Border Environment Cooperation Commission

Improvements to the Wastewater Collection and Treatment Systems and Construction of a Wastewater Treatment Plant in Ojinaga, Chih.

I. General Criteria

1. Project Type

The project proposes improvements to the wastewater collection and treatment, and the construction of a new wastewater treatment plant, for which failing collection lines (lines with negative slopes, insufficient diameter and excessive wear) will be replaced and new lines will be installed to provide coverage and connect 100% of the existing population. In addition, a new wastewater treatment plant of 140 lps capacity, comprised of facultative lagoons will be built to prevent contamination of the Rio Grande's main course, the ground and local water tables.

2. Project Location

The city of Ojinaga, Chih., seat of the municipality of the same name, is located along the southern margin of the Rio Grande, which is the demarcation between Mexico and the United States of America (USA). It is located along the border with the State of Texas, across from Presidio. The city is located 231 km. northeast of the city of Chihuahua, the state capital. Geographically, the community is located along coordinates N29º 34' latitude, and W104º 24' longitude, at approximately 841 meters above sea level. By the year 2000, the number of residents in Ojinaga was 20,371, and projections for 2020, the last year of the project's planning period, expect 25,176 residents according to official INEGI and CONAPO data endorsed by the State Population Council on February 16, 2001.

3. Description of Project and Tasks

In 1999 the city of Ojinaga, along with the Junta Municipal de Agua y Saneamiento [the local water utility, known as JMAS], started a technical assistance and certification process with the BECC. The BECC provided assistance for the development of a Water, Wastewater Collection and Treatment Master Plan by hiring the engineering firm of Parkhill, Smith & Cooper, Inc. The study included an assessment of the systems' conditions and identified the tasks needed to provide efficient wastewater collection and treatment services to 100% of the community, since at this time, 56% of the residents lack wastewater collection, and wastewater treatment is practically non-existent, given that the existing oxidation lagoon has reached the end of its life cycle, after almost nine years in operation.

The proposed wastewater collection tasks will enable the utility to collect wastewater from section of the city that are not being currently served, reducing thus the potential for human contact with wastewater and organisms that are vectors for disease. In addition, the project will reduce the potential for contamination of ground and surface water by discontinuing the use of latrines, septic tanks and open-air drains. Effluent from the proposed wastewater treatment plant will be discharged to the Rio Grande without contaminating its waters, providing thus environmental and health benefits to residents of Ojinaga and adjacent U.S. areas.

4. Project Components

A. Replacement of collectors that have negative slopes and cause silting, obstructions and septicization of wastewater.

B. Construction of expansions and new sections of the wastewater collection system to connect and provide service to approximately 11,500 additional users.

C. Replacement of lines that are over 30 years old and are about to collapse due to their deteriorating condition.

D. Substitution of final sections of the system's outfall; increase its diameter and hydraulic capacity, and correct its layout and slope to manage expected wastewater flows.

E. By replacing failing lines and connecting 100% of the population to the system, the project will reduce leachates from septic tanks and latrines that contaminate local water tables.

F. Replacement of damaged manholes, which will prevent wastewater leaks and spills that may infiltrate water tables and the ground.

G. Construction of a new wastewater treatment plant of 140 lps capacity, pursuant to the final designed prepared by the Junta Central de Agua y Saneamiento [state utility, known as JCAS] of the State of Chihuahua.

H. Initiation of an action plan to strengthen the utility (Ojinaga JMAS).

5. Compliance with International Treaties and Agreements

The project is in compliance with agreements dealing with the environment and the betterment of quality of life conditions for border residents, signed by Mexico and the United States of America, including the La Paz Agreement, the Comprehensive Border Environment Plan, the Border XXI Program and the North American Free Trade Agreement.

II. Human Health and Environment

1. Human Health and Environmental Need

The development of this project will lead to improved environmental and human health conditions in the city of Ojinaga, Chihuahua, through the realization of improvements and expansions to the wastewater collection and treatment systems. The proposed wastewater collection project will provide service to city areas that are not being served. Wastewater treatment works include the construction of a new wastewater treatment plant (WWTP) to provide service to 100% of the community. The planning period concludes in the year 2020.

Ojinaga is presently facing serious environmental quality and public health problems. Only 44% of community residents have sanitary sewage due to system deficiencies, and the rest of the community uses latrines and septic tanks, which increase the risk of residents coming in contact with wastewater, as it also increases the potential for contamination of surface water and water tables. The existing oxidation lagoon has reached the end of its life cycle; it is currently inoperable and discharges an effluent with a level of contaminants that is above permissible limits, negatively impacting the quality of the Rio Grande water.

The development of this project will address the above issues, and will improve public health conditions for local residents in the following manner:

(1) Human health conditions will be improved by reducing or eliminating wastewater leaks and overflows with the improved sanitary sewage system. The risk for residents of coming in contact with wastewater will also be reduced.

(2) The project will reduce the potential for ground and water table contamination that could result from an inadequate use of latrines and septic tanks in areas that lack sewage, or from the use of failing lines and the discharge of raw wastewater to the Rio Grande.

(3) The construction and operation of the new WWTP, as well as the construction of new lines and the improvements to existing wastewater collection lines, will reduce the pollution of Rio Grande waters, water tables, surface water and the ground.

2. Environmental Assessment

The project's Environmental Assessment was developed in compliance with BECC's criteria and, since the project is eligible to receive funds from the Border Environment Infrastructure Fund (BEIF), it has to comply with the regulations established there on. Consequently, the project required an environmental assessment to be developed in conformance with the corresponding format, which must be approved by the U.S. Environmental Protection Agency (EPA). The FNSI was signed on July 17, 2002

Mexican laws establish in the General Law for Ecological Equilibrium and Environmental Protection that water infrastructure projects such as the one being proposed, being a Wastewater Treatment Plant that

will discharge liquids or sludge into receiving bodies that are considered to be national assets, require an Environmental Impact Assessment (EIA) to be developed under the federal format. The EIA must be reviewed and evaluated by SEMARNAT. An EIA was developed and an approval resolution was issued on June 21, 2002 by the corresponding federal authorities.

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

The site selected for the wastewater treatment plant (WWTP) and the effluent's discharge point into the Rio Grande have been duly identified and conform to the provisions of Official Mexican Norm NOM-001-ECOL-1996, tables 2 y 3. In January 2002 EPA's Region 6 developed a mathematical model of the impact of discharging the WWTP's treated effluent into the Rio Grande, and concluded that 600 MPN/100 ml is the maximum level of fecal coliforms required to ensure compliance with the 200 MPN/100 ml criterion established by the Texas Natural Resource Conservation Commission (TNRCC) for recreation uses with direct contact and conservation of aquatic life 500 meters downstream from the discharge point. This criterion is met by the WWTP, which will produce an effluent with 20 mg/L BOD_5, 20 mg/L TSS and 100 MPN/100 ml of fecal coliforms.

The National Institute of Anthropology and History found no impact to archeological or historical resources by the project's implementation.

III. Technical Feasibility

1. Appropriate Technology

BECC's technical assistance funds were used to develop the Water, Wastewater Collection and Treatment Master Plan for the City of Ojinaga, Chih. (completed in March 2002) to be used as a planning tool; the final design of the Complementary Works for the Municipal Wastewater Collection System (to be completed in May 2002), and the Environmental Impact Statement (submitted for consideration to SEMARNAT in April 2002). The State's Junta Central de Agua y Saneamiento (JCAS) used its own funds to develop the final design of the Wastewater Treatment Plant for Ojinaga (completed in February 2002). The Step II certification document was developed by the BECC in April 2002.

The technical and financial review of the above projects was jointly undertaken by the BECC and NADB, and comments, observations and requests for additional information were timely incorporated, including those issued by participating regulatory agencies (EPA, IBWC and CILA).

The project's planning period covers until the year 2020. Initially, certification is being sought for the first two phases (2002-2005 and 2005-2010).

Recommendations to update and maintain full functionality of the municipal wastewater system throughout the project's planning period consist in replacing critical sections of collectors that currently have negative slopes, the progressive substitution of old wastewater lines that tend to collapse, the introduction of a complementary system of smaller sewers to serve areas that are not connected and fall outside of the city limits, and connecting all households to the public wastewater collection system within a maximum of four years.

All of the components of the municipal wastewater system will operate by gravity, and the outfall will convey treated wastewater to a pumping station to be located in the vicinity of the existing oxidation lagoon. Then, wastewater will be conveyed through pressurized lines to the proposed treatment system, which will consist of a train composed by a series of lagoons (anaerobic – facultative – finishing), that will discharge treated effluent by gravity to the Rio Grande's main course.

Several alternatives were explored to define the proposed treatment system, seeking at all times a technology that would be congruent with the utility's (Ojinaga JMAS) capacity as far as the number of employees and their training, in addition to the availability of financial resources.

An initial screening included ten different treatment process trains capable of meeting effluent quality requirements. This review phase considered both mechanical and natural treatment alternatives based on lagoons and wetlands. Since the availability of land was not a major limitation, the applicant opted for natural alternatives, which coincidentally have less power and operator training requirements. As a result of the initial process screening, two basic treatment trains were selected along with five variations as to the potential for implementing modular facilities and increasing the quality of the effluent in the future.

The official criterion to be met initially by the system's effluent is the one established by NOM-001-ECOL-1996 in its section on discharges to rivers with public urban use, that is, 75 mg/L BOD_5, 75 mg/L TSS and 1000 MPN/100 ml of fecal coliforms. Pursuant to this criterion, the proposed treatment system did not consider disinfecting the effluent by chemical means, but through the elimination of pathogen microorganisms by natural means (e.g. ultraviolet ray radiation in maturation and finishing lagoons), avoiding thus the incorporation of potentially toxic organochlorinated compounds to river waters, or the need to dechlorinate the effluent, with the possibility of complications related to the operation and the high associated costs. The design developed by the JCAS was influenced by the need to consistently produce an effluent with less than 1000 MPN/100 ml of fecal coliforms, which would be achieved with relatively long water retention times in treatment lagoons, close to 25 to 30 days total. Thus, the efficiency for removal of organic matter and suspended solids will be higher than what is needed to comply with criteria stated in the above NOM, producing in theory an effluent with approximately 20 mg/L BOD_5, 20 mg/L TSS and less than 1000 MPN/100 ml of fecal coliforms. As for organic charge, the system's design was based on 54 g/res/day per capita which, incorporating a 20% safety factor, resulted in a mean concentration of 160 mg/L BOD_5. Treatment efficiency for units based on these figures was reviewed for a 220 mg/L concentrating, meeting official discharge criteria, even under these circumstances.

As per the mathematical model developed by EPA Region 6 in January 2002 to estimate the impact of discharging the treated effluent to the Rio Grande, 600 MPN/100 ml is the maximum level of fecal coliforms required to ensure compliance with the 200 MPN/100 ml criterion established by the Texas Natural Resource Conservation Commission (TNRCC) for recreation uses with direct contact and conservation of aquatic life 500 meters downstream from the discharge point. This additional criterion is also fully met by the proposed design.

In summary, wastewater treatment will be based on natural purification methods, specifically a system of stabilization lagoons where organic matter will be biodegraded under controlled conditions. The treatment system will consist of the following unitary operations:

- Degritting and desilting unit.
- Raw wastewater pumping station and extraordinary flow regulating reservoir
- Pressurized conveyance line
- Flow measuring unit
- Four primary lagoons (anaerobic)
- Two secondary lagoons (facultative)
- Two primary polishing lagoons, and
- One secondary polishing lagoon

The treatment system's lagoons were designed to meet all the above criteria, and their final dimensions were adjusted to the geometry of the available land; thus, the effluent's expected quality will be, at all times, approximately 20 mg/L BOD_5, 20 mg/L TSS and 100 MPN/100 ml of fecal coliforms.

It must be mentioned that Chihuahua's JCAS is considering the possibility of reclaiming the treated effluent for urban public uses (industry, turf irrigation, etc.) in the future.

2. Operation and Maintenance Plan

Ojinaga's JMAS will be charged with operating and maintaining in good operating condition the works that are proposed to complement the wastewater collection and treatment systems, for which existing programs must be adapted pursuant to the guidelines contained in the corresponding final designs.

3. Compliance with applicable design norms and regulations

Basic design and planning criteria applied to all phases of the project's development were those recommended by the [Mexican] National Water Commission for comprehensive water, wastewater collection and treatment projects.

IV. Financial Feasibility and Project Management

1. **Financial Feasibility**
2. Following are the costs of wastewater collection and treatment as per the project:

Investments for the first phase, which have already been incurred by the Mexican government, are detailed in the table below:

Item	Updated Cost (Mex$)
Sewer lines	702,182.81
Sewer lines	21,518.26
Sewer lines	62,519.51
Sewer lines	15,185.08
Household hook-ups	1,302,162.39
Household hook-ups	652,402.85
Sewer lines and Reforma collector	589,159.38
Subtotal	3,345,130.29
Land	441,044.94
Final Design (7 %)	334,513.03
Supervision (10 %)	334,513.03
Total	**4,455,201.29**

Updated prices based on NCPI, December 2001

The investment schedule for the first, second, third and fourth phases is outlined in the following table:

Table IV-1

Tasks	2000-2005	2005-2010	2010-2015	2015-2020
Improvements to the existing wastewater collection system				
Replacement of line A sections	2,840,730.00			
Replacement of line B sections		840,475.00		
Replacement of line D1 sections	888,322.50			
Replacement of line D2 sections	485,587.50			
Replacement of existing system's pipes		1,952,350.00	1,485,425.00	1,158,300.00
Additional sewage lines (for expansion)	563,241.25	1,396,000.00	3,054,500.00	
Connecting new users to the sewage system	9,402,400.00			
Amount (Includes 15% V.A.T.)	14,190,281.25	4,188,825.00	4,539,925.00	1,158,300.00
Final Design (7%)	993,319.69	293,217.75	317,794.75	81,081.00
Supervision (10%)	1,419,028.13	418,882.50	453,992.50	115,830.00
Contingencies (10%)	1,419,028.13	418,882.50	453,992.50	115,830.00
Total	**18,021,657.20**	**5,319,807.75**	**5,765,704.75**	**1,471,041.00**
Treatment (Construction of the wastewater treatment system)				
Pretreatment	3,400,103.85			
Pressurized conveyance line	5,556,546.16			
Pressure-breaking and flow-distribution box	101,239.04			
Formation of lagoons	8,067,709.47			
Inspection boxes, manholes, and interconnection pipes	942,955.70			
Supplementary works	511,835.86			
Amount (includes 15% V.A.T.)	18,580,390.08			
Final Design (7%)	1,300,627.31			
Supervision (10%)	1,858,039.01			
Contingencies	1,858,039.01			
Total	**23,597,095.41**			
Institutional Capacity Building	**200,000.00**	**500,000**		

Updated prices based on NCPI, December 2001

For certification purposes, this analysis only considers wastewater collection and treatment projects. The possibility of certifying a water project will be considered in the future. Proposed investments will be complemented by institutional capacity building actions throughout the project's first and second phases.

Institutional capacity building activities include:

- Upgrading billing and collection systems
- Fee / Rate study
- Program for reclaiming unaccounted water
- Energy-savings program
- Outfitting

Cost of Projects (Mx$) to expand the Wastewater Collection System, build a new Wastewater Treatment System, and Improve Customer Service

	1st Phase	2nd Phase	3rd Phase	4th Phase
Wastewater collection system	$18'021,657	$5'319,807	$5'765,704	$1'471,041
Wastewater treatment system	$23'597,095			
Institutional capacity building	$200,000	$500,000		
TOTAL	**$41'818,752**	**$5'819,807**	**$5'765,704**	**$1'471,041**

Updated prices based on NCPI, December 2001

From the total budget, approximately $4'455,201 have been incurred by the three levels of government. The amount required for the 1st and 2nd phases (2003-2010) is $47'638,559 pesos.

A summary of the financial structure for the first and second phases appears in the following table. Tasks completed for the first phase have been considered and updated based on the December 2001 National Consumer Price Index. Additionally, a final design has been developed for the first phase of the project, and costs have been determined with more accuracy.

Financial Structure for the First and Second Phases of the Project (2003-2010)

Source	Type	Amount (US$)	% of the Cost of the Project's Phase I
Mexican Government (Apazu & FDSM)*	Grant	464,084	9.4%
Mexican Government (State)	Grant	1,501,869	30.2
NADB-BEIF C.A. (subject to EPA approval)	Grant	2,115,953	43
LOAN	Loan	867,466	17.4
TOTAL		**4,949,372**	100%

3. Fee Structure

The current fee structure includes a flat fee that depends on the type of service. Below is a summary table of the 1999-2000 fee schedule and the number of users with each type of service. The structure includes four residential rates, A to D, and nine commercial rates, E to M. Categories A through C are only for water service without wastewater collection. Category D is for water and wastewater collection service. Commercial rates depend on the type of business and estimated monthly usage. All commercial rates include wastewater collection.

Table IV-2
Residential Rates

	Flat Fee				Metered Service		
	Applicable monthly fee	Users	Amount	Range	Applicable monthly fee	Users	Amount
A	55.54	1,967	109,247.18	23	44.21	1,123	49,647.83
B	88.54	1,568	138,830.72	33	55.87	358	20,001.46
C	138.02	103	14,216.06	50	80.63	395	31,848.85
D	330.05	2	660.10	75	197.48	255	50,357.40

E	106.54	132	14,063.28	Total	2,131	151,855.54
F	222.03	46	10,213.38			
Total		3,818	287,230.72			

Average residential rate 2.21 $/m^3

Table IV-3
Commercial, Industrial and Government Rates

	Flat Fee			Metered Service			
	Applicable monthly fee	Users	Amount	Range	Applicable monthly fee	Users	Amount
G	474.08	8	3,792.64	100	293.86	85	24,978.10
H	754.57	14	10,563.98	130	421.81	40	16,872.40
I	1492.65	5	7,463.25	160	615.74	21	12,930.54
J	5358.84	1	5,358.84	200	892.85	19	16,964.15
X	241.55	2	483.10	300	1701.67	18	30,630.06
Y	355.57	8	2,844.56	400	2170.78	4	8,683.12
Z	0.00	0	0.00	500	4200.43	3	12,601.29
				OVER			
Total		38	30,506.37	500	0	0	-
				Total		190	123,659.66

Average commercial, industrial and government rate 7.22 $/m^3

Table IV-4

	Annual volume (m^3)	Percentage	Weighted rate ($/$m^{3)}$)
Residential	2,383.50	90.30 %	2.00
Commercial and Government	256.15	9.70 %	0.70
Total	**2,639.65**	**100.00 %**	**2.6970**

In 2000, the average residential rate was $2.21/m^3, while the commercial rate was $7.22/m^3.

The financial feasibility study has been reviewed by NADB and their proposal in terms of financial structure and water rates are presented in the following tables

The total estimated cost of the first phase of the Project is $4,949,372. The proposed uses of funds are:

USES OF FUNDS

COMPONENT	COST
WASTEWATER TREATMENT PLANT	
Construction	**1,935,457**
Other costs including design	**329,028**
Land acquisition	**45,942**
Design contingency	**193,546**
TOTAL WWTP COST	**2,503,973**
WASTEWATER COLLECTION SYSTEM	
Construction	**1,826,605**
Other costs including design	**320,976**
Design contingency	**147,815**
TOTAL WW SYSTEM COST	**2,295,397**
Construction Management	**150,000**
TOTAL PROJECT COST	**4,949,372**

AVERAGE RATE PROPOSED

Last Year to Increasee Rates	Rate $/m^3	AverageCost Méx$/month	Increase (%)
2002	2.10	103.7	
2003	3.32	157.8	60
2004-06	3.32	142.0	0
2007	3.99	158.4	20
2008-11	3.99	136.5	0
2012	4.30	143.3	8

Notes:

1. The above figures consider the implementation of the wastewater system portion of the overall project.
2. When the water supply and distribution portion of the project is analyzed, the water rates will be revisited.
3. The proposed rate increase of 20% should be applied by the year 2007. This rate increase may be applied gradually in the period 2004-2006.
4. The BEIF funds mentioned are subject to US.EPA approval.

4. Project Development

The project will be managed by the local water utility, Ojinaga's JMAS. The system is expected to operate efficiently and become self-funded through the collection of user fees.

V. Public Participation

1. Initiation of the Public Process

The public process started on June 29, 2001, when the Chairman of the Junta Municipal de Agua y Saneamiento de Ojinaga, Chih., Mr. Adrián Muñiz Rodríguez, in his capacity of official project sponsor, was provided with the BECC's Guide for Public Participation and other reference documents, to begin the public process.

2. Steering Committee

The Steering Committee was established on October 25, 2001 at a meeting held at the JMAS' Meeting Room in Ojinaga, where the board of directors was elected. The following individuals were elected:

Chairman: Mr. Salvador Franco Armendáriz
Secretary: Mr. Elpidio Pando García
Alternate: Dr. Manuel Acosta Muñoz
Technical Secretary: Mr. Adrián Muñiz Rodríguez

3. Comprehensive Community Participation Plan

Ojinaga's prior experience in developing a BECC public participation process, based on their experience with the certification of their Solid Waste project in October 2001, has enabled local residents to use of what was learned from a successful journey to optimize community efforts.

The close proximity of the last certification allow the Steering Committee to use the recent "Public Opinion Survey" developed for the community of Ojinaga, Chihuahua by the Colegio de la Frontera Norte, which identified socioeconomic characteristics and the most appropriate methods to inform the community about environmental issues and potential solutions. Thus, the study served as a basis to develop the Comprehensive Community Participation Plan that was submitted to the BECC for approval.

This Comprehensive Community Participation Plan was received by the BECC on November 16, 2001 and approved on December 6, 2001.

4. Public Information

Information about the project and its characteristics has been distributed through approximately 6,000 brochures and flyers, which have been attached to water bills that are delivered to each household. In addition, the project has been advertised, and the community has been invited to public meetings through the three local radio stations. The Steering Committee has done a remarkable job of scheduling information meetings with community groups, particularly with trade chambers, professional associations, service clubs, and groups of teachers from local schools. The project has been available for review by the community at the JMAS office in Ojinaga.

5. First Public Meeting

This meeting took place on January 22, 2002 at the Assembly Room of the local Chamber of Commerce, and was attended by 47. At this meeting, the project's technical aspects, location, issues and approximate cost were discussed. The participation of attendees, given its intensity and application, greatly surpassed expectations based on the number of attendees. The public showed interest in knowing when the project tasks will begin. An exit poll was applied and 100% of attendees explicitly stated to be in total agreement with the project and emphasized the importance it has for Ojinaga.

6. Second Public Meeting

It was held at 7:30 p.m. on July 26, 2002 at the "Zocalo" in Ojinaga. The meeting had an attendance of more than 400 people. Assistants arrived on time and enjoyed a party ambiance, despite the high temperature and storm warning. At this meeting, the project's technical characteristics and scope, cost, financial structure, and corresponding fee schedule were presented. Seven people spoke up at the meeting requesting clarification on the project's purposes and the rate structure. Finally the project and its rate structure were accepted by a notorious majority of the people at the meeting. Additionally, relevant comments as to the importance and significance of the project were made by community members. A poll was realized to 335 people present at the meeting, 91%(305 people) indicated they understood the project and accepted the proposed rate, the remaining 9% (30 people) was either against the project or didn't have an opinion about it.

VI. Sustainable Development

1. Definition and Principles

The project complies with the BECC's definition of Sustainable Development. The project for improvements to the wastewater collection and treatment systems and the construction of a new wastewater treatment plant (WWTP) focuses on providing better quality of life for Ojinaga residents.

The project contributes to reducing environmental deterioration by correcting existing flaws in the wastewater collection system, expanding the lines and providing the means to connect 100% of the households, businesses, industries and public and community service facilities. Wastewater will be collected and conveyed to the project's WWTP, where it will be adequately treated using the proposed system, to eliminate organic and bacteriological contaminants that jeopardize human health.

It is important to highlight that by improving the sanitary sewage system, the project will eliminate the use of latrines and septic tanks, as well as leaks and overflows that contribute to polluting surface waters, water tables and the ground. In addition, the project will prevent the risk of human contact with wastewater. Appropriate treatment of wastewater will prevent contamination of the course of the Rio Grande, since the effluent will have adequate quality, in conformance with established legal criteria.

Stakeholders in this project are the municipal government through the JMAS Ojinaga, the Government of the State of Chihuahua, and Ojinaga residents, who will be directly benefited by the improvements to wastewater services, the environment and the ecological setting.

2. Institutional and Human Capacity Building

The project proposes improving the functions of the local utility, in this case the Junta Municipal de Agua y Saneamiento de Ojinaga, by implementing adequate accounting systems, appropriate rates to ensure recovery and payment of investments needed for the system's self-sufficiency, and improving billing and collection systems. A grievance department will also be established to obtain customer input and make applicable adjustments on a timely basis. The project includes an operation and maintenance manual for the wastewater treatment system, which will be efficiently operated by available local staff. To build the wastewater treatment plant, JMAS Ojinaga purchased rural land and has authenticated the property title deed.

3. Conformance to Local, Municipal and Regional Conservation and Development Plans

The project meets all applicable provisions established by the National and State Development Plans. Specifically, the project addresses actions recommended in Ojinaga's Municipal Urban Development Plans. JMAS Ojinaga applied for and obtained a certificate for use of soil issued by the Directorate of Public Works of the Municipal Government of Ojinaga, Chihuahua.

4. Natural Resource Conservation

The project takes into account all applicable health and environmental standards for its development, and proposes strategies to adequately handle wastewater collection and treatment in Ojinaga.

The most beneficial environmental impact will be that, upon improving the sanitary sewage system, the project will provide service to 100% of the community, and will prevent contamination of surface water, water tables and the ground; it will also prevent human contact with wastewater. With the construction of a new wastewater treatment plant (WWTP), wastewater will be adequately treated and the effluent that will be discharged to the Rio Grande will meet applicable standards to prevent water contamination and comply with Official Mexican Norm NOM—001-ECOL-1996.

5. Community Development

Characteristics and parameters used for planning the project's strategies result in a direct benefit for 100% of the urban population.

Some of the major beneficial impacts include:

- Direct environmental and human health benefit with the collection of wastewater for 100% of the population and adequate treatment of raw water at the new WWTP.
- Financial benefit brought about by the works needed for the construction and operation of wastewater collection and treatment systems.

This leads us to conclude that there will be major environmental, social and economic benefits and developments for Ojinaga by providing residents with efficient and safe wastewater collection and treatment services that will increase the community's welfare by eliminating the risk of diseases caused by wastewater mismanagement.