



## Assessment – Pre-Trip Plan

<b>Community:</b>	La Cuchilla, Dominica Republic
<b>Country:</b>	Dominican Republic
<b>Chapter:</b>	Kansas City Professional Chapter
<b>Submittal Date:</b>	11/07/2016
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<b>Scope of Assessment (100 words)</b>	Existing drinking water infrastructure has been inoperable for multiple years and is possible contaminated by the nearby irrigation canals and agriculture runoff. This assessment will determine what modifications need to be made to ensure clean drinking water at an adequate supply to meet the demand of the community.

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## 1.0 Objectives of Site Assessment Trip

The trip objectives include the following:

1. Establish communication between community members, partners, and EWB
2. Learn more about the community through questionnaires and interviews
3. Establish water quality testing program
4. Investigate and gather data on the existing water and electric infrastructure
5. Determine modifications needed and scope of project

The overlapping goal of this trip across all disciplines is to establish a partnership and open lines of communication between all parties involved including the community, NGOs, and the EWB KC chapter. Introductions will take place during the first day the team is in country and a concluding meeting will take place towards the end of the assessment. During these meetings EWB-KC will help to determine everyone's roles and responsibilities. Regular communication will be established at an agreed upon interval.

Interviews and questionnaires will be used to gain more insight into the day-to-day lives of community members and the history of the region. The proposed questionnaire is attached to this document. All responses will be documented.

The feasibility of a water quality testing program will be determined. It would be ideal to have regular water quality tests of the water sources so that fluctuations in water quality across time can be captured. This will give EWB-KC the best data to determine what water treatment, if any, is required.

A multi-disciplinary approach to the infrastructure assessment will be done as described in the following section. This assessment will help to determine recommendations and define the scope of any modifications done as a part of this project.

## 2.0 Data Collection and Analysis

The below sections describe the data collected and analysis methods for the Assessment Trip.

### 2.1 Existing System History

The following is an excerpt from a document provided by the NGO which describes a brief history of the community and its water system:

*“A Dominican organization, IDDI (Dominican Development Institution) recently installed a solar panel-powered submersible pump system at the site of the community well that sits directly under the communal water storage tank of 15,000 gallons. For a small community like Cuchilla, this should be enough water to provide over 15 gallons per person daily, but the water is not reaching all of the houses and buildings in the community and the school has not had water for 2 years. This school is the site of a 2011 WWR water filtration system and water has not reached the school since late 2012.”*

*“WWR is currently trying to contact the person responsible for the installation to gain information regarding the specs of the pump and solar panel system. There are 6 solar panels on the roof of the pump house and the well casing pump is powered by a grundfos CU2000 SQFlex controller. We hope a contact for the installer will provide us with more information on the casing pump.”*

Any and all existing data on the water system will be gathered. Prior to the trip EWB-KC will work to gather any original drawings for the water system by coordinating with the NGO. Further historical and qualitative information will be gathered from the CBO through interviews.

EWB-KC will briefly investigate the region including neighboring community’s water system strategies and other NGOs or groups working in the region. Similar investigations will be done for the wastewater systems for the neighboring communities.

## **2.2 Community Assessment**

Detailed community interviews and questionnaires will be conducted drawing on the questions in the attached questionnaire list. All responses will be documented. Efforts will be taken to conduct interviews not only with community members but also with officials and professionals associated with the local school, church, and health clinic to understand the history and challenges faced by different perspectives. Members from the Peace Corp and the NGO will be hired to help as translators during these interactions because most in the region speak Creole.

## **2.3 Water Quality Tests**

The team will work with the Community Based Organization (CBO) and the Non-Governmental Organization (NGO) to establish regular water quality testing of the water sources. A payment structure will be worked out between all parties. Initial goals are to develop a water quality testing program which tests at periodic intervals which will range between once a month or once a quarter. Initial water testing will also be conducted while the EWB-KC team is on site, so an initial baseline assessment of the parameters can be developed in the near-term.

It is anticipated that the nearby irrigation water is also being used by the community or getting introduced into the drinking water supply because of the irrigation canal’s proximity to the drinking water well and the reported presence of broken pipes. For these reasons the irrigation canal water will also be included in the regular water quality testing program.

As agreed on an October phone call, World Water Relief is seeking out testing labs within the region. The list of potential facilities will be provided to EWB-KC prior to travel. Once the local water testing agency is identified, EWB-KC will work with that testing agency to determine the water quality tests they are capable of and the list of contaminants EWB-KC deems advantageous to track. A preliminary list of water quality tests include:

1. E. coli
2. Total Coliform
3. Nitrates (NO<sub>3</sub>)

4. Chlorides
5. Hexavalent Chromium (Cr6)
6. Total Dissolved Solids (TDS)
7. pH
8. Biological Oxygen Demand (BOD-5)

## **2.4 Structural Assessment**

Data collection for structural investigation of the two water storage tank structures will include the following:

1. Determine seismic and wind load requirements
2. Detailed dimensions of existing structure
3. Member sizes
4. Investigate foundation
5. Determine existing structure load capacity
6. Determine any modifications needed to structures

Seismic requirements will be defined through further research for the area. Initial research reveals that the local seismic codes are very outdated (circa 1979). EWB-KC will look to international codes and standard which include seismic classifications for the La Cuchilla area. Wind loads will be defined in a similar manner and EWB-KC will use engineering judgment to determine seismic and wind load requirements to be used in assessment of the existing structure capacity.

Detailed dimensions will be taken of the existing storage tank support structure to gather structural member sizes. Worst case assumptions will be made for reinforcement and concrete properties. Visual inspections and engineering judgment will be used to determine structural member connection details. As much investigation as possible will be done to determine sub-surface foundation details.

Other investigative sources such as existing drawings (may exist in Peace Corp records), local building codes, and local construction practices will be used to develop the best assumptions to be used in place of destructive evaluation measures. The above investigation strategy will determine the structural capacity of the existing elevated tank support structures. This will be used to determine the structural integrity of the existing structure and any modifications that would need to be made. EWB-KC may determine that an increase in water storage capacity is required which would be limited by how much the existing structure can support, unless further modifications are made.

## **2.5 Mechanical Assessment**

Data collection for mechanical scope investigation will include the following:

1. Develop system flow diagram
2. Determine current water demand
3. Assess water storage needs

4. Assess wastewater infrastructure
5. Establish water quality testing program

Developing a system flow diagram will include identifying any and all existing infrastructure associated with the drinking water supply system. Information of all equipment with associated serial numbers and ratings will be included on the flow diagram. Details of all valve locations, filters, and piping sizes and materials will be incorporated. The water distribution system will be mapped using a GPS locator and tagging device (Garmin eTrex Vista), but will not include elevation readings due to limited variance in system elevation.

The existing water demand of the community will be established by identifying all connections to the water distribution system, uses, and all individuals currently relying on the system. Allowances will be included for homes or sites using water for appliances, showers, sinks, or toilets along with drinking water needs. Appropriate assumptions will be used for per capita drinking water demand per person based on local standards and guidelines. The resulting water demand will be compared against any known data we collect on site (metering data, bills, historical measurements, etc.).

The storage needs of the system will be assessed and compared to existing storage tanks. The calculated water demand and a recommended retention time will be used to determine the amount of storage needed. If there is a difference in the water demand of the community and of the water supply from the existing water source, adequate retention time will be included to minimize interruption of service to the community.

The current project scope is to only identify improvements to the drinking water system. However, for a holistic view of the community the entire water system and uses will be assessed. Existing wastewater infrastructure will be assessed to determine health impacts to the community and adequacy of treatment. The wastewater system assessment will be secondary to the primary goal of investigating the drinking water system.

## **2.6 Electrical Assessment**

Data collection for electrical scope will include the following:

1. Determine peak solar panel output power (controller input).
2. Determine peak and average controller output power.
3. Length of time the solar panels provide adequate output each day.
4. Determine loads on system besides pump and controller. Percentage of time electrical system is being used for the intended use.
5. Level of cleanliness of solar panels.
6. Observed evidence of routine maintenance.

Measurements of solar power provided should be taken throughout the system by measuring the solar panel open circuit voltage and short circuit current. Assuming safe operating environments, measurements should be taken at the solar panel output put and the input point to the Grundfos SQflex controller (or transfer switch if present). This will determine whether the solar panels are

performing reasonably close to design specifications and if any loss is present in the system between the solar panel output and the input to the pump controller.

The output power of the solar panel will vary over time due to cloud cover and change in angle of the sun. Data points should be collected over an appropriate time to determine the effect of these factors, and to better understand how the power delivered to the pump changes over time.

It is known that when the input power falls below a minimum the pump the pump will cease operation. This minimum should be determined, and an assessment of how often this occurs should be conducted.

An assessment of the electrical infrastructure within the community should be conducted. Typically the Grundfos SQflex system is designed for use solely to power the Grundfos pump. It should be determined if any other loads are present on the system, and if possible their power draw should be determined. If the pump is ever disconnected, the percentage of time that it is connected with adequate supply should be determined.

## **2.7 Civil Assessment**

Data collection for electrical scope will include the following:

1. Determine existing well depth and water table depth
2. Evaluate potential locations for new well

Details on the existing well will be gathered including the well depth and water table depth. It is not known if the current water source is of adequate supply or quality to be used as the water source for the community. Since this is unknown EWB-KC will collect data to be used in determining the integrity of the well and if a new well needs to be drilled or not. Since assessing underground infrastructure may be difficult without using destructive evaluation techniques, assumptions may be made by investigating what is considered an industry standard well installation for the region. This may include reaching out to local well construction companies or getting in touch with those or originally dug this well.

### 3.0 Schedule of Tasks

An baseline schedule of the above described tasks is presented below:

ID	Task Mode	Task Name	Duration	Start	Finish	Mon Nov 28		Wed Nov 30		Fri Dec 2		Sun Dec 4	
						12	12	12	12	12	12	12	12
1													
2		<b>General</b>	<b>7 days</b>	<b>Sun 11/27/16</b>	<b>Sun 12/4/16</b>	[Gantt bar from Sun 11/27/16 to Sun 12/4/16]							
3		Travel To	1 day	Sun 11/27/16	Sun 11/27/16	[Gantt bar from Sun 11/27/16 to Sun 11/27/16]							
4		Travel Home	2 days	Sat 12/3/16	Sun 12/4/16	[Gantt bar from Sat 12/3/16 to Sun 12/4/16]							
5		Water Quality Testing	2 days	Thu 12/1/16	Fri 12/2/16	[Gantt bar from Thu 12/1/16 to Fri 12/2/16]							
6		Community Interviews	5 days	Mon 11/28/16	Fri 12/2/16	[Gantt bar from Mon 11/28/16 to Fri 12/2/16]							
7													
8		<b>Structural Assessment</b>	<b>7 days</b>	<b>Sun 11/27/16</b>	<b>Sun 12/4/16</b>	[Gantt bar from Sun 11/27/16 to Sun 12/4/16]							
9		Determine seismic and wind load requirements	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
10		Detailed dimensions of existing structure	2 days	Mon 11/28/16	Tue 11/29/16	[Gantt bar from Mon 11/28/16 to Tue 11/29/16]							
11		Member sizes	2 days	Mon 11/28/16	Tue 11/29/16	[Gantt bar from Mon 11/28/16 to Tue 11/29/16]							
12		Investigate foundation	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
13		Determine existing structure load capacity	2 days	Tue 11/29/16	Wed 11/30/16	[Gantt bar from Tue 11/29/16 to Wed 11/30/16]							
14		Determine any modifications needed to structure	2 days	Tue 11/29/16	Wed 11/30/16	[Gantt bar from Tue 11/29/16 to Wed 11/30/16]							
15													
16		<b>Mechanical Assessment</b>	<b>7 days</b>	<b>Sun 11/27/16</b>	<b>Sun 12/4/16</b>	[Gantt bar from Sun 11/27/16 to Sun 12/4/16]							
17		Develop system flow diagram	3 days	Mon 11/28/16	Wed 11/30/16	[Gantt bar from Mon 11/28/16 to Wed 11/30/16]							
18		Determine current water demand	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
19		Assess water storage needs	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
20		Assess wastewater infrastructure	2 days	Mon 11/28/16	Tue 11/29/16	[Gantt bar from Mon 11/28/16 to Tue 11/29/16]							
21													
22		<b>Electrical Assessment</b>	<b>7 days</b>	<b>Sun 11/27/16</b>	<b>Sun 12/4/16</b>	[Gantt bar from Sun 11/27/16 to Sun 12/4/16]							
23		Develop system one-line	3 days	Mon 11/28/16	Wed 11/30/16	[Gantt bar from Mon 11/28/16 to Wed 11/30/16]							
24		Determine peak solar panel output power	2 days	Mon 11/28/16	Tue 11/29/16	[Gantt bar from Mon 11/28/16 to Tue 11/29/16]							
25		Determine controller output power	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
26		Determine solar panel performance	2 days	Mon 11/28/16	Tue 11/29/16	[Gantt bar from Mon 11/28/16 to Tue 11/29/16]							
27		Level of cleanliness of solar panels	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							
28		Observed evidence of routine maintenance	1 day	Mon 11/28/16	Mon 11/28/16	[Gantt bar from Mon 11/28/16 to Mon 11/28/16]							

### 4.0 Go/No Go Decision

A preliminary list has been developed which identify potential difficulties that could cause EWB-KC to discontinue the project. These include:

1. Partnership Conflicts
  - a. Conflicts with sugar cane company
  - b. Fallout between community and NGO
2. Political Conflicts
  - a. Political unrest resulting in safety concerns
  - b. Health, security, and safety concerns
  - c. Prohibitive government regulations
3. Project Conflicts
  - a. Lack of investment by the community
  - b. Project feasibility and cost

Throughout the region, all bateys are owned by sugar cane companies. These companies have had a long history of conflict among the communities in the bateys. Careful consideration has been taken for the recent history of actions taken by the sugar cane company which owns the land La Cuchilla is on. It appears that the sugar cane company should not interfere in this project, but if that changes it could be very disruptive. Little to no communication will be done directly between EWB-KC and the sugar cane company but will be directed through the community or the NGO.

Political conflicts could prove disruptive to this project by making it very difficult for EWB-KC to travel to the region or construct the project.

Project conflicts like a lack of investment by the community or project feasibility may also disrupt this project. Care will be taken to mitigate costs during the design phase while still meeting all design requirements.

If any of the above mentioned items reveal themselves as potentially disrupting this project in the future EWB-KC will address these items and make a go or no-go decision for continuing the project. EWB-KC will do everything possible to make this project successful while working within the potential conflicts within the region.



## 5.0 List of Attachments

### 5.1 Community Questionnaire

Below is a list of example questions for use during the community interviews. Interviews will all be documented for future reference.

1. Food
  - a. Describe a typical meal.
  - b. Is there enough food for everyone during all times of the year?
  - c. Is malnutrition a problem?
  - d. Where and how do people get food? (e. g. grazing, hunting, farming, brought into local market from outside the community, etc.)?
  - e. Where and how do people get water?
  - f. How many meals a day do people eat?
  - g. How does a child's diet differ from an adult?
  - h. How does a woman's diet differ from a man's?
  - i. Does this change when the woman is pregnant?
  - j. What, if any food is considered taboo?
  - k. What percentage of women breastfeed their children?
2. Sanitary:
  - a. What do people use for bathroom facilities and what is the approximate percentage of each? (Flush toilets, pit latrines, neighboring fields, other please describe? Indoor and Outdoor?)
  - b. What does your family use for bathroom facilities? (Flush toilets, pit latrines, neighboring fields, other please describe? Indoor and Outdoor?)
  - c. How do people dispose of their garbage?
  - d. What percentage of homes have bathroom facilities (either indoors or outdoors)?
  - e. Are there community bathroom facilities? How many and where are they?
  - f. Are there bathroom facilities of some sort available to all the community members? Are there community garbage dumps? If so where are they located?
3. How do you think the Partnership with EWB will benefit the community?
4. Water:
  - a. Do you get water from a distribution system?
  - b. Where do people get water (streams, springs, households, community taps, rainwater, wells, distribution system, purchased in town)?
    - i. For Drinking?
    - ii. For Cooking?
    - iii. For Bathing?

- iv. For Hand-Washing?
  - v. For Animals?
  - vi. For irrigation?
  - c. On average how far do people have to travel to get to their drinking water source?
  - d. Is there enough water during all times of the year? If not, during which season (s) is there not enough?
  - e. Is there access to water throughout the day? If not, during what hours is there limited access?
  - f. Do you think the water you and your family drink is safe?
  - g. Do you boil water before drinking?
  - h. Is your house equipped with water filtration devices?
  - i. If so, how often do you use them?
  - j. If so, how satisfied are you with them?
  - k. What are the methods of water purification in your area?
  - l. Who in the community makes the decisions regarding water distribution?
  - m. If wells are used, how many are there?
  - n. Where are the water sources located?
  - o. Would you be willing to pay for filtration devices?
5. Demographics:
- a. How many people benefit from this project?
  - b. Number of families:
  - c. Number of adult men in community/ with access to distribution system:
  - d. Number of adult women in community/ with access to distribution system:
  - e. Number of children ages: <1 year \_\_\_\_ 1-4: \_\_\_\_ 5-15: \_\_\_\_\_
  - f. Number of elders greater than 50 years:
6. Community Illness/ Injury:
- a. What are the 5 most important illnesses/injuries affecting the community?
  - b. Estimate the number/percentage w/ this problem every year?
  - c. Is this illness/injury gender specific? If so, does it affect more women or men?
  - d. What do people think is the cause of this illness it?
  - e. How is it treated? By whom? Where?
  - f. Have you experienced illness due to unclean water?
  - g. Has your family experienced illness due to unclean water?
  - h. Has a family that you know experienced illness due to unclean water?
  - i. Is there a difference between the overall health of men and women?
  - j. Is there a malaria problem?
  - k. Is there a Zika problem?
  - l. Is there a mosquito problem?
  - m. Is HIV/AIDS a problem? Is testing Available?

- n. Is tuberculosis considered a problem? Where do people go for treatment?
  - o. Is hypertension considered a problem? Where do people go for treatment?
7. Morbidity/Mortality (for health care providers):
- a. What is the average life span of women?
  - b. Total number of births in the area each year:
  - c. Total number of deaths in the area each year:
  - d. Number of children less than 1-year-old that die each year:
  - e. Number of children from 1-5 that die each year:
  - f. Total number of people in area:
  - g. Number of women who die during childbirth each year:
  - h. Most common causes of death:
  - i. Are there certain diseases that occur at specific times during the year?
8. Community Health Resources:
- a. What is the nearest health facility? Is this an in-patient facility (people spend the night) or is there an outpatient only?
  - b. Who staffs this facility? (Physician, nurse, health aide, traditional healer)
  - c. Does the health facility have constant, reliable electricity 24/7?
  - d. How do most people get to this facility?
  - e. Is cost a barrier to receiving medical treatment?
  - f. What public health programs are functioning in the community?
  - g. What types of traditional health care providers are in the community?
  - h. How many of each type are there?
  - i. Where do these traditional health care providers receive their training, and what kind of training do they receive?
  - j. What percentage of children are immunized?
  - k. Who provides the vaccines/immunizations?
  - l. Do parents pay for the vaccines?
  - m. What prevents children from being immunized? (cost/availability etc.)?
  - n. Where do people get medications?
  - o. How do they pay for medications?
9. Education/Health Education (interview with school administrator)
- a. How many students attend the school?
  - b. Number of primary students:
  - c. Number of secondary students:
  - d. Ages of students who attend the school:
  - e. Number of children not attending school:
  - f. Is the school religious, private, or public?
  - g. What is the literacy rate in the region?
  - h. Percentage of those who can read
  - i. Percentage of those who can write

- j. Percentage of those who can sign their name only
  - k. To whom does the community turn for health information/education?  
(family/village nurse/traditional healers/teachers, radio, tv)
  - l. Is there a health educator in the community?
  - m. If there are not the same person, do the health educators have a good relationship with the health care providers in the community?
10. Transportation/Communication (head of the community)
- a. Does public transportation go into the community?
  - b. What (bus, train, trucks....)?
  - c. How many households have, or have regular unlimited access to?:
    - i. Radio
    - ii. Television
    - iii. A telephone
    - iv. Access to a newspaper
    - v. A vehicle
  - d. Where is the closest medical clinic?
  - e. Where is the closest city?
  - f. What is the main method of transportation the community uses?
  - g. Are there any methods of transportation only available part of the year? If so, why?