PROJECT SUMMARY AND EXECUTION PLAN
SURIQUI WATER SUPPLY PROJECT

ENGINEERS IN ACTION

MMAyA
Ministerio de Medio Ambiente y Agua

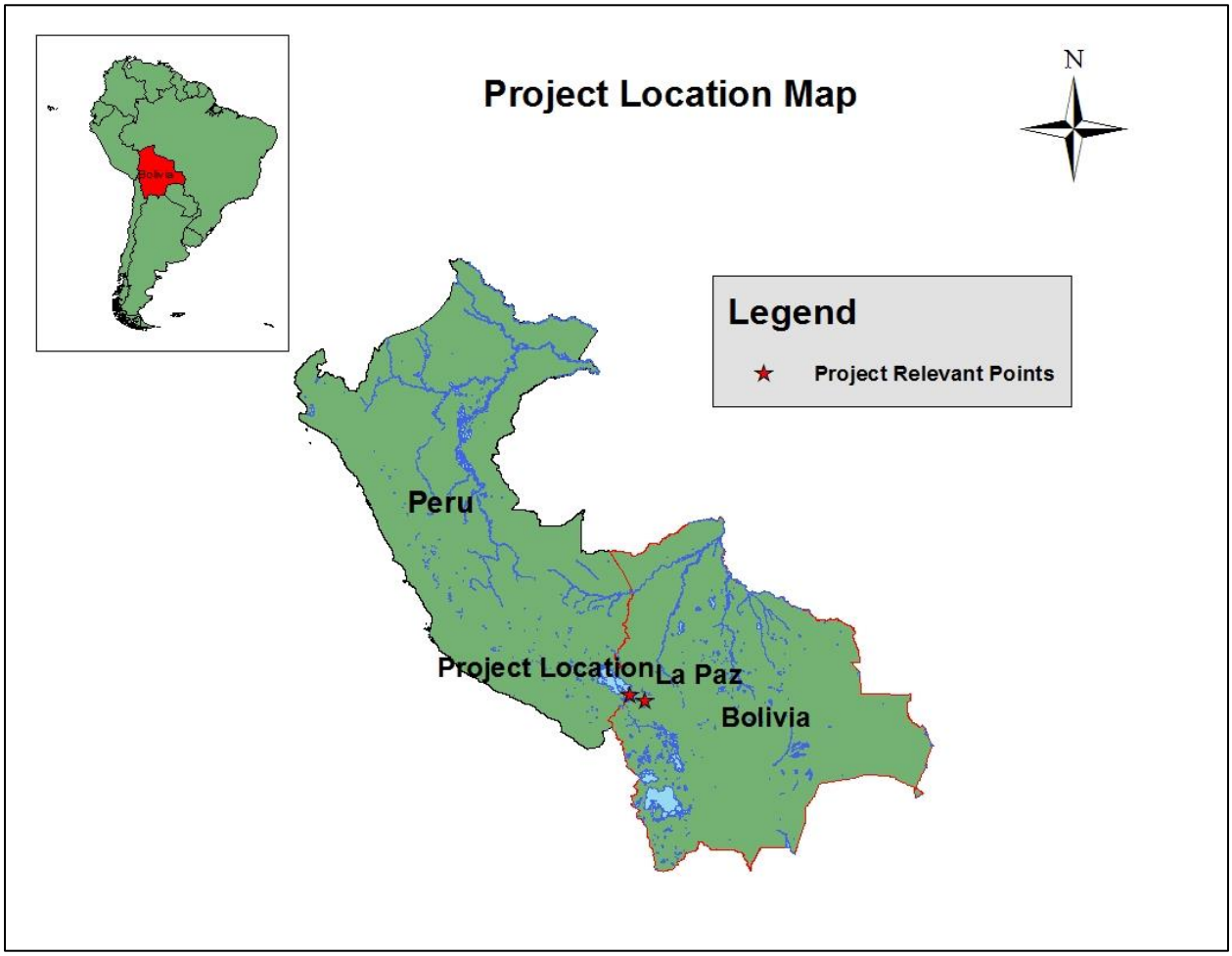
GUY ENGINEERING SERVICES, INC

PROJECT BACKGROUND

Members of the Bolivian Ministry of Environment and Water met with personnel from Engineers in Action (EIA) in Spring of 2016 to discuss working on projects with local communities. Specifically, the Bolivian Ministry of Environment and Water asked if EIA would work with the Island of Suriqui and its seven communities. EIA recruited Guy Engineering, an engineering firm based out of Tulsa Oklahoma, to provide technical services for the project. Guy Engineering and EIA have recruited engineers from other firms as well do form the project team.

EIA is a Bolivian Non-Profit organization and U.S. 501(c)3 with a mission to work with indigenous professionals to improve the lives of people in need through sustainable programs that build their capacity while also helping to develop global awareness among program participants.

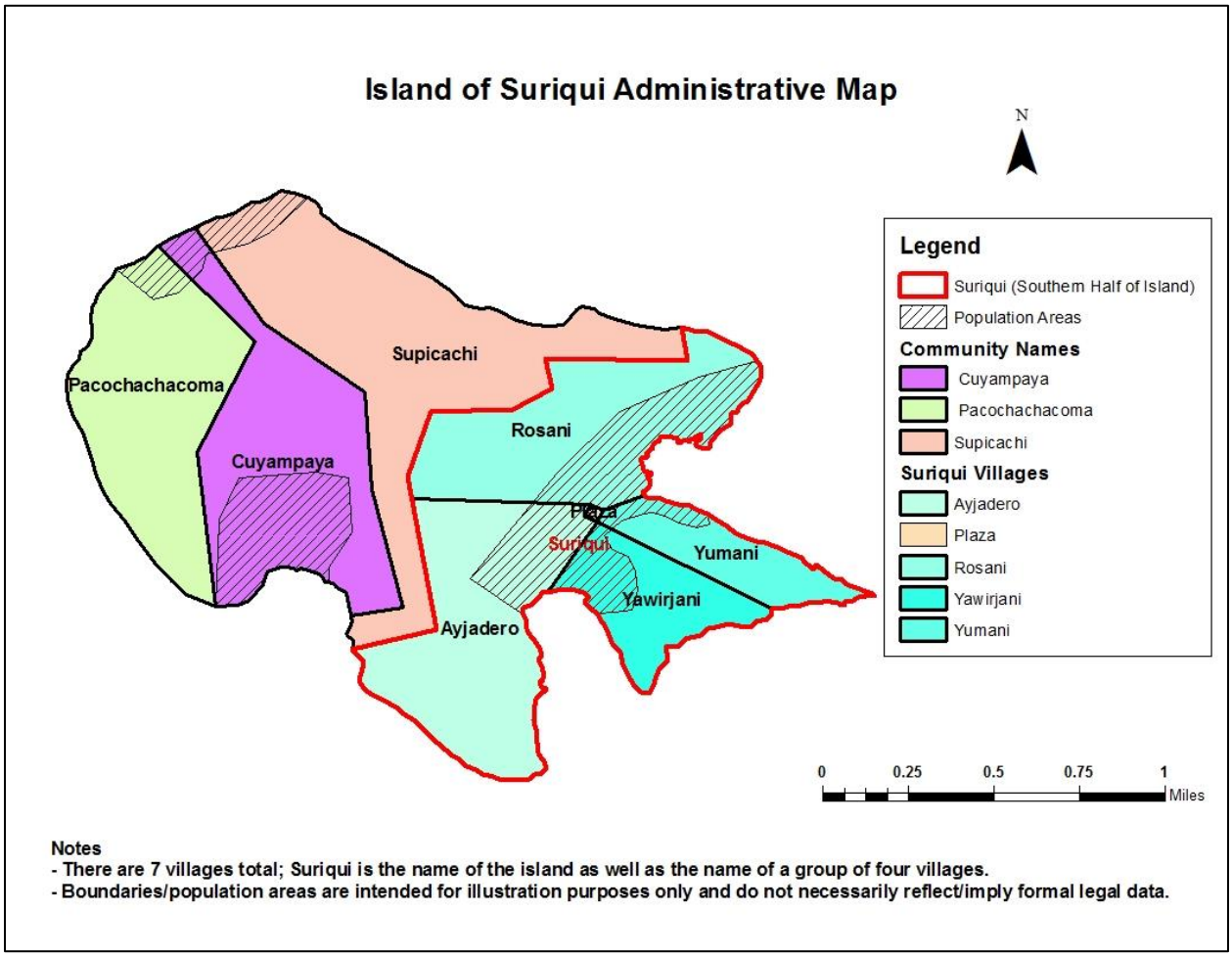
The project site is located on an island in Lake Titacaca in Bolivia.



DESCRIPTION OF COMMUNITY/DEMOGRAPHICS

The Island of Suriqui is located on the Bolivian side of Lake Titicaca in South America. There are seven administrative communities organized into three general areas (see map below). The people on the island make their living primarily from boat making and fishing. Some community members practice subsistence farm, however there is little flat land on the island making farming difficult.

Approximate Coordinates of Island: 16° 18’ 10.63” S 68° 45’ 57.67” W



ASSESSMENT TRIP SUMMARY (JULY 2016)

July 2016

In July of 2016, four team members travelled to the island of Suriqui to collect data, view the project location, and discuss project needs with the Communities. Assessment activities included but were not limited to:

- Collection of GPS points of major existing water system components
- Photo documentation of project site/water infrastructure
- Discussions with the Community regarding desired projects, state of existing infrastructure, community organization etc.

March 2017

In March of 2017 members of Engineers in Action traveled to the Island of Suriqui for various purposes, but primarily to conduct water testing. See the attached trip report produced by Engineers in Action personnel for further details.

EXISTING INFRASTRUCTURE

Village	Infrastructure	State
Suriqui (Ayjadero, Rosani, Yumani, Yawirjani)	Water Well/Pump	Disrepair – pump broke, uncertain cause
	Treatment Tank	Not used -
	Spring Catchment	Functions well – only provides water during rainy season
	Old Collection Tank	Disrepair – not needed
	New Collection Tank	Functions well
	Distribution System	Functions well (some areas of low pressure)
	Pila (Tap Stand) in Almost Each Home	Function well (some homes missing, low pressure in areas)
Pacochachacoma	Water Well/Pump	Being installed July 2016 by Municipality during trip
	Plastic Storage Tank (~10,000 L)	Being installed July 2016 by Municipality (villagers prefer concrete tanks because they last longer)
	Distribution Lines	Being installed July 2016 by Municipality
	Community level Pilas (tap stands)	Being installed July 2016 by Municipality (villagers prefer in-home taps)
Supicachi	Existing Spring (high on hill)	Unclear if used or not
	Filter System	Stopped working 6 months after install – unclear why
	Collection Tank	Leaks – not used; buy bottled water from nearby community
	Distribution Lines	Leaks – not used; buy bottled water from nearby community
Cuyampaya	Ojo (hole in ground) from which people collect water near lake	Functions, but requires manual hauling of water
	Spring Catchment	Functions well but only provides water during rainy season
	Collection Tank	Functions well
	Distribution Lines	Installed by the community (very little available head, laid on top of the ground)
	Pila (tap stand) in homes	Not certain if in all homes, but function well

Notes
July 2016 Assessment Team has pictures of all infrastructure
"State" Column based on verbal conversations with villagers and visual observations unless otherwise noted

PROJECT TEAM AND STAKEHOLDERS

Project Team Members	Roles
Engineers in Action – La Paz, Bolivia • *Luz Hurtado - Project Manager • Rod Beadle - Executive Director	In country non-profit organization providing local engineering expertise, translation services, transportation services, cost data, etc. Conduct project bidding and manage Contracts with Contractors as needed (work with U.S Engineers).

	Provide follow-up assistance with community during Operation and Maintenance of infrastructure
Guy Engineering – Tulsa, OK • *John Blickensderfer - President • Megan - Right of Way PM • *Jason - Architectural Engineer/GIS • *Ryan - Surveyor • Becky - CAD Technician • Rebecca Alvarez - Senior Civil Engineer	Provide primary technical expertise and project management services (Cost, Schedule, Scope, Contracts) for the project. Provide engineering services during construction and construction management
Other Project Team Members – U.S. • David Buck - Water Engineer • Josh Kennedy - Water Engineer • AguaClara – provide water treatment expertise	Provide additional technical expertise, project management and translation services as needed. Specifically, water conveyance/distribution/treatment design
Additional Stakeholders	**Roles**

Island of Suriqui
• Suriqui
  ○ Aijadero – 550 people
  ○ Yumani – 470 people
  ○ Rosani – 340 people
  ○ Yawirhani – 450 people
• *Other*
  ○ Paco Chachacoma – 580 people
  ○ Supicachi – 300 people
  ○ Coyambaya – 200 people
	End User/Community(s)/
	• Provide feedback regarding needs
	• Provide a portion of funds toward the project (5%-10%). Exact amount to be determined.
	• Conduct Operation and Maintenance after project is implemented.
	• Organize and develop a water board
	• Pay taxes for ongoing O and M costs
	Potential Construction Tasks
	• Digging Trenches
	• Digging Excavations (Tanks)
	• Laying conveyance/distribution piping
	• Transporting materials throughout the site

Puerto Perez Municipality	Local Government Agency (Similar to a county government in the U.S), provides Suriqui with an annual water project budget. Reviews the design prior to acceptance.
Water/Environment Ministry of Bolivia	Regulatory Agency – Provides Local Standards. Funding is an option, however application process is lengthy (> 3 years)
Needed Expertise	
Water Well Drilling Company	Conduct Study, Provide Cost estimate, Conduct Drilling
Equipment Vendors (Pumps)	Provide Local Pump Expertise
Construction Contractor(s)	Construct portions of project not constructed by community members

Electrical Engineer	Well company typically serves this role

*Individuals who were part of July 2016 travel team

SCOPE OF WORK – PROJECT PHASES/TIMELINE

Feasibility Study

U.S. Project team will conduct a feasibility study outlining different options for the 4 different communities. Each option shall include a concept design, cost estimate and list of pros and cons. U.S. team will write a final Feasibility Study Report deliverable document to match the requirements outlined in the Bolivian Water/Environment Ministry's Standard for Project Presentations. Solutions being considered include pumped water wells, distribution systems and treatment systems.

Community Organization

Once the feasibility study is complete, Project Team Members and Stakeholders will work together to determine a specific solution for detailed design, with community/end-user input being a major factor in the decision. Additionally, EIA will work with the community to set up a water board and tax system to collect money for the new water system(s). As part of this process EIA will work with the community to identify individual community member(s) who will be responsible for physically maintaining the water system (e.g. a plumber) and compensation for those individuals will be determined.

Detailed Design

The U.S Project team (Guy Engineering and others) will create a detailed design of the proposed solution or solutions. At the time of the feasibility study completion EIA and the U.S. Project Team will work together to determine if the existing team is sufficient to complete final designs for all communities, or if additional teams (e.g. EWB Groups) will be required.

The Detailed Design will include all plan drawings, calculations, etc. required per Water Environment Ministry and Bolivian standards. The design will likely not include specifications but rather incorporate notes into the plan drawings. Exact details of the design will be determined after the feasibility study is complete.

Fundraising Services

Guy Engineering/U.S. Team to work together to fundraise for the project. Potential sources of funding include:

Organization/Funding Source	**Approximate Potential Contribution**	**Notes**
Bolivian Water/Environment Ministry	Full Funding	Review period once final design is complete is approximately 3 years
Puerto Perez Municipality	Varies depending on village	
Rotary Clubs (Local)	$100-$5,000	
Rotary Districts (Regional)	Match what local clubs raise	EIA has a meeting in April 2017 with District for MN/ND – 6 month process
Rotary International (Global)	Provide 3:1 match of local and regional money raised	1-2 year process
Lions Club	TBD	
Corporate Sponsorship(s)	Potentially Large Source	Guy Engineering, CH2M etc.
Crowdfunding	Potentially Large Source	GoFundMe, Indiegogo etc. (requires expertise)
Individual Donations	Varies	Friends/Family/Coworkers

Local Fundraisers	$100 - $5,000	Selling bracelets, trivia night (Tulsa), Basketball Game Raffle (Tulsa), Virtual 5K etc.
World Bank Grants	TBD	
Other Grants	TBD	

Bidding

U.S Project Team (Guy Engineering +) will create the bidding documents, which EIA will distribute and manage. EIA, U.S. Team, and community will work together to determine which tasks can be completed by the community and which ones need to be completed by a local Contractor.

Construction Management/Services during Construction

U.S. Project Team will provide on-site services during construction, manage the construction, and conduct construction inspection to ensure construction follows design parameters. Details of the Construction Management/Services during construction will be finalized as construction approaches. U.S. Project Team will work with EIA to ensure Construction Management/Services During Construction line-up with local customs. The U.S. Project Team will likely take a trip to Bolivia to assist in the Construction

Commissioning/Training/Operation and Maintenance Manuals

The U.S. Project team and EIA will work together to conduct a commissioning/training workshop with the community. The U.S. Project Team will create simple to Use Operation and Maintenance Manuals

Community Follow-Up

The U.S. Project team will create record drawings to document the as-built condition. EIA will store a copy of the as-built drawings for future use in Bolivia. EIA will facilitate any needed follow-up with the Community and bring the U.S. Project team in as needed. At the conclusion of this project, the U.S. project team may work with the community to improve solid waste/wastewater management. This will be determined at a later date.

CONTRACT ADMINISTRATION

One or more Memorandums of Understanding (MOU) will be developed after completion of the feasibility study between relevant project stakeholders to solidify agreements made during the project selection process. The below diagram displays organizations involved in the project.

SOCIO-POLITICAL CONSIDERATIONS

EIA and U.S. team to work with local social and political leaders to ensure the project is completed to the community's satisfaction.

QUALITY CONTROL

All project information (reports, data, calculations, deliverables, drawings, etc.) will be reviewed by a second party to ensure quality. Additionally all major deliverables will have multiple review parties to ensure quality. Project Team requests that EIA personnel review Spanish language versions of all reports to ensure proper grammar, spelling, terminology etc.

CHANGE MANAGEMENT

The unique nature of this project does not lend itself to a formal change management process, however, typical change management procedures will be followed. The project team will have regular project meetings to discuss the project. As much as possible community members will be involved in major decisions. Also, changes to the project direction/deliverables will be communicated and documented. Due to the unique nature of the process, documentation will be vital.

DELIVERABLES

Title	Due Date Timeframe	Reviewers	Additional Requirements/Notes
Feasibility Study (All Communities)	December 2017	U.S. Project Team Engineers in Action Suriqui Water/Environment Ministry Puerto Perez	Must Follow Water/Environment Ministry Presentation of Projects Document
Detailed Design – Suriqui	June 2018	U.S. Project Team Engineers in Action Suriqui Water/Environment Ministry Puerto Perez	Must Follow Water/Environment Ministry Presentation of Projects Document
**Detailed Design – Pacochachacoma*	June 2018	U.S. Project Team Engineers in Action Suriqui Water/Environment Ministry Puerto Perez	Must Follow Water/Environment Ministry Presentation of Projects Document
**Detailed Design – Supicachi*	June 2018	U.S. Project Team Engineers in Action Suriqui Water/Environment Ministry Puerto Perez	Must Follow Water/Environment Ministry Presentation of Projects Document
**Detailed Design - Cuyampaya*	June 2018	U.S. Project Team Engineers in Action Suriqui Water/Environment Ministry Puerto Perez	Must Follow Water/Environment Ministry Presentation of Projects Document
***Bid/Construction Documents*	TBD	TBD	Detailed Design will be used to determine what work must be completed by a local Contractor and what can be completed by the Community
***O and M Manuals*	TBD	TBD	TBD
***As-Built Drawings*	TBD	TBD	TBD
*** Construction Report*	TBD	TBD	TBD

*Deliverables that may be carried out entirely or partially by other project teams – TBD at completion of Feasibility study

** Deliverables that are not yet scoped but expected

MEETINGS

Project meetings to occur once a month via conference call or as needed. A member of the project team will provide a meeting agenda and meeting notes for each meeting to document discussions/decisions.

DRAWINGS LIST

Details TBD Based on Feasibility Study/Final Design Deliverables

DWG #	Sheet No.	Title	Responsibility	Included in Feasibility	Included In/Updated For Final Design	Comments
Title	--	Title Page	Existing Team	X	X	
G-010	TBD	Legend of Symbols	Existing Team	X	X	Use Bolivian Symbols
G-011	TBD	Notes Sheet	Existing Team		X	
C-010	TBD	Overall Plan (Full Island)	Existing Team	X	X	
C-011	TBD	Site Plan – Single Treatment System for Full Island	AguaClara	X		
C-011	TBD	Logistical Sheet	Existing Team	--	X	Material Delivery/Storage Locations
C-020	TBD	Overall Plan (Suriqui)	Existing Team	X	X	Options in Different Colors
C-021	TBD	Treatment System Site Plan (Suriqui)	AguaClara	X		
C-030	TBD	Overall Plan (Supicachi)	Existing Team	X	X	Options in Different Colors
C-031	TBD	Treatment System Site Plan (Supicachi)	AguaClara	X		
C-040	TBD	Overall Plan (Pacochachacoma)	Existing Team	X	X	Options in Different Colors
C-041	TBD	Treatment System Site Plan (Pacochachacoma)	AguaClara	X		
C-050	TBD	Overall Plan (Cuyampaya)	Existing Team	X	X	Options in Different Colors
C-051	TBD	Treatment System Site Plan (Cuyampaya)	AguaClara			

DWG #	Sheet No.	Title	Responsibility	Included in Feasibility	Included In/Updated For Final Design	Comments
P-020	TBD	Suriqui Plan/Profile – Supply Line	Existing Team	--	X	
P-021	TBD	Suirqui Plan/Profile Supply Line – Detail	Existing Team	--	X	If needed
P-022	TBD	Suriqui Water Well/Pump House Design	Existing Team	--	X	Work in conjunction with Water Well Company
P-030	TBD	Supicachi Plan/Profile – Distribution Lines	TBD	--	X	
P-031	TBD	Supicachi Plan/Profile Supply Line – Detail	TBD	--	X	If needed
P-032	TBD	Supicachi Water Well/Pump House Design	TBD	--	X	Work in conjunction with Water Well Company
P-040	TBD	Pacochachacoma Plan/Profile – Supply Line	TBD	--	X	
P-041	TBD	Pacochachacoma Plan/Profile Supply Line – Detail	TBD	--	X	If needed
P-042	TBD	Pacochachacoma – Distribution Line Detail	TBD	--	X	
P-043	TBD	Pacochachacoma Water Well/Pump House Design	TBD	--	X	Work in conjunction with Water Well Company
P-050	TBD	Cuyampaya Plan/Profile – Supply Line	TBD	--	X	

DWG #	Sheet No.	Title	Responsibility	Included in Feasibility	Included In/Updated For Final Design	Comments
P-051	TBD	Cuyampaya Plan/Profile Supply Line – Detail	TBD	--	X	If needed
P-052	TBD	Cuyampaya Water Well/Pump House Design	TBD	--	X	Work in conjunction with Water Well Company
S-020	TBD	Suriqui Treatment Tank 1	Existing Team	--	X	
S-021	TBD	Suriqui Treatment Tank 2	Existing Team	--	X	
S-022	TBD	Suriqui Water Well House	Existing Team	--	X	TBD if maintenance or new well-house
S-023	TBD	Suriqui Spring Catchment	Existing Team	--	TBD	Not a likely solution (only provides water 2 months of the year)
S-030	TBD	Supicachi Treatment Tank 1	TBD	--	X	
S-031	TBD	Supicachi Treatment Tank 2	TBD	--	X	
S-032	TBD	Supicachi Water Well House	TBD	--	X	
S-033	TBD	Supicachi Spring Catchment	TBD	--	TBD	
S-040	TBD	Pacochachacoma Treatment Tank 1	TBD	--	X	
S-041	TBD	Pacochachacoma Treatment Tank 2	TBD	--	X	
S-042	TBD	Pacochachacoma Water Well House	TBD	--	X	
S-043	TBD	Pacochachacoma Spring Catchment	TBD	--	TBD	

DWG #	Sheet No.	Title	Responsibility	Included in Feasibility	Included In/Updated For Final Design	Comments
S-050	TBD	Cuyampaya Treatment Tank 1	TBD	--	X	
S-051	TBD	Cuyampaya Treatment Tank 2	TBD	--	X	
S-052	TBD	Cuyampaya Water Well House	TBD	--	X	
S-053	TBD	Cuyampaya Spring Catchment	TBD	--	TBD	

ATTACHMENTS

Engineers in Action Trip Report

Water Lab Testing Results – Samples taken April 2016

Water Lab Testing Results – Samples Taken April 2017

Water Environment Ministry Design Document