CERTIFICATION AND FINANCING PROPOSAL

WASTEWATER TREATMENT PLANTS REHABILITATION/UPGRADE PROJECT IN CHIHUAHUA, CHIHUAHUA

Published: September 20, 2019

CONTENTS

EXECUTIVE SUMMARY

WASTEWATER TREATMENT PLANTS REHABILITATION/UPGRADE PROJECT IN CHIHUAHUA, CHIHUAHUA.

Project:

The proposed project consists of i) the rehabilitation/upgrade, operation and maintenance of the North and South wastewater treatment plants (WWTPs), which will have a combined capacity to treat an average flow of 54.2 million gallons per day (mgd) or 2,375 liters per second (lps) in the city of Chihuahua[1], and ii) the design, construction, operation and maintenance of a 1.25 megawatts (MW) cogeneration power plant in the South WWTP, (the Project). The Project will be carried out by the Sponsor under an 11-year agreement.[2]

Objective:

The development of the Project is required since the equipment at both plants has reached its useful life, and a major upgrade is required to ensure that the operation of the plants continues to meet environmental and reuse requirements in the years to come. Moreover, since the operations of the North and South WWTPs were taken over by JMAS from ATLATEC in 2011 and 2016, respectively, a lack of proper maintenance has worsened the operational risks of the WWTPs.

The main objectives of the Project are:

1. - Maintain current and future access to adequate and sustainable wastewater treatment services.
2. - Reduce demand on electricity generated from fossil fuel sources by the operation of a new cogeneration facility, which will contribute to the reduction of greenhouse gas emissions.
3. - Support increased demand of treated wastewater reuse for irrigation and industry, by providing a more consistent and reliable effluent quality.

Expected Project Outcomes:

The Project is expected to generate environmental and human health benefits, related to the following Project outcomes:

- Reduce the risk of discharges of inadequately treated wastewater by rehabilitating/upgrading both WWTPs to

[1] Currently, the North and South wastewater treatment plants are treating a total flow of 39.9 mgd (1,750 lps). This Project will provide additional treatment capacity to the plants of 14.3 mgd (625 lps) to address future treatment requirements.

[2] The contract includes one year for investment or final designs and 10 years for operation.

treat up to a total average wastewater flow of 54.2 mgd (2,375 lps).

- Reduce the volume of sludge, from approximately 65,700 m^3 per year (85,932 yds^3 /year) to approximately 43,800 m^3 per year (57,288 yds^3 /year).
- Install renewable energy generation capacity of 1.25 megawatts (MW).[3]
- The generation of 8.52 GWh/year will offset the WWTP's energy demand and will help reduce approximately 9,583 metric tons/year of carbon dioxide (CO_2), 6 metric tons/year of nitrogen oxides (NOx) and 7 metric tons/year of sulfur dioxide (SO_2).[4]

Benefited Population: 809,232 residents of the city of Chihuahua.[5]

Sponsor: Aguas de Reúso y Energía Renovable, S.A. de C.V." (ARERSA), the special-purpose company created by the consortium formed by "La Peninsular Compañía Constructora, S.A. de C.V.", "Grupo Acuanovus, S.A. de C.V.", "Suez Medio Ambiente México, S.A. de C.V." and "Suez International, S.A.S.", which was awarded a build-operate-transfer contract for the design, construction, financing and operation of the Project (the "BOT Contract") by the municipal water utility, Junta Municipal de Agua y Saneamiento de Chihuahua (JMAS).

Borrower: Aguas de Reúso y Energía Renovable, S.A. de C.V.

Project Cost: $332.5 million pesos (US$ 16.7 million).[6]

NADB Loan Amount: Up to $249.3 million pesos (US$12.5 million) split into two tranches:

- Tranche A for up to $183.4 million pesos (US$9.2 million); and
- Tranche B for up to $65.9 million (US$3.3 million).[7]

[3] The final generation will be determined during the Project's final design.
[4] Source: NADB. CO_2, NOx and SO_2 calculations are based on the potential emissions avoided as a result of reducing future demand on fossil fuel-based electricity, through cogeneration equivalent to 8.52 GWh/year and the emission factors for the state of Chihuahua. The emission factors are calculated by NADB based on the power generation portfolio of the state of Chihuahua and on the factors reported per technology in the Mexican National Power System Development Program (PRODESEN) 2018.
[5] Based on the Chihuahua City total residents. INEGI 2015 https://www.inegi.org.mx/app/areasgeograficas/?ag=08).
[6] Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of $19.90 pesos per dollar, according to Bloomberg.com dated August 26, 2019.
[7] Idem.

CERTIFICATION AND FINANCING PROPOSAL

WASTEWATER TREATMENT PLANTS REHABILITATION/UPGRADE PROJECT IN CHIHUAHUA, CHIHUAHUA

1. PROJECT OBJECTIVE AND EXPECTED OUTCOMES

The proposed project consists of i) the rehabilitation/upgrade and operation of the North and South wastewater treatment plants (WWTPs), which will have a combined capacity to treat an average flow of 54.2 million gallons per day (mgd) or 2,375 liters per second (lps) in the city of Chihuahua[8], and ii) the design, construction and operation of a 1.25 megawatts (MW) cogeneration power plant in the South WWTP, (the Project). The Project will be carried out by the Sponsor under an 11-year agreement.

The main objectives of the Project are: 1) maintain current and future access to adequate and sustainable wastewater treatment services, 2) reduce demand on electricity generated from fossil fuel sources by the operation of a new cogeneration facility, which will contribute to the reduction of greenhouse gas emissions and 3) support increased demand of treated wastewater reuse for irrigation and industry, by providing a more consistent and reliable effluent quality

The Project is expected to generate environmental and human health benefits, related to the following Project outcomes:

- Reduce the risk of discharges of inadequately treated wastewater by rehabilitating/upgrading both WWTPs to provide an average wastewater treatment capacity of 54.2 mgd (2,375 lps).
- Reduce the volume of sludge, from approximately 65,700 m^3 per year (85,932 yds^3 /year) to approximately 43,800 m^3 per year (57,288 yds^3 /year).
- Install renewable energy generation capacity of 1.25 megawatts (MW).[9]
- The generation of 8.52 GWh/year will offset the WWTP's energy demand and will help reduce approximately 9,583 metric tons/year of carbon dioxide (CO_2), 6 metric tons/year of nitrogen oxides (NOx) and 7 metric tons/year of sulfur dioxide (SO_2). [10]

[8] Currently, the North and South wastewater treatment plants are treating a total flow of 39.9 mgd (1,750 lps).
[9] The final generation will be determined during the Project's final design.
[10] Source: NADB. CO_2, NOx and SO_2 calculations are based on the potential emissions avoided as a result of reducing future demand on fossil fuel-based electricity, through cogeneration equivalent to 8.52 GWh/year and the emission factors for the state of Chihuahua. The emission factors are calculated by NADB based on the power generation portfolio of the state of Chihuahua and on the factors reported per technology in the Mexican National Power System Development Program (PRODESEN) 2018.

2. ELIGIBILITY

2.1. Project Type

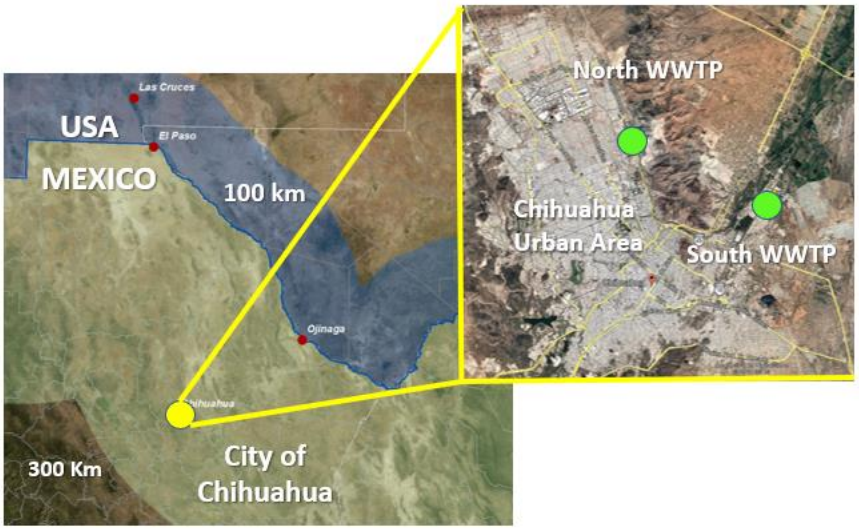
The Project falls within the eligible category of wastewater.

2.2. Project Location

The Project will be implemented in the city of Chihuahua, which is located approximately 112 miles (180 kilometers) south of the U.S.-Mexico border. The city of Chihuahua is the capital of the Mexican same-named State.

The Project includes the rehabilitation/upgrade, operation and maintenance of the North and South WWTPs. The North plant is located northeast of the urban area at the geographical coordinates: 28° 41' 51.09" latitude north and 106° 04' 60" longitude west. The South plant is in the eastern area of the city at the geographical coordinates: 28° 40' 08" latitude north and 106° 00' 18" longitude west. Figure 1 shows the location of the Project:

Figure 1
PROJECT LOCATION MAP



2.3. Project Sponsor and Legal Authority

On August 30, 2018 the State of Chihuahua Congress issued the decree number LXV/AUPIP/0881/2018 XVIII P.E. authorizing the "Junta Municipal de Agua y Saneamiento (JMAS)" to celebrate a long-term contract for the rehabilitation/upgrade, operation and maintenance of the North and South wastewater treatment plants in compliance with the Chihuahua Long-Term Public Investment Law. On February 27, 2019, the Acquisitions, Leasing and Services Committee of the JMAS, authorized the bidding process for the proposed Project. On March 9, 2019 the JMAS carried out an open competitive procurement process number 025-2019-JMAS-IPLP-RP-P, in accordance with the Long-term Public Investment Law of the state of Chihuahua. Originally, the Project did not include the cogeneration component, but partly due to NADB's efforts and funding from the Environmental Protection Agency (EPA) to evaluate the potential for cogeneration at these facilities, the JMAS decided to include this component in the Project.

In May 2019, JMAS awarded the consortium formed by "La Peninsular Compañía Constructora, S.A. de C.V.", "Suez Medio Ambiente México, S.A. de C.V.", "Suez International, S.A.S." and "Grupo Acuanovus, S.A. de C.V." a build-operate-transfer contract for the rehabilitation and operation of the North and South WWTPs in Chihuahua city ("BOT Contract").

The consortium created a special-purpose company "Aguas de Reúso y Energía Renovable, S.A. de C.V." (ARERSA or the Sponsor) to execute the BOT Contract and carry out the Project. ARERSA is a Mexican company established on June 12, 2019. Its contact representatives are Richard Edouard Féret and Héctor Octavio Durán Díaz.

3. CERTIFICATION CRITERIA

3.1. Technical Criteria

3.1.1. General Community Profile

According to the 2015 population census conducted by the Mexican National Institute for Statistics, (INEGI), the state of Chihuahua has a population of 3.57 million residents and approximately 24.6% of the state population (878,062) lives in the municipality of Chihuahua. According to INEGI, the city of Chihuahua has 92.2% of the total population in the municipality (approximately 809,232 residents). INEGI reports that the growth rate of the Chihuahua city was 1.5% between 2005 and 2010 and 1.3% between 2010 and 2015.[11]

According to the latest Mexican economic census, the municipality of Chihuahua represents 28.7% of the state Gross Domestic Product (GDP).[12] The main activities contributing to the GDP are: commerce (44.03%), services (27.85%) and manufacturing (8.85%).

[11] INEGI 2015 https://www.inegi.org.mx/app/areasgeograficas/?ag=08
[12] INEGI Economic Census 2014 http://www.beta.inegi.org.mx/app/saic/

The city of Chihuahua, through JMAS, provides public services and related infrastructure to address the water and wastewater needs. Table 1 summarizes the status of water and wastewater services and infrastructure in the city of Chihuahua in 2019.

Table 1
WATER, WASTEWATER SERVICES AND INFRASTRUCTURE

Water System			
Coverage	98 %		
Supply source	**Type**		**Number**
	Groundwater wells		154
	Surface water (potabilization plant)		1
Number of hookups	334,436		
Wastewater Collection			
Coverage	94%		
Number of total connections	321,316		
Wastewater Treatment			
Treated wastewater collected	100 %		
Treatment facilities	Plant	Type	Current treated flow
	North	Activated Sludge	9.1 mgd (400 lps)
	South	Activated Sludge	30.8 mgd (1,350 lps)

Source: Water Utilities Management Indicators Program. JMAS, June 2019 (Programa de Indicadores de Gestión de Organismos Operadores. JMAS, junio 2019).

Wastewater Management

The wastewater collection system provides service to 321,316 connections, of which 93% (298,300) are residential. Currently, wastewater is collected and conveyed through 3,000 kilometers of the city's sewer network that discharge to the North and South WWTPs. Wastewater collection services cover approximately 94 % of the city's inhabitants.[13]

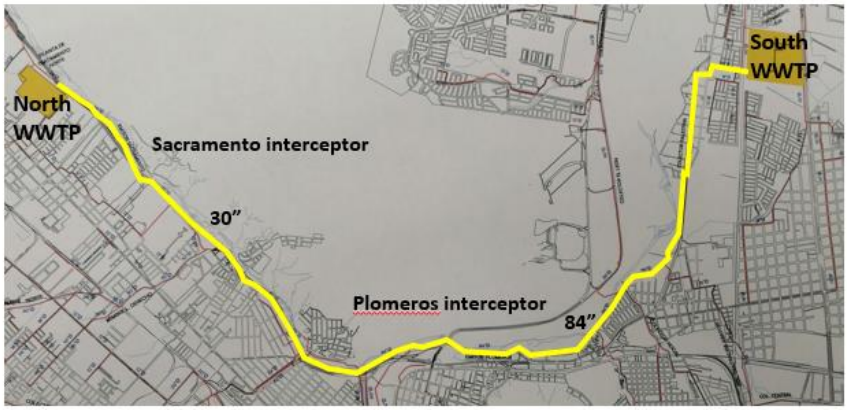
The North and South WWTPs started operations in 1995 and 2006 respectively under a 10-year BOT contract with a company named ATLATEC. Currently both plants are operated by JMAS and together provide treatment to all current collected wastewater flows, averaging 39.9 mgd (1,750 lps). Approximately 23% of this flow is treated in the North plant and the remaining flow is treated in the South plant.

In particular, the North WWTP is receiving an average wastewater flow of 11.4 mgd (500 lps), of which 9.1 mgd (400 lps) is treated at this facility and the remaining flow of 2.3 mgd (100 lps) is diverted to the South WWTP through the existing city's collectors "Sacramento" and "Plomeros" for treatment, see Figure 2.[14]

[13] Source: Water Utilities Management Indicators Program. JMAS, June 2019 (Programa de Indicadores de Gestión de Organismos Operadores. JMAS, junio 2019). The Project will continue providing 100% wastewater treatment coverage to users connected to the sewage system.

[14] Sacramento and Plomeros are existing reinforced concrete interceptor pipelines of the city's sewer network also used by JMAS for the gravity conveyance of raw water and untreated sludge from the North plant to the South plant.

Figure 2
GRAVITY CONVEYANCE SYSTEM



The treated effluent of the North WWTP is conveyed as follows: i) 1.1 mgd (50 lps) are discharged to the Sacramento river and ii) 8 mgd (350 lps) are supplied to the 317 km reclaimed water distribution system, named "linea morada" ("purple line") which is used for green areas irrigation and industrial reuse. The purple line has capacity to distribute a total flow of 11.4 mgd (500 lps) of treated water.

The waste activated sludge from the North WWTP is discharged to the collection system flowing to the South WWTP, along with the 2.3 mgd (100 lps) mentioned above.

Similarly, the South plant is treating an average flow of 30.8 mgd (1,350 lps). The treated effluent of the South WWTP is conveyed as follows: i) 8.0 mgd (350 lps) are discharged to the Chuviscar river, ii) approximately 19.4 mgd (850 lps) are diverted for agricultural irrigation purposes, and iii) the remaining flow of 3.4 mgd (150 lps) is conveyed to the purple line. The South WWTP has a sludge conditioning and treatment process which produces approximately 85,932 yds^3/year (65,700 m^3/year) of dehydrated sludge which is used as agricultural soil enhancer by local farmers. Biogas generated from the sludge digestion process is currently captured, stored and flared on site.

Aside from the sludge treatment occurring only at the South WWTP, both plants currently operate with similar processes consisting of: i) preliminary treatment, which includes coarse screens, and grit removal tanks; ii) primary treatment including the sedimentation tanks; iii) secondary treatment in activated sludge bioreactors and clarifiers; and iv) disinfection with chlorine gas, as presented in Figures 3 and 4.

Sacramento interceptor sewer is a 30-inches (76 centimeters) diameter pipeline with length of approximately 3.1 miles (5 kilometers) and Plomeros interceptor sewer is an 84-inches (213 centimeters) diameter pipeline with length of approximately 3.8 miles (6 kilometers). According to JMAS, both interceptors have sufficient capacity to convey raw water and waste activated sludge, along with urban wastewater. Operation and maintenance of these interceptors and the city sewer network are provided by JMAS and are not part of the scope of this Project.

Figure 3
NORTH WWTP PROCESS

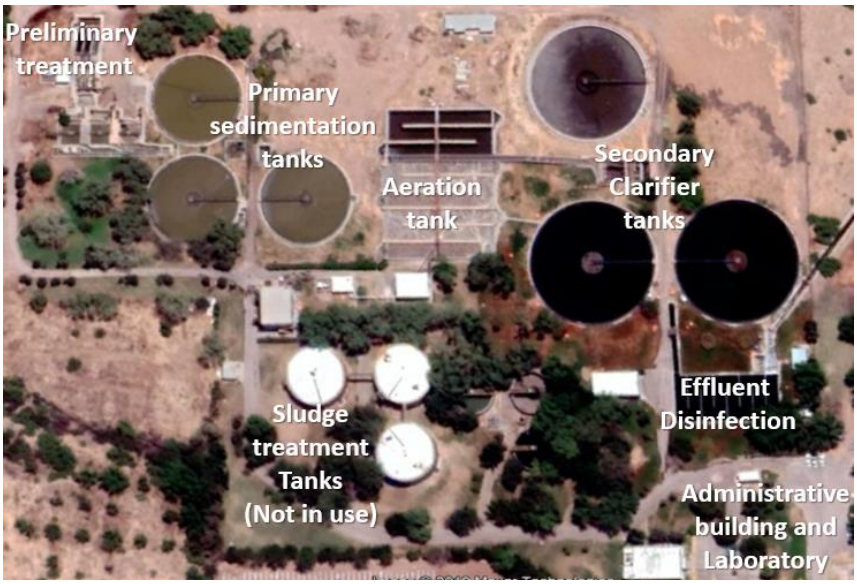


Figure 4
SOUTH WWTP PROCESS

The Project is required to be developed since the equipment at both plants has reached its useful life, and a major rehabilitation is required to ensure that the operation of the plants continues to meet environmental and reuse requirements in compliance with the NOM-001-SEMARNAT-001-

1996,[15] NOM-003-SEMARNAT-1997[16] and NOM-004-SEMARNAT-2002[17] in the years to come. Moreover, since the operations at the North and South WWTPs were taken over by JMAS from ATLATEC in 2011 and 2016, respectively, a lack of proper maintenance has worsened the operational risks of the WWTPs. In addition, the chlorine disinfection system at both plants will be replaced by ultraviolet systems, thus eliminating related risks for neighboring subdivisions.

3.1.2. Project Scope

According to the bid documents prepared by JMAS, the following elements for the Project are required:

Rehabilitation works

- *North WWTP*
    - *Preliminary treatment*. Includes the construction of a new mini-lift station, replacement of eight pumps and four coarse screens and the grit removal systems.
    - *Secondary treatment.* Includes the installation of three air blowers, replacement of various water/sludge valves and oxygen and suspended solids sensors.
- *South WWTP*
    - *Preliminary treatment.* Includes the rehabilitation of four coarse screens and the grit removal systems, as well as replacement of five pumps.
    - *Secondary treatment.* Includes the installation of new air blowers; replacement of oxygen and suspended solids sensors and replacement of 16 valves.

Upgrade works

- *North and South WWTPs*
    - *Effluent disinfection.* Replacement of the chlorine gas disinfection systems with ultraviolet (UV) light systems which will use low-pressure high output (LPHO) vertical lights. These components will eliminate the risk of a potential chlorine gas leak and related harmful impacts.
- *North WWTP*
    - *Tertiary treatment.* Includes the installation of two filters to remove fine particles. Each filter is comprised of 15 polyester screening discs. These filters will ensure a

[15] NOM-001-SEMARNAT-1996 establishes the maximum permissible levels of contaminants for wastewater discharges into national waters and territories.
[16] NOM-003-SEMARNAT-1997, establishes the maximum permissible levels of contaminants for treated wastewater used in public services.
[17] NOM-004-SEMARNAT-2002, establishes the maximum permissible levels of contaminants for sludge and biosolids for use and final disposal.

consistent and reliable effluent quality that should make the reuse of the treated wastewater more attractive and thus increase the demand.

- *South WWTP*
    - *Secondary treatment.* Includes the installation of a denitrification system.
    - *Sludge management system.* Includes the installation of three centrifuge systems to replace belt presses. It is expected to reduce the volume of sludge by 33%, from 65,700 m^3/year (85,932 yds^3/year) to 43,800 m^3/year (57,288 yds^3 /year).
    - *Cogeneration plant.* Includes the design, construction , operation and maintenance of a cogeneration power plant with a capacity of 1.25 MW which is expected to generate the heat required for the sludge digesters, and approximately 8.52 GWh/year of electricity, nearly 71 % of the electricity required by the South WWTP. The remaining demand will continue to be met by electricity from the CFE. In order to ensure the optimal quality of the biogas, the system will include:
        - Removal of hydrogen sulfide (H_2S). Biogas contains a small amount of hydrogen sulfide that becomes a very corrosive fluid when mixed with water. To protect the generators and related components the sulfur must be removed.
        - Gas drying. The biogas produced by the current digesters contains moist, therefore it must go through a drying process to reduce the amount of water.

      The cogeneration plant will be connected to the existing substation in the plant. No additional off-site facilities are required.

The Sponsor considers a time frame of up to 12 months to fulfill the required rehabilitation/upgrade works. The Sponsor will coordinate with JMAS to review final designs and work progress to obtain approval from JMAS.

3.1.3. Technical Feasibility

Selected Technology

JMAS conducted a competitive bidding process for procurement to rehabilitate/upgrade and operate both WWTPs as well as the construction of a cogeneration plant. The bid documents established technical requirements for the equipment aimed at maintaining adequate wastewater treatment services. These technical requirements are based on international and domestic recommendations for wastewater treatment. Three participants submitted technical and economic proposals which JMAS evaluated considering elements such as costs, warranties and delivery times. The Sponsor presented the most cost-effective proposal that complied with the bid requirements that resulted in the contract award.

As the North and South wastewater treatment processes have proven to be effective on addressing discharge and reuse standards, no major changes in technology were required except for the replacement of the disinfection systems, sludge treatment and power generation infrastructure.

3.1.4. Land Acquisition and Right-of-Way Requirements

The Project will be implemented at the existing sites of the North and South WWTPs, which are owned by JMAS. Under the BOT Contract, JMAS has granted the Sponsor permission for the rehabilitation/upgrade and operation of both WWTPs as well as the construction of the cogeneration plant at the South WWTP. The JMAS and the Sponsor executed a commodatum[18] contract whereby the Sponsor is allowed to use both WWTPs facilities during the term of the BOT Contract. No additional land acquisition or rights of way are required for Project implementation.

3.1.5. Project Milestones

The Project is required to start construction in January 2020, therefore all final designs must be completed before this date. Since final designs are part of the BOT Contract, the Sponsor requires Board approval no later than November 2019. Table 2 shows a summary of key tasks for the implementation of the Project and their respective status.

Table 2
PROJECT MILESTONES

Key Milestones	Status
JMAS Board approval	Completed (July 2018)
State of Chihuahua Congress approval	Completed (August 2018)
Bidding process	Completed (March – May 2019)
BOT Contract execution	Completed (June 2019)
North WWTP environmental authorization (MIA resolution)	In process (MIA submitted to SEDUE) in September 2019)
South WWTP environmental authorization (MIA resolution)	In process (MIA submitted to SEMARNAT in September 2019)
Financial closing	Pending (Required November 2019)
CRE authorization for energy generation	Pending (Expected November 2019)
SENER Social Impact Study	Pending (Expected November 2019)

NADB's procurement policies require that Sponsors comply with all applicable environmental requirements and use appropriate procurement methods to ensure a sound selection of goods, works and services at fair market prices and that their capital investments are made in a cost-effective manner. As part of its due-diligence process, NADB will review compliance with this policy.

[18] Commodatum refers to a certain loan of a property which is to be returned undamaged to the lender.

3.1.6. Management and Operation

As previously mentioned, the Project will be implemented and operated by ARERSA, a special-purpose company created by "La Peninsular Compañía Constructora, S.A. de C.V.", "Grupo Acuanovus, S.A. de C.V.", "Suez Medio Ambiente México, S.A. de C.V." and "Suez International, S.A.S.".

La Peninsular Compañía Constructora, S.A. de C.V., is a Mexican construction company created in 1978 and headquartered in Mexico City. As part of the "Hermes Group", it specializes in industrial construction, concrete structures, civil and electromechanical works, among other fields. Relevant hydraulic projects include: 1) El Zapotillo Dam, in Jalisco, and 2) El Caracol Pumping Plant, in the State of Mexico.

Grupo Acuanovus, S.A. de C.V. is a Mexican company with over 10 years of experience implementing water and wastewater turnkey projects. It has installed more than 75 WWTP for the Walmart Group in Mexico.

Suez is one of the world's leading environmental companies. With more than 88,500 employees around the world, it provides operation and maintenance services in several private and public sectors, including wastewater treatment, waste management and recycling, water resource management, electricity, mining, chemical and pharmaceutical. Suez supplies clean drinking water to 92 million people across 70 countries and 5 continents.[19] Suez has operations in Mexico with nine WWTPs for a total treatment capacity of over 7,100 lps. NADB has worked with Suez (formerly Degremont S.A. de C.V.) financing the three WWTPs built in Ciudad Juárez (North, South and South-South) and a cogeneration project at the South WWTP in Ciudad Juárez.

Suez is the technical leader of the Project and will be responsible with La Peninsular as Servicios Integrales en Reúso de Agua S.A. de C.V. (SIRASA), the operating company they formed together, for the operation and maintenance of the two WWTPs in order to maintain the required effluent quality for the reclaimed water system, for the discharge in the receiving water bodies and sludge transportation.[20] Failure to comply with the operational parameters under the BOT contract will result in the operator being responsible for paying any potential damages.

3.2. Environmental Criteria

3.2.1. Environmental and Health Effects/Impacts

A. ***Existing Conditions***

The North and South WWTPs have been in operation for 24 and 13 years respectively, with the original equipment. Even though the mechanical and electrical equipment of both WWTPs have reached their useful life, the effluents conveyed to the purple line system and to the Sacramento

[19] Source: Suez web page https://www.suez.com/en

[20] Currently, sludge is transported to agricultural parcels where farmers use it as fertilizer. Once the Project is implemented, the sludge is expected to continue being used for agricultural purposes.

and Chuviscar rivers continue to be in compliance with the parameters established in the Mexican official norms NOM-003-SEMARNAT-1997 and NOM-001-SEMARNAT-001-1996. Moreover, the effluents are in compliance with the parameters established in the discharge permit 2CHH100310/24HMSG94 for both WWTPs issued by CONAGUA.[21] According to an analysis performed in February 2019, the JMAS reported that the North plant had levels of 9.33 mg/l of total suspended solids (TSS), biological oxygen demand (BOD_5) and coliforms were not reported. The South plant effluent had levels of 8.3 mg/l of BOD_5, 16.35 mg/l of TSS and coliforms of less than 3.0 most probable number/100 milliliter. These values meet the limits established by the NOM-003-SEMARNAT-1997.[22] Despite being in compliance, the treatment plants need to be rehabilitated due to their age and operation condition, to minimize the risk of discharges that are inadequately treated and pose an environmental and health risk.

According to SEMARNAT, the Chuviscar river is experiencing high levels of TSS which could be associated with untreated wastewater discharges not yet connected to the city's sewage system.[23]

B. *Project Impacts*

The Project is expected to generate environmental and human health benefits, related to the following Project outcomes:

- Reduce the risk of discharges of inadequately treated wastewater by rehabilitating/upgrading both WWTPs to treat up to a total average wastewater flow of 54.2 mgd (2,375 lps).
- Reduce the volume of sludge, from approximately 65,700 m3 per year (85,932 yds^3 /year) to approximately 43,800 m^3 per year (57,288 yds^3 /year).
- Install renewable energy generation capacity of 1.25 megawatts (MW). [24]
- The generation of 8.52 GWh/year will offset the WWTP's energy demand and will help reduce approximately 9,583 metric tons/year of carbon dioxide (CO_2), 6 metric tons/year of nitrogen oxides (NOx) and 7 metric tons/year of sulfur dioxide (SO_2). [25]

Additionally, the Project will eliminate the risk associated with chlorine gas handling in both WWTPs.

Besides, as a result of the implementation of the Project, the treated wastewater will continue to be in compliance with current regulations for discharges into water bodies and green areas irrigation. The risk of untreated or inadequately treated discharges will be minimized.

---

[21] The CONAGUA permit authorizes the North plant and South plant to discharge 13.7 mgd (600 lps) and 45.6 mgd (2,000 lps) respectively. The permit also includes limits for parameters such as biological oxygen demand (30 mg/l), total suspended solids (30 mg/l), coliforms (less than 1,000 most probable number /100 milliliter).

[22] This norm requires a monthly average of 20 mg/l of BOD_5, 20 mg/l of TSS and 240 mpn/100 ml of coliforms.

[23] Source: Montero Martínez / Ibáñez Hernández. (2017). The Conchos River Basin: A Look from the Sciences to Climate Change. MEXICO: CONACYT SEMARNAT IMTA. https://www.imta.gob.mx/biblioteca/libros_html/rio-conchos/files/assets/common/downloads/publication.pdf

[24] The final generation will be determined during the Project's final design.

[25] Source: NADB. CO_2, NOx and SO_2 calculations are based on the potential emissions avoided as a result of reducing future demand on fossil fuel-based electricity for the South WWTP, through cogeneration equivalent to 8.52 GWh/year and the emission factors for the state of Chihuahua. The emission factors are calculated by NADB based on the power generation portfolio of the state of Chihuahua and on the factors reported per technology in the Mexican National Power System Development Program (PRODESEN) 2018.

Finally, the co-generation facility at the South plant provides an opportunity to displace greenhouse gases (GHG) and other pollutants produced by fossil fuel-based energy generation, while providing the South WWTP with a safe and reliable energy alternative.

C. *Transboundary Impacts*

No transboundary impacts are anticipated as a result of this Project.

3.2.2. Compliance with Applicable Environmental Laws and Regulations

A. *Environmental Clearance*

The North and South WWTPs obtained their original environmental authorizations on September 20, 1993 and December 8, 2004, respectively. On July 23, 2019, the Sponsor submitted to Ministry of Environment and Natural Resources (SEMARNAT) a consultation letter to clarify if a new environmental clearance for each of the two WWTPs was required. On July 24, 2019, SEMARNAT responded through official letter no. SG.IR.08-2019/240 to the Sponsor that: i) the Environmental Impact Assessment (MIA) for the North WWTP needed to be submitted to the State Ministry of Urban Development and Ecology (SEDUE), and ii) the MIA for the South WWTP was required to be submitted to SEMARNAT.

On September 6, 2019, the Sponsor submitted to SEDUE the corresponding MIA for the North WWTP and to SEMARNAT the corresponding MIA for the South WWTP. The authorization for the North WWTP is expected to be obtained in October 2019 and in November 2019 for the South WWTP.

Both MIAs identify, describe and evaluate the potential environmental impacts associated with the Project—such as soil erosion and contamination, waste production, and impacts to air and water—and include the proposed mitigation measures to prevent or minimize any negative effect or impacts. According to the MIAs, the Project will be developed in previously impacted sites, and since no significant adverse impacts were detected, the construction and operation activities of the Project will not affect the local environment.

B. *Mitigation Measures*

During the development of the Project, measures will be implemented to mitigate the temporary effects of construction, as well as to minimize negative impacts during operation. The following mitigation measures are included in both MIAs:

- *Air quality.*
  - Perform vehicle tune-ups to reduce emissions.
- *Hazardous waste.*
  - Hazardous waste must be stored in closed containers to avoid spills. In case of accidental spills, waste must be stored in plastic bags and disposed of in an authorized site.
  - Vehicle maintenance is prohibited within WWTPs premises.

- *Solid waste:*
    - The different types of waste generated in the Project area will be collected and disposed of in accordance with applicable regulations.

C. *Pending Environmental Tasks and Authorizations*

MIA authorizations for both WWTPs are pending to be obtained.

3.3. Financial Criteria

The estimated cost of the Project is $332.5 million pesos. The Project Sponsor ARERSA has requested a loan for up to $249.3 million pesos from NADB to complete the financing of the Project. The proposed payment mechanism is well known and commonly used in the Mexican financial sector to structure similar transactions.

The proposed NADB loan will be for an aggregate amount of up to $249.3 million pesos split into two tranches: (i) Tranche A for up to $183.4 million pesos. The source of payment will be the fee designated to pay the fixed amortization costs of investments funded with loan proceeds and equity ("T1") under the BOT Contract executed between ARERSA and JMAS, as well as a Debt Service Reserve (DSR); and (ii) Tranche B for up to $65.9 million pesos. The source of payment will be the fee designated to pay the fixed operation and maintenance costs ("T2") under the BOT Contract, as well as the DSR.

The loan payment mechanism for the proposed NADB loan is comprised of two irrevocable trusts. According to the bidding documents, JMAS must pledge all monthly collection for services provided to its users to an irrevocable payment trust (the "Payment Trust"). ARERSA will create an irrevocable administration trust (the "Administration Trust") to receive the monthly payments for the services it provides under the BOT Contract. In the case of Tranche A, the Administration Trust will retain all of the T1 payment to secure NADB's monthly debt service payments. Once NADB debt service is paid, the remaining balance will be transferred to ARERSA. In the case of Tranche B, the Administration Trust will retain all of the T2 payment to secure NADB's monthly debt service payments. Once NADB's debt service is paid, the remaining balance will be transferred to ARERSA.

NADB performed a financial analysis of ARERSA and the source of payment. The analysis included a review of historical financial information, as well as cash flow projections. Considering the Project's characteristics and based on the financial and risk analyses performed by NADB, the proposed Project is financially feasible and presents an acceptable level of risk. Therefore, NADB proposes providing a market-rate loan for up to $249.3 million pesos to ARERSA to complete the financing of the Project.

4. PUBLIC ACCESS TO INFORMATION

4.1. Public Consultation

NADB published the draft certification and financing proposal for a 30-day public comment period beginning on September 20, 2019. The following Project documentation is available upon request:

- Bidding documents from the JMAS procurement process number 025-2019-JMAS-IPLP-RP-P.
- Environmental Impact Assessment for the North WWTP submitted on September 6, 2019.
- Environmental Impact Assessment for the South WWTP submitted on September 6, 2019.

4.2. Outreach Activities

According to the Procurement, Leasing and Contracting Services of the State of Chihuahua Law (Ley de Adquisiciones, Arrendamientos y Contratación de Servicios del Estado de Chihuahua) a social witness is required to review all state procurement processes exceeding 15 million pesos. On October 26, 2018 the State of Chihuahua government designated a member of Karewa as the social witness for the procurement process of the North and South WWTPs. [26]

On October 31, 2018 JMAS triggered the 082-2018-JMAS-IPLP-RP-P public bid process to select a company to rehabilitate/upgrade and operate the North and South WWTPs and construct a cogeneration facility under a BOT contract. In February 2019 the bidding process was declared void due to incomplete proposals submitted by participating companies. On March 9, 2019 JMAS triggered a second process under the bidding number 025-2019-JMAS-IPLP-RP-P 2019. On May 24, 2019, JMAS awarded the BOT contract to the consortium formed by La Peninsular Compañía Constructora, S.A. de C.V., Suez Medio Ambiente México, S.A. de C.V., Suez International, S.A.S. and Grupo Acuanovus, S.A. de C.V. to rehabilitate/upgrade and operate the WWTPs in compliance with the long-term public investment law of the state of Chihuahua.

NADB conducted a media search to identify potential public opinion about the Project. References to the Project were found on the websites listed below:

- *Net Noticias* (August 23, 2018), "Proponen contrato para rehabilitar las plantas de tratamiento de Chihuahua" [Contract proposed to rehabilitate treatment plants in Chihuahua]. http://netnoticias.mx/2018-08-23-550cf457/proponen-contrato-para-rehabilitar-las-platas-de-tratamiento-de-chihuahua/

- *Chihuahua Gobierno del Estado* (September 7, 2019), "Amplía JMAS red de agua tratada en beneficio de 95 mil Chihuahuenses" [JMAS expands the treated water system to benefit 95,000 residents in Chihuahua].

[26] Karewa is a non-profit social association founded in August 2016 to prevent corruption acts from the government. http://karewa.org/

http://www.chihuahua.gob.mx/contenidos/amplia-jmas-red-de-agua-tratada-en-beneficio-de-95-mil-chihuahuenses

- *El Puntero* (May 24, 2019) "Inicia Junta Municipal modernización de sus plantas tratadoras de aguas residuales" (JMAS starts modernization works in wastewater treatment plants). http://elpuntero.com.mx/n/98829

- *Chihuahua Gobierno del Estado* (May 25, 2019) "Adjudica JMAS Chihuahua contrato para modernizar plantas de tratamiento de aguas residuales." [JMAS Chihuahua awards contract to modernize wastewater treatment plants]. http://www.chihuahua.gob.mx/contenidos/adjudica-jmas-chihuahua-contrato-para-modernizar-plantas-de-tratamiento-de-aguas

- *Tiempo* (September 4, 2019) "Piden controversia contra topillazo hidráulico" [Asking for controversy against the North and South WWTPs project]. http://www.tiempo.com.mx/noticia/congreso_de_la_union_porfirio_munoz_ledo_chihuahua_maru_campos_galvan_cambios_en_el_gabinete_armando_herrera_miguel_riggs_secretaria_del_trabajo/

In summary, these publications highlight the scope of the Project. It is important to note that a publication in the *Tiempo* news website, informs that a congressmen of the Institutional Revolutionary Party (PRI) required the State Congress to issue a constitutional controversy against the Project. This initiative is pending to be resolved by the Congress. No further information on this topic was identified.

Finally, the Project Sponsor has followed all public consultation requirements in order to comply with applicable environmental clearance and permitting processes.