CERTIFICATION AND FINANCING PROPOSAL

REGIONAL LANDFILL PROJECT FOR CHIHUAHUA, CHIHUAHUA

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EXECUTIVE SUMMARY

REGIONAL LANDFILL PROJECT FOR CHIHUAHUA, CHIHUAHUA

Project: The proposed Project consists of closing the current sanitary landfill and constructing a new regional sanitary landfill, for the disposal of municipal solid waste and waste requiring special handling in the metropolitan area of Chihuahua, Chihuahua (the "Project). The Project includes land acquisition for the new landfill.

Objective: Provide the infrastructure necessary to replace the current regional landfill, which is approaching the end of its useful life, and thus continue managing the proper disposal of municipal solid waste (MSW) and waste requiring special handling (WRSH)[1] in the metropolitan area of Chihuahua, which will help prevent the potential for soil and water contamination, as well as health risks associated with the inadequate disposal of waste.

Expected Results: The environmental and human health outcomes anticipated as a result of the Project, include:

- The capacity to continue managing the proper disposal of approximately 1,100 tons of MSW and WRSH per day, for the next 20 years. in compliance with applicable Mexican law.[2]
- Appropriate closure of 45 hectares of existing landfill.

Population to Benefit: Approximately 970,000 residents of the metropolitan area of Chihuahua (MACh), which is formed by the communities of Chihuahua, Juan Aldama, and Santa Eulalia.[3]

Sponsor: Municipality of Chihuahua, Chihuahua.

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[1] The Mexican General Law for Comprehensive Waste Prevention and Management defines "municipal solid waste" as the residential trash generated by the everyday items used and thrown away by households. "Waste requiring special handling" is defined as the trash with household characteristics generated by productive processes, that does not meet the definition of hazardous waste, or produced by generators of large quantities of municipal solid waste. (https://www.gob.mx/profepa/documentos/ley-general-para-la-prevencion-y-gestion-integral-de-los-residuos-62914#:~:text=Tiene%20por%20objeto%20garantizar%20el,la%20contaminaci%C3%B3n%20de%20sitios%20con)

[2] Source: Quantity provided by Sponsor.

[3] Source: Mexican national statistical institute (INEGI), 2020 Population and Housing Census (https://www.inegi.org.mx/app/areasgeograficas/?ag=08) and the publication "*Delimitación de las zonas metropolitanas de Mexico 2015"* [Delimitation of the metropolitan areas of Mexico 2015]. Data from the city of Chihuahua and the communities of Juan Aldama and Santa Eulalia were used to calculate the population benefitted. https://www.inegi.org.mx/contenido/productos/prod_serv/contenidos/espanol/bvinegi/productos/nueva_estruc/702825006792.pdf

Borrower: Municipality of Chihuahua, Chihuahua.

Lender: North American Development Bank (NADBank), through Corporación Financiera de América del Norte, S.A. de C.V. SOFOM, E.N.R. (COFIDAN).

Estimated Project Cost: $158.6 million pesos (US$8.01 million).[4]

NADBank-COFIDAN Loan: Up to $132 million pesos (US$6.7 million).

Uses & Sources of Funds:
(Millions of pesos)

Uses*	Amount	%
Current landfill closure	$ 48.6**	31
Land acquisition and construction of new landfill	$ 110.0**	69
TOTAL	**$ 158.6**	**100**

Sources	Amount	%
NADBank-COFIDAN loan	$ 132	83.2
Municipality of Chihuahua, Chihuahua	$ 26.6	16.8
TOTAL	**$ 158.6**	**100**

* Includes supervision, contingencies, and financial costs.
** The costs are approximate due to the studies and designs being prepared.

Repayment Period: Up to sixty (60) months, including a six (6) month grace period on principal, provided that the loan is fully repaid by September 8, 2027, in accordance with the decree issued by the Chihuahua State Congress authorizing the financing.

Grace Period: Up to six (6) months on principal payments, computed as of the date of the first disbursement.

Interest Rate: A variable or fixed market-rate in Mexican pesos.

Source of payment:

- A monthly percentage or variable amount of federal tax revenue ("*participaciones*"), from the General Fund allocated to the Municipality and irrevocably pledged to a trust; and
- Debt Service Reserve Fund.

Debt Service Reserve Fund: Up to two (2) months of principal and interest payments.

Debt Service Coverage Ratio (DSCR): A DSCR equal to or greater than 1.2x times the debt service for each fiscal year must be maintained in the trust.

[4] Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of $19.7967 pesos per dollar, according to exchange rate (FIX) established by the Banco de Mexico on April 13, 2022.

CERTIFICATION AND FINANCING PROPOSAL

REGIONAL LANDFILL PROJECT FOR CHIHUAHUA, CHIHUAHUA

1. PROJECT OBJECTIVE AND EXPECTED OUTCOMES

The proposed Project consists of closing the current sanitary landfill and constructing a new regional sanitary landfill for the disposal of municipal solid waste and waste requiring special handling in the metropolitan area of the Chihuahua, Chihuahua (the "Project), which includes land acquisition for the new landfill.

The purpose of the Project is to provide the infrastructure necessary to replace the current landfill, which is approaching the end of its useful life, and thus continue to manage the proper disposal of municipal solid waste (MSW) and waste requiring special handling (WRSH) [5] in the metropolitan area of Chihuahua (MACh), which is formed by the communities of Chihuahua, Juan Aldama and Santa Eulalia. As a result of this Project, the communities will have the capacity to manage and properly dispose of approximately 1,100 tons of MSW and WRSH a day[6] in compliance with applicable Mexican law, and the appropriate closure of 45 hectares of the current landfill, which will help prevent the potential for soil and water contamination, as well as health risks associated with the inadequate disposal of waste.

2. ELIGIBILITY

2.1. Project Type

The Project falls within the eligible category of solid waste management.

2.2. Project Location

The municipality of Chihuahua is located in the central region of the state of Chihuahua. Its municipal seat is the city of Chihuahua, which is also the state capital. The city is approximately

[5] The Mexican General Law for Comprehensive Waste Prevention and Management defines "municipal solid waste" as the residential trash generated by the everyday items used and thrown away by households. And "waste requiring special handling" is defined as the trash with household characteristics generated by productive processes, that does not meet the definition of hazardous waste, or produced by generators of large quantities of municipal solid waste. . (https://www.gob.mx/profepa/documentos/ley-general-para-la-prevencion-y-gestion-integral-de-los-residuos-62914#:~:text=Tiene%20por%20objeto%20garantizar%20el,la%20contaminaci%C3%B3n%20de%20sitios%20con)

[6] Source: Quantity provided by Sponsor.

190 km (118 miles) south of the U.S.-Mexico border. The current municipal landfill is located approximately six miles northeast of downtown Chihuahua, at km 7.5 on the highway to Aldama, at the following geographical coordinates: latitude 28°42'02" N and longitude 106°01'56" W.

The Project Sponsor is currently performing the studies specified under Mexican regulations for closing the current landfill, selecting the new site, and final designs for the construction of the new regional landfill, which is expected to be located in the municipality of Chihuahua and occupy approximately 200 hectares (494 acres). Figure 1 shows the location of the current regional landfill, along with the communities that it serves.

Figure 1
PROJECT LOCATION MAP

2.3. Project Sponsor and Legal Authority

The Project sponsor is the Municipality of Chihuahua, Chihuahua (the "Municipality" or the "Sponsor"), a public entity legally constituted in accordance with the Mexican Constitution, the Chihuahua state constitution, and the Municipal Code of the State of Chihuahua.

Article 115, section III, subsection c) of the Mexican Constitution establishes that the municipalities are responsible for providing the service of cleaning, collection, transporting, storing, treatment, and final disposal of solid waste.

The Mexican General Law for Comprehensive Waste Prevention and Management authorizes and empowers the municipalities to control MSW, so that municipal entities are responsible for storing, transporting and final disposal of MSW, among other activities, in compliance with waste

valorization goals and health, environmental, technological, economic, and social efficiencies. Article 9 of the Mexican General Law on Climate Change indicates that municipalities are responsible for developing and implementing policies and actions to address climate change related to the management of municipal solid waste. Furthermore, its third transitory article establishes: "*By 2018, in coordination with state agencies and other administrative and financial entities and with technical support from the Ministry of Social Development, the municipalities will develop and build solid waste management infrastructure for that does not allow emit methane into the atmosphere*."

Finally, through decree LXVII/AUOBF/0111/2021 I P.O. published in the official gazette of the State of Chihuahua on January 8, 2022, the Chihuahua State Congress authorized the Municipality to manage and contract financing up to $132,000,000 pesos for the construction of the new sanitary landfill.

3. CERTIFICATION CRITERIA

3.1. Technical Criteria

3.1.1. General Community Profile

The Project is expected to benefit residents in the metropolitan area of Chihuahua, which is formed by the city of Chihuahua in the municipality of Chihuahua and the communities of Santa Eulalia in the municipality of Aquiles Serdán and Juan Aldama in the municipality of Aldama. According to the 2020 census data from the Mexican national institute of statistics, (INEGI), the town of Juan Aldama had 22,568 inhabitants, the town of Santa Eulalia had 20,042, and the city of Chihuahua had 925,762, for a total of 968,372 residents in the MACh, representing 25% of the population of the state of Chihuahua in 2020.[7]

According to the INEGI Economic Census, in 2019, the economy of these three municipalities accounted for 36.6% of total gross state product (GSP), with the municipality of Chihuahua alone accounting for 36.4%. Manufacturing was the most important sector for the three municipalities, generating 49% of GSP and employing 34% of their working population. Commerce represented the second largest sector, generating 21% of GSP and employing 23% of their workforce, followed by construction, which represented 8% of their economy and provided 4% of employment. [8]

Municipal Solid Waste Management in Mexico

While the Mexican Constitution establishes that the municipalities are responsible for managing all MSW functions, including collection, transfer, treatment, and final disposal, according to the Mexican Ministry of Environment and Natural Resources (SEMARNAT), in reality, Mexican municipalities face various circumstances that in many cases are beyond their technical and financial capacities, such as the difficulty of hiring trained personnel; securing or committing

[7] Source: INEGI, Population and Housing Census, 2020 (https://www.inegi.org.mx/app/areasgeograficas/?ag=08).
[8] Source: INEGI, Economic Census, 2019 (https://www.inegi.org.mx/app/saic/default.html).

financial resources that would provide certainty for private sector investments; and lack of continuity for projects and programs stemming from the short term for municipal administrations in Mexico.[9]

According to the most recent figures from SEMARNAT,[10] close to 45 million tons of MSW were generated in Mexico in 2017, which represented an increase of more than 35% compared to 2003; therefore, there was a national average generation of 0.98 kilograms (2.16 lbs) per person a day of solid waste in 2017.

INEGI reported that 92% of Mexican municipalities have MSW collection services, and the waste collected is disposed of in more than 2,200 landfills. Of those landfills, 14.5% have a geomembrane as part of their impermeable system, 10% have an infrastructure for recirculating and controlling of leachates, about 11% have biogas control systems, and only 0.3% (six sites nationwide) use the biogas to produce electricity.[11]

The General Law on Climate Change establishes that Mexico commits to reducing its greenhouse gas emissions by 22% and its black carbon emissions by 51% by 2030, which will be achieved by meeting the reduction targets for the different emission sources, including a reduction of 28% in the emissions generated by MSW nationally.[12]

Municipal Solid Waste Management in Chihuahua State

Based on studies conducted by BECC, in 2015, only 40% of the municipalities in the state of Chihuahua disposed of their MSW in a sanitary landfill. The state had a total of 22 sanitary landfills, two of which were regional: i) the Delicias-Meoqui regional landfill and ii) the MACh regional landfill. Just over half of all the sanitary landfills received less than 10 tons of MSW a day.[13]

Municipal Solid Waste Management in Chihuahua City

The Department of Municipal Public Services for the Municipality of Chihuahua, which is responsible for sanitary landfill operations, estimates that MSW generation per capita is 1.1 kilograms a day and consists of 45% organic waste; 20% cardboard and paper; 15% plastics; 11%

[9] Source: SEMARNAT, Acciones y Programas, Residuos Sólidos Urbanos y de Manejo Especial [Actions & Programs, Municipal Solid Waste and Waste Requiring Special Handling], (https://www.gob.mx/semarnat/acciones-y-programas/residuos-solidos-urbanos-rsu).
[10] Source: Government of Mexico, Informe del Medio Ambiente [Report on the Environment]. Sistema Nacional de Información Ambiental y de Recursos Naturales [National Environment and Natural Resource Information System], Chapter 7: Waste, December 2021 (https://apps1.semarnat.gob.mx:8443/dgeia/informe18/tema/cap7.html).
[11] Source: INEGI, Press Release No. 333/21. Estadísticas a propósito del día mundial del medio ambiente [Statistics on World Environment Day], (https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2021/AMBIENTE2021.pdf).
[12] Source: General Law on Climate Change, latest update on November 6, 2020, (https://www.diputados.gob.mx/LeyesBiblio/pdf/LGCC_061120.pdf).
[13] Source: Border Environment Cooperation Commission (BECC), *Propuesta de establecimiento de "Rellenos Sanitarios Regionales"* [Proposal for Establishing Regional Sanitary Landfills], (https://www.nadb.org/uploads/files/13_rellenos_sanitarios_regionales_por_localidades_2_mil_a_10_mil_hab_mxico_2014.pdf).

metal, aluminum, and glass; and 9% textiles. Currently, the city of Chihuahua does not have transfer stations or units for separating and recycling MSW.

The sanitary landfill operates from 5:00 a.m. to 6:00 p.m. with a staff of 18 employees, consisting of general management and landfill workers, including heavy equipment operators, mechanics, and scale attendants. The collection and transfer of MSW to the municipal landfill is carried out by 58 garbage collection trucks owned by the Municipality, supported by 57 trucks from six private companies. The towns of Juan Aldama and Santa Eulalia, representing 0.3% of the total MSW received in the landfill, send their waste generated directly from their collection trucks to the landfill since they do not have transfer stations. According to the Sponsor, there is currently no agreement with these localities, and they are not charged for depositing their MSW at the landfill; however, as with all vehicles that arrive at the landfill facilities, staff keep a record of the weight of the waste deposited in the sanitary landfill.

Given the original design of the landfill and the quantity of MSW it currently receives, the facility is expected to reach maximum capacity at the end of 2023. Therefore, in order to continue disposing of MSW in compliance with Mexican regulations, the Municipality of Chihuahua plans to build a new regional landfill that will benefit the residents of the MACh.

3.1.2. Project Scope

The Project consists of carrying out the necessary engineering works to i) close the current regional sanitary landfill and ii) land acquisition and construction of a new regional sanitary landfill for the final disposal of MSW and waste requiring special handling[14] in the MACh.

On February 28, 2022, the Municipality of Chihuahua signed three collaboration agreements with the Universidad Autónoma de Chihuahua (UACH) to develop the studies, analyses and designs required by Mexican regulations for the closure of current landfill, site selection and construction of the new landfill; as well as for a study to develop socialization strategies to increase the recycling and valorization of MSW. NADBank is supporting the development of these activities through its Technical Assistance Program.[15] Upon completion of these studies and designs, the Sponsor will acquire the land of the new site and carry out a competitive process for landfill construction.

The activities for closing the current sanitary landfill that will be included in the final design, once the waste is no longer disposed of there, mainly include:

- *Final site configuration and use*, it is the preparation and final use that will be given to the closed site, which must consider the physical characteristics of the site (slope stability, infrastructure for leachate and biogas control, among others); the restrictions inherent in this type of construction (low load capacity, possibility of differential subsidence and

[14] The Mexican General Law for Comprehensive Waste Prevention and Management defines "municipal solid waste" as the residential trash generated by the everyday items used and thrown away by households. And "waste requiring special handling" is defined as the trash with household characteristics generated by productive processes, that does not meet the definition of hazardous waste, or produced by generators of large quantities of municipal solid waste.
[15] The scope of the Technical Assistance includes the hiring of an external consultant who will supervise and verify that the studies and designs follow Mexican regulations.

presence of biogas); as well as the type of land use to be determined by the competent authority.

- *Installation of perimeter drains* will be installed at the base of the landfill slopes to collect and convey leachates and rainwater, according to studies and estimations of the generation of leachate and rainwater runoff.
- *Installation of infrastructure to control and monitor biogas* will be installed pipelines for its collection and elimination according to field measurements and projected generation.
- *Final Closing coverage* uses natural or synthetic materials, which must isolate the waste, minimize erosion and infiltration of liquids in the cells, and control the release of the biogas generated, as established in the final design.
- *Post-closure maintenance and monitoring program activities*, which entails the development of monitoring and maintenance activities, as indicated in the corresponding studies and designs, to prevent conditions that could pose an environmental risk due to biogas emissions or leachates.

The activities and complementary works for constructing, operating, and monitoring the new sanitary landfill for the MACh must comply with the specifications established in the applicable Mexican regulations and legislation for a Type A disposal site, and mainly include the following: [16]

- *Land acquisition*, the site for the new landfill must ensure the protection of the soil, subsoil, surface water and groundwater; as well as being at an appropriate distance from the urban area to allow the transfer of MSW in an efficient and sustainable way.
- *Installation of an impermeable barrier* (*geomembrane)*, For the prevention of contamination to groundwater, the site must have a waterproofing system, in order to reduce and prevent the flow of liquids and leachates into the natural soil.
- *Installation of biogas and leachate control and monitoring equipment*, which includes pipelines to interconnect and convey the biogas and leachates in accordance with projected generation.
- *Construction of an emergency waste reception area*, which will operate on a temporary basis to receive solid waste, in the event of any contingency, natural disaster, or other types of emergencies.
- *Infrastructure and services for proper landfill operations*, including:
    - Access and interior roadways.
    - Perimeter fence and access gate.
    - Guard booth and gate control.
    - Scale for recording and controlling MSW and WRSH.
    - Sanitary facilities and services for staff.
    - Facilities for the maintenance of machinery and equipment.

[16] Mexican official Standard NOM-083-SEMARNAT-2003, published in the official gazette on October 20, 2004, defines Type A final disposal sites as those that receive more than 100 tons a day of waste. Draft NOM-083-SEMARNAT-2003, published on May 10, 2021, establishes that Type A landfills receive more than 500 tons of MSW a day.

- First aid services and personal protective equipment (PPE).
- Administration and operation offices.

- *Transfer stations*: in the event that the location of the new landfill and the cost-benefit studies require the construction of these facilities, they will be included in the scope of the Project.

3.1.3. Technical Feasibility

The basic design of a sanitary landfill consists of an area fill method, in which the soil is prepared using natural or synthetic materials to prevent the filtration of liquids from the decomposition of the waste, including various structures for controlling and monitoring liquids and gases, such as venting wells, flares for biogas and collectors to recirculate or capture leachates and thus also prevent the risk of fire or explosions. [17] Finally, the waste dumped at the site must be mixed in layers and covered with soil using heavy machinery and, finally, compacting it to maximize the tonnage of waste using a minimum of space in the landfill.

According to the information provided by the Sponsor, the site for the new sanitary landfill is expected to occupy approximately 200 hectares (494 acres) in order to provide MSW disposal services to the metropolitan area of Chihuahua for the next 20 years.[18] The site of the new regional sanitary landfill must meet the following minimum conditions:[19]

- It must not be built within protected natural areas.
- The landfill must be at least 500 meters (1,640 ft) from the urban area or any surface water.
- It should not be located in aquifer recharge zones, archaeological areas or 100-year flood zones.

The MACh new regional sanitary landfill will have the elements and infrastructure required under the applicable Mexican regulations to control and provide proper waste disposal, minimizing the impacts on public health and the environment.

[17] The NOM-083-SEMARNAT-2004 defines a sanitary landfill as the "Infrastructure involving engineering methods and works for the final disposal of municipal solid waste and waste requiring special handling, in order to control environmental impacts through compaction and additional infrastructure. (http://www.dof.gob.mx/nota_detalle.php?codigo=658648&fecha=20/10/2004#:~:text=NORMA%20Oficial%20Mexicana%20NOM%2D083,urbanos%20y%20de%20manejo%20especial).

[18] Draft NOM-083-SEMARNAT-2003, published in the *Diario Oficial de la Federación* on May 10, 2021, includes the condition that final disposal sites must guarantee a minimum useful life of 15 years in order to prolong their use, which will result in considerable economic savings by avoiding the need to acquire more land, build a new facility and dispose of waste at a greater distance from town, thus also benefiting ecosystems by not having another disposal site. (https://www.dof.gob.mx/nota_detalle.php?codigo=5617899&fecha=10/05/2021).

[19] Source: NOM-083-SEMARNAT-2003, Section 6 – Specifications for Site Selection, published in the official gazette *Diario Oficial de la Federación* el october 20, 2004. http://www.dof.gob.mx/nota_detalle.php?codigo=658648&fecha=20/10/2004#:~:text=NORMA%20Oficial%20Mexicana%20NOM%2D083,urbanos%20y%20de%20manejo%20especial).

3.1.4. Land Acquisition and Right-of-way Requirements

As mentioned before, the Project Sponsor is carrying out the studies for selection of the new landfill site, which take into consideration the requirements of the applicable Mexican regulations. Once the site is determined, the corresponding permits and studies will be prepared, as well as acquisition of the land if the Municipality of Chihuahua does not already own it.

3.1.5. Project Milestones

The studies for the new site selection are expected to be completed at the beginning of the third quarter of 2022. Therefore, the Sponsor will acquire the land during the same period and thus give continuity to the final designs on the new site. Based on the above and in compliance with the Financial Discipline Law, it is estimated that the Municipality of Chihuahua will initiate the procurement process for loan financing for the Project at the end of the second quarter of 2022.

In addition, the decree by which the Congress of the State of Chihuahua authorized the municipality to contract financing with any financial institution that offers the best market conditions, must be fully repaid by September 8, 2027, with a repayment period of up to sixty months. Therefore, to use the maximum term of the loan, the Sponsor expects to make the first disbursements at the beginning of September 2022. Due to the times of its internal process, it will initiate the procurement process for loan financing at the end of the second quarter of 2022.

The Sponsor will have to obtain the corresponding environmental authorizations before construction. Table 1 presents the current status of key tasks and due dates for Project implementation.

Table 1
PROJECT MILESTONES

Key Milestones	Status
Procurement of Project loan financing	Expected in 2nd quarter of 2022
Studies for selection of new landfill sanitary site in accordance with NOM-083-SEMARNAT-2003	In process (expected in 3rd quarter of 2022)
Land acquisition of the new site	Expected in 3rd quarter of 2022
Final designs for new landfill construction	In process (expected in 3rd quarter of 2022)
Chihuahua State environmental clearances*	In process (expected in 4th quarter of 2022)
Municipal land use permit	Expected in 4th quarter of 2022
Procurement for construction of new sanitary landfill	Expected in 4th quarter of 2022
Construction start-up on new sanitary landfill	Expected in 1st quarter of 2023
Design for closure of current sanitary landfill	In process (expected in 1st quarter of 2023)
Star-up to close current sanitary landfill	Expected in 2nd quarter of 2022
Start-up of operations at new landfill	Expected in 3rd quarter of 2023

* The construction of a landfill for the final disposal of municipal solid waste does not require a Federal Environmental Impact Statement.

As shown in the table above and mentioned before, the Sponsor expects to obtain the environmental clearances in the fourth quarter of 2022 but plans to procure the loan financing during the second quarter of 2022. In order for NADBank-COFIDAN to participate in the financial bid process, the Board of Directors must approve the certification of the proposed Project by the

end of the second quarter of 2022, with the understanding that NADBank-COFIDAN will include in the credit agreements that should not approve any disbursement for construction until the Sponsor has obtained the corresponding environmental permits.

3.1.6. Management and Operation

The administration of the Project will be the responsibility of the Department of Municipal Public Services of Chihuahua, which is composed of two offices: Office of Multiple Services and Office of Urban Sanitation. The latter is in charge of carrying out and coordinating activities related to the collection, transfer, and final disposal of non-hazardous solid waste in the Municipality of Chihuahua in accordance with current regulations.[20]

The Office of Urban Sanitation has 18 staff members assigned to the sanitary landfill operation, handling yard operation activities, heavy machinery, scales, etc. The landfill has an inventory of equipment and machinery leased per hour of operation and operated by personnel from this Office. The equipment and heavy machinery are used to: i) transport and compact waste; ii) transport and compact soil to cover the waste; and iii) for support functions. The equipment is in good working condition, meets operational needs, and is serviced on a regular basis in accordance with the lease agreements. There are operation and maintenance manuals on site that document routine tasks, as well as procedures for dealing with unexpected conditions and to ensure proper operation of the MSW management system at the landfill. It is expected that this same staff will operate the new landfill once the existing landfill stops receiving MSW and operations begin at the new regional sanitary landfill.

3.2. Environmental Criteria

3.2.1. Environmental and Health Effects/Impacts

A. Existing Conditions

The current sanitary landfill serving the metropolitan area of Chihuahua began operations in 1992, occupies approximately 45 hectares of land and is located northeast of the urban area of the city of Chihuahua. Because of the growth of the urban area, it is currently less than 500 meters (1,674 ft) from residential developments. The landfill has two cells with a total capacity of 5 cubic hectometers (hm^3). Based on current MSW generation, its overall useful life will end in 2023. Cell No. 1 began receiving MSW in 1992 and was closed in 2010, with the installation of perimeter leachate control systems and 28 biogas flares. Cell No. 2 currently receives an average of more than 1,100 tons a day of MSW generated by the towns of Chihuahua, Santa Eulalia, and Juan Aldama.

The current landfill has the following infrastructure in compliance with the applicable Mexican regulations:

[20] Source: Internal Regulations of the Municipality of Chihuahua, Article 58, (http://www.municipiochihuahua.gob.mx/Transparencia/AD/81?file=636021168642077808/REGLAMENTO%20INTERIOR%20DEL%20MUNICIPIO%20DE%20CHIHUAHUA.pdf).

- *Administrative offices*: For use of the administrative staff in charge of the site.
- *Security booth*: Located at the entrance to the landfill, to control the entry and exit of all vehicles, as well as any irregularities (i.e., uncovered, unsafe or other loads) and to prevent the entry of prohibited materials, such as liquids or hazardous waste.
- *Scale*: Located next to the security booth, it is used to weigh vehicles and keep track of the MSW received at the landfill. It uses a weighing system software to record the data for each vehicle, including the weight of the RSU, amount of charged if applicable, as well as generates invoices or receipts and weight documents.
- *Leachate tank*: The leachates generated in the cells are discharged by gravity in this tank and is located below the slope of Cell No. 2.
- *Leachate recirculation pond*: Located at the crown of Cell No. 1 and is connected by a pipe to the leachate tank, the liquid from the tank is discharged to this pond.
- *Mechanical workshop*: Located on the northwest side of the site, preventive and corrective maintenance work on the landfill equipment and machinery is carried out inside the workshop.
- *Heavy equipment*: The equipment and machinery used in the landfill include two Caterpillar D9 bulldozers, a garbage compactor, a front-end loader and two water tank trucks to support MSW compacting and dust control.

To control the leachate, the sanitary landfill has several pipelines at the bottom of the cells, which drain into a concrete-lined perimeter gutter to convey the liquid to the leachate tank. From there the leachate is conveyed by a tank truck equipped with a centrifugal pump to the recirculation pond located at the crown of Cell No. 1. The geomembrane that was originally installed is now fully covered throughout the landfill, both on the bottom of the cells, as well as on their slopes and edges, so it is not possible to inspect or maintain it. However, according to the Sponsor, the landfill personnel continuously monitor the flow of leachates discharged into the tank, which indicates that these liquids are flowing out of the cell.

Because Cell No. 2 is still in operation, there are no gas collection pipes yet. They will be installed in due course to not interfere with the operation of Cell No. 2. Due to negligible methane gas emissions, fire prevention measures are currently in place in this cell and in the landfill in general, such as avoiding open flames and smoking in the cell areas and adjacent areas.

The MSW received at the landfill is spread in a previously delimited area and compacted in layers during the day. Before the end of the workday, the area with the compacted waste is covered with a layer of soil, which is then compacted again, reducing the likelihood of the outbreak of fires, and inhibiting the proliferation of harmful fauna, mainly rodents and flies, since they cannot easily access the waste for food or burrows. It also reduces the amount of waste exposed to the weather, thus minimizing the dispersion of litter, microorganisms, and dust in the area, as well as mitigating or eliminating odors and gases emanating from the landfill cells.

The Chihuahua landfill has been in operation for 30 years and is thus expected to reach full capacity in the near future, which is why the Municipality of Chihuahua is in the process of selecting and designing a new sanitary landfill, which is expected to have a useful life of at least

20 years. Consequently, based on population growth projections, the new site will have a surface of approximately 200 hectares.

B. Project Impacts

The inadequate management and disposal of MSW can generate harmful impacts on public health and the environment, especially when the waste contains toxic compounds. Among the risk factors that must be addressed are:

- *Biogas generation*. MSW confinement sites generate various gases, some of which are greenhouse gases. The largest quantities of gas produced are methane and carbon dioxide.
- *Release of ozone-depleting substances (ODS)*. These substances are released into the atmosphere when empty aerosol cans or household appliances containing them are not disposed of properly.
- *Soil and water contamination*. MSW generates liquids during its decomposition process that can pose a risk of contamination for the soil and adjacent water bodies.
- *Proliferation of harmful fauna and transmission of diseases*. When MSW is not adequately covered, their accumulation generates an environment conducive to the proliferation of disease-carrying fauna since it acts as a source of food and shelter.

The implementation of this Project will help prevent the negative impacts caused by the inadequate disposal of municipal solid waste. Based on studies and designs developed for the Project, the infrastructure and equipment will comply with applicable Mexican regulations and legislation. In particular, the Project will prevent the proliferation of harmful fauna and will control stormwater and manage the gases generated by the decomposition of organic matter, which will help protect the environment and public health.

The construction of the new regional sanitary landfill will facilitate ongoing waste management services and the proper disposal of approximately 1,100 tons of MSW in compliance with Mexican regulations for near a million residents in the MACh

Finally, the Municipality of Chihuahua is developing strategies to engage the general population and corporations in MSW recycling and valorization in order to keep reusable materials from ending up in the landfill and/or being illegally dumped. This effort is included within the scope of the agreements signed with UACH, as explained in section 3.1.2. Project Scope of this proposal.

C. Transboundary Impacts

No negative transboundary impacts are anticipated as a result of this Project since it will be implemented approximately 190 km (118 miles) south of the U.S.-Mexico border.

3.2.2. Compliance with Applicable Environmental Laws and Regulations

A. Environmental Clearance

In accordance with Article 6 of the Chihuahua State Law of Ecological Balance and Environmental Protection, the State of Chihuahua is responsible for regulating the infrastructure, facilities, and equipment for managing and disposing of non-hazardous solid waste. Similarly, Article 41 of the aforesaid law indicates that prior to initiating the construction of a sanitary landfill infrastructure or facilities, authorization regarding their environmental impact must be requested from the Chihuahua Ministry of Urban Development and Ecology. Therefore, the proposed Project must obtain environmental clearance from state government. Likewise, the Sponsor must obtain the necessary construction and land use permits from the respective municipal government agencies, prior to the construction start-up.

With respect to federal permits, it may be necessary to consult the National Institute of Anthropology and History (INAH) to determine any potential impacts to archaeological, historical, or cultural resources in the area selected for the new landfill. Likewise, if the selected site is classified as “forest land,” it may be necessary to request land use change authorization from SEMARNAT, which entails submitting a technical study to justify the change. The scope of the agreements signed with UACH includes the determination, preparation and submission of the documentation required to obtain the environmental clearance applicable to the Project.

Due to the fact that the studies for the selection of the new site are being prepared, the corresponding environmental authorizations are not yet obtained; therefore, the NADBank-COFIDAN will establish in the credit agreements the condition that the Sponsor must have the environmental permits in advance of the approval of the disbursements for the construction of the new regional landfill.

B. Mitigation Measures

The Environmental Impact Statement that will be prepared by the Sponsor will analyze and assess the impacts that Project implementation may have on the environment and natural resources, in order to establish the conditions to which its execution will be subject, to prevent or minimize adverse effects on the environment, as well as the contingency measures to mitigate them. It is also expected that the resolution for the authorization of the closure, construction, and operation of the new site will include various conditions to mitigate, prevent or avoid pollution to the environment. Some of the mitigation measures that are typical to be practiced during the implementation of these projects are:

- The application of water in the soil to reduce the emission of dust particles
- Vehicle tune-ups to reduce air emissions
- Placement of warning signs to prevent potentially hazardous situations

The infrastructure to be built and the equipment to be installed that will be carried out for Project implementation will help prevent harmful effects on the environment and public health deriving from the inadequate disposal of municipal solid waste. Some of the mitigation measures that will

be carried out in accordance with the final designs during the construction, operation, and closure phases of the Project, are presented below.

Current Sanitary Landfill - Closure

- *Site closure and final use.* The activities to close the site and configure its final use will be in accordance with the land use authorization approved by the competent authority and the characteristics of the facility to ensure that air, water, and soil contamination is prevented or avoided.

    - *Final closure cover*. A layer of natural or synthetic material or a combination of both will be placed on the site's surface to isolate the MSW to minimize erosion and the infiltration of liquids into the cells, control the release of biogas, and provide adequate water rain protection.

    - *Management and control of biogas*. Infrastructure will be installed for use and or flaring the gas generated in the closed cells, based on the volume established in the designs, thus minimizing the release of greenhouse gases into the atmosphere.

    - *Maintenance and monitoring program*. The Sponsor shall develop a maintenance manual to detect any risk to the environment and to preserve the infrastructure for the control of biogas, leachate, the final cover layer, and the overall appearance of the site.

New Sanitary Landfill – Construction

- *Site Selection*. To prevent harmful impacts to the environment, the new facilities must be at least 500 meters (1,640 ft) from the limits of urban areas or surface water bodies and may not be located in protected natural areas, flood plains, aquifer recharge zones or archaeological areas, nor over geological cracks, faults, or caves.

- *Leachate control infrastructure*. To prevent contamination of water bodies, the site must have a natural geological barrier or an equivalent impermeable system to reduce and prevent the flow of liquids out of the cell. The proposed Project will have a system for leachate collection, and control.

- *Emergency Area*. The site must have an area for receiving MSW in the event that a natural disaster or meteorological event, preventing daily operations at the working front of the new landfill. This area must have the same environmental and health protections as regular operating landfill cells.

- *Complementary infrastructure*. The facility design must include infrastructure for employees' safety, prevent the entry of unauthorized personnel, and control vehicular traffic, such as access roads and interior roads, a perimeter fence, security booth, and first-aid station.

New Sanitary Landfill – Operation & Maintenance

- *Biogas control infrastructure*. Once the volume and age of the waste reach the stage of generating biogas, systems must be installed for its extraction, collection, conveyance, and control in order to prevent or reduce the release of greenhouse gases into the atmosphere.

- *Daily operation*. To control the dispersion of light materials, proliferation of harmful fauna and stormwater filtration, the waste will be covered and compacted on a daily basis, in accordance with Mexican regulations. Measures will be adopted to prevent hazardous liquids or waste from being deposited in the landfill.

- *Administrative controls*. The Sponsor must have an operation manual that establishes procedures for tracking the generation and management of leachates and the sequence for filling the cells; instructions and protocols for access to personnel, vehicles and MWS; maintenance procedures for equipment and machinery; staff training; internal regulations and emergency plans, etc.

- *Monitoring programs*. Programs for monitoring leachates and biogas should be established to protect the integrity of the site, as well as to prevent contamination of the air, soil, and bodies of water.

By implementing best practices for the operation of the landfill and complying with the standards indicated in the applicable Mexican regulations and legislation, any potential environmental impacts associated with the Project can be minimized. In addition, the Sponsor will be responsible for ongoing coordination with local authorities and must comply with any requirements, authorization procedures, or recommendations that may be issued during the useful life of the Project.

C. Pending Environmental Tasks and Authorizations

Currently, the Project Sponsor is developing the studies and designs for closure of the current sanitary landfill and for site selection, construction, and equipping of the new regional sanitary landfill. The required environmental authorizations will be obtained prior to construction start-up and the disbursement of the proposed NADBank-COFIDAN financing.

3.3. Financial Criteria

The total estimated cost of the Project is $158.6 million pesos. The Municipality of Chihuahua plans to finance the Project with internal resources, as well as debt. In accordance with the Financial Discipline Law for States and Municipalities, the Sponsor will carry out a competitive process to obtain the best financing conditions for the Municipality for an amount of up to $132.0 million pesos (US$6.7 million)[21] to partially finance the solid waste Project.

[21] Unless otherwise noted, all U.S. dollar figures are quoted at an exchange rate of $[19.7443] pesos to the dollar, according to Banxico.org.mx on April 04, 2022.

Table 2 shows the uses and sources of funding.

Table 2
USES AND SOURCES OF FUNDS
(Million MXN)

Uses	Amount	%
Current landfill closure	$ 48.6**	31
Land acquisition and construction of new landfill	$ 110.0**	69
TOTAL	**$ 158.6**	**100**
Sources	**Amount**	**%**
NADBank-COFIDAN loan	$ 132	83.2
Municipality of Chihuahua, Chihuahua	$ 26.6	16.8
TOTAL	**$ 158.6**	**100**

* Includes supervision, contingencies, and financial costs.
** The costs are approximate due to the studies and designs being prepared.

The source of payment for the loan will be a percentage of the Municipality of Chihuahua's federal tax revenue ("*participaciones*") derived from the General Fund. The Municipality will assign part of its current and future participations and will irrevocably instruct the Ministry of Finance and Public Credit of the State of Chihuahua (SHEC) to deposit these funds in a trust that will serve the payment mechanism.

NADBank-COFIDAN's preliminary analysis verified that the Project Sponsor has the legal authority to contract the financing and to pledge the revenue for the payment of the debt obligation. Moreover, considering the characteristics of the Project and based on the financial and risk analysis performed, the proposed Project is financially feasible and presents an acceptable level of risk.

4. PUBLIC ACCESS TO INFORMATION

4.1. Public Consultation

NADBank released the Draft Certification and Financing Proposal for a 30-day public comment period beginning on May 6, 2022.

The document outlines the interest of NADBank-COFIDAN to participate in a potential competitive bidding process to provide public financing up to $ 132,000,000 pesos to the Municipality of Chihuahua for the construction of the new landfill, under the Law of Financial Discipline for States and Municipalities.

4.2. Outreach Activities

NADBank conducted a media search to identify public opinion regarding the Project. References to the Project were found on several websites, as indicated below:

- *El Diario de Chihuahua* (March 8, 2022), "*Continúan estudios para nuevo Relleno Sanitario"* [Studies ongoing for new sanitary landfill]. The article mentions that by mid-year, the preliminary studies are expected to indicate adequate alternatives and most importantly, the location of the new landfill.
  https://www.eldiariodechihuahua.mx/local/continuan-estudios-para-nuevo-relleno-sanitario-20220308-1906144.html

- *El Heraldo de Chihuahua* (March 6, 2022), "*De 18 a 20 meses de vida para el relleno sanitario: Bonilla"* [18 to 20 months of life left in sanitary landfill, says Bonilla]. The mayor reported that the current sanitary landfill has approximately 18 to 20 months of useful life left. The Administration is working hard to carry out the Chihuahua Metropolitan Sanitary Landfill project.
  https://www.elheraldodechihuahua.com.mx/local/chihuahua/de-18-a-20-meses-de-vida-para-el-relleno-sanitario-bonilla-7953381.html

- *Omnia Cuauhtémoc* (February 28, 2022), "Niega Castrejón interés por alcaldía por oposición al financiamiento del Relleno Sanitarios" [Castrejón denies that his opposition to the financing of the Landfill is due in his interest to be next Chihuahua's mayor]. The article mentions that the congress representative Oscar Castrejón denied his position against the landfill's financing because it generates problems for his political party.
  http://www.omniacuauhtemoc.com.mx/noticia/210227

- *El Heraldo de Chihuahua* (February 1, 2022), *"Construcción del relleno sanitario quedaría en ejercicio fiscal 2022"* [Construction of sanitary landfill in fiscal year 2022]. The article mentions that the financing for construction of the new sanitary landfill may be contracted in fiscal year 2022.
  https://www.elheraldodechihuahua.com.mx/local/chihuahua/construccion-del-relleno-sanitario-quedaria-en-ejercicio-fiscal-2022-7805574.html

- *Norte Digital* (July 18, 2021), *"Espera Bonilla que nuevo relleno sanitario sea su 'gran legado'"* [Mayor Bonilla hopes the new landfill will be his 'great legacy']. The article mentions that the mayor elect Marco Bonilla hopes that the work "will be his greatest legacy in public office."
  https://nortedigital.mx/nuevo-relleno-sanitario-sera-el-gran-legado-de-bonilla/

The articles identified above provide general information on the need for the Project and the benefits for the residents deriving from implementation of the Project. Only an article that mentions the opposition of a congressman to the decree that authorized the debt for the project was discovered.