Valle Risco Water Distribution System Improvements
Bocas del Toro, Panama

Background

- Sultan Consultants traveled to Valle Risco, Panama in Summer 2019 (Fig. 1)
- Valle Risco has a population of 500 and is inhabited by the Ngabe indigenous people
- The team worked with the established Water Committee and their Peace Corps Volunteer, Tristan Odekirk, on their current water distribution system
- Current water distribution system is sourced by two streams supplied by springs

Problem

Problem Statement: The community of Valle Risco does not have a safe or reliable water distribution system.

- No water storage tank for times of drought
- No water treatment in place
- Current water pipeline is unburied PVC pipe (Fig. 2)
- Frequent breaks and leaks (Fig. 3)
- Villagers experience times of no water

Data Collection and Analysis

- Current water distribution pipeline was surveyed (Fig. 4)
- Water quality was tested at sources and tap
- E. coli was found in water and can cause illness (Fig. 5)

Proposed Design

Hydraulic Model

- EPANET™
- Inputs
  - Survey Data
  - Water Demand
  - Tank Parameters
- Calculates & Models (Fig.6)
  - Flow Rate
  - Daily Water Usage
  - Pipe Diameters
  - Pressure

Sedimentation Tank

- Removes large suspended particles by gravity settling (Fig. 8)
- Wiers control velocity & distribute water evenly
- Particle settling ramp aids in cleaning
- Floor and roof slabs built of poured concrete and rebar
- Walls built of concrete block and rebar
- All tanks built similarly

Slow Sand Filtration Tank

- Removes small, dissolved particles, and some pathogens (Fig. 10)
- Removes particles by physical straining and biological uptake
- Mixture of sand and gravel filter media (Fig. 9)
- Layers:
  1. Large gravel
  2. Medium gravel
  3. Small gravel
  4. Fine sand
  5. Biofilm

Chlorine Disinfection

- Ensures water quality by deactivating pathogens
- Eliminates remaining E. coli and coliforms that pass the filtration tanks
- Chlorine pucks will be placed at the storage tank inlet

Storage Tank

- Volume is built for a 20 year estimated population’s single day’s use
- Assuming the average person uses 30 gallons/day
- 14,000 gallons

Stream Pipe Crossings

- 5 stream/pipe crossings throughout system
- Pipe will be suspended by cable and stringers (Fig. 13)
- Anchors will hold the cable in place
- Ensuring pipe stability and rigidity against debris in the streams

Cost Estimate

- The estimated cost of the system is $10,000
- Assuming donated labor
- All new PVC pipes and concrete blocks for tank account for $7,000 of estimate
- There is currently no funding secured to implement these improvements
- Tristan will search for available grants or other funding

Construction Schedule

- Constructed by the residents of Valle Risco with Tristan’s guidance
- Estimated duration 3-6 months
- Trenching and pipe laying will take 2-3 months
- Construction of tanks will take 1-2 months

Looking Forward

- Design will be sent to Tristan in Valle Risco, along with an operation and maintenance manual
- Tristan will share design with Water Committee and advocate for construction
- Funds will need to be acquired in order for design to be built

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