

**Border Environment Cooperation Commission
Cameron County Irrigation District No. 2, Texas
Two Water Conservation Improvements Projects
Replacement of River Pumping Plant and Construction of Interconnect System**

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General Criteria

1. Type of Project

The document includes two proposed projects by Cameron County Irrigation District No.2 (CCID No.2). The two proposed projects fall under the Border Environment Cooperation Commission (BECC) priority area of water conservation. The proposed projects involve modernization and technical improvements to two initial system components:

- *Replacement of River Pumping Plant*
- *Interconnect System*

2. Project Location

The projects are located within the boundaries of the CCID No.2. Cameron County is the southernmost county in Texas and is bounded by the Rio Grande and the Gulf of Mexico. CCID No.2 lies in the central part of Cameron County in the Lower Rio Grande Valley. The southern border of the District is near the Rio Grande and extends from La Paloma westward to Los Indios. The Arroyo Colorado forms the northern boundary of the District which extends from near Harlingen on the west to near Highway 106 on the east. Included within the boundaries of the District are the cities of San Benito, Rio Hondo, and part of the City of Harlingen. The District contains 64,281.6 acres, of which 57,439.5 can be irrigated. The District conveyance system consists of 227.96 miles of canals and pipelines. The proposed projects are within the 62-mile limit from the border that the BECC requires for project certification.

3. Project Description and Work Tasks

CCID No.2 organized by an election held on July 25, 1916. Creation of the District was validated in Cause No. 3182 in the District Court of Cameron County, Texas, 28th Judicial District, March Term, 1917. Under the provisions of the acts of the 35th Legislature (H.B. No. 238), the name of the District was changed by resolution of the Board of Directors to Cameron County Water Improvement District No. 2. The District was later converted to a water control and improvement district under the provisions of Article 16, Section 59, of the Constitution of the State of Texas, and retained the name of Cameron County Water Improvement District No. 2. On February 1, 1981, the District changed its name to CCID No.2 and is operating under Vernon's Texas Civil Statutes, Water Code, Chapter 58 and under Article XVI, Section 59 of the Texas Constitution.

Water is diverted from the Rio Grande using the District's pumping plant facilities located near Los Indios, Texas. Water is pumped from the river into two main canals; the High Line System, which provides water to the northern portion of the District, and the Low Line System, which provides water to two storage reservoirs and the southern portion of the District.

The District conveyance system consists of 227.96 miles of canals and pipelines. The system includes 198.89 miles of unlined canals, 8.62 miles of lined canals, 5.51 miles of pipeline, and 14.94 miles of Resaca. Of the 227.96 miles, 136.64 miles are considered to be main canals and 91.32 miles are classified as lateral canals. The District's total storage reservoir capacity is 7,924.6 ac-ft, including the Resacas located throughout the distribution system. Approximately 5,500 ac-ft of this storage is contained in the two reservoirs. The water in the reservoirs provides backup water supply for Municipal and Industrial (M&I) deliveries, and also provides a cushion during the four-day delivery time required to convey water from International Falcon Reservoir down the Rio Grande to the District's pumping system. In addition, a smaller 128 surface-acre storage reservoir located in the northern portion of the District (Reservoir No. 7) is used to store water during periods of low demand, and it is re-lifted into the distribution system during periods of higher demand.

The District's irrigation water right is 147,823.65 ac-ft per year. However, this water right is "as-available" and the actual water available to the District varies from year to year. In 2002 the District's allocation was 35,000 ac-ft.

In addition to irrigation water rights, the District holds municipal/domestic water rights of 5,517.5 ac-ft per year, municipal water rights of 6,390.0 ac-ft per year, and industrial water rights of 4,650.0 ac-ft per year. The municipal/domestic water can be used either for municipal water supply or for domestic use such as watering of lawns or livestock.

The District also contracts for delivery of municipal water to the East Rio Hondo Water Supply Corporation (485 ac-ft per year) and the Arroyo Water Supply Corporation (200 ac-ft per year). The District's primary municipal customers include the City of San Benito (5,500 ac-ft per year) and the City of Rio Hondo (890 ac-ft per year). The District is the sole source of water for these municipalities, which together include a total population of over 60,000 residents. The District also serves as the sole water supply (2,400 ac-ft per year) for the AEP Central Power and Light La Palma electrical power generating station in San Benito, which serves 800,000 individual customers. Due to inadequate energy production and transmission capacity in the Lower Rio Grande Valley, the operation of the La Palma Power Station is considered vital for a stable energy supply for much of the eastern valley.

The average annual water diverted by the District from 1986 through 2001 was 87,513 ac-ft per year, and the District reports an estimated conveyance efficiency of approximately 40%.

The two proposed projects will improve their water conveyance efficiency and reduce energy consumption and maintenance costs, and they are:

Pumping Plant.

The District's existing river Pumping Plant was constructed over 90 years ago and currently exhibits evidence of structural distress and damage. The District is proposing to replace the existing Pumping Plant to improve operational efficiencies not only in terms of annual operation and maintenance expenditures, but also with respect to energy and water conservation. The existing pumps are decades old and the replacement of these pumps with newer, more efficient models will reduce the District's energy needs.

The construction cost for the Pumping Plant is estimated at \$ 11,000,736.

According to the Economic and Conservation Evaluation of Capital Renovation Projects for the CCID No.2, prepared by the Texas Water Resources Institute of the Texas A&M University, the estimated annual water savings resulting from construction of the new Pumping Plant is 2,171 ac-ft/yr, and the energy savings are 721,904 kwh/yr.

Interconnect System.

The District is also proposing to construct an Interconnect System to improve their water conveyance efficiency and reduce energy consumption and maintenance costs. Irrigation District 13 was merged with CCID No.2 several years ago in order to improve delivery and provide more cost effective operation and maintenance for the farmers within Irrigation District No. 13. Old District 13 contained approximately 8,000 acres of farmland, and no municipalities were dependent on delivery of its water. The main supply canal (Canal 13-A) for old District 13 is undersized and cannot convey a sufficient volume of water to meet the total delivery requirements. To satisfy water demand in the northern portion of old District 13, Canal 13-A currently delivers water to storage Reservoir No. 7 during periods of low demand. Re-lift pumps are used to move the water back into the distribution system for delivery to the farmers during periods of peak demand when Canal 13-A cannot deliver sufficient volumes of water to serve the entire District. Use of this reservoir is inefficient and results in substantial loss of water due to evaporation and infiltration as well as increased energy consumption due to the need for re-lift pumps to move water from the storage reservoir back into the distribution system. In addition, water remaining in the storage reservoir for extended periods of time becomes too saline for irrigation use so the water must be released and the reservoir refilled.

The proposed Interconnect System will convey water from Canal C to Canal 13-A1, eliminating the need for Reservoir No. 7 and improving the delivery rate and efficiency to old District 13. This action will result in conservation of water, which would otherwise be lost to seepage and evaporation from the reservoir. In addition, construction of the Interconnect System will include modifying and lining Canal 39, which will also result in a reduction in water lost to seepage. The delivery rates in old District 13 will increase which will result in an improvement in the on-farm efficiencies in that area. These water conservation measures will result in energy conservation through reduced pumping requirements.

The construction cost for the Interconnect System is estimated at \$ 4,332,110.

According to the Economic and Conservation Evaluation of Capital Renovation Projects for the CCID No.2, prepared by the Texas Water Resources Institute of the Texas A&M University, the estimated annual water savings resulting from construction of the Interconnect System are 9,129 ac-ft/yr, and the energy savings estimated are 302,688 kwh/yr.

The combined total cost for the Pumping Plant and Interconnect System is estimated to be \$ 15,322,846.

The total estimated annual water conservation for these projects is 11,300 ac-ft/yr once all components are completed. The expected water savings from the two projects over their expected productive lives are 242,748 acre-feet.

A total energy savings of 1,024,592 kwh/yr is anticipated once all components of these projects are completed. The expected energy savings from the two projects over their expected productive lives are 22,010,478 KWH.

Work tasks included:

- *Final Project Study Report, Final Report was completed in May of 2003.*
- *Plans & Specifications will be completed in September 2003.*
- *Review Draft Plans & Specifications, will be completed in September 2003.*
- *Final Plans & Specifications will be completed in October 2003.*
- *Installation Specifications will be completed in October 2003.*
- *Materials Specifications will be completed in October 2003.*
- *Project Funding Awarded, will be completed in September 2003.*
- *Project Bid Package, will be completed in October 2003.*
- *Bid Advertisement, will be completed in October 2003.*
- *Bid Award & Contracting, will be completed in January 2004.*
- *River Pumping Plant Construction will start in January 2004 and will be completed in June 2005.*
- *Interconnect System Construction, will start in April 2004 and will be completed in June 2005*
- *O&M Training will start in May 2005.*

4. Compliance with International Treaties and Agreements

The International Boundary and Water Commission (IBWC) is an independent bi-national public organization that foresees that the 1944 Water Treaty between the United States and Mexico related to water and boundaries issues applies. The project will not violate the allocation of water rights. The District will continue to meet all state surface water diversions from the Rio Grande in accordance with the agreements in place and the restrictions of the Treaty.

Human Health and Environment

1. Human Health and Environmental Need

The human health impacts from this project would be all positive from the sense that through water conservation, additional water would be made available for growing crops for human consumption and additional water would be available for municipal use. This water conservation would partially offset water shortages during periods of drought. Through water conservation and a more efficient use of the allocated waters for irrigation and municipal use, a growing population of the region can be sustained over a longer period without creating health risks through diseases due to unsanitary conditions because of lack of water. The District does not use groundwater for its operations since the groundwater is undependable and has a high total dissolved solid in excess of 1500 mg/L in dissolved salts and thus does not meet the Primary Drinking Water Standards. The Rio Grande traditionally runs from 500 to 1000 mg/L of total dissolved solids, which meets Texas Commission on Environment Quality (TCEQ) primary water standards.

The Rio Grande Valley has in the past 7 years experienced a drought, which has limited the amount of surface water available for irrigation and municipal use. The drought in northern Mexico and the entire Rio Grande Basin, which includes the Rio Conchos Basin in northern Mexico, has contributed significantly to the water shortages for irrigation in the Lower Rio Grande Valley. This water shortage has created an economic hardship in the region through reduction of crops and subsequent reduced revenue. The proposed water conservation project will provide a modern, centralized means of controlling and monitoring flows to the various accounts/parcels and eliminate water seepage losses with resulting water savings and respective energy savings through reduced pumping.

2. Environmental Assessment

In accordance with the National Environmental Policy Act (NEPA) and other associated statutes, Bureau of Reclamation (USBOR) has evaluated the impacts on the environment of the proposed construction of a new Pumping Plant and Interconnect System. In summary, the impacts of the Pumping Plant construction would include the net permanent loss of up to five acres of mowed grassy habitat, a short-term increase in turbidity of the inlet channel and a short-term decrease in air and noise quality. There would be no effect to any endangered or threatened species, any migratory bird or any historic or cultural property. Construction of the Interconnect System would result in a net permanent loss of 26 acres cropland, a permanent gain of 126 acres of pasture w/scattered brush, 4.5 acres mowed grassland, and 1.1 miles of canal open water. There will also be off-site mitigation of approximately 128 acres of low quality wetland (Resaca) habitat. In addition, there would be a short-term decrease in air and noise quality, some long-term decrease in air quality and a temporary disruption of service to irrigators along Canal 39. Environmental requirements and commitments have been made part of this project to minimize the impacts of the new Pumping Plant and Interconnect System on the environment.

Pumping Plant.

In accordance with the NEPA and other associated statutes, USBOR has evaluated the impacts on the environment of the proposed construction of a new Pumping Plant and the alternatives. The findings of this evaluation are presented in the Environmental Assessment report. In summary, the impacts of the proposed project would include the net permanent loss of up to five acres of mowed grassy habitat, a short-term increase in turbidity of the inlet channel and a short-term decrease in air and noise quality. There would be no effect to any endangered or threatened species, any migratory bird or any historic or cultural property.

In addition, the following environmental commitments will be made part of the proposed project:

- *Where possible, landscaping would be limited to seeding and replanting with native species, and to native trees, shrubs, and herbaceous species which are more drought tolerant, adaptable and use less water.*
- *A mixture of grasses and forbs appropriate to address potential erosion problems and long-term cover would be planted over disturbed areas.*
- *Existing trees and woody vegetation would remain undisturbed if possible. If not avoidable, stands of native brush and woods would be surveyed for nesting migratory birds, and then not be disturbed during the (nesting) period of March through August if any were found.*
- *All State and Federal permit conditions necessary for the construction or operation of the proposed pumping plant would be complied with. This could include provisions for protecting wetlands (Section 404), water quality (Section 401), and/or international boundary water resources (IBWC license).*

Interconnect System.

In accordance with the NEPA and other associated statutes, USBOR has evaluated the impacts on the environment of the proposed construction of the Interconnect System and the alternatives. The findings of this evaluation are presented in the Environmental Assessment report. In summary, the proposed project would result in a net permanent loss of 26 acres cropland, a permanent gain of 126 acres of pasture w/scattered brush, 4.5 acres mowed grassland, and 1.1 miles canal open water. There will also be off-site mitigation of approximately 128 acres of low quality wetland (Resaca) habitat. In addition, there would be a short-term decrease in air and noise quality, some long-term decrease in air quality and a temporary disruption of service to irrigators along Canal 39.

To minimize these impacts, the following environmental requirements have been made part of the proposed project:

- *Landscaping would be limited to seeding and replanting with native species where possible. A mixture of grasses and forbs appropriate to address potential erosion problems and long-term cover would be planted. Native trees, shrubs, and herbaceous species which are more drought tolerant, adaptable and use less water would be used for landscaping in the project areas.*
- *Preserve and/or restore 128 acres (or functional equivalent) of wetland or riparian habitat in the Lower Rio Grande Valley. USBOR and the District are presently working with Region 2 of the U.S. Fish and Wildlife Service to identify acceptable mitigation sites.*
- *Existing trees and woody vegetation would remain undisturbed if possible. If not avoidable, stands of native brush and woods would be surveyed for nesting migratory birds during the (nesting) period of March through August, and then not be disturbed if any were found.*
- *Bilingual notices will be given to all residences within 100 feet of the project construction area indicating when and where construction activities will be taking place. All construction equipment will be operated and maintained to minimize noise generation (shutting off idling equipment, mufflers, etc.). Additionally, all construction activities will take place only between the hours of 8:00 am and 6:00 pm.*
- *Electrical power lines will be designed for raptor protection as outlined in "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996".*
- *All State and Federal permit conditions necessary for the construction or operation of the proposed Interconnect System and associated improvements would be acquired and complied with.*

No environmental risks or associated costs are anticipated in the project area due to the proposed project improvements.

3. Compliance with Applicable Environmental and Cultural Resource Laws and Regulations

As previously mentioned and as part of the preparation of the Environmental Summary Report, comments were solicited from relevant Federal, State, and Local cooperating agencies, including: Texas Historical Commission, the U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, National Weather Service, U.S. Soil Conservation Service, Texas Department of Transportation, Texas Water Development Board, and the U.S. Army Corps of Engineers. The project improvements comply with all applicable regulations from the contacted agencies.

Technical Feasibility

1. Appropriate Technology

The proposed water conservation improvements have been described in the Project Plan prepared by the USBOR for the District and submitted to BECC. All design and construction requirements are to adhere to USBOR under the "Guidelines for Preparing and Reviewing Proposals for Water Conservation and Improvement Projects under Public Law 106-576" as per the memorandum of agreement between the District and USBOR. The USBOR has reviewed and approved the Project Plan as well as the "Economic and Conservation Evaluation of Capital Renovation Projects: Cameron County Irrigation District No. 2 (San Benito)- Interconnect Between Canals 39 and 13-A1 and Replacement of Rio Grande Diversion Pumping Plant" Report prepared by Texas Water Resources Institute Texas A&M University. All technology used in the proposed improvements is appropriate based on local experience and that of the USBOR for irrigation projects with similar operations and infrastructure.

Pumping Plant.

The existing pumping plant was constructed on the Rio Grande. When the river changed course, the pumping plant was left in place on the abandoned river channel which now serves as a 3,000 foot long intake channel extending from the Rio Grande. The abandoned river channel has been backfilled beyond the pumping plant. Mechanical removal of Hydrilla and Water Hyacinth from the intake channel is required two to three times per year, and dredging of the channel is required every few years. A floating boom constructed of Styrofoam filled 18-inch HDPE pipe has been placed across the entrance to the intake channel to prevent floating Water Hyacinth plants from entering the intake channel.

The pumping plant delivers water to two parallel main canals, one serving the Low Line System, and one at a higher elevation serving the High Line System. A weir is located along the Rio Grande downstream from the intake channel. The elevation of the weir crest is 45.44 feet (MSL), and the water surface upstream of the weir generally fluctuates between 4 feet below and 10 feet above the weir crest with a typical elevation of approximately 45.94 feet (MSL). The pumping plant intake pipes are set at elevation 38 feet (MSL). The high water mark on the High Line System is approximately 59.5 feet and the high water mark on the Low Line System is approximately 54 feet (MSL). All pumps discharge into the High Line System and the water flows through an electric motor operated slide gate to the Low Line System as needed. Based on these elevations, head on the existing pumps ranges from approximately 11.5 feet to 17.5 feet.

The plant houses four operational pumps; three electric pumps and one natural gas pump which is currently being converted to electric. The plant also houses a fifth pump which recently burned up and is no longer operational. A sixth pump (also electric) is located outside the plant on a pump stand constructed above the inlet channel. Until the loss of the American 60" pump in 2001, the capacity of the pumping plant was 595 ft³/sec. With the loss of the American pump and rehabilitation of the Worthington 36" pump, the capacity of the plant will be 510 ft³/sec.

A structural investigation of the existing pumping plant building was conducted in September 2000 by Halff Associates. The investigation found evidence of moderate damage to some of the concrete structural elements in the form of spalls and cracks, and attributed much of the distress to past modifications made to the structure to accommodate new equipment. Sources of water exist in the inlet channel on the west side of the structure and the series of outlet tanks on the east side of the structure. Water seeps into the plant through numerous cracks in the concrete walls, and the rate of seepage increases significantly when the water level in the outlet tanks is high. The structural investigation concluded that the problem of water infiltration into the building was significant and that controlling migration of water into the plant would require substantial repairs and improvements. The structural investigation report suggested that, given the age and uncertainty of the condition of the foundation, the construction of a new facility may be a better alternative than rehabilitating the existing plant.

The proposed pumping plant will be located at the end of the inlet channel, immediately north of the existing plant. The plant will include eight electric motor driven vertical turbine pumps. Two of the pumps will have a 50 ft³/sec

capacity and the remaining six pumps will have a 100 ft³/sec capacity. The pumping plant will consist of a poured in place concrete substructure with the pumps mounted on top of the structure. A shed roof will be provided above the pumps to protect them from the weather.

The canal system was designed to convey approximately 600 ft³/sec. The pumping plant will have sufficient capacity to fully utilize the delivery system during normal operations. To accomplish this goal, 100 ft³/sec of excess pumping capacity will be included to accommodate having one pump out of service for maintenance at any given time.

The minimum pumping capacity will be reduced from 75 ft³/sec to 50 ft³/sec to allow the District to divert additional no-charge water when excess water is available in the downstream reaches of the Rio Grande. This no-charge water does not count against the District's annual water allocation. The District's current minimum pumping rate is 75 ft³/sec, and no-charge water often cannot be pumped from the river at that rate. Reducing the minimum pumping capacity will also allow for water and energy savings during periods of low demand when only minimal M&I deliveries are required and pumping at a rate less than 75 ft³/sec could satisfy the demand.

The existing power transformers for the pumping plant are located on elevated platforms. The District has experienced lighting strikes to the elevated transformers which resulted in the loss of electrical power to the pumping plant. A recent occurrence left the pumping plant without power for six weeks. The existing power transformers at the site will be replaced with ground level transformers, and lightning protection will be added to minimize the potential for such future occurrences. In addition, a diesel powered backup generator system will be provided to ensure the District can deliver a minimum of 200 ft³/sec to their M&I customers. The District's current M&I delivery requirement is approximately 75 ft³/sec, and 200 ft³/sec should accommodate future expansion of the District's M&I customer base.

The major features for this facility include the following:

- Inlet Channel Extension
- Eight Unit Pumping Plant
- Outlet Structure adjacent to Pumping Plant
- Tie-in Channel for the High Line Canal
- Earthen Plug for High Line and Low Line Canals
- Tie-in Channel for Low Line Canal
- One, 2,500 kVA Transformer
- One, 750 kVA Engine Generator and 2,000 Gallon Diesel Fuel Tank
- A Realigned Access Road to Pumping Plant Service Yard

The size, location, and arrangement of these features were selected to minimize the need for specialized foundation preparation and treatment, optimize overall construction complexity and time, and to simplify the operational and maintenance requirements and costs for the new facility. Additionally, construction sequencing will allow the existing pumping plant to operate during construction of the new pumping plant facility.

Several features will need to be relocated and/or abandoned prior to or during construction of the new facility.

Another feature that will need to be removed will be the existing 36-inch diameter pump discharge line, vertical turbine pump, and supporting steel frame that exist along the north end of the existing intake channel. It is anticipated that this pump and discharge line will be removed once construction of the new inlet channel extension begins.

The portion of the existing High Line Channel that extends from the existing pumping plant to the new High Line Tie-in Channel will be abandoned once the new pumping plant is tested and operational. The portion of the existing Low Line Channel that extends from the existing pumping plant to the new Low Line Tie-in Channel will also be abandoned once the new Low Line Canal connection is completed and operational.

The proposed pumping plant location will require demolition and removal of the existing house. However, the economic gains realized with simplified construction, elimination of special foundation treatment, and simplified operation and maintenance with the new plant location were determined to far exceed the expense of removal and replacement of this house.

The current construction sequencing plans for the construction of the Pumping Plant, Intake Channel extension, the Outlet Structure, the new service yard, and installation of all pump units with electrical and mechanical equipment prior to construction of the High Line Tie-in Channel (HTC) and any of the Low Line Tie-in Channel (LTC). Once the new pumping plant is capable of pumping water from the Intake Channel, the HTC will be constructed to allow

deliveries from the new pumping plant to the High Line Canal. This will minimize the time required to connect the new pumping plant to the existing High Line Canal. It is expected that less than 30 days will be required to construct the HTC and connect the Outlet Structure to the existing High Line Canal. Deliveries from the existing pumping plant into the Low Line Canal will continue throughout the entire period of construction described above.

Once the new pumping plant is capable of making deliveries into the existing High Line Canal, the LTC will be extended to a point near the Low Line Canal. The Low Line Canal will be taken out of service for no more than 30 days to construct the earthen plug within the canal and extend the LTC into the existing Low Line Canal. Once this is completed, the new pumping plant will be capable of making deliveries to both canal systems and the existing pumping plant will be taken off-line.

The new pumping plant orientation and location were selected to optimize the length of intake channel and the tie-in channels while minimizing the impact to existing facilities. Also, the orientation of the new pumping plant provides for direct alignment of the tie-in channel to the High Line Canal. The length of the intake channel extension was also governed by the need to provide adequate distance for the sheet pile wall anchorage.

The Outlet Structure is located along the southeast end of the pumping plant. The design and orientation allows discharge from the plant manifold directly into the Outlet Structure and along the end of the plant into the High Line and Low Line canals. The Outlet Structure will be constructed while the High Line and Low Line Canals are in operation. The Outlet Structure is oriented to allow construction of gentle curves for tie-in channels. Existing roads will be re-routed to cross decks over the concrete channels.

The proposed pumping plant is a wet-sump type plant. The sump has been divided into eight separate sumps to allow isolation and dewatering of each pump. This structural arrangement for the sump also accommodates large uplift pressures and lateral soil pressures with smaller wall and slab sections. Bulkhead gate slots are located approximately 60 feet upstream of the pumps. Access into the sump is accomplished via removable frames and grating at the valve deck floor (elevation 52.75 feet) or from the intake deck (elevation 57.00 feet).

The units have been arranged along one line that is perpendicular to the flow of water in the sump. The length of sump is established to satisfy hydraulic flow criteria for the largest units ($100 \text{ ft}^3/\text{sec}$ units). The units are grouped into two sets of four units (three $100 \text{ ft}^3/\text{sec}$ units and one $50 \text{ ft}^3/\text{sec}$ unit) that provide flow to two, separate, 96-inch diameter manifolds. The motors for each unit are horizontal motors located just north of the centerline of the units described above. The motor deck slab extends further north to accommodate motor control equipment located to the north of the pump motors.

The discharge pipes with check valves and motor operated butterfly valves extend back over the sump (upstream direction) to reduce the overall dimensions required for the pumping plant footprint. A deck is provided upstream of the discharge lines and discharge manifold piping to provide additional access to the sump (removable frames and grating) and slots for installation/removal of the bulkhead gates for dewatering of the sump. The width of this intake deck is sufficient to allow access for maintenance trucks and equipment required to remove trash from the trashracks and for installation of the bulkhead gates. Trashracks are provided along the upstream end of the intake portion of the pumping plant.

The pumps were selected to provide a maximum total flow of $600 \text{ ft}^3/\text{sec}$, $300 \text{ ft}^3/\text{sec}$ to the High Line Canal and $300 \text{ ft}^3/\text{sec}$ to the Low Line Canal, at the design head (typical river water surface elevation), and a minimum total flow of $50 \text{ ft}^3/\text{sec}$ at the minimum river water surface elevation.

Six, 42-inch, $100 \text{ ft}^3/\text{sec}$ and two, 30-inch, $50 \text{ ft}^3/\text{sec}$ vertical turbine propeller-type pumps will be provided. Each half of the pumping plant, consisting of one, $50 \text{ ft}^3/\text{sec}$ and three, $100 \text{ ft}^3/\text{sec}$ units will be manifolded to individual 96-inch diameter discharge pipes. Both discharge pipes direct the flow into an Outlet Structure for diversion of the total pump flow to the High Line and Low Line Canals.

Vertical turbine propeller-type pumps were selected based on the low operating head and to maximize pump efficiency over the pumping head range. Right-angle gear drives are necessary to enable the pumps to operate at the lower operating speeds required of these propeller-type units.

Assuming an 85 dB(A) noise level for each pump motor, the noise level at the pumping plant will be approximately 95 dB(A) when all eight pumping units are operating. At a distance of 200 feet from the pumping plant, the noise level will be below 50 dB(A).

Interconnect System.

Irrigation District No. 13 was merged with CCID No.2 several years ago in order to improve delivery and provide more cost effective operation and maintenance for the farmers within old District 13. The main supply canal

(Canal 13-A) for old District 13 is undersized and cannot convey a sufficient volume of water to meet the total delivery requirements. To satisfy water demand in the northern portion of old District 13, Canal 13-A currently delivers water to storage Reservoir No. 7 during periods of low demand. Relift pumps are used to move the water back into the distribution system for delivery to the farmers during periods of peak demand when Canal 13-A cannot deliver sufficient volumes of water to serve the entire District. Use of this reservoir is inefficient and results in substantial loss of water due to evaporation and infiltration as well as increased energy consumption due to the need for relift pumps to move water from the storage reservoir back into the distribution system. In addition, water remaining in the storage reservoir for extended periods of time becomes too saline for irrigation use so the water must be released and the reservoir refilled.

The District is proposing to construct an Interconnect System to improve their water conveyance efficiency and reduce energy consumption and maintenance costs. The proposed Interconnect System will convey water from Canal C to Canal 13-A1, eliminating the need for Reservoir No. 7 and improving the delivery rate and efficiency to old District 13.

The proposed Interconnect System will consist of the Interconnect Canal, modification of Canal 39 to convey water from Canal B to the Interconnect Canal, and installation of a new pump and pipeline to serve farmland currently irrigated with water pumped directly from Reservoir No. 7. Implementation of the new Interconnect System will eliminate the need for Reservoir No. 7 which will result in reduced energy consumption and significant water conservation. In addition, construction of the Interconnect System will result in a significant increase in available irrigation water for old District 13 which will improve the on-farm delivery efficiency in that area.

The District first proposed constructing the Interconnect Canal between Canal E and Canal 13-A1. A preliminary layout and cost estimate was developed for this alternative by Reclamation's Great Plains Regional Office. The estimated cost for this proposal was higher than expected and the District began looking for less expensive alternatives. The Interconnect Canal between Canal 39 and Canal 13-A1 is shorter, but will require enlarging Canal 39 to handle the additional flows.

The additional flows required from Canal C will be carried in Canals D and B before reaching Canal 39 and the proposed Interconnect Canal. The Interconnect Canal will be approximately 5,920 feet long and will have a capacity of 57.9 cubic feet per second. The Interconnect Canal will consist of a lined channel constructed on a raised pad, four new farm turnouts, a new turnout for the lower portion of Canal 39, a 54-inch diameter inverted siphon, a 60-inch diameter inverted siphon, one new check structure, and associated drainage structures. The raised pad will be constructed from materials excavated on either side of the pad. The excavated areas will be constructed to provide surface and sub-surface drainage ditches similar to those located along the existing delivery system.

Design capacities and system requirements were developed during discussions and field reviews with the District. Preliminary designs were made in accordance with USBOR standards.

Preliminary designs indicate that the Interconnect Canal will have the following dimensions:

- *10-foot bottom width*
- *Channel invert slope = 0.00003*
- *1.5 to 1 side slopes*
- *6'-5" high canal banks to provide required freeboard*
- *5'-3" high canal prism lining for normal flows*
- *Estimated 200 foot ROW width (includes new drainage/borrow ditches)*

The District is also proposing to enlarge and raise Canal 39 from Canal B to the point where the Interconnect Canal will be constructed. This reach of Canal 39 is approximately 6,595 feet long. Flows in Canal 39 will vary from 66.3 cubic feet per second at the headworks to 59.3 cubic feet per second just above the proposed Interconnect Canal. The invert of the canal will be raised between 2.5 and 6.75 feet. The enlarged Canal 39 will consist of a lined channel constructed on a raised pad, ten new farm turnouts, two 66-inch diameter inverted siphons, two new check structures, and associated drainage structures. The raised pad will be constructed from materials excavated along the existing drains that parallel the canal.

Preliminary designs indicate that the Canal 39 channel will have the following dimensions:

- *12-foot bottom width*
- *Channel invert slope = 0.00003*
- *1.5 to 1 side slopes*
- *6'-3" high canal banks to provide required freeboard*
- *5'-0" high canal prism lining for normal flows*
- *Estimated 200 foot ROW width (includes new and existing drainage/borrow ditches)*

The District is proposing to line Canal 39 and the Interconnect Canal with a geomembrane protected by a layer of concrete. A 20-mil PVC membrane with a 3.5-inch thick concrete protective cover was selected as the liner. Installation of lining on the canals will reduce water lost to seepage by approximately 95% and will also reduce operation and maintenance costs.

Design capacities and system requirements were developed during discussions and field reviews with the District. Designs were made in accordance with USBOR standards.

2. Operation and Maintenance Plan

Because the plant is a reinforced concrete structure with a metal framed sun shade, upkeep and maintenance of the plant itself will be minimal. The site will be sloped to allow surface water drainage back toward the Inlet Channel and the High Line and Low Line Canals. Rain water that would collect on the motor deck and on the intake deck of the pumping plant will drain into the sump or off the deck into the Service Yard.

Trash that may need to be removed from the trashracks will be raked manually, placed on the intake deck, and hauled away. The trashracks will be sloped to optimize the raking effort and length of intake structure.

Because discharge from the new pumping plant will be directly into the Outlet Structure with open channel flow from there to the canals, inspection and maintenance of the system will be simple and routine. No special equipment or means of access will be required. Flow measurement will be accomplished at the Outlet Structure through use of weirs and staff gauges. Simply starting or stopping a pump unit will accomplish flow control.

Access and removal of equipment, valves, motors, or pumps will be accomplished with a mobile crane. Installation and removal of bulkhead gates will also be performed with a mobile crane. Removal of roof panels on the sun shade will be required to access the pumps, pump motors, and four of the discharge line valves. The other four discharge line valves are located outside of the sunshade and can be accessed without removal of the roof panels.

The proposed projects require a long term O&M plan for training, or certification of operators, and preparation of an O&M manual. All O&M documentation of any equipment installed as a result of the proposed project shall be provided by vendors of such equipment as shall be required in the project bid specifications.

Start-up operational plan is required for these projects. Start-up and operational plans may be in conformance with the recommendations of the manufacturers of the equipment supplied in accordance with the project bid specifications.

Any emergencies or contingencies that may occur during the course of the proposed project shall have none or very limited impact on the ongoing operations of the delivery of raw water by CCID No. 2. No contingency plan is required for the proposed project.

The bid specifications shall specify the standards and submittals required by all vendors and contractors for the proposed projects.

3. Compliance with Applicable Design Regulations and Standards

The Projects will comply with the design standards of the USBOR and regulations of the Texas Water Development Board (TWDB).

Financial Feasibility and Project Management

1. Financial Feasibility.

The financial information for the proposed CCID No.2 projects, and the District's financial condition were analyzed to obtain sufficient support of the District's capability to sustain the proposed funding structure of the projects and the on-going operation and maintenance of the improvements.

The projects costs are as follows:

Cost Breakdown

<i>Item</i>	<i>River Pump Plant</i>	<i>Interconnect System</i>
<i>Construction</i>	<i>7,915,736</i>	<i>2,957,110</i>
<i>Engineering & Admin</i>	<i>3,085,000</i>	<i>1,365,000</i>
<i>Total Project</i>	<i>11,000,736</i>	<i>4,322,110</i>

The funding sources for the project are summarized in the table below. Based on the Water Conservation Investment Fund (WCIF) Guidelines, the WCIF grant may support 50% of the project costs or up to a maximum of \$4,000,000. The funding sources for the project are as follows:

Pumping Plant

Financial Structure for the Pumping Plant

Source	Type	Amount USD	% of Project Cost
NADB	WCIF- Grant	\$ 4,000,000	36.4%
State of Texas	SECO Grant	\$ 527,324	4.8%
CCID No.2	Cash	\$ 6,363,425	57.8%
CCID No.2	Prev. Investigations	\$ 34,987	0.3%
Federal Appropriations	Grants	\$ 75,000	0.7%
TOTAL		\$ 11,000,736	100.0%

Interconnect System

Financial Structure for the Interconnect System

Source	Type	Amount USD	% of Project Cost
NADB	WCIF- Grant	\$ 1,800,000	41.65%
CCID No.2	Prev. Investigations	\$ 645	0.01%
CCID No.2	Cash	\$ 2,481,465	57.41%
CCID No.2	In kind services	\$ 40,000	0.93%
TOTAL		\$ 4,322,110	100.0%

The BECC requested a third party review of the capability of the District for supporting the initial investment and the sustainability of operations and maintenance for the project. BECC's financial consultant, Brown and Caldwell, reviewed all the information concerning the projects, aspects of CCID No.2 operations, and the CCID No.2 financial condition, it was their opinion that CCID No.2 is capable of providing the initial matching cash contribution and supporting the ongoing operation and maintenance expenses of the projects through the end of the evaluation period and one subsequent year without adjustments to its current assessment structure.

The District has developed the projects in accordance with requirements for funding participation by the USBOR. The District has submitted the projects for consideration by USBOR. Should the USBOR funding become available, the District will request reimbursement for approved cash expenditures.

2. Rate Model.

The rate model for this type of Project Sponsor is better described as a Fee and Assessment Structure. The District charges an annual \$30.00 flat rate assessment for the first acre and \$9.50 for each additional acre. The District's water assessment is \$ 7.00 per acre per irrigation. The table below summarizes the existing structure.

Existing Assessment Fee Structure

Fees	Interval	Charge Per Acre
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<i>Flat Rate Assessment</i>		<i>\$ 30.00 first acre + \$ 9.50/additional acre</i>
	<i>Per Year</i>	
<i>Delivery Charge</i>	<i>Per Irrigation</i>	<i>\$ 7.00</i>

The delivery charge is paid prior to the date that water is to be delivered by the District. In addition, the District charges municipal and industrial users \$ 0.16 per thousand gallons plus 25% for travel and storage loss.

Effective 2003, the District increased its flat rate assessment from \$8.50 to \$9.50 per acre for irrigation water use after the first acre of use. The increase is expected to result in about \$57,000 in additional revenue per year. The charge for agricultural irrigation has been at its current value of \$7.00 per acre since 1993. The charge for wholesale water, now \$0.16 per 1,000 gallons, was effective 2001. The previous increase to the wholesale water charge was from \$0.10 to \$0.13 effective 1995.

The District also earns service revenue as a result of reimbursable maintenance work performed for Cameron County Drainage District No. 3 (Drainage District) and other entities. Service revenue also includes reimbursement from Cameron County Drainage District No. 3 for shared administrative expenditures and use of CCID No.2 equipment and personnel by the Drainage District. The same land comprises most of the territory of CCID No.2 and the Drainage District and, in many locations, drainage ditches and irrigation facilities are side by side. An "Interlocal Cooperation Contract" between CCID No.2 and the Drainage District, dated July 1, 2000, describes the expenditures to be shared and the rates to be paid for the use of equipment and personnel. The Contract stipulates that the Manager of CCID No.2 will also be the Manager of the Drainage District.

The proposed projects and funding structure do not require that an adjustment to the current Fee and Assessment Structure need to be implemented by the District.

3. Project Management.

CCID No.2 will manage the projects. The District has managed the construction of similar projects throughout the District's properties. The District will operate in a self-sufficient manner, supporting itself through user fees. The project will not require additional staffing. Therefore, the existing organizational structure will be sufficient.

Community Participation

1. Comprehensive Community Participation Plan

The CCID No.2 was contacted in late 2002 and informed of the BECC requirements for certification in public participation. The project sponsor submitted the public participation plan for approval in June 2003 and was approved that same month. The sponsor and steering committee fulfilled the elements proposed in the plan to comply with BECC requirements. Below is a summary of the activities held in fulfillment of the BECC requirements for certification.

Steering Committee

The steering committee was recruited in October 2002 and in June of the following year began activities. It was composed of Ovi Atkinson and Bill McMurray, CCID No.2 Board members; Leonard Simmons, David Newell, and Billie Mack Simpson, district farmers; Sonia Kaniger, General Manager of the District, and Billie Joe Simpson of the East Rio Hondo Water Supply Corporation. James Allard of the U.S. Bureau of Reclamation and Bill Norris of NRS Consulting Engineers provided support.

Local Organizations

In early July the City of San Benito, the East Rio Hondo Water Supply Corporation and the Lower Rio Grande Authority were contacted and presented with the project proposal. They each provided letters of support.

Public Information

The Project Report and Environmental Assessment for the project were made available thirty days prior to the first BECC public meeting. The documents have been available during and after regular business hours at the District offices in San Benito. A fact sheet with technical and financial aspects of the projects was available at the meetings

and at the District offices. The public meetings were advertised in San Benito newspaper 30-days prior to the meetings. Once public meeting notice was used for both meetings.

Public Meetings

Public meetings were held on August 6 and August 11, 2003 in the offices of the Irrigation District in San Benito, Texas. Approximately 40 people were in attendance at both meetings and all expressed support for the project.

2. Report Documenting Public Support

The final Comprehensive Public Participation Report has been delivered to the BECC.

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Sustainable Development

1. Definition and Principles

The projects comply with BECC's definition of Sustainable Development: "Conservation oriented social and economic development that emphasizes the protection and sustainable use of resources, while addressing both current and future needs, and present and future impacts of human actions." These projects would positively impact the area and sustainable life of the area's residents through the conservation of water which is becoming a scarce resource and critical for sustainability of life and economic growth. Through elimination of water loss through seepage and reduction of energy needs, the projects provide a positive impact on the overall environment by conserving and effectively using a limited water supply resource. Local residents will benefit from better agricultural yields within a sustainable development framework and from a better quality of life within mature water resources conservation scheme, being careful not to compromise water and soil resources for the future, considering that modernization and technical improvements within the District's operational system provide a net positive effect.

The required public review process ensures that residents in the project's influence area participate in the development process fully aware that the decisions they make will focus on the sustainable management of environmental resources to achieve a better environmental and socio-economic improvement in their community. Besides the water conservation from mitigating seepage losses, there are energy savings both from pumping less water forthcoming from reducing leaks and from improving efficiency of the pumping plant.

2. Institutional and Human Capacity Building

The Rio Grande Regional Water Plan, in support for the implementation of agricultural water conservation strategies, includes the following strategies for reducing irrigation shortages:

- *Expanded technical assistance should be available from local, state, and federal sources to assist irrigation districts with more detailed, systematic evaluations of district facilities and management policies to identify cost effective water efficiency improvements.*
- *The State of Texas and the federal government should assist with the financing of irrigation water efficiency improvements through the provision of low interest loans and /grants.*

Accordingly, due to the limited financial capacity of irrigation districts, the State of Texas through the State Energy Conservation Office (SECO) and TWDB provided financial assistance to the CCID No. 2 for the preparation of feasibility studies, and the necessary documentation that was required to support federal appropriations of construction funds. A Project Plan for the Improvements to Irrigation Water Distribution System and replacement of the River Pumping Plant was funded under this financial assistance.

Also, the Texas Water Resources Institute of the Texas A&M University prepared the Economic and Conservation Evaluation of Capital Renovation Projects for the CCID No.2, with funds provided through a federal initiative, "Rio Grande Basin Initiative", administered by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture. The USBOR approved the methodology for the economic and conservation analyses.

The project plans for each proposed project were completed under the Lower Rio Grande Valley Water Resources Conservation and Improvement Act of 2000 (Act), Public Law 106-576. The Act also provides limited funding availability for engineering work, infrastructure construction, and improvements. An amendment to the Act (H.R. 2990/S.1577) authorized funds for conservation projects, including the replacement of River Pumping Plant and construction of the Interconnect System. The USBOR Project Reports for the two projects were prepared in compliance with the requirements of the Act.

The District entered into a contract with the TWDB whereby the TWDB will reimburse the District (with 527,324 dollars of grant funds) for the costs of preparing the Project Plans, Project Reports, and Monitoring Reports for the proposed projects.

The District has developed and funded the following Plan and Reports:

- *Report on Structural Investigation, Pump Station Building, September 2000.*
- *Preliminary Engineering Report, Canal "C" and Canal 13 Inner Connect, February 2001.*
- *Preliminary Engineering Plans, River Pumping Plant, 1997.*

Additionally, the District has completed the Project Plan and a draft Project Report for the lining of approximately 30 miles of main canal and the replacement of 16 miles of laterals with PVC pipes. An economic analysis has also been completed by Texas A&M for this project. The Project Plan has been approved by TWDB.

The NADB Water Conservation Investment Fund (WCIF) will complement with grant funds the capital investments that will be spent in the Irrigation District improvements. The use of these grant funds allows the Irrigation District to improve its infrastructure in order to reduce water losses in water conveyance.

The projects will be managed by the local sponsor and be constructed and operated in conformance with the requirements of both the regulatory and funding agencies. The process used in the development of these projects has followed a planning and public participation process that has developed alternatives and associated costs, solicited public input in to the process, established priorities based on input of the stakeholders and proceed according to the priorities established in the planning process.

A monitoring program will be established for a two-year period to evaluate and quantify actual water and energy savings following construction of the projects. The monitoring program will consist of the following:

- *The electrical use per acre-foot of water pumped will be determined on a monthly basis and reported annually. The annual report will include the historic electrical costs per acre-foot for comparison.*
- *The water pumped will be measured and compared with the water delivered on a monthly basis and submitted annually. The annual report will include historic water pumped and water delivered volumes for comparison.*

3. Conformance with Applicable Local and Regional Conservation and Development Plans

The proposed projects comply with all local and regional conservation and development plans. In particular, the projects comply with the following:

- *"Rio Grande Regional Water Plan", which recommends agricultural water conservation and on-farm water use efficiency, in order to reduce irrigation shortages.*
- *"Water Allocation Plan for the Cameron County Irrigation District #2", which was adopted on June 11, 2002.*
- *"Water allocation Guidelines of the Cameron County Irrigation District #2", which were adopted on August 03, 1999. These guidelines constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code.*

The Project Reports for each of the two projects have been prepared in accordance with the "Guidelines For Preparing and Reviewing Proposals for Water Conservation and Improvement Projects Under Public Law 106-576" issued by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), June 2001.

4. Natural Resources Conservation

The proposed projects were developed with the intent of conserving water. The District irrigation water right is 147,823.65 acre-feet per year; however, this water right is "as-available" and the actual water available to the District varies from year to year. In 2002 the District's allocation was 35,000 acre-feet.

Recent years' agricultural water diversions in the District have been significantly hampered by deficit allocations. Comparing long-term historical water diversion values (1986-1996), with recent years' agricultural water diversions (1997-2001) reveals significant variability and a down trend. Long-term values range from 45,229 to 94,889 acre-feet per year, with an average of 75,325 acre-feet per year. Recent agricultural water diversions during 1997-2001 have ranged from 45,229 to 80,992 acre-feet per year, with a five-year average at 66,323 acre-feet per year.

According to the Economic and Conservation Evaluation of Capital Renovation Projects for the CCID No. 2, prepared by the Texas Water Resources Institute of the Texas A&M University, the implementation of the two projects will allow estimated water savings of 11,300 acre-feet/year; on an average annual basis, as shown in the table below.

Item	Annual Water Savings (Acre-feet)	Annual Energy Savings (Kw-hr)
Interconnect between Canals 39 and 13-A1	9,129	302,688
Pumping Plant replacement	2,171	721,904
Total annual savings	11,300	1,024,592

The energy savings estimated by the Texas Water Resources Institute with the implementation of the two projects are 1,024,592 Kw-hr/year, on an average annual basis.

The expected water savings from the two projects over their expected productive lives are 242,748 acre-feet, and the expected energy savings 22,010,478 Kw-hr.

Water conservation in the agricultural sector will not only reduce projected irrigation shortages, it will also “free up” additional Rio Grande water supplies for future domestic-municipal industrial needs. The construction of the proposed projects improvements would conserve sufficient water to allow continued development in the Cities of San Benito, Rio Hondo, East Rio Hondo Water Supply Corporation, and Arroyo Water Supply Corporation, which depend on the Rio Grande for their water supply. Therefore, the Cities and the Irrigation District would be able to manage sustainable growth within their available resources.

The projects will not only have an impact in water resources, but it will also contribute in savings of natural resources required to generate the energy that will be saved with the implementation of the improvements in the CCID No.2.

5. Community Development

The benefit obtained by the modernization of these irrigation facilities by the proposed projects may directly impact agricultural production and may result in an increased income and an improved quality of life for the end users. With this, the increased economic may be enhanced by making residents active participants in their community's development.

An improved quality of life for the residents may also have a favorable impact on the development of health, and education of the area.

Agriculture has been the primary component of the region's economy. Based on Texas Cooperative Extension data presented in “Alternative Approaches to Estimate the Impact of Irrigation Water Shortages on the Rio Grande Valley Agriculture”, the estimated economic benefit of an acre-foot of irrigation water is \$652 in business activity and 0.02 jobs. Based on this information, the water conserved from these projects would allow the region to realize \$7,782,728 in business activities and 238 jobs.

Based on TWDB data presented in “1995 Per Capita Water Use For Texas Cities”, the per capita water use in Brownsville is 184 gallons per day, or 0.206 ac-ft per year. Assuming this is representative of the region, the annual water conservation realized through implementation of these projects would provide sufficient water to sustain a population of 57,950. Regardless of whether the conserved water is applied to additional crop irrigation or to M&I usage, the conservation benefits are significant and will have a lasting impact on the region.

Documents available related to the CCID No.2, Texas, Replacement of River Pumping Plant and Construction of Interconnect System Projects:

- Baseline Conditions and Irrigation District Indicators for the CCID No.2, Texas

- *Environmental Summary*
- *Economic and Conservation Evaluation of Capital Renovation Projects: CCID No.2- (San Benito)- Interconnect Between Canals 39 and 13 A1 and Replacement of Rio Grande diversion Pumping Plant prepared by Texas A&M University*
- *Financial Analysis*
- *Certification Document*
- *Project Plan*
- *Final Design for the Pumping Plant and Interconnect System*