DRP-040

City of Mercedes's Proposed Water Well System for Drought Resiliency

WaterSMART: Drought Response Program: Drought Resiliency Projects for Fiscal Year 2021
Funding Opportunity BOR-DO-20-F002
August 5, 2020
Funding Group I

Submitted by:
Sergio Zavala, City Manager
City of Mercedes
400 South Ohio,
Mercedes, Texas 78570
(956) 565-3114
szavala@cityofmercedes.com

Table of Contents

Technical Proposal and Evaluation Criteria

Executive Summary

Date: August 5, 2020
Applicant Name: City of Mercedes
City, County, State: Mercedes, Hidalgo County, Texas

The City of Mercedes is located Hidalgo County, Texas, and is pursuing the Drought Response Program grant to assist in the construction of a new water production well system, critical to providing the City and the community with drought resiliency, which they do not currently possess. The well will supplement an approximately 25 year old production well, and will add approximately 2,200 acre-feet per year of local, high-quality water to the City's drinking water supply, a much needed relief from the constant threat of water shortage. The project will mainly consist of the construction of the well and necessary pipeline improvements, among other appurtenances. The City's only source of surface water is from a local irrigation canal, and since the water supply system does not have a raw water reservoir, the City's surface water supply can become inaccessible at a moment's notice. The construction of this new groundwater production well will increase the reliability and resiliency of the City of Mercedes's water supply system, and will allow it to maintain its treatment capacity, and meet the communities' necessities. The project is supported by various local entities, such as Hidalgo County, local Irrigation District, local Water Supply Corporation, among others, as well as being supported by the Rio Grande Regional Water Planning Group Plan since at least 2011.

The City of Mercedes is in an area where the only source of surface water is provided through an irrigation canal controlled by the local Irrigation District. The canal provides water directly to the only municipal Water Treatment Plant (WTP), located adjacent to the irrigation canal. Said WTP does not have a raw water reservoir, meaning that if the irrigation canal was to suffer a bank failure, be in need of emergency repairs, or for any other reason be unable to deliver usable water to the WTP, the City will immediately run out of surface water supply.

The WTP has one alternate source of water, being a water well located within the WTP facility, built approximately 25 years ago. The well had been unusable for several years in the recent past due to a need for repairs and rehabilitation, and was recently brought back online in 2019. It was brought back online out of urgent necessity, because the City found itself in a situation in which the surface water available and WTP facility were not enough to meet the needs of the City, especially during the summer demands. There was a sense of urgency to have an alternate

source of water available, so the City could responsibly provide water to its residents. That objective was met, and a big hurdle overcome, temporarily.

However, the City is now in a similar predicament once more. The old well is not enough to provide drought resiliency or enough operational margin to the City, as its primary role right now is to complement the surface water to meet the typical demand requirements. The old well is also in suboptimal conditions, and is not expected to have much usable life left, especially since it is been operated close to its tolerance limits to meet demand. If surface water became unavailable, either through minor drought, or massive drought that causes temporary water allocation reductions to irrigation districts, among other, since the City does not have a raw water reservoir it would see an instant reduction of its water production capacity to substantially lower than its demand, and would not be able to meet the necessities of its residents.

The proposed project would not provide just some minor help to the City, it will create a substantial and amplifying positive effect throughout the entire system, as it will combat the constant risk of drought, the constant risk of surface water depletion, among others, which together comprise the constant risk of residents being unable to receive potable water.

The proposed project will not be built on a Federal facility, and the anticipated timeline, contingent upon award, is from 01/21 to 06/22 from start of planning/design to end of construction and project closeout, with construction to being after 07/21.

Project Location

The City of Mercedes is located in the southernmost part of the State of Texas, within Hidalgo County, in the area known as the Rio Grande Valley. Hidalgo County is bordered by Cameron and Willacy Counties to the East and Northeast, respectively, and Starr County to the West. To the South it is bordered by the Rio Grande River, with Kenedy and Brooks Counties bordering it to the North. Within Hidalgo County, the project is located within the City of Mercedes, itself being located in the southeast region of the County, as can be observed in Exhibit 1.

The project, being the Water Well for Drought Resiliency, will be located within the city limits of the City of Mercedes. The project location latitude is 26.147750°, and longitude is -97.905018°. In Exhibit 2, the project location can be observed in detail.

Technical Project Description

The proposed project will provide the applicant, being the City of Mercedes, with a complete and comprehensive water well system, which will serve the City by providing an alternative source of water, while also providing drought resiliency.

Before diving into the important technical aspects and workings of the project, the broad scope of the project is that a new water well will be created into which a pumping system will be installed. The groundwater will then be pumped to the nearby municipal Water Treatment Plant (WTP). The proposed path of the pumped groundwater and location of both the proposed well and existing WTP can be observed in Exhibit 2. Once at the WTP, the water will be chlorinated, and then, depending on plant operations and groundwater conditions at any given time, the water can either be directly stored in the existing clearwell for distribution, or routed through the WTP for further treatment before distribution.

The in-depth project description begins with the approach to accomplish this project. The engineering firm in charge of design will conduct an extensive study and analysis of the proposed project area, to determine its suitability for the proposed project. A

geotechnical engineering analysis will also need to be conducted to assist the design engineer in their determinations. Once the study and analysis phase is complete, the design engineer will proceed with the hydraulic study, which is necessary to accurately determine several critical components. Afterwards, the process can proceed to preliminary engineering, where what was determined during the study/analysis and hydraulic analysis phases can be put to work. For this specific project, some of the items that need to be determined for its successful completion include the appropriate pump size and motor, the required flow rate and settings for the pump, the pump curve, the pump depth within the well, the proposed depth of the well itself, the diameter of the well casing, the depth, spacing, length, and quantity of the well screens, the type of well screen to be used, the diameter of the pump column pipe, the suction and discharge dimensions, the materials used in submerged applications, the force main pipe dimensions to deliver water to the plant, the friction headloss of the proposed system, among others. The various figures and numbers used throughout the application are preliminary, and would need to be confirmed or adjusted by the design engineer.

Afterwards, the final engineering phase can begin, where everything that has been determined in the previous phases is placed into action, and plans and specifications for construction are developed. At this point, in this specific project, it would need to be determined the best route for the proposed force main pipe to take, taking into

account existing pavement and driveways, as well as the crossing of the existing irrigation canal. In familiarity with the governing Irrigation District's requirements, the pipe crossing the irrigation canal will likely need to be made of fusible pipe, as well as be installed 15 feet deep beneath the canal flow line. A topographic survey would have to have been conducted to adequately establish the location of the force main, water well, and other project components. All the electrical controls and appurtenances will need to be designed as well. Other aspects that will need to be determined is, once at the WTP, how best to connect the proposed force main to the existing WTP system. The produced groundwater will have seasonal and environmental fluctuations, so its conditions will not be consistent year round, every year. Likewise, the operations and conditions at the WTP are not the same all the time. Therefore, the pumped groundwater must be able to be routed through the WTP for treatment when necessary, but also be directed towards the existing clear well for storage when additional treatment is not necessary.

All of this would create a cohesive project that will provide substantial relief and drought resiliency to the City.

After the project design is complete, it will need to be implemented successfully. After the City formally procures a construction contractor through a federal procurement process, the contactor can begin construction deliberations with the City. The proposed first step at this time would be for the contractor to mobilize to the project site and prepare it for construction. A pilot well would be drilled, to conduct pumping tests and confirm that the location can produce the necessary water. After studying the results of the pilot well, the water well itself will be drilled. Drilling the well is a substantial component of the project. A bore is drilled to a larger diameter than the final diameter required for the well, as the well casing and well screen needs to be installed within, and there needs to be enough space to pack the gap between the bore and the well casing with a gravel rock material to stimulate water flow into the well.

After the creation of the water well is complete, the rest of the project can proceed. A pump test will be conducted, to establish the final capacity and production flow rate of the new well. This data is used to modify, if necessary, the proposed pump system. A video/CCTV inspection of the interior of the well will also be conducted, where a tethered camera is dropped in a controlled matter within the well, to inspect and analyze the interior of the well from top to bottom, and ensure the installation was a success. Afterwards, the pump system, composed of pump, motor, column pipe, among others, is installed in the well, along with various appurtenances such as the concrete base slab and pump support.

Afterwards, the completed well needs to be connected to the WTP in order to deliver water. Several further components and appurtenances are installed at the well locations, such as ductile iron piping, valves to control flow, flow meter to verify flow rate, a transducer to verify groundwater depth, as well as all the electrical systems

required to control, monitor, and operate the water well from the control building within the Water Treatment Plant. The controls and necessary electrical components will be housed in a panel adjacent to the pump. At its final stage, this part of the project area will be restored to its previous, grassy conditions, and will be fenced off to protect the site and the public, and ensure that the project site is a "good neighbor" to the community.

Another part of the project consists of the installation of the force main to deliver the water from the proposed well to the WTP. The ductile iron piping mentioned above will transition to a PVC pipe once underground, which will be installed by the construction contractor along the proposed route to the WTP. It will be necessary to restore all areas where trenching and excavation are performed to previously existing conditions.

Finally, once the force main installation reached the WTP, the project is near complete. There, a chlorine injection system will need to be installed to treat the raw water. After treating the water with chlorine, the proposed force main piping will be able to route the water either directly to the clearwell for storage and distribution, or route it through the WTP for further treatment before distribution.

Once all of the above is completed successfully, the project can be brought online, and the objective of creating drought resiliency for the City and the community will have been accomplished.

Although not part of the design or construction, another technical component that needs to be considered is the permitting of a new water well by the governing entity, in this case being the Texas Commission of Environmental Quality (TCEQ). The process would be started during the preliminary design phase, so that the permit is completed in a timely manner.

Performance Measures

There are several quantitative measures of well performance, the most common being discharge (Q), the volume of water produced per unit time. The water well design will be optimized to minimize drawdown while meeting the required discharge rates and intervals. A method that can be used for monitoring water levels in the proposed well is through the use of a sonic water level meters, which can be used both as a temporary well level measurement tool or permanently installed in a well to automatically record water levels over time. Sonic meters are often accurate to within 1/10 of a foot, but have a high convenience factor. Another option, and the method which will be used in this project to monitor water levels is through the use of a pressure transducer and datalogger. This set up uses a pressure transducer to record the height of the water column over the top of the transducer. The data is then stored

in the datalogger for direct read or periodic downloading and processing. The pressure transducer can generally register water levels to within 1/100 of a foot when properly calibrated and corrected for barometric pressure. To track water levels over time, the data for both static and pumping water levels will be charted over time to observe trends and to identify potential plugging issues before they endanger well production. The transducer will be connected to the existing SCADA system at the water treatment plant, so that its data is always tracked and readily available for monitoring during operations.

Additionally, the pump system will have a flowmeter immediately after the pump discharge head, to monitor and track flowrates any time the pump is on. In this manner, production from this well and its performance will always be measured and recorded, providing valuable date to manager and operations, as well as keeping a record for the future.

Evaluation Criteria

Evaluation Criterion A: Project Benefits

- How will the project build long-term resilience to drought? How many years will the project continue to provide benefits?

The project will build long-term resilience by adding up to an additional approx. 2 Million Gallons per Day (MGD) or 2,240 acre feet per year (ac-ft/yr). This means the supply will potentially increase from 2,893 ac-ft/yr to 5,133 ac-ft/yr, as seen in the figures below. Based on demand projections by the Rio Grande Regional Water Planning Group, this will be able to sustain the City until 2080. However, these projections do not take into account the existing water well reaching the end of its productive lifespan, likely before 2040, as well as any drought conditions which eliminate or reduce surface water availability. Additionally, the risk of the irrigation canal not being able to provide water is a constant looming cloud over the ability to deliver water to the system, which will be substantially mitigated with this project.

Figure 1. Mercedes Existing Supply Balance (ac-ft/yr)

Mercedes Existing Supply Balance (acft/yr)

MERCEDES	2020	2030	2040	2050	2060	2070	2080
Supplies	2,893	2,893	2,893	2,893	2,893	2,893	2,893
Demand	2,222	2,648	3,090	3,558	4,048	4,530	4,999
Need(-)/Surplus(+)	671	245	-197	-665	-1,155	-1,637	-2,106

Figure 2. Mercedes Anticipated Supply Balance (ac-ft/yr)

Mercedes Anticipated Supply Balance (acft/yr)

MERCEDES	2020	2030	2040	2050	2060	2070	2080
Supplies	2,893	5,133	5,133	5,133	5,133	5,133	5,133
Demand	2,222	2,648	3,090	3,558	4,048	4,530	4,999
Need(-)/Surplus(+)	671	2,485	2,043	1,575	1,085	603	134

- Will the project make additional water supplies available?

It is anticipated that up to 2,240 acre feet per year of additional water will able to be supplied to the system. This was calculated after converting from the proposed 2 million gallons per day to acre feet per year (2,000,000 gallons/day x 365 days /325,851 gallons = 2,240 acre feet per year). It is of note however, that this number does not account for water loss. Anticipated water loss according to the revised 2020 Water Conservation Plan is 10%. This equals to 2,016 ac-ft/yr (2,240 ac-ft/yr x 90% = 2,016 ac-ft/yr). Additionally, although the water well system will be designed to provide up to 2 MGD if necessary, it will not operate at that flowrate during normal operations. The anticipated production rate will be 1.75 MGD during normal operations, being 1,960 acre-feet per year of additional water supply, on average.

The estimated percentage of the total water supply is 43.6%. The estimate was calculated based on the proposed volume the water well provide divided by the total anticipated supply (2,240 ac-ft/yr / (2,240 ac-ft/yr + 2,893 ac-ft/yr) = 0.43 or 43%).

The water will provide a significantly boost the supply of the City's raw water. The City only has one source of surface water, which is impacted by drought and allocation restrictions, and no raw water storage in case of emergencies. Therefore, this new additional water supply will have a substantial positive impact in the City and its residents, to the degree that it will mitigate and alleviate many of its current and future issues. This supply may be able to help meet the City's demand for an additional 40 years. This source of water will also greatly benefit in case of a surface water emergency.

- Will the project improve the management of water supplies? For example, will the project increase efficiency, increase operational flexibility, or facilitate water marketing (e.g., improve the ability to deliver water during drought or access other sources of supply)?

The City of Mercedes currently has a water well that is rated at 1.75 mgd. However, the water well has had issues in the past and upgrades and repairs have been needed. It was previously decommissioned for three years. This additional source of water will give the City flexibility in the case that the existing water well will likely stop functioning in the future. Additionally, there is only one canal that delivers surface

water, and the City does not have a raw water reservoir. In case of a drought, or failure of the irrigation canal, this additional source will be able to help meet the demand of the City. It will also increase operational flexibility, in that having now two alternate sources of water allows the City to reduce demand and strain on the existing old well, therefore extending its usable life substantially. It also provide flexibility as described above, by being able to handle demand if the irrigation canal is unable to deliver water in the typical volumes due to any reason (drought, operations, maintenance, etc.)

It is anticipated that up to 2,240 acre feet per year of additional water will able to be supplied to the system. This was calculated after converting from the proposed 2 million gallon per day to acre feet per year (2,000,000 gallons/day x 365 days /325,851 gallons = 2,240 acre feet per year). It is of note however, that this number does not account for water loss. Anticipated water loss according to the revised 2020 Water Conservation Plan is 10%. This equals to 2,016 ac-ft/yr (2,240 ac-ft/yr x 90% = 2,016 ac-ft/yr). Additionally, although the water well system will be designed to provide up to 2 MGD if necessary, it will not operate at that flowrate during normal operations. The anticipated production rate will be 1.75 MGD during normal operations, being 1,960 acre-feet per year of additional water supply, on average.

New information will be made available as part of this project. The amount of water supplied, typical production flow rates, groundwater levels, among others, will be supplied to governing agencies, such as TCEQ, as well as TWDB, and provided to the Rio Grande Regional Planning Group, which has had this project in its Plan for at least the past 10 years.
Data and information created from this project will also be incorporated into the annual utility profile, conservation report, and other documents the City needs to provide to the governing agencies, documents which become public domain and available through their website.

- Will the project have benefits to fish, wildlife, or the environment? If so, please describe those benefits.

It is not anticipated that there will be any substantial benefits to fish, wildlife, or the environment.

The proposed project will include a well component.

- What is the estimated capacity of the new well(s), and how was the estimate calculated?

The estimated capacity of the new well will be up to 2 MGD. This was estimated through hydraulic analysis of the proposed pipe, pump, and well casing dimensions. The estimated capacity is preliminary and will be dependent of the design phase

confirming the estimated capacity. It will need to be verified that the proposed capacity is feasible in an adequate manner.

- How much water do you plan to extract through the well(s)?

Although the well will be able to produce up to 2 MGD if necessary in case of emergencies, during typical operations the flow rate is not anticipated to exceed 1.75 MGD. In daily normal operations, production may be closer to 1 MGD than 2 MGD, as supply duties are split between the existing well and the new well. The pump curve will be designed so that the pump operates efficiently over a wide margin of flow.

- Will the well be used as a primary supply or supplemental supply when there is a lack of surface supplies?

The water well will be used as a supplemental supply to complement the existing water well, with the capacity to increase flow and meet demands in case of surface water unavailability and/or drought. It is anticipated that the supply balance between the existing well and the proposed well will shift as time progresses, with the new well providing a larger component of the supply as time passes, and with the demand on the existing well being decreased to reduce wear on its old infrastructure.

- Please provide information documenting that proposed well(s) will not adversely impact the aquifer ... nearby surface water supplies, and physical descriptions of the proposed well(s) (depth, diameter, casing description, etc.).

Figure 3. Aquifers Present in the Rio Grande Valley

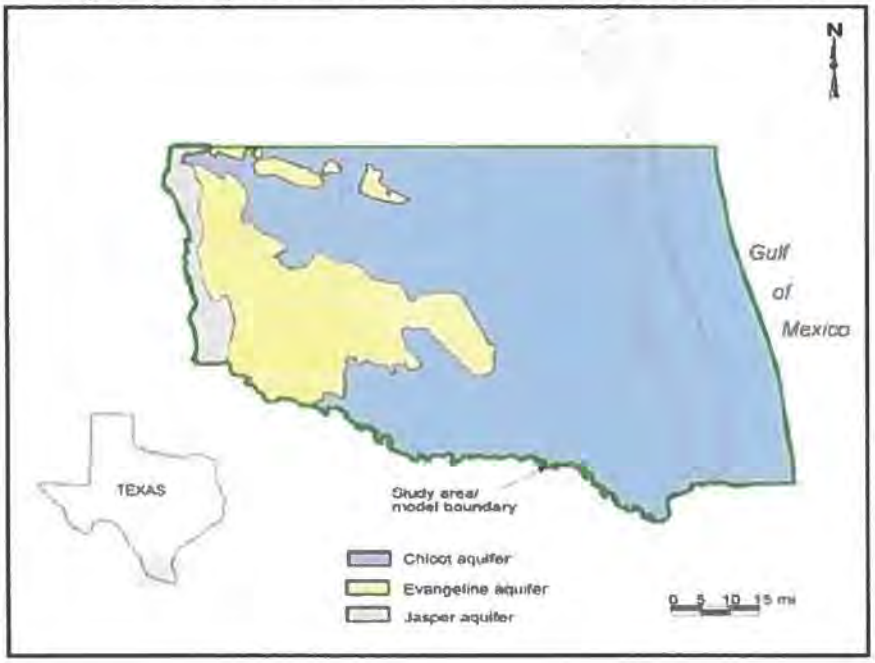


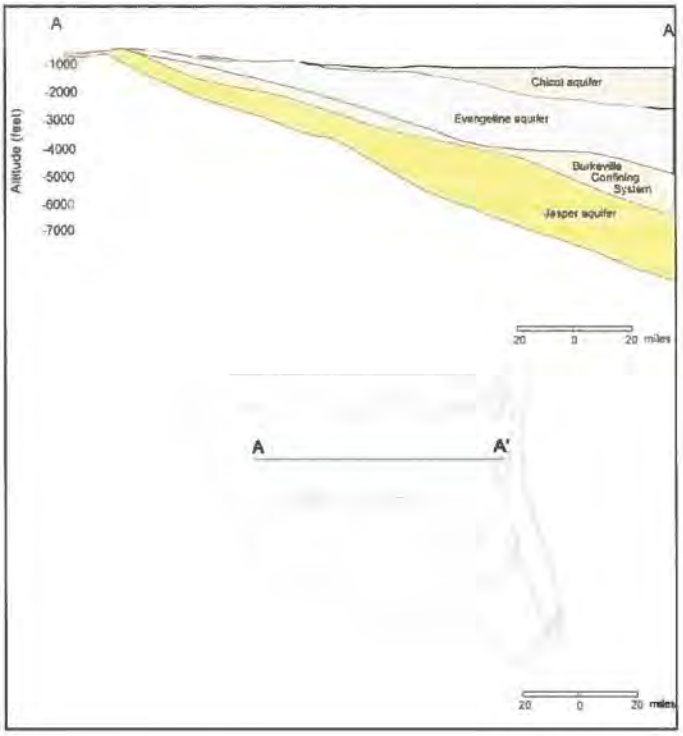
Figure 3 shows the three prevalent aquifers in the Rio Grande Valley. The Chicot is the shallowest and is most prevalent from Cameron County for the Gulf. As shown on Figure 7, the aquifer thins further west into Hidalgo County. This is the formation which seems to be taped in the above wells.

Under the Evangeline is the Burkeville Confining system and under that, the Jasper aquifer. These systems are present in both Hidalgo and Cameron but are too deep to exploit conventionally. The Burkeville Confining system keeps the Jasper from interacting with the Chicot and the Evangeline. The Burkeville begins at the base of the Evangeline and terminates at about 2000 feet. This keeps the Jasper under additional pressurization. The Jaspers bottom elevation is about 3000 feet below the surface. This system would require a well depth of 3000 feet to exploit this system. This system along with other deeper systems not studied by the TWDB could be exploited in a more innovative way.

The Gulf Coast Aquifer consists of interbedded clays, silts, sands, and gravels, which are hydrologically connected to form a leaky aquifer system. In general, there are four components of this system: the deepest zone is the Catahoula; above the Catahoula is the Jasper Aquifer located within the Oakeville Sandstone; the Evangeline Aquifer contained within the Fleming and Goliad sands is separated from the Jasper by the Burkeville confining layer; and the uppermost aquifer, the Chicot, consists of the Lissie, Willis, Bentley, Montgomery, Beaumont, and overlying alluvial deposits. In Region M, these overlying alluvial deposits include portions of the Rio Grande alluvium. These zones extend into Zapata and Webb counties but produce smaller quantities of water in these areas.

Recharge to the Gulf Coast Aquifer occurs primarily through percolation of precipitation. This may be supplemented in some areas by the addition of irrigation water from the Rio Grande, which may have negative impacts on water quality in localized areas. In some areas, recharge may be limited by shallow subsurface drainage systems designed to control the buildup of salts resulting from continued irrigation operations.

Figure 4. Aquifer Cross-Section

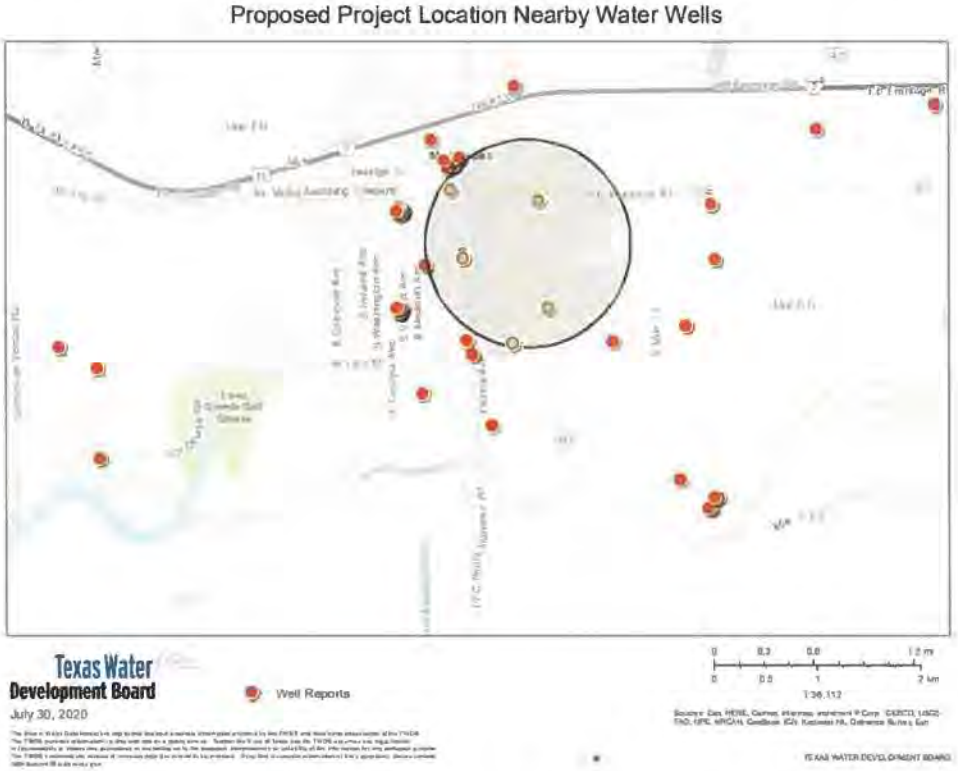


Nearby wells include the following:

Figure 5. Well Locations near Proposed Project Location Details

Owner	Well Location	Proposed Use	Borehole Diameter (in.)	Top Depth (ft.)	Bottom Depth (ft.)	Filter Material	Size
City of Mercedes Public Works	105 N Ohio Mercedes, TX	Monitor	8	8	30	Gravel	
Queen City Laundry	546 S Illinois Mercedes, TX	Test Well (Plugged)	2	7	19		
St. John Development Co.	605 E 10th St Mercedes, TX	Monitor	8	8	25	Gravel	12/20
Mr. Charles Bertholf	630 E 2nd St Mercedes, TX	Monitor (Plugged)	9	3	25		
Frank Hatch	S FM 491 Mercedes, TX	Domestic	5.25	52	57	Gravel	crushed

Figure 6. Well Locations near Proposed Project Location



The proposed well is anticipated to be 400 feet deep, with the pump being placed at a depth of approximately 300 feet deep. The casing of the well is 16' in diameter, preliminarily. The well casing will be gravel packed on the outside diameter to assist flow into the well. The casing will have screen sections, the length and location of which will be determined during design.

There are a few wells in the vicinity, as can be seen in Figure 6, and there has been no adverse impacts recorded, either overdraft or land subsidence, among others. From the Region Water Planning Group, which has studied the local aquifers extensively, groundwater usage for the area is encourage, and this specific project for the City has been supported in the Plan for at least a decade.

To assist in monitoring well production and groundwater levels, the well system will have a flowmeter installed to quantify flow, as well as a transducer to monitor groundwater elevation. These measuring tools will work in conjunction with the existing flowmeter and transducers at the existing water well, giving managers and operators two reference points into groundwater elevations, which can be used to responsibly monitor and compare groundwater elevations. Additionally, the project area will be fenced off for safety, and will be visited and inspected daily by operation staff to ensure no adverse effects are taking place.

Evaluation Criterion B: Drought Planning and Preparedness

A copy of the applicable drought plan has been attached to the appendix of this application.

- Explain how the applicable plan addresses drought. Proposals that reference plans clearly intended to prepare for and address drought will receive more points under this criterion.

As part of the process, input for collaboration was sought through a 30 day period for comments. The draft drought plan was published on the City's website for review and comments from interested parties before finalizing.

The current drought plan does not include consideration of climate change impacts at this time.

- Describe how your proposed drought resiliency project is supported by an existing drought plan.

The drought plan document identities the water well as an alternative source of water.

The proposed project meets a need described during emergency water supply instances. This happens when occurrences within this treatment or distribution create the inability for the system to provide adequate water to the customers. Notification is given to General Public through all media available. The proposed projects implements a measure described as an alternate water source, a well, in the plan, and will assist the City combat drought.

The proposed project is not directly prioritized in the referenced drought plan, but mention of an alternate source of water, being a water well, is reference as one of the mitigation measures for drought resiliency.

Evaluation Criterion C: Severity of Actual or Potential Impacts to be addressed by the Project

- What are the ongoing or potential drought impacts to specific sectors in the project area if no action is taken and how severe are those impacts? Impacts should be quantified and documented to the extent possible.

The community has another existing source of water in the case that surface water service is interrupted, this being a 1.75 million gallon per day (MGD) water well. However, there have been pre-exiting issues with this water well in the past that have placed it out of service, and has is likely nearing the end of its operational time. In addition, as previously stated, the City does not have a raw water reservoir in case of drought. There is an ongoing concern about possible water shortage, which is the

main reason the old well was rehabilitated. However, this measure is only a stop gap solution, and whenever it is brought offline for repairs or maintenance, the City is in a difficult situation once more.

There are no anticipated potential environmental impacts.

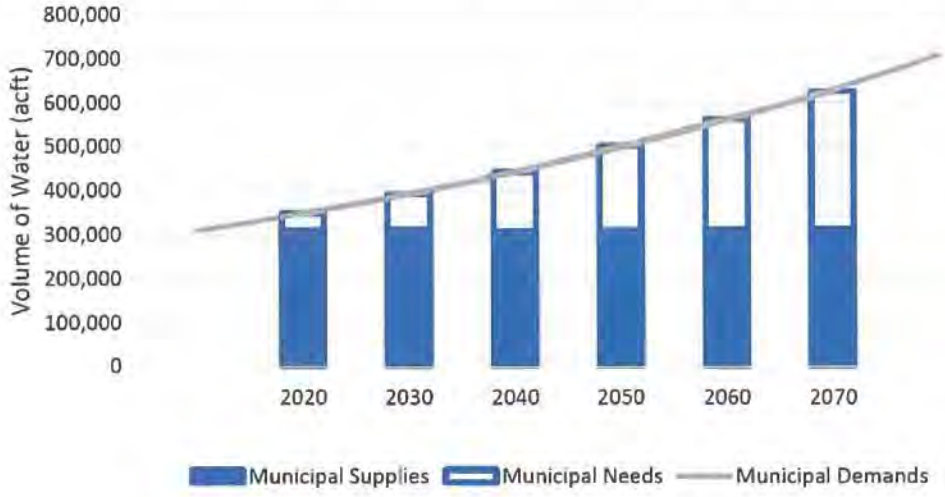
There are no recent, known losses associated with current drought conditions at this time. The City has been able to meet demand one way or another, but the situation is difficult and a substantially drought will cause the City to not meet demand.

Other drought related impacts exist, as are described in the endorsement letter from the local Irrigation District. The cloud of a water shortage looms, and the City, as well as the local Irrigation District, is currently in situation where it may be difficult to meet demand in the near future.

- Describe existing or potential drought conditions in the project area.

The population of Region M has been growing at a slightly higher rate than the rest of Texas. The demand distribution is heavily concentrated in Cameron and Hidalgo counties and in the Laredo area in Webb County. Current supplies are estimated to be less than the 2020 demands for municipalities. In some cases, this indicates that drought-year demands exceed normal supplies, and that need is regularly met by short-term contracts for water. Other municipalities may experience persistent shortage, especially those communities that rely solely on groundwater or utilities with infrastructure limitations.
Severe drought has affected Region M in the period of record of the Water Availability Model (WAM) (1940 through 2000) as well as in the years since 2000. The drought record helps to understand the firm yield from the Amistad-Falcon Reservoir system, and if droughts after 2000 have been more severe that those encompassed by the model's period of record, the firm yield is likely to be overestimated in the WAM.

Figure 7. Municipal Supplies Shown Relative to Municipal Demands



The WAM takes into account inflows from both Mexican and US tributaries associated with the drought of record, volumes and locations of demands along the river, channel losses along the river, and other factors. The deliveries from Mexico are not modeled according to the 1944 treaty, which establishes 350,000 acre-feet/year to be delivered to the United States; the deliveries are modeled according to historical supplies and demands rather than assuming that the treaty obligation will be met in full each year. Firm yield decreases slightly each decade from reduced reservoir capacity due to sedimentation.

Figure 8. Firm Yield Projections, Amistad-Falcon Reservoir System 2020-2070

	2020	2030	2040	2050	2060	2070
Amistad-Falcon Reservoir System	1,079,381	1,079,175	1,078,968	1,078,762	1,078,555	1,078,349

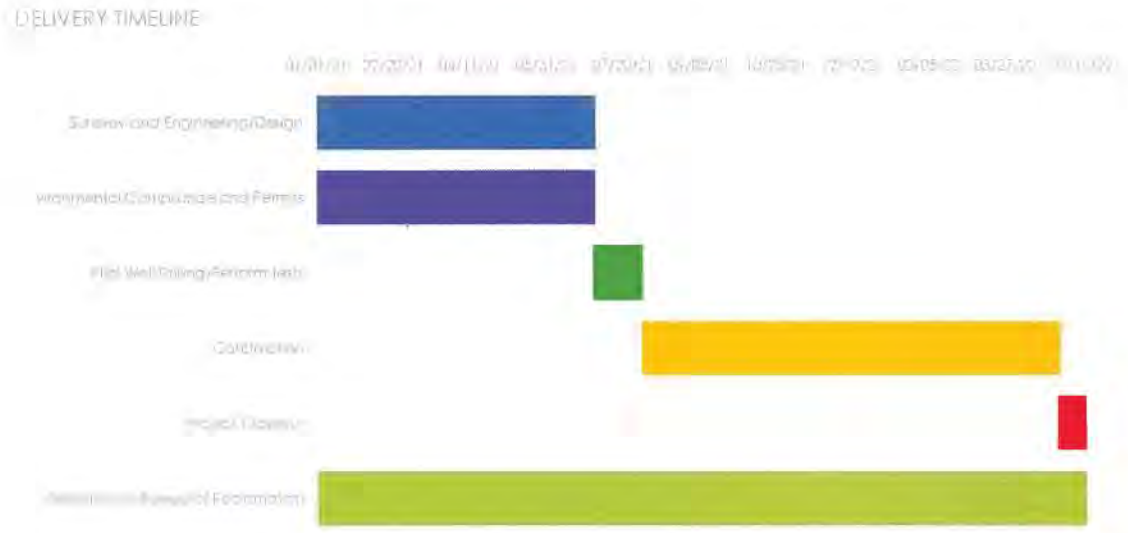
Evaluation Criterion D: Project Implementation

- Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: design, environmental and cultural resources compliance, permitting, and construction/installation.

Anticipated project time is anticipated to span from January 1, 2021 to June 1, 2022.

Figure 9. Project Milestones

Milestone/Task/Activity	START DATE	END DATE
Surevey and Engineering/Design	01/01/21	07/01/21
Environmental Compliance and Permits	01/01/21	07/01/21
Pilot Well Drilling/Perform Tests	07/01/21	08/01/21
Construction	08/01/21	05/01/22
Project Closeout	05/01/22	06/01/22
Reporting to Bureau of Reclamation	01/01/21	07/01/22



- **Survey and Engineering/Design.** The initial step in this project is to survey the project area and develop the engineering/design plan. A qualified engineering firm will work with the City of Mercedes to accomplish this step. Completion of this task is expected within six months of the award agreement.
- **Environmental Compliance and Permits.** The project will be constructed on property of the City of Mercedes. Any required local, state, or Federal permits will be obtained. Completion of this task is expected within six months of the award agreement.

- **Pilot Well Drilling/Perform Test**. Completion of this task is expected within seven months of the award agreement.
- **Construction**. Following the completion of the construction plans, the project will be commence construction. It will encompass all items required for the successful completion of the project. Completion of this task is expected within seventeen months of the award agreement.
- **Project Closeout**. Conclude all facets of the project in a manner that exceeds project objectives and accomplishes goals. Assure that the City has accepted the deliverables, perform a final assessment, and write the final project report. Completion of this task will take approximately one month.

  Reporting to Bureau of Reclamation. Reports will be prepared as required for submittal to the Bureau of Reclamation, and will keep in constant communication as necessary to ensure goals are met and project is completed successfully and satisfactorily.

- Describe any permits that will be required, along with the process for obtaining such permits.

The construction of the proposed water well will be coordinated with TCEQ following 30 TAC 290 (f) guidelines. A TCEQ well drilling permit and a TxDOT right-of-way permit will need to be obtained. Several forms will be filled out and submitted to TCEQ. Among these included are:

  - Public Water System Plan Review Submittal Form (TCEQ-10233)
  - Sanitary Control Easement Form (TCEQ-20698)
  - Core Data Form (for new systems) (TCEQ-10400)
  - Cementing Certificate (TCEQ-20842)
  - Financial Ability Form (TCEQ-20841)

- Identify and describe any engineering or design work performed specifically in support of the proposed project.

It will be necessary to conduct a thorough engineering analysis to study and design the project. It will be necessary to safely design the well, pumping system, force main pipe, and connection to WTP for distribution and drought resiliency. An in-depth description of the engineering and design work necessary for the successful completion of the project can be found under the Technical Project Description section.

- Describe any new policies or administrative actions required to implement the project.

No new policies will be required to implement the project.

Evaluation Criterion E: Nexus to Reclamation

- How is the proposed project connected to a Reclamation project or activity?

The project is set to improve forecasts of water availability and use technology to improve and increase water reliability. It will also improve management of available water in times of drought, given that the City does not count on a reservoir to store water. The need for this Project has also been referenced under the 2011, 2016, and 2021 Region M Planning Group report.

- Will the project benefit any tribe(s)?

It is not anticipated that the proposed project will benefit any tribes.

- Does the applicant receive Reclamation project water?

The applicant does not receive Reclamation project water.

- Is the project on Reclamation project lands or involving Reclamation facilities?

The project is not on Reclamation project lands and does not involve Reclamation facilities.

- Is the project in the same basin as a Reclamation project or activity?

The project is not believed to be in the same basin as a Reclamation project or activity. However, it is known that Reclamation has supported and assisted in the funding of local and neighboring Irrigation Districts.

- Will the proposed work contribute water to a basin where a Reclamation project is located?

The proposed work will not contribute water to a basin where a Reclamation project is located.

Evaluation Criterion F: Department of the Interior and Bureau of Reclamation Priorities

Department of the Interior Priorities

1. Creating a conservation stewardship legacy second only to Teddy Roosevelt

The project will utilize science, math, and engineering, among other disciplines, to use the available local water resources, in this case groundwater, in a manner that meets best practices.

2. Utilizing our natural resources

The project will utilize natural resources, in this case being groundwater, to meet the necessities of local residents and the community.

3. Restoring trust with local communities

By implementing this project, the City will be accomplishing a project long described in the Regional Water Planning Group's plan, which is directed by Texas Water Development Board. The project has also been endorsed by county commissioners and local community leaders, as reflected by the attached Letters of Support.

4. Modernizing our infrastructure

The project will entail the construction of infrastructure for water production and distribution, which will serve the basic needs of local residents.

Bureau of Reclamation Priorities

1. Increase Water Supplies, Storage, and Reliability under WIIN and other Authorities

The proposed 2 MGD water well will substantially increase the amount of water that the City is able to supply, as discussed in previous sections. It will also improve the City's drinking water system reliability.

2. Leverage Science and Technology to Improve Water Supply Reliability to Communities

The proposed 2 million gallons per day (mgd) water well project consists of several technologies used in order to improve water supply reliability. Among these are: the drilling method, casing that meets certain standards, transducers to read the water levels, pumps, and electrical appurtenances. Specific technology will be used in order to meet the proposed demand. The entirety of the project will be designed through a thorough engineering study, using various sciences.

3. Address Ongoing Drought

The project will alleviate past drought issues that the area has experienced and mitigate any possible future droughts. Additionally, it can also serve as an emergency source in case of drought, according to the City's Drought Contingency Plan.

Project Budget

Funding Plan and Letters of Commitment

The City of Mercedes plans to fully fund the Non-Federal portion of the project, as well as assume responsibility for any cost overruns (none are anticipated). The City budgets (and will budget in the next fiscal years) for such infrastructure expenses and has the fiscal capacity to perform this project. No letters of commitment are being provided since the City will be the sole non-federal entity funding the project, and will use funds within its budget to do so.

The budget proposal does not include any project costs that have been or will be incurred prior to the award.

Budget Proposal

Below please find Table 1 and Table 2, showing the Total Project Cost and Summary of Non-Federal and Federal Funding Sources, respectively.

Table 1: Total Project Cost Table

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$442,612.50
Costs to be paid by the applicant	$442,612.50
Value of third-party contributions	$0.00
REQUESTED RECLAMATION FUNDING	**$885,225.00**

Table 2: Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
City of Mercedes	$442,612.50
Non-Federal Subtotal	$442,612.50
REQUESTED RECLAMATION FUNDING	**$442,612.50**

Below please find Table 3, being the Budget Proposal table. The sample budget proposal format was followed as it was strongly advised to do so, and it is the City's

main objective to submit an application that is satisfactory, competitive, and successful. However, since at this time the construction is anticipated to be done primarily by a construction contractor who will provide the labor, materials, and equipment, it can be observed that no entries fit under the categories of salaries/wages, fringe benefits, equipment, and supplies/materials.

Table 3: Budget Proposal

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
Public Works Director	**$ 25.00**	**168**	**hour**	**$ 4,200.00**
Fringe Benefits				
N/A	**$ -**	**0**		**$ -**
Equipment				
N/A	**$ -**	**0**		**$ -**
Supplies and Materials				
N/A	**$ -**	**0**		**$ -**
Contractual/Construction				
Construction	**$ 665,500.00**	**1**	**Lump Sum**	**$ 665,500.00**
Engineering and Surveying	**$ 91,900.00**	**1**	**Lump Sum**	**$ 91,900.00**
Other				
Geotechnical Exploration	**$ 5,000.00**	**1**	**Lump Sum**	**$ 5,000.00**
Construction Management & Inspections	**$ 23,000.00**	**1**	**Lump Sum**	**$ 23,000.00**
Contingency	**$ 97,325.00**	**1**	**Lump Sum**	**$ 93,125.00**
Environmental & Regulatory Compliance	**$ 2,500.00**	**1**	**Lump Sum**	**$ 2,500.00**
Total Estimated Project Costs				**$ 885,225.00**

Please see Table 4 for breakdown of construction cost.

To supplement the recommended Budget Proposal format, please find Table 4 below, further describing the construction line item and providing a thorough breakdown of its components.

PRELIMINARY

Table 4

Opinion of COST ESTIMATE

Project: City of Mercedes - Proposed Water Well Drinking Water System

Description: Prop. Water Well System, including Controls, Electrical, Piping, etc., connecting to WTP for Drought Resiliency

Date: 7/31/2020

Item	Description	Quantity	Unit	Unit Price	Item Total
1.	MOBILIZATION	1	L.S.	$10,000.00	$10,000.00
2.	PILOT WELL EXPLORATION AND TESTING	1	L.S.	$30,000.00	$30,000.00
3.	WATER WELL INSTALLATION (DRILLING, CASING, ETC.)	400	L.F.	$350.00	$140,000.00
4.	VIDEO SURVEY/INSPECTION OF WELL	1	L.S.	$3,000.00	$3,000.00
5.	48 HOUR PUMP TEST (AND WATER SAMPLES)	1	L.S.	$15,000.00	$15,000.00
6.	VERTICAL PUMP, VFD MOTOR, 1400 GPM, 200 TDH, 10" COLUMN PIPE, 300' DEEP	1	EA.	$120,000.00	$120,000.00
7.	CONCRETE SLAB BASE, PUMP SUPPORT, VALVES, MAG METER, D.I. PIPE, TRANSDUCER, CHLORINATION SYSTEM, FITTINGS, AND APPURTENANCES	1	L.S.	$90,000.00	$90,000.00
8.	10" PVC PIPING/FORCE MAIN FROM WELL TO WTP (W/ FITTINGS, DETECTION TAPE, ETC.)	2,750	L.F.	$30.00	$82,500.00
9.	CANAL CROSSING W/ FUSIBLE PIPE	300	L.F.	$300.00	$90,000.00
10.	ELECTRICAL (CONTROLS, WIRING, VFD, SCADA CONNECTION, & OTHER APPURTENANCES)	1	L.S.	$60,000.00	$60,000.00
11.	CONNECTION & BYPASS TO WTP AND CLEARWELL	1	L.S.	$15,000.00	$15,000.00
12.	PERMANENT FENCING AND SITE RESTORATION	1	L.S.	$10,000.00	$10,000.00

SUBTOTAL OF CONSTRUCTION COSTS	$665,500.00
CONTINGENCIES @ ~14%	$93,125.00
ESTIMATED CONSTRUCTION COST	$758,625.00
TOTAL ENGINEERING & SURVEYING SERVICES	$91,900.00
GEOTECHNICAL EXPLORATION	$5,000.00
SALARIES/WAGES FOR APPLICANT PROJECT MANAGER	$4,200.00
ENVIRONMENTAL & REGULATORY COMPLIANCE	$2,500.00
CONSTRUCTION MANAGEMENT & INSPECTIONS	$23,000.00
TOTAL ESTIMATED PROJECT COST	$885,225.00

Budget Narrative

Salaries and Wages

The project manager for this project will be Mr. Jose Figueroa, Public Works Director for the City of Mercedes. He will be aware and involved in all parts of the project. However, the City has many current and future daily ongoing tasks that require attention, but primarily also understands that the City requires the technical expertise of professionals to successfully perform this project. Therefore, the current intent is for the selected engineering firm to provide management services and assist the City as necessary under the proposed "Construction Management & Inspections" line item. The engineer will also perform all required compliance and reporting requirements.

It is anticipated that the project will require 4 hours weekly of Mr. Figueroa's time during the construction period (with a preliminary construction timeline of 9 months), and 1 hour weekly on average for the periods pre and post construction (3 months each). At an hourly rate of $25/hour, it is anticipated that the project will require 168 hours of his time (4 hrs*4 weeks*9 months + 1 hrs*4 weeks*6 months = 168 hours), for a projected cost of $4,200.

Fringe Benefits

None are anticipated.

Travel

None is anticipated.

Equipment

Equipment will be furnished and installed under the construction contract, and the construction contract cost estimate reflects so.

Material and Supplies

Materials and Supplies will be furnished and installed under the construction contract, and the construction contract cost estimate reflects so.

Contractual/Construction

As it can be observed in tables 3 and 4, the intent is for the work to be performed by a proficient contractor, competitively selected through federal procurement standards, who can provide the City a cohesive and complete project. The majority of the work is specialized or technical, such as the drilling of the well itself, so it was deemed to the City's advantage to have a contractor perform the work.

However, the City is also conscious about spending funds in the most cost effective manner, so if allowed, the City may consider performing part of the non-specialized work that is currently proposed under the construction contractor, such as the installation of the water force main. Of course, the main objective is to be successful in procuring the grant, otherwise the project cannot proceed. So if separating an item from the contract work complicates the approach, the primary manner of proceeding will remain with the selected contractor providing the construction of the total project.

Further elaborating on the breakdown of the construction line items in Table 4, it can be observed that the first item is the anticipated cost of the contractor to mobilize crews, equipment, and materials to the job site. A pilot well will need to be drilled, to ensure that the proposed project location (which will be thoroughly studied and analyzed), is capable of yielding the anticipated and required water flow. The next line item within the construction breakdown shows the creation and installation of the water well itself. This will encompass the necessary drilling to the predetermined depth, the installation of the well casing and well screens, the gravel packing, among other items required to deliver a complete well installation. Afterwards, a pump test must be performed to analyze and evaluate the well's capacity. The next two line items, being #6 and #7 within Table 4, show the procurement and installation of necessary equipment, such as the pump system, motor, concrete slab, valves, flow meter, transducer, chlorine injection system, among other necessary components. Afterwards, line items #8 and #9 show the anticipated cost to route the water produced from the well towards the municipal Water Treatment Plant (WTP). The preliminarily proposed path of the force main can be observed in Exhibit 2, and necessitates an irrigation canal crossing, which the governing Irrigation District requires be performed with fusible pipe, and with a clearance of 15' beneath the canal's flow line. The next construction line item is the electrical system and appurtenances required to control and monitor the water well pumping system. Afterwards, it can be seen that the next line item is a connection that will need to be analyzed and determine how best to connect to the existing WTP infrastructure, in case the City needs to treat at any time the ground water and thus circulate the water produced from the well through the treatment process, but also be able to deliver the groundwater directly to the existing clearwell for storage after chlorination, if it does not require treatment at the WTP. Finally, the last construction line item is a fencing

component to protect the public and the new water well system, as well as site restoration to its original conditions before construction.

The second line item under the contractual section, being engineering and surveying, shows the anticipated cost for the professional services of a qualified engineering firm to provide all the required engineering and surveying services for the successful completion of the project, including but not limited to, study and analysis, hydraulics, preliminary design, final design, plans and specifications, among others. The firm would also perform all required topographic survey required for the successful completion of the analysis and plans. The firm will also perform on behalf of the City all necessary reporting and compliance requirements.

Third-Party In-Kind Contributions

None are anticipated.

Environmental and Regulatory Compliance Costs

Described under "Other Expenses" in Table 3, the applicant understands that Reclamation will perform environmental compliance activities for the project. The preliminary cost is for a standard review anticipated from Reclamation. If further review is required from the applicant's end, the contingency line item will allow for such expenses.

Other Expenses

Under the "Other" section, the first line item is Geotechnical Exploration. This encompasses the anticipated costs for a geotechnical soil exploration and analysis, which will be a valuable tool for the design engineer. The anticipated cost is typical for the area, depending on the amount of bores.

The next line item is Construction Management and Inspections. Preliminarily, this would be conducted by the same professional engineering firm that performed the design, as their knowledge of the project would be valuable. The services would include pre-construction phase services, such as construction contractor procurement and bidding and negotiation, as well as construction phase services, being construction management and constant project inspections to ensure project is being built as per plans and specifications, and finally post-construction phase services, being project closeout and warranty items, among others. Under this management line item, reporting and compliance will also be performed as necessary.

The next line item is the Contingency, being approximately 14.5% of the construction cost (12.5% of the total project), which provides some flexibility if there are unforeseen expenses determined during the in-depth design phase, or possible rise in cost of materials and equipment between this date and the construction commencement date.

Finally, the last line item under 'Other' is the anticipated cost required to perform the environmental and regulatory compliance review, if required for the project.

Indirect Costs

None are anticipated.

Environmental and Cultural Resources Compliance

1. The proposed project will be built within land currently owner by the city, and there are no nearby structures or habitats of concern. A 50' x 50' surface area will be reserved and fenced off, which will be restored to the original conditions before being disturbed, to ensure the project and project area is a "Good Neighbor". This action will minimize impacts on the surrounding environment. Earth disturbing work will be limited to the drilling of the well, and the trenching for the water force main pipe installation. Construction may result in dust, which will be mitigated by watering. If additional control measures are needed, they will be implemented. No impact from proposed work is anticipated.

2. No species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat is anticipated to be present or affected in the project area.

3. There are no wetlands or other surface waters inside of the project area boundaries that could potentially fall under CWA jurisdiction as "Waters of the United States".

4. The proposed water well delivery system is a new construction that will tie to the existing water treatment plant for distribution. The WTP was most recently upgraded and improved in 2000.

5. The proposed project will not result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes).

6. There are no existing buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places. The project funding is being sought for new construction in a vacant field located on A City of Mercedes property, and does not impact an irrigation district.

7. There are no known archeological sites in the proposed project area.

8. The proposed project will not have a disproportionately high and adverse effect on the low income and minority populations in the service area. Rather, the project will have a positive effect on the population in the service area, which is composed primarily of minority and low income populations.

9. The proposed project will not limit access to nor limit any ceremonial use of Indian sacred sites or result in other impacts on tribal lands. There are no existing Native American sites within the project area.

10. The proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

Required Permits or Approvals

If the NEPA review process finds that the project requires permits or approvals, those will be obtained. The City of Mercedes will also consult with the Texas Historical Commission for any requirements. None are anticipated.

In addition to the aforementioned requirements, the construction of the proposed Water Well will be coordinated with TCEQ following 30 TAC 290 (f) guidelines. A TCEQ Well Drilling Permit and a TxDOT Rights-Of- Way Permit will need to be obtained. Several forms will be filled out and submitted to TCEQ. Among these included are:

- Public Water System Plan Review Submittal Form (TCEQ- 10233)
- Sanitary Control Easement Form (TCEQ- 20698)
- Core Data Form - Required for New Systems (TCEQ-10400)
- Cementing Certificate (TCEQ-20842)
- Financial Ability Form (TCEQ-20841)