

Executive Summary

Technical Report Water Kiosk Facility "GDM-2" Rockhill Township, Paynesville, Montserrado County, Republic of Liberia, West Africa

1. Georeferencing and location

The water kiosk is located in the densely populated Rockhill community, which is divided into several blocks in District 6, Montserrado County, with an estimated population of approximately 65,000 people. The area is about 13 km southeast of the capital Monrovia and is a hilly landscape interspersed with palm trees and bushes with a rocky subsoil. There are only dirt roads and the residential areas are passable under difficult conditions, especially in the rainy season. There are numerous shallow draw wells, closed wells and open wells that run dry in the dry season from November to May. There is no water supply in the entire municipal area. Children and women carry their plastic buckets and canisters with unclear water from far away, which they then boil and drink. There is also no electricity anywhere on this rocky hill and the national electricity grid, which is extremely unstable and expensive, simply does not exist on Rockhill. The people in this area are not capable of smelly and expensive generators. Neither waste disposal, nor sewage and storm water management (rainy season) is established here, which has a major impact on the health situation in this area with regard to "waterborne diseases".

2. Project description "Water kiosk GDM-2"

After extensive studies and consultations, this community was selected as a target. In the past, several country-internal and external institutions have attempted to provide water services to Rockhill. The need for water and electricity in this "bush settlement area" is great and that is why the decision was made in favor of this community. Geological assessments pointed to a difficult starting position, but there were indications of existing, presumably water-bearing rock fractures in the subsoil that had to be localized.

a. Preparation of the community / beneficiary

From March 2021, the BTFS team carried out a "baseline study" in order to be able to describe the current starting point for project planning. The following criteria emerged that are important for project implementation:

- Land ownership structure of the planned project zone (well drilling)
- Political structures in the relevant blocks of the Rockhill community
- Indigenous, traditional concerns (pretention & customary rights, egoism)
- Lack of hygiene and environmental awareness in families and schools
- Lack of skills for planning, organizing a functioning community (management)

The BTFS NGO Community Engagement Team, in cooperation with the technical team, developed a master plan on how the community should be prepared for the current project and created a budget for it. The goals of this mobilization were, among other things, the constitution of a municipal steering committee, a working group and the formulation of a declaration of cooperation (MoA). Leadership was to be with the community, while BTFS had an advisory and supportive role. Workshops and community meetings should prepare the way for representatives and the schools of the community to understand what the goal of this water kiosk is and above all that it is understood that it is in the interest of the community to operate and maintain the project independently in the medium to long term (sound understand of ownership and commitment)

The land owner of the first project site signed a land cession to the community and the BTFS technical team, together with a Liberian company, began drilling the first well.

b. Technical project implementation phase 1 by June 2021

- The technical team of the BTFS NGO also created a master plan with a cost ceiling for well drilling, building design, GDM filter technology and photovoltaic system for operating the water pump of around US\$ 40,000.
- In the months of April to June 2021 (rainy season and Corona), preparations were made under difficult conditions to such an extent that the well was drilled at a depth of 70 m at the evaluated site, but no water was found.

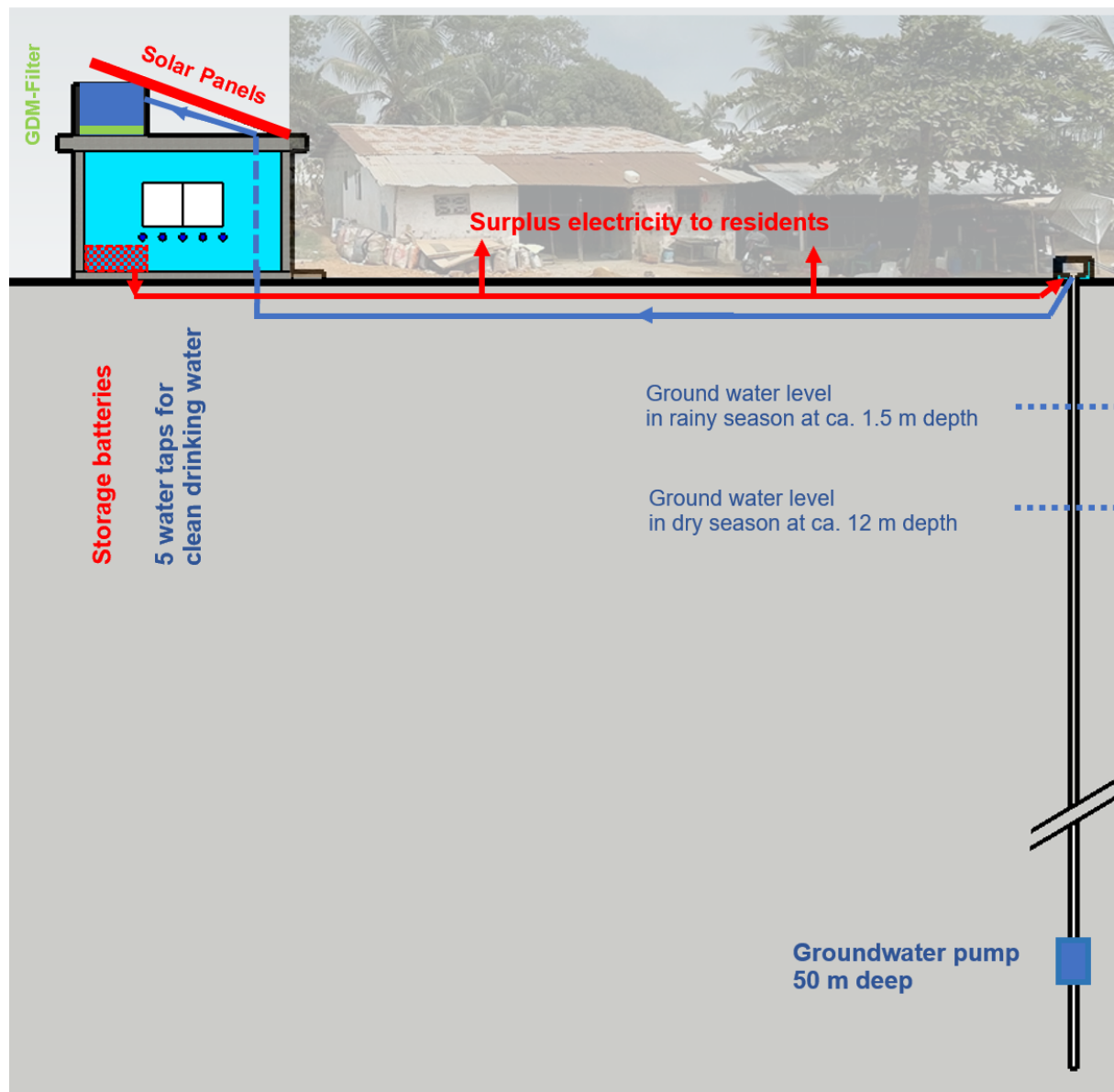
c. Technical project implementation phase 2 by December 2021 / February 2022

- New geological site studies by means of geo-electrical ground investigations (vertical electro sounding) under the guidance of the Swiss geotechnical engineer, Prof. Dr. H.R. Schneider, led to a new promising zone in the municipal area
- The mobilization team and the technical team adjusted their design work to the new conditions. In September 2021 the well drilling was successful. Based on the previous geo-electrical investigations, the drilling to a depth of 60 m hit a water-bearing fracture zone. Initial pump tests resulted in a barely noticeable lowering of the water table, which is a good indication that a productive source has been tapped.
- Negotiations with the new landlord went well and the plant construction with "Supreme Contractors" (building construction) and "Smart Energy" (solar) could be commenced
- With the photovoltaic system installed, the submersible water pump is installed at a depth of 50 m. It pumps groundwater into a 1000 US gallon (3800 liter) water tank on top of the water kiosk building. The GDM membrane filters, installed below the water tank, safely filter out disease-causing coli bacteria and thus the now bacteria-free clean drinking water flows in a second tank (500 US gallons) inside the water kiosk. From there, a pipe leads the drinking water to five water taps outside the building, where water buckets and 5-gallon canisters can be filled within a very short time (approx. 40 seconds). A water meter is installed.
- The water flow depends on the performance of the water pump, the resistance of the piping system to water flow as well as the seepage capacity of the membrane filter.
- More pumping tests are necessary to determine the long-term groundwater regime.
- The solar system generates much more electricity than is needed for the water pumping operation and the LED floodlights on the building. With the additional electricity, people can charge their cellphones and surplus electricity can be fed into the directly adjacent residential huts of families.
- Specifications:
 - Production approx. 6`000 Watt in full sunlight (12 solar panels)
 - Approx. 12`000-Watt storage capacity of the batteries
 - Pumping operation. including floodlight requires max. 1500 watts
 - Surplus electricity is available for LED lamps, mobile phones, residential huts, etc.
 - System with fuses / protective shutdown
 - Power consumption is permanently documented.

3. Operation and management of the "Water Kiosk GDM-2" / Total Project-Cost's

The facility is operated and managed by trained personnel under the supervision and support of the BTFS team, led by our Laryee (Bob) Sannor and Elijah B. Dunoh. The system should be operated economically in such a way that the operating and maintenance costs can be covered. It keeps people busy, they have something meaningful to do and they learn responsibility. The total cost of this project is US\$ 52,000. Around 75% of this is for the technical implementation (two borehole drillings) and 25% for the operation of the teams (BTFS), with training and mobilization engagements in the community

Schematic Rockhill Groundwater Extraction System with Solar Panels on Water Kiosk



Hans R. Schneider,
Prof. Dr.-Ing.

H. Schneider

14.2.2022



The water kiosk project "GDM-2" is finished and ready for operation. The young painting artist Salomon Boakai painted the most important logos very beautifully and clearly, completely freehand and without any tools.



Bob in the technical room of the water kiosk explains the photovoltaic system. The landlord (right) made his property available for the project free of charge.



BTFS Chief Operations, Bob (middle) with BTFS Head Community Engagement Team, Elijah (left) and a plumbing installer. Right picture: Bob receives his new drone from BTFS President Felix F. Walz for aerial surveying and photogrammetric terrain profiles for urban drainage and other needs



Left: To say goodbye to Prof. Dr. Schneider, the team meets at the AFROBEACH Restaurant for a fish meal. Picture right: invitation to a Liberian-lunch with the Gertrude Harmon family (Prof. Dr. Schneider and BTFS Chair, Felix F. Walz)



Gathering under the mango tree in front of the Landlord's family clan residence, with visitors from the immediate vicinity. The people are very grateful that they now have access to water and electricity.



Children flock from all sides to fill the buckets and 5-gallon canisters with clean, GDM-filtered water.