

# **EWB Phase 1 Implementation Report**

## **Executive Summary**

This implementation report seeks to inform all stakeholders about the work the EWB-KNUST RWC/Irrigation Team undertook at Ullo on February 6, 2021 at Ullo Senior High in the Ullo Dante Community.

The RWC/Irrigation Project seeks to construct a rainwater collection system, using rain gutters and pipes to harvest water coming from the dining hall roof and channel the rainwater into tanks located by the dining hall building. The water collected in the tanks are supposed to serve as irrigation water for the school's garden. This project has arisen as a result of necessity for water for irrigation of the school garden due to arid conditions in Ullo during the dry season.

The RWC/Irrigation system has undergone a design and consulting stage, involving EWB-USA, EWB-ISU, EWB-KNUST, Ullo Senior High School and the Traditional Council of the Ullo Traditional Area, who are stakeholders of this project and from December 17 - 19, 2020, preliminary works for implementation of Phase 1 began with the construction of the tank pads. For phase 1 implementation, the work span from construction of the tank pads which was completed on December 19, 2020.

The recent trip to Ullo from February 5 to 7, 2021 was to continue with the implementation of Phase 1 work of the Project. The work package included the installation of the tanks on the tank pads, fixing of the rain gutters, fixing of PVC connections from the gutter into the tanks and subsequent PVC tank fittings and connections

The work schedule for the trip was mostly supervisory for the team from KNUST. The team was supposed to inspect: the quality and suitability of materials that had been acquired, check the quantity of materials acquired and offer directions for the technicians who were installing the system. The team was supposed to maintain contact with EWB-ISU during the course of implementation for any review and modification to be discussed, but due to communication challenges experience in Ullo, it became a challenge.

Following the trip and implementation activities, the team has reached a monitoring and evaluation stage for Phase 1. The rains are expected in Ullo late in the month of March.

Notification upon the first rains and feedback on any challenges the system faced in harvesting rainwater is expected from our correspondents at Ullo, on the first rain and subsequent rains. To this result our correspondents in Ullo have been informed and an information request form has been prepared by the team. The team also maintains communication with Stakeholders at Ullo via telephone and on 'WhatsApp'.

The team further expects the teams and stakeholders to go into design and consultation for phase 2 of the project, which mostly involves installing the irrigation system and fencing the garden. After which a date will also be set for implementation activities to commence.

### **Construction Activities**

The team from KNUST had one day, February 6, 2020 to ensure all construction activities were done according to the approved designs. The team started off with the inspection of materials that had been acquired. The materials were all acquired from the Bill of Materials available to the Project's main Ullo correspondent. Upon arrival the materials available which were inspected included:

- Custom made aluminum rain gutters
- Adapter
- 3mm flexible Steel Cables
- Gutter Holders
- Nylon mesh
- Plastic Adapter
- PVC Pipes
- Pipe fittings (Tees, Elbows, Tank Connectors, Valves)
- Ladder

All the materials except the adapter were determined by the team to be of acceptable standard for the project, especially since they all came from trusted distributors from Jirapa and Wa.

The School supplied a longer wooden ladder to complement the steel ladder that had been purchased for use by the technicians.

### **Fixing the rain gutter**

The wood board of the roof already had a line on it and so the technicians used that to measure the slope that the gutter should have and nailed the roof gutter holder unto the wood boards. The gutters were placed on the holders and affixed to the top of the roof using nail anchors and the steel cable. The roof holders were placed at an average distance of about 40cm between each other, and each roof holder had a nail anchor and a steel cable wrapped around it to affix the gutter to the roof.

The gutter had an opening at one end where there was supposed to be a drain and that is where all the water from the roof would slope towards. The open end according to the design was

supposed to have a downspout fixed to it and then an adapter attached which would channel water from the roof through a pipe and then into the tank via the opening at the top.

The quality of the adapter that had been acquired prevented its use in the system as such a pvc elbow alternative was used. Where water coming from the hole in the gutter was channeled through the pvc pipe then through a 45-degree elbow bend then into the top of the tank. It took a total of 2 hours and 30 minutes to fix the rain gutter and have it adjusted to flow rainwater into the hole-side and this activity was done by two teachers from the school who had technical knowledge and experience in installing rain gutters.

### **Installing the tanks**

The tanks were installed on the tank pads with the assistance of students from Ullo senior high school. The tanks were carried from the individual locations and installed in the center of each of the tank pads at first. The dimensions supposed to be used for the spacing of the tanks could not be done based on the construction of the tanks, owing to this, spacing of the tanks was done based on discretion. This decision did not prove to be a challenge to the project as this was done during the installation of the pipes between the tanks. This task took about 10 minutes.

### **Installing Tank Fittings**

The tanks supplied for use for the project have already served other purposes before being supplied for use. As such they came with other tank fittings that needed changing, new holes that needed to be made and other openings on the tank that needed to be plugged. This stage was done by a team of plumbers. The first swapped out all the old tank connectors which were mostly damaged and fixed new tank connectors and based on the orientation of the tanks on the tank pads, sealed the ones that didn't require pipes to come out of them. They then proceeded to

create new holes where new holes were required and fit all of them with tank connectors. It was difficult to acquire a drill with bit sizes of the new holes to be cut, and so the plumbers employed the use of steel pipes and fire. They heated 1-inch and 2-inch steel pipes and melted holes in the tanks. The holes were allowed to cool and the tank connectors were installed without any challenge. This process took a total of about 3 hours partly owing to the plumbers having to go back to Jirapa to purchase more tank connectors.

### **Installing the downspout**

The downspout was installed into the system next, connecting the rain gutter to the tanks. The plumbers handled this stage as well. Unlike the original designs, the downspout was channeled straight into the top of the tank from the gutter. The downspout made from a 2-inch pvc pipe and two 45 degree pvc elbows. From the roof about 30cm of pvc pipe was fixed and the end fixed with a 45 degree pvc elbow. Another piece of pipe was connected to the same 45-degree pvc elbow. The pipe spanned downwards to the middle of the opening at the top of the first tank, there another 45-degree pvc elbow was connected to the end of the pipe and channeled into the tank via a 2-inch hole created in the lid. The piped and elbows were all fixed in place with PVC glue. The tank being aluminum offers flexibility as such, the downspout could be removed easily and the lid taken off, the tank washed and put the lid and downspout put back into place with any challenge. This installation took about 35 minutes to put into place.

### **Connecting the tanks and tank outlets**

The tanks were connected to each other using 1-inch pipes. The first tank which receives water from the rain gutter was connected to the second tank at the top outlet facing the next tank and likewise for the third and fourth tanks. The second and third tanks however owing to their

height difference was connected using 1-inch 90-degree pvc elbows, contrary to the design that required a 45-degree bend. The spacing limitation between two tanks let the team to decide to change to use two 90-degree pvc elbows in a stepped design to send water from the second tank into the third tank.

The tank outlets to the irrigation system was modified, due to the nature of the tanks. The tanks were old tanks and looked repurposed several times and they looked a bit worn out, creating more holes especially in the bottom part of the tanks, where the wear of the tank was most evident, for the irrigation outlets could damage the tanks, especially with the method the plumbers were using to create the holes. So upon deliberation with the KNUST, and plumbers, we resorted to connecting existing outlets which were facing together, put a 'tee' pipe fitting in the middle to channel the water down and fix ball valves at the exits of each tank to control the filling and releasing of water from the tanks into the irrigation lines. This process took a further 2 hours of the time the team had to stay and was completed the next day February 7 while the team was on their return journey.

### **Filtration System**

The filtration system of the system was a nylon mesh lining at the lid of the entry tank which would serve as filtration for any debris which could clog the emitters of the irrigation system.

The nylon mesh had been acquired upon the team's arrival at Ullo but due to the nature of lids of the tanks could not be installed during the trip. The correspondents at Ullo gave assurance of new lids coming in for the tanks and when they arrive the mesh would be installed.

Because the rains were expected soon, a small modification was included to the system so there is filtration present in the system. At the gutter hole, the nylon was cut and used to cover the hole

so that any water that will pass through the hole will be filtered before it gets into the tank. The nylon was fixed in place using a drain cap and glue to hold firmly in place.

### **The overflow system**

The 2-inch tank connector used for the overflow system wasn't available in Jirapa or Wa, and this wasn't communicated to the team from KNUST before arrival. The team had to return to Kumasi and send the 2-inch tank connector via a bus back to Wa for project correspondents in Ullo to pick up and use for the work. The design and construction was thoroughly gone over by the team and plumbers before the team left Ullo.

The overflow system was completed by March 17 due to some unforeseen circumstances, which required work to halt.

### **Conclusion**

A change log document tracking all changes to system during the construction phase would be added as an attachment to this report.

The phase 1 implementation on the construction side went on with any major challenges.

Photos and other materials relevant to the phase 1 implementation tasks will be sent as attachments to this document, and any other document or information would be available upon request.