

TEAM 21: HYDROBROS

Carly Bogdajewicz, Joshua Butuyan, Glory Lee, Abbey Stingley

INTRODUCTION:

Access to clean water is a worldwide problem that unfortunately, does not have a single solution. This is because not all water is the same in every area, requiring different types of treatment methods.

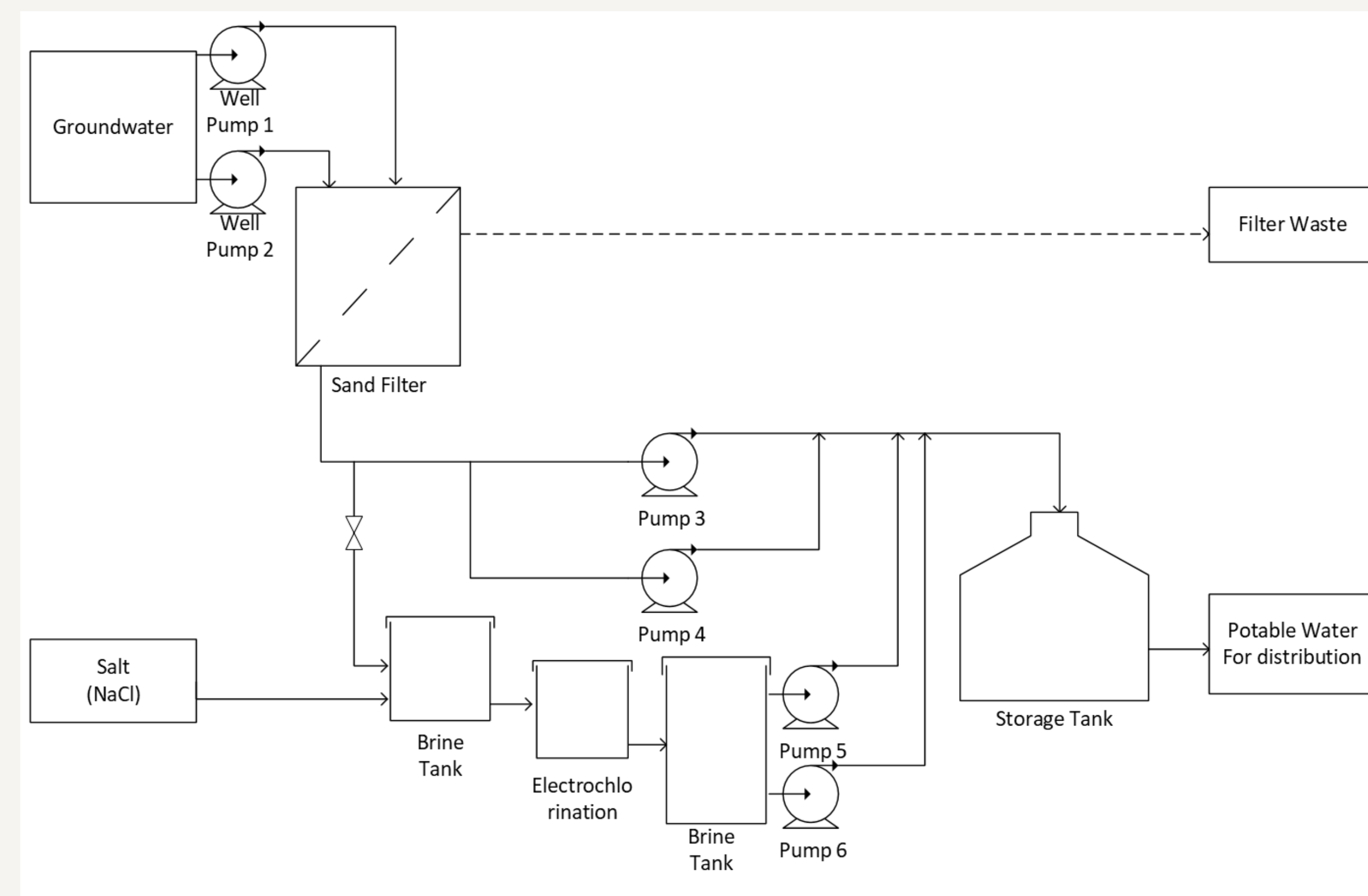
88% of the Rwandan population lacks access to safely-managed drinking water services. Our project was designing a water treatment plant that will allow for a group of villages in Rwanda (Rudashya) to have access to clean water year round. To do this, our design utilized a slow sand filter and electrochlorination system



DESIGN SPECIFICATIONS:

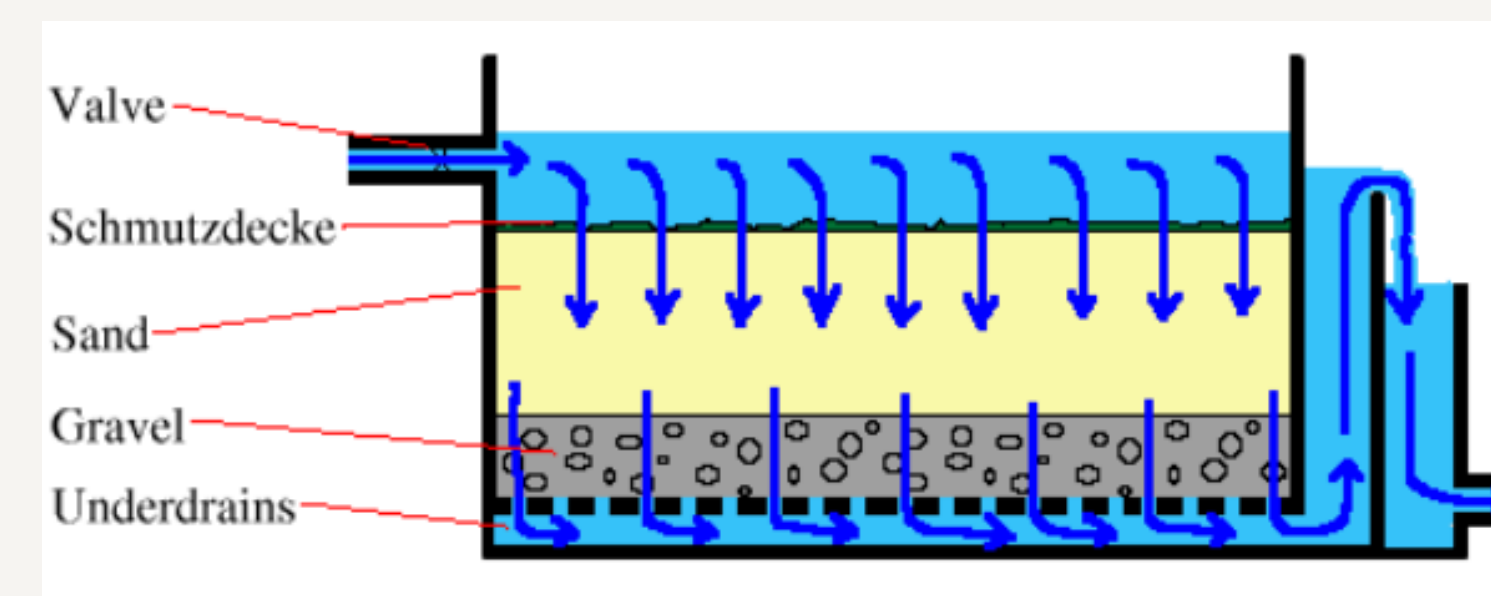
- System does not require extensive technical knowledge to run
- Culturally appropriate materials and implementation
- System lasts between 10 to 20 years
- System provides 40,000 liters of water per day
- Water product is clean, with hypochlorite levels of 0.3 ppm
- Backup pumps are available to ensure that it could be run at constant duty
- Solar panel produce more than enough energy needed to run the system

PROCESS FLOW DIAGRAM:



OUR DESIGN:

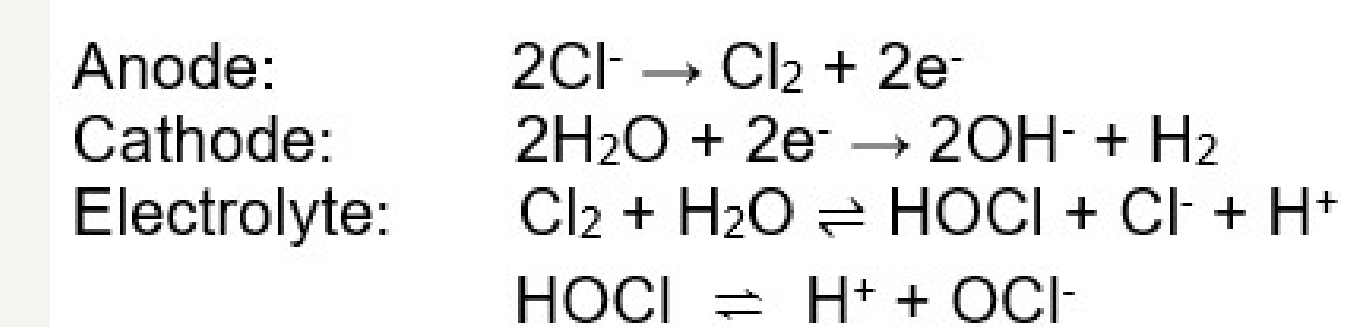
Separation Step: Slow Sand Filtration



Our slow sand filter is made from concrete, sand, gravel, and perforated pipes. There will be total of 5 layers of sand, each being 3" in depth with varying sized particles at each layer, starting at 2mm and ending at 19 mm. The filter is 20m².

The sand will be replaced every 5 years, with the top 1/2" layer of sand scrapped every 2 weeks in order to get rid of the biofilm created by waste to be taken out, preventing any clogging at the bottom of the filter.

Reaction Step: Electrochlorination



Our system creates a 30 liter batch of 6000 ppm ClO⁻ every 14 days. Chlorine will be dosed into the system at a 0.08 L/hr



OTHER EQUIPMENT:

Pumps

- DAYTON submersible deep well: goes down to 284ft to pump water to sand filter
- DAYTON centrifugal pumps: goes from sand filter to storage tank and has low maintenance
- CHEM-TECH metering pumps: made out of corrosion resistance material and very easy to fix

Pipes

- PVC: plastic material pipes will be used from wells to the storage tank for the distribution
- 316 SS: stainless steel pipes will be used after electrochlorination to prevent corrosion

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