

# Example First Project Proposal

This draft proposal represents how AguaClara Reach (ACR) would work with a new Implementation Partner (IP) to provide hydraulic designs, technical support, training, and assistance in procuring components for the IP's **first** AguaClara plant project. It is anticipated that for subsequent projects the IP will require less technical assistance from ACR.

This proposal was prepared by AguaClara Reach (hereafter referred to as "ACR") to support [INSERT IMPLEMENTATION PARTNER NAME HERE] (hereafter referred to as the "Implementation Partner" or the "IP" ) during the Preliminary Engineering, Design, Construction, Installation, Training and Commissioning phases of the development of a drinking water treatment system to treat a surface water source using AguaClara technology. Preliminary design parameters are summarized below and will be confirmed and/or refined during Phase 1 of the project. Any significant changes to these parameters could result in a change of the costs included in this proposal.

- Plant location: [INSERT HERE]
- Approximate current population to be served: [INSERT HERE]
- Approximate future population to be served: [INSERT HERE]
- Design maximum flow rate (to be verified during Phase 1): [INSERT HERE]
- Chemicals to be dosed: Coagulant and Chlorine
- Treatment processes to be included: Coagulant Addition and Mixing, Flocculation, Floc Filtration, Sedimentation, Stacked Rapid Sand Filtration, and Disinfection
- Other functionality to be included: Backwash recycling with a small pump (if required for water conservation)
- Known water quality issues to address: [INSERT HERE]
- Regulatory requirements (finished water quality and other) to be met: [INSERT HERE]
- Expected alterations from the AguaClara standard design: [INSERT HERE]

<b>Abbreviation</b>	<b>Description</b>
ACR	AguaClara Reach
APP	Agua Para el Pueblo
CAD	Computer Aided Design
IP	Implementation Partner
PER	Preliminary Engineering Report

## **Phase 1 - Preliminary Engineering**

The Preliminary Engineering Phase will provide definition to the Project’s scope, schedule, and budget, and includes the necessary technical analysis and operational input to initiate the preparation of Construction Documents during the Design Phase (Phase 2).

ACR shall provide the IP with regular schedule and progress updates during the Preliminary Engineering Phase. ACR shall provide basic design parameters and other readily available technical information requested by the IP to support with any permitting or regulatory approval processes.

### **Task 1.1 Kickoff Meeting**

The Preliminary Design phase will begin with a Project Kick-Off Meeting held between ACR, the IP, and key stakeholders. At a minimum, the Project Designer and Technical Director from ACR will attend the meeting. The IP will plan and facilitate the Kickoff Meeting.

During this meeting, lines of communication, team member responsibilities, document distribution, scope of work (goals, expectations, measurements of success) and project schedule will be discussed. Meeting minutes will be developed and distributed by IP. This meeting may be conducted virtually.

## **Task 1.2 Conditions Assessment**

If available, the IP shall provide one year of turbidity and color data from the source water. ACR recognizes that extensive sampling is often not available and thus the goal is to target sampling to minimize the risk of an unexpected treatment challenge.

If annual water quality data is not available, IP shall provide water quality analysis results for the raw water source including turbidity, pH, alkalinity, hardness, and dissolved organic carbon for a minimum of 3 samples representing high turbidity events following rainfall, baseflow conditions during the rainy season, and baseflow conditions during the dry season. Additional raw water parameters that are also currently being tested for or monitored as part of the existing facilities shall also be provided. ACR will not provide any water quality testing equipment or analysis.

ACR shall provide guidance to IP to conduct jar tests on a minimum of two samples representing low and high turbidity events.

- ACR shall provide IP with a jar test method and recommend coagulants to be tested.
- IP shall obtain water samples and chemical coagulants as required, and shall conduct the jar tests.
- IP shall provide ACR with the test results, and ACR shall analyze the results.

### **Task 1.2.a. Conditions Assessment Workshop**

ACR shall conduct a workshop to review water quality results, and confirm relevant proposed site data and integration. During this task, ACR shall assess if a site visit is needed as part of Phase 2. Meeting minutes will be developed by ACR and distributed within ten (10) business days following the workshop. This workshop may be conducted virtually.

### **Task 1.2.b. Feasibility Assessment**

ACR shall conduct a feasibility assessment based on the Project Definition and Conditions Assessment. ACR shall provide IP with a memo for review and approval in

advance of the Preliminary Engineering Report (PER) sections that will be provided by ACR. An Action Plan detailing next steps will be included in the Feasibility Assessment Memorandum.

### **Task 1.3 Preliminary Engineering Report (PER) Sections**

The IP will be responsible for providing a written draft of the PER. ACR will provide PER sections on process, hydraulics, sustainability, operational constraints, and the occupational safety and health items below.

The PER does not include the evaluation of multiple treatment alternatives with benefits and disadvantages.

ACR will be responsible for development of the following sections of the PER.

#### **Treatment Processes**

- Summary-level narrative of selected processes
- Treatment Process Design Criteria
  - Redundancy Criteria for each treatment process (whether multiple parallel units must be provided for a process so that the plant can operate with one unit offline)
  - Preliminary sizing
- Chemical System Design Criteria
- Residuals Management Alternatives

#### **Hydraulics**

- Narrative of flow through facility
- Narrative of hydraulic profile

#### **Sustainability**

- Description of sustainable design features

#### **Operational Constraints**

- Operator presence required for operation

- Description of operational constraints
  - Water shortage accommodations
  - Treatment failure accommodations
- Measures to meet the operational constraints

## **Occupational Safety and Health**

- Chemical hazards associated with chlorine and coagulant use
- Valve access and removable grate hazards

## **Attachments**

- Drawings
  - Hydraulic profile
  - Liquids and solids process flow diagrams
  - Example architectural floor plans from previous projects
  - Example floor plans and sections
- Preliminary equipment and valve List
- Cost estimates
  - Materials and supplies with basis of estimate report (co-developed with IP)
  - Operation and maintenance cost breakdown by category including chemical and equipment usage

## **Task 1.4 PER Workshops**

After the IP has reviewed ACR's PER deliverables, ACR shall conduct a workshop to review the draft sections of the PER and solicit feedback, to facilitate the review of design progress by Stakeholders, and shall respond to comments. IP may request that ACR conduct follow-up workshops necessary to review specific critical issues that are raised by Stakeholder review. ACR shall identify follow-up workshops, as necessary, to meet Project objectives and goals. Meeting minutes will be developed by ACR and distributed within ten (10) business days following the workshop. This workshop will be conducted virtually.

## **Phase 1 Assumptions**

- The IP will provide all Project Management Services including meeting preparation and facilitation.
- The IP shall establish the regulatory compliance roles and responsibilities and strategy for permit compliance at the initiation of the Preliminary Engineering Phase.
- The IP will add the PER sections provided by ACR to the PER.
- The IP will provide the Project Schedule.
- The IP will provide a site plan showing preferred location(s) of the new water treatment plant and the following:
  - The IP will provide field verification of existing conditions
  - The IP will provide a topographic survey of the project area
  - The IP will provide a plan for an access road if necessary.

## **Phase 2 - Design**

The Design Phase will provide the Construction Documents required for the Construction, Installation, Training, and Commissioning Phase.

The Design Phase will require close collaboration between IP and ACR to ensure that the design meets the site constraints, is based on the available generic materials, and addresses the water quality issues identified in Task 1.2 Conditions Assessment.

### **Task 2.1 Personnel Plan**

From the years of building AguaClara plants in Central America ACR has identified four roles that are critical for their successful implementation.

- Structural engineer
- Architect
- Construction foreman
- AguaClara technician

The IP will be responsible for providing these staff who will learn the details of AguaClara plant implementation during the design, construction, and startup phases. The construction advisor and AguaClara technician have specialized knowledge about the fabrication and operation of AguaClara plants and the most effective way to transfer that knowledge is to bring experienced staff from Agua Para el Pueblo (APP) to work with the IP for the relevant phases of the project so that they can advise the IP counterparts.

ACR and the IP will determine the best mechanism to hire APP staff and bring them to work alongside IP staff. If required the IP will provide a staff member who is fluent in Spanish to translate for the APP staff.

## **Task 2.2 Key Materials Selection and Sourcing**





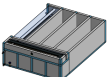

The corrugated polycarbonate sheets used for flocculator baffles and plate settlers determine the width of individual clarifier bays. The AguaClara Infrastructure Design Engine can be quickly updated with different dimensions for these sheets should that become necessary. The IP and ACR will work together to select the best source of these sheets.

ACR and IP will review the list of materials required for construction and operation and determine if, based on a conservative preliminary design, any materials need to be ordered before Phase 3 begins.

## **Task 2.3 Hydraulic and Process Design**

ACR will develop a detailed 3-D model of the hydraulic components in Onshape. ACR will base these drawings off of the required structural wall thicknesses provided by IP, as indicated in the Phase 2 Assumptions. Onshape is a cloud-based CAD environment that facilitates full parametric design and the ability to share documents and collaborate in real time. Onshape is free for open-source projects and ACR encourages the IP to consider developing expertise in using Onshape. The Onshape 3-D model can be exported and opened by other CAD programs.

The Onshape 3-D model will include a bill of materials and a cut list for materials that need to be cut to length (pipes and polycarbonate sheets). The bill of materials will include a potential supplier with their part numbers and costs. The cut list will provide the dimensions of materials that need to be cut to length as part of the hydraulic component fabrication. The Onshape model will include the following processes:

- Liquid chemical feed system for coagulant and chlorine
- Chemical stock tanks
  - Flow measurement columns
  - Constant level tanks
  - AguaClara doser 
- Entrance tank 
  - Trash rack
  - Grit removal hoppers
  - Linear flow orifice meter for plant flow rate measurement 
- Hydraulic flocculator 
  - Baffle modules for uniform velocity gradients
  - Valveless drain system
- Clarifier 
  - Inlet channel with valveless isolation of individual tanks
  - Inlet manifold and diffusers
  - Floc weir to control depth of floc filter
  - Plate settlers modules
  - Outlet manifold
  - Outlet channel with level control weir
- Stacked rapid sand (StaRS) filter 
  - Self backwashing hydraulic control system
  - 6-layer filter system



## **Task 2.4 Tool List for Fabrication**

ACR will provide a detailed tool list required for fabrication of the hydraulic components including free-standing machinery, hand tools, and pipe molding equipment. These tools will enable IP to fabricate the vast majority of the hydraulic components from generic parts.

## **Task 2.5 Replacement Parts**

ACR will provide a list of replacement parts that should be maintained for component repairs and replacements.

## **Task 2.6 Hydraulic Component Fabrication Documentation**

ACR will provide a digital fabrication manual with step-by-step instructions for the following hydraulic components.

- Entrance Tank
  - Trash racks
  - Linear flow orifice meter
- Flocculator
  - Baffle modules
- Clarifier
  - Inlet manifold
  - Plate settler support frame
  - Plate settler modules
  - Outlet manifold
- StaRS filter
  - Inlet and outlet modules
  - Siphon manifold

## **Task 2.7 Hydraulic and Process Design Calculations**

A report detailing the hydraulic and process design calculations will connect the design equations to this specific design and provide the basis of design and relevant calculations for all of the included unit processes.

## **Task 2.8 Webinars**

ACR will provide the following remote hour-long webinars for IP staff

- AguaClara: flow through the plant and treatment process overview
- Introduction to Onshape (and why ACR chose Onshape as the platform for our designs)
- AguaClara Infrastructure Design Engine: from a parts database, process physics, and geometric constraints to a 3-D model and a bill of materials

Additional webinars can be requested if needed.

## **Phase 2 Assumptions**

IP will be responsible for the following tasks.

### **Staffing**

- The IP will facilitate support with any necessary visas in preparation for Phase 3.
- The IP will provide plant operators from the start of construction through commissioning to work with the APP AguaClara technician.

### **Structural and Architectural Design, Site Constraints, and Access Road**

- The IP will provide final thickness (and possibly unit costs) of structural elements as required by the hydraulic design. These will include slabs, suspended slabs, tank walls for various water depths, and weirs. ACR will add these items to our parts database for customization of the hydraulic design for IP.
- The IP will inform ACR of any site constraints that would influence plant layout.

- The IP will design an access road and a temporary construction site building to store construction materials.
- The IP will create the structural and architectural design.
- The IP will create the required construction and fabrication drawings from the Onshape model provided by ACR. The Onshape model can either be exported for use in other CAD programs or the drawings can be created directly in Onshape.

AguaClara plants require a full building enclosure, built according to local code and structural, electrical, mechanical and other considerations appropriate to the locale. The enclosure serves to extend the life of the components and to provide a safe work environment for the plant operators. The enclosure will protect:

- the hydraulic components from direct sunlight that would degrade the plastics;
- the plant operators from adverse weather and intruders;
- the granular coagulants from rain; and
- the clarifier with a floc filter from sunlight, wind, and rain that would cause thermal/density currents and increase the clarified water turbidity.

### **Material Sourcing for Construction and Operation**

IP will prepare to source construction materials, chemicals including the coagulant and calcium hypochlorite required for plant operations, and required water quality meters (at minimum a portable turbidity meter).

## **Phase 3 - Construction, Installation, Training, Commissioning**

### **Task 3.1 Project Staffing**

There are several areas of specialized knowledge for Phase 3, as detailed in Table 26, that can most effectively be transferred to IP by experienced staff who have built AguaClara plants in Central America.

Role	Time Period	Area of Expertise
Construction advisor	Before filter foundation is poured until permanent components are complete	Construction methods for permanent treatment-related structures (weirs, hoppers, jet reverser, etc.)
AguaClara technician	Before operator training begins until 2 months after plant startup	<ul style="list-style-type: none"> <li>→ Help to set up the workshop</li> <li>→ Supervise the fabrication and installation of removable hydraulic components (plate settler modules, diffusers, filter modules, etc.)</li> <li>→ Train plant operators</li> <li>→ Supervise the plant startup</li> </ul>

**Construction Advisor**

The construction advisor will be an advisor to the IP foreman who is responsible for the work. The construction advisor will provide guidance for construction techniques, order of operations, and the details required for the civil and structural work. The construction advisor will ensure that the civil and structural work match the requirements of the permanent hydraulic components and that both match the requirements of the removable hydraulic components.

**AguaClara Technician**

The AguaClara technician will supervise fabrication of the removable hydraulic components, such as the chemical dosing system and flocculator modules. The IP must provide all tools and labor for fabrication. The time and personnel requirements for fabrication of the removable hydraulic components will depend on the size of the treatment plant designed.

The AguaClara technician will train community members to operate the AguaClara plant. If the country where the project is being implemented has a relevant water treatment plant operator certification process which the trainees have not yet completed, the IP

should arrange for them to also receive that training. The AguaClara training and the country specific certification training will ideally occur simultaneously.

ACR recommends that the IP provide a minimum of 8 operator candidates for training. The IP can select the final group of operators from the candidates to be able to provide 24/7 plant operation. In addition to the personnel who are expected to operate the plant, ACR recommends training potential operators to prepare for staff transitions and also other staff from the entity (water board or municipality for instance) that will manage the plant.

### **Task 3.2 Material Acquisition Support**

ACR will provide vendor and part numbers for hydraulic components of the plant and will review alternatives proposed by IP.

There are several specialized components (pipe molds, constant head tank for the chemical feeds, and doser system) that could either be purchased directly from specialty parts suppliers or potentially could be purchased from ACR. ACR will work with the IP to determine which approach is best.

### **Task 3.3 Operation and Maintenance Manual**

ACR will provide an Operation and Maintenance Manual in English or Spanish. Translation to any other language will be the responsibility of the Implementation Partner. The Operation and Maintenance Manual complements the training received by AguaClara certified operators, but it does not replace AguaClara operator training.

### **Task 3.4 Remote Technical Support**

In addition to the construction advisor and AguaClara technician, ACR will provide remote technical support throughout Phase 3 and for the first year of operation. The IP can invite ACR staff to relevant meetings and can contact ACR with questions that arise during the construction phase and the first year of operation.

## **Task 3.5 Webinars for Water Professionals**

ACR will provide the following remote hour-long training sessions (total of 5 hours) for water professionals

- Chemical Dosing
- Flocculation
- Floc Filters
- Plate Settlers
- Stacked Rapid Sand Filters

This training could be exclusively for the IP staff or it could be extended to include water professionals from the region. ACR also welcomes recommendations from the IP for additional relevant training topics.

## **Phase 3 Assumptions**

### **Staffing**

- The IP will identify individuals to be trained as construction foreman and AguaClara technician so that IP has these capabilities in-house for future projects.
- The IP plant operators will be responsible for plant operation as soon as the plant begins operating. This includes during the initial startup and commissioning.

### **Transport to site**

- The IP will provide transport to the worksite for APP staff.

### **Material acquisition**

- The IP will be responsible for acquiring materials for both the civil work and for the hydraulic components.
- The IP will be responsible for acquiring the tools as detailed in Task 2.4 Tool List for Fabrication.
- The IP is responsible for all freight, customs and duty charges.

## **Fabrication Workshop**

The IP will provide an enclosed space where the tools (see Task 2.4 Tool List for Fabrication) can be set up and the hydraulic components can be fabricated. The workshop can either be adjoining the plant construction site or it can be at a more convenient location for electricity and for the workers. The workshop will be used to assemble hydraulic components including flocculator baffle modules, settler modules, manifolds, and filter piping. The workshop should have dimensions of at least 12 m x 5 m and will require electricity and lighting.

## **Access Road**

The IP shall provide an access road to facilitate construction and operation of the treatment plant.

## **Electricity**

The IP is responsible for electricity supply during construction and for minor ancillary power requirements during normal plant operation.

Construction activities require electricity for:

- power tools
- lighting
- charging batteries

Although AguaClara plants can be operated off-grid there are several critical power requirements for operation:

- Lighting for nighttime operations
- Charging station for cell phones
- Backwash recycle (option that ACR recommends if there are water shortages in the dry season).

The electricity needs for operation could be met by connecting the plant to the electrical grid or by adding solar panels to the roof. IP is responsible for selecting and installing the best option.

The IP is responsible for provision of emergency lighting during power failures.