

## Border Environment Cooperation Commission

*Replacement of the International Outfall Interceptor, Upgrade and Expansion of the International Wastewater Treatment Plant, and Partial Replacement of the Wastewater Collection System in Nogales, Arizona.*

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### General Criteria

1. **Type of Project.** *The project consists of the replacement of portions of a sanitary sewer system and the upgrade and expansion of the wastewater treatment system.*
2. **Location of Project.** *Nogales is located in the south-central part of the State of Arizona, in the County of Santa Cruz. The City is bordered on the North by Rio Rico, by the Santa Rita mountains to the East, by the Pajarito Mountains to the West, and Nogales, Sonora to the South. The project is located within the 100 km border region as defined by the La Paz agreement. The current population of Nogales is approximately 21,000 people, and is expected to reach 28,000 people by the year 2020. The location of the city is shown in the following map:*

**Description of Project and Tasks.** *The project consists of upgrading and expanding the Nogales International Wastewater Treatment Plant (NIWTP), and replacing the International Outfall Interceptor (IOI), as well as portions of the Nogales, Arizona wastewater collection system. The upgrade of the NIWTP includes modifications to provide nitrogen removal in order to meet the required concentrations for protection of aquatic life and water supply sources. The treatment process at the NIWTP will be a Modified Ludzack-Ettinger process in order to achieve the necessary nitrogen concentration levels. The NIWTP will be expanded to treat a total of 22.2 mgd (973 l/s) to accommodate wastewater flows from Nogales, Sonora in excess of their current capacity allocation of 9.9 mgd (454 l/s) that may reach the plant during storm events, system failures and until later phases of the Mexican wastewater project are implemented. The Nogales, Arizona allocation at the NIWTP will remain at 7.3 mgd (354 l/s).*

*The IOI will be replaced by a new line to eliminate bottlenecks and provide additional capacity. The new interceptor will have a total length of 8.9 miles (14.4 km) and will vary in diameter from 48 in (122 cm) at the international border, to 60 in (152 cm) at the NIWTP. The IOI will be able to convey all the wastewater generated in Nogales, Arizona (an average flow of 4.1 mgd [180 l/s]); an average flow of 9.9 mgd (434 l/s) from Nogales, Sonora; and peak flows generated in Ambos Nogales.*

*Also, portions of the Nogales, Arizona wastewater collection system will be replaced to provide additional hydraulic capacity and prevent raw wastewater surcharges.*

**Compliance with International Treaties and Agreements.** *Due to the international nature of the NIWTP and the IOI, their operation and maintenance is subject to agreements between the United States and Mexico through the International Boundary and Water Commission (IBWC) Minutes. The project will have positive international impacts since it will ensure that all wastewater flows originated in both Mexico and the United States will be treated accordingly; and the effluent, which will comply with the NPDES permit, will be discharged in an international watershed.*

### Human Health and Environment



1. **Human Health/Environmental Needs.** *The current effluent quality at the NIWTP is unable to comply with the newly established National Pollutant Discharge Elimination System (NPDES), requiring nitrogen removal. Also, the International Outfall Interceptor and the wastewater collection system allow excessive amounts of extraneous water to infiltrate the system during precipitation events.*  
*An additional concern is the need to maintain and enhance the riparian and aquatic ecosystem existing downstream of the NIWTP, inhabited by the endangered Gila topminnow (Poeciliopsis occidentalis). Additionally, provisions need to be made to account for the fact that wastewater reclamation could be a feasible solution to the region's water resources problems in the future.*  
*In 1996 the IBWC (both sections) signed Minute 294, which relates to the solution of sanitation issues along the US-Mexico border. The sanitation project of Nogales complies with the spirit of environmental cooperation presented in Minute 294.*
2. **Environmental Assessment.** *As part of the planning process, an environmental assessment (EA) was submitted to the International Boundary and Water Commission (IBWC) and Environmental Protection Agency (EPA) in December, 1999. The EPA (Region IX) issued a Finding of No Significant Impact (FNSI) on February 11, 2000. A 30-day public comment period, ending on March 12, 2000 followed. A comment was received regarding flooding potential due to increased growth in the City. EPA adequately addressed the comment.*
3. **Compliance with Ecology and Cultural Laws and Regulations.** *As part of the environmental review, the Arizona State Museum was consulted to determine if the project would cause any threats to the ecology or cultural resources of the area. The Arizona State Museum determined that the project would not cause any negative impacts in the area.*

### Technical Feasibility

1. **Appropriate Technology.** *As part of the wastewater facilities plan for Ambos Nogales, various alternatives were evaluated. Preliminary sizing for treatment trains utilized maximum month flow projections for the year 2020. The exceptions, headworks and disinfection facilities, were based on an estimated peak flow of twice the maximum month flow.*

#### WASTEWATER TREATMENT

*The conceptual design of the treatment technologies was based on the following concentrations of key constituents in the influent:*

Biochemical Oxygen Demand (BOD <sub>5</sub> ):	150 mg/L
Total Suspended Solids (TSS):	200 mg/L
Total Kjeldahl Nitrogen (TKN):	50 mg/L
Total Phosphorous:	10 mg/L

*These values are slightly higher than current NIWTP influent values, since infiltration/inflow improvements are expected to increase the concentration of these constituents.*

**Preliminary Treatment.** *Three processes were considered for preliminary treatment at the NIWTP:*

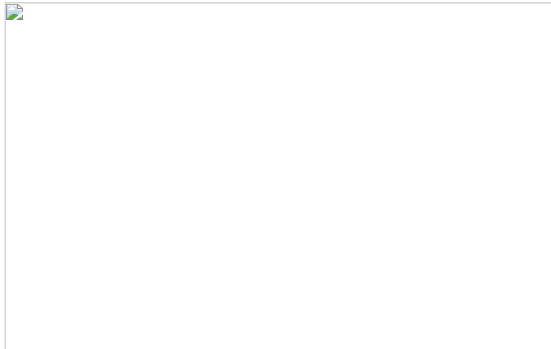
- Trash racks
- Bar screens
- Aerated grit chambers

**Secondary Treatment.** *The upgraded and expanded NIWTP must be capable of achieving stringent ammonia removal levels, due to toxicity threats to aquatic life or as the first step in removal of total nitrogen/nitrate, or both. In light of these requirements, the following alternatives were considered for secondary treatment at the NIWTP.*

- Aerated lagoons.
- Facultative lagoons.
- Facultative lagoons with ammonia stripping.
- Advanced integrated pond systems (AIPS).
- Lag-Nite Lagoon nitrification system
- Trickling filters.
- Constructed wetlands
- Oxidation ditches
- Activated sludge (Modified Ludzack-Ettinger process)

**Disinfection facilities.** *Chlorination and ultraviolet light irradiation (UV) were considered for disinfection at the NIWTP.*

**Selected Alternative.** *The selected alternative entails the use of aerated grit chambers, and conversion of the existing complete mix lagoons (CML) to a nitrification/denitrification reactor based on the Modified Ludzack-Ettinger process. UV was selected as the disinfection technology at the NIWTP.*



**No-Action Alternative.** *Under this alternative, no long-term improvements would be made to the NIWTP. However, the existing treatment train is not capable of meeting the anticipated ammonia limit of the revised NPDES permit for the plant at any projected flowrate, and may not be capable of meeting BOD<sub>5</sub> discharge limits at flows higher than presently observed. Failure to meet the proposed ammonia limit will result in a continued negative impact on population of aquatic species at points downstream of the NIWTP outfall.*

*The NIWTP treatment process is presented in the figure below.*

## WASTEWATER COLLECTION SYSTEM

Several of the subcollectors in Nogales, Arizona will be replaced to increase hydraulic capacity for future needs. In some cases, a few subcollectors will be replaced in their entirety. Approximately 1,800 m (5,900 ft) of sewer lines will be replaced throughout the City.

## INTERNATIONAL OUTFALL INTERCEPTOR (IOI)

The IOI will be replaced because of its age and state of deterioration, the need for additional hydraulic capacity to relieve surcharging in the system, and to minimize the infiltration/inflow flows and related problems. The proposed IOI will convey the incoming wastewater from across the U.S.-Mexico International Border to the NIWTP. Also, the IOI will receive flows from several main subcollectors or interceptors in Nogales, Arizona. The total length of the IOI will be 14.4 km (8.9 mi).

**O&M Plan.** This plan identifies the requirements of O&M of all unit processes, including human resources, the frequency of maintenance and cost estimates. Before operation of the upgraded and expanded NIWTP, and wastewater conveyance lines, there should be a final O&M plan in place. The O&M plan would be developed once the final design for the project is completed.

2. **Compliance with applicable design norms and regulations.** The requirements for construction of the sewer system, IOI, and treatment plant have been validated by the Ambos Nogales Binational Technical Committee.

## Financial Feasibility and Project Management

### 1. Financial Feasibility.

The NADB is currently analyzing the project to determine its financial feasibility. This analysis will help determine the contributions for each funding source, as well as credit and/or grant components, and the ultimate rate structure.

The table below summarizes the project construction costs.

### Estimated Cost

Concept	Amount (US\$)
Arizona Wastewater Collection System	638,000
Expansion and Upgrade of NIWTP	26,064,000
International Outfall Interceptor	19,400,000
<b>Total</b>	<b>\$46,102,000</b>

### Estimated Operation and Maintenance Costs (Annual)

Concept	Amount (US\$)
Arizona Wastewater Collection	4,000
NIWTP	2,279,000
IOI	30,000
<b>Total</b>	<b>\$2,313,000</b>

Based on the analysis developed by the NADB, the grant and loan amounts for the project will be determined.

### Financial Structure

Source	Amount (US\$)	%
BEIF	\$42,904,000	93
WIFA Loan	\$638,000	1.4
WIFA Loan (non eligible projects)	\$2,560,000	5.6
<b>Total</b>	<b>\$46,102,000</b>	<b>100%</b>

2. **Rate Model:** The rate model prepared by the NADBank was used to determine the impact that the proposed project would have on the user rates, considering various grant and loan combinations. The proposed wastewater rate increase is \$6.75 to \$9.96 for the base fee over a period of 10 years, and a increase in the consumption of every 1,000 gallons of \$1.17 to \$1.71, over the same period.
3. **Project Management.** The project will be managed by the IBWC and the City of Nogales, the later being the entity responsible for the provision of water and wastewater services to the community. The system is expected to operate in a self-sufficient manner, supporting itself through user fees.

## Public Participation

**Comprehensive Public Participation Plan.** The City of Nogales Wastewater steering committee submitted a public participation plan (Plan) to BECC on December 16, 1999. The Plan was approved in January 2000. The Plan comprises the following activities: develop a steering committee, identify and meet with local groups and organizations, hold public meetings and develop and final report documenting public support for the project.

**Steering Committee:** The steering committee was formed on December 8, 1999. It is composed of: Alejandro Barcenas, Chair; Nancy Valentine and Mark Larkin, Friends of the Santa Cruz River; Vera Kornylak, Arizona Center for Law in the Public Interest; Beth Daley, Nogales Chamber of Commerce; Rosa Elvira Padilla, Nogales City Council; Don Baker, Rio Rico Utilities and David Gutfahr, Rio Rico Properties. The committee was responsible for defining the information strategy, development of the public participation plan and scheduling the public meetings. The committee met on December 14, 1999; January 6 and 20; February 9 and 17; and March 29, 2000 to follow-up the public information campaign and related activities.

**Local Organizations:** The project sponsor and steering committee held a meeting on January 12 with representatives from 54 local organizations to request an opportunity to present the project to their memberships. Presentations were made to the Nogales City Council, Santa Cruz County Board of Supervisors, Santa Cruz Valley Citizens Council, Nogales and Rio Rico High Schools and Friends of the Santa Cruz River. Letters of Support have been received by the Friends of the Santa Cruz River, Santa Cruz County Board of Supervisors, R. J. Stabel Realty, Santa Cruz County Board of Realtors, REMAX Associates, Inc, Santa Cruz County Citizens Council, B & B Tool, Inc., and from concerned citizens.

**Public Information:** The project proposal to the BECC was available at the Nogales City Hall and the Tubac and Nogales libraries during and after work hours for public review. Seventeen thousand bilingual fact sheets on the project were sent to Nogales electricity and wastewater utility customers. An additional 8750 fact sheets were available at Nogales City Hall, Nogales Public Library, Tubac Public Library, Rio Rico Utilities, Rio Rico Properties, the offices of the Friends of the Santa Cruz River and the Arizona Department of Water Resources. Television Interviews were held on February 28, March 20 and April 11, 2000. The Green Valley News & Sun and Nogales International provided press coverage on the February and April public meetings. A presentation was provided to about 25 students at Rio Rico High School and one of the students gave a similar presentation to about 30 of her peers. A Nogales High School student volunteered time to deliver facts sheets to Nogales residents and copies of the Facilities Plan to 15 local organizations. Radio and TV interviews were aired on February 28, March 20, April 11, and April 12. Media Com, a local public television station aired public service announcements on the public meetings.

**Public Meetings:** *Three public meetings were held on January 26, February 1, and on April 13 to present the financial information on the project.*

#### **Sustainable Development**

1. **Definition and Principles.** *The project complies with BECC's definition of Sustainable Development: "An economic and social development based on the conservation and protection of the environment and the rational use of natural resources, but considering current and future needs, as well as present and future impacts of human activities".*  
*All the environmental parameters have been met and the culture of environmental sustainability will be achieved through the improvement of the NIWTP's effluent and its positive impact on the riparian habitat downstream of the discharge point.*  
*The principles of sustainable development are satisfied. These include: Human beings are the central point of all concerns for sustainable development; they have the right to a healthy and productive life in harmony with nature. The project complies with the principles' objectives, which are to solve human health problems by improving the potable water system, and decreasing pollution of the environment and health risks to the population, through sewerage improvements and sanitation of wastewater.*
2. **Institutional and Human Capacity Building.** *The investment of approximately \$46 million dollars in improvements to the infrastructure in Nogales, Arizona, will have a deep impact on government institutions and local economy, as well as on the community residents.*
3. **Conformance with Applicable Local/Regional Conservation and Development Plans.** *The upgrade and expansion of the wastewater treatment plant will comply with new NPDES permits, and will address the concerns outlined in the IBWC Minute 294.*
4. **Natural Resource Conservation.** *The upgrade and expansion of the NIWTP, and the replacement of the IOI will reduce the load of contaminants that are currently discharged into the Nogales Wash. Thus, preserving aquatic life in the Nogales Wash and the Santa Cruz River.*

5. **Community Development.** *The construction of approximately \$46 million dollars in infrastructure will be the foundation for the future growth of the community. Without an adequate infrastructure, the city could not sustain the development of new businesses or the current population growth. The positive impacts related to the project are short as well as long term. Additionally, communities downstream (i.e. Rio Rico) of the NIWTP discharge point will benefit from this project since the riparian habitat will be enhanced.*

#### **List of Available Documents**

*Ambos Nogales Wastewater Facilities Plan. Camp Dresser & McKee Inc.*

*Nogales, Arizona Wastewater Project Certification Document. Prepared by Camp Dresser & McKee Inc. for the International Boundary and Water Commission.*

*Nogales, Arizona Wastewater Project Public Participation Plan submitted by the Nogales, Arizona Steering Committee.*

*Nogales, Arizona Final Public Participation Report prepared by Camp Dresser & McKee Inc. for the Nogales, Arizona Steering Committee.*

*Nogales, Arizona Wastewater Project Environmental Assessment. Prepared by Camp Dresser & McKee Inc. for the International Boundary and Water Commission and the Environmental Protection Agency, Region IX.*

*Ambos Nogales Finding of No Significant Impact. Issued by the Environmental Protection Agency, Region IX.*