

Engineers Without Borders (EWB) Research Triangle Professional (RTP) Chapter:



Caserio Chipozo
Alta Verapaz Guatemala
Water Supply Improvement Project
21March2022

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<https://ewb-rtp.org>
<https://support.ewb-usa.org/fundraiser/725961>
<http://ewb-usa.org>

Objectives of this brief

- Introduce Engineers Without Borders (EWB)
 - EWB Mission, Core Values and Impact
 - Our professional chapter in Raleigh NC
- Provide an overview of the EWB RTP water supply improvement project in the community of Caserio Chipozo in Alta Verapaz, Guatemala
 - *Objective: Improve water supply for 95 families (615 people) who are without dependable clean water*
 - *This video also provides a good overview:*
 - https://m.youtube.com/watch?v=V_HlMm88gss
- *Provide current status of the project*
 - *Implementation status*
 - *Budget/fundraising status*



EWB USA

Building a Better World



Vision

EWB-USA's vision is a world in which every community has the capacity to sustainably meet their basic human needs.

Mission

EWB-USA builds a better world through engineering projects that empower communities to meet their basic human needs and equip leaders to solve the world's most pressing challenges.

Engineers Without Borders USA is a 501c(3) tax-exempt organization



Core Values

SERVICE FIRST

EWB-USA commits to harnessing the skills of its volunteers to fulfill communities' basic human needs. We provide the services that meet these needs without consideration of race, religion, gender or political affiliation.

TRUSTED PARTNERSHIPS

Trust forms the foundation of EWB-USA partnerships, which are achieved through transparency, integrity and respect for the contributions and capabilities of all parties.

SUSTAINABLE SOLUTIONS

Sustainability drives EWB-USA's programs. We commit to community-driven projects. We equip our partner communities to maintain each project so it remains functional long after our commitment is fulfilled.

GROWTH & LEARNING

EWB-USA fosters an environment of learning so our volunteers, community members and staff have the tools, training and passion to address the world's most pressing challenges. We strive for our work to inspire others to learn more, do more, and become more.

CONDUCT & PRACTICES

EWB-USA holds paramount safety, security and ethical conduct. The volunteers and staff of EWB-USA are bound by the Member Code of Conduct and the engineers' Code of Ethics.

STRONGER TOGETHER

The EWB-USA family is comprised of community members, students, professionals, universities, headquarters staff and a host of other supporters. We thrive off diversity and the collaborative pathways it provides. But most importantly, we pursue EWB-USA's mission as one, with aligned goals and purpose.

We are **Impactful**

651 Projects Underway



384

WATER
PROJECTS



77

STRUCTURES
PROJECTS



40

ENERGY
PROJECTS



77

SANITATION
PROJECTS



44

AGRICULTURE
PROJECTS



25

CIVIL WORKS
PROJECTS



3

INFORMATION SYSTEM
PROJECTS



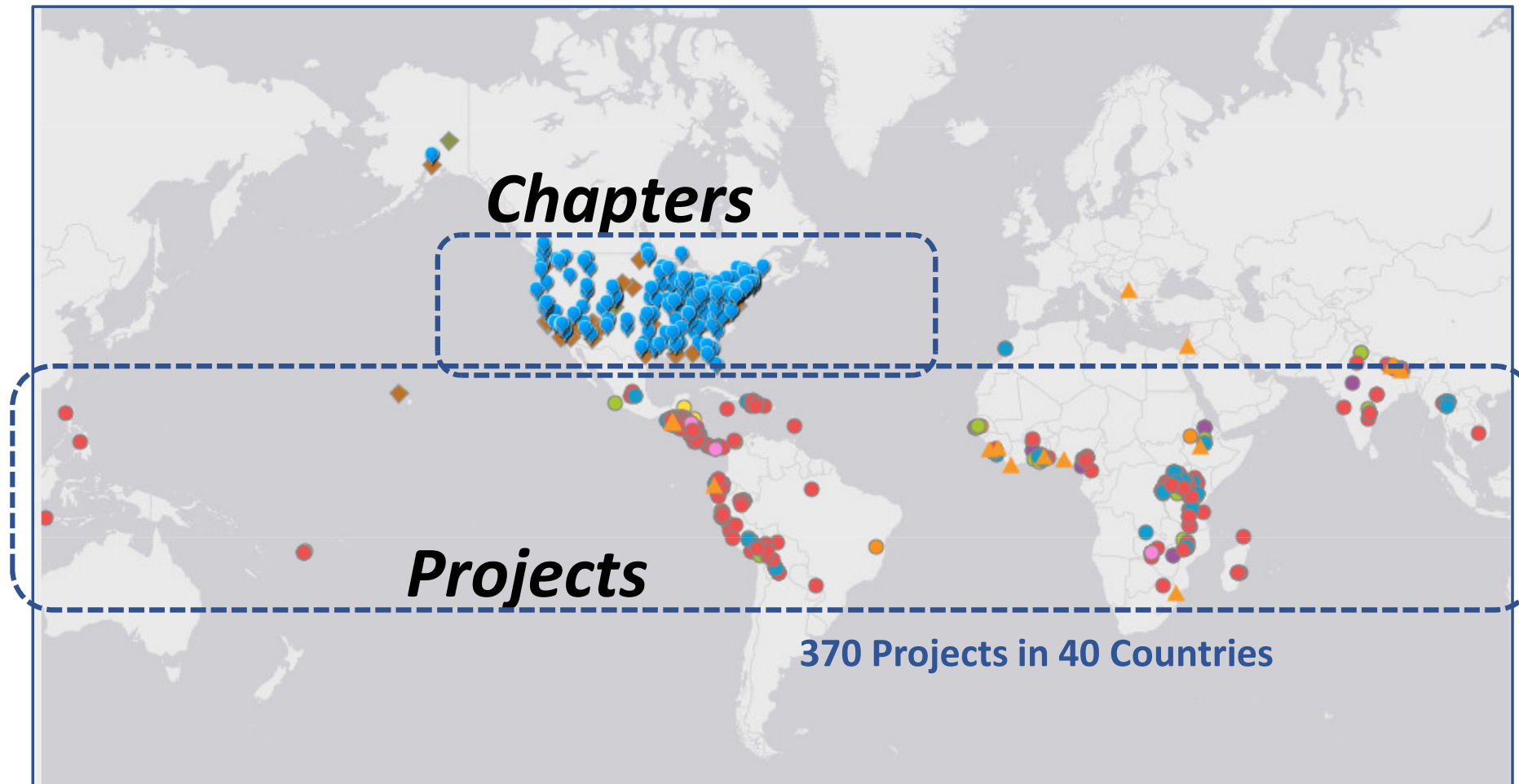
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DISASTER RECOVERY
PROJECT

For more info, please visit:
<https://www.ewb-usa.org/>

EWB USA

Building a Better World

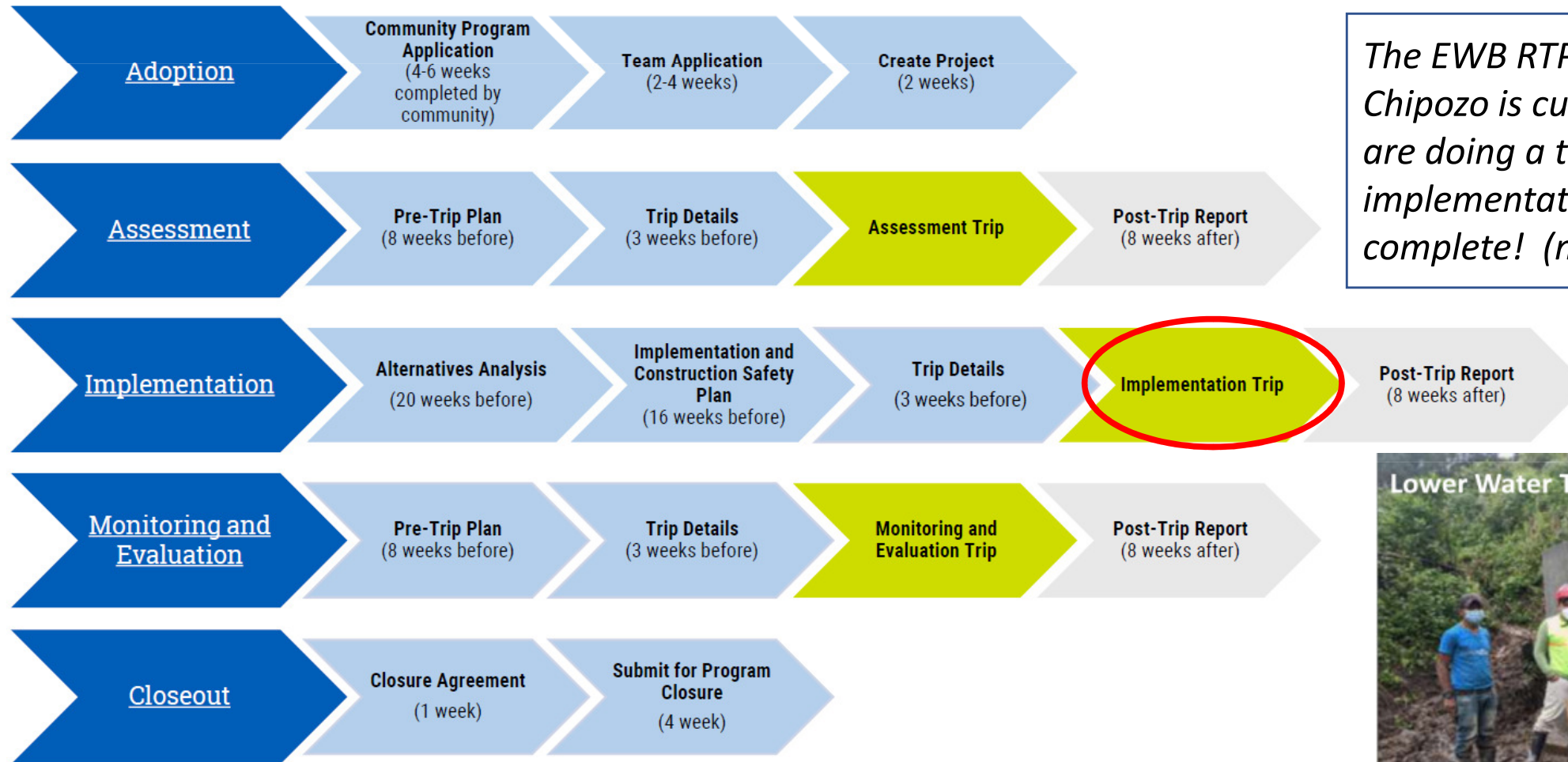


Visit <https://www.ewb-usa.org/our-work/where-we-work/>
to learn more about the worldwide efforts of the EWB Professional and Student chapters

EWB USA

Building a Better World

EWB-USA PROJECT PROCESS: Focused on sustainable solutions



The EWB RTP water supply project in Chipozo is currently in this stage. We are doing a three phase “remote” implementation, and Phase 1 is complete! (more details further in brief)



Chipozo Water
Supply Project -

Coordinates:
15.42085°,
-90.59399°

The Chipozo Project

Chipozo Project: Where is it?

Chipozo
(EWB RTP
Project)

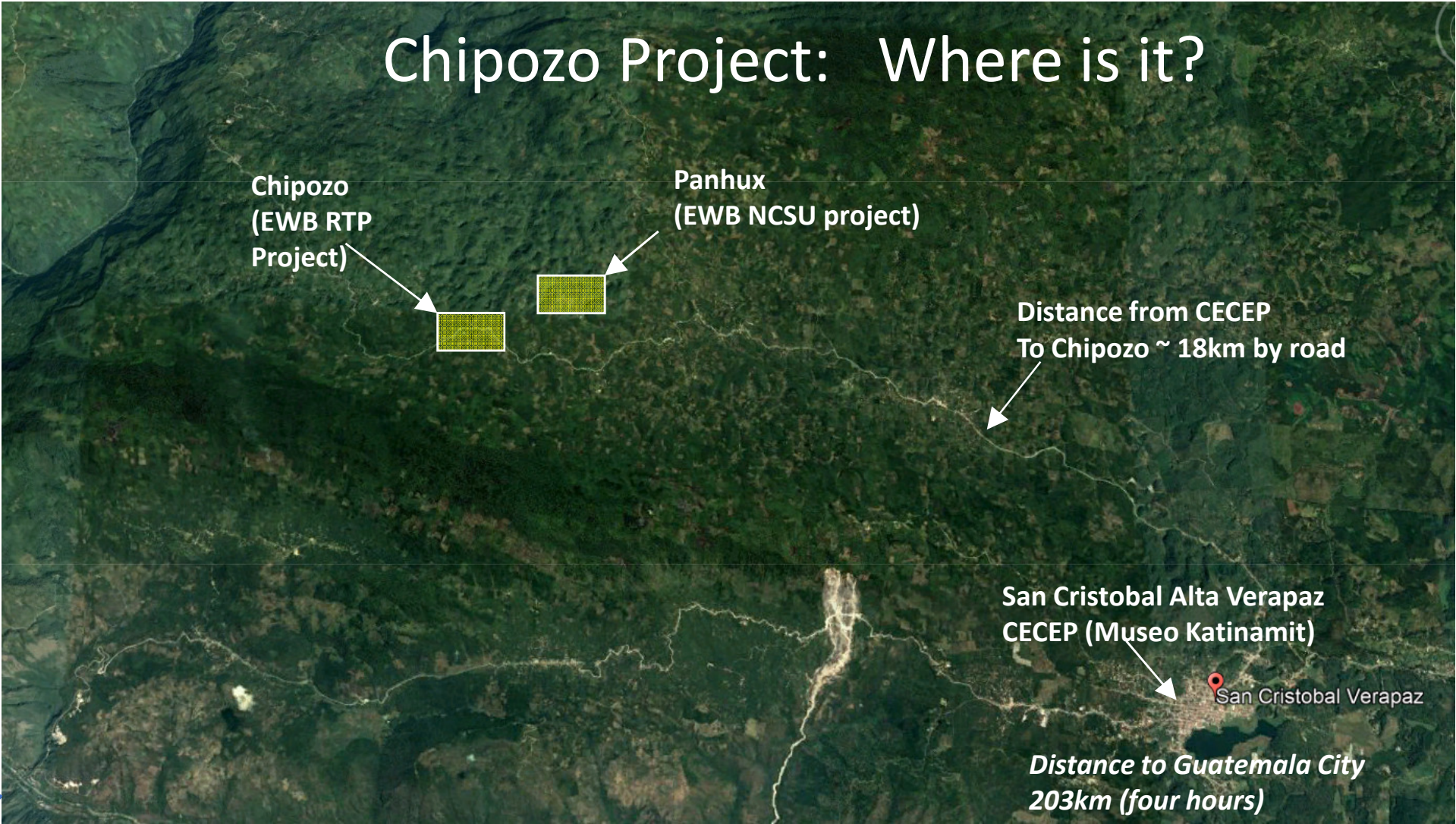
Panhux
(EWB NCSU project)

Distance from CECEP
To Chipozo ~ 18km by road

San Cristobal Alta Verapaz
CECEP (Museo Katinamit)

San Cristobal Verapaz

Distance to Guatemala City
203km (four hours)



Overview of the EWB RTP Water Supply Improvement Project in Chipozo Guatemala

- **Problem**: The 95 families in the Mayan (Pokomchi) village of Chipozo do not have a dependable clean water source
 - Current sources are largely unimproved springs which are not clean or are water catchment on houses which do not supply water in the dry season
- **Opportunity**: The community has identified a spring in a remote area which can support sufficient and clean water flow all year
 - But is a rugged and steep path of over 1km in distance and 150meters elevation change
- **Solution**: Build a sustainable solar-powered water distribution system from the spring to the community
- **Current Partners** in the project are:
 - Community-Based Organization (CBO): Chipozo COCODE
 - Non-Governmental Organization (NGO): CECEP (<http://www.cecep.cosmosmaya.info/>)
 - EWB Guatemala



Typical unimproved springs



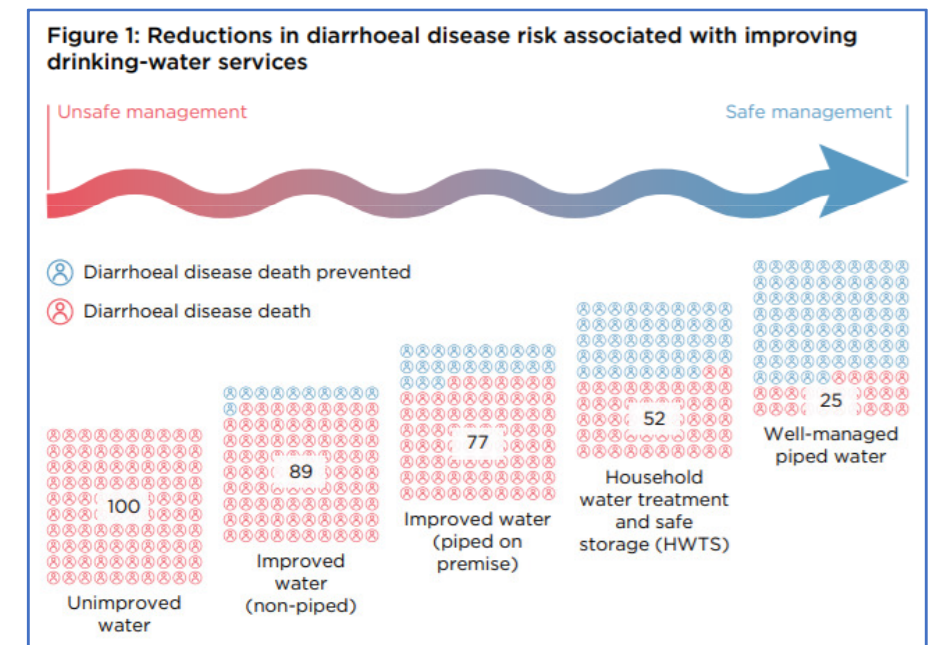
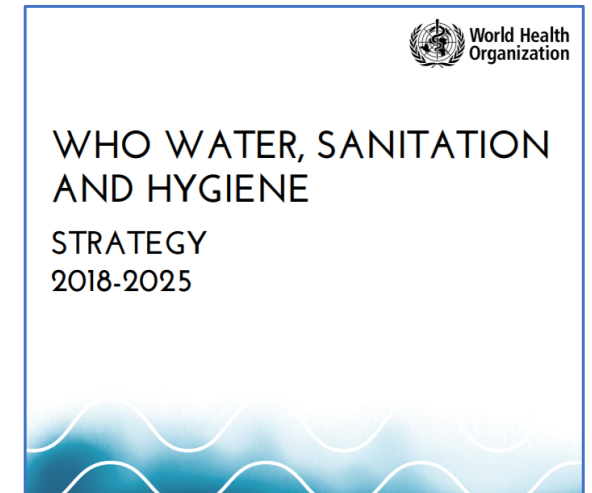
New tank which we have already built to collect water from the spring



The people we want to help

Context: The “WASH” Challenge

- 768 million people lack access to clean water
- Water, Sanitation and Hygiene (WASH) shortfalls continue to be a major problem in the developing world
 - High correlation of improved health with clean drinking water
 - X Millions do not have access to clean water
- The World Health Organization has placed great emphasis on making WASH improvements world-wide
 - EWB also supports this focus in our projects

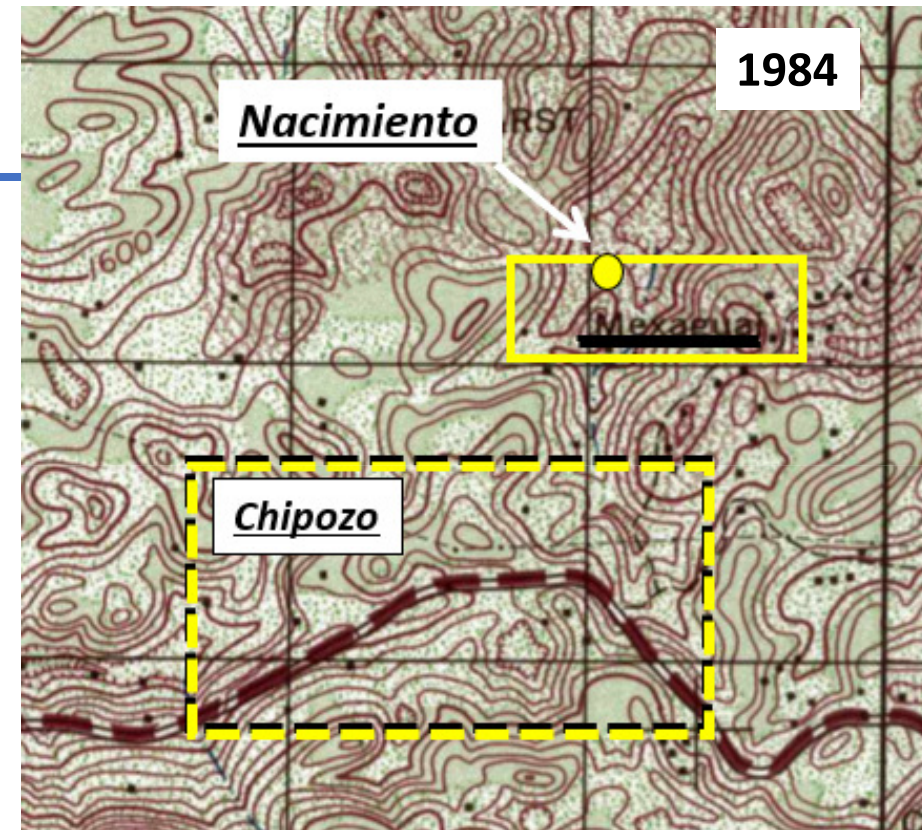


Historical Context

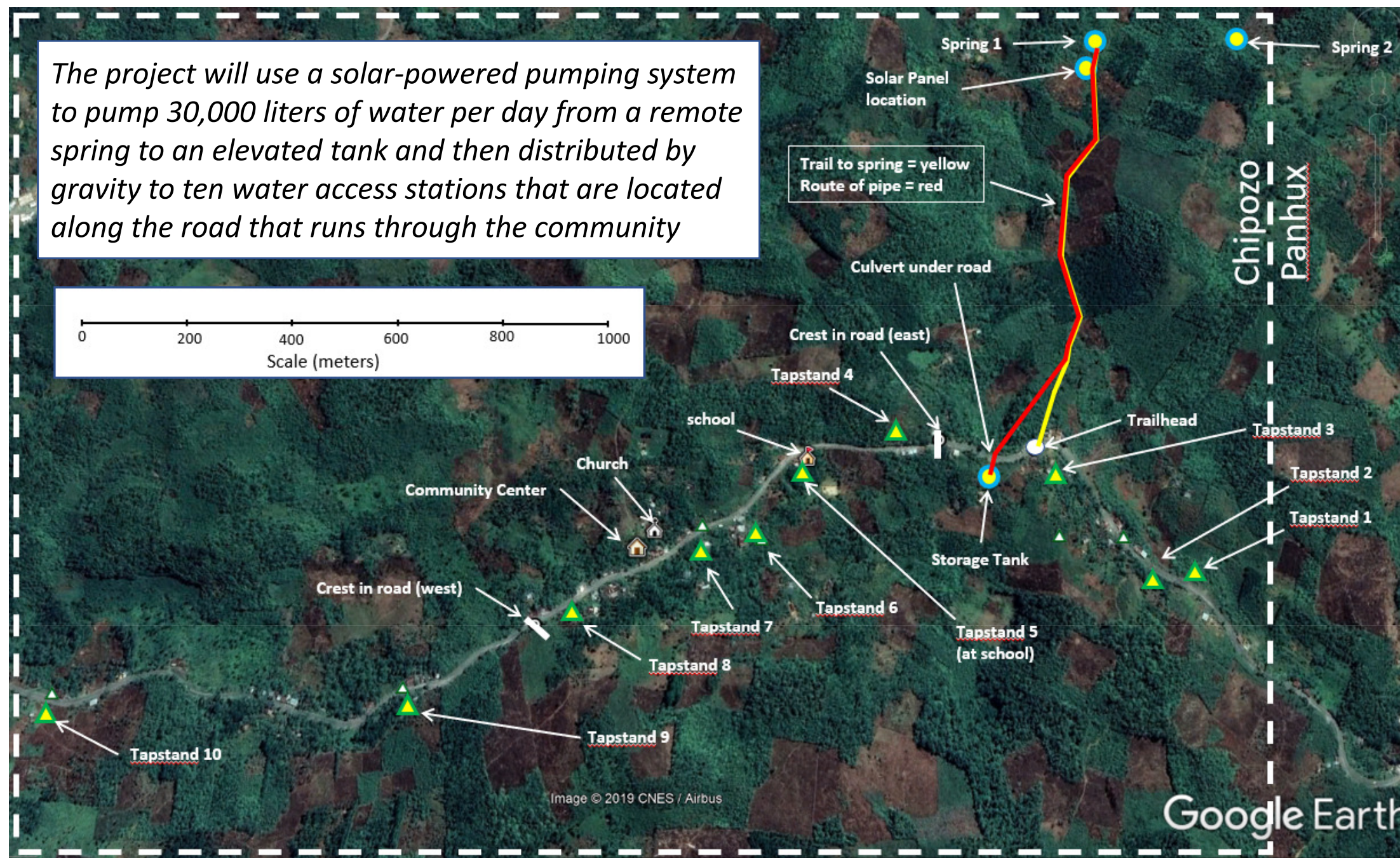
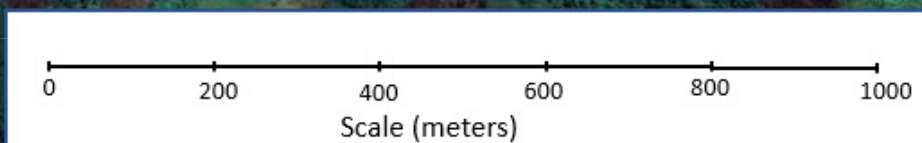


- Mayan communities historically centered around water sources
 - This 1984 still shows the name Mexagua as the name of a community at the location of the spring we are using in our project, and village elders remember when this was the case
- The Guatemalan Civil War* (1960-1996) displaced and disrupted many Mayan communities
- The Chixoy Hydroelectric project (started in 1976) built a major road through the region of what is now Chipozo, and the community largely relocated along the road
- **End result: Inadequate water resources for the current community**

* Read about the Guatemalan Civil War here:
https://en.wikipedia.org/wiki/Guatemalan_Civil_War



The project will use a solar-powered pumping system to pump 30,000 liters of water per day from a remote spring to an elevated tank and then distributed by gravity to ten water access stations that are located along the road that runs through the community



Chipozo Water Supply Top-level Design Schematic

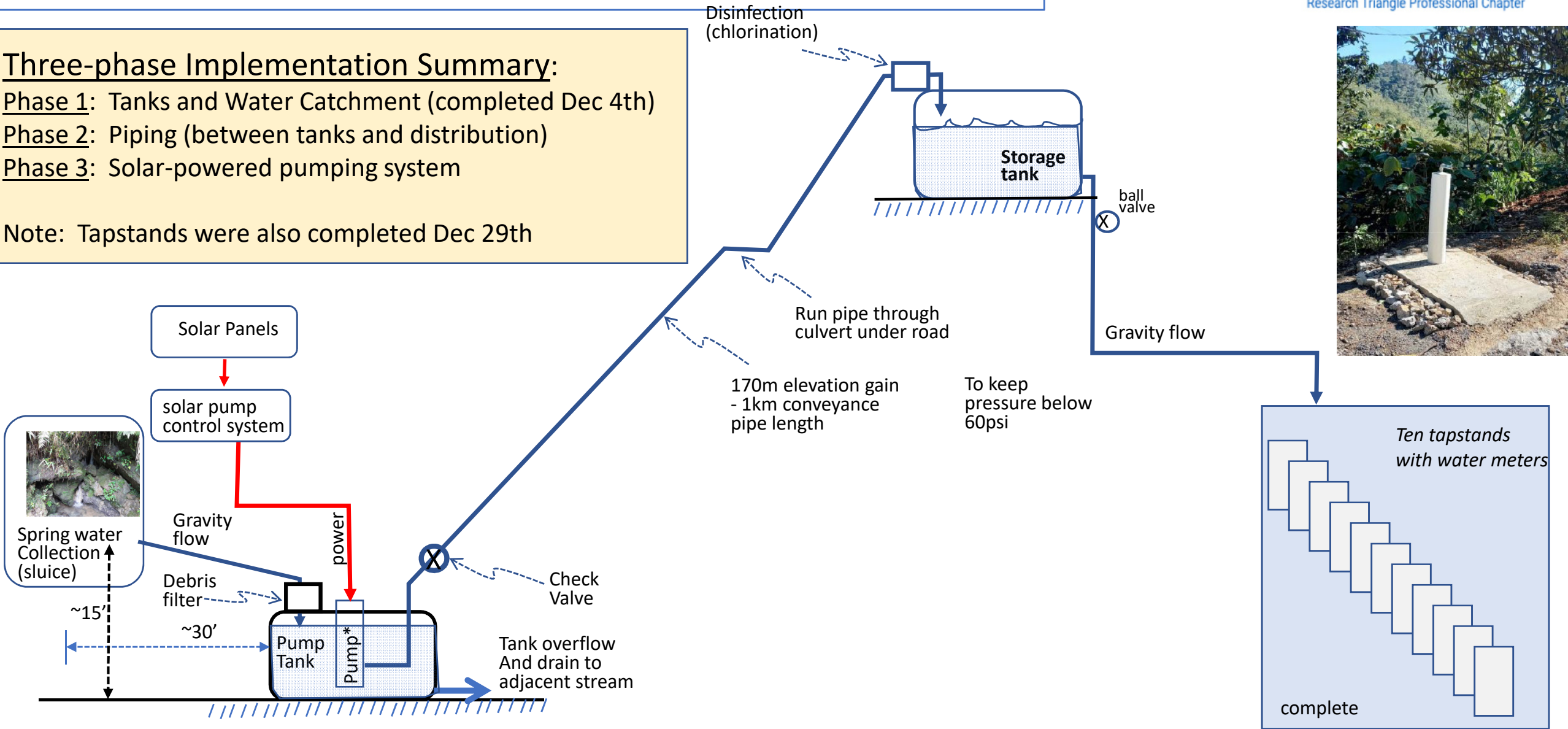
Three-phase Implementation Summary:

Phase 1: Tanks and Water Catchment (completed Dec 4th)

Phase 2: Piping (between tanks and distribution)

Phase 3: Solar-powered pumping system

Note: Tapstands were also completed Dec 29th

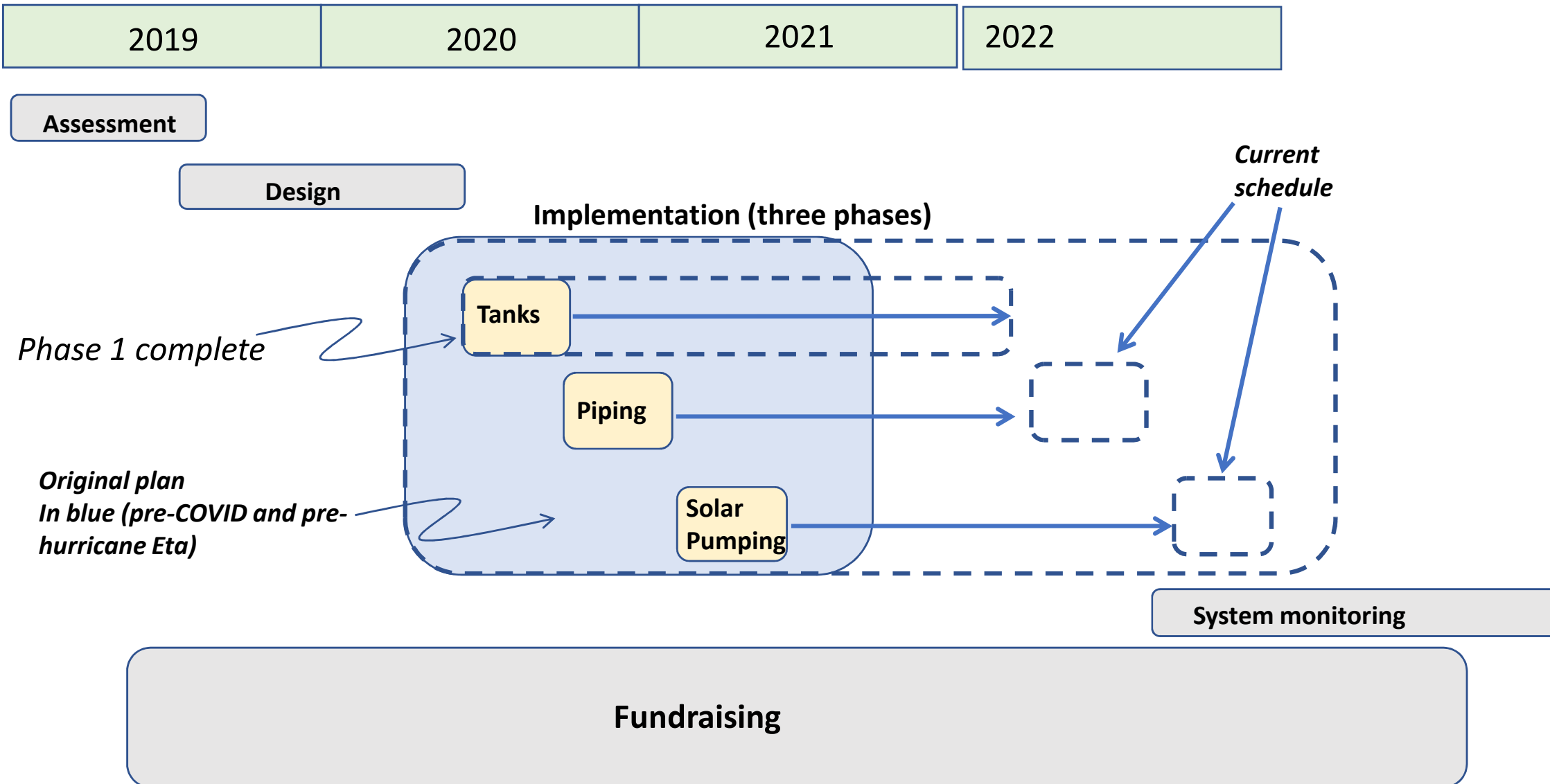


* tank/pipe configuration will support either internal (submersible) or external pump

Engineers Without Borders Research Triangle Professional Chapter	Project Name: Chipozo, Guatemala – Water Supply Improvement	Drawing Name: Top-level Design Overview	
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Chipozo Water Supply Overall Project Schedule

- has moved to the right from original plan due to both COVID and also damage from Hurricane Eta (Nov 2020)



Detailed Schedule and Funding/Budget Status

Each "Plan" is 22 days of work without a break, followed by eight days of rest (TAN = completed plans)

Expended to date: Q408,769 (\$54,502)

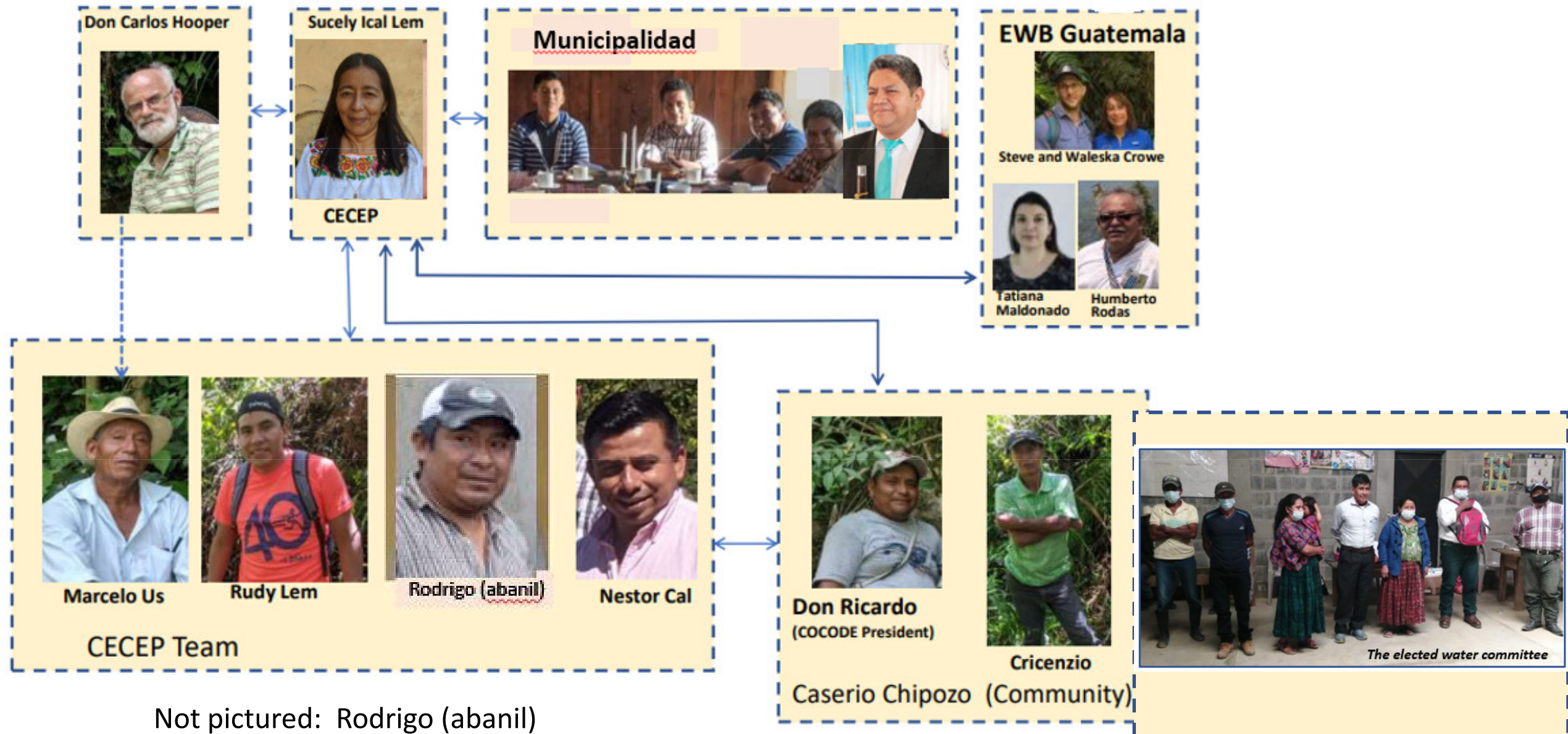
Funds balance as of 31Dec2021: Q158,405 (\$21,120)

Shortfall to complete Phase 2 = \$9844

Shortfall to complete total project = \$44,993

Phase	Plan # and tasks	Start date	End Date	Labor and staff	Materials, tools etc	Donations	Balance (Q)	Balance (USD)
	Start	1-Jul-20				Q176,514	Q176,513.60	\$ 23,535.15
1	Plan 1 - Excavate lower Tank	7-Jul-20	29-Jul-20	Q15,615	Q13,673	Q0	Q147,225.60	\$ 19,630.08
1	Plan 2- Prepare base for lower tank	4-Aug-20	26-Aug-20	Q13,980	Q3,795	Q0	Q129,450.60	\$ 17,260.08
1	Plan 3 - Excavate upper tank	4-Sep-20	29-Sep-20	Q18,240.00	Q23,464.00	Q22,594.00	Q110,340.60	\$ 14,712.08
1	Plan 4 - prepare base for upper tank	8-Oct-20	31-Oct-20	Q24,722.00	Q8,690.00	Q23,001.00	Q99,929.60	\$ 13,323.95
1	Plan 5 - finish bases	1-Dec-20	22-Dec-20	Q19,490.00	Q1,311.00	Q13,831.00	Q92,959.60	\$ 12,394.61
1	Plan 6 - work to recover from Hurricane Eta damage	9-Jan-21	31-Jan-21	Q27,790.00	Q3,776.00	Q0.00	Q61,393.60	\$ 8,185.81
1	Plan 7 - complete lower tank	24-Feb-21	16-Mar-21	Q10,865.00	Q8,054.00	Q10,500.00	Q52,974.60	\$ 7,063.28
1	Plan 8 - Prep Site for Upper Tank	5-Jul-21	15-Jul-21	Q6,990.00	Q304.00	Q166,877.50	Q212,558.10	\$ 28,341.08
1	Education Workshops for Chipozo Water Board			Q13,382.60			Q199,175.50	\$ 26,556.73
1	Plan 9 - Construct foundation and base of upper tank	26-Jul-21	17-Aug-21	Q17,415.00	Q38,411.50	Q127,554.00	Q270,903.00	\$ 36,120.40
1	Plan 10 - Construct Frame Upper Tank	31-Aug-21	22-Sep-21	Q20,015.00	Q2,908.00	Q385.00	Q248,365.00	\$ 33,115.33
1	Plan 11 - Construct Walls of Upper Tank	6-Oct-21	14-Oct-21	Q17,040.00	Q0.00	Q385.00	Q231,710.00	\$ 30,894.67
1	Plan 12 - Construct Roof & Finish Upper Tank (fittings etc)	16-Oct-21	7-Nov-21	Q21,280.00	Q7,962.00	Q385.00	Q202,853.00	\$ 27,047.07
1	Plan 13 - Finishing Upper Tank and Chlorination Shed	14-Nov-21	4-Dec-21	Q18,540.00	Q0.00	Q385.00	Q184,698.00	\$ 24,626.40
2	Plan 14 - Build Tap Stands	7-Dec-21	29-Dec-21	Q20,200.00	Q30,855.00	Q24,762.00	Q158,405.00	\$ 21,120.67
2	Plan 15 - Construct piping between Lower and Upper tanks	1-Apr-22	23-Apr-22	Q26,030.00	Q79,061.40	Q385.00	Q53,698.60	\$ 7,159.81
2	Plan 16 - Construct piping between Lower and Upper tanks	7-May-22	29-May-22	Q26,030.00	Q11,000.00	Q385.00	Q17,053.60	\$ 2,273.81
2	Plan 17 - Complete Construct piping between Lower and U	12-Jun-22	4-Jul-22	Q26,030.00	Q11,000.00	Q385.00	-Q19,591.40	\$ (2,612.19)
2	Plan 18 - Construct distribution piping, connect Tap Stands	18-Jul-22	9-Aug-22	Q15,800.00	Q38,830.00	Q385.00	-Q73,836.40	\$ (9,844.85)
3	issue Purchase order for solar pumping system		24-Jun-22		Q106,000.00		-Q179,836.40	\$ (23,978.19)
3	Plan 19 - Install Solar Panels and Solar Pump	23-Aug-22	14-Sep-22	Q20,200.00	Q137,800.00	Q385.00	-Q337,451.40	\$ (44,993.52)

The Chipozo Project Team in Guatemala



About CECEP (our NGO partner)-

http://www.cecep.cosmosmaya.info/menu_02.htm

<https://www.facebook.com/museo.katinamit>



ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter



Centro Educativo Comunitario Pokomchi (CECEP) was founded in 1993 through the united efforts of local and international people with the objective of exposing and strengthening the Pokomchi culture.

For this purpose we work in translation (pokomchi-spanish), alphabetization, exhibition of our culture, promotion and distribution of Pokomchi literature and cultural strengthening. Furthermore we work with national and international associations supporting and reinforcing our community through our projects. We manage a community tourism alliance, educational workshops, volunteers, tours around the town, a store of handicrafts made by local artisans, and a school for the languages Spanish and Pokomchi.

With Museo Katinamit (opened in 2001) we offer the unique exhibition of Pokomchi culture, presenting our lifestyle which is considered among one of the oldest in the world and still living.

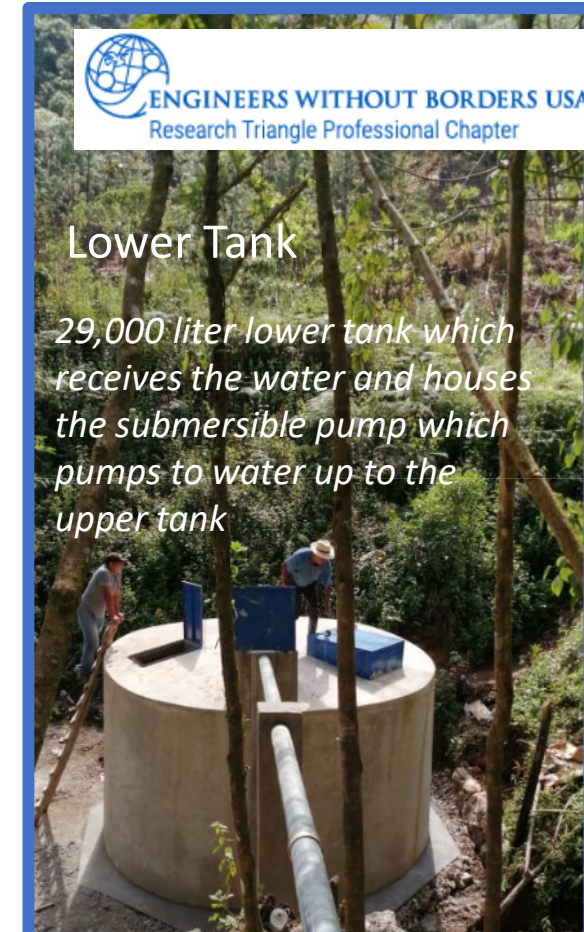
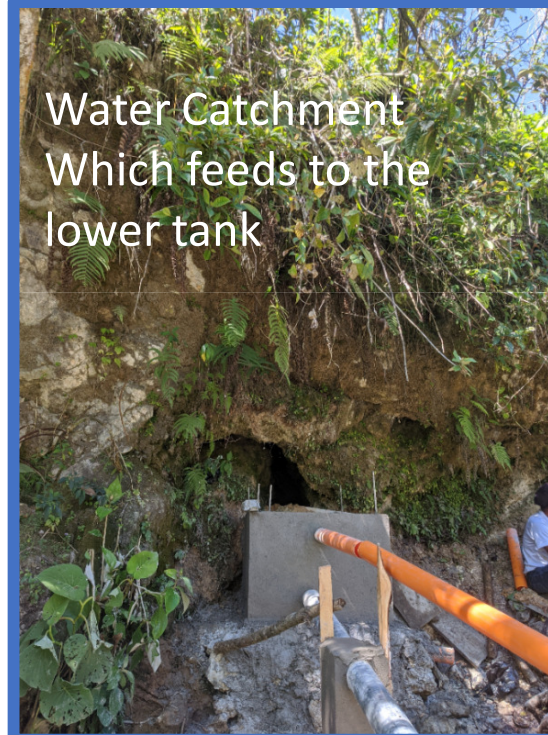


Sucy Ical Lem



Phase 1 Status (tanks and water catchment)

- Lower tank and water catchment is complete and lower tank has been filled with water!
 - Video of water catchment: <https://youtu.be/3E6UA8APG58>
 - Video of tank filling (wait for it at 0:56): <https://youtu.be/7K5JvBMA6n0>
 - Video after tank is full: <https://youtu.be/cnVoJ9TQZiY>
- Upper tank is complete!
- **Phase 1 is COMPLETE!!**



Phase 1 Highlight: Placing concrete for the base of the lower tank – October 5th, 2020
- Community participation is key to the success of the project



Transporting the materials (1km)



Placing the concrete

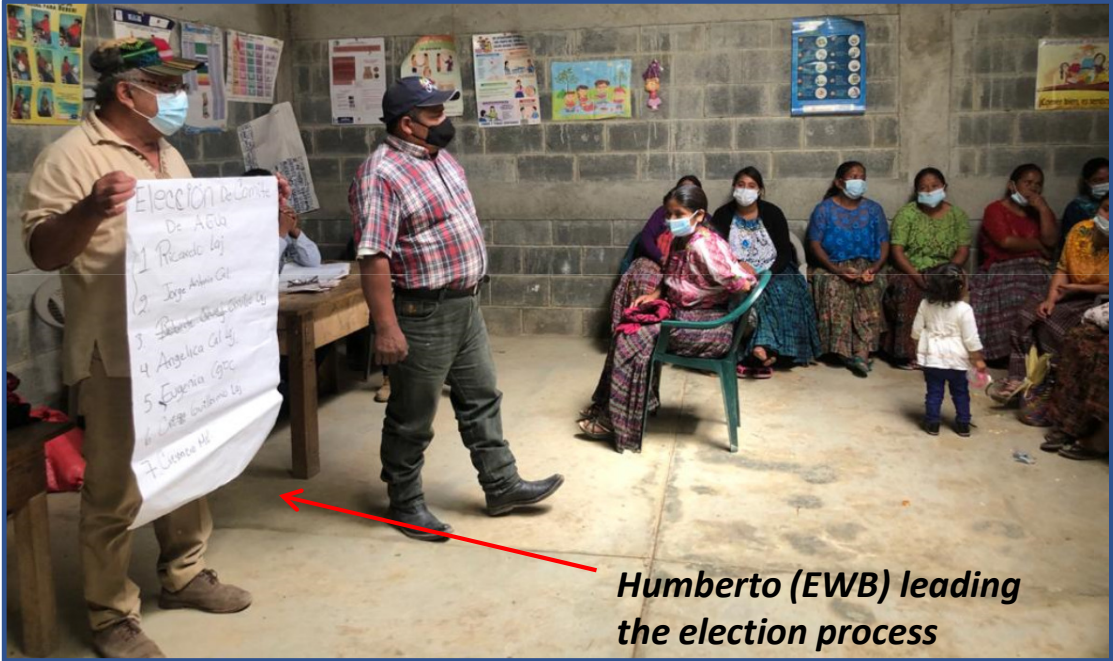


Many people from the community contribute to the effort



The finished tank base showing sump where the pump will go

Phase 1 Highlight: 27 March 2021: Establishment of Chipozo Water Committee



Humberto (EWB) leading the election process



The community votes



The elected water committee

MIEMBROS DEL COMITÉ DE AGUA DE LA COMUNIDAD DE CHIPOZO.
ELECCION DEL COMITÉ SE REALIZAO EL SABADO 27 DE MARZO DEL 2021.

No	Nombre	Cargo
1	Ricardo Laj	Presidente
2	Emilio Laj	vicepresidente
3	Jorge Antonio Cal	tesorero
4	Angelica Cal Laj	Secretaria
5	Eugenia Cojoc	Vocal I
6	Guillermo Laj	Vocal II
7	Cresencio Mo.	Vocal III

Phase 1 highlights: 08/14/2021: Community involvement in building the base for the upper tank

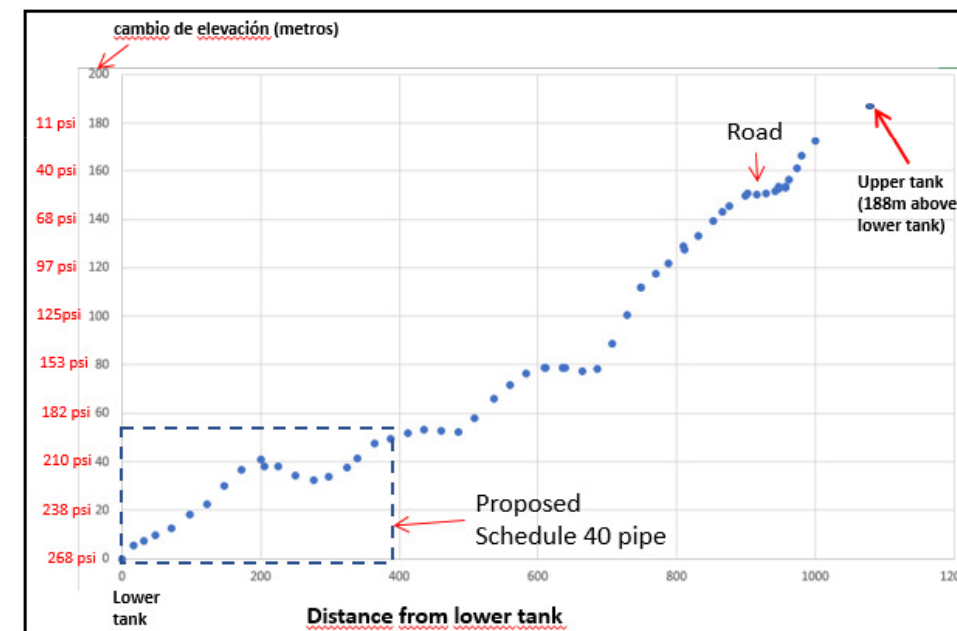


Phase 2 update (conveyance and distribution system)

- Piping design is complete based on detailed route survey conducted during 18-31Jan2021 trip and updated in 01-08Dec2021 trip
 - Piping for 1km route between tanks went from 100% metal to about 600m metal and 400m PVC (SDR17)
 - Preparing to submit Phase 2 Implementation Plan for approval by EWB USA
- Materials are currently being ordered (with support of \$11,200 contribution by the municipality of San Cristobal, which includes Chipozo)
 - Muni has also offered use of an excavator to bury distribution piping along the main road (about 2.5km)
- Construction of the ten tapstands (Phase 2a) is complete – for connection to distribution piping
 - Includes a tapstand at the school
- **Planning to start Phase 2b in April**



Measuring the pipe route

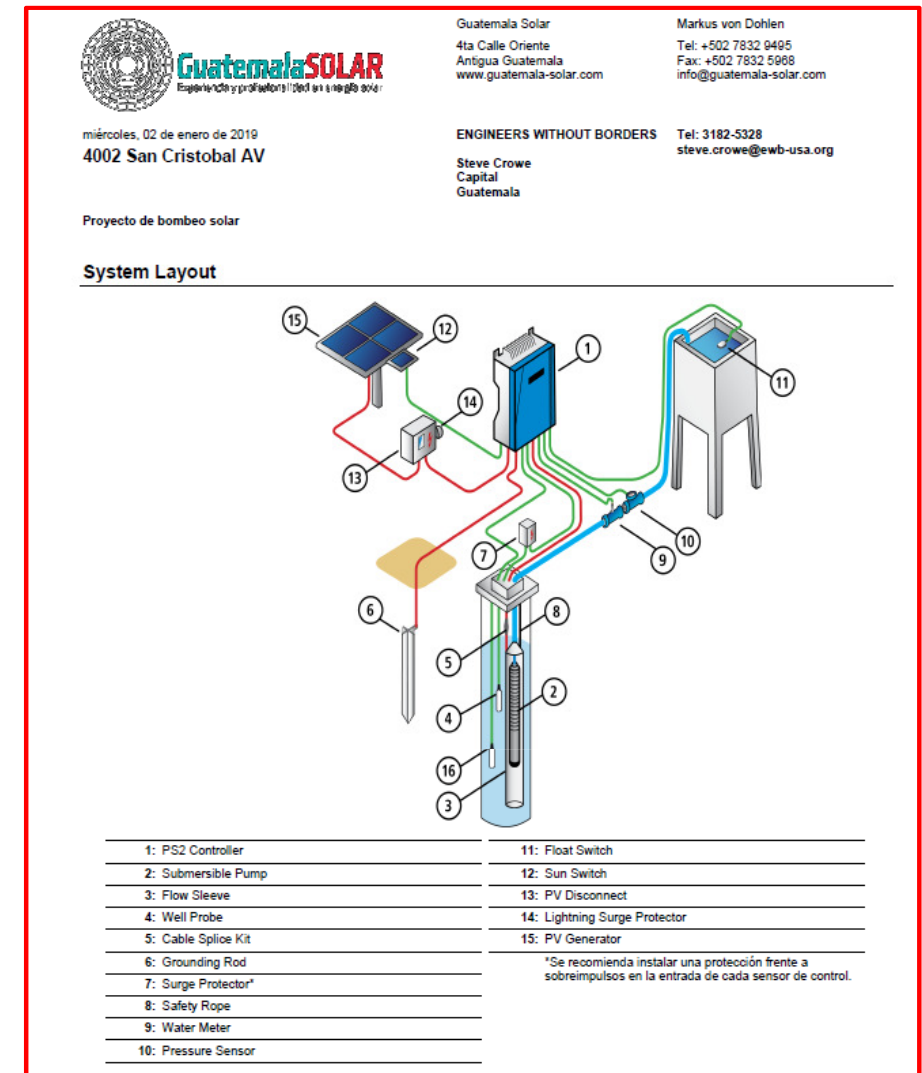


Phase 3 - Solar Powered Pumping System - rationale and overview



Rationale: There is no feasible grid electrical supply available, so the solution is to use a solar-powered pumping system

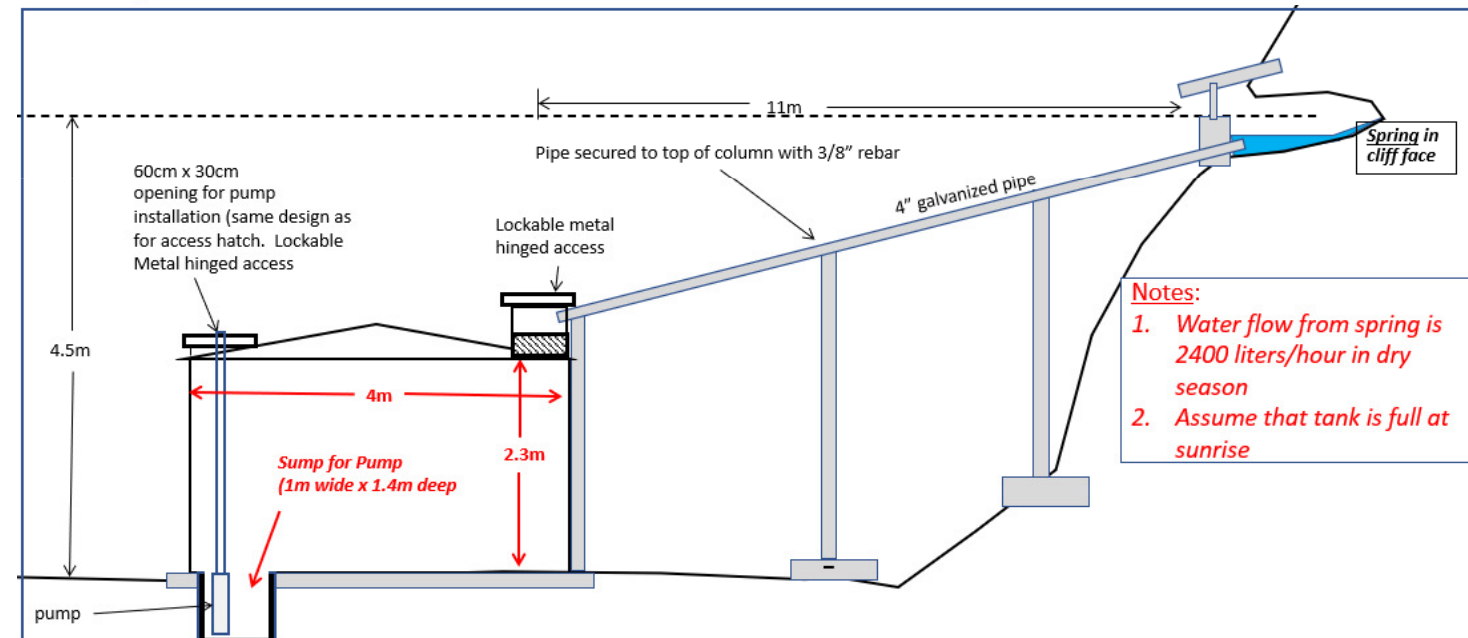
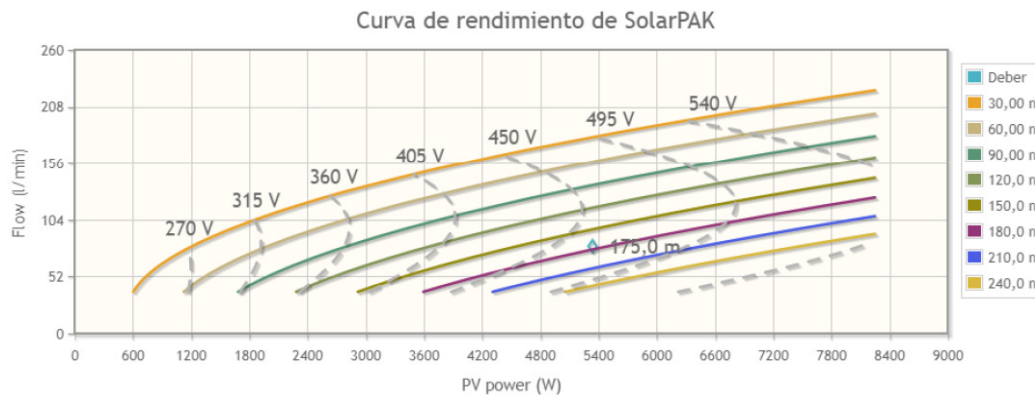
- The solar-powered pumping system must pump approximately 30,000 liters/day over a distance of 1km and elevation of 184m to meet the minimum needs of the community
- The system configuration will include between 28 and 36 solar panels which will be installed on land that has been acquired by the community
 - Total cost of the panels, pump, associated components and equipment building is approximately \$33,000
- The community will operate the system and will fund the long-term maintenance by collection and management of fees from the community members
 - This process has been codified in community bylaws
 - A community water committee has been established to manage the process



Example vendor system depiction (notional)

Phase 3 Update/Status – Solar Pumping System

- Analysis continues of solar pumping system options
 - An “RFQ” has been developed with all requirements for the system (flow per day, pipe size and length, elevation change, and location)
- Conversations are in progress with multiple vendors in Guatemala for three primary pump product lines (Lorentz, Franklin, Grundfos)



Chipozo Water Supply Improvement Project:

Conclusion



- Summary: The goal of this project is to improve the quality and quantity of the water supply for the Mayan community of Chipozo in Alta Verapaz Guatemala
- The EWB RTP team is partnered with the community as well as with local NGO CECEP to ensure the long-range success of the project
 - Progress has been excellent, but costs have risen due to impact of COVID as well as recovering from damage caused by Hurricane Eta in November 2020
- Fundraising is the current primary challenge
 - Total shortfall as of January 2022 is \$44,993 out of total budget of \$120,616
- Next Steps:
 - *Begin Phase 2 in April*



From this



to this



https://m.youtube.com/watch?v=V_HlMm88gss

Questions?



ENGINEERS WITHOUT BORDERS USA
Research Triangle Professional Chapter

Thank you for your support!

Please contact me for more information:
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