



**TRANSBOUNDARY IMPACT ASSESSMENT OF WASTEWATER  
INFRASTRUCTURE PROJECTS IN AMBOS NOGALES**

**AGREEMENT NO. CONTA18-005**

**FINAL REPORT**



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## ACRONYMS

NADB:	North American Development Bank
BEIF:	Border Environment Infrastructure Fund
CILA:	Comisión Internacional de Límites y Aguas
CONAGUA:	Comisión Nacional del Agua (Mexico's National Water Commission)
COAPAES:	Comisión de Agua Potable y Alcantarillado del Estado de Sonora (Sonora State Water Utility)
EPA:	Environmental Protection Agency
IBWC:	International Boundary and Water Commission
INEGI:	Instituto Nacional de Estadísticas y Geografía (National Institute of Statistics and Geography)
IOI:	International Outfall Interceptor
NIWTP:	Nogales International Wastewater Treatment Plant
WWTP:	Wastewater Treatment Plant
OOMAPAS:	Organismo Operador Municipal de Agua Potable, Alcantarillado y Saneamiento de Nogales (Municipal Water Utility)

### Unit Conversions

1 liter per second = 86.4 cubic meters per day

1 kilometer = 0.62 miles

1 meter = 3.28 feet

## EXECUTIVE SUMMARY

The purpose of the Transboundary Impact Assessment of Wastewater Infrastructure Projects in Ambos Nogales is to identify changes in the quality of life in Nogales, Arizona and Nogales, Sonora, resulting from the implementation of those projects. This report presents the results and recommendations of the study funded by the North American Development Bank (NADB) to evaluate the applicable infrastructure projects. The study was conducted by *El Colegio de la Frontera Norte*, the University of Arizona and *El Colegio de Chihuahua*.

To establish context, it is important to describe the two infrastructure projects involved, which include the Rehabilitation and Expansion of the Nogales International Wastewater Treatment Plant (NIWTP) in Nogales, Arizona, and the Rehabilitation of the Wastewater Collection System in Nogales, Sonora. These two communities are sister cities separated only by the international boundary line between Mexico and the United States and have become known locally as “Ambos Nogales.”

The proposed objective of the study was addressed using both quantitative and qualitative methods. From a quantitative standpoint, official data of various urban development indicators were reviewed for both cities to establish baselines for conditions in the different sectors *before* and *after* project implementation. The qualitative approach refers to the perception or opinion of local residents regarding the quality of life in their cities after implementation of both projects.

### **Evidence-based Approach**

The impact assessment is not intended to establish a quantitative cause-effect correlation, but rather to identify evidence of the impact, whether positive or not, of the projects under review.

<b>Projects Evaluated</b>	
<b><i>Wastewater Collection Project in Nogales, SON</i></b>	
<i>Certified:</i>	2004
<i>Cost:</i>	US\$ 11.4 million
<i>Objective:</i>	Rehabilitation of 30 linear kilometers (18.6 linear miles) of wastewater collection lines
<i>Direct impact:</i>	Rebuilt the municipal wastewater collection system; 27,300 households with improved wastewater connections; eliminating 5.6 million gallons (mgd) of wastewater.
<b><i>Wastewater Treatment Plant in Nogales, AZ</i></b>	
<i>Certified</i>	2000
<i>Cost:</i>	US\$ 64.8 million
<i>Objective:</i>	Expand the capacity of the plant to 14.74 mgd to treat 9.90 mgd of raw wastewater from Nogales, SON, which was not being treated and was generally flowing into its neighboring city, along with 4.84 mgd from Nogales, AZ.
<i>Direct impact:</i>	Preventing sewage from both cities, and particularly from Sonora, from overflowing into Nogales, AZ, thus reducing health risks in both communities.

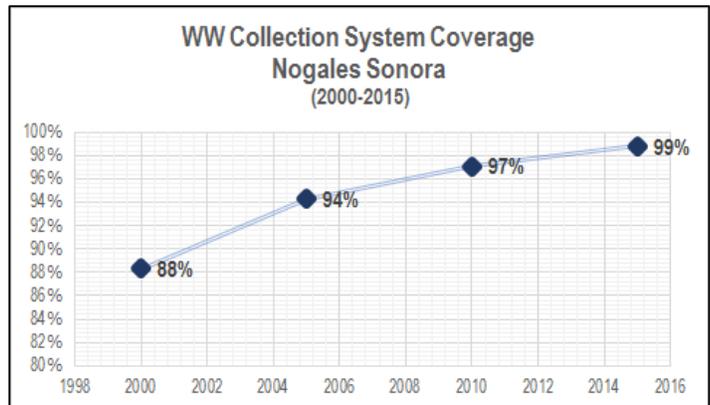
### ***Orographic Context of the Region***

Runoff in the Ambos Nogales region flows naturally from south to north. Consequently, installing a sewer system in Nogales, SON, was not enough; uncontrolled wastewater flows from Mexico to the U.S. had to be treated in a location that was geographically feasible for a treatment plant.

### ***Project Outcomes***

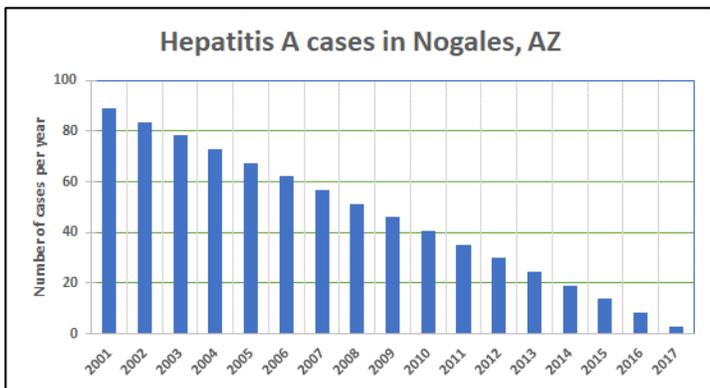
#### ***Wastewater Collection Project in Nogales, Sonora***

This large-scale wastewater collection project solved a critical local issue by providing viability to the current urban development of the city and largely helps explain its growth to 243,000 residents in 2017—a population 12 times larger than that of Nogales, AZ. The municipal wastewater collection system prevents wastewater from the Mexican side from spilling into the neighboring city of Nogales, AZ. The NADB project increased wastewater collection system coverage from 88% to 97% in 2010 and enabled the system to reach 99% coverage in 2015.



#### ***NIWTP in Nogales, Arizona***

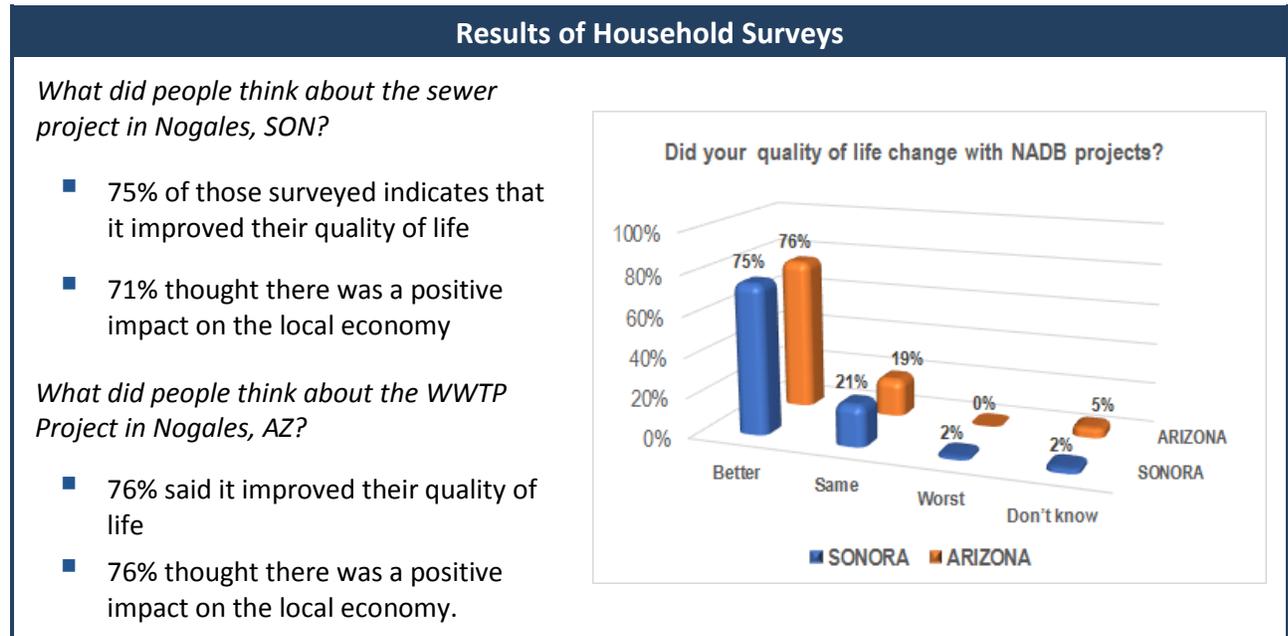
The plant treats wastewater from Nogales, AZ (20,000 residents in 2017), as well as from Nogales, SON, where flows frequently spilled across the border to the U.S. Contact with raw wastewater increased health risks for residents, including diarrheal diseases, skin conditions and Hepatitis A. Today, the NIWTP, located north of the city near the community of Rio Rico, AZ, produces a continuous flow of good quality water, which has led to the greening of the area and very successful suburban development that has reactivated the economy of the area.



It is fair to say that the projects in Ambos Nogales, along with other contributing measures, positively impacted public health in Nogales, AZ, as cases of Hepatitis A dropped from 89 in 2001 to just three in 2017.

### Perception of Quality of Life by Residents

Another important aspect of the study was to understand the public perception in both cities regarding any change in the quality of life as a result the projects carried out by NADB. Public perception was measured through 750 household surveys: 650 in Nogales, SON and 100 in Nogales, AZ.



### Conclusions

The study confirmed the positive binational transboundary impact that the NADB projects have had on both cities. In Nogales, Sonora, the projects largely solved the city’s wastewater collection service problems by collecting and conveying 5.6 mgd of wastewater to the NIWTP in Arizona, for treatment. Today, the NIWTP prevents flows of raw wastewater from the neighboring Mexican city from impacting the urban health and safety of residents in Nogales, AZ. Both cities largely agree (76%) that the quality of life in their sister cities has been improved. The binational cooperation strategy used in carrying out these projects proved to be successful.