

## **WEFTA Trip Report**

San Miguelito, El Salvador

February 4–9, 2026

### **Brief Trip Recap**

This site visit to San Miguelito, El Salvador—near El Imposible National Park—assessed the condition, reliability, and sustainability of the community’s five gravity-fed water sub-systems and confirmed alignment between current needs and proposed improvements. The assessment was supported by Lam Ho, a long-time volunteer engineer with WEFTA who has provided technical service on projects in Panama, Bolivia, and now El Salvador. Lam’s steady technical presence and practical field experience were invaluable as we evaluated both hydraulic performance and long-term operability.

San Miguelito is deeply personal to WEFTA. In the late 1990s, Tim Wellman served here as a Peace Corps Volunteer, working alongside the local water committee on organizational strengthening, sanitation improvements, spring capture protection for community water sources, community health promotion with his counterpart agency AGAPE El Salvador, and improved cooking stove initiatives. In 2001, WEFTA’s partner Waterlines, together with multiple funding partners, helped construct the water systems that continue to serve the community today. Over the past 25 years, Tim has returned five times to assess the infrastructure and sustain the relationships that began during his Peace Corps service. The continuity of those relationships remains one of the strongest assets of this project.

The water committee, known as ACASAPSAM (Asociación Comunal de Abastecimiento de Agua Potable San Miguelito), remains strong and engaged, with sound financial management, consistent fee collection, and active community participation. Records are organized, user payments are steady, and leadership attendance during meetings was nearly full. Technically, the systems remain functional but face dry-season shortages, reduced spring capture efficiency due to root intrusion and partial blockages, limited storage in certain sectors, and localized tank deterioration that will require preventive rehabilitation.

In brief, the water systems that serve the community of San Miguelito are supplied by multiple protected spring sources located at higher elevations than the service area (see the Preliminary Engineering Report for more details). The La Lechera spring serves 9 homes with no formal storage tank—only approximately 200 gallons of storage within the spring box itself—leaving little buffer during peak demand. The El Cucho spring serves 12 homes with a small storage tank of approximately 400 gallons. The El Mango system serves 10 homes, again with no dedicated storage tank beyond roughly 200 gallons within the spring structure. The Mariogil system serves 10 houses with an estimated 1,200 gallons of storage. The Boledor and Tecomate springs together serve approximately 119 homes, supported by two storage tanks of roughly 3,500 gallons and 4,500 gallons. While gravity remains the system’s strength, storage limitations and aging infrastructure create vulnerabilities during the dry season.

Priority recommendations focus on rehabilitating key spring catchments to improve effective flow capture, adding storage where critically needed, improving interconnections and transmission reliability, and completing minor but important structural repairs. These targeted upgrades will strengthen dry-season performance, reduce operational stress on the committee, and extend the life of infrastructure originally built more than twenty years ago.

San Miguelito's water system was built on trust, partnership, and community leadership. With modest, strategic investment and continued collaboration, it can continue serving families reliably for the next generation.

### **Wednesday, February 4 – Arrival**

The WEFTA team of Lam Ho, Engineer and Tim Wellman, Executive Director, convened in Houston Airport to chat about the trip and expectations. We boarded our flight to El Salvador and 3 hours later arrived at San Salvador International Airport (Comalapa). After completing the arrival logistics and procuring the rental truck, we drove to El Zonte in the La Libertad Department for the night. We chatted over dinner to review the work plan, prepare for the technical meetings and site visits scheduled in San Miguelito.

### **Thursday, February 5 – Travel to San Miguelito and Meeting with the Water Committee**

In the morning, the team traveled to Cara Sucia, Ahuachapán. We made a stop to connect for lunch with Tim's counterpart, Rafael Chinchilla and family, from his Peace Corps days (RPCV El Salvador '97-'99), and to purchase necessary provisions for the field visit to San Miguelito

Later in the afternoon, the team arrived in the community of San Miguelito to connect with our host family. At 4:00 p.m., a formal meeting was held with the Water Committee at their office.

During this meeting, the team:

- Presented the objectives of the technical visit.
- Listened to the Committee's concerns and priorities.
- Reviewed the general performance of the existing water system.
- Coordinated the inspection schedule for the following days.
- Identified current challenges related to supply, storage, and distribution.

This meeting was a great exchange of ideas and strengthened our local coordination. We were also able to ensure active participation from the Committee for the technical evaluations. We made a plan to meet the following morning for a cup of coffee and set out on the overall assessment of the water systems.

### **Friday, February 6 – Technical Evaluation of the Water System (See the Technical Report below)**

Up early on a cold morning after a few hours of sleep (the high winds in the area made for a challenging night of sleep), we ate breakfast and drank coffee with some of the water committee members responsible for showing us the majority of 5 small independent water systems that together serve the

entire community of San Miguelito. A detailed technical evaluation of the existing water system began. Accompanied by Water Committee members, the team inspected the various components of the system.

Activities included:

- Assessment of Water Sources (Boledor, Tecomate, El Cucho, El Mango, Mariogil)
  - Inspection of the existing spring sources currently in use.
  - Review of physical conditions, estimated flow rates, and spring protection.
  - Preliminary identification of a potential new spring source for development.
- Transmission Lines (5 systems)
  - Inspection of pipeline conditions.
  - Identification of possible leaks, deterioration, or vulnerable sections.
  - Evaluation of topography and elevation changes affecting water delivery to customers.
- Storage Tanks (El Cucho, Mariogil, Boledor systems)
  - Inspection of existing storage structures.
  - Basic structural assessment.
  - Preliminary evaluation of a potential new site for a water storage tank to improve pressure and service reliability.
- Distribution System and Meters (5 systems)
  - Observation of the household distribution network.
  - Review of the condition and usage of water meters.
  - Conversations with residents regarding service frequency and water pressure.

Key technical observations were documented for further analysis (see the Preliminary Engineering Report below).

### **Saturday, February 7 – Technical Evaluation of the Water System (Day 2)**

The second day, we met again for coffee and discussion of the observations from the previous day. The water committee members were excited to hear our thoughts from the previous day's inspection and eager to share their own ideas on how to inter-connect some of the systems, increase storage capacity, renovated the spring boxes for improved flow, and repair problem areas within the transmission and distribution systems. The day's field inspection allowed the team to deepen the previous day's findings and complete remaining system reviews.

Activities included:

- Additional review and comparative verification of spring flow rates.
- Full walk-through of transmission lines to confirm areas needing improvement.
- More detailed evaluation of the proposed new storage tank location.
- Expanded discussions with residents regarding service continuity, pressure challenges, and operational issues.
- Discussion with the Water Committee regarding preventive maintenance practices and administrative capacity.

At 4:00 p.m., a formal closing meeting was held with the Water Committee. During this session, the team:

- Presented preliminary observations.
- Discussed potential improvement pathways.
- Explored options for developing new sources or expanding storage capacity.
- Reaffirmed the spirit of collaboration between WEFTA and the community.
- Sign the rehabilitation project agreement between ACASAPSAM and WEFTA

This day was critical for understanding not only the technical condition of the system but also its community management structure, identifying organizational strengths and areas needing capacity strengthening.

### **Sunday, February 8 – Final System Review and Closing Meeting**

The morning was dedicated to final clarification of technical questions, confirmation of site measurements, and informal conversations with community members. These conversations provided additional context regarding household water use, expectations, and appreciation for continued partnership.

### **Monday, February 9 – Departure**

The team departed early for San Salvador International Airport, concluding the field mission and returning to the United States with detailed field notes, photographs, and a clear path forward.

### **Overall Summary**

The visit allowed for a comprehensive technical assessment of the San Miguelito water system, including sources, transmission, storage, and distribution. The trip also strengthened collaboration with the Water Committee and the broader community, establishing a solid foundation for future interventions aimed at improving system reliability, sustainability, and management capacity.

The information gathered during this visit will support the development of formal recommendations and next steps for the project (see the Preliminary Engineering Report below).

# EL SALVADOR

## San Miguelito Water System Project Scoping

FEBRUARY 2026



*WEFTA Water System Renovation Project in San Miguelito*

A special thanks to all those involved in making this trip a success.

They are:

- Lam Ho, Engineer, WEFTA volunteer
- Water Committee (ACAAPSAM) of San Miguelito, Ahuachapán
- Donations from Waterlines (NGO), and private donors like you
- Tim Wellman, Executive Director, WEFTA, and a WEFTA volunteer
- The wonderful people of El Salvador





Typical unprotected spring still used by community members during dry season.



Engineer Lam and Arturo assessing the Boledor #3 Spring Capture.



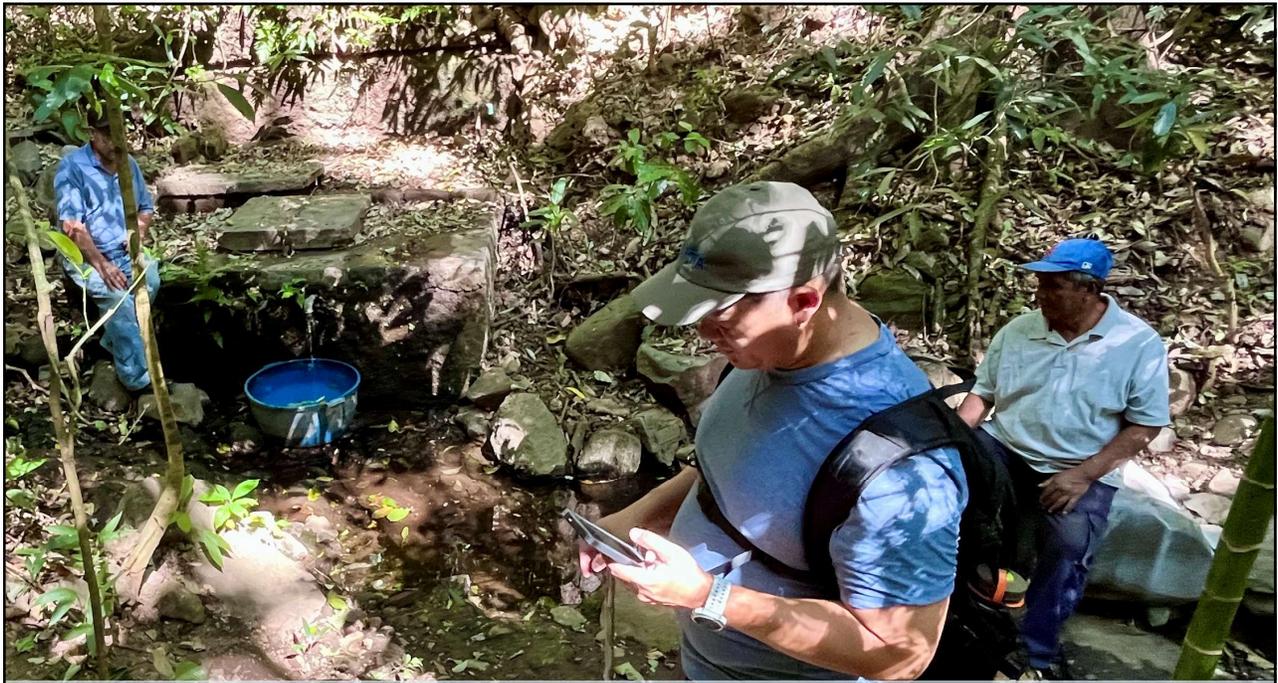
WEFTA Team and water committee members assessing Boledor #2 Spring Capture.



WEFTA Team and water committee members hiking back from some of the spring capture assessments.



WEFTA Team and water committee discussing the improvements to be made at the El Cuche Spring Capture.



Engineer Lam taking GPS data points at the El Mango Spring Capture.



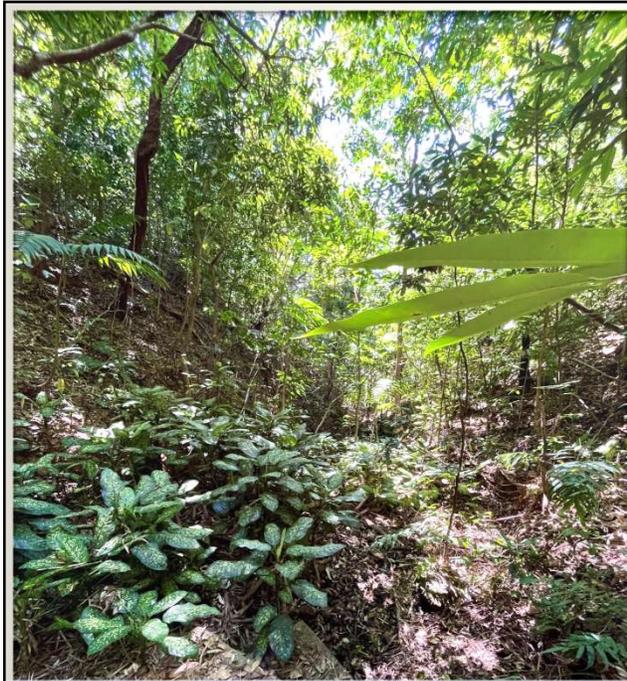
San Miguelito Water Committee checking water levels in the Mariogil water storage tank.



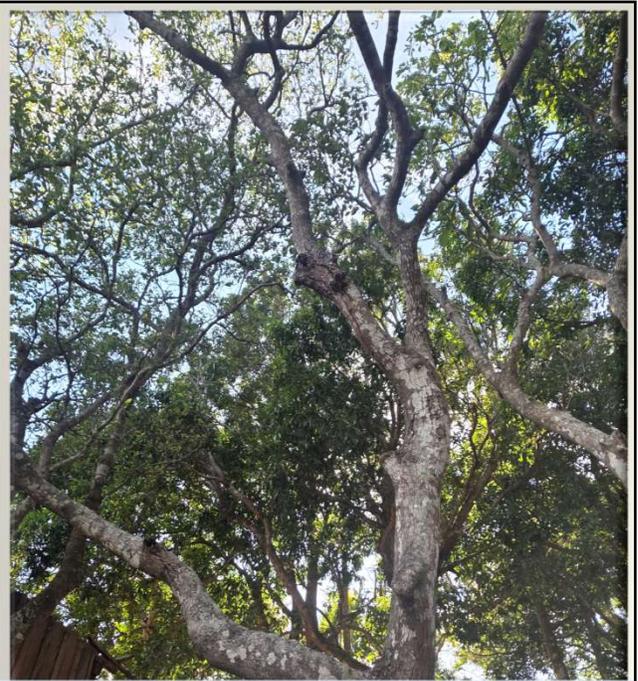
Water committee and community member assessing the status of the El Cucho water storage tank.



Engineer Lam assessing the status of the Boledor Water Storage Tank #1.



Tree canopy in the community of San Miguelito.





Some relaxing time with San Miguelito's furry friends.



When in El Salvador you must start your day with a breakfast of Pupusas.



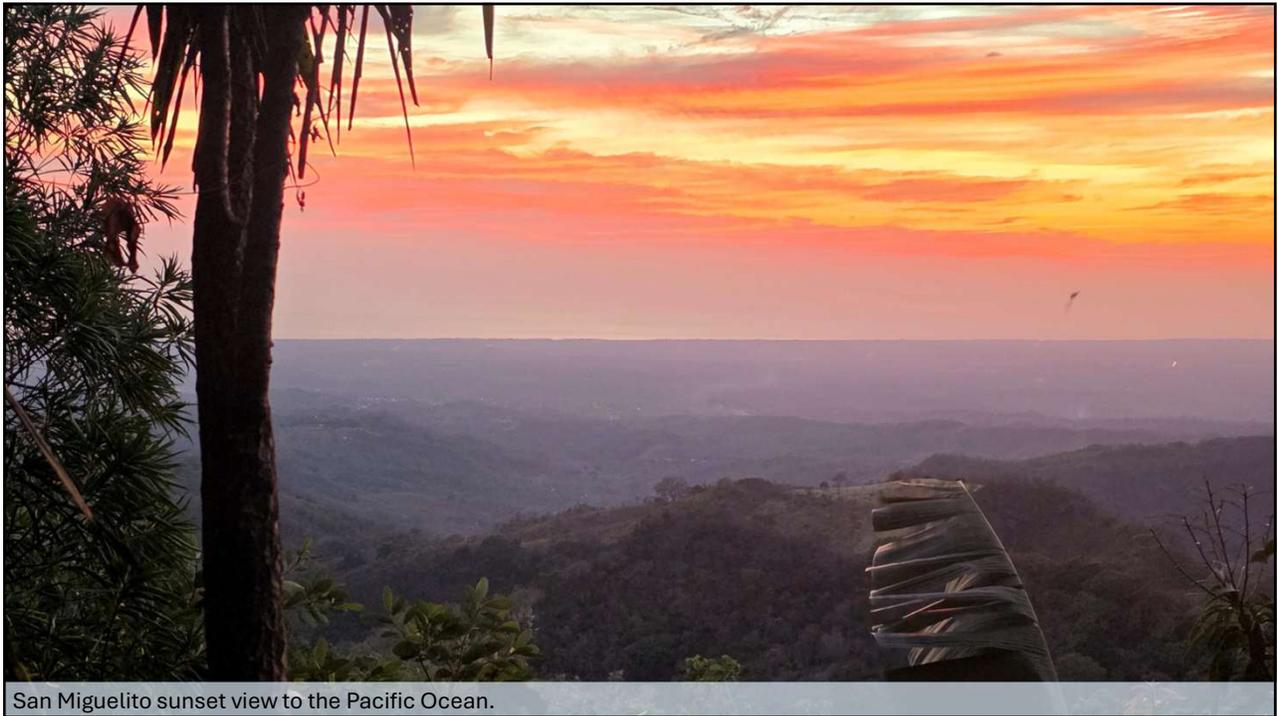
Tim and the Water Committee President, Arturo Molina, signing the agreement to work together on the project.



Engineer Lam and the majority of the Water Committee proud to be working together for improved access to water.



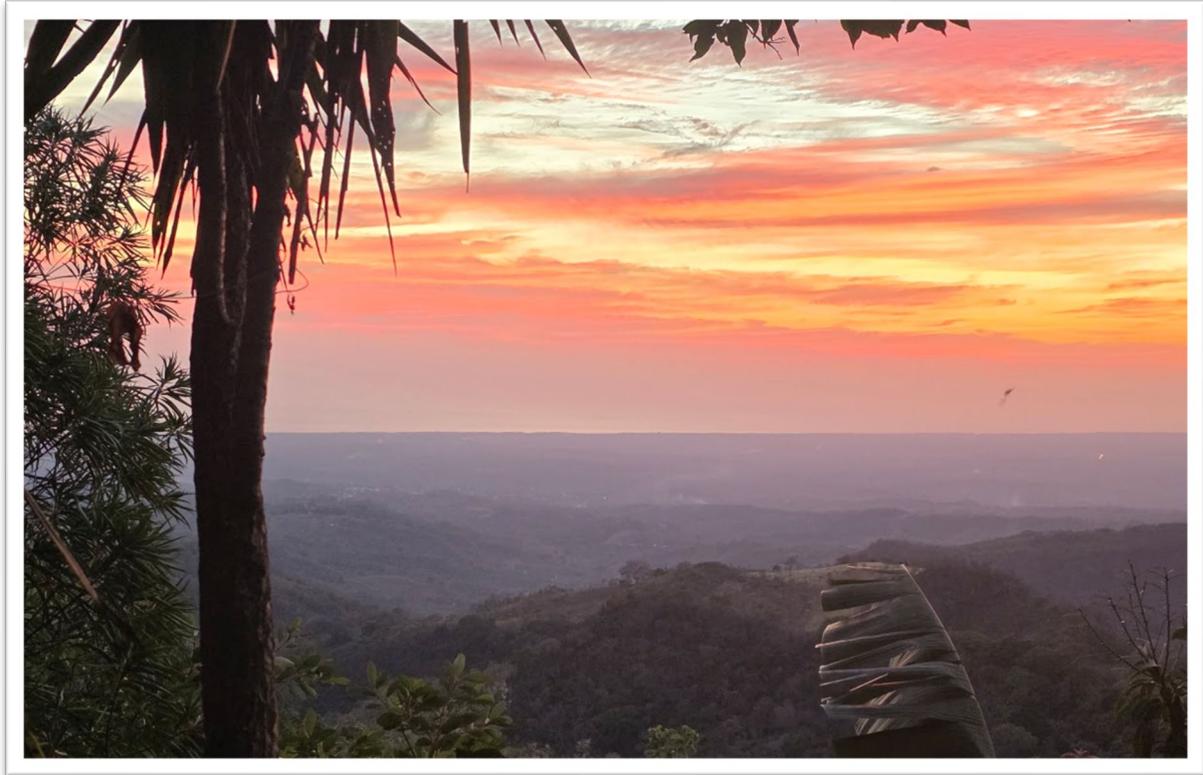
Lam and Tim at the beach before returning to the USA.



San Miguelito sunset view to the Pacific Ocean.

# Preliminary Engineering Report San Miguelito, El Salvador

*February 2026*



## **Prepared by:**

Water Engineers for the Americas (WEFTA)  
Executive Director Tim Wellman and Engineer Lam T. Ho

## **WATER ENGINEERS FOR THE AMERICAS AND AFRICA**

Water Engineers for the Americas (WEFTA) is a 501(c)(3) non-profit organization that seeks to help alleviate the problem of unsafe water supplies and inadequate sanitation in the western hemisphere. WEFTA provides technical and administrative support to needy communities for the construction of drinking water and wastewater systems by working with local organizations and promoting community-based projects.



# Report Summary

This Preliminary Engineering Report presents the findings of a February 2026 site assessment of the San Miguelito water systems in San Miguelito, El Salvador, conducted by Water Engineers for the Americas and Africa (WEFTA). The purpose of the assessment was to evaluate existing spring sources, storage facilities, and distribution infrastructure; verify administrative capacity; and refine engineering priorities to address observed deficiencies and recurring dry-season water shortages.

San Miguelito is served by five independent gravity-fed sub-systems—Boledor, El Cucho, La Lechera, Mango, and Mariogil—collectively providing service to approximately 160 household connections. Total observed spring production across all sub-systems was approximately 28 liters per minute (40,320 liters per day) at the time of inspection. While overall production is meaningful for a rural system of this size, flow availability and storage capacity are unevenly distributed among sub-systems, resulting in localized shortages during peak demand and dry-season conditions.

Administrative findings indicate that the water committee is well organized, financially functional, and engaged with both users and municipal authorities. Billing and collection systems are effective, community participation is strong, and current tariffs appear sufficient to cover routine operations and minor repairs. This administrative strength provides a solid foundation for implementing phased infrastructure improvements.

Technical findings identified several key constraints affecting system reliability: partial spring capture due to root intrusion and clogging (particularly in the Boledor sub-system), lack of storage in La Lechera and Mango, limited redundancy in El Cucho, aging or undersized conveyance infrastructure in Mariogil, and localized concrete deterioration at the Boledor 1 tank. Reported water shortages in La Lechera and the Molina sector are consistent with observed storage and hydraulic limitations.

The report outlines six prioritized engineering improvements focused on increasing effective spring capture, improving storage capacity and operational flexibility, strengthening interconnections between sub-systems, and addressing structural maintenance needs. The total planning-level estimated cost for implementation of all recommended improvements is \$40,433. The recommendations are designed to improve dry-season reliability, enhance hydraulic balance among sub-systems, and extend the service life of existing infrastructure while maintaining the community's gravity-fed operating model.



## **PURPOSE AND OBJECTIVES**

The purpose of the site visit was to review and assess the existing water sources, storage systems, and distribution systems serving the San Miguelito community. The assessment was based on direct field observations, site inspections, and discussions with local water system operators conducted in coordination with WEFTA technical experts.

The site visit also evaluated how the proposed project scope aligns with actual conditions observed in the field. This comparison was intended to identify gaps, confirm assumptions, and refine project priorities to better reflect existing system conditions and operational realities.

In addition to the technical assessment, the site visit objectives included interfacing with the local water committee to:

- Confirm the committee's status as a certified water committee.
- Verify community support for proposed system improvements; and
- Assess the committee's financial capacity to implement, operate, and maintain future project improvements.

## **ADMINISTRATIVE FINDINGS**

### **Water Committee Governance and Compliance**

The water committee maintains its administrative and financial records in good standing and demonstrates an effective working relationship with the municipal government to support regulatory compliance and coordination.

### **Billing and Revenue Collection**

Water users appear to pay their water bills promptly and in full, indicating a functional and reliable billing and revenue collection system.

### **Committee Participation and Capacity**

The water committee consists of twelve (12) members, with eleven (11) members present during the initial meeting. This level of participation reflects strong engagement in system governance and operations.

### **Financial Sustainability**

The existing water fee structure appears sufficient to cover routine operational expenses and maintain limited reserve funds for minor repairs and contingencies.

### **Community Engagement**

The water committee conducts annual general community meetings to communicate water system status, engage users, and support transparency and community outreach.



## TECHNICAL FINDINGS

The San Miguelito water system consists of five (5) independent sub-systems: Boledor, El Cucho, La Lechera, Mango, and Mariogil. Each sub-system operates with its own source(s), conveyance infrastructure, storage (where available), and distribution system. As a result, system capacity, redundancy, and operational reliability vary significantly between service areas. Tank and source elevations were acquired using mapping data provided in the project KML file (see Water System Map in Annex 1).

### Boledor Sub-System

The Boledor sub-system is supplied by four (4) spring sources: Boledor 1, Boledor 2, Boledor 3, and Tecomate. The combined yield from these sources is approximately 12 liters per minute (L/min) based on field observations and information provided by system operators.

The sub-system includes two storage tanks:

- Boledor 1 Tank, with an approximate capacity of 13,000 liters, located at an elevation of 2,223 ft-AMSL; and
- Boledor 2 Tank, with an approximate capacity of 18,000 liters, located adjacent to the main road at an elevation of 2,185 ft-AMSL.

In addition to spring sources, the Boledor sub-system receives supplemental water from the Mariogil sub-system via a 3/4-inch diameter pipeline extending from the end of the Mariogil distribution system to the Boledor 2 tank. This connection includes a manually operated valve that is used by system operators to throttle flow during periods of high demand. The Boledor sub-system provides water service to approximately 119 household connections.

At Boledor 1, water was observed flowing around the exterior of the spring catchment box rather than fully entering through the intake. This condition indicates that the intake may be partially obstructed, causing flow to bypass the catchment rather than being fully captured.

At Boledor 2 and Boledor 3, signs of root intrusion were observed within or adjacent to the spring catchment structures. Root intrusion may reduce effective flow capture and could lead to further degradation of the catchment structures over time if not addressed.

Localized deterioration and spalling of concrete were observed at the upper rim of the Boledor 1 storage tank. While this condition does not currently appear to compromise tank watertightness or structural performance, continued deterioration could result in falling concrete debris and accelerated degradation if left unaddressed.

Estimated elevation range of service connection elevations:

- Molina Section – 2222 - 2023 ft-AMSL
- Main Trunk – 2222 – 1709 ft-AMSL

### El Cucho Sub-System

The El Cucho sub-system is supplied by a single spring source located within El Imposible National Park. Spring flow was measured by WEFTA volunteers at approximately 8.5 liters per minute (L/min), equivalent to approximately 12,240 liters per day (L/day) at the time of inspection.

Water from the spring is conveyed via an approximately 3,150-foot transmission line to a storage tank with an estimated capacity of approximately 2,280 liters. The spring box is located at an elevation of



approximately 2,488 ft-AMSL, and the storage tank is located at approximately 2,343 ft-AMSL, providing adequate elevation difference for gravity-fed conveyance and distribution.

The spring catchment structure was not opened for inspection, as it was reported by system operators to be in good condition and constructed in 2018. The El Cucho sub-system provides water service to approximately 12 household connections.

Estimated elevation range of service connection elevations: 2341-2197 ft-AMSL.

### **La Lechera Sub-System**

The La Lechera sub-system is supplied by a single spring source located at approximately 2,617 ft-AMSL. The observed spring flow was approximately 1.3 liters per minute (L/min), equivalent to approximately 1,872 liters per day (L/day) at the time of inspection.

The La Lechera sub-system does not include a storage tank, instead the spring box itself holds approximately 750 liters. Water from the spring is conveyed directly into the distribution system and supplied to users without intermediate storage. The system provides water service to approximately 9 household connections.

The spring catchment structure was not inspected due to accessibility limitations at the time of the site visit. The approximate location of the spring source was estimated based on information provided by the system operator and the water committee president, Arturo Molina.

Range of service connection elevations: 2460-2375 ft-AMSL.

### **Mango Sub-System**

The Mango sub-system is supplied by a single spring source located at approximately 2,450 ft-AMSL. The observed spring flow was approximately 2.4 liters per minute (L/min), equivalent to approximately 3,456 liters per day (L/day) at the time of inspection.

The Mango sub-system does not include a storage tank, like the Lechera system, the spring box at Mango holds approximately 750 liters. Water from the spring is conveyed directly into the distribution system and supplied to approximately 10 household connections.

Estimated elevation range of service connection: 2472-2285 ft-AMSL.

### **Mariogil Sub-System**

The Mariogil sub-system is supplied by a single spring source located at approximately 2,430 ft-AMSL. The observed spring flow was approximately 4 liters per minute (L/min), equivalent to approximately 5,760 liters per day (L/day) at the time of inspection.

Water from the spring is conveyed to a storage tank with an estimated capacity of approximately 5,000 liters, located at an elevation of approximately 2,310 ft-AMSL. The elevation difference between the spring source and the storage tank provides gravity-fed conveyance and distribution.

The Mariogil sub-system provides water service to approximately 10 household connections.

Estimated elevation range of service connection: 2472-2285 ft-AMSL.



## Reported Water Shortages

Water system operators and water committee representatives reported recurring water shortages affecting specific portions of the system, particularly during the dry season and periods of peak demand.

The La Lechera sub-system was reported to experience frequent water shortages during the dry season. This condition is suspected to be related to the absence of intermediate storage within the La Lechera system. Effective storage is limited to the spring catchment and transmission piping, which provides minimal buffering capacity during peak demand periods.

Additional water shortages and intermittent periods of no water service were reported in the Molina sector, located east of the Boledor 1 tank and south of the Boledor 2 tank. These shortages were reported to occur primarily during dry season peak demand periods.

## SUB-SYSTEM DATA

San Miguelito Water System Data by Sub-System								
Sources	Storage Tank	Elevation	Storage Capacity	Tank Elev	Flow	Flow	# of Connections	Average Flow/Connection
	Name	ft-AMSL	Liters	ft-AMSL	L/min	L/day		L/connection
Boledor 1-3, Tecomate	Boledor 1	2352	13000	2222	12	17280	119	145
	Boledor 2	2381	18000	2192				
Mariogil	Mariogil	2393	5000	2254	3.8	5472	10	547
Mango	Spring box storage	2476	750	2476	2.4	3456	10	346
Lechera	Spring box storage	2631	750	2631	1.3	1872	9	208
Cuche	Cuche	2492	2280	2347	8.5	12240	12	1020
				<b>TOTALS</b>	<b>28</b>	<b>40320</b>	<b>160</b>	<b>252</b>

## ENGINEERING RECOMMENDATIONS

The following engineering recommendations are based on field observations, system operator input, and evaluation of existing system conditions. Recommendations are organized by priority to address immediate deficiencies, improve reliability during dry-season and peak-demand conditions, and support long-term operability and sustainability of the San Miguelito water systems.

All cost estimates are planning-level estimates intended for budgeting and funding evaluation. Final costs will be refined during detailed design and procurement.

### Priority 1 – Spring Infiltration Gallery Rehabilitation

It is recommended that all spring infiltration galleries and catchment structures within the San Miguelito water system be rehabilitated to improve effective flow capture and reduce bypass losses. Priority should be given to Boledor 1 and Boledor 2, as these sources support the Boledor sub-system, which serves the largest number of users and these two springs would benefit the most from rehabilitation.

Field observations identified root intrusion, partial blockages, and gravel pack clogging at multiple spring sources. These conditions reduce hydraulic efficiency and divert water around, rather than into, the catchment structures.

#### Priority 1 Total

Line Item	Quantity	Unit Price (USD)	Subtotal (USD)
Labor (excavation, cleaning, reassembly)	1	\$550	\$550
Root intrusion removal	1	\$300	\$300
Gravel pack removal, washing, screening	1	\$200	\$200
Replacement gravel allowance	1	\$250	\$250
Minor concrete repair materials	1	\$250	\$250
Tools, sieves, consumables	1	\$200	\$200
<b>Total per spring</b>			<b>\$1,275</b>
Total for Boledor 1 and 2 (Priority Rehabilitation)			<b>\$2,550</b>

### Priority 2 – La Lechera Storage Tank

It is recommended that a dedicated storage tank be constructed for the La Lechera sub-system to address frequent dry-season water shortages and improve reliability during peak-demand periods.

Tank elevation shall be the primary design driver, with the objective of meeting minimum potable water service pressure at household connections. Tank siting will depend on available land and will require coordination with local landowners.

Final storage capacity should provide no less than one (1) day and no greater than two (2) days of storage, based on estimated daily demand.



<b>Priority 2 Total</b>			
<b>Line Item</b>	<b>Quantity</b>	<b>Unit Price (USD)</b>	<b>Subtotal (USD)</b>
1000 L polyethylene storage tank (procurement)	1	\$3,000	\$3,000
Transport / delivery / handling to site	1	\$800	\$800
Site preparation (clearing, grading)	1	\$600	\$600
Concrete tank pad / foundation	1	\$1,000	\$1,000
Piping, fittings, valves, overflow, drain	1	\$700	\$700
Tie-ins to existing system	1	\$900	\$900
Contractor labor and supervision	1	\$1,200	\$1,200
Mobilization / demobilization	1	\$500	\$500
Contingency (15%)	1	\$1,020	\$1,020
<b>Priority 2 Total</b>			<b>\$9,720</b>

### **Priority 3 – El Cucho Second Storage Tank and Interconnection with Boledor Tank 1**

It is recommended that a second 1000-liter polyethylene storage tank be purchased and installed for the El Cucho sub-system to improve operational flexibility and redundancy.

The new tank should be constructed at the same ground elevation and hydraulic elevation as the existing tank, if feasible, to maintain consistent pressure conditions and simplify operations and maintenance.

Overflow from the Cucho storage tanks should be routed to the Boledor Tank 1 to improve water supply for the Boledor system (Molina section).

<b>Priority 3 Total</b>			
<b>Line Item</b>	<b>Quantity</b>	<b>Unit Price (USD)</b>	<b>Subtotal (USD)</b>
1000 L polyethylene storage tank	1	\$3,000	\$3,000
Delivery (no access difficulty)	1	\$200	\$200
Minor site preparation	1	\$200	\$200
Concrete foundation	1	\$900	\$900
Piping, fittings, valves	1	\$650	\$650
System tie-ins	1	\$1700	\$1700
Labor and supervision	1	\$1900	\$1900
Mobilization	1	\$250	\$250
Contingency (10%)	1	\$680	\$680
<b>Priority 3 Total</b>			<b>\$9,480</b>



### Priority 4 – Mariogil Transmission Line Replacement

It is recommended that approximately 2,800 feet of the Mariogil transmission line be fully replaced with 2-inch PVC, installed above ground, to improve reliability, reduce losses, and support downstream operational improvements.

Priority 4 Total			
Line Item	Quantity	Unit Price (USD)	Subtotal (USD)
2-inch PVC pipe (6 m sticks)	143	\$22	\$3,146
Fittings allowance	1	\$1,200	\$1,200
Isolation valves / hardware	1	\$900	\$900
Pipe supports / anchors	1	\$800	\$800
Labor (above-ground installation)	1	\$2,200	\$2,200
Mobilization / demobilization	1	\$1,000	\$1,000
Contingency (15%)	1	\$1,386	\$1,386
<b>Priority 4 Total</b>			<b>\$10,632</b>

### Priority 5 – Mariogil to Boledor 2 Tank Interconnection

It is recommended that a direct tank-to-tank interconnection be constructed between the Mariogil storage tank and the Boledor 2 tank. The outlet from the Mariogil tank should be installed near the overflow elevation, allowing flow only when the Mariogil tank is full.

The existing downstream Mariogil-to-Boledor connection should remain normally closed and used during periods of high demand.

Priority 5 Total			
Line Item	Quantity	Unit Price (USD)	Subtotal (USD)
2-inch PVC pipe	500 ft	\$2.00/ft	\$1,000
Fittings allowance	1	\$700	\$700
Isolation valves (2)	2	\$150	\$300
Flow regulation / throttling device	1	\$350	\$350
Tank penetration / bulkhead hardware	1	\$500	\$500
Supports / anchors	1	\$400	\$400
Labor	1	\$1,200	\$1,200
Mobilization / demobilization	1	\$600	\$600
Contingency (15%)	1	\$758	\$758
<b>Priority 5 Total</b>			<b>\$5,808</b>



## Priority 6 – Boledor 1 Tank Concrete Repairs

Localized concrete repairs should be performed at the upper rim and top edge of the Boledor 1 storage tank, where spalling and deterioration were observed during the site visit.

Repairs should include:

- Removal of all loose and unsound concrete to expose sound substrate.
- Cleaning of exposed surfaces and any exposed reinforcement.
- Application of cementitious or polymer-modified bonding agents.
- Placement of non-shrink cementitious repair mortar suitable for potable water infrastructure.
- Use of wire mesh or fiberglass mesh where repair depth exceeds approximately 1.5–2 inches.
- Proper curing to minimize shrinkage cracking.

Anchors or dowels are not anticipated unless more extensive deterioration is encountered.

<b>Priority 6 Total</b>			
<b>Line Item</b>	<b>Quantity</b>	<b>Unit Price (USD)</b>	<b>Subtotal (USD)</b>
Surface preparation and removal	1	\$400	\$400
Repair materials	1	\$300	\$300
Formwork and finishing	1	\$250	\$250
Labor	1	\$700	\$700
Mobilization / demobilization	1	\$300	\$300
Contingency (15%)	1	\$293	\$293
<b>Priority 6 Total</b>			<b>\$2,243</b>

## Project Cost Summary

Priority 1 - Spring Infiltration Gallery Rehabilitation	\$2,550
Priority 2 – La Lechera Storage Tank	\$9,720
Priority 3 – El Cuche Second Storage Tank	\$9,480
Priority 4 – Mariogil Transmission Line Replacement	\$10,632
Priority 5 – Mariogil to Boledor 2 Tank Interconnection	\$5,808
Priority 6 – Boledor 1 Tank Concrete Repairs	\$2,243
<b>Project Total</b>	<b>\$40,433</b>



## Conclusion

The San Miguelito water systems demonstrate strong community governance and committed local stewardship, supported by a functional water committee and consistent user participation. However, technical constraints—particularly uneven source productivity, insufficient storage in certain sub-systems, and localized infrastructure deterioration—limit system resilience during peak demand and dry-season periods.

The recommended phased improvements represent practical, targeted investments that address root causes rather than symptoms. Rehabilitation of spring infiltration galleries will maximize available source yield. Strategic addition of storage in La Lechera and El Cucho will buffer demand fluctuations and improve service continuity. Transmission upgrades and tank interconnections within the Cucho, Mariogil and Boledor systems will enhance hydraulic flexibility and redundancy. Concrete repairs at Boledor 1 will preserve existing infrastructure and prevent accelerated deterioration.

Collectively, these improvements will strengthen operational reliability, improve equity of service across sub-systems, and position the San Miguelito water committee to sustainably manage its water resources for the long term. With an estimated total investment of \$40,433, the proposed project scope represents a cost-effective and technically sound approach to improving water service reliability while building upon an already strong administrative foundation.



## **ANNEX 1**

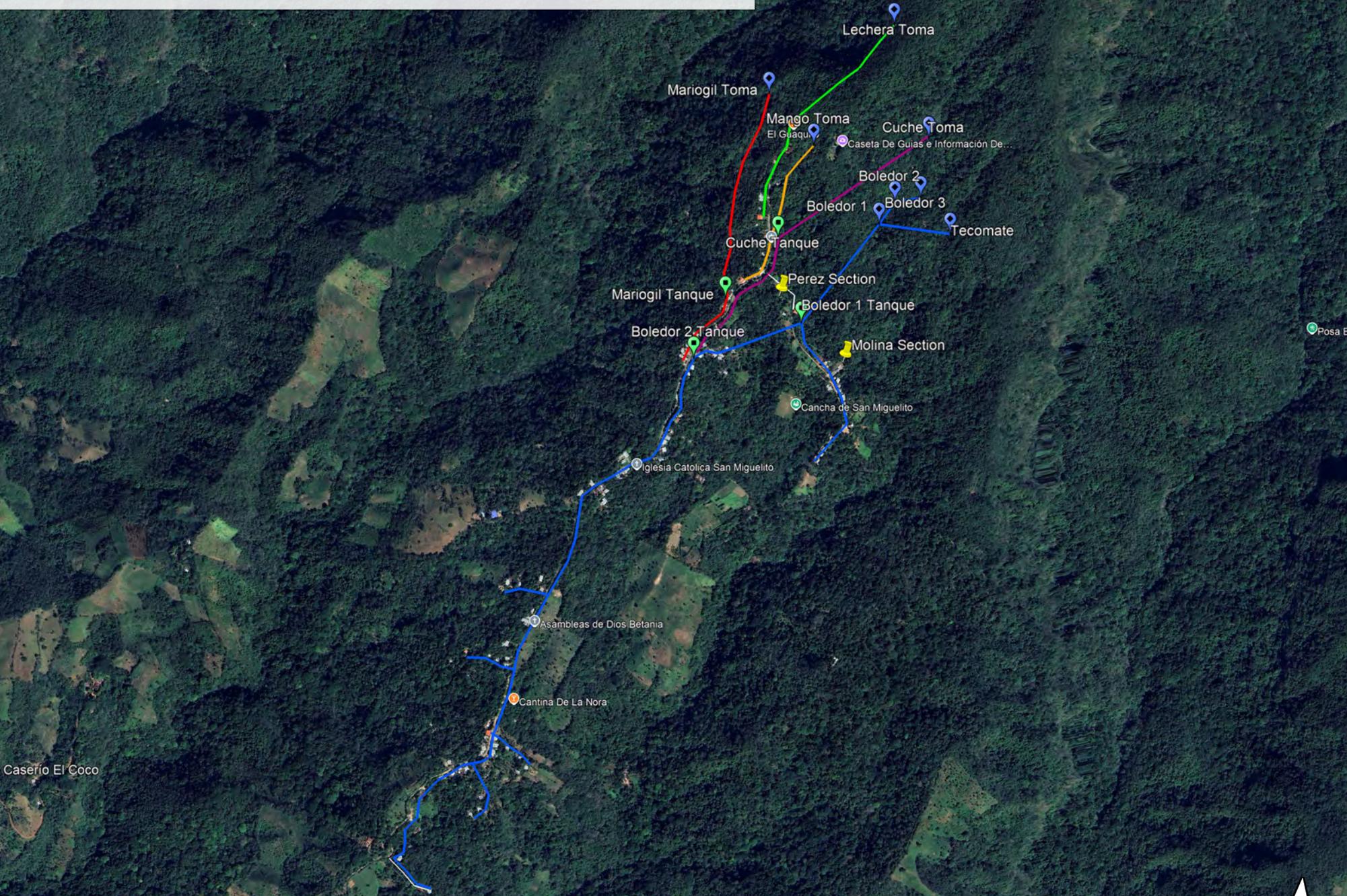
# **San Miguelito Water System Map**



# San Miguelito Water System Rehabilitation Project

Map of Water System Attributes

Parque Nacional El



Caserío El Coco

Posa E

