Assessment – Pre-Trip Plan

Executive Summary	
Community:	Kibuon
Country:	Kenya
Chapter:	Harvard SEAS Chapter
Submittal Date:	3/28/2019
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REIC and other mentors:	Christopher Lombardo (REIC, Faculty Advisor), Nisheet Reddy (Mentor), Avery Meyer (Mentor)
Scope of Work for the project (50 words)	The Kibuon community consists of about 800 members. Due to the lack of a nearby clean water source, community members in Kibuon travel long distances to collect water from a river. This river water is unclean and often leads to sickness in the community. The project aims to construct a water provision system, such as a rainwater water catchment system or a borehole, within the community in order to address the need for safe and accessible water.
Scope of Work for the trip (100 words)	This will be the first assessment trip where: 1) The project team members will meet with the community to discuss the Project Partnership Agreement with the community and the 5% community contribution, 2) Project alternatives will be assessed and potential solutions will be presented to the community for input, 3) Survey data will be collected and the project site topography investigated to allow for the analysis and design of the project later and 4) material prices will be investigated.
Proposed Next Step (100 words)	After this trip, the Harvard SEAS chapter will begin the alternative analysis process while maintaining communication with the community to get input on the alternative solutions. The team has tentatively slated the first project implementation for January or May 2020. The proposed alternatives include a rainwater catchment system and a borehole.
Describe Recent Contact with Community, NGO, and in country partners. (100 words)	The Chapter's primary contact is Julius Amara, the projects coordinator of the Kibuon CBO. The chapter regularly communicates with Julius via WhatsApp and schedules calls every two weeks over Skype. The chapter has also corresponded over email with Paul Olango— a community guide and translator who has previously worked with EWB chapters in the nearby communities of Lela and Bondo. Lastly, the chapter has been in contact with an NGO partner called WECCO via email.
Describe the Chapters current fundraising goals and milestones. (100 words)	In the past academic year, the team has networked extensively with the Harvard John A. Paulson School of Engineering and Applied Sciences, the Phillips Brooks House Center for Public Service and Engaged Scholarship, and the David Rockefeller Center for Latin American Studies. The chapter aims to receive funding from these programs, continue applying to grants, and continue contacting potential new funding sources. The goal is to raise a total of $44K to cover the upcoming assessment trip for our next project and the implementation trip costs for the following winter and summer.
IS THE PROGRAM STILL ON TRACK TO MEET THE EWB PROJECT EXPECTATIONS?	YES

Privacy: EWB-USA may release this report in its entirety to other EWB-USA chapters or interested parties. Once the report is approved any member in Volunteer Village will be able to find and view the plan. Please do not include personal or sensitive information.

Project Timeline			
Major Milestone	**Previous Date**	**Current Date**	**Description**
Program Adoption Date	12/31/18		
Previous Project in Program Date Constructed	NA		Rainwater catchment project at school.
Project Approval Date	3/28/19		
Completed Assessment Trip	Not Previously Planned	6/11/19	Trip conducted to sign partnership agreement and to start data collection for the borehole or rainwater catchment system
Planned Assessment Trip	Not Previously Planned	5/28/19	Trip to complete data collection and hydrogeologic assessment for onsite borehole or rainwater catchment system.
Planned Implementation Trip	Not Previously Planned	1/6/20	Trip to construct rainwater catchment system or drill a borehole
Planned M&E Trip	Not Previously Planned	6/15/20	Trip to monitor the system performance and conduct minor repairs.

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1. Project Description

1.1 Project Background and History

The Harvard SEAS EWB Chapter began its partnership with the Kibuon community in January 2019 when it adopted the Kibuon Water Program. The CBO, the Kibuon Water Council, initiated the Kibuon Water Project and a partnership with EWB to improve access to clean water for local residents. The Kibuon Water Committee was founded in January 2018 and was modeled on CBOs in nearby communities that are also partnered with EWB. The Harvard Chapter has been in contact with the community, specifically the CBO, to discuss community structure, project expectations, available resources, and the environment in Kibuon. The chapter is currently coordinating with the CBO to plan the first assessment trip, during which it will formally meet the community members and assess project alternatives for the community.

1.2 Project Context

The project is based in Kibuon, Kenya, a community of around 800 people located 8-10 km outside Migori in the Migori County of southwest Kenya. The water source closest to the community is a river, which flows during the rainy season in the beginning of the year (November-May). The community gets most of their water from this source, but it is unreliable and often dries up during the dry season (June-October). Furthermore, the river water is not clean and so is not the preferred source of water for the community. Those who are able walk around two hours round trip to another water source where they collect water and transport it on foot. The primary barrier to water usage is the time it takes to collect it, as well as purification practices once the water is collected. Though the team has yet to directly discuss the community's infrastructure with the CBO, a Kibuon community organization recently founded in January 2018 focused on water access and usage, the fact that they walk on foot to a distant water source implies that their infrastructure may not be very highly developed. According to the in country contact, the local government is not conducting any projects in the area, but multiple neighboring communities, such as Bondo and Lela, have successfully partnered with EWB-USA and drilled wells, and the Bondo project is ongoing.

1.3 Project Goals and Objective

Determine the feasibility of the Kibuon Water Project:

- Survey local village members to gauge their interest in the water project and the greatest sources of need in the community. Use hydrologic or rainfall data to gauge the potential for water collection and if the project will address these needs.
- Determine the social, logistical, and technical work the project will require, as well as the community's capacity to contribute 5% of the project costs.

Discuss the Project Partnership Agreement with the community:

- Assess fundraising practices. Attend Water Council meetings to observe how money is being collected, who is contributing, and how much they are contributing. Ask council members about other fundraising means they have planned. Determine how much money has already been raised.
- Answer any questions that the community has regarding the project.
- Establish communication and project workflow expectations through meetings with key stakeholders like the community members, Kibuon Water Council (CBO), and suppliers and contractors.

Assess project alternatives:

- Consider the best method for water collection. Use observation, hydrologic surveys and seasonal rainfall data to compare the feasibility of a borehole project versus a rainwater catchment system. Find potential locations for each.
- Discuss alternatives with community, mentioning pros and cons of each, and listen to the various opinions such as those of the community as a whole, and those of particular groups such as women, workers at the clinic, teachers and school kids.

- Collect sufficient data to support project analysis and design.
- Interview various households to analyze the demographics of the community. Produce a site layout using GPS apps or handheld devices. Sketch property lines and important landmarks in the community
- Conduct technical measurements and analysis to begin preliminary design for the new water project. This includes coordinates, relative elevations, hydrologic surveys, potential well recharge rate, seasonal variations, and expected demand.
- Scope local area for material suppliers and labor for completion of the project.

Work with the community to select a group that will maintain and operate the water project:

- Hold weekly meetings with this group and the general community to discuss visions for the project. Obtain contact information to enable continued communication.
- Begin an operation and maintenance fund for the water collection system. Work with the stakeholders to discuss potential maintenance necessities and cost, as well as appropriate compensation for a designated community operator.

1.4 Scope of Work

The current sources of water in the Kibuon community—open sources and shallow hand dug wells—are unclean, leading to a high occurrence of water borne diseases. In addition, community members spend a lot of time travelling to collect this water. This project aims to provide cleaner and more accessible water for the approximately 800 members of the community which would reduce the occurrences of such diseases and reduce the amount of time spent collecting water, hence allowing time for other activities, particularly education for children who spend time collecting water. The community is requesting assistance in the form of assessment, engineering design expertise, and project funding from EWB. Their preferred solution is the construction of a groundwater well, but they are open to alternatives. After the assessment trip, the team will have enough information about community layout, underground water availability, elevation, local water usage, and rules and regulations of the area to decide on the most feasible water solution.

1.5 Potential Solutions Considered

The team has come up with two potential useful solutions to solve the need for clean drinking water in Kibuon. These systems are being considered because they have been successful in nearby communities, and the chapter has the necessary skills and experience to design and implement these methods.

Water Catchment: A rainwater catchment system is a rooftop water collection system that can be installed on community buildings, to provide water for a community. It is suitable for Kibuon because there are community buildings with the potential to gather enough rainwater during the rainy season to provide for the community year-round. Rainwater catchment systems include: a collection area, a conveyance system and a storage area. In addition, most rainwater tank designs usually include: a solid secure cover, a coarse inlet filter, an overflow pipe, a manhole, sump and drain to facilitate cleaning, an extraction system that doesn't contaminate water and a soak-away to prevent puddles forming near the tank.

Borehole: Since the water table is high and stable enough to make drilling feasible, another option is to install a borehole in the most convenient location for as many community members as possible. The borehole would be drilled by a contractor that the Chapter would hire on the ground. The Chapter would order a pump from a local business, and the project team would likely install it. The team will likely need to use solar or battery power due to a lack of grid power in Kibuon. The borehole and pump should be maintained by the community members as parts are available locally and skilled workers are available.

1.6 Project Team

REIC, and Faculty Advisor: Dr. Chris Lombardo will be serving as the REIC, faculty advisor for student chapter, a travel mentor, and a health and safety officer. Dr. Lombardo is an Associate Director of Undergraduate Studies in the

Harvard School of Engineering of Applied Sciences and Lecturer in Electrical Engineering. He received BS degrees in Electrical Engineering and Physics from the University of Maryland at College Park and his MS and PhD in Electrical Engineering from The University of Texas at Austin. He has been actively involved in EWB-USA since 2004 in several chapters throughout the United States. During this time, he has worked on projects in Ecuador, Mexico, Cameroon, Panama, Peru, Dominican Republic, and Tanzania. Additionally, he has served in several regional and national leadership positions within EWB-USA, including organizing the Design Global, Engineer Local course hosted with ASCE/EWB-USA Global Engineering Conference, serving as the chair of the Faculty Leadership Committee, and is a member of the EWB-USA Board of Directors. He has experience advising EWB projects for over 10 years therefore his involvement will be key in ensuring quality.

Avery Meyer, EIT: Avery is a structural engineer at WSP USA and a member of the Boston Professional Chapter. He was previously involved in a joint program with the Boston Professional chapter. Avery intends to continue to act as a mentor for the Harvard chapter. This project would be within his capacity to support since Avery was able to support the Harvard SEAS chapter's last project in Tanzania while remaining active in the Boston Professional chapter. As the "International Development Lead" Avery will be helping select the culturally appropriate methods and will be working in the location of the project with the expertise to make sure the technology and construction practices are feasible.

Nisheet Reddy, EIT: Nisheet is a structural engineer at GEI consultants, and also the Vice President of the Boston Professional Chapter. Previously, he was a co-Mentor for a joint project in Tanzania between the MIT Student Chapter and the Boston Professional Chapter. As a mentor, he worked alongside students and co-mentors to design a catchment and tank system.

Project Leads: Billy Koech, a third year student at Harvard University studying electrical engineering, and Tatheer Adnan, also a third year student at Harvard University studying Bioengineering, are project leads for the Kibuon team. As the project leads, they will be taking on the primary management role for the students and would be the primary contact between the REIC, faculty advisor, students, community and Program Engineer. Billy Koech will also take on the role of translator because as he is a native Swahili speaker (one of the languages spoken in Kibuon).

Chapter President: Nicole Trenchard, a fourth year student at Harvard University studying mechanical engineering, and Eva Cai, a third year student at Harvard University studying Bioengineering, will be serving as the chapter presidents. A strong chapter is well-organized, has clearly defined leadership roles, and prioritizes long-term planning to ensure sustainability. As Chapter Presidents, Nicole and Eva will set chapter objectives and goals for the upcoming year, manage chapter activities, facilitate chapter meetings, maintain communication with EWB-USA HQ as well as the State Representative by reporting on chapter activities, changes and progress, disseminate information from EWB-USA to chapter members and ensure EWB-USA is represented professionally in conduct, communication, and at events.

Students: There are currently 18 students working on the project.

1.7 Community Partners

Kibuon Water Council (CBO): Our primary community partner in this project is the Kibuon Water Council, located in Kibuon. The council was founded January 2018 and modeled after water councils in nearby communities that have interfaced with EWB chapters. The Kibuon Water Council has 15 members, meets every two weeks, and makes decisions through a voting process. The chairperson of the council is Eunice Awino. Community members are invited to participate at meetings if so desired. Members of the council speak English, Swahili and Luo, and they are able to communicate remotely with EWB as much as needed.

WECCO: The Kibuon Water Council lists "WECCO" as an NGO partner. According to a phone call with the council, WECCO provides well drilling services. The water council does not have a relationship with the government and does not anticipate the government being involved in the oversight of the well, except for requiring an upfront drilling permit.

Lela Women's Water Committee: The village of Lela, Kenya worked with the Oregon State Engineers Without Borders chapter from 2009-2013 to install a water pump. The project team interacted with committee members Paul Olango and Charles Olango. The committee helped organize meetings during the assessment trip and is responsible for the ongoing maintenance of the pump. For the Kibuon project, Paul Olango will act as a guide and translator for the Harvard EWB Chapter during the trip.

1.8 Reference Projects (Conducted by EWB-USA)

There are several water projects being conducted in communities near Kibuon, and the team has already reached out to three other chapters familiar with the area.

The Oregon State University Chapter (OSU) constructed rainwater catchment and well-drilling projects in Lela, Kenya until 2015. Following a short hiatus due to university travel restrictions, the project was resumed by the San Francisco Professional Chapter (SF). The Harvard EWB chapter has been in contact with both groups via email and Skype. Due to the community's desire for clean water, the OSU Chapter originally considered rainwater catchment, well-drilling, and surface water collection. However, after testing local water sources in the community, the project team determined that they were not viable due to contamination. The team chose to drill wells with a hand pump, noting the community's specific request, and implement rainwater catchment systems as a supplementary source of water. The SF Professional Chapter has continued the work begun by OSU and plans to drill two new wells by the end of 2020.

The SF Professional Chapter also described the fundraising challenges faced by another local water board in Arombe. In response, they created a training workshop which focuses on effective management strategies and building relationships between local water boards. During the assessment and implementation phases, Harvard EWB will ensure that the new Lela Water Board and existing local water boards share contact information for future reference.

Harvard EWB has also reached out to Princeton Chapter, which is working in several nearby communities. Through initial surveying, the Princeton chapter learned that many families in their community, Kiburanga, experienced ongoing issues with typhoid due to unclean drinking water. More specifically, over half of community members reported encountering waterborne illness. The Harvard Chapter will be sure to survey families and local nurses (if a dispensary is present) to determine the local health effects of water unreliability.

Lastly, the chapter contacted the Hope College Chapter (HCC) which worked in the nearby community of Bondo on a borehole and rainwater catchment system. At present, the team is working to coordinate a call between chapters. By reviewing HCC's previous documents, the team has learned to overlay a survey grid on the map being used to aid with distance measurement. During the implementation phase, the team also learned to clearly communicate that a well may not be installed if the water yield from a borehole is not sufficient. In this case, rainwater catchment systems can provide a partial solution and help to retain the trust of community members.

2. Assessment Activities

2.1 Partnership Formation

2.1.1 Community Members

The travel team will meet with members of the community to ask questions about the community's goals for the project and their partnership with the Harvard SEAS chapter of EWB-USA. The chapter will be signing a Project Partnership Agreement with the intention to work together. The following questions have been drafted with that intention in mind.

Water Distribution:

1. What is the overarching goal? What do the people of Kibuon want to accomplish with regards to water distribution in their community?
2. Has there been previous involvement by other organizations in designing a water distribution system? If so, when was it and what did they do?
3. Who owns the rights to the land in the community? Is it possible to get a map or create a map with property distribution lines? What laws and permits are there that pertain to a water distribution project?
4. Are there any existing contracts in your community related to water distribution?

Community Partnership:

1. The community application states that there are pre-existing water and projects committees. What have these committees accomplished so far?
2. Is there anyone in the community with technical knowledge with respect to water distribution or any skills that can contribute to the successful implementation of an improved potable water distribution system? Is there anyone who knows how to conduct a hydrogeological survey? Does anyone know how to dig a well or maintain the mechanical components of a pump and solar panels? Does anyone know how to maintain a rainwater catchment system?
3. What is the leadership structure in the community? What is the relationship between the local board and the central government? Who has the authority to collect fees and spend money for maintenance? What is the best way to contact the community leaders internationally?

2.1.2 CBO Leaders

The Harvard SEAS Chapter of EWB-USA has been in contact with CBO leaders in the community and will meet these members of the community once on the ground in Kibuon. These leaders serve on the Kibuon Water council, a group of 15 elected members that will oversee the raising of money for the project and giving go/no-go standards for EWB. Following the initial meetings with the CBO and the community members, the Harvard Chapter will compare their goals and maintain close contact with these leaders. This committee is on the ground project support. These leaders will likely be an important contact for the entirety of the project. They will be in charge of providing a lot of the information about the village and the surrounding area. The Council will raise the required 5% contribution for all project work and will provide labor and materials when possible. The following questions have been drafted with the intention of talking to the CBO leaders in mind.

1. How is the relationship between the CBO leaders and the community/regional governments?
2. How often do the CBO leaders hold community meetings?
3. How does the council intend to raise their contribution for the project?
4. What can the council tell EWB about the community infrastructure?

2.1.3 Local Government

Local government involvement with the Kibuon project is minimal, and there is no designated main contact for the community program. Current government involvement includes only the work permits that must be obtained for well drilling. No person within the local government authority has travelled to Kibuon to provide assistance. Despite this, Kibuon has a good relationship with the government, which will most likely not interfere with the project. Instead, there is a community-based organization called the Kibuon Water Council that consists of 15 elected individuals that will raise funds and review the designs sent by EWB. The community has requested engineering expertise and support from the local government, the Migori county Office. The project team will also reach out to the district level government to determine whether any support can be provided.

2.1.4 Contractors

The community of Kibuon has not hired a contractor for the well drilling. One challenge is that they do not have the funds to hire a well drilling company. There is engineering expertise available locally, but the community does not have access to it. WECCO is the community-based organization in Migori county in western Kenya. They have worked within the country of Kenya and drilled two wells in Oruba and Ragana areas. This may be the company that will drill the well in Kibuon. The community will obtain a contract with the drilling company and will require a drilling permit from the local government. Our team will also need to contract a hydro geological study if it is not already done so by the drilling company hired.

2.1.5 Suppliers

As for every construction project, materials are needed in order to successfully conduct the work. Given the limited funding received by EWB, the community is supposed to contribute in cash or by supplying materials. The Chapter will collect information about different suppliers and the cost of the various supplies that the project will require as well as other expenses such as transportation costs. After negotiation of prices, an agreement will be established with the selected suppliers that they will provide quotes whenever necessary or requested as well as define the delivery expectations. Expected materials range from gravel that can be used as a base aggregate for concrete slabs, pipe bedding, to gravel filters, etc.

If the team decides to build a concrete water tank, they will need: pebbles, sand, cement, bricks, cement mixer, constant supply of water, shovels, tape measure, wheelbarrow, hammers, gloves, iron, levels and stones and buckets.

2.2 Project Feasibility

Rain Water Catchment System

First, the project team will analyze existing rainfall data to determine maximum storage capacity and estimate the water usage of the community to determine whether the project will be able to meet the water needs of the community. Infrastructure within the community will be examined, and surface area for each non-household roof will be tabulated to determine which roofs can be used to collect maximum rainfall. In addition to providing sufficient surface area for water collection, the buildings must allow for a space where a tank of the needed dimensions can be constructed/installed to store the collected rain water. Given these constraints, the project will be considered feasible if the tanks constructed are able to store a high enough quantity of water that meets the needs of the community.

On the new program application to EWB-USA, the community had listed a borehole as the preferred project but indicated openness to alternative solutions. Therefore, particularly for the rainwater catchment system, it is necessary to survey community acceptance of the project and willingness to maintain the system. The project team will assess this largely through surveys conducted with various community members. Questions will try to understand if community members see an advantage to the project, understand its operational flow, and find themselves able to maintain the structure and conduct needed repairs.

Borehole

A borehole well was the solution originally proposed in the community application. The cost of drilling and constructing a borehole well is relatively high compared to other solutions, such as the rainwater catchment system. An aspect of project feasibility is project cost so the chapter and community must be sure that they can fully fund this project. The chapter must identify possible contractors to work with in the area and get estimates about how much it would cost to hire them. Additionally, the project team must locate materials around Kibuon and get price estimates about how much those materials will cost. Materials needed for a borehole project include a pump, electric cables, pipes (PVC) and solar panels or batteries to power the pump.

The chapter will thoroughly survey the water table to assess whether it is possible to drill a borehole for this project. This will be done by hiring professionals to conduct a hydrogeological survey. With this survey, the chapter can decide on a convenient location for most of the community members to access the water. After the hydrogeological survey has been conducted, the chapter must apply for a drilling permit from the water resource management authority (WRMA). A NEMA (National Environment Management Authority) borehole permit must also be obtained by the chapter, and an Environmental Impact Assessment has to be conducted before applying for this permit. The chapter must also locate current pit latrines and wells in the community. The borehole well must be located far enough from these existing latrines and wells in order for the borehole water to not be contaminated. There have been boreholes drilled in surrounding communities which means that boreholes may be a feasible option for the community.

2.3 Detailed Technical Data Collection

2.3.1 General Data Collection

Data	Method	Purpose
Total population	Discussion with community leadership	Establish water demand
Water usage by age group	Household surveys	Establish water demand
Locations of public buildings/property throughout community	Discussions with community leadership	Find potential location(s) for water project
Water quality of current water sources	Water quality test strips	Use as baseline data

2.3.2 Survey and Geospatial Data Collection

Data	Method	Purpose
GPS location and elevation of various points throughout community	GPS phone application	Create detailed reference map of community
Boundaries of community	Discussion with community leadership. Tour of the community with locals while recording GPS data using a phone application	Create detailed reference map of community

2.3.3 Data Collected for Rainwater Catchment System

Data	Method	Purpose
Dimensions of public buildings throughout community	Manual measurements	Calculate roof areas, get building heights for rainwater catchment calculations
Soil conditions at potential tank sites (soil bearing pressure, soil type)	Pocket penetrometer or jar testing	Use in tank geotechnical analysis

2.3.4 Data Collected for Borehole

Data	Method	Purpose
Local hydrogeology, target aquifer	Hydrogeological survey	Determine potential location(s) of well
Locations of latrines	Observation	Determine potential location(s) of well
Electricity availability within and outside of the community	Discussion with community leadership	Determine what source of power will be used for pump

2.4 Climate Change Data Collection

2.4.1 Basic Climate Change Questions

1. Has it gotten hotter or cooler in the last ten years?
2. Has there been a change in you drinking water supply in the last ten years? If so how?
3. Have rainfall patterns changed in the last ten years? If so how?
4. Has the change in rain affected how you grow crops? If so how?
5. Has drought impacted your community in the last ten years? If so how?
6. Has a major storm(s) impacted your community in the last ten years? If so how?

2.4.2 Additional Climate Change Questions

1. Have any soil samples been collected in the past 10 years?
    a. If so, what is the water content/moisture content of the soil?
    b. What are the types of soil in different parts of the community?
    c. Have there been significant changes in samples collected over the years?
2. Have you observed if any rock core samples been taken from any parts of the community recently?
    a. Describe the rock formations in different parts of the community?
    b. Are there regions with unconsolidated rock formations?
3. Have you observed any changes in vegetation in the last 10 years?
    a. If so, what changes have you observed?
    b. Have there been changes in agricultural patterns?
    c. Are there certain regions where the levels of vegetation have dropped noticeably?
4. Have you observed changes to relative humidity in the last 10 years?
5. Have you observed if the hours of sunshine changed in the last 10 years?
    a. If so, how? Have sunshine hours gotten longer or shorter?
6. Have you observed any changes in atmospheric pressure in the last 10 years?

3. Schedule

3.1 Schedule overview

The Assessment Trip schedule will focus on several introductory activities, designed to orient the team with local partners and familiarize Kibuon community members with EWB's mission. The first three days of the implementation trip will be focused on meeting several key contacts, specifically Martin Otieno Owino from WECCO, the community's NGO partner, Paulo Olango, the in-country guide/translator, Charles Olango, the Chapter in host while in the community, and Julius Amara, the CBO in country contact. Following these introductions, the team will proceed to meet with the Kibuon Water Council and hold a larger community meeting to ask and address questions concerning the purpose of the trip. The team will then tour the community, collecting observational and special data concerning the geographic layout of Kibuon and the locations and dimensions of preexisting infrastructure. The team will then collect quantitative data that will be important for the design process of the water project. This will include testing water quality at current and potential water sources, analyzing soil, and supervising a hydrologic survey to be completed by WECCO. The team will also investigate potential material suppliers in the local area. Community surveys will be conducted to gather data from household and other potential stakeholders regarding the demand for a water supply system, as well as other key cultural and situational information that may be missing from quantitative data on Kibuon.

3.2 Detailed schedule

Start (Day)	End (Day)	Task	Description	Duration (days)
1	1	Meet with NGO contact (Otieno Owino from WECCO) and community representative (Paulo Olango)	Ask preliminary questions	1
1	1	Meet with community leadership	Discuss project and trip schedule	1
2	2	First meeting with Kibuon Water Council (CBO)	Discuss fundraising progress and methods	1
2	2	Hold community meeting	Introduce team, explain purpose for trip, address questions, comments, and concerns	1
2	3	Tour Kibuon	Record GPS coordinates of important locations (water sources, public buildings, school, health clinic, etc.)	2
3	11	Household surveys	Interview 20-30 households in total, aim for 2-3 per day (ask about water usage, health issues, education)	9
3	3	Water quality testing	Test water quality of current water sources	1
3	5	Gather building dimensions	Of public buildings that could potentially be used for rainwater catchment	3
3	5	Soil analysis at building locations	Test soil type and load bearing pressure	3
5	5	Meeting with county government (if possible)	Discuss local politics and how they may affect projects	1
5	5	Visit local health clinic	Collect health data	2
6	7	Hydrogeological survey	Work with hydrogeologist to find optimal pump location within or near Kibuon	2
7	7	Meeting with WECCO	Discuss borehole construction	
8	8	Second community meeting	Address any new questions, comment and concerns	1
8	8	Women's Meeting (if possible)	Hear concerns and priorities of women in the community	1
9	10	Search for potential suppliers	Visit nearest commercial center and create	2

			directory of vendors and items sold	
11	11	Final meetings with community leadership and Water Council	Discuss next steps and get partnership agreement signed	1-2
12	13	Finish any incomplete tasks		2

3.3 Meetings with stakeholders

3.3.1 Community Members

This meeting will occur as soon as possible after arrival. At the meeting, the team plans to:

- Describe why the team is in the community and find out if they have any objections to our being there.
- Invite feedback from the community and describe plans for getting their feedback through surveys/interviews
- Find out what systems are in place or would be put in place for the distribution of the water
- Find out if there are any community members with skills relating to piping, cement work, etc that can contribute to the successful implementation of the project
- Find out about existing long-term operation and maintenance plans for the project after completion
- Get a good understanding of the relationship between the local board and the central government agency and of who has what authority to collect fees for the water system, and to spend the money for operations and maintenance.

3.3.2 CBO Leaders

The team will meet with the Kibuon Water Council at least twice on the trip. The meetings are scheduled for Days 2 and 10. The second meeting in day 10 is meant to recap and discuss the next steps after the trip. The agenda for the first meeting will be as follows:

- Receive educational briefing on the Kibuon area
- Find out if there has been previous involvement by other organizations in the designing of a water distribution system
- Get a good understanding of the relationship between the local board and the central government agency and of who has what authority to collect fees for the water system, and to spend the money for operations and maintenance.
- Find out how public community meetings are organized outside of election meetings
- Find out about any laws or permits that need to be addressed with respect to potable water distribution system implementation
- Find out what assistance the CBO can give us (survey data, census data)
- At the second meeting, the team intends to discuss the next steps and sign the partnership agreement.

3.3.3 Local Government/Community Leadership

During the trip, the team will meet with village leadership. To that end, the project team plans to:

- Learn more about local government from Princeton chapter
- Inquire about setting up a meeting with Migori government officials or other pertinent regulators.
- Find out about the permitting process for wells and/or rainwater catchment.
- Find out what funding is available for the project, or if government will require a fee.
- Find out if the government can provide technical expertise for ongoing monitoring of the well

3.3.4 Contractors

The team will need to hire contractors for well drilling, a hydrogeological study, and potentially ongoing monitoring. One contractor the team has been in contact with is WECCO, a local non-profit contractor based in Migori that drills wells, educates communities about pump installation, and helps with ongoing monitoring of wells. However, the team might work with other contractors. A few questions the team has related to contractors are:

- What is the cost of a hydrogeological study?
- What is the cost of the well drilling?
- Roughly how deep is the groundwater here? (this will help us estimate the cost of the pump and the energy requirements of the project)
- What is the cost of ongoing well monitoring?
- What is the cost of making repairs to damaged infrastructure?
- What suppliers do you use?
- Are there other contractors besides WECCO the team can reach out to for drilling and hydrogeological studies?

3.3.5 Suppliers

The project team will need to find supplies for construction of the well or rainwater catchment system, as well as ongoing maintenance of the systems. The team does not know the specific types of supplies that it will eventually use, given there is no firm design at this time, however the types of supplies that the team would like to get quotes for would ideally fall into the following categories:

- Raw Materials Supplies:
    - Concrete (cement and aggregate, such as gravel) for use in the construction of a concrete water tank for the pump and possibly for the pump housing.
    - Lumber. This might help us make design decisions on the pump housing and construction, and it would be necessary if concrete is used.
- Piping and Tanks Supplies:
    - PVC piping for use in the rainwater catchment device or pump.
    - Plastic water tanks for possible use in rainwater catchment device or pump.
- Machinery Supplies:
    - Water pump
        - Do they sell replacement parts / materials used in maintenance of the pump? If so, are there common replacement parts and materials that they sell frequently, and we should purchase to have readily available at the well in order to mitigate any repair delays?
- Miscellaneous
    - General construction materials such as screws, nails, PVC joint compound, rubber sealant, grout, etc.

In all of these cases, it will also be important to ask whether the supplier has the capability to provide transport for any purchased materials, or whether the project team will need to arrange for the transport independently, given this could impact the teams ability to actually use the supplies.

3.4 Engineering Data collection

Day	Data Collected	Method	Duration (days)
2	Geospatial Analysis	Create a comprehensive survey of site layout. Use a GPS tracking app to mark the locations of key structures in the community. Use an Abney level to get exact elevations for potential site areas.	2
3	Water Quality Analysis	Use a water test kit to analyze the quality of all current water sources and potential future sources. This will likely include several points along the river, and, if applicable, nearby wells and preexisting rainwater catchment infrastructure. The team will analyze the following: • Turbidity (via visual test) • Total suspended solids (via electronic probe) • pH (via test strip) • Alkalinity (via test strip) • Hardness (via test strip) • Bacteria coliforms (via plate count) • Nitrate/Nitrite (via test strip) • Phosphate (via test strip) • Ammonia (via test strip) • Arsenic (via test strip)	1
3	Building Dimensions	Use measuring devices to gather dimensions of relevant buildings, i.e. potential structures for a rainwater catchment system or infrastructure in close proximality to a potential borehole site. Take measurements of all building sides, with special attention paid to the roof dimensions. Measure the grade of the roof and potential slope of the overall building using a level. Schematics should also be made of all buildings and extensive photographs taken.	3
3	Soil Analysis	Quantify soil type using a soil test kit at potential sites for rainwater catchment or a well. Judge soil compaction level and tilth. Determine load bearing pressure and composition using a pocket penetrometer and jar testing respectively.	3
6	Hydrogeological Survey	Contract drilling company to complete a survey of potential aquifers and subterranean geology. Survey and extensive area surrounding the immediate town to find the aquifer productivity and depth of water table and begin to construct a map.	2

3.5 Community Surveys

A series of surveys will be conducted throughout the assessment trip to Kibuon.

The first set of oral surveys will be conducted on Days 1 and 2 of the trip to gather preliminary information about the community and trip objectives. The meeting on Day 1 will be with the NGO contact and with the community representative. The meeting on Day 2 will be with the Water Council. These introductory meetings with key contacts will provide survey information in a discussion format.

Following this, the project team will collect survey notes during a larger community meeting to be held on Day 2 to ask and answer questions about the purpose of the trip and the demand for a water supply. This discussion format will also provide information about other community concerns and comments not reflected in the analytical data.

The final set of surveys will be conducted at approximately 20-25 households between Days 4 and Kibuon community members to obtain data on water usage, health issues, education, and other relevant community statistics and concerns. If these surveys cannot all be completed on Day 4, some team members will continue conducting the household surveys on Days 5 and 6.

To conclude the trip and address remaining concerns and next steps, there will be a secondary community meeting held on Day 9 to supplement the information collected from Day 2. Additionally, there will be secondary meeting with

community leadership and the Water Council on Day 10 to supplement information collected from key contacts from Days 1 and 2.

3.6 Baseline Data Collection

The baseline data collection will happen through a series of community meetings, survey administration, and environmental assessments. The collection will occur over days 3-11 during the assessment trip, as indicated on the figure in section 3.2.

4. Go/No Go Decision

4.1 Community/NGO Capacity

1. Will the NGO and community be able to support the project enough for it to be successful?
    a. Will the community be able to commit to contributing the 5%?
    b. Can community leaders raise these funds prior to implementation?
    c. How much have they raised by the time the chapter travels to the community?
    d. At what rate are they raising the funds?
    e. Where is the funding coming from?
    f. Have there been past projects that the community was able to fund successfully?
2. Was the community application fully honest about the water problems they are facing and their ability to support the project?
    a. The information given on the application may differ slightly from what is found in the community application if the person filling it out had to estimate data or did not have all of the information. Some discrepancies are likely harmless and unintentional, but the ones to be aware of are major differences between the application and reality or any obvious lies on the application.
3. Will the project be sustainable, and will the community be able to maintain it after the partnership is finished?
    a. Have they been able to sustain projects in the past?
    b. Do they have the necessary technicians to perform maintenance?
    c. Do they take good care of current public buildings/infrastructure?
    d. If they haven't or don't do these reliably, it may come into question whether they would be able to adequately maintain the water system.
4. Is the NGO trustworthy?
    a. Do they communicate regularly and clearly with the chapter and other involved parties?
    b. Have they been honest with the chapter throughout the process?
    c. How long have they been involved with the community?
5. Is the community leadership involved in the project?
6. Is there a change in project scope that makes it impossible for the chapter to fund the project?

4.2 Technical Feasibility

1. Is the proposed project technically possible with the resources available?
    a. Is a groundwater well the best solution for the community's water concerns?
    b. Is there some other solution that may be better suited?
    c. Would the community be open to a different solution?
    d. Are there locations for the well?
2. Are the necessary materials and skilled labor accessible?
    a. In the local community?
    b. In nearby cities? How long will it take to get these?
    c. Can they be acquired for a cost which is affordable by the community?
3. Will the government allow the chapter to go through with this project?
    a. Are there any laws or regulations in place that might make the process difficult?
    b. Has the government interfered with similar projects in the past?
4. By the end of the assessment trip, has the chapter collected enough data to make informed design decisions when back at Harvard?
5. Does the chapter have the infrastructural and technical knowledge to construct this system?
6. Is the groundwater in Kibuon of sufficient quality?
7. Are there any environmental threats, such as regular natural disasters that would jeopardize the integrity of the well?

4.3 Chapter Safety

1. Will participating in this project cause any health or safety risks to the team?
    a. Are there any dangerous diseases present in the local community which may pose a threat to the health of travel team members?
    b. Is there political instability in the area which may the community unsafe?
    c. Are there any other issues with violence in the area?

4.4 Project Impact

1. Will this project truly have the impact predicted?
    a. Will the water be serving all parts of the community?
    b. Will everyone in the community have equal access to the water?
    c. If people will be charged for water, will the community ensure that households with less money will be able to access a sufficient amount of water?
    d. Will the proposed project provide enough water for the community's needs?
    e. Are there other issues in the community which need more attention?
2. Is this a project that the community members seem to want?
    a. Are they in support of the solution decided on?
3. Is the NGO truly representing the best interests of the people?
    a. Has the NGO worked with the community before?
    b. Are the community heads and NGO heads familiar with one another?
4. Is there another organization which is implementing or planning a similar project currently which the group previously had no knowledge of?

4.5 Other Factors Contributing or Hindering Development

To determine if there are any NGOs, local or regional governments, or other organizations working in the community the chapter can ask the partnering NGO. Chapter members may also ask citizens in their community surveys if other projects have been implemented or if these other entities are working with the community for any purpose.

Other factors which may hinder development would include violence within or around the community. Community members could be surveyed about if they have experienced violence or if they are aware of any political tension which may cause problems for the project.

The chapter can examine the history and frequency of natural disasters in the area by surveying the community members as well and perhaps by consulting local records about these types of events. If certain natural disasters are common in the area, these disasters may negatively impact the implementation process.

5. Baseline Monitoring Data Collection

5.1 Baseline Data

Baseline data collection will be in accordance to the water system and site assessment guidelines provided by EWB-USA. Geographically we will determine the boundaries of the community, the latitude and longitude coordinates of existing infrastructure and utility systems, and location and number of households. To ensure that we will be able to use resources that are locally available to complete the project we will collect information about the local hardware stores, quality and cost of construction materials, the skilled labor available to community.

The financial and organizational capacity of the community will be determined through meetings with community leadership aimed at understanding the primary form of income for residents, a survey to determine what residents are willing to pay for the construction of the project, the forms of fundraising available to the community, and the financial systems in place for the management of the system that will be constructed. Similarly, the meetings will be used to determine the structure of the existing local government, the election procedures and timelines, and the local laws and regulations that apply to the project and need to be followed.

An environmental assessment will be taken to ensure that the project does not promote excessive material use and consumption. The effect of the project on ecosystems, natural resources, and watersheds will be extensively analyzed with the assistance of professionals within the community.

The technical information collected will involve water quality assessments, water usage patterns, and topography. For instance, water quality testing will be conducted on all sources of water used by community members. The water pH, heavy metal contamination, nutrient and bacteria levels will be determined with water testing kits that the community will bring to the community. The supply and usage of each water source will be determined through the combination community surveys, rainfall data, and seasonal flow data. The demand for water will be estimated based on the population of the community.

The project team intends on patterning with local academic institutions and the a suitable driller to conduct a hydrogeological survey, and understanding laws surrounding water rights. This would involve determining the depth of the water table, if there are other wells in the areas, the degree of water level fluctuation, the pumping rates that can be achieved for the construction of a well, distances to latrines from the site, and possible surface water intrusion onto the well.

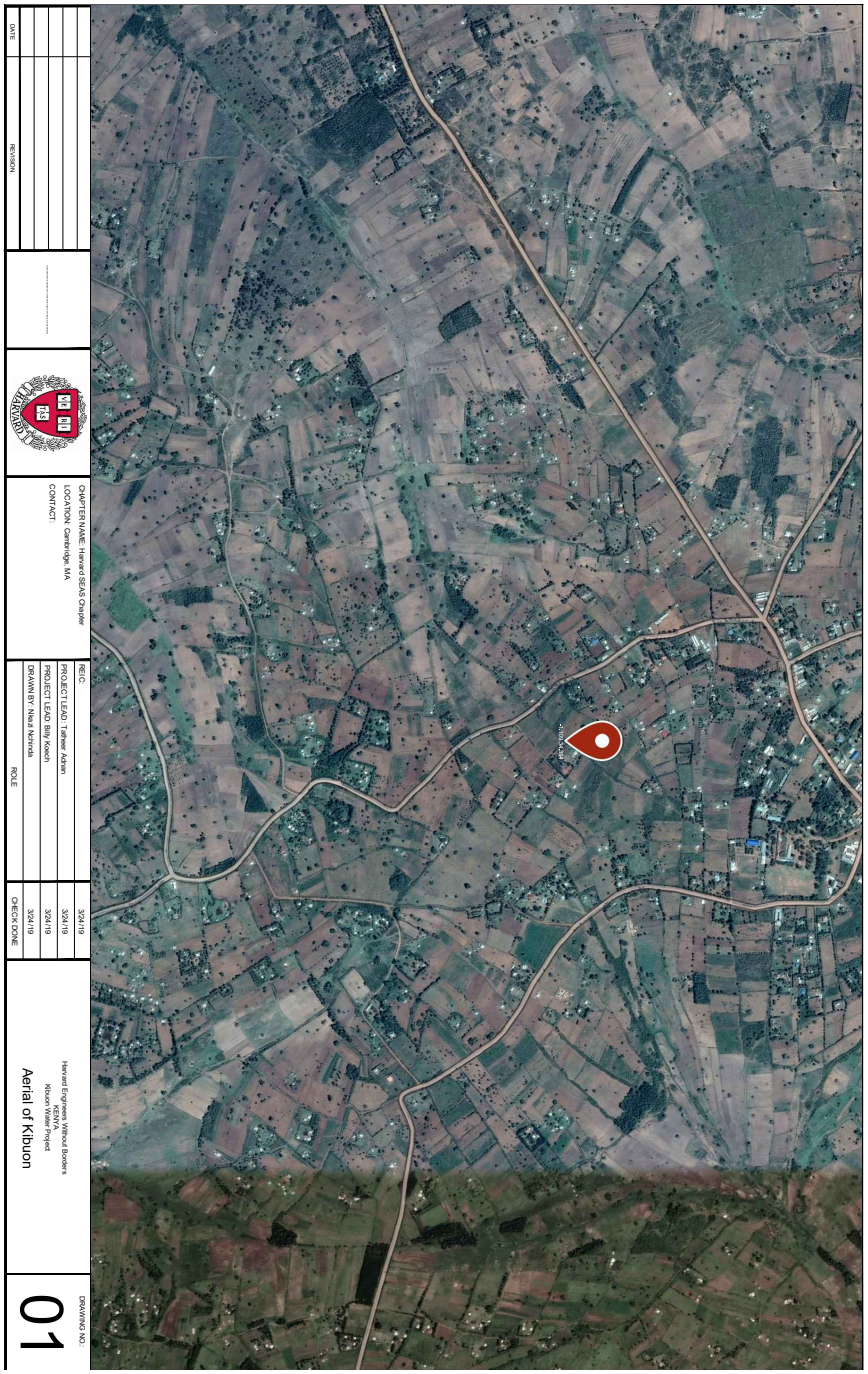
Finally, during the trip the project team will also determine the water treatment options available to the community by surveying the community to understand the kinds of water sanitation protocols familiar to the community, chemicals available for purification, availability of sand and carbon filtration, and the operational costs to maintain treatment systems.

5.2 Beneficiary Analysis

The beneficiaries of this water supply system are the approximately 200 households and 800 people comprising the community of Kibuon. The number of beneficiaries was provided by the Kibuon Water Council in their community partnership application to Engineers Without Borders USA. To better update the number of households and individuals that will serve as beneficiaries, Harvard SEAS chapter will communicate with the Kibuon Water Council and other community partners to determine where national census data regarding Kibuon is accessible and if necessary take this data during the Summer 2019 Assessment Trip. To ensure the beneficiaries adhere to the reporting standards for ICP project beneficiary procedures, the chapter will work with the community and community partners for usage, maintenance, and financial planning purposes.

6. List of Attachments

6.1 Attachment A: Drawing Package



6.2 Attachment B: Data from Previous Assessment trip

Not applicable.

6.3 Attachment C: Partnership Agreement

Community Agreement – Project Partnership

This contract is between the Harvard School of Engineering and Applied Sciences chapter of Engineers Without Borders USA, Kibuon Water Council, and WECCO for the purpose of setting guidelines for the Kibuon Water Project. The roles and responsibilities listed below must be included in the standard EWB-USA Project Partnership Agreement. Additional roles and responsibilities identified by any party to the agreement may be added at the discretion of all parties to the agreement. This document must be signed by all parties in order to move on to the design development of the Kibuon Water Project.

EWB-USA is a volunteer-based organization without a pre-approved budget. Implementation of all projects is contingent upon all parties meeting the commitments outlined below, funds being raised and a stable security situation which allows travel to the site by our members. This agreement is not legally binding, but is intended to clarify expectations, roles and responsibilities of all parties to the subject project.

The residents of Kibuon agree to the following:

- To communicate directly with the Harvard SEAS chapter of EWB-USA on a regular basis, as determined by the needs of the project.
- To inform the Harvard SEAS chapter of EWB-USA of any changes to the security/safety situation.
- To allow the Harvard SEAS chapter of EWB-USA to communicate directly with all interested community groups in order to get all pertinent input to the development of the Kibuon Water Project.
- To organize and involve community members in all aspects of the project.
- To identify community contacts to accompany the Harvard SEAS chapter of EWB-USA team during site visits.
- To ensure that Kibuon Water Project represents community-wide priorities and that all community members will have the opportunity to benefit from the project per the terms of use established by the community.
- To contribute a minimum of 5% of the capital construction cost in cash before construction begins.
- To provide in-kind contributions to the project at no cost to the Harvard SEAS chapter of EWB-USA (examples are skilled and unskilled labor, borrowed equipment, local materials, etc.).
- To identify a formal system of responsibility for the operations and maintenance of Kibuon Water Project.
- To establish and administer the funding mechanism required to continually operate and maintain the Kibuon Water Project after construction is complete.
- To be available to assist with additional technical data collection not completed by the Harvard SEAS chapter of EWB-USA on site assessment trips.
- To allow photos or video taken by the Harvard SEAS to be used in EWB-USA HQ's marketing materials to share the story of the organization's work with wider audiences.

WECCO agrees to the following:

- To avail to the Harvard SEAS chapter a quote of the cost of the services they can offer prior to providing any service.
- To inform the Harvard SEAS chapter of EWB-USA of any changes to the security/safety situation.
- To visit Kibuon often, and as needed, for project progress.
- To build the capacity of Kibuon Water Council to establish continuing support of the system, as needed.
- To provide project-specific training for Kibuon Water Council, as needed.
- To identify contributions that the WECCO can make to the project (examples include funding, resource procurement, heavy equipment, etc.)
- To assist in ongoing monitoring and evaluation of the Kibuon Water Project.
- To be available to assist with additional technical data collection not completed by the Harvard SEAS chapter of EWB-USA.
- To allow photos or video taken by the Harvard SEAS to be used in EWB-USA HQ's marketing materials to share the story of the organization's work with wider audiences.

The Harvard SEAS chapter of EWB-USA agrees to the following:

- To work in partnership with the Kibuon Water Council to design and develop the project, the Kibuon Water Project.
- To seek input from community members during the design phase
- To communicate with the Kibuon Water Council and WECCO throughout project design phases to provide status updates on project design development.
- To identify contributions that the Harvard SEAS chapter of EWB-USA can make to the project construction expenses (examples include fundraising, assistance with community grant applications, etc.).
- To inform the Kibuon Water Council and WECCO of any changes to the agreed upon details of site visits (examples include a change of dates, number of travelers, etc.).
- To collect technical data required to complete the project design.
- To provide project-specific education and training, including operations and maintenance training in Swahili.
- To provide a manual to instruct the community on operations and maintenance of the Kibuon Water Project in English, Swahili and Luo.
- To provide as-built drawings to the Kibuon Water Council after project completion in English, Swahili and Luo.
- To acquire explicit permission before photographing or videoing members of the Kibuon Water Council and/or WECCO, and explain that photos and videos may be used for marketing materials to share the EWB-USA story with wider audiences.
- To ensure photographs and videos present subjects in a dignified and respectful manner and that images are honest representations of the situations and the facts.

In addition to the responsibilities listed above, indicate the responsible party for each of the following:

- Coordination of transportation for travel team members of the Harvard SEAS chapter of EWB-USA will be provided by Paul Olango and Julius Amara.
- Coordination of translation services for travel team members of the Harvard SEAS chapter of EWB-USA will be provided by Billy Koech, Paul Olango and Julius Amara.
- Transportation of materials will be coordinated by Paul Olango and Martin Owino(of WECCO).

On behalf of and acting with the authority of the residents of Kibuon, the NGO/local municipal partner WECCO and the Harvard SEAS chapter of EWB-USA, the under-signed agree to abide by the above conditions.

_____

Signature Date

_____

Printed Name

_____

Contact Telephone Number (including country code)

_____

Project Lead in the Harvard SEAS Chapter of EWB-USA

_____

Signature Date

_____

Printed Name

_____

Contact Telephone Number (including country code)

_____

REIC/Faculty Advisor in the Harvard SEAS Chapter of EWB-USA

_____

Signature Date

_____

Printed Name

_____

Contact Telephone Number (including country code)

_____

Position in Community-Based Organization

_____

Signature Date

_____

Printed Name

_____

Contact Telephone Number (including country code)

_____

Position in Local Partner Organization

6.4 Attachment D: Monitoring Questions

Project Category: Water Source Development (Home) **Chapter:**
Project Name: **Data Collector:**
Project Country: **Date:**
Link to Water Source Development (Home) Question Instructions

Project Indicators Field Data Sheet	
Performance and Quality	
Community Satisfaction	Notes:
Q: What percent of those surveyed say they are satisfied with the current system?	
A: _____ % (based on survey of CBO or community representatives)	
Existing Condition	Notes:
Q; What is the current condition of the existing, modified, or new system?	
A: □ Great condition □ Needs aesthetic maintenance □ Needs maintenance □ Major maintenance □ Not in use due to poor condition □ Does not currently exist	
Local Standard	Notes:
Q: Does the system meet applicable local standards?	
A: □ Yes □ No □ No Standard Identified	
Women Involvement	Notes:
Q: Were women consulted in the planning process?	
A: □ Yes □ No	
Water Quantity - JMP Community dry	Notes:
Q:What level of water access does the project provide in dry season?	
A: □ Does not meet minimum standards: <15 litres per person/ day □ Emergency access: Minimum of 15 litres per person/ day □ Basic access: Minimum of 20 litres per person/ day □ Intermediate access: Minimum of 50 litres per person/ day □ Optimal access: > 100 litres per person/ day	
Water Quantity - JMP Community rainy	Notes:
Q:What level of water access does the project provide in rainy season?	
A: □ Does not meet minimum standards: <15 litres per person/ day □ Emergency access: Minimum of 15 litres per person/ day □ Basic access: Minimum of 20 litres per person/ day □ Intermediate access: Minimum of 50 litres per person/ day □ Optimal access: > 100 litres per person/ day	
Water Quantity - On day tested	Notes:
Q: What is the quantity (measured) of water from the source on the day of the visit? (L/day)	
A: _____ (L/day)	

Project Category: Water Source Development (Home)
Project Name:
Project Country:
Chapter:
Data Collector:
Date:

Link to Water Source Development (Home) Question Instructions

Water Quantity - Dry Season	Notes:
Q: What is the quantity of water from the source (L/day) in the dry season?	
A: _____ (L/day)	
Water Quantity - Rainy Season	Notes:
Q: What is the quantity of water from the source (L/day) in the rainy season?	
A: _____ (L/day)	
Water Consumption - Community	Notes:
Q: What is the overall average people per day using the system?	
A: _____ (people/day)	
Water Quality	Notes:
Q: What is the quality of the water?	
A: □ Good Quality (No water quality issues) □ Exceeds Secondary (Fails test for appearance or taste) □ Exceeds Primary (Does not meet potable water quality standards)	
Water Storage Safety	Notes:
Q: Percentage of system users practicing safe water storage?	
A: □ 0% □ 1– 25% □ 26% - 50% □ 51% - 75% □ 76% - 100% □ N/A for storage	
Water Transportation Safety	Notes:
Q: Percentage of system users practicing safe water transportation	
A: □ 0% □ 1– 25% □ 26% - 50% □ 51% - 75% □ 76% - 100% □ N/A for transportation	
Water Supplies near facility	Notes:
Q: What is the number of improved water sources within 1km of a public water access point (or public service range of your project.)?	
A: _____ (Number)	

Project Category: Water Source Development (Home) **Chapter:**

Project Name: **Data Collector:**

Project Country: **Date:**

Link to Water Source Development (Home) Question Instructions

Water JMP Level of Service	Notes:
Q: Select which WHO/ UNICEF JMP Standard this project meets water access/ quality.	
A: □ Safely Managed: Drinking water from an improved water source which is located on Premises, available when needed and free from faecal and priority chemical contamination. □ Basic: Drinking water from an improved source, provided collection time is not more than 30 minutes for a roundtrip including queuing □ Limited: Drinking water from an improved source for which collection time exceeds 30 minutes for a roundtrip including queuing □ Unimproved: Drinking water from an unprotected dug well or unprotected spring □ Surface Water: Drinking directly from a river, dam, lake, pond, stream, canal or irrigation canal	
Water Collection Distance	Notes:
Q: What is the number of households collecting water from water source further than 30 minutes roundtrip including queing as reported by water committee or appropriate source, times average household size?	
A: _____ (number)	
Theft Protection	Notes:
Q. Theft protection (is theft protection in place and working)	
A: □ Yes □ No	
Maintenance and Functionality	
Functionality On Day Observed	Notes:
Q: Is the system functioning on day observed?	
A: □ Yes □ No	
Functionality	Notes:
Q: % What percent of the time is the system working as intended?	
A: % of time that the project is working (time operating/ time designed to operate): □ 0% □ 1– 25% □ 26% - 50% □ 51% - 75% □ 76% - 100%	
Community Identified Need	Notes:
Q: Does the system meet the community identified need?	
A: □ Yes □ No □ Partial	

Project Category: Water Source Development (Home) **Chapter:**

Project Name: **Data Collector:**

Project Country: **Date:**

Link to Water Source Development (Home) Question Instructions

Functionality Non Performance Reason	Notes:
Q: What is the reason the system is not performing as intended?	
A: □ Initial need overstated or unreasonable or unattainable □ Limited maintenance/construction funds □ Technical design issue □ Not constructed per design □ Inappropriate, ineffective or no maintenance. □ Population growth, migration or other change in number of users. □ Cultural issue □ Change of community priorities □ Theft □ Community infighting □ Intercommunity conflict □ Technology not adopted, not preferred, or not embraced □ Unforeseen damage □ Other organization solved problem □ N/A system functioning as designed	
Maintenance Completed	Notes:
Q: Is there evidence that maintenance is being completed on existing system?	
A: □ Observed □ Inferred □ Reported □ None/Limited	
Maintenance Non Performance Reasons	Notes:
Q: What is the reason for no maintenance or limited maintenance?	
A: □ No responsible party □ Limited funding □ Lack of training □ Staff turnover □ Community dissatisfaction with project □ Lack of community support □ Community infighting or conflict □ N/A	
Community Capacity	
CBO Best Practices	Notes:
Q: Does a maintenance body such as a CBO exist to provide long term operation and maintenance support?	
A: □ Yes □ No	
CBO Structure	Notes:
Q: Which best practices does the CBO/Maintenance body follow?	
A: □ Adequate funding for operation and maintenance □ Equitable cost sharing □ Good record keeping □ Fair elections □ Frequent elections □ Developing and maintaining the respect of the community □ Conduct regular meetings □ Provide leadership for maintenance activities □ Women are represented in the CBO □ Inclusive membership □ Balanced membership (non-nepotistic participation) □ Women in Leadership roles	

Project Category: Water Source Development (Home) **Chapter:**

Project Name: **Data Collector:**

Project Country: **Date:**

Link to Water Source Development (Home) Question Instructions

CBO Fund Adequate	Notes:
Q: Complete this statement: "The maintenance body/ CBO has enough balance in the institutional financial fund to:"	
A: □ Fund full replacement of the system □ Fund 3 months operation and maintenance activities only □ Fund 3 months operational activities only □ Limited funding (less than 3 months operation costs) □ Opportunistic funding (money generated as needed for repairs) (the estimated cost of a single typical repair) □ Limited opportunistic funding (some money but less than the estimated cost of a single typical repair can be generated as needed) □ No balance	
CBO Fund	Notes:
Q: Does the maintenance body/ CBO save its money in an institutional financial (i.e. bank) fund?	
A: □ Yes □ No	
CBO Revenue Source	Notes:
Q: What is the revenue source (who pays the fee)?	
A: □ Users □ Students/parents □ Entire community □ Partial community (more wealthy, business owners, farmers, etc.) □ Sliding scale □ Local government	
CBO Revenue Frequency	Notes:
Q: What is the revenue collection frequency?	
A: □ Monthly □ Per use (tap attendant, kiosk, etc.) □ No fee □ Annual fee □ When needed □ Initial connection □ After sale of products (crop sales) □ Seasonally	
CBO Revenue Structure	Notes:
Q: What is the structure of the revenue collection?	
A: □ Pay metered amount □ Per use (tap attendant, kiosk, etc.) □ Tariff collection □ No fee □ School fee □ Community solicitation/collection as required □ Fee by select user type □ Revenue from sales. □ Initial Connection Fee □ Sliding Scale	
CBO Fund Amount	Notes:
Q: What is the amount in CBO institutional financial fund?	
A: _____ (USD)	