



A HOLISTIC WATER PROJECT FOR GLOBAL OUTREACH SCHOOL, SIERRA LEONE

Reboot2Kids is a Geneva based NGO, focused on improving the lives of children in developing countries through digital literacy and improvement of their access to clean drinking water and sanitation by direct actions with specific schools.

ORIGINS OF THE PROJECT: CHRONIC DIARRHEA, UNSAFE WATER

Our water project for the Global Outreach School in Masantigie, Sierra Leone is to bring improvements to the school to reduce the incidence of diarrhea for the school children. During the 17 years since the school's founding, chronic diarrhea has been a constant occurrence.

OUR HOLISTIC WATER SOLUTION

We have consulted with many experts in the field, and have devised a holistic plan for water and sanitation for the school. We will install a solar pump to the existing borehole well, which will pump water to a 5,000 litre poly holding tank, which is made in Sierra Leone.

From the tank, we will run the water through a water filter, which will filter 99.9% of pathogens out and which is estimated to last around 10 years without needing to change filters or parts to be monitored with the Droople device. Droople offers remote monitoring from any laptop in the world so we can make sure that the water filter is working well and to tell us when it needs to be cleaned. From the filter, we will have one pipe going to two drinking water taps, and a second pipe going to a new concrete handwash station. We also will provide soap for the children.

As Sierra Leone has an extensive rainy season, we would like to help capture this naturally clean source of water to augment the water supply. All the classroom roofs are metal so they are ideal surface collectors of rainwater. We plan to retrofit a gutter into the longest side of one of the classroom buildings, feeding into 2 Milla water tanks, then fitted with a filter and tap spigot.

We selected products that are long lasting, do not require additional electricity, expensive ongoing costs or complicated maintenance to make sure that they can last for a long time at the school. We will include the children in the planning and give them some decisions to take to help them to start their interest in water and sanitation.

ORIGINS OF THE PROJECT– PROBLEM OF CHRONIC DIARRHEA

Our water project for the Global Outreach School in Masantigie, Sierra Leone is to bring improvements to the school to reduce the incidence of diarrhea for the school children. During the 18 years since the school's founding, chronic diarrhea has been a constant occurrence, particularly during dry season and the start of the rainy season. Each year the school's headmaster, Mr. Arthur Vincent recounts that roughly half the school's student body of 450 are affected by diarrhea and some become so ill that they require hospitalization.

Diarrhea is a severe impediment to the children's learning, but even more critical is the risk posed to the children's lives. It is also relatively easy to prevent with measures of drinking water quality improvement and installation of further sanitation measures.

OBJECTIVES

Our objectives for this project are to find a solution to the 17 years of chronic diarrhea at the school. No child should have to be at risk of missing school or worse being hospitalized because of the water available at their school. After a several months long study of the existing infrastructure, we were able to identify where the main problems were and identify a holistic plan to provide a long-term and sustainable solution to the school community.

IMPACT

Improving the water situation at the school will help these children but will make a proportionally larger impact for the girls at the school, who are more likely to miss or drop out of school when they reach menstrual age. In addition, our project will impact the adults of the 5 villages surrounding the school benefit as they come to the school for community activities, and to gather water after school, on weekends and during the summer.



CURRENT SITUATION

After learning of the illnesses at the school and knowing that we could make an important long-term impact for the children's futures, we investigated carefully and realized that the school has already some good measures towards water and sanitation, but it is still not sufficient.

THE WELLS

Currently there are two borehole wells with hand-pumps attached, which means the children do not need to travel very far to access water which is an important step. However, contaminants still are able to enter the water supply, even more so during the beginning of rainy season and during dry season. Run-off water from the well area runs down an open drainage channel, and the water is able to build up and stagnate. This is another possible site of contamination. A government water quality test detected non-fecal coliform bacteria, confirming that a contamination pathway exists between a source of bacteria (such as standing surface water), and the water supply.



The main water pump with handpump, and the drainage canal. Photos taken in August 2021

CURRENT SITUATION

Drinking water

We arranged a water quality analysis test for the well water and found traces of coliform bacteria in the water, which are able to enter through the ground water.

We also discovered that the ways the children draw their water for drinking from the well presents many opportunities for contamination with dirty hands. One way is that the children need to use their hands on the hand pump to draw water out, which they will put into open buckets. Then they will dip their mugs into the water. Multiple children will do the same, potentially contaminating the water in the bucket. Or 20L plastic jerrycans will be filled with pumped water and then brought to other areas of the school for drinking.



Latrines

There are latrine installations on site, however, they are not in very condition and most importantly, there are no handwash sinks or soap nearby. The children generally do not wash their hands after visiting the toilet, if anything, they may rinse their hands in a bucket of water. However, this is not sufficient to remove fecal material and germs which may be on their hands, meaning they can contaminate their food and water afterwards.



WATER SOLUTION PLAN

- Solar pump installed into existing borehole, water drawn to storage tanks, then accessed by spigot taps. This system minimizes the amount of hand contact with water.
- Handwash stations built, so children will wash their hands before eating and after going to toilet. This ensures clean hands to reduce contamination when handling taps, cups etc.
- Uzima XL Hollow Membrane Filter installed before point of use to filter out the coliform bacteria present in the water.
- Rainwater harvesting system, back up supply of clean drinking water and water for community washing.



-  Handwash station
-  Filtered Drinking water taps
-  Water storage holding tanks

COMPONENTS OF PROJECT



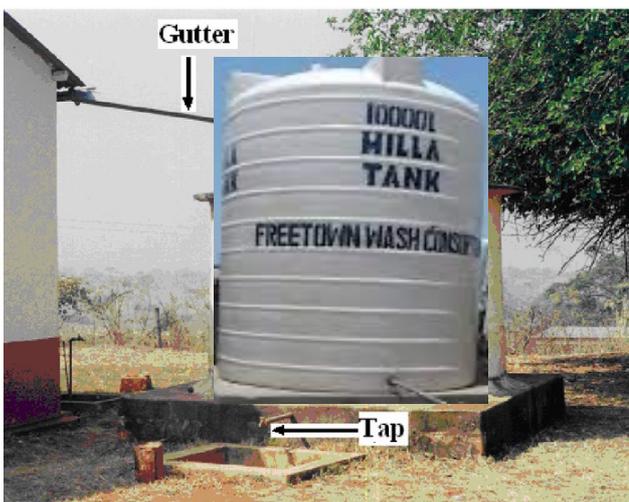
Grundfos solar powered submersible pump SQF 2.5-2.0JP, for installation into existing borehole well



Uzima XL- hollow membrane filter, in line piping. No need for replacement cartridges, estimated 10 year lifespan. 1 for front system tank and 1 for rainwater harvesting tanks.



Locally produced in Sierra Leone Milla Tank for water storage, 1 x 5,000L for front, 2 x 10,000 L for rainwater holding



Rain gutter added to existing metal roof feeding into the Milla tanks



Handwash and drinking tap station with concrete base.

RAINWATER HARVESTING SYSTEM



Existing classroom building, with metal roof to be fitted with new gutter to feed into storage tanks

Annual Rainfall Freetown, Sierra Leone

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Precipitation mm (in)	3.4 (0.13)	3.6 (0.1)	12.5 (0.5)	46.9 (1.8)	177.2 (7)	323 (12.7)	734.3 (28.9)	791.1 (31.1)	484.1 (19.1)	265.8 (10.5)	87.5 (3.4)	15.9 (0.6)	2945.3 (116)
Precipitation Litres/m ² (Gallons/ft ²)	3.4 (0.08)	3.6 (0.09)	12.5 (0.31)	46.9 (1.15)	177.2 (4.35)	323 (7.92)	734.3 (18.01)	791.1 (19.4)	484.1 (11.87)	265.8 (6.52)	87.5 (2.15)	15.9 (0.39)	2945.3 (72.24)
Number of Wet Days (probability of rain on a day)	1 (3%)	1 (4%)	2 (6%)	5 (17%)	13 (42%)	20 (67%)	25 (81%)	24 (77%)	23 (77%)	19 (61%)	11 (37%)	5 (16%)	149 (41%)
Percentage of Sunny (Cloudy) Daylight Hours	68 (32)	61 (39)	69 (31)	60 (40)	53 (47)	37 (63)	23 (77)	19 (81)	32 (68)	52 (48)	56 (44)	63 (37)	50 (50)

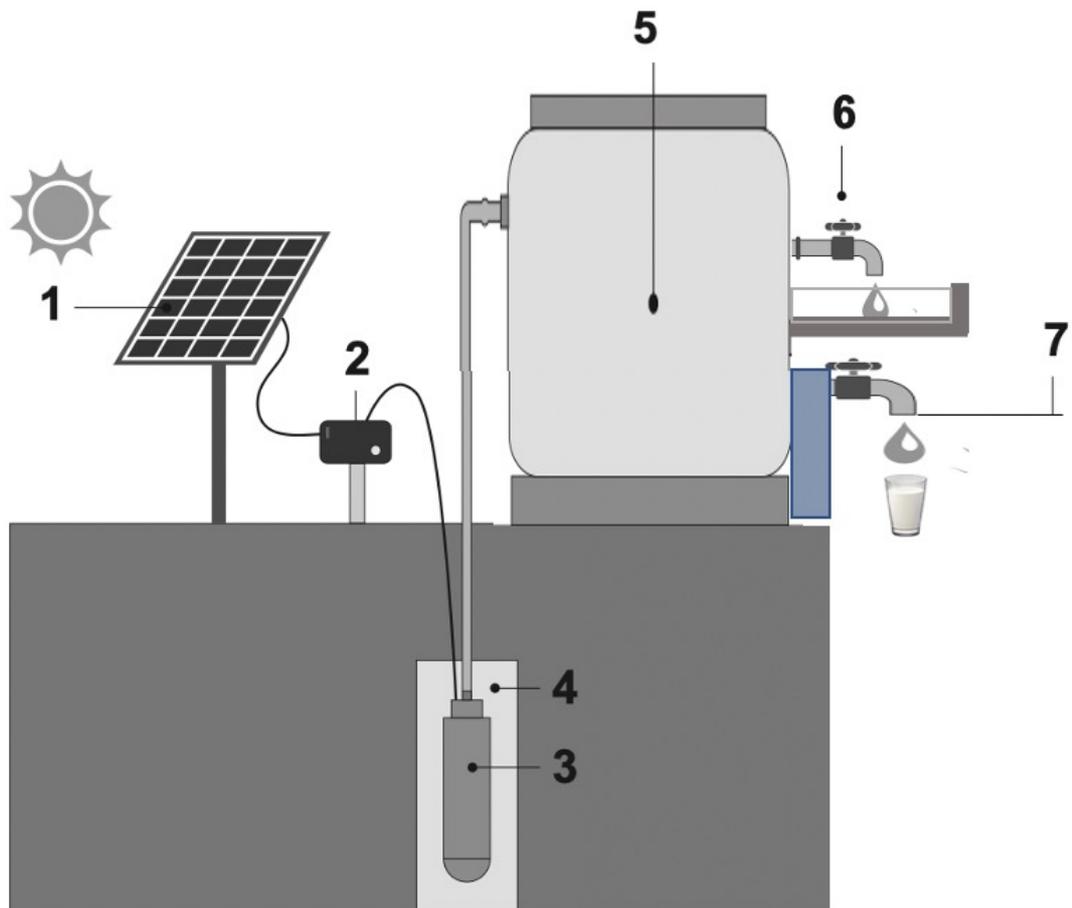
Source: <http://www.freetown.climatemps.com/precipitation.php>

Annual Water Collection

2945mm (annual rainfall) x 80m²= **235,600 L** collected each year from rainwater harvesting.

The rainwater harvesting system will be installed at the back of the school, while serving the school community, it will also be useful for the 5 surrounding villages. In this back area, many villagers come to access drinking water, as well as to access water for washing and other household uses.

PROPOSED WATER INSTALLATION FOR SAFE DRINKING WATER AND HANDWASH STATION



1. Photo voltaic panels
2. Controller connected to floater sensor inside of tank and to bottom of well for automatic refilling of tank when needs to be refilled.
3. Submerged Pump
4. Existing well borehole
5. Water storage tank of 5,000L (locally made)
6. 6 taps for handwashing, with concrete base
7. Drinking water taps with in-line water filter



EDUCATIONAL COMPONENT FOR MONITORING

We have already arranged to provide a computer classroom to the school and arranged for computer lessons for the children. Installed on the computers will be an educational guide, *“Water Well: A guide for Healthy Water”* that we developed for the children to understand why clean water is important for their health, what pathogens are and how they get in their water, and why personal hygiene is so important for their health.



We will also arrange for some water workshops to be delivered by distance learning and plan to start a WASH club for some interested children. They can become leaders in the school by becoming experts in water and sanitation themselves and we will help them with some ideas for club activities. They will then have a sense of personal investment in the project and will make sure that the equipment is kept clean and maintained.



Once the children are armed more with knowledge, hopefully they can bring their knowledge back into their homes and teach their parents, making an even larger impact. We believe that the educational component is just as important as the equipment measures taken to ensure that the project is sustainable for the long term.



ABOUT THE GLOBAL OUTREACH SCHOOL

In 2003, after an absence of 27 years, Martine Coppens, a teacher at the International School of Geneva, was able to return to Sierra Leone during school holidays to join her husband who was there on a special mission for the United Nations. As a teacher by profession, she was naturally interested in the educational sector in the country and immediately saw that there was a lack of adequate educational facilities. This gave her the desire to try to do something, at least for the group of children that she had met on her trip.

Four rural villages, about 40 km from Freetown, only accessible by four-wheel drive due to the rudimentary roads, was chosen to be the site for her school. The closest existing school was more than 10 km away and the children of these 4 villages had no access to primary education. Martine Coppens founded the Global Outreach School in 2004. Today the school enrolls 450 children of primary school level.



ABOUT REBOOT2KIDS

Reboot2Kids is a Geneva based NGO initiated by Eden Chung, now a 17-year-old high school student from the International School of Geneva. Having learned about the digital literacy gender divide, Eden wanted to create an NGO initially to help children in rural areas to access computer learning. However, she found out early on that the children were getting sick from diarrhea and that they needed to go to hospital on occasion. Eden realized that computers were useless to children unless they were healthy enough to attend school and realized that providing clean drinking water to the children had to be a priority.

Martine Coppens was Eden's French teacher during primary school. Eden has followed the progress of this school over the years, as it grew from one classroom building to four so was a natural recipient school for Reboot2Kids. Reboot2Kids has already funded and deployed a computer lab for the school and wants to provide now a long-term water solution for the school.



It is a remarkable accomplishment that Ms. Coppens has been able to found and build a school with 4 school buildings and a community hall in the last 18 years, with constant improvements and additions each year.

It is our hope that our holistic water project, together with your contributions could create a longterm impact without diarrhea for these 450 children, their parents and the adults of the 5 surrounding villages who come to the school for community activities.

It is an investment in their health, their education, and their futures.





CONSULTANTS & REFERENCES

Our water plan was formulated in consultation with the following persons:

- EAWAG- [Dr. Sara Marks](#) advisor assisting with the clean water proposal, particularly from her expertise on psychological ownership as a way to involve the children to feel invested in the project for the longterm.
- WHO/UNICEF JMP for WASH- [Rick Johnston](#) advisor on the water filtration methods, household water treatment and safe storage
- Well Done Ltd and [ANR SL LTD](#): Sierra Leone-based water contractors advising on the technical plan of the water project and installation.
- [Ryan Blyth](#), Global Learning Advisor at Center for Affordable Water and Sanitation Technology (CAWST)
- Mr. Arthur Vincent, headmaster of Global Outreach School
- Martine Coppens, founder of Global Outreach School and president of the NGO, [Education Pour Tous, Sierre Leone](#)

IMPLEMENTATION OF PROJECT

Ms. Martine Coppens of Education Pour Tous, the founder of the school, will assist as coordinator of the project. The school has a local administrator, Ms. Victoria Nichols who has worked for the school from Freetown, SL since the school's inception in 2004 and has proven to be very trustworthy and reliable, having been instrumental in the construction of 4 classroom buildings and a community hall already. She will liaise, control and release payments to contractors. We have obtained quotations already from several water professionals/engineering companies in Sierra Leone, so have confidence about the involved costs and the technical details of the installation.

Mr. Arthur Vincent, the headmaster, will remain on the school grounds to keep an eye on the works' progress.

The project is estimated to take 3-4 weeks to complete. All materials are in stock and available locally in Freetown, SL, except for the water filter from Uzima, which will be shipped from the USA. We are well positioned and ready to execute the project quickly once our funding is secured.

We hope to be able to provide clean drinking water and enhance hygiene and sanitation to help these 450 children + their families and the community of villagers surrounding.



WATER QUALITY LABORATORY
MINISTRY OF WATER RESOURCES
WATER DIRECTORATE
WESTERN AREA RURAL DISTRICT COUNCIL
TEL 079-330133

Water Quality Monitoring Report Sheet

Client: Global Outreach Primary School

District: Western Area Rural District **Chiefdom:** Waterloo **Town:** Masantigie

Date: 27-08-2021. **Sample:** GOPS 001 **Location:** 8.362207, -13.043893 **Type of Source :** Bore hole.

Parameters		Measured Values	WHO recommended Permissible Limits
1.	Water Temperature (°C)	27.3	No. Value
2.	pH	7.1	6.5 – 8.5
3.	Turbidity (NTU)	3.5	<5.0
4.	Conductivity (µS/Cm)	56	<450 µS
5.	TDS (ppm)	36.2	<248
6.	Residual Chlorine (mg/l)	Nil	0.3-0.5 after 30min. disinfection
7.	Aluminum (mg/l)	0.067	<0.2
8.	Ammonia (mg/l)	0.3	No. Value
9.	Copper (mg/l)	0.02	<1.0
10.	Fluoride (mg/l)	0.1	<1.5
11.	Iron (mg/l)	0.05	<0.3
12.	Magnesium (mg/l)	14.1	<200
13.	Nitrite (mg/l)	0.06	3.0
14.	Nitrate-Nitrogen (mg/l)	3.1	<10
15.	Potassium (mg/l)	3.3	<6.0
16.	Sulphate (mg/l)	4.0	<400
17.	Chloride (mg/l)	3.7	<250
18.	Zinc (mg/l)	0.34	<5.0
19.	Faecal Coliforms	Nil	Zero
20.	Non – Faecal Coliforms	25	10

Comments:- The Physical / Chemical analysis of this source indicates that the parameters investigated are within the WHO recommended permissible limits for portable water Except for Residual Chlorine **Bacteriological** analysis depicts that there was minimal non faecal contamination as at the time of analysis. However the source of contamination may be associated with organic matter . Hence, chlorination process is necessary with a free chlorine content of 3.0mg/l - 0.5mg/l which is the WHO Standard for portable water.

Signed By

Laboratory Supervisor