



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
91-5420 Kapolei Parkway,
Kapolei, HI. 96707

SCOPE OF SERVICES

FOR
FURNISHING LABOR AND MATERIALS FOR

Puukapu Non-Potable Water System Operation and Maintenance Services

KAMUELA, SOUTH KOHALA, ISLAND OF HAWAII, HAWAII

T.M.K. (3) 6-4-35, 36, 37, 38

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Puukapu Non-Potable Water System Operation and Maintenance Services
Kamuela, South Kohala, Island of Hawaii

Background

The Puukapu Non-Potable Water System is a “non-DWS standard” system which provides non-potable water service to the Puukapu Pastoral Lots (PPL) designated 184 parcels. Copies of the Water Master Plan, approved by the County of Hawaii, Department of Water Supply (DWS), and the Operation & Maintenance (O&M) Manual for the PPL water system are available for reference from the State of Hawaii, Department of Hawaiian Home Lands (DHHL).

The PPL Water System is connected to the County DWS’ system via a 4-inch master meter at the western end. The PPL Water System has two booster pump facilities to deliver water to service storage tanks. Pump Station No. 1 is equipped with conventional electrically powered motors and pumps. Due to its remoteness to available electrical power, Pump Station No. 2 is equipped with a solar powered pump and a diesel generated powered pump.

The PPL Water System is designated to provide each of the 184 parcels with the DWS standard average daily flow of 400 gallons-per-day (gpd) for a standard single-family service via a 5/8-inch sub-meter that will be issued to each lessee by DHHL. Maximum daily flow is limited to 600 gpd per parcel. Lessees will be required to sign a separate agreement for the sub-meter and signage at the time of issuance. Signage will indicate that water is non-potable and is not suitable for human consumption.

A backflow prevention device shall be installed after the sub-meter. Some parcels serviced by the PPL Water System (identified in the Water Master Plan) require an “Elevation Agreement” because the water pressure delivered to the subject parcel is below the DWS standard 40 pounds per square inch (psi) due to an elevation constraint of the service tank. These parcels may require installation of individual booster pumps. Other parcels with water pressures above 150 psi, may require installation of pressure regulating valves. The Contractor will be required to purchase and install these individual facilities. The lessee will be required to maintain these individual facilities for their parcel to provide the water pressure they desire.

Fire protection for the PPL is proved by “static” fire tanks that have been located during the design of the system and reviewed/approved by the County Fire Department for strategic location and accessibility. Standpipes at each fire tank facility provides for connection to fire fighting vehicles.

The PPL Water System also includes a new spigot at Tank Site #1 to provide limited potable water to homeowners. Access to obtain water from the spigot will be controlled by a lock system. A separate water meter will be installed for the spigot. DHHL plans to limit the total potable water consumption for the spigot to 600 gallons per day, to be shared amongst the lessees.

Scope of Services

The Contractor shall operate and maintain the water system facilities to assure the continuous operation of the Puukapu Pastoral Lots Water System. Such facilities shall be capable of adjustments to function from initial start-up of the system to the planned ultimate build-out of the Puukapu Lots (184 single family services). At the start of the operation and maintenance (“O&M”) services, the Contractor shall document that all signage pertaining to the non-potable water system has been installed at all of the water system facilities.

Rules and regulations for the PPL Water System, such as, but not limited to, billing rates and structure, meter purchase, and distribution as they pertain to existing Administrative Rules or laws of the State of Hawaii, DHHL and other government agencies, and the Hawaiian Homes Commission Act, are still being promulgated.

Consequently, the Contractor shall provide consulting services, as part of this contract, by advising DHHL during the formulation of draft rules and regulations for the PPL Water System that DHHL can adopt which take into account the nature of the system; it being “non-DWS Standard,” unique requirements identified by DHHL; such as input from the community deemed appropriate for implementation, and attempts to maximize the economic efficiency of its O&M and compliance with applicable State and Federal laws.

The Contractor shall perform complete operation, maintenance, and repair services including inspections and emergency calls for all pumps, reservoirs, distribution water lines, telemetry systems, equipment, and other appurtenances included under the contract, in accordance with the manufacturer’s specifications and recommended time intervals.

If the manufacturer does not provide these O&M specifications, the Contractor shall contact the Contract Administrator or its designated representative and provide recommendations regarding the maintenance and repair of the specific equipment or system. Such service shall include regularly scheduled operation and maintenance tasks and inspections and any repairs required for each listed herein.

The maintenance and repair tasks and inspection shall consist of the furnishing of all labor, equipment, parts, materials, and tools necessary to perform a thorough servicing and complete repair of all integral parts, lubricating, adjusting, and touch up painting where needed to keep the units in, or return to, a continuous operating condition. Maintenance of the system shall also include all activities such as routine flushing and water leak repair to insure efficient delivery of water. Any and all posted signage pertaining to the non-potable water system shall also be included in the inspection, maintenance, and repair tasks. All services performed will be subjected to inspection and approval by the Department of Hawaiian Home Lands (DHHL) prior to start of work.

The Contractor shall be responsible for all tools and labor needed to perform the operation and maintenance services. DHHL will reimburse the Contractor for parts and supplies on a cost plus 10% basis. This is under normal operations and maintenance and includes all appurtenances. The Contractor shall submit invoice copies with reimbursement request. Reimbursement request will not be accepted without invoice copies.

The Contractor will not be responsible for the cost of repairs due to flagrant vandalism, fire, storm, or related damages that can be attributed to causes beyond his control such as acts of God; acts of a public enemy; acts of the State and any other governmental body in its sovereign or contractual capacity as described under General Condition Section 13 item d. However, the Contractor shall be responsible for such repairs at no cost to the State, if the damages are caused by the Contractor's failure to properly maintain and service the systems and equipment.

The Contractor shall be responsible to provide and maintain a communication system to notify their maintenance personnel in the event of an emergency at the pump stations.

The Contractor shall also be responsible for all extraordinary incidents above the normal operation and maintenance including emergency call-outs and equipment breakdowns. The Contractor shall provide the Contract Administrator or its designated representative with following:

1. Cost estimates, if repairs can be made with in-house labor and materials. The Contractor will submit cost estimates to the Contract Administrator or its designated representative for approval prior to starting work. Labor charges will be based on the rates for the applicable time situations listed on a current Wage Rate Schedule Bulletin published by the Department of Labor and Industrial Relations. The current Wage Rate Schedule Bulletin is included in this IFB under the section titled Reference Information for Bidding and Construction. The current wage rate bulletin and new bulletins can be obtained at www.hawaii.gov/labor. All material and equipment required shall be on a cost plus 10% basis. The Contractor shall submit invoice copies with reimbursement request. Reimbursement request will not be acceptable without invoice copies.
2. If the Contractor requires using sub-contractors, in addition to in-house labor, or is more economically feasible (reduce down-time of system or special equipment or personnel to repair) to utilize outside sub-contractors, the Contractor shall be responsible to obtain quotations from sub-contractors and submit to the Contract Administrator for review. Charges for work performed by the sub-contractor will be for only the dollar amount quoted. The Contractor shall submit invoice copies with reimbursement request. Reimbursement request will not be accepted without invoice copies.

Such services require the approval of the contract Administrator or its designated representative prior to commencement of work.

All normal operations performed by the Contractor shall include, but not be limited to the following applicable listed items:

1. Familiarization of Water System Startup

The purpose for this requirement is to ensure that the Contractor is able to startup the system in the event of a power outage, equipment breakdown, and flooding for which the Contractor shall be responsible and accountable.

The Contractor shall:

- 1) Operate the entire water system. A DHHL representative shall be present at times to observe the Contractor's operation of the system. The Contractor shall address any comments or concerns from the DHHL representative. The Contractor shall also provide instructions on operating the system to the DHHL representative.
- 2) Maintain a regular maintenance log for record keeping of essential equipment needed to operate the system such as operating hours of pumps, water level indicators, and alarm systems. Contractor shall submit format of logbook and determination of essential equipment to DHHL for approval.

2. Operation and Maintenance of the Water System

A. Backflow prevention Assembly

1. Annually
 - a. Inspect and test the backflow prevention assemblies, including the backflow prevention assembly installed after the DWS 4" master meter, the backflow prevention assembly installed after the 5/8" meter for the spigot in Tank Site no. 1, and the backflow prevention assemblies installed at the individual lots.
 - b. Repair the backflow prevention assembly as required per manufacturer's recommendations in accordance with DWS standards and typical industry practices, to assure that the backflow prevention assembly functions as intended to protect integrity of the DWS water system.

2. Purchase and install new backflow prevention assemblies as authorized by DHHL representative. The Contractor shall submit invoice copies for reimbursement requests. Reimbursement request will not be accepted without invoice copies.

B. Pump Systems

1. Twice weekly
 - a. Inspect, adjust, repair, and or replace if necessary, after receiving approval from DHHL, all pump systems.
 - b. Inspect, adjust, repair, and or replace if necessary, after receiving approval from DHHL, flow metering and totalizer system.
 - c. Check, adjust, and repair if necessary, after receiving approval from DHHL, pumps for vibration, noise and proper operation.
2. Monthly
 - a. Check, adjust, repair, and or replace if necessary, after receiving approval from DHHL, automatic pump control valves for proper operation.
 - b. Check seals on all pumps for leakage and adjust, repair, and or replace as required.
 - c. Check for proper alignment of motor/pump coupling and adjust, repair, and or replace if necessary, after receiving approval from DHHL.
 - d. Check pump bearings for abnormal temperature and replace if necessary, after receiving approval from DHHL.
 - e. Lubricate motor and pump bearings per manufacturer's recommendations.
 - f. Check mounting bolts for tightness and tighten per manufacturer's recommendations.
 - g. Clean motor started contacts and replace if necessary.

- h. Test, check, and maintain the alarm system that notifies maintenance personnel of an emergency at the pump stations.
- i. Clean solar array and conduct diagnostic testing of solar inverter per manufacturer's recommendations.

3. Quarterly

- a. Check and adjust automatic pump control system (tank to sequence switch assembly) for start/stop signal and repair if necessary, after receiving approval from DHHL.
- b. Check and adjust reservoir level indicator assembly for proper operation and level readings.
- c. Inspect all sensors, gauges, monitors, control devices, and telemetry system and adjust through field calibration if necessary, for proper operation.

4. Semi-Annually

- a. Clean strainer.
- b. Check all valves for proper operation, tighten and repair or replace if necessary, after receiving approval from DHHL.
- c. Thoroughly clean out all dust and dirt from inside of electrical panels and starters.

5. Annually

- a. Scrape and sand bare metal and paint all rusted areas, pumps, solar array, and supporting struts for preventive maintenance.
- b. Inspect condition of wiring and conduit from motor to starter and repair or replace if necessary, after receiving approval from DHHL.
- c. Open, inspect, clean, and test pressure regulating and automatic control valves for proper operation and pressure setting.

- d. Inspect motor and submit report and recommendations to the DHHL in writing.
6. Other
- a. Investigate feasibility of replacing pump at Tank Site No.1 with variable speed pump including benefit/cost analysis and cost estimate.
 - b. Pump report findings to DHHL for evaluation in pursuing funding for pump replacement if power costs (to DHHL) warrant such.
 - c. Include salvage, reuse, or sale or exchange of existing pump in the analysis.

C. Distribution System

1. Weekly

Inspect all non-potable water signs for wear and/or discoloration and repaint per original color pattern as needed or if requested by DHHL. Replace any missing signs.

2. Monthly

- a. Inspect, report, and repair if necessary, after receiving approval from DHHL, surface areas above system pipelines for signs of roadway failure, soft spots, or leakage.
- b. Test and maintain Emergency-pumping equipment for proper operation.

3. Bi-Monthly (Every Two Months)

- a. Inspect conditions of water meters and meter boxes, note signs of leakage, damage or tampering; repair or replace meters after receiving approval by DHHL.
- b. Submit report of pump site log activities to the DHHL West Hawaii District Office.
- c. Inspect pressure-reducing station for proper orientation; adjust as needed to maintain downstream pressure.

4. Semi-Annually (Twice a Year)

- a. Check, exercise and adjust all valves for proper operation and tightness; repair or replace, if necessary, after receiving approval from DHHL.
- b. Flush water mainlines as required, after repair of line breaks and after major components are replaced.
- c. Flush inter-connection manifold system.
- d. Utility poles for power or telemetry system. Notify DHHL if repairs or replacement are warranted

5. Annually

- a. Inspect fire tanks, valves, and other exposed plumbing for preventive maintenance.
- b. Inspect valve markers, for rust or deteriorated paint, and repaint per original color pattern as needed or if requested by DHHL.

D. Water Storage System

1. Twice weekly

- a. Check tank water levels and record tank level in log book.
- b. Check tank and booster pump system for vandalism.
- c. Report any vandalism to the appropriate jurisdictions.
- d. Repair breaches or damages to perimeter fence within 24 hours.

2. Weekly

Check fire tank levels and record tank level in log book.

3. Quarterly

- a. Check storage system for the following, and repair if necessary, after receiving approval from DHHL:
 - i. Water storage tanks for leaks.
 - ii. Damaged vent screens.
 - iii. Lock on entry port.
 - iv. Safety condition of ladder.
 - v. Water level mechanism.
 - vi. Operating overflow check valve.
 - vii. Conditions of exterior tank surface coating.
- b. Send quarterly reports to the West Hawaii District Office.

4. Tri-Annually (Every Three Years)

Inspect, repair and paint tanks and ladders as dictated by inspection or if requested by DHHL.

E. General Site Maintenance

1. Cut brush and weeds and remove all rubbish within fence line of booster pump and storage tank sites.
2. Cut and remove brush and weeds within fence of fire tank sites.
3. Apply herbicide to access road and tank perimeter road, and a 2-foot wide strip around the solar array at Tank Site #2, every four months.
4. Fire Tanks Only – inspect stand pipes and stand pipe bollards, for rust or deteriorated paint, and repair per original color as needed or if requested by DHHL.
5. Address unforeseen equipment failures and other related water facility needs, and unforeseen operation and maintenance issues and concerns, authorized by DHHL.

F. Meters and Billings

1. Bi-Monthly

- a. Read all distribution system meters and calculate customer usage using handheld meter reading computer to be provided by the Contractor. Meters shall be read every two (2) months indicating the days of service provided which may vary from 59 to 61 days.
- b. Forward copies of reports and water billing to DHHL West Hawaii District Office or other DHHL office as directed.

2. Purchase and install new meters in existing boxes and de-activate existing meters as authorized by DHHL representative. The Contractor shall submit invoice copies for reimbursement requests. Reimbursement request will not be accepted without invoice copies. Clean and refurbish deactivated meters and store for reuse. Return unused meters to DHHL at the end of the contract.

G. Emergency Repairs and Call-outs

Repair to equipment and appurtenances other than routine servicing described shall be performed as described under Scope of Services. Contractor shall respond to an emergency or a break in service within 60 minutes of notification.

H. Emergency Response Plan

The Contractor shall prepare and submit their Emergency Response Plan (ERP) to DHHL for review and approval. The ERP shall have names and contact phone numbers of personnel responsible for the operation and maintenance of the Puukapu Non-Potable Water System.

I. Specified Equipment

1. 5/8" Water Meters at Individual Lots

- a. Magnetic drive, sealed register, positive displacement oscillating and nutation type. Badger M25, Hersey Model 430 Series IIs and Neptune T10 meters are approved for this contract.

- b. Size must conform the American Water Works Standard C-700 or C-701 Class I as most recently revised.
- c. Size must conform to American Water Works Standard C-700 or C-701 Class I as most recently revised. Laying length shall be 7 ½” threaded.
- d. All meters shall have a non-corrosive Water Works bronze (minimum 75% copper content) outer case with a separate measuring chamber which can be easily removed from the case. All meters shall have a cast on them, in raised characters, the size and direction of water flow through the meter. Bronze bottoms shall be provided on the 5/8” meters. The manufacturer’s serial number must be permanently affixed to read from the inlet side cover hinge on outlet side of meter side.
- e. All external bolts and washers shall be of corrosion resistant material and be easily removed from the maincase. All threaded maincase bolt holes must be covered, to aid in removal of the bolts for repair.
- f. The register must be of the straight reading type with a large red test or sweep hand and shall include a low flow indicator on the dial face. The number wheel assembly shall be located at the bottom of the dial face with reading obtained from left to right. Registration shall be in U.S. gallons. All reduction gearing shall be contained in a permanently hermetically sealed, tamperproof enclosure made from a stainless steel material, covered with a heat tempered glass lens. The register boxes and lid may be plastic.

The register shall be secured to the maincase by means of a locking device located in the interior of the meter so the register cannot be removed externally by non-Utility personnel or of equal security. An external register box assembly is not acceptable. The register must be covered so as to protect the register by a lid constructed of a copper based alloy or a suitable synthetic polymer.

- g. The measuring chamber shall be of Water Works bronze (minimum 85% copper content) or a suitable synthetic polymer and shall not be cast as part of the maincase. All assemblies shall be interchangeable in all measuring chamber assemblies of the same size. The measuring chamber shall be held in place without the use of fasteners.

- h. The motion of the measuring chamber will be transmitted to the sealed register through the use of a direct magnetic drive without any intermediate coupling.
- i. All meters must be provided with a corrosion resistant strainer which is easily removable from the meter without the meter itself being disconnected from the pipeline.
- j. Meters shall conform to current AWWA C-700 or C-701 Class I, current revision, test flows, head loss, and accuracy standards.
- k. Meters shall operate up to a working pressure of 150 pounds per square inch (psi), without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure due to possible distortion. Accuracy shall not be affected by variations in pressure up to 150 psi.
- l. In evaluating bid submittal, warranty coverage will be considered. All bidders are required to submit their most current nationally published warranty statements for water meters maincases, registers, and measuring chambers.
- m. A statistically controlled sample of each meter shipment will be tested by the utility to insure each shipment meets the utility performance and materials specifications.
- n. Meter operational performance with respect to head loss, nutation, oscillation, and accuracy standards shall be evaluated for meter selection. Attach manufacturer's standard flow curves with head loss and percent registered accuracy.

2. Backflow Prevention Assemblies

- a. At Master Meter – 2” Reduced Pressure Zone Backflow Preventer, with Ball valve shut-offs and bronze strainer, Watts Series 909QT or approved equal.
- b. Spigot at Tank Site #1 and at Individual Lots – 1” Reduced Pressure Zone Backflow Preventer, with Ball valve shut-offs and bronze strainer, Watts Series 909QT or approved equal.

3. Pressure Regulating Valves at Individual Lots – 1” Water Pressure Regulating Valve with integral strainer, Watts Series LF25AUB-Z3 (Lead Free).

**DEPARTMENT OF HAWAIIAN HOME LANDS
PUUKAPU PASTORAL LOTS WATER SYSTEM**

**OPERATION & MAINTENANCE
MANUAL**

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APPENDICES

I. EMERGENCY ALERT / RESPONSE

A. Emergency Response and Phone Numbers

The Water System Operator (WSO) shall designate a person who will be responsible to respond to the emergency call and represent the WSO on the site until released of that duty. DHHL will directly contract the WSO.

The WSO shall complete Emergency Conditions and Action listing noted list below.

WSO 1st Point of contact:	(WSO to provide info)	Office	
		Home	
		Pager	
		Cellular	
WSO 2nd Point-of-contact:	(WSO to provide info)	Home	
		Pager	
		Cellular	
Owners Representative:	Dept. of Hawaiian Home Lands	Office	<u>887-6053</u>
	West Hawaii District Office	Cellular	<u>938-1785</u>
	James Dupont		
Other Emergency Entities:			
Police	Waimea		<u>911</u>
Fire	Waimea		<u>911</u>
Civil Defense	Hilo		<u>935-0031</u>
Dept. of Health	Honolulu		<u>586-4444</u>
Dept. of Water Supply	Emergency		
HELCO	Emergency		

B. Emergency Situations

1. Hurricane

- a) Upon notice of hurricane alert, check system to maximize reservoir levels.
- b) Secure all facilities and grounds of objects, doors, screen, and hatches.
- c) Check emergency generator for fuel and oil levels.
- d) If hurricane is going to hit island and affect the water system, shut down system and disengage all electrical switches.
- e) After hurricane clears area, identify damage and activate system if possible. Notify DHHL of any damage found and estimated cost for repair.

2. Earthquake

- a) Review system and trouble shoot each area from reservoirs, boosters, and pipelines.
- b) If a problem is found, identify and take appropriate action. Use above procedures for review or action.
- c) Notify DHHL any damage found and estimated cost of repair.

3. Fire

- a) Notify Fire Dept. (911) of fire and location.
- b) If structural fire, terminate electrical power to structure if possible.
- c) Insure access to fire is open and clear for the fire department or other authorities.
- d) If brush fire, identify water sources for the fire department's use.
- e) Contact DHHL of fire and details. Assist fire fighters with water connections and information. Await DHHL to come to site and then assist DHHL in coordination with authorities.
- f) Once fire is extinguished, access damage and costs. Identify if system can be operated. Notify DHHL of damage, costs, and other affects on the system.

4. Volcano – Lava Flow

- a) Once Upon notice of lava flow that could endanger water system, check system to maximize reservoir levels.
- b) Secure all facilities, doors, screens, and hatches and remove all equipment, records, and tools in path of lava.
- c) Check emergency generator for fuel and oil levels.
- d) Shut down system, isolation valves, and disengage all electrical switches.

- e) After danger clears area, identify damage and activate system if possible. Notify DHHL of any damage found and estimated cost for repair.

5. Vandalism

- a) Notify police of damage and insure police have access to site.
- b) Determine vandalism effect on system and what must be done to protect the system.
- c) Notify DHHL of damage and actions.
- d) With police information, determine how access was achieved and make recommendations to deter future vandalism.

6. Power Outage

- a) Check each reservoir to determine water levels for available supplies.
- b) Contact HELCO to determine problem and possible length of time power will be out.
- c) If power is HELCO problem then and power will be down for more than 8 hours, contact DHHL and notify of known data.
- d) If power is not HELCO caused, then trouble shoot power loss through out system and locate areas affected. Contact electrical contractor to respond to problem and provide known data.
- e) Use emergency generator if needed by moving up system and pumping water from reservoir to reservoir. Notify DHHL of estimated costs to do so before activating program.

7. Water System Malfunction

- a) **Booster Pump**
 - 1) Switch to other booster pump.
 - 2) Determine system water supply capacity and determine possible length of outage. If for any duration of more than 8 hours, consider moving a generator to site and activate pump.
 - 3) Determine rationing plan for water in system and maximize system capacity. Notify DHHL of plan and get input on effect.
 - 4) If damage to equipment, shut down and make repairs.
 - 5) If equipment failing, review data and contact supplier with data for determination of cause and appropriate action.

b) Reservoirs

- 1) If leak, determine location if possible and propose plan for repair. If leak is at bottom of reservoir, determine schedule of repair and if alternate routing can be made. Determine rationing plan for water in system and maximize system capacity.
- 2) Make repairs and activate system.

c) Water Mains

- 1) Identify leak or area of leak.
- 2) Shut down system if leak area cannot be by-passed.
- 3) If leak cannot be by-passed, secure valves above and below the leak.
- 4) Contact a licensed contractor to repair the leak. Determine estimated cost for repair.
- 5) Notify DHHL of problem and cost and notify users of rationing of water as needed.
- 6) Insure leak repairs are made according to standards of original system. Insure water is flushed from line before putting back into service. Check turbidity in system above leak area after put into service.

II. WATER SYSTEM DESCRIPTION:

A. Storage System

1. Non-Potable Water

- a) Tank #1
 - 1) Location - TMK# 6-4-38:06
 - 2) Size capacity - 11,600 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #1204LSTP)
 - 4) Spillway Elevation = 2,841'
 - 5) Ground Elevation = 2,827'
- b) Tank #2
 - 1) Location - Located at TMK# 6-4-36:01
 - 2) Size capacity - 58,800 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #2704LSTP)
 - 4) Spillway Elevation = 3,258'
 - 5) Ground Elevation = 3,244'
- c) Tank #3
 - 1) Location - TMK# 6-4-36:24
 - 2) Size capacity - 72,600 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #3004LSTP)
 - 4) Spillway Elevation = 3,602'
 - 5) Ground Elevation 3,588'

2. Fire Protection Water

- a) Fire Tank #1
 - 1) Location - TMK# 6-4-35:99
 - 2) Size capacity - 19,400 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #1803LSTP)
 - 4) Spillway Elevation 3,048'
 - 5) Ground Elevation 3,038'
- b) Fire Tank #2
 - 1) Location - TMK# 6-4-35:66
 - 2) Size capacity - 19,400 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #1803LSTP)
 - 4) Spillway Elevation = 3,493'
 - 5) Ground Elevation 3,483'
- c) Fire Tank #3
 - 1) Location - TMK# 6-4-36:71
 - 2) Size capacity - 19,400 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #1803LSTP)
 - 4) Spillway Elevation = 3,414'
 - 5) Ground Elevation = 3,404'
- d) Fire Tank #4
 - 1) Location - TMK# 6-4-35:87
 - 2) Size capacity - 19,400 Gallons
 - 3) Make - Galvanized Steel Tank (SCAFCO Model #1803LSTP)
 - 4) Spillway Elevation = 3,192'

- 5) Ground Elevation 3,182'
- e) Existing Dip Tank
 - 1) Location – TMK: 6-4-36:01
 - 2) Size capacity - 7,200 Gallons
 - 3) Make- Open Top Steel Tank

B. Control Systems

1. Tank #1 Facility

- a) Inflow: 2 ½" Cla-Val Model #210-01 Altitude Control Valve with anti-cavitation trim
- b) Outflow: Telemetry Controlled Booster Pump System; 125gpm booster pump with 125 gpm back up pump; Pumps up to 417' of head

2. Tank #2 Facility

- a) Inflow: 6" Gate Valve
- b) Outflow: Telemetry Controlled Booster Pump System; 20gpm Solar Powered Booster Pump; 50 gpm Diesel Back-up pump

3. Tank #3 Facility

- a) Inflow/Outflow: 6" Gate Valve, Telemetry Controlled Pressure Level Indicator

4. Fire Tanks

- a) Inflow: 6" or 3" Gate Valves and 2" Backflow Preventer
- b) Outflow: 2 ½" Standpipe for fire department pump trucks

5. Existing Dip Tank

- a) Inflow: Gate Valve and 2" Backflow Preventer
- b) Outflow: Open Top for Fire Control Helicopter Bucket

6. Telemetry:

- a) Tank levels are transmitted between Tank Site Nos. 1, 2, and 3 via a wireless frequency-hopping spectrum technology. The tank level signals are used to control the respective booster pumps.

C. Tank Site Power:

1. Solar Power:

- a) Telemetry (Tank Site Nos. 2 & 3): A stand-alone 24Vdc power system designed to support wireless applications in remote locations. The batteries provide power during darkness or low light conditions.
- b) Packaged Duplex Booster Pump (Tank Site No. 2): A stand-alone solar pumping system designed to run 230Vac three phase motors directly from a solar array without the use of batteries. The speed of the motor is adjusted in proportion to the available sunlight to allow the pump to continue operating under varying sunlight conditions.

2. Utility Power (Tank Site No. 1):

An overhead 208V/120Vac three phase HELCO service drop provides power for the duplex booster pumps and the local stand-alone telemetering system.

D. Booster Pump Operation:

1. Tank Site #1

- a) Skid mounted duplex inline vertical multistage turbine booster pumps. Each pump is rated at 125 gpm @ 560 feet. Tank level transmitter at Tank Site #2 initiates primary pump start/stop. Manual override and primary-standby selector switch provided on booster pump control panel. Booster pump shall shut down on low suction tank level at Tank Site #1.

2. Tank Site #2

- a) Diesel driven horizontal regenerative turbine booster pump. Pump rated at 50 gpm @ 370 feet. Key switch allows manual start/stop control. A retrofit unit may be available to automatically start and stop the diesel pump.
- b) Photovoltaic powered inline vertical multistage turbine booster pump. Pump rated at 20 gpm @ 370 feet. Pump automatically operates when photovoltaic panels convert sunlight into power for the pump. Manual override to shut down pump when not required.

3. Individual Lots

- a) Hydro-pneumatic Tank system (Typical)
 - 1) 86 gallon pressure tank
 - 2) 1 Hp motor and pump
 - 3) System sized for 23 to 25 gpm performance at a pressure range of 40 to 60 psi
 - 4) Electrical voltage to be single phase 115v or 230v.
 - 4) Cost Allowance \$2,000.00
 - 5) Each lot that requires a hydro-pneumatic system shall be analyzed to determine if the above system fits their needs.
- b) Power
 - 1) Due to the non-availability of electrical power, the lessee shall determine how the hydro-pneumatic system shall be powered.

E. Transmission/distribution System Appurtenances

1. Mid-line Blow-off Cleanouts (5 total), located at:

- a) Waterline I – Sta. 15+71
- b) Waterline I – Sta. 28+34
- c) Waterline K – Sta. 2+60
- d) Waterline L – Sta. 49+28
- e) Waterline M – Sta. 14+00

2. 5' Diameter Drain Sump with Tideflex valve (8 total), located at:

- a) Waterline I – Sta. 15+71
- b) Waterline I – Sta. 28+34
- c) Waterline K – Sta. 2+60
- d) Waterline L – Sta. 49+28
- e) Waterline M – Sta. 14+00
- f) Tank #1 – Cleanout Line
- g) Tank #2 – Cleanout Line
- h) Tank #3 – Cleanout Line

3. Air Relief Valves (34 total), located at:

- a) Waterline A – Sta. 7+70, 15+78, 21+29, 26+06, 74+85
- b) Waterline B – Sta. 3+00, 9+50, 16+45
- c) Waterline C – Sta. 8+36, 21+11, 38+88, 170+58,
- d) Waterline D – Sta. 8+54, 21+34
- e) Waterline E – Sta. 7+59
- f) Waterline F – Sta. 14+13
- g) Waterline G – Sta. 15+38, 44+50
- h) Waterline H – Sta. 6+79, 21+76
- i) Waterline I – Sta. 4+27, 22+85, 29+85
- j) Waterline J – Sta. 8+70
- k) Waterline K – Sta. 11+69
- l) Waterline L – Sta. 7+28, 18+64, 24+70, 40+79, 47+15, 52+67
- m) Waterline M – Sta. 7+33, 23+83.30, 40+86.84

4. Caps tapped for 2 ½ I.P.T. with 2 ½" Cleanout (7 total), located at:

- i) Waterline A – Sta. 77+90
- j) Waterline D – Sta. 28+66
- k) Waterline E – Sta. 23+41
- l) Waterline F – Sta. 47+00
- m) Waterline G – Sta. 120+28
- n) Waterline H – Sta. 33+40
- o) Waterline K – Sta. 17+32

5. Spigot at Tank Site #1 for Potable Water

- a) **1" Brass threadless hose bibb**

6. Backflow Prevention Assemblies

a) At Master Meter

- (1) 2" Reduced Pressure Zone Backflow Preventer, with Ball valve shut offs and bronze strainer, Watts Series 909QT or approved equal.**

b) Spigot at Tank Site #1 and at Individual Lots

- (2) 1" Reduced Pressure Zone Backflow Preventer, with Ball valve shut offs and bronze strainer, Watts Series 909QT or approved equal.**

7. Water Meters at Individual Lots

- a) 5/8" Magnetic drive, sealed register, positive displacement, oscillating and nutation type meters. Badger M25, Hersey Model 430 Series IIS and Neptune T10 meters are approved for this contract.**

8. Pressure Regulating Valves at Individual Lots

- a) 1" Water Pressure regulating valve with integral strainer, Watts Series LF25AUB-Z3 (Lead Free)**

III. NORMAL OPERATIONS AND EMERGENCY RESPONSE

A. Plan of Operation

1. Source and point-of-connection – The Dept. of Water Supply, Waimea System serves the local community from the 4.0 Million Gallon Clearwater Reservoir in Waimea. The present sources which provide water are the Surface Water Treatment Plant, Parker Ranch Well No.1, and the Waimea Well. The Puukapu Pastoral Lots Water System (See **APPENDIX B – Water System Plans**) will be fed from the Hawaii County Department Water Supply system via a 4-inch Master Meter located at Tank #1 site.
2. Tank #1 Facility - The flow into Tank #1 will be controlled by an altitude valve set by a pressure transmitter initially set by the manufacturer's representative. Water is then transmitted from Tank #1 to Tank #2 through 20,000 linear feet of 6-inch HDPE pipe line via a 125 gpm booster pump. This pipe line serves both as transmission to Tank #2 and distribution to services along the way as well as filling Fire Tank #1. There is an additional 8,800 linear feet of 3-inch HDPE pipe connected to the main for distribution of services.
3. Tank #2 Facility - Tank #2 is located near the existing non-potable "Hui" tank and is controlled by a telemetry system located on-site that communicates with the 125 gpm booster pump at Tank #1 site.

Also located at the Tank #2 site is booster pump system to feed Tank #3. The system consists of a 20 gpm solar powered pump which is intended to utilize sun's "natural energy" to fill Tank #3 during the day. When atmospheric conditions hinder the solar powered pump performance or when demand exceeds the 20 gpm capacity, a 50 gpm diesel pump (which must be manually turned on and off) is available to boost water to Tank #3. A retrofit unit may be available to automatically start and stop the diesel pump. The 6-inch HDPE pipe from these booster pumps will provide transmission/distribution for the Tank #3 service area.

4. Tank #3 Facility – The booster pump system at Tank #2 is activated by an on-site telemetry system. The distribution system (42,000 linear feet HDPE pipe, diameters varying from 6-inch to 3-inch) from Tank #3 also feeds Fire Tanks #2, #3, and #4.

5. Fire Protection Operation - Operation of the 19,600 gallon Fire Tank Dead Storage will be managed by the County Fire Department. Upon need, a Fire Department pump truck will attach its hoses to the 2 ½" stand-pipe and prepare to drain the non-potable water. Prior to switching on the on-board pump the valve opening the tank to be filled by the Puukapu Water System will be opened. After pump truck is full, valve is to remain open until tank level indicator shows the tank is full.

The existing 7,200 gallon dip tank operation will be managed by Puukapu Water System operator on demand by the County Fire Department. Should the request for the Fire Department's Helicopter be placed with the system operator, the operator will open the valve and fill the tank using the clear acrylic standpipe as a level indicator. Maintenance of the tank will be the responsibility of the water system operator.

6. Routine Maintenance of Transmission/distribution System - Blow-off and Dead-end lines should be bled at a frequency required to keep the dead-end lines clear of any sediment build-up.

IV. PERSONNEL REQUIREMENTS

A. Technical Knowledge

1. **Minimum Requirements** - Must be familiar with water system components including pumps, motors, tanks, controls and basic repairs to these components.
 - a) Understand hydraulic dynamics and effects of hydraulics in water system.
 - b) Know pumps and repair.
 - c) Able to read and write, to complete logs and records, and respond to written correspondence.

2. **Security Requirements**
 - a) Security Clearance - Will need to have no outstanding felony charges. Personnel will have access to the system, equipment, and property. This will require issuance of keys.
 - b) Security Envelop - Gates to all system components must be closed and locked.

B. Training for System Operator

1. **Operator's Annual Training Program** - This effort is to provide training to the staff to insure they know what is expected of them, raise their confidence, and increase their knowledge. Training will be done by the supervisor, or a contracted trainer like RCAC, or video of a training course. Training is planned monthly with one of the safety and operations subjects each month as noted.

2. **Safety** - Includes CPR and Red Cross First Aid certification, Lockout-Tagout procedures, Hazardous Materials Handling, Confined Space Training and Procedures, and others as noted below.
 - Lockout - Tagout
 - Electrical Safety
 - Fire Protection
 - Disease Protection and Prevention
 - Confined Space Entry
 - Hand Tools and Proper Use
 - Federal and State Regulatory Requirements
 - Red Cross CPR and First Aid Certification
 - Emergency Preparedness and Response
 - OSHA review

3. Operations Training - Sessions will include:

Hazard Communications
Pump Controls, Types, and Maintenance
Mechanical Maintenance; air compressors and blowers
Mechanical Maintenance; bearings and lubrication
Mechanical Maintenance; valves, actuators, PRVs
Material Handling and Storage
Plant Monitoring, Signs and Responses
Motor Maintenance
Logs and Records
Distribution System, Problems and Responses

C. Proposed Operation, Maintenance, and Repair Program

- 1. Operations** – The WSO proposes to work with the operations manual provided by manufacturers. If there are any variations or changes, the WSO shall consult with the DHHL or its designated engineer to insure the planned operations are consistent with the intent of the engineer. The WSO will review the past operations and records and operate the Puukapu Pastoral Lots Water System to produce the quantity and quality of effluent water required.

The operator is prohibited from modifying the water system with out approval from the water system owner or manager. Changes that affect, or that could affect, the as-built plans and specifications and void the engineer's certification should be reviewed and concurred on by a professional engineer. Any substantial change to the system, additional source, water main, tank, etc., shall be submitted to DHHL and/or the designated Engineer, for their review, approval and records.

- 2. Maintenance** – The WSO shall prepare a new record system. These will be done in accordance with the technical manuals and O&M manuals from the manufacturers and engineers. The WSO shall utilize maintenance cards for each piece of equipment, scheduling charts and equipment maintenance records. The WSO may use the computer if software is acquired for this project by WSO. Procedures, tools, frequency and other parameters will be identified and put into the maintenance program.

Daily observation of equipment and trending of data collected will assist in determining the needed maintenance and success of the preventative maintenance program. Maintenance Cards, Scheduling Chart, and other record keeping logs are in the Logs and Schedule section of this manual.

3. Repair – The WSO shall follow a procedure to insure proper identification and notification to DHHL of repairs needed.

- a) Identify Problem.
- b) Identify Scope of Problem and take mitigative action.
- c) Determine repair priority.
- d) Initiate Emergency Repairs if necessary.
- e) Notify Owner of problem, solution, and costs if necessary.
- f) Obtain parts or services.
- g) Conduct repair.
- h) Perform operational test.
- i) Restore to service.
- j) Investigate cause of problem and make corrections.

4. Process Control Data Base – The WSO shall maintain at least the following information on process control. The process control will consist of readings by which the operator will determine if the system is operating within the design parameters. The manufacturers and vendors of the equipment supplied to the project will provide additional requirements. These will be consistent with the design engineer's process control strategy in the Operations and Maintenance manual.

- a) System pressures
- b) Water level changes
- c) Pump(s) hours, alarms, positions, on/off, filter changes, amps and volts.
- d) Generator data on hours, fuel, oil, amps, volts, coolant
- e) System flows and use, line inspections, leak testing
- f) Fuel tanks inspection, fuel levels, alarms, day tank levels

D. Personnel Responsibilities

1. Maintenance Tasks

- a) Pump operations as needed to fill tanks
- b) Readings and records
- c) Operations of the Water system, logs and records
- d) Preventative maintenance of all equipment
- e) Security of system components
- f) Clean and keep vegetation from site to reduce fire hazards.
- g) Visual inspection

- h) Cleaning of equipment
- i) Review and collection of records
- j) Up-date of O&M manual
- k) Reports of activities to owner

2. Operation & Maintenance Documentation - The following logs will be maintained:

- a) System Operations log
- b) Journal of Events
- c) Logs of water flows and tank levels

V. MAINTENANCE SCHEDULE

Preventative Maintenance will be kept on cards, with each piece of equipment having a card with the name of equipment, location, ID number, the schedule of maintenance weekly, monthly, annually, and a record of maintenance done and the date completed.

A. Routine maintenance:

1. Weekly

- a) Visual inspection of pumps, motors, valves, piping, and equipment, and related property.
- b) Check operations of all pumps.
- c) Readings of meters and gages.
- d) Inspect all signage pertaining to the non-potable water system for wear and/or discoloration. Touch-up/repaint per original color pattern as needed or if requested by DHHL. Replace any missing signs.

2. Monthly

- a) Pump packing and seal adjustments as needed.
- b) Photo-voltaic equipment per manufactures schedule
- c) Pressure adjustments as needed.
- d) Clean equipment and station interiors.
- e) Flow meter readings for records as needed.
- f) Read the solar pump controller digital display to report the number of hours the solar pump operated during the month.

3. Semi-Annually

- a) Motor and pump lubrication check. Grease bearings.
- b) Servicing of all valves, pressure regulators, relief valves, related controls.
- c) Clean strainers and regulators as needed.

4. Annually

- a) Alignment check of all pump and motor couplings.
- b) Exercise valves, and as needed, overhaul valves.
- c) Servicing and overhaul as needed of all flow meters, water level meters, and recording instruments.
- d) Touch up paint on all pumps, motors, piping and related equipment.

- e) Inspect and test the backflow prevention assemblies installed after the 4" master meter and 5/8" meter at tank site no. 1 and the backflow prevention assemblies at the individual lots.

VI. LOGS AND RECORDS

A. Operations Log (To be furnished by WSO)

1. All logs and records shall be kept with this O&M manual in a 3 ring binder, so log sheets can be added and notices and changes to the O&M manual can be made.
2. The binder shall contain sections for the O&M manual, Operators logs, Equipment Info., Correspondence, Costs, and Miscellaneous.