Border Environment Cooperation Commission

Water and Wastewater Improvements Project in San Benito, Texas

I. General Criteria

Type of Project. The City of San Benito, Texas is proposing a three-part improvement project to the existing water and wastewater system.

The first component of this project is the construction of a new water treatment plant (WTP) that would increase the City's capacity from 5.97 million gallons per day (MGD) to 10.0 MGD. Construction of the new WTP would follow a phased-in approach. During the first phase till Year 2015, the WTP would have an operational capacity of 6.0 MGD. After this time, the new WTP would be expanded to the full 10.0 MGD capacity.

The second component of this project is to expand the City's accessible elevated water storage. The City is currently served by two elevated storage facilities: the 500,000 gallon Jefferson St. water tower and the 750,000 gallon Williams Rd. water tower. Because of a design flaw with these towers, the City cannot access the full 1.25 million gallons (MG) of storage. The new elevated storage tank will be for 1 MG. A 16-inch transmission line would lead from the new 10.0 MGD WTP to the City's existing 1.5 MG ground storage tanks and high service pump station located at the existing 5.97 MGD WTP; another 16-inch line from the new 10.0 MGD WTP would link with the new overhead storage tank.

The third component involves phasing-in of the WWTP. The first phase, lasting till Year 2015, would construct a new 2.5 MGD WWTP. At the beginning of the second phase, the new WWTP would be expanded to 3.5 MGD.

It is anticipated that these improvements will meet projected demand for the City till Year 2025.

Location of Project. The City of San Benito, Texas is located in Cameron County on U.S. Hwy 77, approximately two miles south of Harlingen, Texas in the lower Rio Grande Valley region. The new WTP will be sited on a twenty acre parcel of land west of the City, adjacent to the Resaca De Los Fresnos. The new elevated tank will be in the City's southernmost section. The existing WWTP is located north of the City on the Arroyo Colorado. The project is located within the 100-kilometer border region as defined by the La Paz agreement. The 2000 population has been estimated at 27,686. The project considers a total project population of 43,477 by the year 2030. The City has a water consumption of 126 gallons per capita per day (gpcd) average.

Description of Project and Tasks. The new WTP will be sited on a twenty acre parcel of land that will be purchased by the City from the San Benito Industrial Foundation. Construction of the new WTP will involve a phased-in approach. The first project phase will construct a new 6.0 MGD WTP at a new location. The operational capacity of the existing

WTP would be reduced to 4.0 MGD and operated in tandem with the new WTP till 2015 when the existing plant would be decommission and the new plant expanded to 10.0 MGD. The new WTP would receive raw water from the Resaca De Los Fresnos from raw water pumps.

In preparation for construction of the new 1 MG elevated storage tank, the existing Jefferson St. tank will be decommissioned. The new water tower will be relocated from the existing site. Because the overflow elevation of the Jefferson St. tower is 27 feet below the Williams Rd. tower, only 30% of the capacity of the Williams Rd. tank can be used. The city can only access 725,000 gallons of their elevated storage capacity without overfilling the Jefferson St. tank. As part of improvements to the City's water distribution system, one 16-inch transmission line would lead from the new 10.0 WTP to the City's the existing 1.5 MG ground storage tanks and high service pump station located at the existing WTP (these pumps and tanks will remain in service at its present located after existing WTP is decommissioned), and another 16-inch line from the new 10.0 WTP to the new overhead storage tank.

Construction of the new WWTP will, like the WTP, involve a phased-in approach. The first phase, lasting till 2015, will construct a new 2.5 MGD mechanical aeration WWTP next to the existing lagoon system. It is the intent of the City to operate the lagoons in tandem with the new WWTP during peak flow periods. It is anticipated that the existing lagoons will treat up to 1.5 MGD. At the beginning of the second phase, the new WWTP would be expanded to 3.5 MGD, providing a total of 5.0 MGD of treatment capacity.

Compliance with International Treaties and Agreements. This project complies with the agreements that the United States and Mexico have signed, such as the La Paz Agreement, Border Environmental Comprehensive Plan, Border XXI Program and the North American Free Trade Agreement.

II. Human Health and the Environment

Human Health/Environmental Needs. Construction of a new WTP, overhead storage facility, WWTP, and related distribution improvements will address several human health and environmental issues for the residents within San Benito's water treatment and wastewater treatment service area. Population increases have resulted in the WTP exceeding maximum permitted treatment capacity, with a resulting TNRCC issuance of an Enforcement Order. An EPA Administrative Order for violation of permitted treatment parameters for BOD and TSS has been issued for the WWTP. Design flaws in the existing elevated water storage facilities, not yet cited by the TNRCC, does place the City in violation of TNRCC minimum elevated storage standards.

WTP operation at or above allowable capacity levels increases the possibility of contaminates, particularly pathogens, reaching treated water for public use and consumption. Not meeting storage requirements is a health concern due to lack of pressure at peak flow levels. Inadequacies with existing storage facilities poses a safety concern for fire flow usage. When released from the WWTP into the City's receiving stream, the high BOD levels become a potential hazard to water and local habitat.

Environmental Assessment. An Environmental Information Document (EID) has been prepared for the City of San Benito Water and Wastewater Improvements Project. The EID attempts to satisfy the requirements of the BECC and Environmental Protection Agency (EPA). Currently, EPA is reviewing the EID. The FONSI will be issued early August, 2002.

Compliance with Applicable Environmental and Cultural Resource Laws and Regulations. As part of the preparation of the EID, comments were solicited from relevant Federal, State, and Local agencies including: the Texas Archeological Research Laboratory, the Texas Historical Commission, the US Fish and Wildlife Service, Texas Parks and Wildlife Department, Federal Emergency Management Agency, the United States Army Corps of

Engineers, and the Cameron County Engineer's Office. Project approval responses were obtained from all agencies contacted. The project is in compliance with all applicable environmental and cultural resource laws and regulations, including among others: Significant, Unique or Important Farmlands, National Natural Landmarks, Wilderness Protection, Wild and Scenic Rivers, Wetlands Protection, Floodplain Management, Fish and Wildlife Protection, Endangered Species Protection, Historical, Architectural, Archeological, and Cultural Sites, Air Quality, and Environmental Justice.

III. Technical Feasibility

Appropriate Technology. The existing WTP utilizes standard water treatment processes including coagulation, sedimentation, clarification, filtration, and chlorination. The proposed project is the construction of a 10.0 MGD WTP designed to treat water taken from the Resaca De Los Fresnos.

Cameron County Irrigation District No. 2, by way of a canal and resaca system, supplies raw water for the City of San Benito from the Rio Grande River. The City's delivery point is at the WTP. Raw water is drawn from six pumps to the first part of the treatment train, coagulation.

Coagulation. This process uses chemicals to catalyze the aggregation of particulate matter in the raw water. The larger particles that develop settle better and are removed more completely. It is important for coagulation that there be rapid mixing of the chemical coagulant. The second part of the coagulation phase is flocculation. Flocculation occurs when the particles reach a size that the main method of increasing precipitate size is by trapping other particles in their matrix.

Pilot studies will determine the best process for coagulating the influent water to the plant. The Preliminary Engineering Report for this Project mentions the use of conventional coagulation, used by the City currently. Newer technologies, specifically membrane treatment and synthetic coagulant computer controlled technology (e.g. Microfloc) are already in use by some of the providers in the area with good results. These technologies will be the primary focus of the pilot study.

Sedimentation. Sedimentation removes the flocs created during coagulation. The process is based on the non-turbulent steady flow through a series of canals allowing the flocs to naturally settle out and collect on the bottom of the sedimentation basin.

Design of settling basins is based on the overflow rate. Sedimentation basins may have a rectangular shape with length being several times longer than width or circular design with radial flow from the inside to the outside. The system will be designed so that there are several settling basins in parallel, allowing for maximum flexibility and redundancy.

Filtration. The filtration process ‘‘polishes’’ the water by removing the remaining flocs using granular material, usually sand. Filters are differentiated by the rate of filtration they allow. Slow sand filters are the older technology. Rapid sand filters often dependent on chemical pre-treatment of water before filtering. Rapid sand filter beds tend to be smaller and shallower than slow sand filters.

Another trend in filtration, which may be considered in the design of the San Benito WTP, concerns use of dual media. Multiple media are being used increasingly to attain the greater chemical removal standards required under recent regulations. The usual alternate media are anthracite or activated carbon.

If a synthetic coagulate process is used, the coagulation and filtration processes will be combined into one factory made module. There is not a sedimentation process with this type of treatment. Rather the floc is embedded in the media and must be periodically washed out. Backwash timing is critical for a good final product, so a computer is used to monitor the module for head increase as the filters become occluded.

Disinfection. Disinfection involves the killing or inactivation of pathogens which previous parts of the treatment process did not remove from the effluent (water). The oxidants used in disinfection include chlorine gas, chloramine, chlorine dioxide, ozone, or ultraviolet light. The final method of disinfection will be decided after the pilot studies. The decision on what chemicals to use is also dependent on the contaminants in the water, ease of operation, and costs.

A composite type storage tank should be utilized, considering the large amount of storage water to be contained. Construction of the support pedestal section will utilize reinforced concrete, providing durability, low maintenance, and eliminating costs for painting. The storage tank will be comprised of welded structural steel.

The existing WWTP is a non-mechanical lagoon and pond system consisting of primary, secondary, and final treatment. Wastewater enters the system from a 16-inch outfall line from San Benito to the South. Primary treatment occurs in three facultative lagoons, followed by a secondary treatment which takes place in three stabilization ponds. Resulting effluent is sent to a transfer lift station to continue treatment or be recycled through primary and secondary treatment or into the stabilization pond that feeds the hyacinth basins. Final treatment consists of fourteen hyacinth ponds. WWTP outfall line releases to an un-named ditch, which feeds into the Arroyo Colorado.

The proposed WWTP would involve the construction of an extended aeration system adjacent to the existing WWTP. The treatment process for this alternative is a single aeration basin followed by a single clarifier. Utilization of a mechanical aerator system will increase the level of oxygen in the wastewater, enhancing aerobic digestion. The water separated from the sludge is brought to another basin where filters then remove any remaining solids. Finally, disinfection reduces harmful pathogens. Ultraviolet (UV) light disinfection has been chosen for this step. Multiple mercury vapor arc lamps are either submerged or placed overhead, from which UV rays are able to destroy pathogens.

This single train system is permissible because the existing lagoon process gives redundancy. Sludge from sedimentation will be thickened, digested, and then applied to the digesting beds. A shared waste train will connect the two systems.
The exact treatment process will be determined during the preliminary engineering phase of the Project, and will be some form of the extended aeration process.

O&M Plan. The engineer will be responsible for the development of an Operation and Maintenance Manual. This O&M Manual will be completed prior to completion of construction. All personnel will receive training prior to the start up of WTP and WWTP Manuals. Mr. Albert Cabrera oversees all operations at both facilities. He has WTP and WWTP licensing and over 20 years of experience. Initial startup of the system will include testing of the components prior to acceptance by the owner to assure that they properly perform their intended function. If there are new procedures used in WTP or WWTP operation, the company providing the equipment will be required to conduct training on site for City staff in operating and maintaining the new equipment.

Compliance with applicable design norms and regulations. The TNRCC has regulatory authority for water and wastewater treatment plants in the State of Texas. The TNRCC will also have review authority in the final design of the water distribution and sewer collection lines, which must meet State Design Criteria. Additional requirements of the funding agency (BECC) include approval of the preliminary engineering plan and project cost estimate, approval of plans and specifications prior to bidding, approval of procurement methods, site inspections during construction, approval of amendments and change orders during the project, and approval of the close out documents. There will be close coordination between the City, BECC, and other involved agencies to assure these procurement requires are met.

IV. Financial Feasibility and Project Management

Financial Feasibility. The financial analysis determined the following funding structure of the project and the user rates to guarantee the financial sustainability of the operating agency.

Current Water and sewer Expenses (Annual)

Concept	Amount (US$)
Operating Revenue (Water and Sewer)	2,504,428
Operating Expenses (Water and Sewer)	2,413,465
Non-operating Expenses (Water and Sewer)	37,713
Net Income	**$ 53,250**

Estimated Cost

Concept	Amount (US$)
Water Treatment Plant	18,069,852
Elevated storage tank	3,861,447
Wastewater Treatment Plant	10,512,936
Total	**$32,444,235**

Rate Model: The rate model was developed by NADB.

SINGLE FAMILY RATES (US$)			
	2003	2004	2005
Average Monthly Water Bill	$18.01	$21.26	$24.66
Average Monthly Sewer Bill	$15.50	$16.42	$17.41
Total Bill	$33.51	$37.68	$42.07
	2006	2007	2008
Average Monthly Water Bill	$28.60	$30.03	$31.54
Average Monthly Sewer Bill	$18.46	$19.57	$20.54
Total Bill	$47.06	$49.60	$52.08

Source	Amount (US$)	%
TWDB (loan)	17,533,351	54
NADB-BEIF Construction Assistance (grant)	14,910,884	46
Total	**$32,444,235**	**100%**

Financial Structure

In addition, the NADB is proposing Transitional Assistance in the amount of $2,999,341.00 to reduce the overall impact increased debt service payments on the city of San Benito ratepayers caused by the construction of the project.

Project Management. The City has adequate personnel to handle the proposed infrastructure and to respond to any potential emergency that might arise during operation and maintenance of the project.

V. Public Participation

Comprehensive Public Participation Plan. The public participation plan of the City of San Benito and the Wastewater Project Steering Committee submitted their plan on January 17, 2002 and was approved that same day.

Steering Committee: The steering committee is composed of Pete Claudio, Chair; Celeste Sanchez, San Benito School District; Lynnete Ross, citizen; Bill Weekly, businessman; Rick Torres, Valley Interfaith; Romero Garza, Housing Authority; Mario Medrano, Health Care Professional; Matilde Martinez and Irma Rodriguez, of the San Benito Parental Involvement Program; Leroy Gomez; book store owner; Nelda Agado, Parent Educator; Sam Mendez, Educator; Beatriz Rodriguez, Valley Interfaith; Ursulo Robles, businessman; Pat Barber, citizen; Velma de los Santos, VIP Realty; Robert Cepeda, Public Health Department; Bill Elliott, Valley Baptist Medical Center; and Mary Bolado of Dr. Bolado's office. The technical work group developed in support of the committee is composed of: Victor Treviño and Martha McClain of the City of San Benito; Carlos Mondragón, consultant; and Tom Brown consulting engineer.

Local Organizations: Local organizations contacted include: St. Theresa Church Group; Chamber of Commerce; Kiwanis Club; San Benito Literacy Center; Parental Involvement Meeting; San Benito Ministers; Fred Booth Elementary PTA; Resaca City Civic; Friends of the Library/Library Board; Lions Club; Housing Authority Residents; Landrum Elementary PTA; and Sullivan Elementary PTA.

Public Information: Project information, such as the Facility Plan and draft Step II Document were available for public review at City Hall and the local library 30 days prior to the first public meeting. A fact sheet was developed and distributed to local residents and available at the public meetings. Newspaper and television coverage of the project has taken place.

Public Meetings: Public meetings were held on February 21, June 25 and July 23, 2002. An average of 180 people attended each meeting. Exist surveys show more than 90 per cent support for the project and the rates.

VI. Sustainable Development

Definition and Principles. The project complies 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.'' This project is to improve the quality and safety of water and sewer service for the Public Works customers of San Benito. The existing WTP has been cited by the TNRCC for exceeding its rated capacity. This is a serious problem since the City cannot meet current peak day demands. When the plant produces more water than its rated capacity there is the potential that the water has not been sufficiently filtered to remove harmful pathogens. Satisfaction of water quality goals will have significant long-term benefits to all users of this resource.

The existing elevated storage capacity of 725,000 gallons yields approximately 112 gallons of elevated capacity per connection. This does not meet the minimum capacity requirement of the TNRCC for elevated storage. This lack of sufficient elevated storage capacity is a safety problem because the City water system cannot provide adequate pressure during peak flow periods, such as fire protection. Increasing the City's storage capacity takes into account future development and population growth.

The City's WWTP has been cited by the TNRCC for peak flows of over 75% capacity for three consecutive months in 1997. In May 2001, the EPA issued an Administrative Order against the City for violation of BOD and TSS standards from June to January 2000. The City has had problems with keeping the hyacinth basins filled with hyacinths for many years. Current wastewater flows have exceeded the plant's capacity at peak flow. The inability of the City's WWTP to adequately treat it's wastewater is a serious health problem. Discharge of inadequately treated effluent to the Arroyo Colorado will continue to contribute to the degradation of water quality, posing a danger to public health. Satisfaction of water quality goals will have significant long-term benefits to all users of this resource. The construction of the new wastewater treatment system will provide treatment capacity that will be able to provide existing and future customers of the system with a safe, high quality, dependable, wastewater collection, treatment, and disposal.

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

Conformance with Applicable Local/Regional Conservation and Development Plans.
The construction contractor will be required to observe State and Federal Safety Laws during construction of the improvements. The Contractor will be required to provide a written safety plan. Each project component will be quality tested prior to acceptance by the owner. The owner and his construction engineer must also accept the entire project as completed to their satisfaction before the contractor can receive his final payment. Once construction is completed the City is required by TNRCC to have safety plans developed for the handling of all hazardous materials. The City will also implement the American Water Association's safety plan as part of their safety program and continue to promote a safe work environment.
A pollution protection plan will be required of the contractor before he commences work.
There are closure and post closure requirements by the TNRCC for existing and new WTPs and WWTPs.
The project is in conformance with the Water and Wastewater Facility plan developed by the city in 2000 and with the Regional Water Plan approved by TWDB. The city has also a Drought Contingency Plan.

Natural Resource Conservation. The City does have a TWDB approved formalized water conservation plan.

Community Development. The development of a new WTP, elevated storage facility, and WWTP will provide sufficient capacity to meet the water needs of the City's customers for the next 25-30 years. With sufficient wastewater treatment capacity, the city will be able to manage growth within its available resources, while providing an affordable water supply and wastewater service to customers.