Project Description

Design a gravity fed water system
- Distribute and disinfect the water
- Serve 13 homes, approximately 78 people

Previous gravity-fed water system
- Constructed by Panamanian government
- No longer functioning
- Much of the infrastructure still exists

Community Background

Cerro Ortiga II
- Subsection of the larger community Cerro Ortiga
- Located in the Comarca of Ngöbe-Buglé
- Approximately 600 citizens
- Sprawls across approximately 15-20 square miles
- 1.5-to-2-hour hike from the nearest bus stop
- Steep and rocky terrain

Common issues
- Remote location
- Transportation of materials
- Medical attention
- Lack of sanitation and clean water sources
- Lack of water during the dry season (February through April)

Data Collection

Community Surveying
- Surveyed distances and elevations of the system
- Steep hills and thick vegetation
- Equipment
  - digital rangefinder
  - abney level
  - tape measure
- GPS

Spring Flowrate
- Nalgene water bottle with known volume was filled
- Time to fill was recorded

Water quality
- Tested spring source for microbes using 3M petrifilm

Data Analysis

EPANET model
- Designed using the data collected
- Simulate:
  - the demands
  - pressures throughout the system
  - tank water level

Hydraulic Grade Lines (HGL)
- Ensure no negative pressures
- Ensure within safe pressure limits

Spring Flowrate
- The rate was measured at 1.13 gpm
- Average of 11.6 colonies per petrifilm
- No E-coli was found at the spring source

Cost Estimate and Construction Schedule

Cost estimate
- Community will apply for a government grant of $8,000 to fund the project
- Final cost is estimated to be $7,900
- Includes all materials and equipment
- Labor costs are not needed
- Community members will be constructing the system

Construction Schedule
- August 1, 2017 to October 26, 2017
- During the rainy season

Design Details

Spring Box
- Contain and direct water coming from a natural spring
- Constructed from reinforced concrete

Rainwater catchment
- Provide water to a laundry area that is located in front of the spring box
- Capture approximately 145-180 gallons/month of water

Chlorinator
- Release free chlorine into the water to eliminate bacteria
- Located before holding tank

Storage tank
- Hold 270 cubic feet, or just over 2000 gallons
- Constructed from reinforced concrete

Pipeline
- Approximately 5654 feet with a total elevation change of 375 feet
- Constructed of 1.5 inch and 1 inch SDR 26 PVC piping
- The main line will be 1.5 inch, and the branches will be 1 inch in diameter

Pipe Crossings
- Five pipe crossings
- Suspension bridges will be constructed for each crossing

Air valve
- Release air trapped in the pipeline

Pressure release valve
- High pressures occur in the pipeline
- Reduce pressures from approximately 150 psi to 45 psi

Tap Stands
- A tap stand built at each of the 13 homes
- Constructed of 4-inch by 4-inch wooden posts that the PVC pipe will be clamped to

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