwater.

These improvements will provide the following benefits to GBRA and the residents of Calhoun County:

- The new facilities will be more reliably protected from storms that are prevalent on the Gulf Coast; and plant personnel and the surrounding public will be better protected from chlorine leaks.
- The treatment process will more reliably protect the public from harmful disinfection byproducts and from organics found in the raw water supply.
- The potential for loss of service due to aging and corroded infrastructure will be reduced.
- A more reliable source for backup power will be provided.
- Fire protection for Port Lavaca and the other fire departments throughout Calhoun County will remain uninterrupted during storm and drought events.

CDBG-MIT: Budget Justification of Retail Costs
(Former Table 2)

Cost Verification Controls must be in place to assure that construction costs are reasonable and consistent with market costs at the time and place of construction.

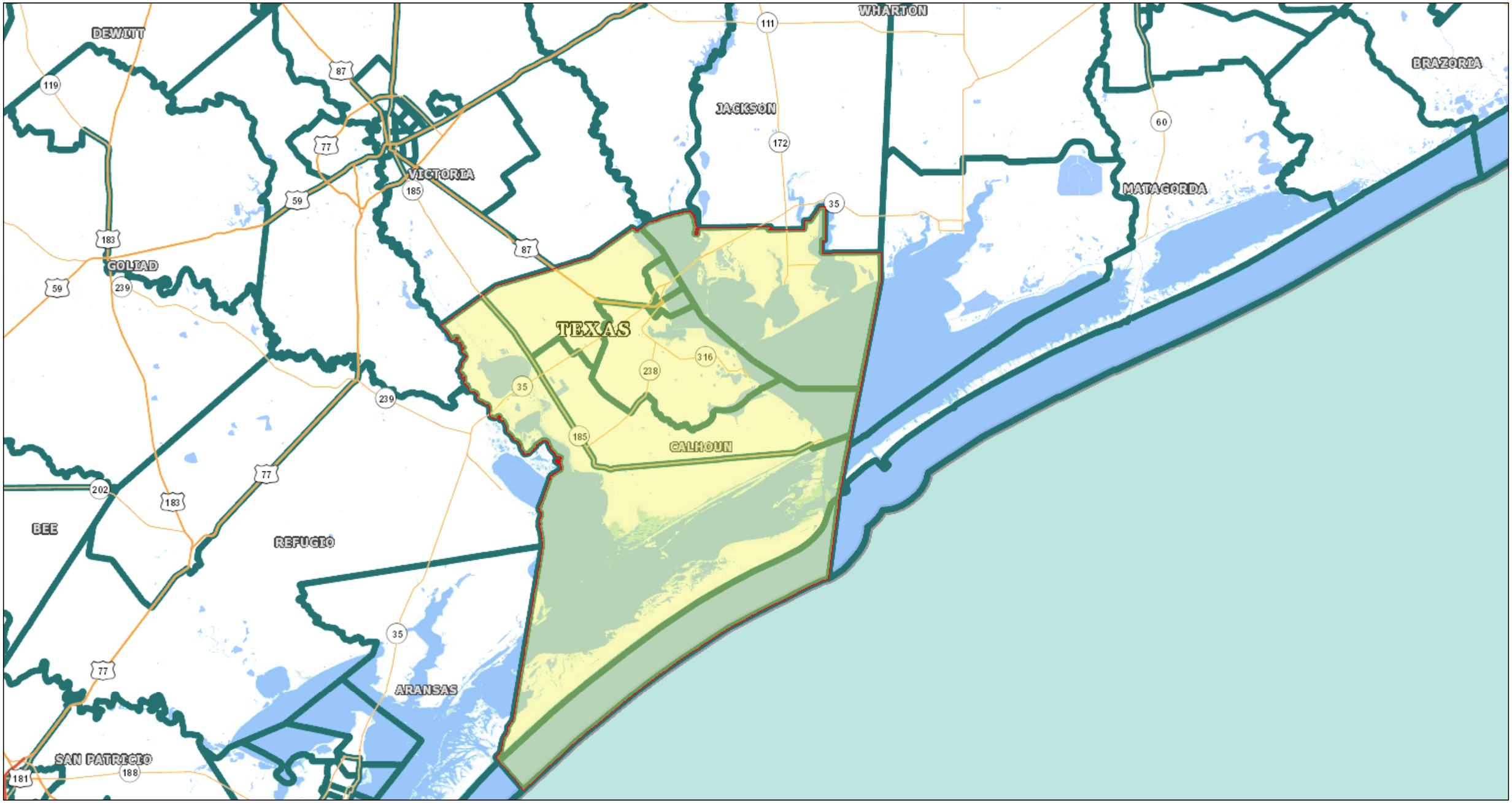
Applicant/Subrecipient:	GBRA/Plummer				
Site/Activity Title:	WTP Improvements				
Eligible Activity:					
Materials/Facilities/Services	**$/Unit**	**Unit**	**Quantity**	**Construction**	**Total**
Raw Water Pump Station	$ 1,702,839.00	LS	1	$ 1,702,839.00	$ 1,702,839.00
Chemical Supply	$ 4,432,390.38	LS	1	$ 4,432,390.38	$ 4,432,390.38
Rapid Mix	$ 205,178.00	LS	1	$ 205,178.00	$ 205,178.00
Flocculation/Sedimentation Basins	$ 1,524,424.10	LS	1	$ 1,524,424.10	$ 1,524,424.10
GAC Filters	$ 6,897,258.20	LS	1	$ 6,897,258.20	$ 6,897,258.20
Transfer Pump Station	$ 1,702,839.00	LS	1	$ 1,702,839.00	$ 1,702,839.00
Finished Water Storage Tank	$ 3,206,555.00	LS	1	$ 3,206,555.00	$ 3,206,555.00
High Service Pump Station	$ 4,949,385.54	LS	1	$ 4,949,385.54	$ 4,949,385.54
Emergency Generator	$ 1,992,606.42	LS	1	$ 1,992,606.42	$ 1,992,606.42
Buildings (Admin, Maintenance, Electrical, Payment)	$ 4,515,450.51	LS	1	$ 4,515,450.51	$ 4,515,450.51
Solids Handling Improvements	$ 526,948.75	LS	1	$ 526,948.75	$ 526,948.75
Demolition of Abandoned Facilities	$ 1,417,427.46	LS	1	$ 1,417,427.46	$ 1,417,427.46
Yard Piping & Site Work	$ 5,060,215.26	LS	1	$ 5,060,215.26	$ 5,060,215.26
	$ -			$ -	$ -
Administration - Force Account Labor (6%)	$ 2,288,011.06	LS	1	$ 2,288,011.06	$ 2,288,011.06
Engineering Budget (15%)	$ 5,720,027.64	LS	1	$ 5,720,027.64	$ 5,720,027.64
Local Leverage (1%)	$ (461,415.56)	LS	1	$ (461,415.56)	$ (461,415.56)
	$ -		0	$ -	$ -
	$ -		0	$ -	$ -
	$ -		0	$ -	$ -
	$ -		0	$ -	$ -
	$ -		0	$ -	$ -
	$ -		0	$ -	$ -
TOTAL	$ 45,680,140.76			$ 45,680,140.76	$ 45,680,140.76

Project Beneficiary

geoname	Lowmod	Lowmoduniv	Lowmod_pct
Block Group 1, Census Tract 1, Calhoun County, Texas	545	1255	43.43%
Block Group 2, Census Tract 1, Calhoun County, Texas	780	3300	23.64%
Block Group 3, Census Tract 1, Calhoun County, Texas	865	1030	83.98%
Block Group 1, Census Tract 2, Calhoun County, Texas	465	745	62.42%
Block Group 2, Census Tract 2, Calhoun County, Texas	1035	1630	63.50%
Block Group 3, Census Tract 2, Calhoun County, Texas	285	450	63.33%
Block Group 4, Census Tract 2, Calhoun County, Texas	585	1410	41.49%
Block Group 1, Census Tract 3, Calhoun County, Texas	125	745	16.78%
Block Group 2, Census Tract 3, Calhoun County, Texas	245	650	37.69%
Block Group 1, Census Tract 4, Calhoun County, Texas	1265	2240	56.47%
Block Group 2, Census Tract 4, Calhoun County, Texas	645	1615	39.94%
Block Group 3, Census Tract 4, Calhoun County, Texas	135	1495	9.03%
Block Group 4, Census Tract 4, Calhoun County, Texas	525	1130	46.46%
Block Group 1, Census Tract 5, Calhoun County, Texas	395	1160	34.05%
Block Group 2, Census Tract 5, Calhoun County, Texas	375	910	41.21%
Block Group 3, Census Tract 5, Calhoun County, Texas	570	1060	53.77%
Block Group 4, Census Tract 5, Calhoun County, Texas	155	575	26.96%
Block Group 0, Census Tract 9900, Calhoun County, Texas	0	0	0.00%
	8995	21400	

Project Beneficiaries	**21,400**
Low to Moderate Beneficiaries	**8,995**

Port Lavaca Water Treatment Plant CDBG-MIT Project



September 30, 2020

1:577,791

States
Counties
Census Tracts
States
Counties

0 5 10 20 mi
0 10 20 40 km

Source: U.S. Census Bureau
Sources: Esri, USGS, NOAA

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