

**WaterSMART: Water and Energy Efficiency Grant for  
Fiscal Year 2023, Funding Group III**

**Donna Irrigation District  
Piping of 3,800 feet of Lateral 22 with 48" PVC,  
5,200 feet of the South Crossover with 60" PVC,  
Solar Powered Backup Battery Systems for Pump Stations, and Solar  
Powered Metering and Overflow Monitoring**



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Table of Contents

SF - 424 Application for Federal Assistance  
 SF - 424A Budget Information  
 SF - 424D Assurances - Construction Programs  
 Project Abstract Summary (OMB 4040-0019)  
 Certification Regarding Lobbying  
 Title Page  
 Table of Contents

A. Technical Proposal .....	1
(1) Executive Summary.....	1
(2) Project Location.....	2
(3) Technical Project Description.....	2
(4) Evaluation Criteria.....	13
A. Quantifiable Water Savings.....	13
B. Renewable Energy.....	16
C. Sustainability Benefits.....	18
D. Complementing On-Farm Irrigation Improvements.....	24
E. Planning and Implementation.....	25
F. Collaboration.....	27
G. Additional Non-Federal Funding.....	27
H. Nexus to Reclamation Project Activities.....	27
(5) Performance Measures.....	28
B. Project Budget.....	28
(1) Funding Plan and Letters of Commitment.....	28
(2) Budget Proposal.....	28
(3) Budget Narrative.....	28
C. Environmental and Cultural Resources Compliance.....	33
D. Required Permits or Approvals.....	34
E. Overlap on Duplication Efforts.....	34
F. Conflict of Interest Disclosure Statement.....	34
G. Uniform Audit Disclosure Statement.....	34
H. Letters of Support.....	34
I. Official Resolution.....	35



*Frank A. Ferris*

7.27.22

## List of Figures

Figure 1.1 – Location Map.....	3
Figure 1.2 – Overall Project Map.....	4
Figure 1.3 – Project Map.....	5
Figure 2 – Push Water Operation for Municipal Customers.....	10
Figure 3 – District, US and Mexico Percent Storage in Falcon & Amistad.....	12
Figure 4 – Engelman Irrigation Solar Powered Metering and Overflow Monitoring Location.....	14
Figure 5 – Five Year Repayment Cycle to the US by Mexico.....	20
Figure 6 – Amistad-Falcon Percent of Conservation Capacity.....	21
Figure 7 – Rio Grande Basin & North America Drought Monitor.....	23

## List of Tables

Table 1 – Water Diversion, Deliveries and Efficiency.....	6
Table 2 – Quantifiable Water Conservation.....	7
Table 3 – Annual Transit Loss Reduction.....	15
Table 4 – Milestones and Schedule of Expenditures.....	26
Table 5 – Total Project Cost Summary .....	29
Table 6 – Non-Federal Funding Source Summary.....	29
Table 7 – Proposed Budget.....	30

## List of Appendices

Appendix A – Energy Conservation.....	36
Appendix B – Excerpts from "Lower Rio Grande Basin Study".....	40
Appendix C – TCEQ Operaton of the Rio Grande Allocation and Distribution of Waters, TAC Rule 303.22 Allocation to Accounts.....	52
Appendix D – Seepage Calculations.....	55
Appendix E – Not Used	
Appendix F – Greenhouse Gas Emissions Calculation.....	64
Appendix G – Water Conservation and Drought Contingency Plan.....	65
Appendix H – Letters of Support.....	73
Appendix I – Budget Development and Documentation.....	75
Appendix J – Lower Rio Grande Valley National Wildlife Refuge.....	92

## A. Technical Proposal and Evaluation Criteria

Date: July 27, 2022

Applicant: Donna Irrigation District, Category A Applicant  
101 N. Salinas Blvd., Donna, Hidalgo County, Texas

### **(1) Executive Summary**

The proposed project will conserve water while reducing the quantity of Push Water required to serve the City of Donna (the City) and North Alamo Water Supply Corporation (NAWSC), a rural water supply corporation, and reduce the likelihood that a push water operation limited to municipal customers might occur. The reduction is achieved by piping 5,200 feet of open, leaking canals between the District's Second Lift Station and the City's Water Treatment Plant (WTP) with 60" PVC pipe and piping 3,800 feet of open, leaking and overflowing, canal with 48" PVC that feeds a NAWSC WTP. Through seepage testing and modeling, it was determined that the project will conserve 1,790 acre-feet per year, reducing the impacts on the two potable water systems (PWS) in the event of a severe drought, greatly enhancing drought resiliency for the District and its customers. The two PWS's serve approximately 180,000 people, the majority of which are of low income and minority. This reduction in push water requirements could save the entities several hundred thousand dollars during a severe drought when irrigation supplies are depleted. The new PVC pipe has no measureable leakage and will facilitate on-farm irrigation improvements, such as drip-irrigation, through increased head energy as new pipelines connect to main canals which will serve as storage reservoirs when District pumps are not running. A solar-charged battery system at the First (Rio Grande River) Lift Pump Station will allow continued diversion of water during power failures, which would otherwise be lost downstream. A solar-charged battery system at the Second (Donna Reservoir) Lift Pump Station will allow continuous service to the City WTP, which has no raw water storage, so that they can continue to treat water for a safe, pressurized water supply to City potable water customers. The ability to pump out of the Rio Grande River during power outages reduces the releases from the District's storage in the Falcon and Amistad reservoir systems by 500 acre-feet per year. The solar charged battery backup systems are a renewable alternative to fossil fuel generators, reducing greenhouse gasses. The total annual reduction in releases from the reservoir system, 2,290 acre-feet per year, will remain in the District's storage balance in the reservoir system. Had the proposed USBR projects been implemented in 2010, the last time that the District had a full storage balance, the District's storage balance that is 5%, would have only dropped to 65%. This significant increase in storage accumulation greatly decreases the likelihood that the District would encounter a Push Water Operating Condition where only municipal customers are being supplied, greatly reducing the potential for conflict with the PWS customers while easing international conflicts with Mexico over the shared, limited, water resource. Two solar-powered monitoring stations are proposed to monitor operating conditions in real-time without the constant use of fossil-fuel consuming automobiles for visual inspection, resulting in better managed water. The total project cost is \$6,600,000, of which \$3,300,000 is the proposed Federal Share. The District will convert irrigation water rights to municipal use and sell them to NAWSC for their share of the project cost.

## (2) Project Location

The Project is located in Hidalgo County, Texas, within the boundaries of Donna Irrigation District. Figures 1.1 and 1.2 provide the project location map.

The project components are all within a few miles of downtown Donna, Texas, as shown in Figure 1.2.

The latitude and longitude of the project components are as follows:

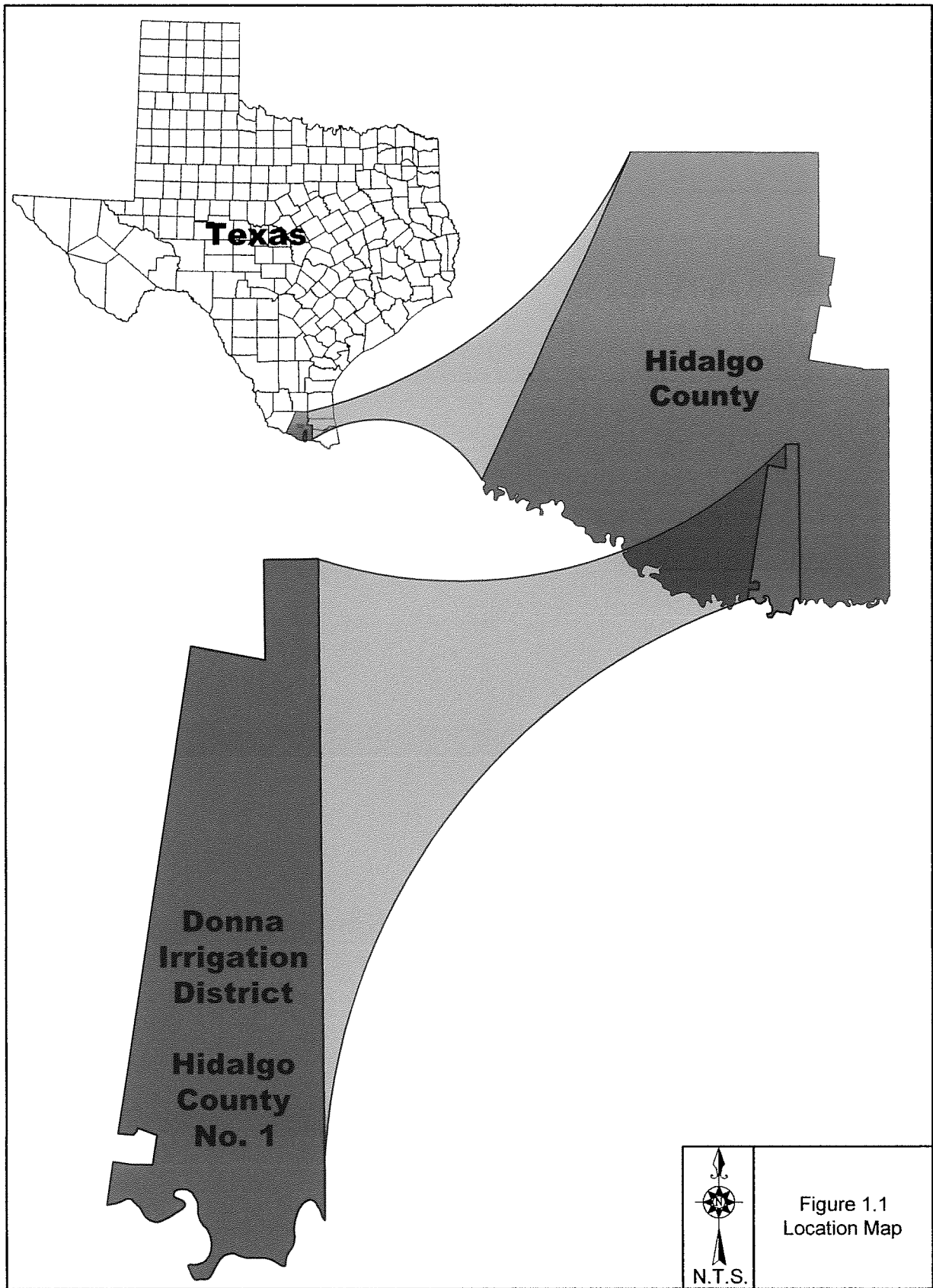
Component	Latitude	Longitude
3,800 LF x 48" Piping of Lateral 22 & Solar Powered Metering Station	26°13'04" N	98°00'50" W
5,200 LF x 60" Piping of South Crossover Lateral & Solar-Charged Battery Bank at Second Lift to start Natural Gas Driven Pump	26°09'27" N	98°04'42" W
Solar-Charged Battery Bank at First Lift to start Natural Gas Driven Pumps	26°04'03" N	98°04'31" W
Solar Powered Metering and Overflow Monitoring Station at the Engelman Irrigation Delivery Point	26°18'51" N	98°1'25" W

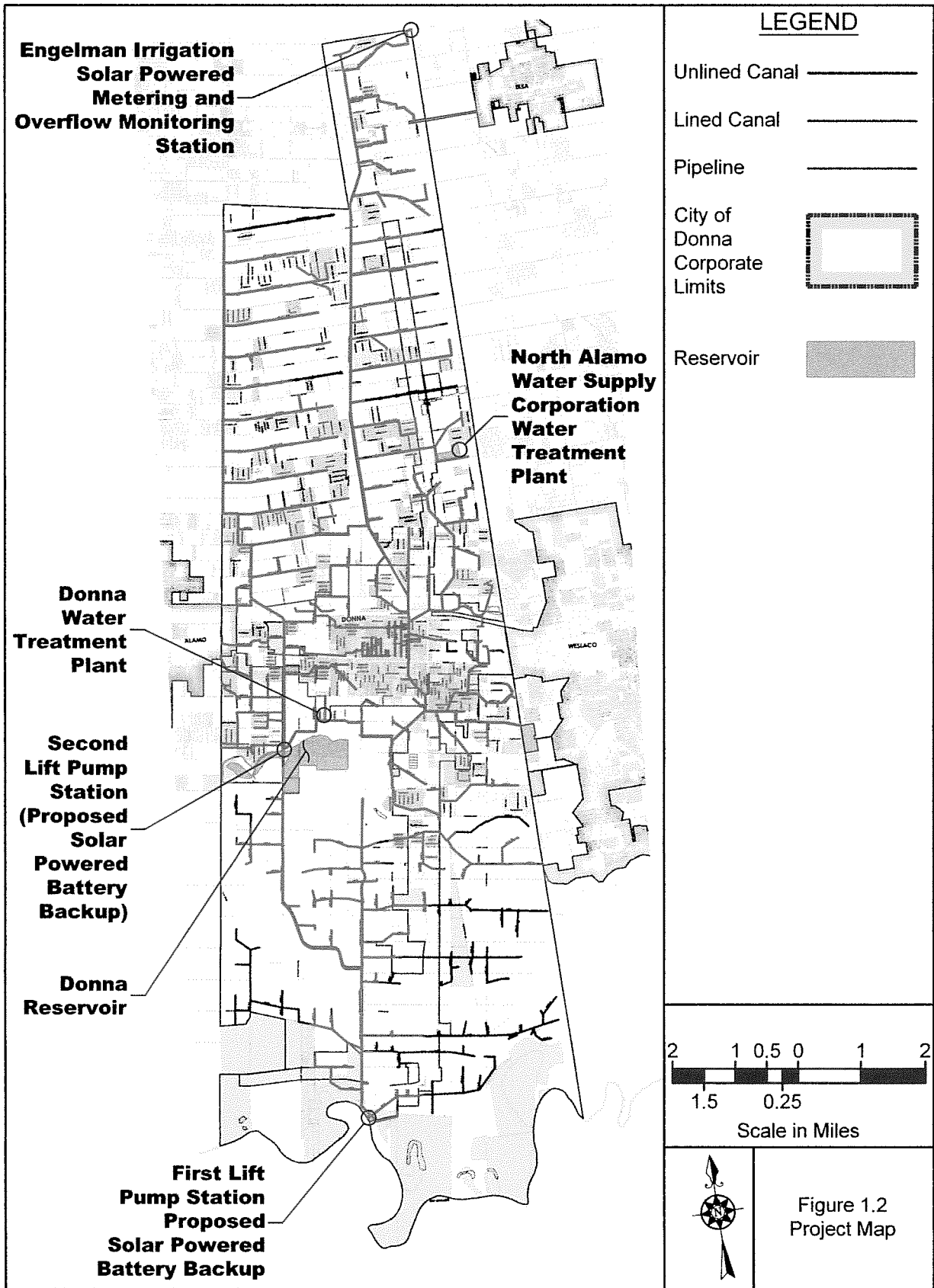
A kmz file of the project location along with the pdf of the application are provided on a USB drive attached to the hard copy. Figure 1.3 provides a more detailed location of the two proposed pipelines.

## (3) Technical Project Description

The Donna Irrigation District provides irrigation water to about 30,000 acres of farmland within its boundaries and delivers irrigation water to Engelman Irrigation District. The District also delivers water to the City of Donna (the City) as well as North Alamo Water Supply Corporation (NAWSC). The two Public Water Systems (PWS) treat the water and deliver it to their potable water customers. Table I provides the annual diversion and customer deliveries from 2016 through 2021.

Overall, the main purpose of this project is water conservation. Piping of the Lateral 22 that feeds NAWSC WTP will eliminate the seepage and evaporation from the existing canal as well as eliminate the overflows that commonly occur. Piping of the South Crossover canal will eliminate seepage, evaporation and overflows that occur in the existing open canal. The two canals experience seepage as they were constructed more than 50 years ago, and their existing concrete linings have deteriorated such that they are cracked and lose water. The two canals will be piped with pressure rated PVC piping that has no measurable leakage. The overflows will be eliminated because the piping will terminate at the downstream end at a well that is the same elevation of the upstream canal. The Main Canal at the upstream end of the proposed pipe is higher than the lateral canal to be piped, so canal riders and water plant operators are constantly trying to adjust the upstream canal gate to match the WTP demand.





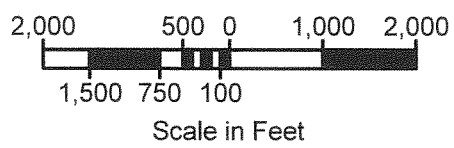
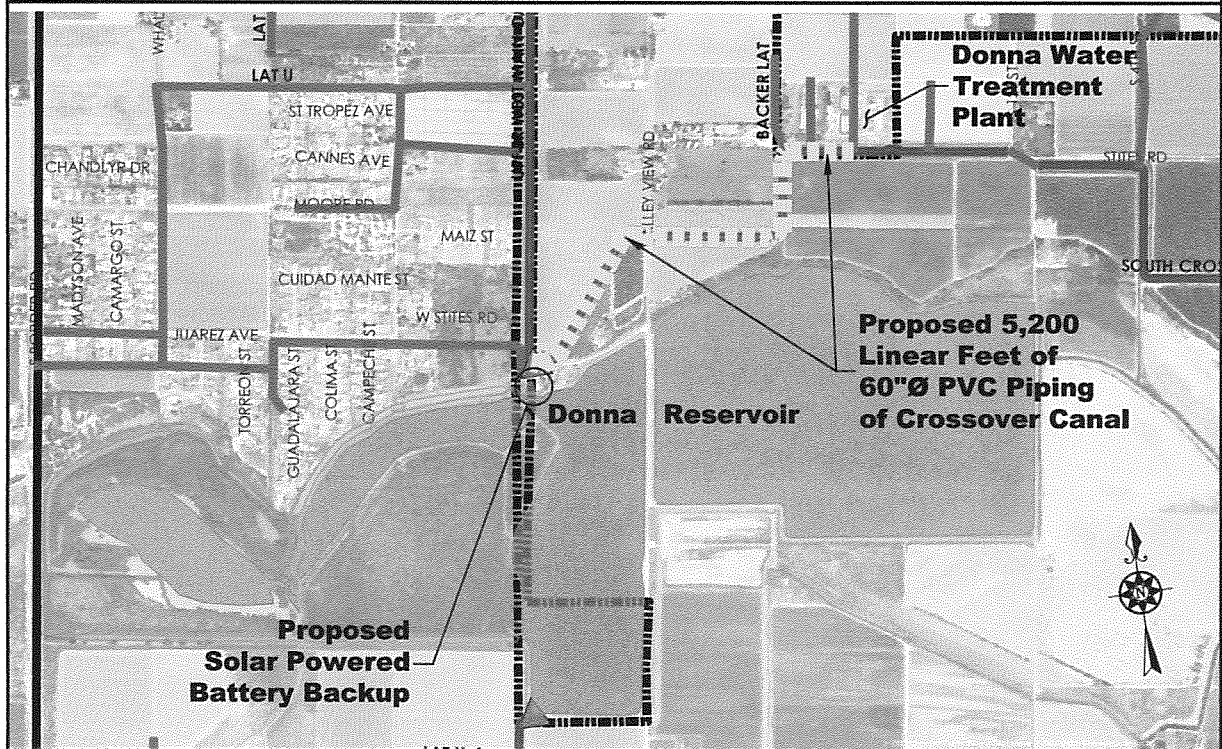
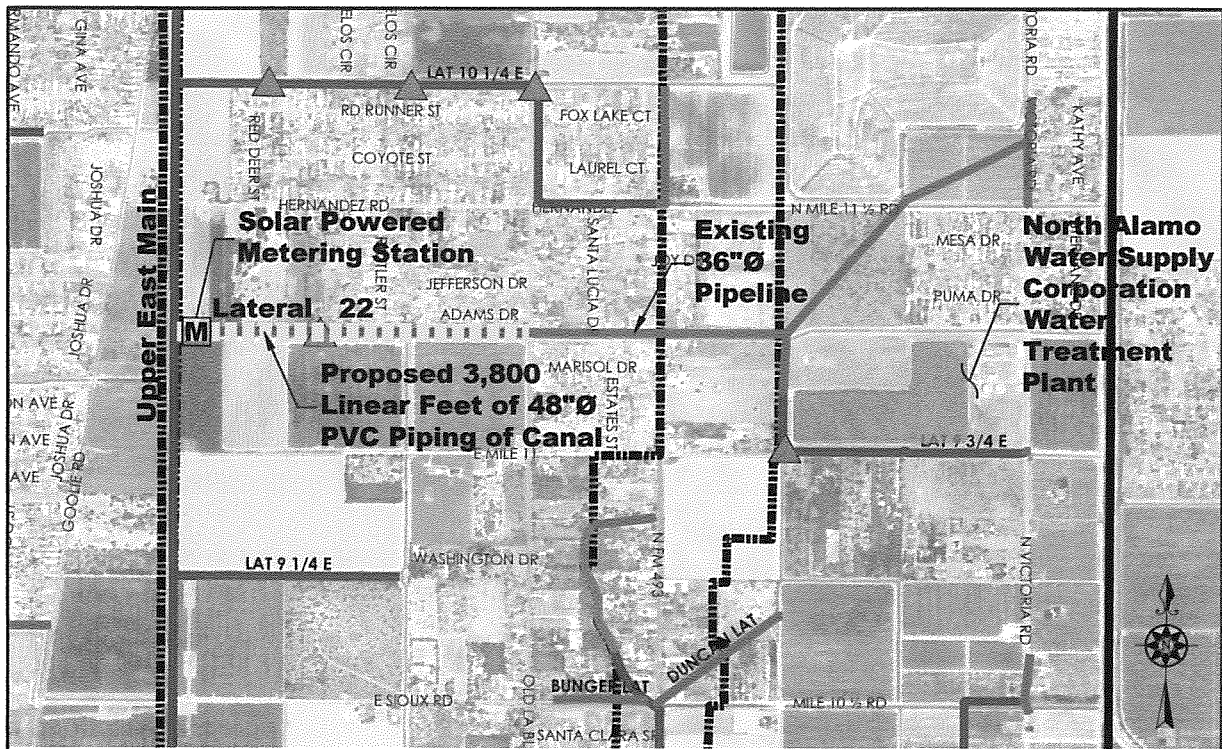


Figure 1.3  
Project Map



**Table 1**  
**Water Diversions, Deliveries and Efficiency**

All units in Acre Feet unless shown otherwise

Calendar Year	2016	2017	2018	2019	2020	2021	Average
Water Pumped	68,028	72,359	80,434	67,677	71,086	52,453	68,673
Watermaster Charge	68,717	73,605	80,970	69,656	72,016	52,991	69,659
River Losses	689	1,246	536	1,979	930	538	987
River Losses as % of Water Charged	1.0%	1.7%	0.7%	2.8%	1.3%	1.0%	1.4%
Annual Rainfall (inches)	14.5	19.8	21.3	19.8	29.1	33.1	22.9
In District Drip and Sprinklered Irrigation	1,174	1,207	2,250	3,049	2,150	1,807	1,940
In District Flood Irrigation	31,007	34,190	33,194	32,215	24,988	16,305	28,650
Engelman Irrigation District	3,885	4,822	6,643	5,279	5,243	4,933	5,134
Out of District Irrigation	66	181	171	65	157	0	107
City of Donna Municipal	1,897	2,086	1,991	2,053	2,179	2,126	2,055
North Alamo WSC Municipal	1,999	1,987	2,023	2,040	1,722	2,021	1,965
Total Water Delivered	40,027	44,471	46,272	44,701	36,439	27,191	39,850
System Losses	28,001	27,887	34,162	22,976	34,647	25,262	28,822
System Losses as a % of Water Charged	40.7%	37.9%	42.2%	33.0%	48.1%	47.7%	41.6%
Overall System Efficiency	58.2%	60.4%	57.1%	64.2%	50.6%	51.3%	57.0%

When demand reduces, and the upstream gate is not adjusted, the canal overflows to a drain and the overflowing water is wasted. In addition to conserving water by eliminating seepage and overflows. The proposed project will eliminate that need to adjust the main canal gates, reducing operation efforts, fuel costs and greenhouse gasses from pickups used by canal riders.

The method utilized to determine the seepage losses was measuring flow velocity and cross sectional area at the upstream and downstream ends of the canal to measure flow into and out of the canal; the difference being the seepage. The overflow loss was calculated by utilizing hydraulic modeling software, US Army Corps of Engineers Hydraulic Engineering Center’s River Analysis System (HEC-RAS), to model the field-measured overflow and water level to determine flow. The total amount of water conserved by the piping of Lateral 22 is 670 acre-feet per year. Table 2 provides the reduction in seepage and overflow that results from the piping of Lateral 22 and the South Crossover Canal. Piping of the latter will be accomplished using 5,200 linear feet of 60” PVC pipeline to eliminate seepage. The measured seepage in this section of canal was 1,120 acre-feet per year.

**Table 2 – Quantifiable Water Conservation**

<b>Project Component</b>	<b>Annual Conservation (Acre-feet)</b>
Piping of Lateral 22 that feeds NAWSC with 3,800 feet of 48” PVC	670
Piping of South Crossover Lateral that feeds Donna WTP with 5,200 feet of 60” PVC	1,120
<b>Total Annual Water Conservation</b>	<b>1,790</b>
Installation of solar-charged battery backup systems at the First and Second Lift Pump Stations to start gas engines and installation of 2 solar powered metering stations; one at Lateral 22 and one at Engelman Irrigation.	500
<b>Total Annual Water Conservation</b>	<b>2,290</b>

All water conserved, by the proposed project that is lifted by pumps results in energy conservation at the First and Second Lift Pump Stations. The pumps utilize significant energy to lift water that is currently being lost to seepage & overflows. The information provided in Appendix A, Energy Conservation, documents that each acre foot of water pumped through the First and Second Lift Pump Stations requires about 273 KWh to pump. The conservation of water will result in energy conservation and related reduction in greenhouse gasses by not pumping conserved water.

According to the “2021 Rio Grande Regional Water Plan,” Rio Grande Regional Planning Group and Black & Veatch, November 2020 (Water Plan), the two potable water retailers provide water to 180,000 people which is expected to more than double in the next 50 years to 400,000.

The potable water customers are vulnerable to drought conditions, which occur often in the region supplied by the Lower Rio Grande. The water resource is shared with Mexico by treaty. Appendix B includes excerpts from the “Lower Rio Grande Basin Study,” US Department of Interior, Bureau of Reclamation and Rio Grande Regional Water Authority, December 2013 (Basin Study). One key quotation from the Basin Study that the proposed project addresses is:

*“In summary, the climate-affected future supply situation for surface water indicates that the expected shortfall of over 300,000 acre-feet for municipal demands by the year 2060 (see figure 2-7) will be exacerbated in the median and 5<sup>th</sup> percentile flow factor scenarios. The projection that present municipal water rights would be 100% reliable in future years as evidenced by our WAM runs is only possible at the expense of agricultural rights, which fall to 1.6% reliable in the annual climate-affected projections (see figure 2-18). This reduction in irrigation flows also has serious impacts on the delivery of water to municipalities due to the need for Push Water. In combination with risks stemming from Mexico’s ability to meet obligations to supply water under the Treaty, Rio Grande surface water poses significant reliability risks in the future.”*

Push Water is defined as the water required to fill channels and pipelines and storage facilities and overcome transportation losses, including seepage and evaporation to deliver water to the end user from the source. For Donna Irrigation District, the system losses are normally shared by the irrigation users and the municipal customers that operate PWS. Table 1 is a summary of a water audit for the years 2016 through 2021, which quantifies District demands and operating efficiency. The District diverts an average of 70,000 acre-feet per year, approximately 4,000 of which is for its two municipal customers. The District loses approximately 30,000 acre-feet per year while delivering 40,000 acre-feet per year to its customers, an efficiency of 57%. The 30,000 acre-feet lost per year is all Push Water.

The Lower Rio Grande Valley water resource, shared with Mexico, is operated by the Rio Grande Watermaster, a division of the Texas Commission on Environmental Quality (TCEQ). Falcon and Amistad are storage reservoirs for the water supply. The Watermaster allocates water out of the reservoirs for irrigation purposes if surplus is available after setting aside 225,000 acre-feet for municipal, domestic and industrial (MD&I) uses and 75,000 acre-feet for operating reserve. The Texas Administration Code regarding the allocation of waters by the Rio Grande Watermaster, Rule §303.22 is included as Appendix C. The 300,000 acre-feet set aside above, is about 9% of the total US share of storage in Falcon & Amistad reservoirs of 3,392,000 acre-feet. The end of June Watermaster Account Balance report for the District is included in Appendix C and shows that the Watermaster drew 55,000 acre-feet from the operating reserve at the end of June. This is the lowest the reserve has been in recent memory.

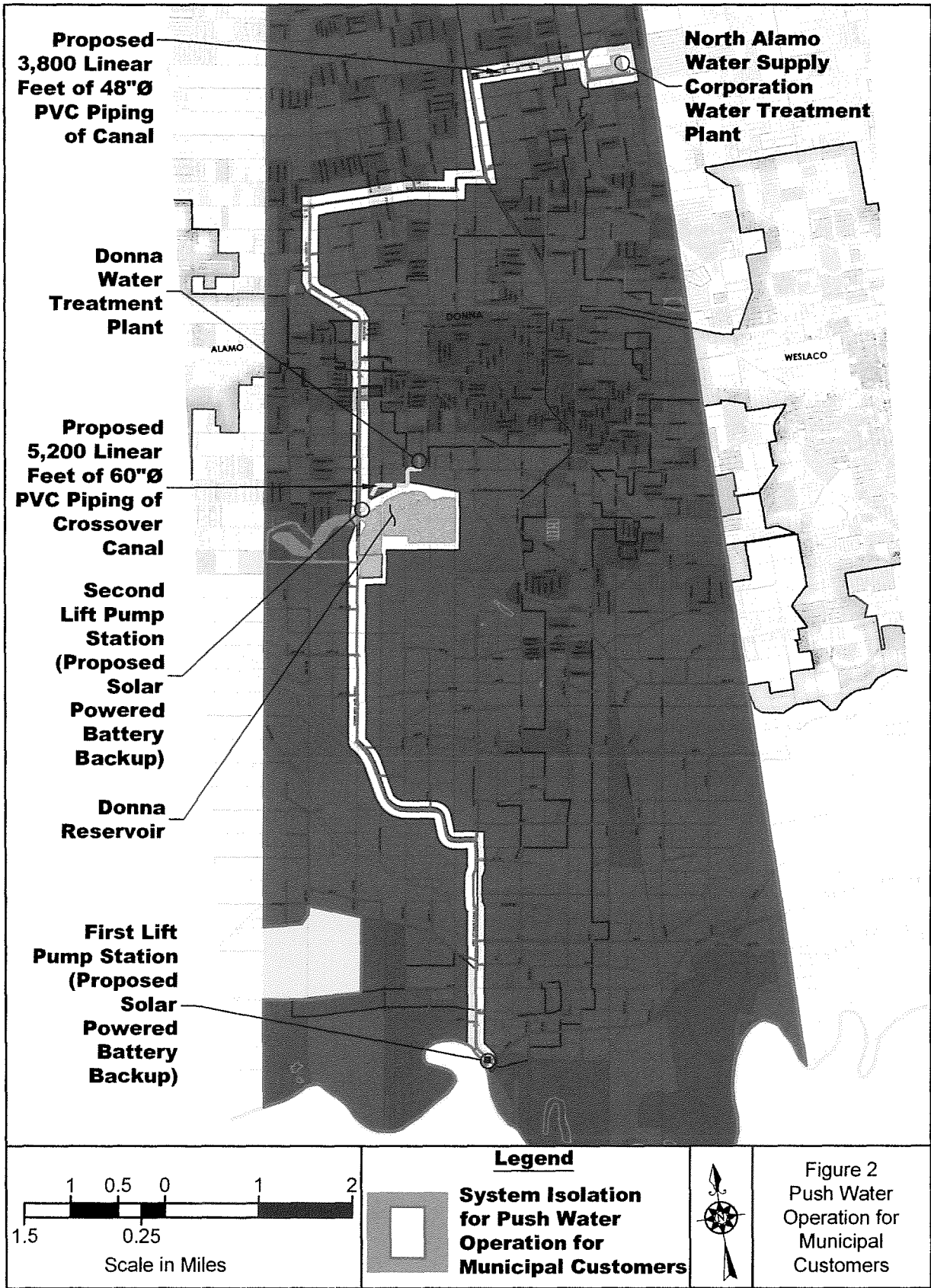
A severe drought scenario, where Donna Irrigation District would be forced to cease all irrigation but still be required to deliver water to its municipal PWS customers, the City of Donna and NAWSC, is defined in this application as Push Water Operation for Municipal Customers, and abbreviated as PWOMC. NAWSC has multiple surface water plants supplied by other Rio Grande water diverters and ground water treatment plants but the City of Donna is entirely dependent upon delivery from the District for all of its raw water to treat for delivery to its potable water customers. The TCEQ regulations require that a PWS maintain a minimum amount of pressure at all times which can only occur with a continuous water supply from the District. The PWOMC scenario could occur if the storage in the Rio Grande reservoirs falls below 9%, but more likely, when Donna Irrigation District experiences a low storage balance in its irrigation account. Without significant rainfall in the watershed this condition will occur in the next few months.

Donna operates under a certificate of adjudication, account number 0805-003, which authorizes annual diversions of 94,063.6 acre-feet per year with a maximum storage balance of 132,629.67. Approximately 3.9% of the U.S. storage capacity in the Falcon and Amistad reservoir system is dedicated to Donna Irrigation District.

The proposed project significantly reduces the amount of Push Water required and the likelihood that PWOMC event would occur. The two new PVC pipelines will reduce the volume of water required to fill the existing canals to be piped, eliminate seepage and evaporation and eliminate canal overflows and blowouts.

A PWOMC scenario would result in the isolation of the system, as shown in Figure 2. The only system features that would be operating are the First Lift Pump Station, the Lower West Main Canal to the Donna Reservoir, the Second Lift Pump Station, the new 60" pipeline to the City WTP, the West Main Canal, the North Crossover Canal, the Upper East Main Canal, and the new 48" pipeline to the NAWSC. With most of the system removed from operation, the system losses would be much less than the 30,000 acre-feet loss experienced over the past five years. The Push Water required would further be reduced by 1,790 acre-feet resulting from the proposed project. The likelihood that a PWOMC event would occur in the District will also be greatly reduced by the proposed project.

A third component of the project is the addition of a backup solar-electric battery at the First (Rio Grande River) and Second (Donna Reservoir) Lift Pump Stations. The District has natural gas driven pumps at each station and can pump during power outages, but only if a gas engine is already running when the power goes out. The natural gas engine requires compressed air from our electric compressor to start at the river. The gas driven pumps require priming to start that occurs with electric driven vacuum pumps. The proposed solar-electric battery backup system will operate the vacuum and compressed air systems to start the natural gas engines when the power fails. Unfortunately, power failures are frequent at the two stations.

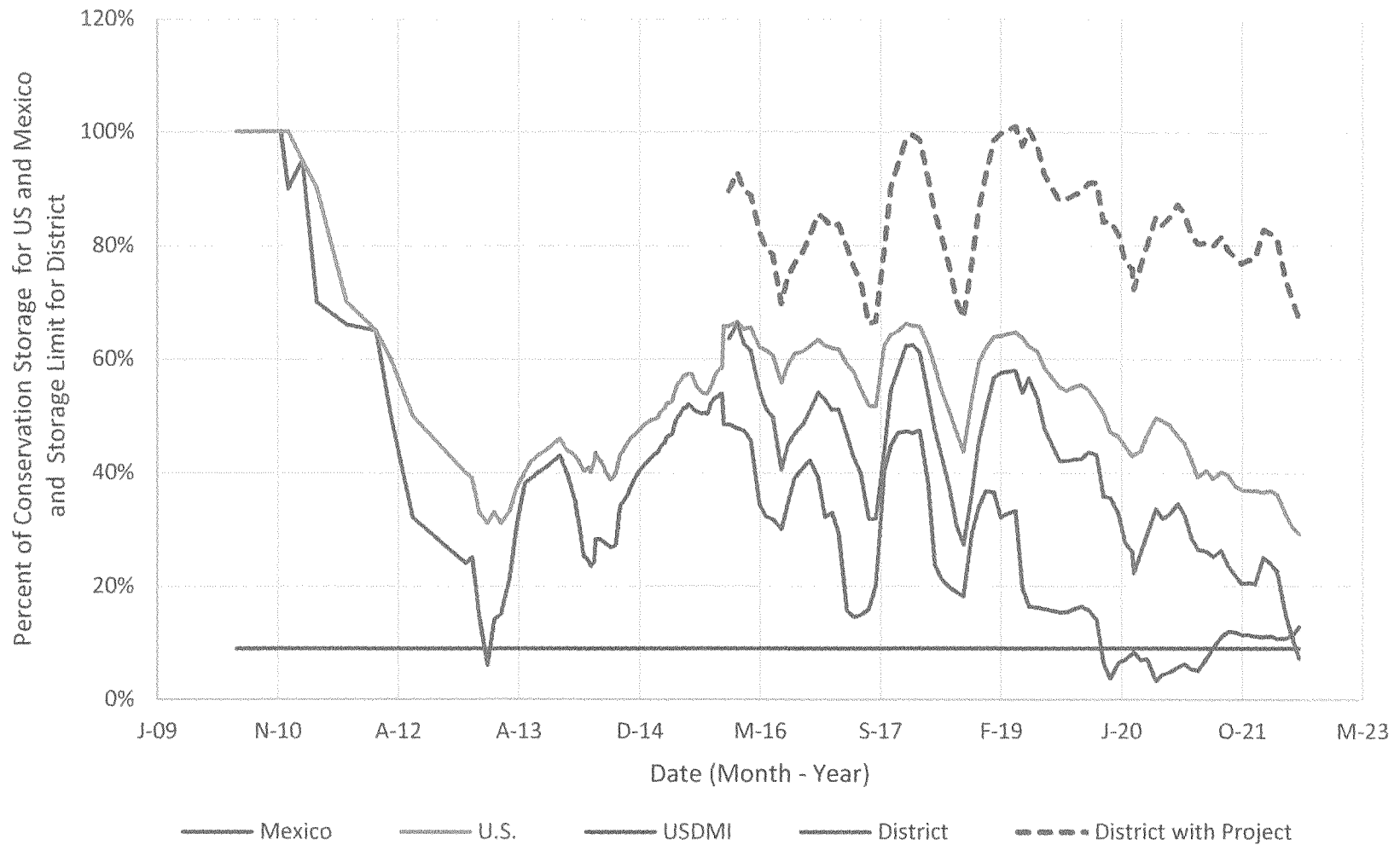


The quantity of water that is conserved by installing the backup solar-electric battery systems is 500 acre-feet. The proposed backup solar-electric battery systems at the First Lift allows the District to divert water during power outages that would otherwise be River losses. The District orders its water from the Watermaster considering a 72 hour travel time from Falcon Reservoir. At any given time, there may be as much as 1,500 acre-feet (500 acre-feet per day x 3 days) already released by the Watermaster on its way to the District First Lift Pump Station from the Rio Grande River. If the District does not pump that water, the Watermaster will charge their account 90% of the order. The six year water audit, summarized in Table 1, was the result of a review of six years of water ordered from the Watermaster in comparison to the water actually pumped from the River. The difference between the two is identified in Table 1 as River Losses. The River Losses are actually lost downstream to the Gulf of Mexico and the District's storage balance in the Falcon & Amistad reservoir system is reduced by that amount. The River losses over the past six years averaged about 1,000 acre-feet per year. In an interview with the District pump operating personnel, we learned that about half of that, or 500 acre-feet, can be attributed to inability to pump at the river due to power failures. The solar-electric battery backup system at the second Lift Pump Station allows the District to continue pumping the water out of the Donna reservoir to areas where it can be stored downstream in customer reservoirs, like NAWSC, Engelman Irrigation District, and drip irrigation ponds. Power failures often occur during wet weather. It is during these occurrences that the Second Lift backup solar-electric battery would greatly benefit the District, as it can help distribute water and reduce River losses. Additionally, the Second Lift backup solar-electric battery system would allow continued supply to the City WTP, during these types of events. The infrastructure improvement, increasing the reliability of service to the City WTP, is important because the City does not have any raw water storage, therefore, it must stop treating water within a few hours of a power failure at the Second Lift. The 60" PVC piping of the South Crossover will help alleviate this concern, as it will allow water stored in the Upper West Main Canal to be available to the City WTP, which is not possible with the current open canal with check gates.

The proposed project decreases the likelihood of a PWOMC condition due to the fact that it reduces the District's annual diversion request from the Watermaster by the total of 2,290 acre-feet, as reflected in Table 2. Figure 3 is a chart of the total US and Mexico shares in the Lower Rio Grande reservoir system where Donna stores their irrigation water, along with the corresponding percentage of storage balance held by Donna since 2011. 2011 is an important date as it signifies the last time the system was full with 100% conservation storage, resulting from the wet years of 2008-2010, which included Hurricane Dolly (2008), Tropical Storm Alex (2010) and 2010 Tropical Depression No. 2. When the reservoirs are full, all of the water right holders' storage accounts are also full. The District's water right storage limit is 132,629.68 acre-feet. The annual reduction in diversions resulting from this project of 2,290 acre-feet amount to 1.73% of the District's storage limit.

The District was successful on a 2022 WEEG grant on a project to line two canals that will conserve 4,620 acre feet per year. That amounts to 3.48% of the District's Storage Limit. The water savings from the 2022 WEEG Grant are included in the chart in Figure 3, for a total savings in the chart of 5.21% per year.

Figure 3  
 District, US and Mexico Percent Storage in Falcon and Amistad



If the proposed project had been in place and operational in 2010, the District's percentage of storage balance in the reservoir would have been higher at the rate of 5.21% per year, or 57.31% higher in 2022. The chart displays how the project greatly reduces the likelihood that the District would run out of irrigation allocation, forcing a PWOMC scenario. The chart also shows the impact that the USBR WaterSMART Program can have on a District in times of drought.

All meters with level monitoring will be added to the new Lateral 22 pipeline to ensure flow conditions are as expected. Low flow would indicate system failure and high flow would indicate possible downstream overflow. The metering and cellular communication to the internet will be solar powered. Solar power isolates the equipment from dependence on the electrical grid which protects it from damaging power surges. In addition, solar powered equipment will function during power outages.

A new solar powered open channel flow meter will be added at the Engelman Irrigation delivery point. Occasionally, the existing meter fails, so this meter will serve as a backup meter, but more importantly, it will communicate with canal rider's smartphones so they can monitor the flowrate remotely. The open channel flowrate measures the depth in the canal, which is an additional benefit as it will alert the canal riders if the level is too high. A high level alarm will be set to advise the canal riders that an overflow is about to occur. Figure 4 is a photograph of the meter location and the overflow.

The District has agreed to convert irrigation rights to municipal rights for sale to NAWSC, resulting in additional funding for the improvements proposed in this application. When the rights are converted, the authorized water right is reduced to half because of the priority given to municipal rights in the Watermaster allocation process. The District will convert irrigation rights to municipal use and sell them to NAWSC for their share of the project cost.

#### **(4) Evaluation Criteria:**

##### **Evaluation Criterion A: Quantifiable Water Savings**

The water savings as a result of the canal piping project are projected to be 1,790 acre feet per year, as summarized in Table 2. The first component of the water savings estimate is the 1,120 acre-feet per year of seepage losses for the South Crossover Canal. The second component of the water savings is the 670 acre feet per year of seepage losses for the Lateral 22 Canal. The combined total of the two canal seepage losses represents the 1,790 acre feet per year of estimated water savings. An additional 500 acre feet per year will be conserved through implementation of the Solar-Battery Backup System at the First Lift Pump Station to reduce River Losses that currently average 1,000 acre feet per year.

The water losses identified in this project are currently seeping into the ground and into drainage ditches. Once water is lost to seepage, it is no longer available to be used by others. There are no known benefits associated with the current seepage losses. The River Losses flow downstream to the Gulf of Mexico. The River mouth of the Rio Grande currently bypasses the Laguna Madre and flows directly into the gulf, so the estuaries at the mouth are relatively small.





Figure 4 Engelman Irrigation Solar Powered Metering and Overflow Monitoring Location

To obtain the total annual water savings estimate in Table 2, Ferris, Flinn & Medina, LLC, conducted an inflow/outflow test on a typical section at the upstream and downstream ends of each of the two proposed canals. The method utilized consisted of measuring both the water current velocities and the cross sectional areas at the upstream and downstream ends of each canal. These readings were then used to calculate the discharge rate into and out of each canal; the difference between these two discharge rates being the seepage.

The Annual Transit Loss Reduction is reflected below, in Table 3.

**Table 3: Annual Transit Loss Reduction**

<b>CANAL</b>	<b>WATER LOSS (AC FT / YR)</b>	<b>SECTION LENGTH IN MILES (LINEAR FEET)</b>	<b>ANNUAL TRANSIT LOSS REDUCTION (AC FT / YR / MILE)</b>
<b>South Crossover Canal</b>	1,120	0.985 (5,200)	1,137
<b>Lateral 22 Canal</b>	670	0.720 (3,800)	930
<b>TOTAL (AC-FT / YR)</b>	<b>1,790</b>		
<b>TOTAL (MILES)</b>		<b>1.705</b>	
<b>ANNUAL TRANSIT LOSS REDUCTION (AC FT / YR / MILE)</b>			<b>1,050</b>

Water current velocities were collected for each canal using Teledyne RDI's StreamPRO Acoustic Doppler Current Profiler (ADCP). The StreamPRO ADCP is a type of sonar that measures and records water current velocities over a range of depths. This allowed for the capturing of accurate water current velocity readings without the need to interrupt the District's water demand operations. Canal cross sections were measured in the field immediately before the water current velocities were captured using the StreamPRO ADCP.

Once a cross section of the canal was measured, the StreamPro ADCP would be used to begin measuring the water current velocities in the exact same location where the cross sections were measured. The photographs in Appendix D show the method of measuring the water current velocities using the StreamPro ADCP on each of the proposed canals. A minimum of 4 StreamPro ADCP transects were made for each upstream and downstream section.

Water current velocities in each of the two canals were very consistent and had very minor variations between each transect. In the end, the average water current velocity was recorded for each upstream and downstream section at each of the two canals. These average water current velocities were then multiplied by their corresponding canal cross sectional area measurements. With these two data sets, a manual calculation was made to estimate the inflow and outflow discharge rates in cubic feet per seconds (CFS). The difference between these two discharge rates was the seepage loss total for each canal.

The Lateral 22 Canal consistently overflows. The photograph in Appendix D shows the depth of the water overflowing the canal. The overflow was modeled using the Hydrologic Engineering Center River Analysis System (HEC-RAS) to calculate the volume of flow. The HEC-RAS modeling results are provided in the Appendix.

The expected post-project seepage losses are negligible. The proposed piping will be pressure rated PVC conforming to AWWA C900, 80 psi. There will be no leakage. The Contractor will be required to perform leakage testing on the completed pipeline to ensure there is no leakage. For connections to concrete wells, a hydrophilic waterstop is utilized around the pipe to ensure there is no leakage from the concrete structure at the pipe connection.

All proposed Slide Gates are stainless steel, fabricated with neoprene seats to minimize leakage.

## **Evaluation Criterion B - Renewable Energy**

### **Subcriterion B.2 - Increasing Energy Efficiency in Water Management**

The yearly water savings of 1,790 acre-feet presently being lost to seepage will result in reduced pumping from the first and second lift stations. The reduced pumping is expected to provide a yearly energy savings of 488,530 KWh, or 2.5% of the District's current average consumption per year (see Appendix A).

The EPA states on their website that "the transportation sector generates the largest share of greenhouse gas emissions." A total of 29 percent of the 2019 greenhouse gas emissions came from the transportation sector. The proposed project proposes to take steps to modernize the District's antiquated method of collecting the flow and level data of its main canals. Currently, the flow and level data are inspected visually by field operators using vehicles to drive to these sites.

Multiple operators drive to the remote locations of the water treatment plants and Engelman Irrigation meters to inspect the flow and levels of the District's canals. This is a task that takes place every day, 365 days out of the year. The two proposed solar monitoring stations will monitor both volumetric flow and canal level of the District's main irrigation canals with remote data access via operators' smartphones. The two proposed monitoring stations will be powered by solar generated electricity, thus establishing and using a renewable energy source.

The proposed remote monitoring stations will eliminate the need for fossil-fuel powered automobiles presently required for visual inspection of water volumetric flow and levels. These metering stations will not incur any fossil-fuel consumption from power plants to receive electricity.

The District operates the First Lift Pump Station located on the Rio Grande and the Second Lift Pump Station located at the District's reservoir approximately 7 miles from the Rio Grande (see Figure 1.2). The First Lift Pump Station operates on engines run by natural gas and/or electricity. The Second Lift Pump Station can be operated with natural gas and/or electricity as well.

The yearly energy savings is 488,530 kWh. This energy savings estimate originates from the point of diversion, and it is calculated by analyzing the District yearly average energy consumption at the First Lift Pump Station; it is then divided by the total acre-feet of water diversions of 192,458.18 acre-feet for the year. From this analysis, the energy required to pump one acre-foot of water can be obtained in kWh/Acre-Foot. This figure is then applied to the water savings total of 1,790 acre-feet of the proposed project, and then doubled since all of the water conserved by the project will be re-lifted at the Second Lift which has similar equipment and power costs. The total energy savings for the project translates to an annual energy cost saving of \$9,722.89 (see Appendix A). Note that the 500 acre feet of River Losses conserved is not actually pumped, so there is no related energy conservation. The reduced energy consumption translates to a reduction in greenhouse gasses.

The project is expected to result in reduced vehicle miles driven, which will in turn reduce greenhouse gas emissions. As previously mentioned, the project will incorporate two new solar monitoring stations at Lateral 22 and the Engelman Irrigation Delivery Point. These monitoring stations will reduce the vehicle miles driven by providing district operators with the ability to access the District's main irrigation canals volumetric flow and level real time information through remote data access accessible via their smartphones. This modernization in district infrastructure will eliminate the need for fossil-fuel powered automobiles presently required for visual inspection of water volumetric flow and levels. A total of 11.06 Metric Tons of greenhouse gas emissions per year are expected to be removed from the atmosphere as a result of this project. The greenhouse gas emissions calculations are available in Appendix F.

The two proposed metering stations will be powered by solar panels. These monitoring stations will not incur any fossil-fuel consumption from power plants to receive electricity. On the contrary, they will result in solar energy production, thus establishing and using a renewable energy source. The types of metering stations proposed are installed in other more modernized irrigation districts throughout the region and have been proven over time to provide reliable data in an efficient manner. Proposed flow and level meters will provide additional points of data available to the region to monitor its water resources and develop historical data for future analysis and resource predictions. Remote monitoring systems allow much more efficient, real-time, detection of problems, minimizing loss of water resources.

The installation of the solar-electric battery backup systems outlined in the previous section at both the First and Second Lift Pump Stations will improve system reliability and allow pumps to continue operating in the event of power outages in emergency situations and will conserve 500 acre-feet per year, which is currently lost downriver in these scenarios. The implementation of said systems will not only eliminate river loss during power outages, but also provide emergency response (currently lacking) during outages via water pressure maintenance; ensuring safe and reliable potable water for the City, which has no raw water storage capability.

The solar powered backup batteries will be charged by solar power. A solar array will be constructed at each site. This system would be installed in lieu of a fossil fuel generator that would otherwise be required. Fossil fuel backup generators typically need to be exercised once a month, so installation of the solar powered battery backup will avoid fossil fuel consumption for the same purpose, reducing greenhouse gasses.

### **Evaluation Criterion C - Sustainability Benefits**

The District services the City of Donna and North Alamo Water Supply Corporation (NAWSC). The two potable water systems (PWS) are vulnerable to drought conditions, which occur often in the region. All water in the region is supplied by the Lower Rio Grande and this source is shared with Mexico by treaty. Appendix B includes excerpts from the "Lower Rio Grande Basin Study," US Department of Interior, Bureau of Reclamation and Rio Grande Regional Water Authority, December 2013 (Basin Study). One key quotation from the Basin Study that the proposed project addresses is:

*"In summary, the climate-affected future supply situation for surface water indicates that the expected shortfall of over 300,000 acre-feet for municipal demands by the year 2060 (see figure 2-7) will be exacerbated in the median and 5<sup>th</sup> percentile flow factor scenarios. The projection that present municipal water rights would be 100% reliable in future years as evidenced by our WAM runs is only possible at the expense of agricultural rights, which fall to 1.6% reliable in the annual climate-affected projections (see figure 2-18). This reduction in irrigation flows also has serious impacts on the delivery of water to municipalities due to the need for Push Water. In combination with risks stemming from Mexico's ability to meet obligations to supply water under the Treaty, Rio Grande surface water poses significant reliability risks in the future."*

Push Water is defined as the water required to fill channels and pipelines and storage facilities and overcome transportation losses, including seepage and evaporation to deliver water to the end user from the source. For Donna Irrigation District, the system losses are normally shared by the irrigation users and the municipal customers that operate PWS.

Table 1 summarizes the findings of a water audit for the years 2016 through 2021, which quantifies District demands and operating efficiency. The District diverts an average of 72,000 acre-feet per year, approximately 4,000 of which are for its two municipal customers. The District loses approximately 30,000 acre-feet per year while delivering 42,000 acre-feet per year to its customers, an efficiency of 58%.

The proposed project will increase long-term drought resilience for the City and NAWSC by reducing municipal Push Water requirements for the entities by 1,790 acre-feet per year. During extreme drought conditions, municipal water allocation has historically sold for up to \$100 per acre foot.

The proposed project will save those entities several hundred thousand dollars per year in an extreme drought. While the primary objective of this project is water conservation through eliminating seepage losses, the proposed project will also significantly increase the reliability of water supplies to the City and NAWSC, especially in drought conditions and emergency/natural disaster scenarios.

The US Fish and Wildlife Service (USFWS) is a major water right holder in the Lower Rio Grande Valley Watermaster System. As the Lower Rio Grande Valley National Wildlife Refuge (Refuge) expanded, it also acquired water rights currently totaling about 23,000 acre feet. The Refuge manages their water to restore critical habitat. A description of how the Refuge utilizes the water is included in Appendix J. Also provided in Appendix J is Refuge information on the endangered Ocelot and how the wild cats are a management priority. The Refuge manages its water resources as it determines most beneficial to the Ocelot, along with other species in the area. Conserved water, at times, is allocated to water accounts held by the US Fish and Wildlife, further promoting conservation activities throughout the region. The Refuge utilizes its water to restore critical habitat for the Ocelot and other endangered species. Conserved water from the proposed project can be allocated to the Refuge.

Water conservation improvements to the District will in turn conserve water in Falcon and Amistad Reservoirs, which are home to many species of wildlife which depend on those water sources to sustain life. Conservation of those bodies of water will help maintain aquatic wildlife through combatting falling water levels and rising salinity levels. Figure 3 reflects the levels at Falcon and Amistad Reservoirs since they were full in 2011. The District's storage limit of 132,630 acre feet is 4% of the US share of storage in the reservoirs, a significant portion.

The proposed project will allow the District to successfully address the major water reliability concern in the region and improve the District's water resource management. When the District has a full storage balance in the Reservoir System, all conserved water is allocated to other users in the system which include mining, industrial and municipal water users. This project will have a real impact on the other users in the system and provide greater flexibility to water managers, resulting in a more efficient use of water supplies.

The Lower Rio Grande Valley Watermaster System is unique in that it shares its water supply with Mexico based on an International Treaty. Falcon and Amistad are storage reservoirs for the water supply. According to the Treaty, 1/3 of water from several Mexican Tributaries is allotted to the US. Since the Treaty was formed, Mexico has constructed reservoirs upstream of Falcon and Amistad that allow Mexico to withhold runoff, which many in the US consider a violation of the Treaty.

The system is further complicated by the fact that the International Treaty with Mexico allows Mexico to defer water deliveries up to five years. Figure 5 is the status of the current five year cycle. All lines that end below the diagonal red line represent 5-year periods in which Treaty obligations were not met. Mexico is about one and a half years behind in delivery of water to the US exacerbating drought in the more heavily irrigated Districts in South Texas.

There have been recent conflicts in Mexico where farmers have protested against the Mexican government's plans to repay the debt as stipulated in the Treaty. The fact that Mexico delays releases is evident in the graph displayed in Figure 6, where Mexico's percentage of storage in the Falcon and Amistad reservoirs is much less than the US share. The result is a system susceptible to extreme drought and international water conflict. The Amistad-Falcon Storage Conditions from 1996 to present, shown on Figure 6, for example, highlight extended low periods of conservation capacity. It is important to note that between the years of 1996 and 2004, the reservoir storage dropped below 50% and remained there for the entire nine years. One third of water released into Falcon and Amistad from Mexican reservoirs eventually becomes US water, so Mexico delays that release as long as possible. The conservation that will occur from this project helps ease international conflict over the shared, limited, water resource.

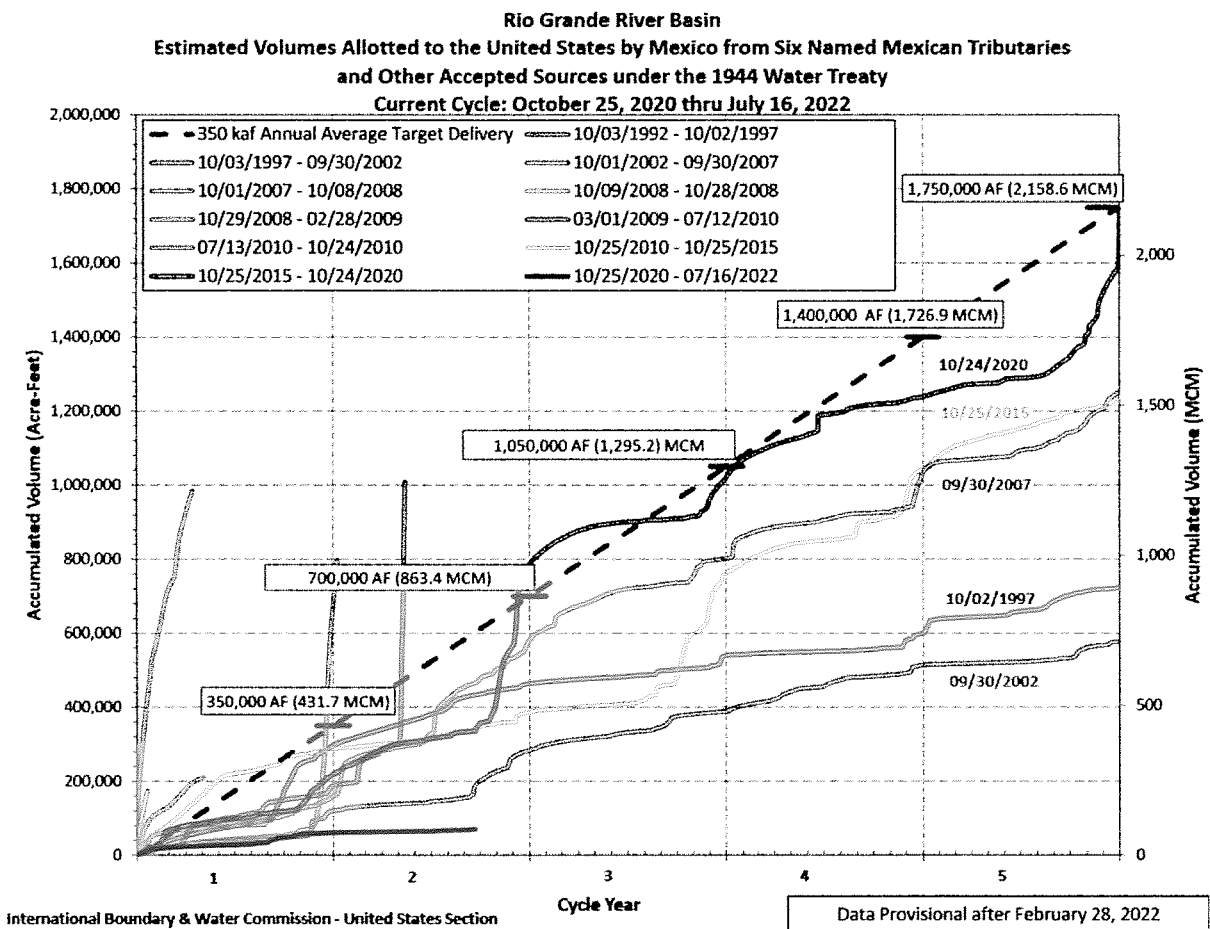


Figure 5: Five Year Repayment Cycle to the US by Mexico

Amistad-Falcon Percent of Conservation Capacity

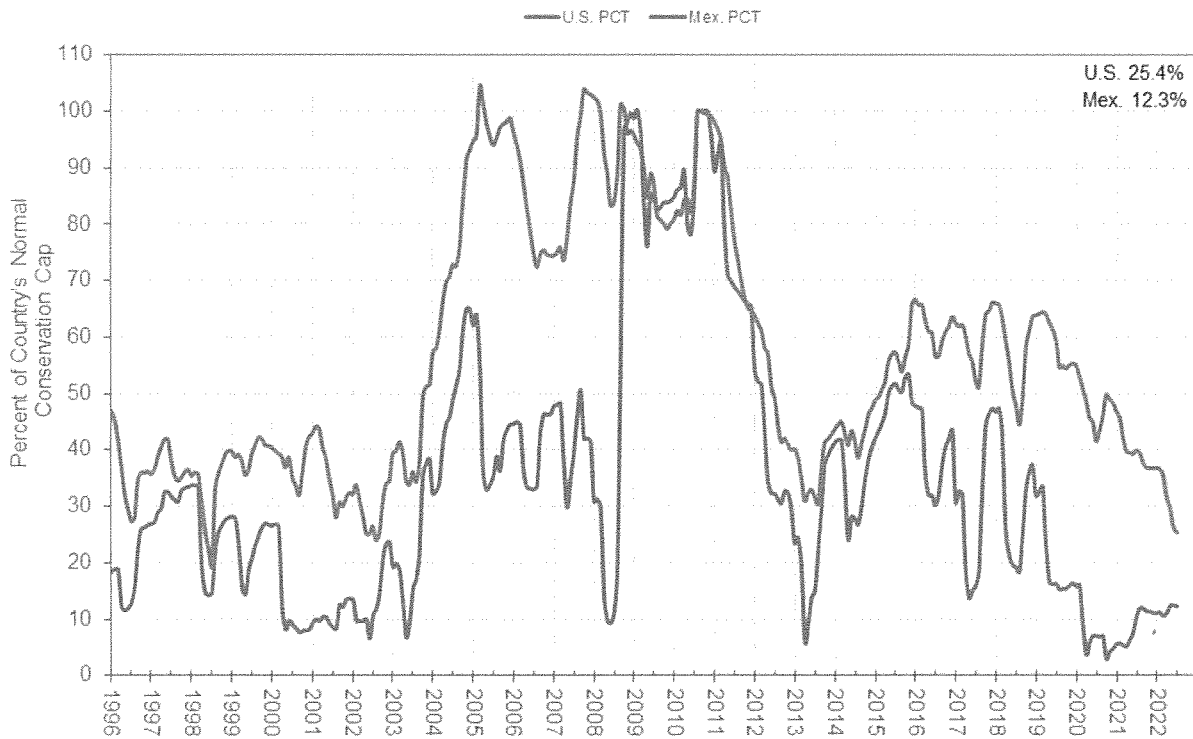


Figure 6: Amistad-Falcon Percent of Conservation Capacity

The District relies on visual inspection of water volumetric flow rates and canal levels which requires the use of fossil-fuel powered automobiles for traveling.

The proposed project will include two solar powered monitoring stations that will monitor both volumetric flow and/or level at Lateral 22 and at the Engelman Irrigation Meter with remote data access via operators' smartphones. Currently, the flow and level data are inspected visually by field operators using vehicles to drive to these sites. By utilizing remote data collection, the District will reduce its energy consumption and vehicle emissions with respect to water management.

As previously described, conservation in the Lower Rio Grande Valley Watermaster System helps reduce competition for the over allocated supply. All 2,290 acre-feet of conserved water from this project are expected to remain in the system for allocation to other water rights holders.

The Watermaster will allocate surplus water in the system among users. All 2,290 acre-feet of conserved water from this project are expected to be used in the region for their intended purposes.



### Combating the Climate Crisis

The proposed project will conserve water in the Lower Rio Grande Valley Watermaster System which already has a limited water supply. In this manner, the project will strengthen water supply sustainability and increase the region's resilience to future droughts caused by climate change. Figure 7 shows a current map of the Rio Grande Basin & North America Drought Monitor with the Amistad Reservoir and the majority of the Rio Grande Basin in exceptional drought.

The proposed project is also expected to lower the greenhouse gas emissions by a total of 11.06 Metric Tons per year (see Appendix F). This, as explained under Evaluation Criterion B, will be achieved by reducing the vehicle miles driven by District operators through the installation of solar powered canal monitoring stations at the District's First and Second Lift Pump Stations. By installing the two solar canal monitoring stations and the Solar-Battery Backup at the two pump stations, the proposed project will establish and utilize a renewable energy source.

### Disadvantaged or Underserved Communities

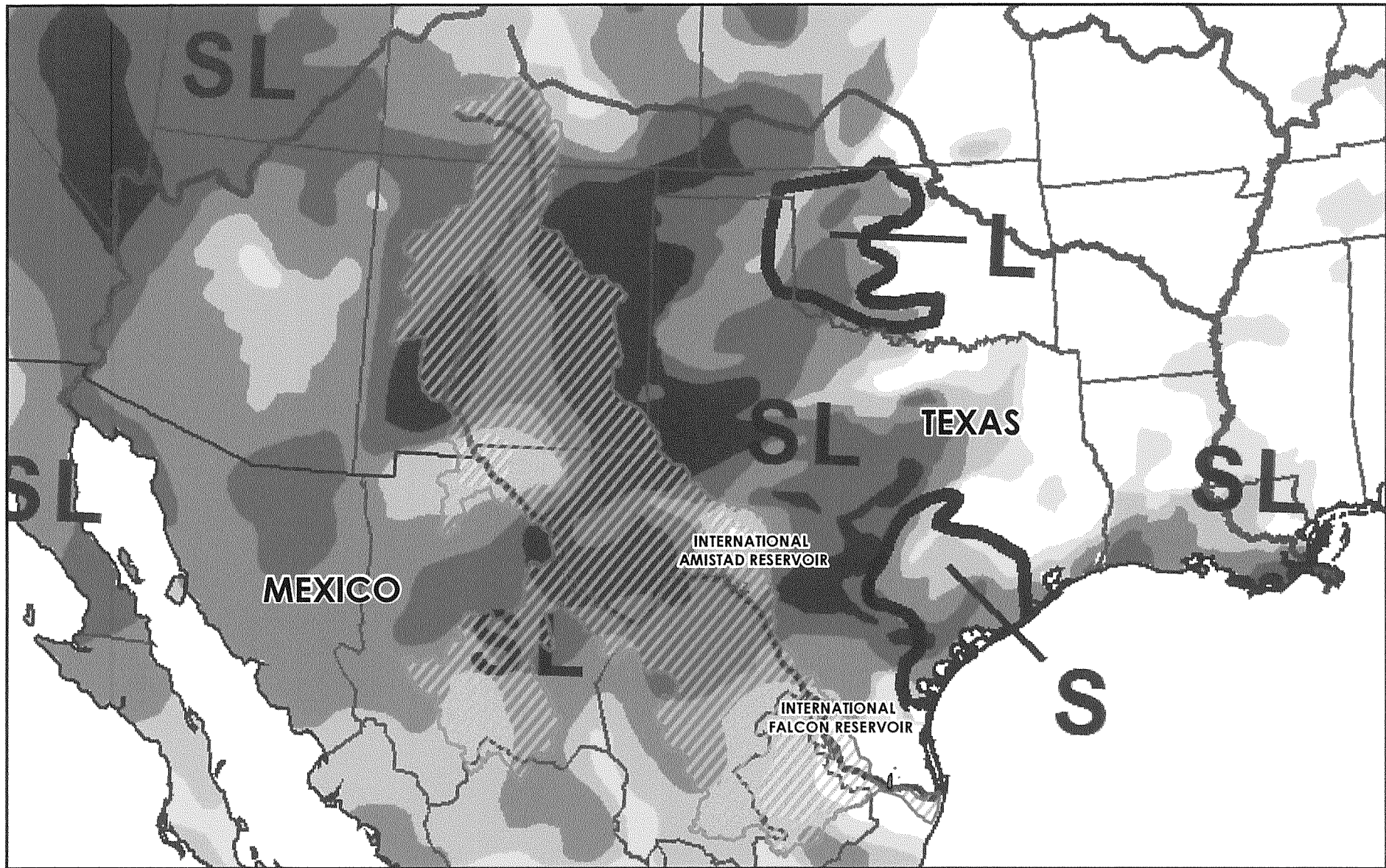
The proposed project will benefit rural, disadvantaged communities by increasing the reliability and resiliency of water supplies to said communities. The City of Donna, served by the District, has a population of 16,797 as of 2020, 5,011 households, and 36.5% of its population in poverty [US Census Bureau QuickFacts, [www.census.gov](http://www.census.gov), Accessed Oct. 1<sup>st</sup> 2021]. The City has a median household income of \$29,724, which amounts to only 46% of the statewide median household income (\$64,034) for the State of Texas [DataUSA:Texas, [www.datausa.io](http://www.datausa.io), Accessed Oct. 1<sup>st</sup>, 2021], meeting the definition of a disadvantaged community as per Section 1015 of the Cooperative Watershed Act. Executive Order 13985 defines an underserved community as "adversely affected by persistent poverty and inequality" having individuals who are denied equitable treatment such as those of Latino heritage and persons living in rural communities. The City is comprised of a 92.7% Latino or Hispanic population.

NAWSC, another PWS serviced by the District, is a rural water supply corporation. Over the years its service area has overlapped municipal boundaries, but its formation was based on the need for drinking water in rural areas. There is no census data available for NAWSC, however, its demographics mirror those of the City of Donna, 92% Latino and median income of 42.6% of the state wide median household income.

This project will benefit agricultural and municipal users in the District's system by making more usable water available to them through a reduction in seepage losses via the piping of the two proposed canals. Reducing the number of greenhouse gas emissions in the area through the installation of solar powered monitoring stations at Lateral 22 and the Engelman Irrigation Meter will benefit municipal and agricultural users. The solar-battery backup at the First and Second Lift Pump Stations will also provide useful renewable power.

### Tribal Benefits:

No tribal benefits are expected from this project.



**Legend**

USDM 6/30/2022

Abnormally Dry

Moderate Drought

Severe Drought

Extreme Drought

Exceptional Drought

District Limits

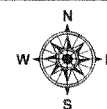
Rio Grande Basin

~ Delineates dominant impacts

S - Short-term impacts, typically less than 6 months (agriculture, grasslands)

L - Long-term impacts, typically greater than 6 months (hydrology, ecology)

SL - Short- and long-term impacts



1 INCH = 886,836 FEET

**Figure 7**

Rio Grande Basin  
&

North America Drought Monitor

#### Other Benefits:

The project will directly benefit agriculture and municipal users in the District's system by making more usable water available to them through a reduction in seepage. However, the Lower Rio Grande Valley Watermaster System also includes industrial and mining water rights holders. Because all conserved water from this project is expected to remain in the system for allocation among all water right holders, the project will also indirectly benefit industrial and mining water rights holders.

The "Lower Rio Grande Basin Study" was completed in December 2013 by the USBR in cooperation with the Rio Grande Regional Water Authority (RGRWA). The District is a member of the RGRWA. The Basin Study refers to the 2010 Region M Plan, "Rio Grande Regional Water Plan", dated October 1, 2010 to reiterate Irrigation Conveyance System Conservation as one of the water management strategies that will result in the greatest amount of water for further use when compared to 15 other strategies.

The proposed project conserves Rio Grande water through irrigation conveyance conservation of seepage losses, making the conserved water available to other users in the Lower Rio Grande Valley Watermaster System.

As previously discussed, the ongoing drought is a source of international dispute with Mexico, which shares the Rio Grande resources with irrigation districts and municipalities in the United States along the South Texas border. The proposed improvements will result in more water in storage for the US, reducing the pressure on Mexico to comply with the Treaty that essentially allows Mexico 5 years to release US share of flows from upstream reservoirs in Mexico. The Treaty also allows a 5 year extension, equating to a total of 10 years for Mexico to pay its water debt.

The piping of the canals leading to the water plants will reduce operational conflicts with NAWSC and the City. District operators and water plant operators are constantly adjusting the head gates to meet demand as other users in the system change their demands. Once the pipelines are completed, main canal gates will no longer have to be adjusted, reducing conflicts between District and PWS operators. The increased efficiency and reduction in Push Water requirements will significantly reduce the potential for conflict and the likelihood of a Push Water event.

#### **Evaluation Criterion D - Complementing On-Farm Irrigation Improvements**

The proposed canal piping project will directly facilitate the implementation of on-farm improvements projects such as drip irrigation, because the pipelines will be capable of holding water without leaking or seepage losses. This will significantly increase the available head energy that will then be transferred directly to the irrigation fields. This available energy will help supply pumps needed for drip irrigation systems and allow for more efficient on-farm improvements.

Having the charged pipeline system allows more opportunity for NRCS funded drip irrigation systems. Without the threat of seepage losses, the District will be able to utilize the newly piped canals as storage reservoirs for producers to draw out of the main canals during periods when the District pumps are not running.

The proposed two piped canals will not seep, allowing a longer duration for these systems to run without operating the Second Lift pumps.

Technical assistance from the local NRCS is also available for those interested in implementing on-farm systems. Producers implementing on-farm systems will provide additional water savings to the District and are therefore encouraged by the District to partake in such projects. The proposed project will allow producers to take advantage of the more efficient on-farm systems.

A map of the District's water service area boundary is included in Figure 1.2.

## **Evaluation Criterion E - Planning and Implementation**

### **Project Planning**

The District has a Water Conservation and Drought Contingency Plan in place, included as Appendix G. The State of Texas mandates that districts of this size implement such a plan and submit an updated plan every five years. In addition, they are to report annually on the success and progress of the plan. The proposed project meets an objective of the District's Water Conservation Plan which identifies the modernization of District infrastructure to "greatly reduce water losses" as stated under *Section V. Five-Year and Ten-Year Targets* of the plan.

Canal piping projects are part of the "2022 State Water Plan," that includes all the recommendations of the "2021 Rio Grande Regional Water Plan." Canal piping is listed as a Conservation Strategy in the Regional Plan and by inclusion, the State Plan.

The proposed project conforms to the District's planning effort of water savings. The "Lower Rio Grande Basin Study" completed by the USBR identifies Irrigation Conveyance System Conservation and On-Farm and Irrigation Water System Conservation as two water management strategies to meet future water demands. This canal piping project is an Irrigation Conveyance System Conservation Project that will allow District producers to take advantage on-farm irrigation improvements.

### **Readiness to Proceed**

The proposed project is capable of proceeding upon entering into a financial assistance agreement with the USBR. Table 4 includes the Milestones and Schedule of Expenditures, as well as a breakdown provided for the USBR's share of the cost. The schedule assumes October 1, 2023 as the date for the agreement with the USBR and project completion within 2 years of the agreement date. The project construction can begin upon entering into a financial assistance agreement, and approval of the environmental compliance by the area office.

The District will prepare and adopt a Storm Water Pollution Prevention Plan (SWP3) for this project. Any requirements resulting from consultation with US Fish & Wildlife Services, Texas Parks and Wildlife Department, Texas Commission on Environmental Quality and the Texas Historical Commission will be incorporated into the SWP3. The SWP3 will address runoff from the site as well as requirements for trash management and dust and noise control.

The District's Engineer, Ferris, Flinn & Medina, LLC, performed a seepage study on the South Crossover Main Canal and the Lateral 22 Canal in support of the proposed project. In addition, as part of final report for this project, the District will continue to implement a Watermaster ledger to determine efficiency on an annual basis that will help track water efficiency.

There are no new policies or administrative actions required to implement the proposed project.

**Table 4  
Milestones and Schedule of Expenditures**

Reporting Period	Milestones	Expenditures	
		Total Cost	USBR Share
Pre-award	Engelman Irrigation Metering & Overflow Monitoring (100% Complete)	\$13,501.56	\$6,750.78
October 1, 2023 to March 31, 2024	Enter Agreement with USBR. Environmental Review and Permitting (100% Complete). Design Surveying and Geotechnical Investigation (100% Complete). Engineering Design (100% Complete).	\$561,490.65	\$280,745.32
April 1, 2024 to September 30, 2024	Bid Solar Powered Battery Backup Project & Award of Contract to Successful Bidder Construction of Canal Piping (25% Complete) Bid Canal Piping Project & Award of Contract to Successful Bidder.	\$4,122,389.10	\$2,061,194.56
October 1, 2024 to March 31, 2025	Construction of Canal Piping Improvements (75% Complete).	\$1,232,309.56	\$616,154.78
April 1, 2025 to July 31, 2025	Construction of Canal Piping Improvements (100% Complete). Construction of Solar Powered Battery Backup (100% Complete)	\$660,309.13	\$330,154.56
August 1, 2025 to September 30, 2025	Final Report to USBR.	\$10,000.00	\$5,000.00
	<b>Project Total</b>	<b>\$6,600,000.00</b>	<b>\$3,300,000.00</b>

**Evaluation Criterion F – Collaboration**

Letters of support from the City and NAWSC are included in Appendix H of this report. The project is connected to the Basin Study completed by the US Bureau of Reclamation in 2013. The Basin Study identifies Push Water as a planning objective (see Basin Study page S-3 & 4, in Appendix B). The paragraph quoted in the Technical Project Description, Basin Study, page 2-41, summarizes the problem the proposed project will address. The conversion to municipal and sale of water rights to NAWSC is funding the District’s share of the cost.

All conservation projects in the area help reduce competition for the over allocated supply. Therefore, it is in the best interest of all other users in the system to pursue water conservation projects.

**Evaluation Criterion G - Additional Non-Federal Funding**

The Non-Federal Funding proposed for this project is as follows:

$$\frac{\text{Non Federal Funding}}{\text{Total Project Cost}} = \frac{\$3,300,000.00}{\$6,600,000.00} = 50\%$$

**Evaluation Criterion H - Nexus to Reclamation Project Activities**

The USBR is heavily invested in the Rio Grande Watermaster System through financial assistance of many conservation projects over the past 40 years. The “Lower Rio Grande Basin Study” was completed in December 2013 by the USBR, in cooperation with the Rio Grande Regional Water Authority (RGRWA). The District is a member of the RGRWA. The Basin Study refers to the 2010 Region M Plan, “Rio Grande Regional Water Plan”, dated October 1, 2010 to reiterate that Irrigation Conveyance System Conservation as one of the water management strategies that will result in the greatest amount of water for future use when compared to 15 other strategies. This canal piping project is an Irrigation Conveyance System Conservation Project.

The Basin Study ultimately chose one water management strategy out of the 15 identified that did not use the Rio Grande as a source and was cost effective; desalination of brackish groundwater (DBG). The District’s project conserves Rio Grande water through irrigation conveyance conservation, making conserved water available to others.

The District’s project is connected to reclamation activities. Reclamation has been essential to the recent conservation efforts in the lower Rio Grande Basin. This project builds upon that success. Conservation in Donna Irrigation District eventually benefits other users in the system, as conserved water is allocated to others. The District was awarded and began a 2022 WEEG Grant to line several miles of canal to conserve 4,620 acre feet of water.

The proposed project is not expected to benefit any tribes.

## **(5) Performance Measures**

As a part of the Construction Contract, the general contractor will be required to test the completed pipelines for leakage. No measurable leakage will be allowed.

The District will also commit to continue the annual water audit and build upon the years of 2016-2021. Once the project is implemented, the results will show up in a reduction in system losses and river losses. The proposed project will increase the District's efficiency by 3.8%. The District is required to report its overall efficiency, annually, to the Texas Water Development Board and that information is available to the public. The updated Table 1 will be included in the Final Report to the USBR.

In this manner, the performance of the pipelines will be measured and the results will be provided as part of the Final Report to the USBR.

### **B. Project Budget**

#### **(1) Funding Plan and Letters of Commitment**

The non-federal share of the budget will be funded by the proceeds from the sale of water rights to NAWSC. The first portion of that sale will close early next year and the District can provide its account balances to the USBR at that time. There are no third party sources of funds. The pre award costs for this project includes purchase and installation of the Engelman Irrigation Meter. The District has a current need for the meter and will install it while it waits for a decision on the grant.

#### **(2) Budget Proposal**

The total project cost is \$6,600,000. Table 5 outlines the total cost and the portion to be paid by the applicant, \$3,300,000, which represents 50% of the total budget after considering the \$3,300,000 grant from the USBR. There are no third party contributors.

Table 6 provides the funding sources from non-federal entities. It should be clarified that the sale of water rights to NAWSC will occur and the funds will be utilized, as mandated by State regulations, for capital improvement projects. NAWSC has no approval authority regarding the use of the proceeds.

The Budget Proposal is outlined in Table 7 and described in the Budget Narrative. More information on the development of the budget and documentation is provided in Appendix I.

#### **(3) Budget Narrative**

This Narrative describes the general methodology used to develop the budget. A detailed budget methodology, the source of the prices and the calculations are included in Appendix I.

The first component of the project is the piping of Lateral 22, the canal that feeds the North Alamo Water Supply Corporation (NAWSC) Water Treatment Plant (WTP). The project involves construction of 3,800 linear feet of 48" pipeline from the Upper East Main Canal to an existing pipeline crossing Old La Blanca Rd. A 48" stainless steel gate will be installed in a well just east of the Upper East Main Canal and a well will be installed at the end of the existing Lateral 22 open canal just west of La Blanca Rd.

**Table 5  
Total Project Cost Summary**

<b>Source</b>	<b>Amount</b>	<b>Percentage of Total</b>
Costs to be Reimbursed with the requested federal funding	\$3,300,000.00	50.0%
Costs to be paid by the applicant	\$3,300,000.00	50.0%
Value of Third Party Contributions	\$0.00	0.0%
<b>Total Project Cost</b>	<b>\$6,600,000.00</b>	<b>100.0%</b>

**Table 6  
Non-Federal and Federal Funding Sources Summary**

<b>Funding Source</b>	<b>Amount</b>
<b>Non-Federal Entities</b>	
1. Donna Irrigation District with proceeds from sale of water rights marketed to North Alamo Water Supply Corporation, a potable water retailer, benefitting from the project.	\$3,300,000.00
<b>Requested Reclamation Funding</b>	<b>\$3,300,000.00</b>



**Table 7  
Proposed Budget**

BUDGET ITEM DESCRIPTION	COMPUTATION		QUANTITY TYPE	TOTAL COST
	\$/Unit	Quantity		
<b>SALARIES/WAGES</b>				\$0.00
<b>FRINGE BENEFITS</b>				\$0.00
<b>TRAVEL</b>				\$0.00
<b>EQUIPMENT</b>				\$0.00
<b>SUPPLIES AND MATERIALS</b>				\$0.00
48" 80 PSI PVC Pipe	\$281.31	3,800	LF	\$1,068,978.00
60" 80 PSI PVC Pipe	\$446.00	5,214	LF	\$2,325,444.00
<b>Subtotal</b>				<b>\$3,394,422.00</b>
<b>CONTRACTUAL CONSTRUCTION</b>				
<i>Piping of Lateral 22</i>				
Trench Excavation Protection	\$3.23	3,800	LF	\$12,285.40
Install 48" PVC Pipe	\$55.51	3,800	LF	\$210,938.00
Pea Gravel Bedding	\$48.37	3,800	LF	\$183,817.40
Collars to connect to existing pipe	\$10,974.00	3	LF	\$32,922.00
Saddle Outlets	\$14,160.00	3	LF	\$42,480.00
Irrigation Well	\$64,900.00	2	LF	\$129,800.00
Irrigation Outlet	\$9,440.00	3	LF	\$28,320.00
<i>Subtotal Piping of Lateral 22</i>				<i>\$640,562.80</i>
<i>Piping of South Crossover</i>				
Trench Excavation Protection	\$3.23	5,200	LF	\$16,811.60
Install 60" PVC Pipe	\$55.51	5,200	LF	\$288,652.00
Pea Gravel Bedding	\$61.77	5,200	LF	\$321,196.72
Collars to connect to existing pipe	\$10,974.00	4	LF	\$43,896.00
Saddle Outlets	\$14,160.00	3	LF	\$42,480.00
Irrigation Well	\$80,000.20	4	LF	\$320,000.80
Irrigation Outlet	\$9,440.00	4	LF	\$37,760.00
<i>Subtotal Piping of South Crossover</i>				<i>\$1,070,797.12</i>
Solar-Electric Battery Backup System at the First Lift	\$218,096.00	1	Each	\$218,096.00
Solar-Electric Battery Backup System at the Second Lift	\$164,917.00	1	Each	\$164,917.00
Remote Metering and Level Locations	\$13,501.56	2	Each	\$27,003.11
<b>Subtotal Contractual Construction</b>				<b>\$2,121,376.03</b>

**Table 7  
Proposed Budget**

<b>CONTRACTUAL PROFESSIONAL SERVICES</b>				
The following services are based on the sum of the materials and construction costs listed above that total				\$5,515,798.03
Engineering	@	7.00%		\$386,105.86
Surveying	@	4.00%		\$220,631.92
Inspection	@	4.00%		\$220,631.92
Geotechnical	@	3.00%		\$165,473.94
<b>Subtotal</b>				<b>\$992,843.65</b>
<b>OTHER</b>				
Environmental and Cultural Compliance Costs	@	1.43%		\$78,858.32
<b>TOTAL DIRECT COSTS</b>				<b>\$6,587,500.00</b>
<b>INDIRECT COSTS</b>				
Based on 10% of not more than \$25,000 for Five Contracts	10.00%	of	\$125,000.00	\$12,500.00
<b>TOTAL ESTIMATED PROJECT COSTS</b>				<b>\$6,600,000.00</b>

Three saddle outlets will be installed to connect existing farm turnouts. Three collars to connect to existing pipelines are forecasted and two new wells are also forecasted.

The pipe materials will be purchased by the District and are based on a current quote in Appendix D for pipe. Prices for PVC pipe have skyrocketed in the last few years, due in large part to resin shortages and increase in shipping costs. There has been an increase in demand to replace pipe damaged by the cold weather in the South in February of 2021, as well as stimulus. PVC prices have tripled in the past two years. For this reason, historical prices for PVC pipe are not utilized. The prices obtained were from Eduardo Alvarez, a representative for Diamond Plastics Corporation (DPC). DPC is the only manufacturer of 60" PVC pipe in the US that also sells directly to Districts. The District will advertise the pipe bid and solicit sealed bids in accordance with the Texas Water Code and the Texas Local Government Code.

The Construction of the pipeline will be bid per State regulations for an Irrigation District. The prices for installation are based on prior bids, the HCWID No. 3 Bicentennial Project and Foremost Paving, Inc., Relocation of Pipeline across Lots 10-1, 10-2 and 10-3 for United Irrigation District. An inflation factor is applied to historical bid prices to account for cost increases and forecast inflation since the resource bid date of August 1, 2021 to the forecast middle of construction period of October 1, 2024. That inflation factor is based on a "Construction Inflation Analysis for National Data", Zaneski, Eduard R, May 2021. A chart from the reference used to calculate the cost increase and inflation is included in Appendix I. The curve utilized is the "Non-building Infrastructure" curve and the increase factor is abbreviated CA Factor throughout the Appendix.

The backup solar-charged batteries at the First and Second Lift Pumping Plants are required to start the natural gas engines in the event of a power failure and provide emergency lighting in addition. An electric vacuum pump primes the pumps while an electric compressor is utilized for an air starter on the First Lift Pump Station gas engine. The prices for the solar-battery backup systems are based on an Engineer's estimate from Willard Jordan, PE, an experienced Electrical Engineer. The estimate is included in the Appendix.

The metering stations are based on a quotation from United Water Services, LLC (a local SCADA and electrical contractor), to Cameron County Irrigation District No. 6, in November of 2020, for installation of a solar powered remote monitoring station. Applying a CA Factor of 1.22 to the total quotation of \$11,066.85, amounts to \$13,500, per each of the two sites.

Engineering involves utilizing the boundary and topographic survey to develop a set of construction plans and specifications to bid and construct the project(s) by outside contractors. The District will not be performing any work, aside from participating in the administration of contracts, reporting and payments.

The engineering also includes contract administration during construction. Seven percent of materials and construction is a standard lump sum fee/budget for a project of this magnitude.

Surveying will include topographic and boundary surveying, as well as construction staking. Surveying is crucial to project success and a budget of 4% is reasonable. Inspection will be necessary to ensure that the general contractors perform in accordance with the plans and contract documents. Installation of pea gravel is crucial to pipe integrity. Rebar inspection, prior to casting concrete, is necessary. An inspection budget of 4% is included.

Geotechnical includes subsurface investigations along the project to properly design the wells and provide information to prospective bidders regarding the ground condition during pipe installation. The geotechnical includes materials testing of cast in place concrete as well as any density tests that may be required.

Environmental and Cultural Compliance costs of \$78,858, are budgeted for this project. This includes the portion that the USBR will retain for its portion of the work. There are no environmental concerns regarding this project. A review with the Texas Historical Commission will occur and an archeological survey and a Texas Antiquities Permit is expected. Installation of the pipeline is deeper than the existing canals, therefore excavation in undisturbed soils is inevitable. Ferris, Flinn & Medina, LLC, has worked with Southern Archaeology Consultants, from Indian Lake, Texas (near Los Fresnos) to assist with these matters. Construction monitoring for these projects is the norm. The budget of 2.04% of construction and material costs is an accurate estimate of the combined resources of the USBR and the consultants to accomplish these tasks. The District proposed to charge indirect costs at a de minimis rate of 10% of the modified total direct costs.

There are five contracts associated with this project as follows: pipe, construction of pipelines, backup solar-electric battery systems, engineering and surveying, and geotechnical. Each will be over \$25,000; therefore, the indirect cost of 10% of each contract, up to the first \$25,000, amounts to \$12,500.

The total project budget is \$6,600,000.00.

### C. Environmental and Cultural Resources Compliance

There are no environmental concerns for this project. The project will not impact the surrounding environment. The open canal to be piped will be left with a slight mound to avoid altering drainage patterns. The existing canal will be leveled before installing the pipeline by excavation and backfill. The pipe will be covered each day for safety purposes, thus impact is minimal.

- No species listed or proposed to be listed, or critical habitat will be affected by the project.
- There are no wetlands or other surface waters within the project boundaries.
- The water delivery system was constructed between 1902 and 1960.
- The project will result in the modification/removal of existing open canals. The exact construction date of which cannot be determined, nor can their dates of modification.

- Some facilities in the District were constructed as early as 1902. Many facilities in the District are eligible for listing on the National Register of Historic Places.
- There are known archaeological sites in the project area. An archaeological survey and monitoring for this project are anticipated.
- The proposed project will not have an adverse effect on low income and minority population. On the contrary, the project will improve the reliability of the water supply for the City of Donna and NAWSC; both with majority low income and minority populations.
- The project will not impact tribal lands.
- The project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native species known to occur in the area.

It is anticipated that an archaeological survey and construction monitoring will be requested for this project, as disturbing previously undisturbed earth to lay the pipeline below the elevated canals is expected. The coordination with the Texas Historical Commission by an archaeological consultant will occur at the beginning of the project and is built into the schedule.

#### D. Required Permits or Approval

The District owns the land required for the project; therefore, no permits or approvals are required, aside from a Texas Antiquities Permit.

Communication with the State Historic Preservation Office will occur during the procurement phase of the project; the first 90 days. There are no anticipated delays to the project schedule.

#### E. Overlap or Duplication of Efforts

There is no duplication of effort or overlap between the proposed project and any other proposal or project.

#### F. Conflict of Interest Disclosure Statement

There are no known conflicts of interests at the time of submission. The District operates under the Texas Water Code which prohibits board members from participating in discussion or voting on any item for which they may have a conflict. In addition, that Board Member must sign an Affidavit that he has abstained from discussion on any item where a conflict could exist.

#### G. Uniform Audit Reporting Statement

Donna Irrigation District was not required to submit a Single Audit Report for the most recently closed fiscal year.

#### H. Letters of Project Support

Letters of project support are provided in Appendix H. The North Alamo Water Supply Corporation and the City of Donna, both benefactors of the proposed project, have provided letters of support.