

Border Environment Cooperation Commission Basic Environmental Infrastructure Program for Substandard Urban Developments in Nuevo Leon

1. General Criteria

1.a Project Type

Project Name:	Basic Environmental Infrastructure Program for Substandard Urban Developments in Nuevo Leon
Project Sector:	Air Quality

1.b Project Category

Category:	Community environmental infrastructure project – Community-wide impact
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1.c Project Location and Community Profile

Communities:	10 municipalities in the State of Nuevo Leon
Location:	Apodaca, Escobedo, Guadalupe, Juárez, Monterrey, Cadereyta, García, Salinas Victoria, Carmen, and Pesquería.
Location within the Border:	10 municipalities within the 300 km border area

Figure 1 shows the location of the 10 municipalities in the State of Nuevo León

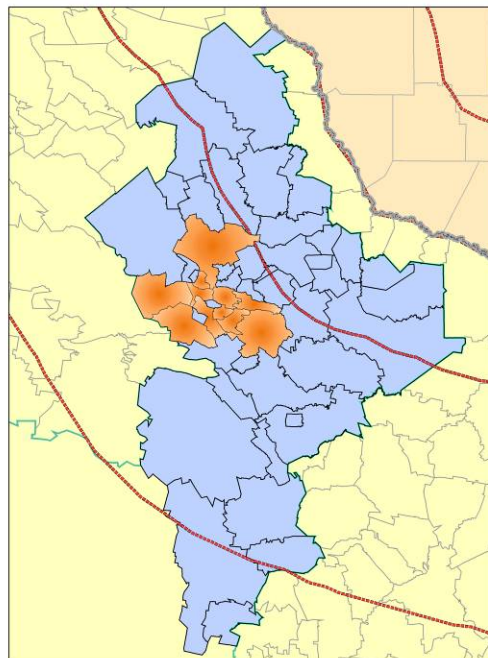


Figure 1. Location of Nuevo León municipalities within the 300 km (186-mile) border area.

Demographics	
Current population in 10 municipalities:	2,946,973
Growth rate:	1.39 %
Reference:	INEGI
Economically active population:	1,494,501
Reference:	National Municipality Information System (SNIM)
Median per capita income:	US \$ 10,012.6/year
Reference:	National Human Development Office (ONDH), 2008
Primary economic activities:	Manufacturing, cattle-raising, trade, transportation, and communications.
Marginalization rate:	Very Low (CONAPO)
Services	
Water System	
Water coverage:	94.6%
Water supply source:	Surface water, deep wells
Wastewater Collection System	
Wastewater coverage:	95.1 %
Wastewater Treatment	
Wastewater treatment coverage:	100 %
Solid Waste	
Solid waste collection coverage:	100 %
Street Paving	
Street paving coverage:	84 %
1.d Legal Authority	
Project Sponsor:	Government of the State of Nuevo León, through the Secretariat of Public Works.
Legal Representative:	Lombardo Guajardo Guajardo
Legal instrument to demonstrate legal authority:	Political Constitution of the State of Nuevo León Public Works State Act
Date of instrument:	October 4, 2009
Compliance with agreements:	<ul style="list-style-type: none"> • 1983 La Paz Agreement, or Border Environment

Agreement

- 1990 Integrated Border Environmental Plan (IBEP)
- 1994 North American Free Trade Agreement (NAFTA)
- Border 2012 Program

1.e. Project Summary

Project Description and Scope:

The project consists of introducing basic Water, Wastewater Collection, storm drainage and Paving services to 106 settlements (*colonias*) in 10 municipalities of the Monterrey, Nuevo León metropolitan area.

Components:

Basic services

The scope of the project is as follows:

- Paving 6,195,825 ft² (575,611 m²) of roadways; construction of 77,772 lf (23,705 m) of water lines and 2,473 household connections; construction of 94,790 lf (28,892 m) of sewer lines and 2,843 hookups to the existing system.
- The proposal includes construction tasks required for the implementation of the project, including: rehabilitation of water and wastewater collection lines, construction of storm sewers as required, and other tasks related to the project purpose.
- The proposed paving layout will be: 3% hydraulic concrete and 97% asphalt pavement. These percentages may vary based on field conditions identified during the construction process.
- The project will be executed over a period of thirty-six months. Construction tasks began in 2009.

The diagnostic assessment study identified 106 *colonias* in 10 municipalities that require immediate assistance due to their disadvantaged condition. It must be noted that the State Government is attempting to bring to compliance these *colonias* that for many years have lacked basic services by virtue of being irregular settlements. The sectors with more significant issues are those located primarily in newly-developed areas in the outskirts of town.

Population Benefited: 117,049 residents

Project Cost: \$ 476.9 million pesos

The following municipalities have been considered as part of the project:

10 MUNICIPALITIES IN NUEVO LEON	
# of Residents	Municipalities
1.- Municipalities with more than 100,000 residents	Apodaca, Escobedo, Guadalupe, Juarez, Monterrey.
2.- Municipalities with 10,000 to 100,000 residents	Cadereyta, Garcia, Salinas Victoria
3.- Municipalities with less than 10,000 residents	Carmen, Pesqueria

Project Map:

The following figures show examples of areas in the different municipalities that are part of the paving program.

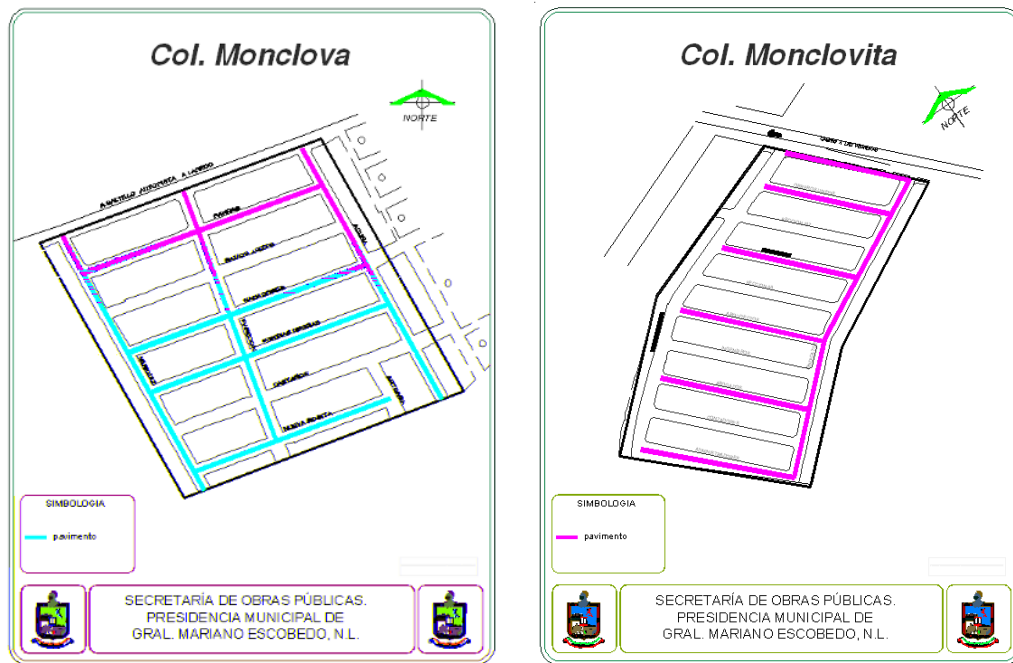


Figure 1. Streets on Monclova Subdivision, Escobedo, Nuevo León

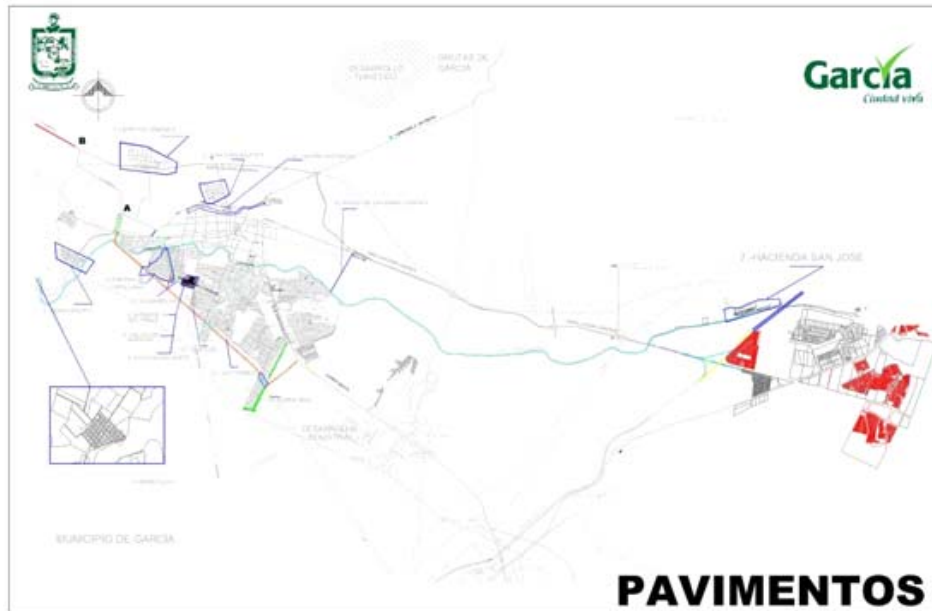


Figure 2. Street paving in Garcia, Nuevo León

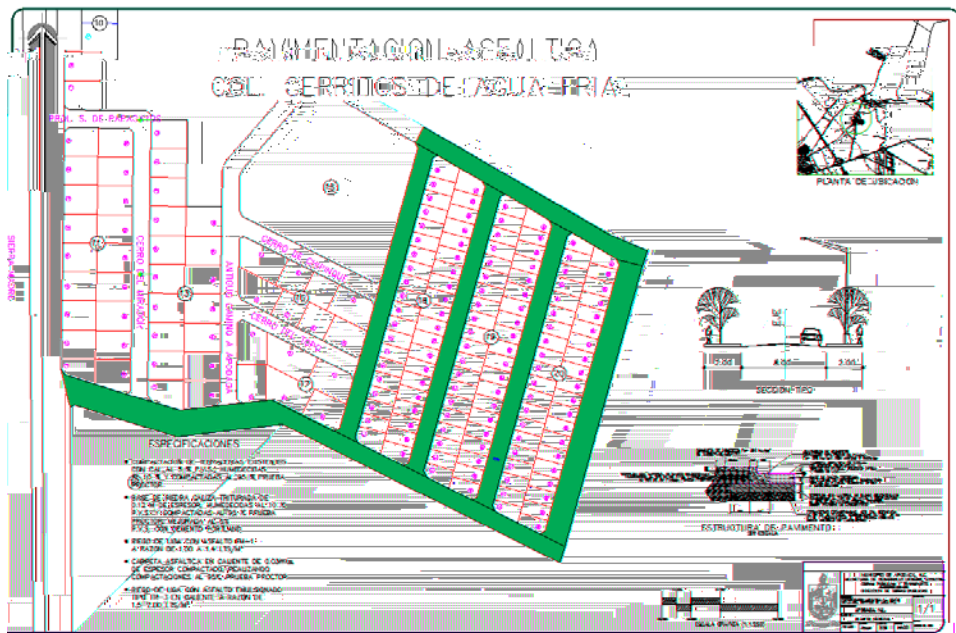


Figure 3. Streets on Cerritos de Agua Fría Subdivision, Apodaca, Nuevo León

Project Justification:

- The project is needed to reduce the concentration of PM₁₀ particles in the local air basin shared by municipalities in Nuevo León.

**Project Need or Consequences of
the No Action Alternative:**

- The proposed tasks will immediately reduce the volume of PM₁₀ particles released by vehicular traffic traveling on unpaved surfaces and disturbed by the gusty winds that frequently batter the city. These improvements will help reduce respiratory illnesses and allergies, which are rather common in the region.
 - During the rainy season, the lack of pavement results in water ponding on the surface of local roadways, which also becomes a source of infection for humans.
 - The proposed tasks will help provide water and wastewater collection services to residents in the project area that are currently unserved.
 - Residents of the project area currently lack potable water service and rely on water hauled by tank trucks to obtain their water supply. The implementation of the proposed project will help provide adequate water service to approximately 12,480 residents. This action will help to reduce the risk of infections associated to poor water quality.
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- Various communities in Nuevo León have an air pollution problem caused by suspended particles associated to the use of vehicles on unpaved roadways, a condition that is exacerbated by the action of prevailing winds.
 - The no-action alternative means that the problem associated with the dispersion of PM₁₀ into the atmosphere will be aggravated, a situation that may cause an increase in the rate of respiratory health problems among area residents. This is due to the fact that sustained exposure to particulate matter that originates from vehicular fuel combustion and vehicular traffic circulating on unpaved roadways may cause eye and nose irritation, and an increase in respiratory problems.
 - The lack of water services jeopardizes the health of area residents, as it exposes them to an increased rate of gastrointestinal diseases due to non potable water consumption.
 - The lack of wastewater collection services jeopardizes the health of area residents, as it exposes

them to contact with raw wastewater and consequently, it puts them at risk for associated diseases.

Prioritization Process Category: N/A

Pending Issues:

None.

Criterion Summary:

The proposed projects are part of BECC's priority sectors and meet the basic general criteria. The project is defined as an air quality improvement effort. The project is located within the 300 km border area.

2. Human Health and Environment

2.a Compliance with Applicable Environmental and Cultural Resource Laws and Regulations

Environmental and Public Health needs addressed by the proposed project (factor 1):

The effects on human health directly related to prolonged exposure to fine particulate matter (particles with a diameter of 10µm or less) are eye and nose irritation, an increase in respiratory illnesses, aggravation of asthma, a decrease in lung performance, and an increase of symptoms related to respiratory problems. The effects on human health are determined by the size of the particles, their degree of penetration, and their permanence in the respiratory system. Most of the particles with a diameter larger than 5 µm are deposited in the upper airways (nose), windpipe and bronchial tubes. Particles with a smaller diameter have a higher probability of being deposited in the bronchi and pulmonary alveoli; therefore, smaller particles are more harmful to human health.

Beneficial environmental impacts that will result from the project's implementation include a reduction in the concentration of PM₁₀ particles in the Nuevo Leon airshed. Failure to implement the project will continue aggravating the problem of PM₁₀ particles being dispersed into the atmosphere.

Reduce the risk for communicable waterborne diseases caused by the lack of drinking water and/or human contact with raw wastewater runoff as a result of the lack of wastewater collection in the projects area.

The project meets the following applicable environmental laws and regulations :

Official Mexican Norm NOM-025-SSA1-1993 establishes the maximum limits of PM₁₀ concentration in the environment that are necessary to protect public health. These limits are 50 µg/m³ as the annual average for chronic exposure, and 120 µg/m³ over 24 hours once a year, in case of acute exposure.

Since these projects will be carried out within existing urban areas and roadways, a consultation with the National Anthropology and History Institute (INAH) is not required. Disturbances of any cultural or historical resources are not anticipated; however, should any cultural resources be found, construction tasks will be deferred until an assessment is performed by the INAH.

The Environmental Agency for Sustainable Development

of Nuevo Leon issues Official Communication 1292/SPMARN/10 stating that the type of tasks proposed by this project do not require the development and submission of an Environmental Impact Study.

2.b Human Health and Environmental Impacts

Direct and indirect benefits to human health :

- The project will enhance the quality of life of project area residents by providing them access to water and wastewater collection services.
- The project may help reduce soil and air pollution.
- The project is expected to reduce respiratory illnesses as a result of reduced particle volumes.

Human health impacts:

In 1996, the US Environmental Protection Agency (EPA) published a document titled “*Air Quality Criteria for Particulate Matter*” (AQC PM) that discusses, among other aspects related to air pollution caused by suspended particles, various studies regarding the effects of said pollutants on human health. This document concludes that the vast majority of available epidemiological evidence suggests an increment in human mortality caused by short and long term exposure to particulate matter (PM) in the environment.

The document published by the EPA recognizes that the complexity of synergetic effects (association with other pollutants, particle size, source of the particulate matter, age and susceptibility of the exposed population, etc.) results in significant variations between the different studies on human exposure to atmospheric pollutants, including particulate matter. However, it concludes that said studies provide enough reasons to be concerned about the detectable effects on human health caused by the exposure to PM₁₀ in the environment, even at levels below those established by the official standards.

In the Monterrey Metropolitan area the contaminant that reports the highest number of exceedances of the Official Mexican Standard due to its heavy concentration in the environment consists of particles with a diameter of less than 10 microns (PM₁₀).

Public health related documents (factor 2):

Pursuant to the 2008-2012 Air Quality Management Program for the Monterrey Metropolitan Area (ProAire), short and long term PM₁₀ exposure may cause reduced pulmonary function, as well as chronic respiratory diseases and premature death, inasmuch as PM₁₀ particles fail to be captured by the respiratory system's filtering mechanisms.

Particle exposure in children has been associated to increased respiratory symptoms --including coughing, shortness of breath, and chest pain-- as well as to respiratory infections and lung disease. In general, this sector of the population has less ability to metabolize, filter out, and remove toxic substances from the body in comparison to adults.

Furthermore, older people exposed to high particle levels tend to die prematurely, especially if they have pulmonary disorders such as asthma, bronchitis, emphysema, or if they suffer from heart disease. Additionally, the number of hospital admissions increases due to an exacerbation of these conditions.

Health statistics:

The following table shows the health impact of increased levels of <10 micron particles.

Response to particle exposure in the general population

Indicators *	% of increase per each 10 $\mu\text{g}/\text{m}^3$ of average daily PM_{10}
Hospital admissions	
Respiratory	1.39
Cardio-cerebro-vascular	0.60
Congestive heart failure	1.22
Visits to the emergency room	
Respiratory	3.11
Days of restricted activity	
Total (adults)	7.74
Lost work days (adults)	7.74
Total (children)	7.74
Lost work days (females)	7.74
Days of minor restricted activity	
Total (adults)	4.92
Impacts for asthma patients	
Asthma attacks	7.74
Cough without phlegm (children)	4.54
Cough with phlegm (children)	3.32
Cough with phlegm and use of bronchodilator	10.22
Some respiratory symptoms (children)	-
Minor respiratory symptoms	-
Respiratory symptoms	
Symptoms in upper respiratory tract	4.39
Symptoms in lower respiratory tract	6.85
Wheezing	-
Acute bronchitis	11.0
Chronic morbidity	
Chronic bronchitis, additional cases	3.60
Chronic cough, prevalence (children)	0.30
Longitudinal Mortality	
Total	3.84
Cross-sectional Mortality	
Total	1.01
Children's	3.52

Source: Institute for Environmental Studies, et al. (2000).
 *Population in the Valley of Mexico Metropolitan Area.

According to the ProAire Program, for each 10 $\mu\text{g}/\text{m}^3$ increase in PM_{10} levels there may be an increase in acute mortality cases between 0.6% and 3.5%, and a 3% to 3.8% increase in chronic mortality.

In Nuevo León, health sector units maintain records of the number of people who visit a clinic for the first time due to diseases subject to epidemiological surveillance. The following table shows the number of cases reported for each of the diseases associated to air pollution in the state of Nuevo León.

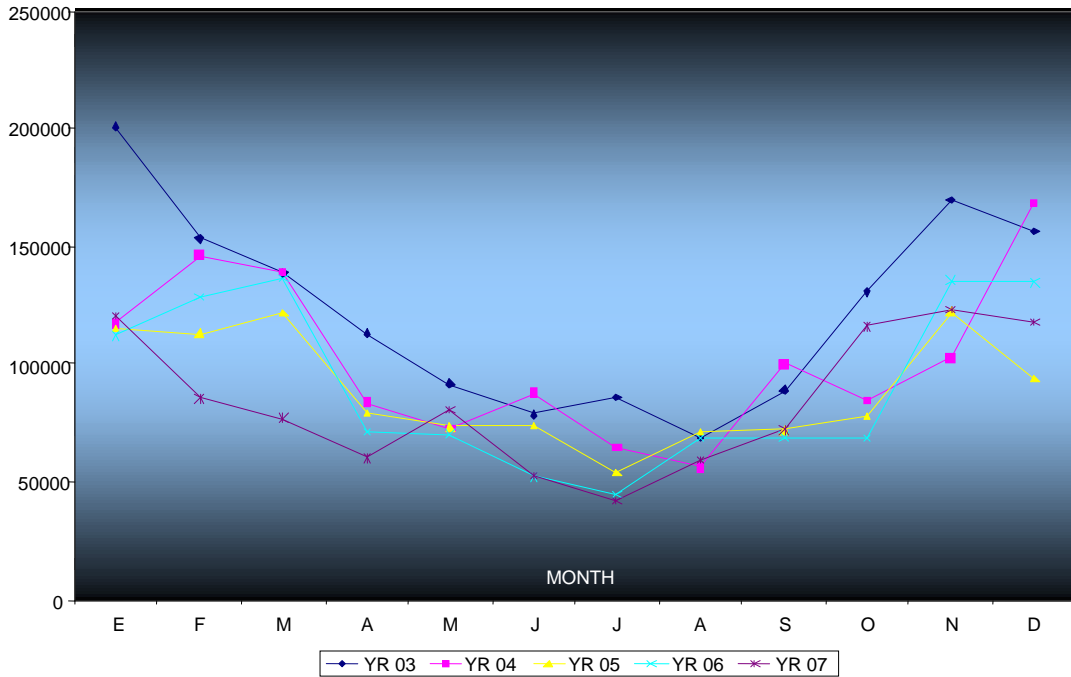
Main diseases associated to
air quality in NL, 2007.

Diseases	No. of cases
Acute respiratory infections	1,114,798
Acute otitis media	47,747
High blood pressure	18,681
Asthma and mild asthma	16,370
Conjunctivitis	15,342
Other diagnoses	103,595
Total	1,316,533

Source: SUIVE 2007, SSNL.

The following figure shows historic monthly records of Acute Respiratory Infections (ARI) during the 2003-2007 period.

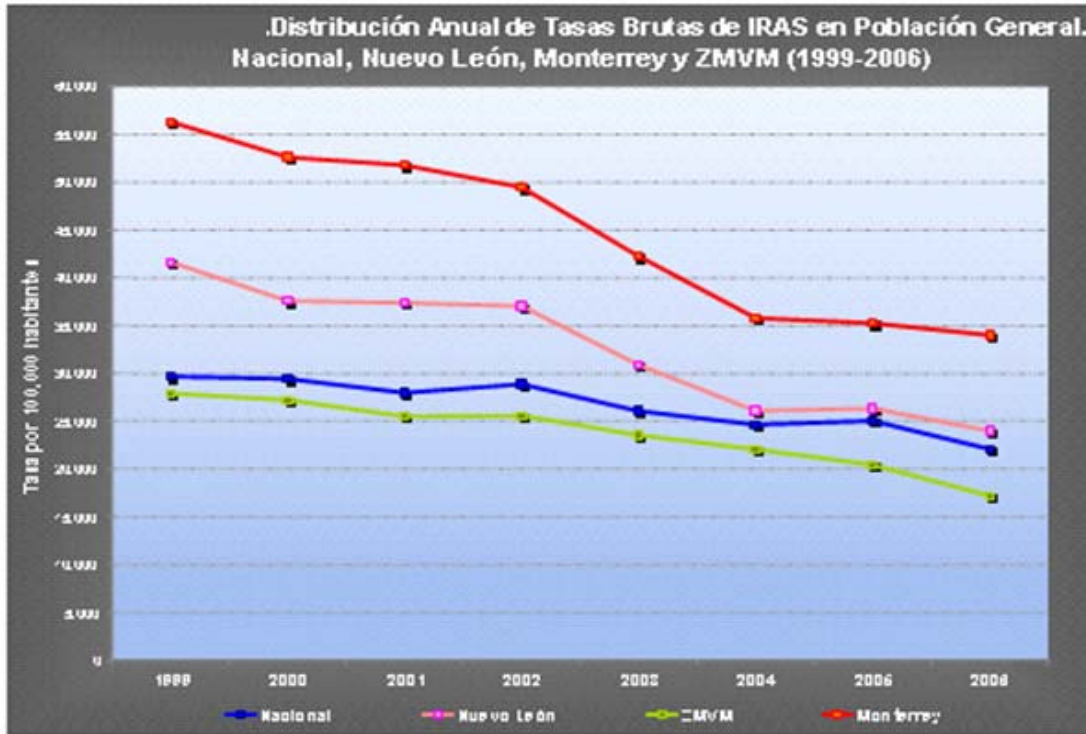
Acute Respiratory Infections



The rate of occurrence increases significantly during the months of November to January due to the synergy between the low temperatures and higher pollutant concentrations.

The review of epidemiological data stemming from information provided by the Epidemiological Surveillance Information System (SUIVE) shows that the annual distribution of crude Acute Respiratory Infection (ARI) rates among the population of the Monterey Metropolitan Area is higher than the national and state mean values, and higher than the mean value for the Valley of Mexico Metropolitan Area (ZMVM), as it has reached values above 36/100,000 residents, as depicted in the following figure:

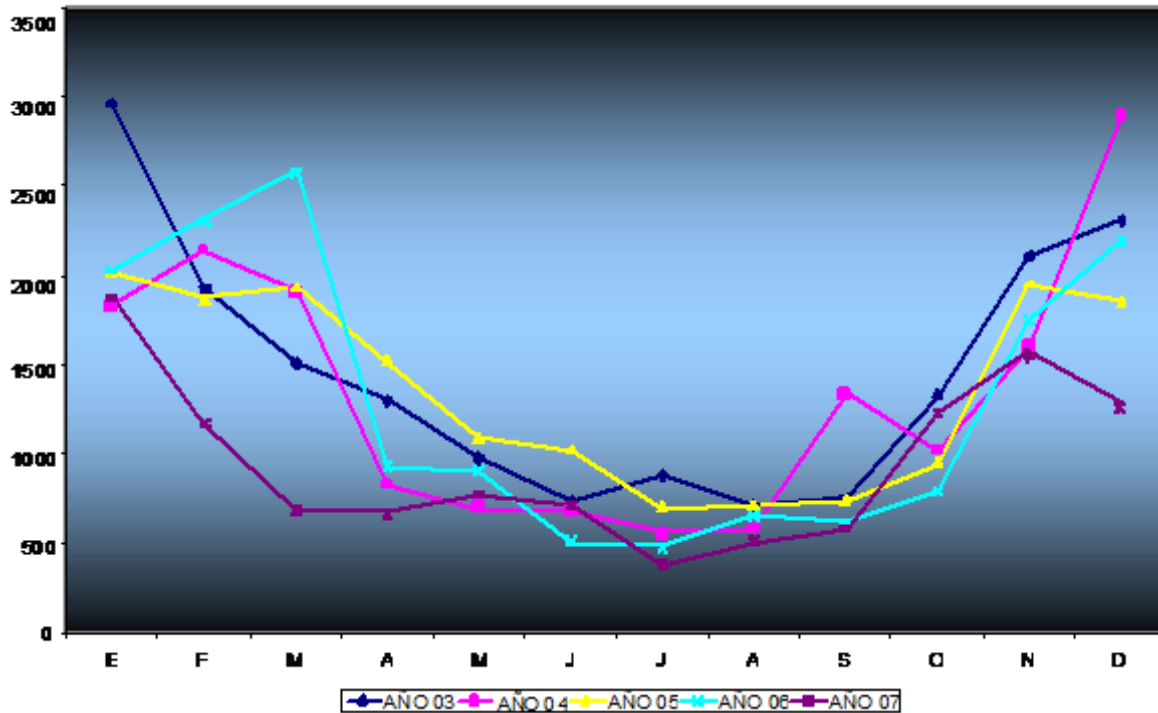
Annual Distribution of crude ARI rates in the general population



Source: Cofepris

Pneumonia and bronchopneumonia are often considered complications of acute respiratory infections and therefore, the same factors that cause the former are triggering factors for the latter. In the case of pneumonia and bronchopneumonia, the same behavior may be observed throughout the year, with an increase in the number of cases during the winter season.

Pneumonia and Bronchopneumonia Monthly Historic Records during 2003-2007
Neumonía broncopneumonía



Source: Nuevo Leon Secretariat of Health

As for pneumonia, the Monterrey Metropolitan Area reports an extremely high rate compared to Mexico City and the state and national mean values.

health problems among area residents. This is due to the fact that sustained exposure to particulate matter that originates from vehicle fuel combustion and vehicle traffic circulating on unpaved roadways may cause eye and nose irritation and an increase in respiratory problems.

**Environmental related documents (factor 2).
 Environmental impacts:**

According to the 2005 Inventory of Emissions, one million tons of pollutants were released to the air that year in the Monterrey Metropolitan Area, including 63,622.4 tons of PM₁₀. Out of that figure, 16,458.8 tons of PM₁₀ are associated to emissions released on unpaved roads (Source: Monterrey Metropolitan Area Air Quality Management Program 2008-2012).

The ProAire Program establishes, under Strategy No. 19, the design and implementation of a campaign to reduce emissions caused by suspended dust particles on unpaved roads and eroded areas. Pursuant to such program, the Government of the State of Nuevo León, through the Secretariat of Social Development and the Secretariat of Public Works, is proposing the paving project for the different municipalities located within the MMA.

The following table shows the estimated reduction in PM₁₀ particle emissions that will result from the proposed paving projects in the different municipalities located within the MMA.

PM₁₀ Particle Emissions in Municipalities within the Monterrey Metropolitan Area

Description	Apodaca	Garcia	Gral. Escobedo	Guadalupe	Benito Juarez	Cadereyta	Monterrey	El Carmen	TOTALS
Kms to be paved	12.1	12.3	21.3	1.5	21.4	3.8	3.0	6.2	81.5
Current emissions on UR (kg/d)	503.0	511.5	889.5	60.9	893.1	160.5	123.6	256.9	3399
Current emissions on UR (ton/yr)	161.0	163.7	284.6	19.5	285.8	51.4	39.5	82.2	1088
Red. (Ton/yr) with PR	159.34	162.04	281.80	19.31	282.93	50.84	39.15	81.39	1077
Annual emissions (ton/yr) with PR	1.61	1.64	2.85	0.20	2.86	0.51	0.40	0.82	11

Table figures assume the following data:
 Average vehicle traffic flow: 100 vehicles per day on each unpaved road.
 Average speed: 20 km/hr
 Type of roads: compacted dirt (non gravel)
 Days/year without rain: 320
 Model: CMAQ (Community Multiscale Air Quality)

The above shows that out of a total of 1,088 tons/year of PM₁₀ released, paving projects in the different municipalities in the MMA will result in a reduction of 1,077 tons, which is equivalent to a 99% reduction in the amount of emissions in the proposed project sites.

Consequently, air quality in the MMA will be enhanced by the proposed paving projects, which will in turn improve the health conditions and quality of life of local residents.

Mitigation Measures:

During the implementation of the project all the necessary preventive measures will be implemented to mitigate temporary impacts. These measures are as follows:

1.- AIR AND NOISE.

Site Preparation in Areas to be Paved.

Emission of dust and gases caused by excavation and cleaning, terrain preparation, excavation and formation of sub-grade, earthworks, hauling of excavation material and hydraulic base, formation of hydraulic base, and hydraulic asphalt/concrete layer.

Mitigation Measures

1.1 Minimize the emission of dust generated by vehicular traffic by irrigating the area where work will be performed.

1.2 To comply with regulations regarding atmospheric emissions caused by motor vehicles, all vehicles used in the project will adhere to a scheduled maintenance program.

Vehicles transporting scrap materials produced during the construction should be covered by a canvas in order to avoid dispersing particles during the trajectory.

Standard **NOM-041-ECOL-1993** establishes the maximum level of exhaust emissions allowed for vehicles using gasoline.

Standard **NOM-042-ECOL-1993** establishes the maximum permissible level of unused hydrocarbons, carbon monoxide and nitrogen oxide in new motor vehicles, as well as evaporated hydrocarbons.

Standard **NOM-044-ECOL-1993** establishes the maximum permissible levels of hydrocarbons, carbon monoxide, and nitrogen oxide, suspended particles, and smoke opacity from diesel engines.

Standard **NOM-045-ECOL-1993** establishes the maximum permissible levels of smoke opacity from the exhausts of motor vehicles using diesel as fuel.

Noise emission caused by the circulation of motor vehicles and the use of heavy machinery during excavation and cleaning, terrain preparation, excavation and formation of subgrade, earthworks, hauling of excavation materials and hydraulic base, formation of hydraulic base, and hydraulic asphalt/concrete layer.

- 1.3** All vehicles operating must close their exhausts and operate at a low speed around the work area.

Norm **NOM-080-ECOL-1994** establishes the maximum permissible limits for noise emission caused by motor vehicles, motorcycles and motor tricycles in circulation and their method of measurement.
- 1.4** All machinery and equipment must comply with the following standard:

Standard **NOM-080-STPS-1993**, which establishes the maximum levels of noise exposure for project workers.
- 1.5** Avoid having more than two teams working simultaneously, which could generate noise levels higher than the above mentioned norm.
- 1.6** Work during the day to avoid causing noise while neighbors are at rest.
- 1.7** Provide audio protection and persuade personnel exposed to noise to use protective equipment.

2.- WATER

Site Preparation and Construction

For excavation cleaning and wastewater.

During construction, water will be necessary for dust control irrigation, preparation of concrete, compacting beddings, as well as potable water for human consumption and water for lavatories.

- 2.1** Wastewater collected in portable containers will be disposed of by an authorized company. These waters will be disposed of in approved areas and under the conditions established by the authorities in compliance with environmental laws in effect.
- 2.2** The use of water should be optimized during the duration of the project.
- 2.3** Potable water will be obtained in containers from local suppliers.
- 2.4** Only raw water will be used for the different activities related to the project.
- 2.5** The water required during the construction stage should be obtained from a water tap provided by the Water and Wastewater Utility (*Servicios de Agua y Drenaje de Monterrey, SADM*) or from any other source authorized by Mexico's National Water Commission (CONAGUA).

3.- SOILS

Construction Stage.

During excavations:

- 3.1 Stone materials required for construction should be obtained, preferably, from authorized source providers. If the above is not possible, all necessary mitigation measures must be considered in order to minimize impacts in the area.
- 3.2 Excavations will only be performed in areas previously defined by the project.
- 3.3 In-fill activities will be performed, preferably, with the material from the excavations whenever appropriate. The excess material should be sent to a location authorized by the Municipality.
- 3.4 If it is necessary to extract any material for filling or any other activity from an area outside of the project, this location will be restored when the project is concluded to avoid erosion and changes to drainage patterns, as well as to restore the cover of native plant species.
- 3.5 If it is necessary to perform activities in an undisturbed site it will be necessary to collect the surface material to later use it in the restoration of areas impacted by the project or in the site itself.

Handling of wastes generated during construction may impact the ground soil.

- 3.6 The work area will be cleaned periodically to avoid pollution and to control the dispersion of waste around the area.
- 3.7 Bedding and compacting materials should be free of hazardous and non-hazardous wastes.
- 3.8 In order to avoid ground contamination generated by vehicles, machinery and equipment maintenance and oil change, these activities will be carried out in maintenance shops or in authorized facilities.

Impacts:

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

- Water and wastewater collection coverage rates will increase, thus reducing environmental pollution and enhancing the quality of life of local residents by reducing potential health risks.

3. Reduced harmful emissions	Objectives and Indicators Eliminate uncollected wastewater discharges (Target = 0.59 MGD)
	Current Conditions: Connections = 0
4. Reduced harmful emissions	Objectives and Indicators Reduction of PM ₁₀ particles (Objective ≥ 1,000 Ton/yr)
	Current Conditions: Emission of PM ₁₀ particles = 1,006 Ton/yr (AP-42 Calculation)
5. Reduced respiratory disease incidence rates	Objectives and Indicators Reduction in incidence of acute respiratory diseases (Objective ≤ 2009 baseline)
	Current Conditions: Acute respiratory infections = 1,114,798 cases per year
6. Increased number of residents with direct access to paved roads:	Objectives and Indicators Increased number of residents with direct access to paved roads (Objective= 91,277 residents)
	Current Conditions: Residents with direct access to paved roads =0
Results: Goods and services produced by the project:	<ul style="list-style-type: none"> - Construction of 6,195,825 ft² (575,611 m²) of paved roads. - Construction of 2,473 water connections. - Construction of 2,843 wastewater hook-ups to the sewer system.

Pending Issues:

None.

Criterion Summary:

The project addresses a major human health and environmental issue by reducing the amount of suspended particles released by vehicles traveling on unpaved surfaces, a condition that has an impact on the increased rate of respiratory illnesses among the population.

3. Technical Feasibility

3.a Technical Aspects

Project Development Criteria

Design Criteria:

Water projects will be developed pursuant to technical specifications contained in the Wastewater Collection and Treatment Manual prepared by CONAGUA's Technical Directorate.

Paving projects will be designed following standard engineering practices. The project complies with the applicable State Code. Typical designs for roadway paving are available and will serve as the basis for developing the design documents for the selected streets. Both asphalt and hydraulic concrete will be utilized in the pavement structures.

Project Components:

Asphalt Pavement

The Asphalt Concrete Pavement structure is based on a surface asphalt layer consisting of granular material, mineral dust, asphalt cement, and aggregates in various grade sizes. The pavement can be constructed using hot mix or cold mix asphalt, so that all stone particles can be covered with a homogeneous layer of asphalt cement.

Under the asphalt course lays the pavement structure. It consists of several layers of higher to lower quality from the roadbed, including: a sub-base, a stabilized or unstabilized base, and a layer of asphalt concrete.

This pavement structure will be covered with a prime coat to act as waterproof sealant and to favor adherence between the base and the asphalt layer. Additionally, a layer of asphalt cement will be applied as a tack coat before laying the roadbed.

Hydraulic Pavement

The hydraulic concrete structure is based on a hydraulic surface consisting of granular materials, Portland cement, water, and aggregates.

Under the hydraulic surface lays the pavement structure. It consists of several layers of higher to lower quality from the roadbed, including: a sub-base, a stabilized or unstabilized base, and a layer of hydraulic concrete.

This pavement structure will be covered with a prime coat to act as waterproof sealant and to favor adherence between the base and the hydraulic layer.

Water and Wastewater Components

The local water utility, *Servicios de Agua y Drenaje de Monterrey* (SADM), is responsible for providing wastewater collection and treatment services to the entire state of Nuevo León. SADM only authorizes new wastewater connections when the collected sewage can be treated. Therefore, the project sponsor, *Secretaría de Obras Públicas del Estado de Nuevo León*, previously consulted and was authorized by SADM to implement the project, since all proposed sewer hookups will be connected to the SADM wastewater system and 100% of flows will be treated in the following SADM's facilities

- 0.39 MGD at Dulces Nombres WWTP which has a treatment capacity of 171 MGD and has an available capacity of 68.02 MGD
- 0.10 MGD at García WWTP which has a treatment capacity of 1.71 MGD and has an available capacity of 0.96 MGD
- 0.10 MGD at Salinas Victoria WWTP which has a treatment capacity of 0.57 MGD and has an available capacity of 0.23 MGD

Every dwelling that receives a new water connection, will also receive a wastewater connection. In addition, homes receiving new sewer connections but not a new water connection already have access to an adequate water connection.

The project will be constructed according to applicable norms and regulations including rainwater runoff control infrastructure such as street gutters. Should any additional runoff control infrastructure requirements be identified in design/construction, the State will coordinate again with the Municipality to determine if the required investment will be made. Should the Municipalities not be able or willing to make such investments, the State will not pave the subject road.

Other Design Criteria:

The project will include terrain plotting and leveling, excavation or cutting, hauling of material, formation and compaction of earth-fills, treatment of the subgrade layer, and development of the hydraulic base layer. As for the pavement, the project includes the hydraulic base prime coating, and the tack coating for the asphalt layer, followed by the installation of the asphalt concrete layer. The project also includes trace and leveling of curbs and the manufacturing of hydraulic concrete curbs, as well

as all the construction tasks required for the implementation of the proposed project, including: rehabilitation of water and wastewater collection lines, construction of storm sewers as required, and other tasks related to the project purpose.

The geometric design of the thoroughfares incorporates a grade line at the center of the street for runoff towards the curbs by means of a 2% minimum gradient, and the installation of elevated manholes above the runoff level to prevent water infiltration in the sewer system. In case the manhole is not located in the grade line, it will need to be elevated to the runoff level and be sealed to prevent storm water infiltration. The design also incorporates checks for surface runoff and berms.

Appropriate Technology

Assessment of Alternatives:

The assessment will be based on vehicle traffic volumes and the ratio of heavy duty vehicles traveling on existing roadways:

Three levels will be established according to heavy duty traffic identified for the project area. Annual average daily traffic (AADT).

- Level I Up to 50 vehicles.
- Level II 50 to 500 vehicles.
- Level III 500 to 6000 vehicles

Each section will be designated with a combination of a Roman numeral, an Arabic numeral, and a letter, based on the following definitions:

- I. The Roman numeral designates the level of heavy duty traffic, pursuant to Article 16 of this Act;
- II. The Arabic numeral designates the unpaved road rating, pursuant to Article 17 of this Act; and
- III. The letter designates the type of pavement, according to the following criteria:
 - a) Type A: asphalt mixture on a hydraulic base;
 - b) Type B: asphalt mixture on an asphalt base;
 - c) Type C: asphalt mixture on a cement base; and
 - d) Type D: hydraulic concrete pavement on a hydraulic base.

Property and Right-of-Way Requirements

Requirements:

Since the paving projects will be conducted within the urban area and existing rights-of-way, there will be no need to acquire ROW or additional land, since these two items are within the purview of the municipality. Furthermore, no land use changes will be required for the project.

During the project construction the State will supervise the project through its Secretariat of Public Works.

Project Tasks and Timelines

Project Timeline:

The State expects to complete the construction of the proposed project over a period of thirty-six months. Construction tasks began in 2009.

3.b Management and Operations

Project Management

Resources:

According to the Internal Code of Public Municipal Administration, and other agreements and provisions, the Cities

Pending Issues:

None.

Criterion Summary:

An assessment of alternatives was developed to identify roadways to be paved. A decision was made to pave roads with the highest vehicle traffic volumes and loads, so as to expand the life cycle of their road surface and reduce maintenance requirements. Asphalt pavement was considered for secondary streets with less traffic.

The project was designed following standard engineering practices.

The project sponsor has established coordination with the local water utility (*Servicios de Agua y Drenaje de Monterrey*, SADM) to ensure that water and wastewater infrastructure is available in streets selected for paving.

4. Financial feasibility

4.a Proof of Financial Feasibility

Financial Conditions

Information submitted: State of Nuevo León's financial statements

Financial Analysis Results: The State of Nuevo León shows a solid financial position and, based on NADB's conservative assumptions, should be able to generate the net operating cash sufficient to cover current debt, and the project obligations under this proposed loan.

Project Costs, Financial Structure and other plans for Capital Investments

Item: Basic Environmental infrastructure for substandard urban developments in Nuevo León.

Final Cost: MX \$476.9 million

Financial Structure:

Source	Type	Amount (Million MX pesos)	%
NADB	Loan	400.0	84
State of Nuevo León	Grant	76.9	16
Total:		\$476.9	100

Primary Source of Income

Source of Income: Revenue from the State of Nuevo León

4.b Legal Considerations

Project Management: The project will be managed by the *Secretaria de Obras Publicas* (Public Works Department) of the State of Nuevo Leon, which has adequate staff to manage the proposed infrastructure. The infrastructure generated by the Project will be operated and maintained by, correspondingly, the benefited municipalities and *Servicios de Agua y Drenaje de Monterrey* (SADM).

Financing Status: N/A

Pending Issues:

None.

Criterion Summary:

The project meets all applicable financial feasibility criteria.

5. Public Participation

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

Steering Committee

Date of Establishment: The project sponsor intends to establish a Steering Committee for each of the projects to be completed. To date, the Secretariat of Social Development has established 13 of such committees, which have been formally installed. These committees have available their bylaws, records of attendance and administration of oath to committee members, agreements, and comments.

Steering Committee Members: Steering Committees have been established according to the following structure:

- Chairperson
- Secretary
- Treasurer
- Social Comptroller
- Auxiliary Member

Public Participation Plan :

Date of Approval The Comprehensive Community Participation Plan developed by the Secretariat of Social Development was approved by the BECC on September 30, 2010.

Public Access to Project Information: Technical and financial information on each of the proposed projects is being made available to the public for review at City Mayors' offices, workshops, bus stops, community centers, etc. The Steering Committee, with assistance from the project sponsor, is preparing the following:

- Flyers
- Megaphone advertising
- Radio advertising

Project information is available at :

Site/Hours	Contact / Tel.	Address/Municipality
Office of the Secretariat of Social Development	(81) 2020-2175	Churubusco # 495 Nte. Col Fierro, Mty, NL

	<p>Additionally, the project's technical and financial information was made available on the Secretariat of Social Development's website: http://www.nl.gob.mx/?P=desarrollosocial</p>
Additional outreach activities:	<p>The "Mi Comunidad" newsletter, a local media outlet, published a feature on total basic service coverage.</p> <p>A project factsheet was developed and distributed.</p> <p>The project launching was published in major newspapers of statewide distribution.</p>
First Public Meeting:	<p>The launching of the basic service coverage program was published on April 15 in three major newspapers of regional distribution. To date, 13 public meetings have been held in the <i>colonias</i> served by the program. The launching ceremony was held in the municipality of Escobedo, Nuevo León.</p> <p>The meeting was used to present the project's technical, financial, and environmental aspects. Approximately 200 residents of the project area and other communities attended the meeting, which was presided by the State Governor. Media features and the minutes of neighborhood meetings reflect that the community has shown support for the project.</p>
Second Public Meeting:	N/A
Final Public Participation Report	
Final Report:	The Steering Committee and the sponsor 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 sponsor, in coordination with the 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:

Final Public Participation Report.

Criterion Summary:

The project meets the BECC's Public Participation criterion.

6. Sustainable Development

6.a Human and Institutional Capacity Building

Project Operation and Maintenance:

The project sponsor, through SDAM, will be the agency responsible for operating and maintaining the water distribution system.

The project sponsor has the basic institutional and human capacity needed to operate and maintain the project using:

- Qualified personnel
- Training program
- Operating manual for infrastructure maintenance

Human and Institutional Capacity Building :

Actions considered by the project will strengthen the municipalities by increasing their service provision capacity, as well as water and road paving coverage rates.

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:

- 2009 – 2015 State Development Plan, Chapter 7 – Social Development and Quality of Life, under the section on social infrastructure and basic service backlogs.
- The projects adhere to the U.S.-Mexico Border 2012 Environmental Program by meeting Goal 1: Reducing water contamination, and Objective 1: Promoting an increase in the number of household connections to wastewater collection and treatment services.
- The projects adhere to the U.S.-Mexico Border 2012 Environmental Program by meeting Goal 1 –Reduce air emissions as much as possible, towards the attainment of each country's national ambient air quality standards, and reduce exposure to contaminants in the border region.

Laws and Regulations addressed by the project:

The projects meet applicable federal regulations pursuant to road paving within the municipalities.

6.c Natural Resource Conservation

- The final design includes the implementation of green building practices as part of the technical construction specifications.

- The purpose of the project is to improve the air quality of the atmospheric basin of the local communities, and at the same time benefit the health of residents of the border region without deteriorating the environment. The project does not interfere in any way with the conservation of natural resources of the region as it will be carried out in an urban area and over existing roadways in urban areas, and will not require any changes regarding land use patterns.
- The project contributes to reduce environmental deterioration by building wastewater collection lines that will convey sewage to wastewater treatment facilities, thus reducing the risk of aquifer contamination and human health hazards resulting from the discharge of raw wastewater to oceans, streams, or agricultural drains.

6.d Community Development

The introduction of the new water system will promote community development, inasmuch as it will help to reduce the incidence of waterborne diseases and will enhance the quality of life of residents of the *colonias* benefited by the project.

The project will promote community development by reducing the incidence of respiratory illnesses in the region. Direct benefits to the community are foreseen, and include an improved quality of life of the population by reducing pollution levels; reducing travel times; promoting quick access to emergency, security and other public services; fostering economic development, and increasing the value of properties located adjacent to the project site.

Pending Issues:

None.

Criterion Summary:

The project complies with all sustainable development principles.

Available Project Documentation:

- Preliminary Design of the State's 2009-2015 Basic Service Coverage Program, developed by the Nuevo León Secretariat of Public Works, 2009.
- Final Public Participation Report (pending).