

## A borehole alternative: Main lessons learned from Concern Worldwide's experience in Sierra Leone

### Project Overview

Tree Planting is classified by the Freetown City Council (FCC) as a hard-to-reach and vulnerable community due to its hilly terrain, poor road access, and lack of essential services. The Tree Planting name reflects the area's history as a former tree nursery for the University of Sierra Leone and the Ministry of Agriculture and Forestry. Although the nursery is no longer in use, the name remains.

With 5,000 residents, most living below the poverty line, the community faces severe water, sanitation, and hygiene (WASH) challenges, leading to disease outbreaks and frequent flooding due to poor waste management, especially during the rainy season, with indiscriminate waste blocking the water ways.

Over 30 female-headed households rely on urban farming, but increased water scarcity due to climate change, especially during the dry season (January–April), threatens their crops. Additionally, the use of chemical fertilizers poses environmental risks by contaminating water resources including groundwater and surface water. To address these issues, the SAFE Project aims to provide safe and sustainable drinking water for 4,500 residents, improve solid waste management and promote the use of organic manure as compost and ensure reliable water access for 30 urban farming households.

Concern Worldwide has a strong presence in the community, having previously worked on a DFID/FCDO-funded Solid Waste Management Project (2020–2021). The SAFE Project (October 2022–September 2025), funded by the Guernsey Overseas Aid & Development Commission, builds on these efforts to provide long-term water solutions.

Initially the SAFE project proposed 2 boreholes however, despite contracting a geophysical surveyor and implementing their recommendations, both boreholes were ultimately unsuccessful in meeting the needs of the community due to limited available geological data as there was no productive aquifer for the recommended depth at the drilling sites.

During a community engagement session, residents were informed about the challenges and risks of attempting a further borehole, and it was proposed that the existing natural spring on Fourah Bay College (FBC)'s land could be rehabilitated and developed. Following this, a joint assessment was conducted on the spring, revealing that it has the capacity to discharge 50m<sup>3</sup> of water within 24 hours (as measured both before and after the spring box installation), compared to the borehole, which can only discharge 20m<sup>3</sup> per day within the same period.

Concern Worldwide together with FCC and community stakeholders approached the administration of FBC in relation to the development of the unprotected spring on their land. After a consultative meeting, a memorandum of understanding between FCC and FBC was developed and signed by both parties. This document legalized Concern Worldwide and partners to develop the spring for the use of the community.

## The function

A spring box is a natural exit point found where groundwater emerges from an aquifer and flows onto the earth's surface as surface water due to various natural forces, mainly hydrostatic pressure and gravity.

In the system constructed by Concern the water from the spring passes through a mini dam where it is first filtered. The water from the mini dam then moves to the filtration box which is equipped with a filter made from river sand and pebbles that provides final filtration to the water before entering the 10,000 litres reinforced concrete reservoir. The combination of both sand and pebbles ensures that the force of the in-flow does not mix the sand with the outflow water.

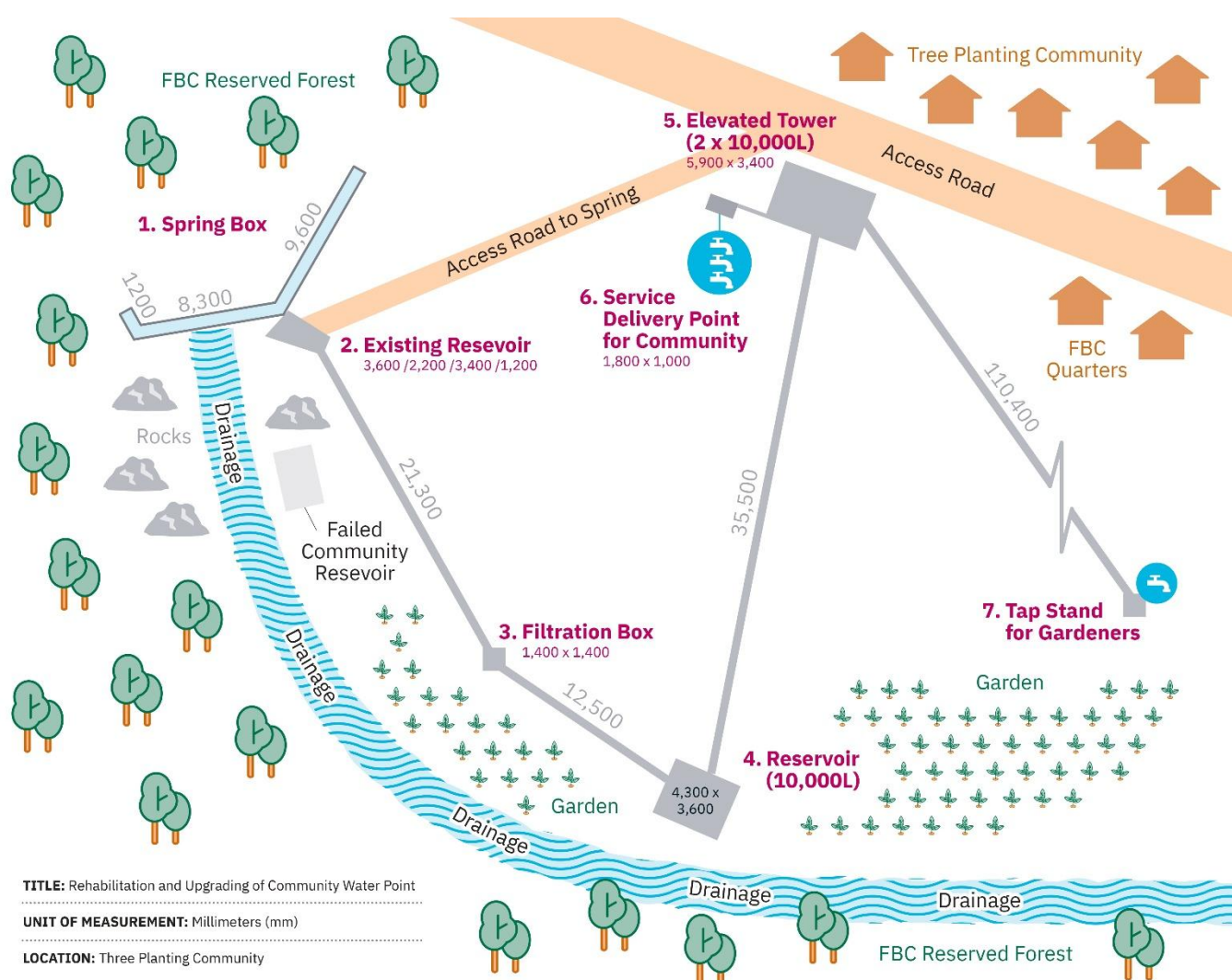
The solar powered Grundfos submersible pump is connected to the reservoir which extracts water with a capacity of 3.5m<sup>3</sup> per hour to the 20,000 litre tanks on the elevated tower. The water is then accessed by the community and gardeners through different service delivery points.

## The impact

- The filtration sand system is a cost-effective solution for filtration, with the water quality analysis report demonstrating that all parameters are within WHO's recommended standards. Instead of relying on expensive treatment methods, the system uses natural filtration materials, including pebbles, to ensure clean and safe drinking water. This method not only reduces maintenance costs but also provides a sustainable approach to water treatment.
- The NLEe2 for 66 litres pricing model, as decided by the WASH Committee (prior to the intervention, the community paid Le2 for 33 litres) has made clean water more affordable and accessible, easing the financial strain on households. Families no longer spend excessively on alternative water sources, allowing them to save money for other essential needs such as food and education.
- Improved access to water throughout the year. This has made nearby communities to come to improved spring box to collect water.
- It has reduced adolescent girls from rape and the demand for sex from care takers in exchange of water amongst adolescent girls. Focus Group Discussions (FGDs) at beginning of project clearly highlighted a Gender-Based Violence (GBV) risk as shared by adolescents. With support from Electric Aid and the installation of lights at the same time as the water points, alongside training and sensitization funded by Guernsey Overseas Aid, the WASH Committee Chairperson reported that since the intervention "... *teenage pregnancies have dropped, and girls are no longer late for school.*"
- School going pupils are prioritized in the process of collecting water, especially during the early morning hours, monitored by the WASH committee Chairperson and Community Chief. This prevents students from attending school late.
- With the water facility in place, as supported by police statements, crime has dropped. Previously, violence, youth gang illegal control / charging for water access, and harassment of young girls were rampant, leading the police to declare Tree Planting a high-crime area. The SAFE Project's intervention has improved safety and stability in the community.
- The community now supports FCC to protect the vegetation around the spring, stopping tree-felling and incorrectly disposing of rubbish, to ensure does not dry up during the drying season. This is done through community awareness and the monitoring and enforcement of FCC by-laws.

## Implementation challenges

- The spring box water supply scheme design was limited by the available funds. The solar powered submersible pump installed has the capacity of pumping 30m<sup>3</sup> within 5 to 6 hours. The initial available budget could only cover the construction of one tower and storage system for 20m<sup>3</sup>. The full potential of the system was not able to be realised due to insufficient storage capacity, leaving 10m<sup>3</sup> of water per pumping cycle remained unused, limiting the overall efficiency and impact. However, the project plans to provide the additional 10cm<sup>3</sup> tank before the end of the grant to be able to maximise the full potential of the pumping system.



*Solarised Spring Box system in Tree Planting Community*

## Lessons learned

**A Cost-Effective Solution:** One of the major lessons from the SAFE Project was the realization that developing a spring box can be a more cost-effective and sustainable alternative to drilling boreholes. Initially, two boreholes were drilled at 140m and 100m, but both failed due to the challenging topography and low recharge rates. Instead of continuing with expensive and uncertain drilling attempts, the project team engaged community stakeholders and opted to rehabilitate an existing spring.

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Furthermore, conducting a geophysics survey and constructing a borehole amounted to NLE1,120,719, whereas the total cost of developing a spring box with a solar-powered system was NLE934,590.6, resulting in a cost saving of NLE186,128.4, demonstrating that spring rehabilitation not only provides a reasonable certainty (even during dry season, the spring will discharge more than 40m<sup>3</sup>) of successfully accessing water but is also less expensive.

**Community ownership enhances sustainability:** The establishment of a WASH Management Committee consisting of 15 members (8 male and 7 female) as well as the active involvement of community stakeholders, have ensured the long-term sustainability of the water facility. Future WASH interventions should prioritize community ownership from the planning stage.

**Tackling Gender-Based Challenges in WASH interventions:** Addressing water access issues in vulnerable communities can also reduce gender-based violence, teenage pregnancies, and school dropouts. Water projects should incorporate protection mechanisms such as solar lighting, community watch groups, and gender-sensitive policies.

**Holistic development approach yields greater impact:** By integrating WASH projects with livelihood support, GBV strategies, and leadership development maximizes community benefits by addressing multiple challenges simultaneously. The availability of clean water has supported livelihoods by enabling community members to water their gardens, enhancing food security and economic stability.

Additionally, the water access has contributed to crime prevention by reducing tensions over scarce resources and fostering a more stable environment where youth are less vulnerable to engaging in negative behaviours. Clearly recognised by the Sierra Leone Police; *"We used to receive regular sexual harassment cases. The complaints were normally brought to us by the parents of the victims. A gang oversaw control of the spring and demanded sex from adolescent girls before being allowed to fetch water. Some girls received teenage pregnancy as a result, and we were unable to identify the person responsible. Since Concern Worldwide's intervention, we are yet to receive such a case again."*

Strengthening local governance structures has further ensured community ownership and long-term sustainability of WASH interventions as leadership development within the community has promoted better decision-making, accountability, and collective responsibility.

**Flexible and adaptive planning are essential:** The project faced unexpected challenges, including failed boreholes and site access difficulties. The ability to pivot strategies, such as shifting from boreholes to spring box rehabilitation, was crucial in achieving success.

**Financial accountability strengthens project longevity:** Establishing a water user fee system and a community-managed account has created a sustainable funding mechanism for maintenance. Future projects should prioritize financial training and accountability measures to ensure long-term water access.

## Recommendations

- **Increase water storage capacity:** The current system has the capability to pump 30m<sup>3</sup> in 6 hours but only 20m<sup>3</sup> are available. To maximize efficiency, the storage capacity should be expanded to accommodate the full 30m<sup>3</sup>
- **Install an additional filtration and pumping system:** Given that the water facility now serves nearby communities, an additional filtration and pumping system is recommended to ensure a continuous and adequate supply of clean water.

- **Enhance Security of solar panels and taps:** To ensure the longevity and efficiency of the water facility, security measures should be implemented to protect system panels and taps, particularly during the rainy season when the risk of damage and unauthorized access increases. Due to reduced water demand in the rainy season, fewer people use the facility, leaving it more vulnerable to vandalism and theft. Implementing protective enclosures, fencing, and regular monitoring will help safeguard the infrastructure, ensuring it remains functional and well-maintained throughout the year.

## Conclusion

This shift in approach is a critical learning for future urban WASH projects, especially in areas where boreholes may not be technically or financially feasible. Investing in alternative water sources like spring boxes, gravity-fed systems, and rainwater harvesting should be considered as part of a context-specific, adaptable water supply strategy. SAFE project has successfully met the identified needs of the community guided by collaborative and inclusive design, implementation and adaptation. Despite the challenges, the project team and community were able to work together in finding a solution which exceeded the initial project goals.

## Testimonials

### Ibrahim Kamara, Community Leader:

*"Before Concern's intervention, our girls would leave for water at 6 PM and return at 3 AM. Many became victims of abuse and pregnancy. But today, thanks to Concern, our girls are safe, crime has dropped, and we, as a community, take full ownership of our water system."*

### Moses Kamara, Teacher at Christ Way Primary School:

*"Comparing the previous years to now, there is a huge difference. Before, pupils used to come late to school and sometimes we didn't conduct the assembly on time just to wait for some of them. This was due to lack of water. They spent too much time trying to fetch water which was making some of them absent from school. Since the intervention of Concern Worldwide, pupils' attendance has improved and coming late to school has minimized."*

### Marie Mansaray WASH Committee Chairperson:

*"We faced a severe water crisis," she recalls. "Girls were exploited by gangsters who demanded 'sex for water,' leading to teenage pregnancies and school dropouts." Marie became deeply involved when Concern stepped in. "I attended every meeting because I wanted to help solve this crisis," she says. She was selected as Chairperson of the WASH Committee, which manages the water facilities. "I accepted the role to contribute to my community's development. Thanks to Concern and the Freetown City Council, we have safe water, dignity, and hope for the future."*



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