

# Border Environment Cooperation Commission Construction of the South-South Wastewater Treatment Plant in Ciudad Juarez, Chihuahua

## 1. General Criteria

### 1.a Project Type

**Project Name:** Project for the Construction of the South-South Wastewater Treatment Plant.

**Project Sector:** Domestic Water and Wastewater Connections

### 1.b Project Category

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

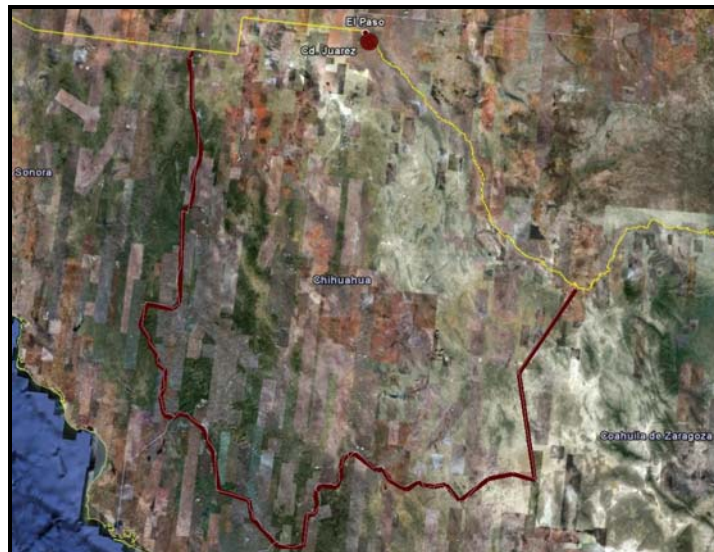
### 1.c Project Location and Community Profile

**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**



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

Initially, the first 10.04 km of the 22 km collection line will be constructed and will be installed in the most populated sector of the project area.

The project also includes sludge treatment.

**Components:**

The project consists of the following:

Wastewater Collection

**South-South Collector Main:**

| Length            | Diameter     |
|-------------------|--------------|
| 17,996 lf/5,489 m | 60 in/1.52 m |
| 14,921 lf/4,551 m | 72 in/1.83 m |

Wastewater Treatment

**South-South Plant:**

- Pretreatment: Screw pumps, Coarse screening, fine screening, and grit/grease removal.
- Primary Treatment: Primary settling.
- Biological Treatment: Aeration tank and Secondary Clarifier.
- Chlorine Gas Disinfection.
- Sludge Treatment: Primary sludge thickening, biological sludge thickening, anaerobic digestion, and sludge dewatering using belt filter press.

**Population Served:**

180,000 residents

**Project Cost:**

\$ 39,324,890 USD

**Project Map:**



**Fig. 2 South-South Wastewater Collector and wastewater treatment plant location**

**1.f Project Justification**

**Project Justification:**

- Currently 8.56 MGD of untreated wastewater generated for the southeast part of Ciudad Juarez is discharged into agricultural canals and soil causing 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 disease, as well as environmental contamination risks.
- With the project implementation 8.56 MGD of untreated wastewater will be eliminated, reducing surface and groundwater contamination 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:**

- Untreated 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 wastewater prior to its discharge, reducing thus the risk of human contact with untreated wastewater and expanding the potential for treated wastewater reuse. 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 southeastern area causes approximately 8.56 MGD of untreated wastewater to be discharged to an existing drain located in the vicinity of the area known as El Sauzal. This untreated sewage mixes with the water conveyed through the 009 Juarez Valley Irrigation System's main canal. This situation represents a hazard to human health due to the potential for direct human 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 improve the quality of the 11.4 MGD (500 lps) wastewater flow generated by the southeastern area of Cd. Juarez.
- The project will reduce surface water contamination.
- The project will reduce soil contamination.
- The project will eliminate public exposure to untreated wastewater.

**Health Statistics:**

Waterborne 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<br>SANITARY JURISDICTION, JUAREZ<br>EPIDEMIOLOGY DEPARTMENT |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|
| GASTROINTESTINAL DISEASES PER TYPE AND YEAR  |       |       |       |       |       |
| YEARS 2003 TO 2007   |       |       |       |       |       |
| DISEASE  | YEAR  |       |       |       |       |
|  | 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    |
| VIPERINOSIS  | 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**

**Environmental Impacts:**

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 project will improve the quality of treated wastewater generated by the southeastern area of Juarez prior to its discharge into agricultural drains. 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.08-2008/173 on March 29, 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 proposed treatment of wastewater generated in the southeastern area of Ciudad Juarez will benefit the environment and the communities on both sides of the border by reducing health hazards and offensive odors currently affecting the area. 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.

**Project Components:** The project includes the following components:

Wastewater Collection

**South-South Collector Main**

| Length            | Diameter     |
|-------------------|--------------|
| 17,996 lf/5,489 m | 60 in/1.52 m |
| 14,921 lf/4,551 m | 72 in/1.83 m |

Wastewater Treatment

**South-South Wastewater Treatment Plant with 11.4 MGD (500 lps) capacity.**

Wastewater Treatment

- Coarse screening unit
- Fine screening unit
- Primary sedimentation
- High-load biological reactors
- Secondary clarifiers
- Disinfection unit

Wastewater Treatment Sludge Management

- Primary sludge thickening unit
- Biological sludge thickening unit
- Anaerobic sludge digesters
- Belt filter press for sludge dewatering

**Other Design Criteria**

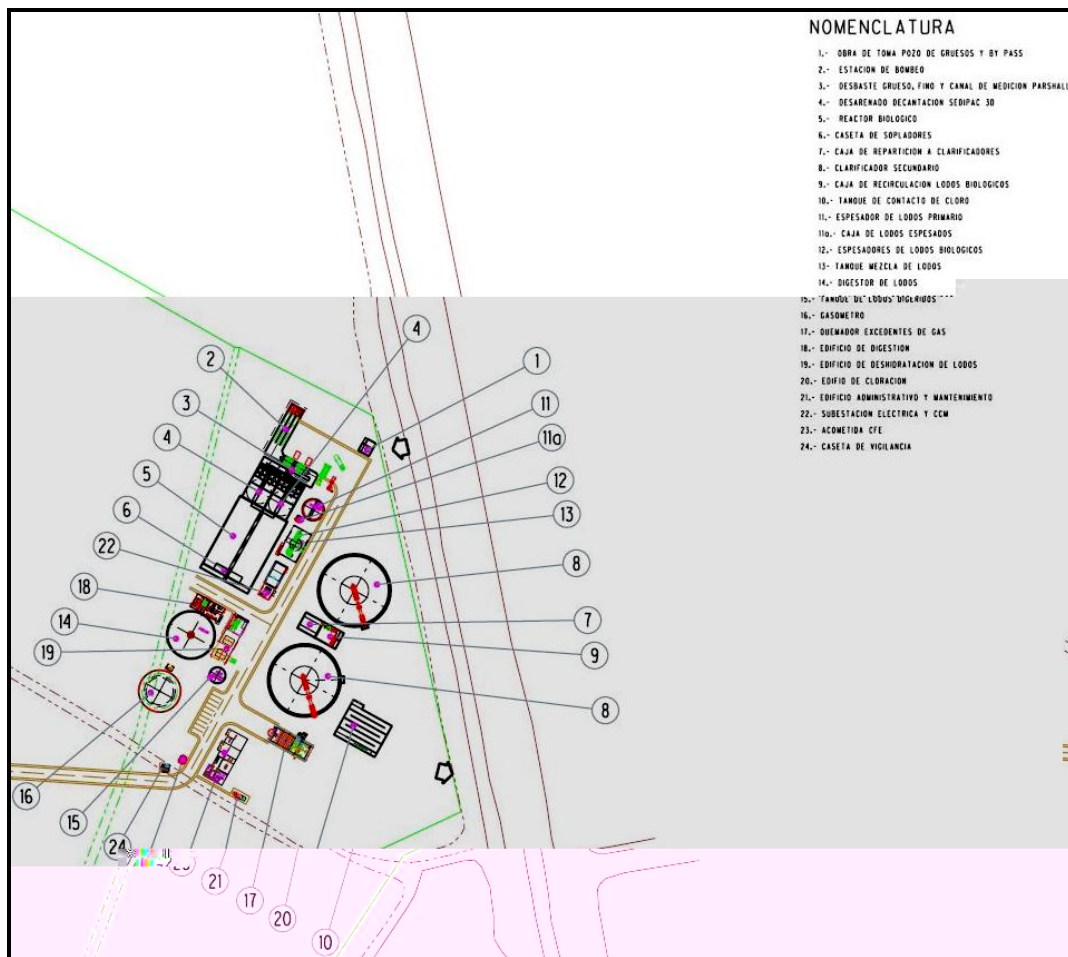
The final design includes the implementation of Green Building practices as part of the technical construction specifications as follow:

- Use of natural topography and No-wood formworks to avoid the use 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 treatment system proposed for the Juarez South-South treatment facility is based on an activated sludge system, which is used worldwide for municipal wastewater treatment. This system produces secondary-level effluent quality (75/75) BOD/TSS that does not generate offensive odors. Additionally, the effluent may be reused for a broad range of urban and agricultural applications.

**Fig. 3 Wastewater treatment Plant general layout**



**Assessment of Alternatives:**

For purposes of this project, the assessment of alternatives focused exclusively on the need to construct the WWTP and the main collector to the treatment facility vs. not implementing the project at all, inasmuch as said plant will operate 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.

Wastewater Treatment

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, which results in surface water, groundwater, and soil contamination, in addition to foul odors in the adjacent area.

Alternative 2. This alternative corresponds to the implementation of the proposed project, which includes the construction of a secondary level Wastewater Treatment Plant (75/75) and the main collector to this WWTP. 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-South plant is owned by the local utility –*Junta Municipal de Agua y Saneamiento de Juárez*–. The property is adjacent to the Jesus Carranza community in the Juarez Valley.

The main collector to the treatment facility does not affect private property, since it will be constructed through existing roads.

**Project Tasks and Timeline**

**Project Timeline**

The construction of the proposed Juarez South-South wastewater treatment system will begin in February 2010. The project is estimated to be completed by January 2012, including the start-up.

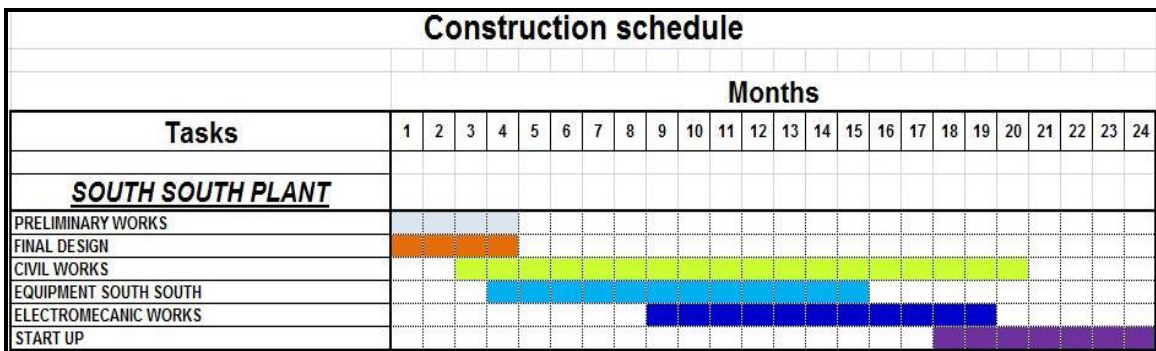


Fig. 4 Project Timeline.

### 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 wastewater prior to its discharge into agricultural drains, and will represent an immediate benefit by eliminating untreated wastewater discharges to local bodies of water. Additionally, the project will help eliminate offensive odors present in adjacent areas. 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 Costs, Financial Structure, and other capital funding plans

**Concept:** Construction of the South-South Wastewater Treatment Plant in Ciudad Juarez.

**Total Cost:** \$39,324,890 USD

#### Financial Structure:

##### South-South WWTP

| Source                | Type   | Amount (USD\$) | %     |
|-----------------------|--------|----------------|-------|
| FONADIN               | Grant  | 4,467,224      | 29.81 |
| NADB                  | Loan   | 7,352,941      | 49.07 |
| Private participation | Equity | 3,163,928      | 21.12 |
| <b>Total:</b>         |        | \$14,984,093   | 100%  |

##### South-South Collector

| Source        | Type  | Amount (USD\$) | %     |
|---------------|-------|----------------|-------|
| Mexico        | Grant | 16,340,797     | 67.13 |
| BEIF-NADB     | Grant | 8,000,000      | 32.87 |
| <b>Total:</b> |       | \$24,340,797   | 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:** Loan contract to be signed once project is certified.

#### 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

**Members:**  
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 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 education 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 facilities at the Juarez South wastewater treatment plant 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 quality of life for local residents
- Treated water may be applied to other uses, such as agriculture, as well as urban public use.
- The project will help the city to achieve greater wastewater treatment coverage, helping the development of the community, since it will reduce contamination caused by raw wastewater discharges.

#### **Pending Issues:**

None.

#### **Criterion Summary:**

The project meets all Sustainable Development criteria.

**Available Project Documentation:**

- Final Design for the construction of the Juarez South-South Wastewater Treatment Plant. Degremont Suez. 2009.
- Acknowledgment of receipt of Preliminary Impact Statement document. Log Entry 08/IP-0614/05/08, SEMARNAT, May 12, 2008.
- Environmental Clearance Resolution by SEMARNAT, Official Communication No. SG.IR. 08-2008/173, Chihuahua Federal Delegation, Environment and Natural Resource Protection Office. May 29, 2008.
- Technical and financial validation of the Final Design 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 in 2007 and 2009, respectively.