Instituto Dominicano de Desarrollo Integral, Inc.

DESCRIPTION WATER AND SANITATION SYSTEM VILLA NIZAO COMMUNITY, MUNICIPALITY OF PARAISO, BARAHONA PROVINCE

May, 2020
Santo Domingo, Dom. Rep.

A. INTRODUCTION:

The Villa Nizao community is located between the coordinates 268254.34 m E and 1994 354.64 m N with vehicular access in very poor condition with very steep slopes and barely passable roads.

In Villa Nizao there are approximately one hundred seventy (170) families, of which ninety (90) are concentrated in one area and the remaining eighty (80) remaining are very scattered about the surrounding mountains. The houses are mostly zinc-roofed wood and a small minority of reinforced concrete. They do not have access to water services safe for human consumption, no available health system whatsoever, and poor sanitation, among other precarious conditions.

The socio-economic level is extremely low, most subsistence farmers with the main source of income coming from coffee growing and to a lesser extent basic vegetables and fruit and livestock.

The community has very weak community organizations. These include the local Parent-Teacher Association (Asociación de Padres, Madres y Amigo de La Escuela), clubs, coffee growing cooperative (Asociación de Caficultores Arca de Noe), Catholic Church committees and others.

Currently, a minority of the inhabitants of Villa Nizao receives the water service by way of an improvised Ø2 inch undependable semi-pressure PVC pipe that is illegally connected to the Ø8 inch steel pipeline of the aqueduct of the Municipality of Paraiso, without any type of treatment or purification, thus causing multiple preventable water borne diseases.

It is in this sense that the Sustainable Empowerment Network, Inc. (SENI) and the Instituto Dominicano de Desarrollo Integral, Inc. – IDDI (Dominican Institute for Integral Development, Inc.) have joined efforts to channel resources and thus support the Villa Nizao community with the construction of a water and sanitation system in order to improve the water supply, sanitation and health of the inhabitants of this community.

The interventions to be carried out in Villa Nizao, consist of two components:

1. Component 1: Infrastructure for water supply and sanitation and

2. Component 2: Social and community strengthening.

B. DESCRIPTION OF THE COMPONENTS:

1. Component 1: Infrastructure:

The Infrastructure Component consists of the construction of two systems, these being the following:

- Water Supply System: An aqueduct to supply water to one hundred and seventy (170) families, of which ninety (90) families that are located in the town of Villa Nizao will be supplied with water through household connections and for the remaining eighty (80) families that are dispersed Two collective water points will be built on the hill.
- Sanitation System: A shared ownership sanitary sewerage system for ninety (90) families connected to the network and the construction of 45 sanitary units in Villa Nizao.

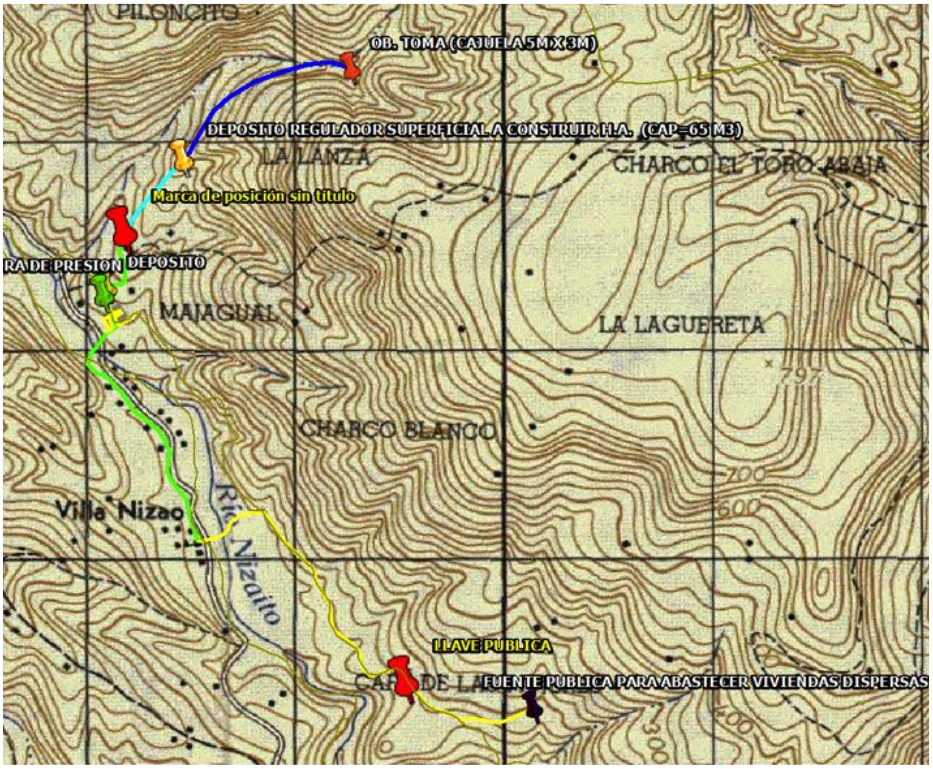
In more detail these are the following:

a. Water Supply System:

The elements that make up the water and sanitation system of the Villa Nizao community are the following:

- *Water Source:* The source is a spring called Arroyo Culebra from which flows by gravity the water required by the target population. The inhabitants affirm that this stream has never dried up, which guarantees a permanent flow of water.

- *Source Water Collection Structure:* This is a structure located in the Arroyo Culebra spring, designed to assure the flow of water required by the community that then is channeled by a system of pipes to a water storage / settling tank.



- *Settling Tank:* As its name implies it is a small tank that serves to retain and separate the sands / soil that are naturally found in the water that comes from the Source Water Collection Structure.

- *Adduction Line:* This is a Ø4 "PVC (SDR-21) pipe leading the flow from the water source through the Settling Tank to the water storage tank. This piping system is comprised of a series of devices required for its proper functioning, such as: suction cups, breaks load, pressure regulating valves, elbows, etc. The water is channeled in pressure pipes by gravity is PVC (depending on the terrain) and in some other sections in polyethylene tubing.

- *Chlorine Dispenser:* This is a container with chlorine and water, which slowly, by means of a hose, empties its contents into the water that comes out of the filter, and then passes to the water storage tank.

  Chlorine is used to eliminate bacteria, fungi and viruses that water contains and makes it suitable for human consumption, that is, in drinking water.
- *Water Storage Tank*: This refers to the surface storage tank built in reinforced

concrete with a capacity of 65m^3, designed for a projected population growth of 20 years. It is where the treated water is stored using with the previously mentioned chlorination system. A water storage system is indispensable to the Project due to the fact that it guarantees a normal flow in dry seasons and at peak demand times; this in contract to a purely gravity fed system.

- *Matrix or Conduction Line:* Refers to the Ø4" PVC pipe (SDR-26) that leads the water from the water storage tank to a point of distribution in the community.

- *Distribution Networks*: A set of Ø3 "PVC pipes (SDR-26), and accessories from the point of distribution channeling the water to each and every user through the existing streets in Villa Nizao.

- *House Level Connections:* This refers to the section of Ø1/2" PVC pipe (SDR-26) that channels the potable water from the distribution network to each of the 90 individual houses / families, as well as to supply water to the sanitary units.

- *Water Points:* Because of the scattered distribution of the remaining 80 families that live in the surrounding hills and the fact that it would be too expensive to build an individual house level water supply system to each of them, it was decided that 3 collective water points would be constructed at places accessible and comfortable to all of the target families previously referred to.

b. Sanitation System:

As stated previously and due to budget constraints, only 45 sanitary units will be constructed, one for every two of the ninety (90) families in Villa Nizao.

The technical description of the units and the sewage disposal system is the following:

- Foundation of an excavation 0.45cm width and 0.60cm deep with cement blocks of 6" (15cms), with a 3/8" rebar at 0.80cm distance.
- The walls will be built with cement blocks of 6" (15cms), with a cement plaster finish and painted. The floor will be ceramic with a reinforced concrete ceiling, a window and a metal door.
- Toilets, sinks and showers will also be installed, all with hydraulic discharge.
- Each of the sanitary devices will be connected to a register with its cover, with a slope from the floor level and hermetically sealed registers.
- The horizontal dry wetland piping will be placed on a bed of compacted sand with a minimum thickness of 10 cm. and after verifying the proper operation of said pipe, it will be covered with fill material free of stone or debris that may damage the network. In all cases, it will be compacted with filling material in layers no larger than 20cm using 10 kg manual tampers to achieve protection and care of the discharge.
- For the discharge of the sanitary units, a hermetically closed three-chamber trench will be built where the absence of air and light will favor the proliferation of

microorganisms that feed on organic matter, converting it into liquids and gases, and the solids remain for a while to produce sedimentation.

- In the first chamber there will be a sedimentation process where the solids will remain, in the second chamber there will be a digestion process where the floats will be and in the third chamber a stone filter will be installed that through a process of bacteria retention that will remain attached to the surface of the rock mantle placed in this treatment unit, they will help to produce a final dose of purification of the waters that pass through them.
- The septic chamber will be built on 6 ”block walls, tarnished to prevent leaks, a bottom and top slab in reinforced concrete with a 3/8” rod, a 80 x 80 cm concrete cover and with vents according to the regulations and standards of the City Council of the Municipality of Paraiso and the Ministry of the Environment.
- The conduction pipeline from the sanitary modules to the septic tank is above the average flow rates and covers any infiltration flow that may occur in times of large floods. In this sense, it is considered that not only will the waters of the sanitary equipment go to the pit, but that in times of heavy rains there will be an additional flow that is infiltration, therefore for the size of the pit a flow will be estimated maximum hours of wastewater from 1 to 3 liters / sec / ha.
- With this estimate, the pit will be adequately built so that it can accept a maximum flow at a maximum speed, without water causing erosion in the material of the drag lines, which is achieved by controlling slopes and maximum and minimum permitted speeds by the rules.

2. Component 2: Social and Community Strengthening:

In order to organize the Villa Nizao community for the care and maintenance of the constructed water and sanitation systems and following the protocol established by the National Institute for Water and Sanitation (INAPA), the Project will create a community based organization called ASOCAR (Community Association for Rural Aqueducts). The ASOCAR will be trained by IDDI and INAPA in the following:

a. *Social Management:*

- Community participation and management.
- Operation manual of the water and sanitation committee.
- Management and resolution of conflicts.

b. *Risk Management:*

- Management, contingency and analysis plan for quick responses that mitigate the impacts to the collective drinking water and sewerage systems.
- Risk management: Before, during and after.
- Prevention, mitigation and evacuation.

c. *Management and Administration of the Water and Sanitation System:*

- Administration and accounting.
- Tariff system, cost structure and user collection management plan.

d. *Gender and Equity:*

- Water and gender: Manifestations of gender and violence, socializing agents and the participation of women in water systems and in community social processes.
- Training in water culture with a gender focus.

e. *Water and Sanitation:*

- Environmental and health education
- Operation and maintenance of the collective drinking water and sewerage system.
- Training on testing and handling kit for water quality control.

ANNEXES

A. BUDGET

B. TECHNICAL DRAWING SANITARY UNIT