

Border Environment Cooperation Commission Expansion and Upgrade of the South Wastewater Treatment Plant in Ciudad Juarez, Chihuahua

1. General Criteria

1.a Project Type

Project Name: Project for the Expansion and Upgrade of the South Wastewater Treatment Plant.

Project Sector: Wastewater Treatment.

1.b Project Category

Category: Community Environmental Infrastructure Project – Community-wide impact.

1.c Project Location and Community Profile

Community: Ciudad Juarez.

Location: Ciudad Juarez is located in the northern part of the State of Chihuahua. It is adjacent to the Rio Grande and El Paso, Texas.

Location within the Border: The project is located within the 100 km U.S.-Mexico border area.

Fig. 1 Location of Ciudad Juarez in Northern Chihuahua



| Demographics | |
|---|---|
| Current population: | 1,395,023 residents |
| Growth rate: | 3.00 % |
| Reference: | INEGI, Year 2005-CONAPO Year 2009 |
| Median per capita income: | \$ 10,761 Mexican Pesos |
| Reference: | BECC estimations based on statistics prepared by INEGI and the National Commission on Minimum Wages. |
| Primary economic activity: | Agriculture, Manufacturing Industry, and Services. |
| Marginalization rate: | -1.62793 Very Low |
| Services | |
| Community: | Ciudad Juarez |
| Water System | |
| Water coverage: | 97% |
| Domestic hookups: | 338,329 |
| Water supply source: | 146 deep wells |
| Wastewater Collection System | |
| Wastewater coverage: | 88% |
| Number of sewer connections: | 306,905 |
| Wastewater Treatment | |
| Wastewater treatment coverage: | 63% |
| Solid Waste | |
| Solid waste collection coverage: | 100% |
| Street Paving | |
| Street paving coverage: | 60% |
| 1.d Legal Authority | |
| Project Applicant: | Junta Municipal de Agua y Saneamiento de Juárez (local water utility) |
| Legal Representative: | Ernesto Mendoza Viveros |
| Legal Instrument to Demonstrate Authority: | The project applicant is the local water utility (<i>Junta Municipal de Agua y Saneamiento de Juárez, JMAS</i>) in coordination with the state water utility (<i>Junta Central de Agua y Saneamiento de Chihuahua, JCAS</i>). The legal authority of JCAS and JMAS has been established pursuant to Article 1564 of the Administrative Code for the State of Chihuahua. |
| Date of Instrument: | May 1 st , 1950. |

Compliance with Agreements:

- 1889 International Boundary Convention
- 1944 Water Treaty
- 1994 North American Free Trade Agreement
- Border 2012 Program
- 1990 Integrated Border Environmental Plan (IBEP)
- 1983 La Paz Agreement or Border Environment Agreement

1.e Project Summary

Project Description and Scope:

The expansion of the wastewater treatment facility by 22.8 MGD (1000 lps) and the proposed system upgrades of the existing 22.8 MGD (1000 lps) Wastewater Treatment Plant from advanced primary treatment (150/150) to secondary treatment (75/75) BOD/TSS will eliminate untreated sewage discharges to agricultural drains in the area, which eventually discharge into the Rio Grande. The project also includes upgrades to the existing sludge treatment process.

Components:

The project consists of the following:

South Plant

- Pretreatment: Coarse screening, screw pumps, fine screening, and grit/grease removal.
- Biological Treatment: Aeration Tank and Secondary Clarifier
- Chlorine Gas Disinfection.
- Sludge Treatment: Sludge pre-thickening, mixing with sludge from the North WWTP, dynamic thickening, anaerobic digestion, and sludge dewatering using belt filter press.

Population Served:

360,000 residents

Project Cost:

\$ 35,669,404 USD

Project Map:

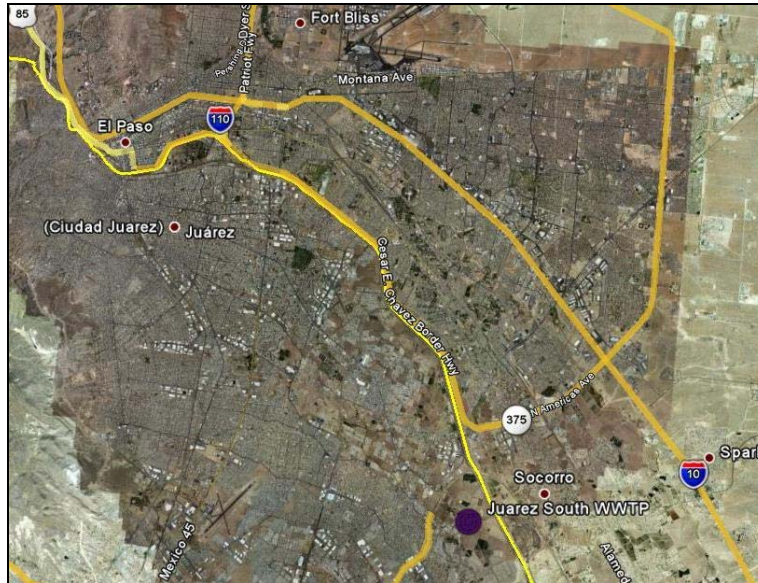


Fig. 2 Juarez South WWTP Location

1.f Project Justification

Project Justification:

- Currently the Juarez South wastewater treatment plant lacks treatment capacity; consequently, there are untreated discharges and flows that potentially reach surface and/or groundwater bodies such as the Rio Grande.
- This situation represents health risks due to the potential human contact with wastewater and vectors of waterborne diseases, as well as environmental contamination risks.
- With the project implementation, 18.26 MGD of untreated wastewater will be eliminated, reducing surface and groundwater contamination caused by this discharge.
- The risks of transmission of waterborne diseases will be reduced with the implementation of this project, as well as the risks of environmental contamination.

Urgency of the project or consequences of no action:

- Low-quality treated wastewater discharges jeopardize the health of project area residents, as this situation leaves them exposed to contact with these waters and consequently, at risk for associated diseases.
- Increased rate of gastrointestinal diseases in the project area.

Prioritization Process Category: Category 1

Pending Issues:

None.

Criterion Summary:

The treatment proposed by this project will substantially improve the quality of the effluent, expanding thus the potential for treated wastewater reuse and reducing offensive odors present in the area. The project meets all general criteria.

2. Human Health and Environment

2.a Compliance with Applicable Environmental Laws and Regulations.

Environmental and Public Health needs addressed by the proposed project:

The lack of sufficient treatment capacity in the Juarez South Plant causes approximately 800 lps of wastewater to be discharged without appropriate treatment into an existing drain located in the vicinity of the plant. This untreated sewage mixes with the advanced primary effluent produced by the same facility, a situation that represents a health hazard. The adjacent agricultural drain that receives this wastewater mixture is part of the 009 Juarez Valley Irrigation District, which flows through the communities in the region, exposing residents to direct contact with these waters.

The project meets the following applicable environmental laws and regulations:

- Official Mexican Standard NOM-001-SEMARNAT-1996, which establishes the maximum permissible levels of contaminants for wastewater discharges into national waters and territories.
- Official Mexican Standard NOM-003-SEMARNAT-1997, which establishes the maximum permissible levels of contaminants for reclaimed water use for non-potable uses.
- Official Mexican Standard NOM-004-SEMARNAT-2002, which establishes the maximum permissible levels of contaminants for biosolids reuse and final disposal.

2.b Human Health and Environmental Impacts.

Human Health Impacts

Direct and Indirect Benefits to Human Health:

- The project will reduce surface water contamination.
- The project will reduce soil contamination.
- The project will eliminate public exposure to untreated wastewater.

Health Statistics:

Water-borne diseases are caused by pathogenic microorganisms that are directly transmitted as a result of inadequate wastewater disposal practices and unhealthy water supplies. An individual may become ill after drinking water that has been contaminated with these organisms, eating uncooked food that have been in contact with contaminated water, or having bad hygiene habits that contribute to the dissemination of diseases by direct or indirect human contact.

Supporting Figures:

Table 1. Gastrointestinal Diseases in the Juarez, Chihuahua area

| HEALTH SERVICES OF CHIHUAHUA SANITARY JURISDICTION, JUAREZ EPIDEMIOLOGY DEPARTMENT | | | | | |
|--|-------|-------|-------|-------|-------|
| GASTROINTESTINAL DISEASES PER TYPE AND YEAR | | | | | |
| IN THE JUAREZ AREA | | | | | |
| YEARS 2003 TO 2007 | | | | | |
| | YEAR | | | | |
| DISEASE | 2003 | 2004 | 2005 | 2006 | 2007 |
| AMEBIASIS | 1012 | 914 | 863 | 934 | 863 |
| INTESTINAL ILLNESESS | 48721 | 49666 | 41123 | 42806 | 41526 |
| PARATYPHOID AND OTHER | 488 | 656 | 1075 | 1367 | 1087 |
| OTHER HELMITIASIS | 3259 | 3087 | 1407 | 1247 | 1555 |
| TYPHOID FEVER | 38 | 54 | 11 | 42 | 60 |
| SHIGELLOSIS | 6 | 30 | 17 | 14 | 29 |
| VIRAL HEPATITIS-A | | 112 | 181 | 76 | 54 |
| GIARDIASIS | 202 | 225 | 100 | 83 | |
| ASCARIASIS | 69 | 10 | 9 | 6 | |
| OXIUROS | 78 | 34 | 18 | 31 | |

SOURCE: WEEKLY REPORT OF DISEASES NEW CASES

Environmental Impacts

Direct and indirect benefits:

Only minor environmental impacts are anticipated from the development of the different project phases, provided the project tasks are implemented in accordance with the specifications of the Environmental Impact Statement and taking into account the mitigation measures established therein.

Potential impacts include the following:

Construction Phase

- Fugitive dust emissions
- Gas emissions from construction machinery

Mitigation Measures:

Mitigation measures will include the following:

- Application of water to reduce fugitive dust emissions.
- Tune up vehicles to reduce emissions.

- Placement of warning signs to prevent potentially hazardous situations.

Impacts:

The environmental impact resulting from the project's implementation will be positive overall, inasmuch as:

- The quality of the Juarez South WWTP effluent will be improved from advanced primary treatment (150/150) to secondary treatment (75/75) BOD/TSS. Both levels of treatment comply with the Mexican Standard NOM-001-SEMARNAT-1996. Offensive odors currently present in the area will be eliminated and environmental contamination will be reduced to enhance the quality of life of area residents by reducing potential health hazards.

Transboundary Impacts

Due to the proximity of Ciudad Juarez with the city of El Paso, there are frequent border crossings between cities. The proposed project will have a positive impact on the health of residents of cities such as El Paso, Clint, Fabens, Tornillo, and the entire region, since the project will help to reduce the risk of waterborne diseases caused by the lack of wastewater treatment or inappropriate wastewater management. Furthermore, the project will reduce human contact with raw wastewater.

Additionally, the project implementation will reduce the potential for contamination of local and shared water bodies, such as the Rio Grande. According to the transboundary environmental assessment significant impacts are not expected due to the project implementation.

Formal Environmental Clearance

Environmental Clearance:

Pursuant to the provisions of the General Law on Ecological Balance and Environmental Protection regarding Environmental Impact Statements, Mexico's Secretariat of the Environment and Natural Resources (SEMARNAT) issued Official Communication SG.IR.08-2008/092 on March 14, 2008, in which the agency determined that based on the Preliminary Environmental Impact Statement submitted by the project sponsor, the project complies with all environmental requirements applicable to this type of projects.

Pursuant to the U.S. National Environmental Policy Act (NEPA), a transboundary impact study was developed and submitted for consideration to the United States Environmental Protection Agency (EPA). A 30-day public

review period was opened on September 29, 2009 to receive questions or requests for clarifications. Finally, a Finding of No Significant Impact (FONSI) was issued by the EPA on November 3, 2009, which establishes that the project will not result in significant environmental impacts that may affect the U.S. border area.

Pending Issues:

None

Criterion Summary:

The upgrades to the treatment system and the proposed improvements to the quality of the effluent produced by the wastewater treatment facility will benefit the environment and the communities on both sides of the border by reducing health hazards. The project meets all Human Health and Environment criteria.

3. Technical Feasibility

3.a Technical Aspects

Project Development Requirements

Design Criteria:

The project was developed in accordance with technical specifications contained in the Water, Wastewater Collection, and Treatment Manual prepared by CONAGUA's Technical Directorate.

The project includes the following components:

South Plant

Wastewater Treatment

- Coarse screening unit (existing)
- Fine screening unit (existing)
- Grit/Grease removal (existing)
- Four high-load biological reactors with a capacity of 24,000 m³ per tank
- Four secondary clarifiers 45 m in diameter and 3.9 m in depth.
- Disinfection unit (existing).

Wastewater Treatment Sludge Management

- Sludge pre-thickening unit (existing)
- Two 1000 m³ sludge mixing tanks with submersible mixers
- Sludge thickening unit
- 120 m³ thickened sludge tank
- Two 12,000 m³ anaerobic sludge digesters
- 1,500 m³ digested sludge tank
- Sludge pumping to belt filter press
- Four belt filter presses for sludge dewatering

The final design includes the implementation of Green Building Practices as part of the technical construction specifications as follow:

- Use of natural topography and No-wood formworks to avoid the use of conventional forms and increase times of reuse.
- Use of recycled aggregate materials for concrete to reduce the use of conventional mix materials.

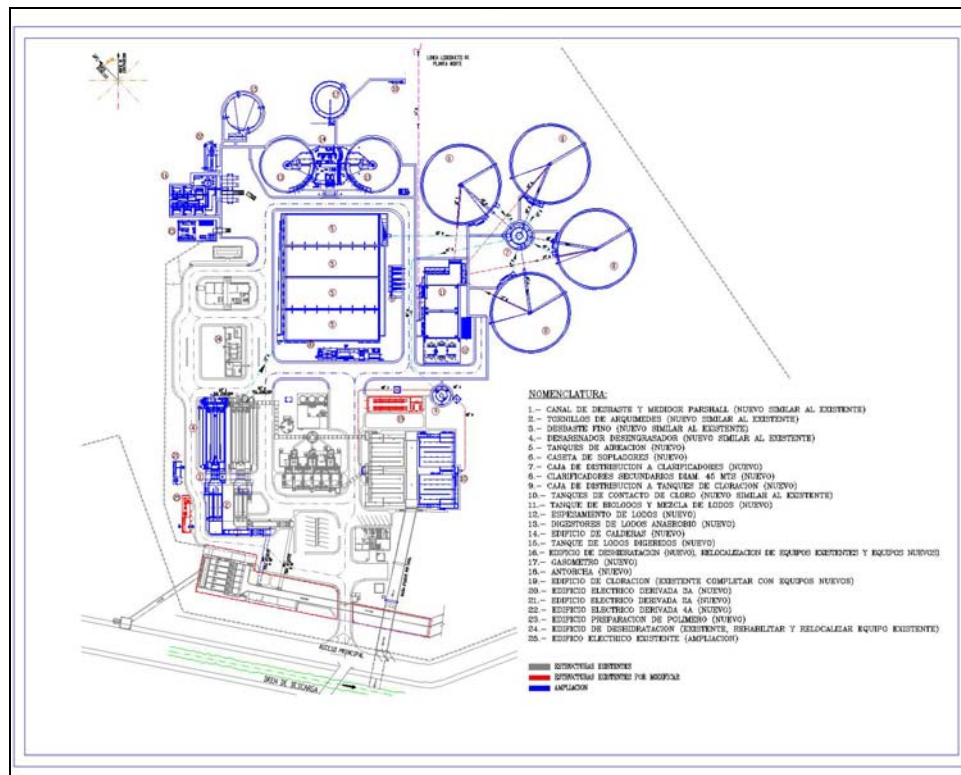
- Use of high efficiency electromechanical equipment to provide energy cost savings.
- Reuse of Methane to enhance sludge treatment and to cogenerate energy for facility lighting.

**Appropriate Technology
 Wastewater Treatment**

The Juarez South treatment plant currently has a treatment capacity of 22.8 MGD (1000 lps) and has implemented an Advanced Primary Treatment (150/150) that uses different chemicals such as coagulants and flocculants as part of its process. This process provides an effluent that generates unpleasant odors in the area adjacent to the wastewater treatment facility. Additionally, the low quality of the effluent does not render it safe for urban activities.

The systems proposed for expansion of the facility and improvements to the quality of the plant's effluent are based on a high-load activated sludge system, which is used worldwide for municipal wastewater treatment. The effluent produced by this system is of higher quality and it helps to eliminate offensive odors almost entirely. In addition, the effluent may be reused for a broader range of urban applications.

Fig. 3 Juarez South WWTP layout



Assessment of Alternatives:

For purposes of this project, the assessment of alternatives focused exclusively on the need to improve the quality of the WWTP effluent vs. not implementing the project at all, inasmuch as said plant operates under a concession pursuant to a Build-Operate-Transfer (BOT) scheme and consequently, the technology to be used was determined by the project applicant. However, it must be noted that the proposed technology has been successfully proven worldwide.

Alternative 1. No Action. The no action alternative involves continuing operating under the current conditions that pose hazards to human health and the environment by disposing of untreated wastewater or low-quality treated wastewater, which results in foul odors and surface water, groundwater, and soil contamination.

Alternative 2. This alternative corresponds to the implementation of the proposed project, which includes the construction of an additional secondary level treatment module and upgrades to the existing process train to bring up the effluent from advanced primary level (150/150) to secondary level treatment (75/75). The above will result in benefits that include the elimination of offensive odors and reduced levels of surface water, groundwater, soil and environmental contamination.

Property and Right-of-Way Requirements

Requirements:

The land needed for the implementation of the proposed project at the Juarez South plant is owned by the local utility Junta Municipal de Agua y Saneamiento de Juárez. The property is adjacent to the existing facility.

Project Tasks and Timeline

Project Timeline

The construction of the proposed expansion of 22.8 MGD (1000 lps) and improvement to secondary treatment (75/75) to Juarez South treatment system started in July 2009. The project is estimated to be completed by June 2011, including the start-up.

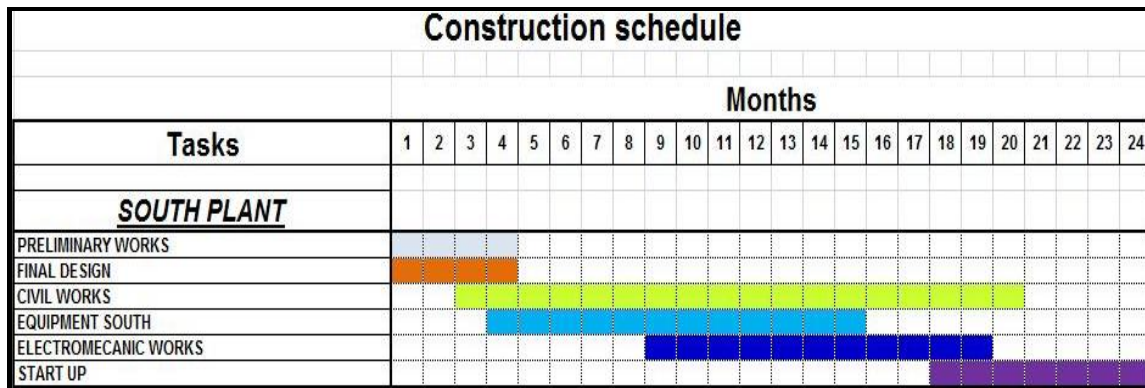


Fig. 4 Project Timeline.

3.b Management and Operations

Project Management

Resources:

The facility concessionaire will be the entity responsible for operating and maintaining the wastewater treatment system until it is transferred to the municipal utility (JMAS Juarez), when the concession ends.

The JMAS Juarez has the basic institutional and human capacity needed to supervise and to pay for the operation and maintenance of the proposed wastewater treatment system during the concession period, and to operate and maintain the facility when the concession ends

Operation and Maintenance

Organization:

The project applicant, Junta Municipal de Agua y Saneamiento de Juárez, has an internal structure that includes different Offices and Departments available to carry out project management and development tasks.

JMAS has a Board of Directors consisting of a Chairman, a Secretary, a Treasurer, and alternates, as well as administrative and technical staff, operators, and aides to manage the Wastewater Treatment Plant.

Pretreatment:

Wastewater flowing through the city's sewage collection system must comply with Official Mexican Standard NOM-002-SEMARNAT-1997, which regulates the quality of said wastewater until it is delivered to the corresponding treatment facility.

Operation Plan:

The Final Design incorporates an Operation and Maintenance manual that includes the primary tasks needed to ensure a proper operation of the system and to prevent breakdowns in the proposed infrastructure.

| | |
|--|--|
| Permits, licenses, and other regulatory requirements: | The project applicant has the following documentation available: Technical and financial validation by CONAGUA and BANOBRAS. |
| Reviewing Agencies: | EPA, BECC, CONAGUA, BANOBRAS, NADB. |

Pending Issues:

None

Criterion Summary:

The proposed project will improve the quality of the effluent produced by the wastewater treatment plant and will represent an immediate benefit by eliminating untreated wastewater discharges to local bodies of water. The project will also promote replacing first use water with reclaimed water for agricultural irrigation and by doing so; it will open up the possibility of converting the current agricultural use given to Rio Grande water under the 1944 Water Treaty to urban public use. The project meets all Technical Feasibility criteria.

4. Financial Feasibility

4.a Verification of Financial Feasibility

Financial Conditions

Information Presented: JMAS's Financial Statements.

Summary of Financial Analysis: JMAS has enough revenues to service the proposed debt.

Project total cost, financial structure and other capital investment plans

Concept: Expansion and Upgrade of the South Wastewater Treatment Plant in Ciudad Juarez.

Total Cost: \$35,669,404 USD

Financial Structure:

| Source | Type | Amount (USD\$) | % |
|-----------------------|--------|----------------|-------|
| Mexico | Grant | 13,326,541 | 37.36 |
| BEIF-NADB | Grant | 8,000,000 | 22.43 |
| Santander | Loan | 5,728,128 | 16.06 |
| Private Participation | Equity | 8,614,735 | 24.15 |
| Total: | | \$35,669,404 | 100% |

Dedicated Revenue Source

Revenue Source: JMAS's Revenues.

4.b Legal Considerations

Project Administration: The project will be operated under a BOT scheme by the concessionaire Degremont, and it is its contractual obligation to operate and maintain the wastewater treatment plant.

Financing status: N/A

Pending Issues:

None.

Criterion Summary:

The project meets all Financial Feasibility criteria.

5. Public Participation

5.a Community Environmental Infrastructure Projects – Community-wide impact

Local Steering Committee

Date of Establishment: The Local Steering Committee was formally installed on March 18, 2008 at a meeting held in the utility's (JMAS) Board Meeting Room.

Local Steering Committee Members: At this meeting, a Board of Directors was installed. The Board consists of the following members:

Chairman: Ernesto Mendoza Viveros

Secretary: Salvador Delgado Terrazas

Alternates:

Enrique Alvarez

Daniel Murguía

Armando Olivas

Carlos Ortiz

Gerardo Hernandez

Jesús Jose Díaz

Joaquín Macías

Date of Approval of Public Participation Plan: The Comprehensive Community Participation Plan developed by the Local Steering Committee was approved by the BECC on March 20, 2009.

Public Access to Project Information

Public Access to Project Information: The project's technical and financial information was made available to the public for review. The Local Steering Committee, with assistance from the project applicant, prepared the following:

- Flyers
- Brochures
- Megaphone advertising
- Radio announcements
- TV announcements

The above media outlets were used to inform the community about the project.

Additional Outreach Activities: Meetings with local organizations.

First Public Meeting: Notice to announce the First Public Meeting was published on the "Diario de Juarez" on July 8, 2009.

The first public meeting was held to inform the community about the technical aspects of the project. The meeting was

held at 18:00 hrs. On August 12, 2009 at the "Valle de Juarez" meeting room in Ciudad Juarez, Chih.

Second Public Meeting:

A second public meeting to inform the community about the project's financial aspects was scheduled at 16:00 hrs. on November 25, 2009, at the "Aguilas de Zaragoza" meeting room in Ciudad Juarez.

Final Public Participation Report

Final Report:

The Local Steering Committee and the applicant will prepare the Final Public Participation Report to demonstrate that the proposed objectives were fully met to BECC's satisfaction.

Post-Certification Public Participation Activities

Post-Certification Activities:

The project applicant, in coordination with the Local Steering Committee, will provide a general description of public participation activities that may be carried out after the project's certification to support its implementation and long-term feasibility.

Pending Issues:

The second public meeting and the Final Public Participation Report are pending. The project is currently under public comment, which will conclude on December 9, 2009.

Criterion Summary:

The project's Local Steering Committee is the same one that was established for the Juarez South South WWTP, since this project is located in the same community and consequently, it is the responsibility of the same utility and applicant. The project meets all Public Participation criteria.

6. Sustainable Development

6.a Human and Institutional Capacity Building

Project Operation and Maintenance:

The facility concessionaire will be the entity responsible for operating and maintaining the wastewater treatment system until it is transferred to the municipal utility (JMAS Juarez), when the concession ends.

The applicant has the basic institutional and human capacity needed to supervise and to pay for the operation and maintenance of the proposed wastewater treatment system during the concession period, and to operate and maintain the facility when the concession finishes.

Human and Institutional Capacity Building:

Actions within the scope of the project that contribute to strengthen the *Junta Municipal de Agua y Saneamiento de Juarez* institutional and human capacity include:

- Providing and improving wastewater treatment services in a continuous, efficient, and cost-effective manner.
- Basic technical training to the operations and maintenance staff responsible for the new infrastructure that will be built as a result of the project's implementation.
- Operating a wastewater treatment system that meets applicable regulations.
- Training and educating for the utility's operating staff throughout its different areas, to provide essential services that meet the needs of the community.

6.b Conformance to applicable Local, State, and Regional Regulations and Conservation and Development Plans

Local and Regional Plans addressed by the project:

The proposed project conforms to applicable plans and actions described in the following documents:

- Master Plan for Improvements to Water, Wastewater Collection, and Treatment Services in Ciudad Juarez
- Chihuahua State Development Plan
- Juarez Municipal Development Plan

The project adheres to the U.S.-Mexico Border 2012 Environmental Program by meeting Goal 1 (Reduce water contamination) and Objectives 1 (Promote an increase in the number of homes connected to water supply and wastewater collection and treatment systems) and 4 (Promote improvements to water system efficiencies).

One of the guiding principles of this program is to reduce major public health risks and to conserve and restore the environment.

6.c Natural Resource Conservation

- The final design includes the implementation of green building practices as part of the technical construction specifications.
- The project will contribute to reduce environmental deterioration by expanding and improving the Juarez South wastewater treatment plant, in order to reduce the risks of aquifer contamination and human health hazards created by the discharge of raw wastewater to local streams and/or agricultural drains.

6.d Community Development

- The completion of this project is crucial to the development of the community. The tasks proposed by the project will provide for the adequate disposal of wastewater, which will in turn contribute to reduce conditions that favor the proliferation of waterborne and arboviral diseases.
- The project will promote community development, as it will reduce contamination in the city and improve the

Available Project Documentation:

- Final Design for a Facility Expansion and Improvements to the Quality of the Effluent produced by the Juarez South Wastewater Treatment Plant. Degremont Suez. 2009.
- Acknowledgment of receipt of Preliminary Impact Statement document. Log Entry 08/IP-0519/03/08, SEMARNAT, March 11, 2008.
- Environmental Clearance Resolution by SEMARNAT, Official Communication No. SG.IR. 08-2008/092, Chihuahua Federal Delegation, Environment and Natural Resource Protection Office. March 14, 2008.
- Technical and financial validation of the project for a facility expansion and improvements to the quality of the effluent produced by the Juarez South Wastewater Treatment Plant, issued by CONAGUA and BANOBRAS. 2009.