Request for Proposals

Blue Acre Aquaponics

Solar System Design and Installation

List of Abbreviations and Acronyms

AC	alternate current
A/E	architects/engineers
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
BAA	Blue Acre Aquaponics
CDs	compact disks
CM	construction management
CSI	Construction Specifications Institute
DC	direct current
EPA	Environmental Protection Agency
ETL	ETL Testing Laboratories
FM	Factory Manual
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
kWh	kilowatt-hour
kW	kilowatt
kV	Kilovolts
LED	light emitting diode
MCRA	Mingo County Redevelopment Authority
MDP	main distribution panel
MPPT	maximum power point tracking
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association

POA	plane of array
POI	point of interconnection
PV	photovoltaic
QCP	Quality Control Plan
RECs	renewable energy certificates
SF	Sprouting Farms
STC	standard test conditions
TRECs	tradable renewable energy certificates
UL	Underwriters Laboratories
V	volts

Request for Proposal

Mingo County Redevelopment Authority (MCRA) is soliciting proposals from a qualified contractor to design, fabricate, deliver, install, and maintain a rooftop or ground mounted utility-interactive solar photovoltaic system.

Statement of Work

Design Build for a Roof Mounted or Ground Mounted Utility-Interactive Photovoltaic System

1. PROJECT INFORMATION

1.1. Project: Roof Mounted or Ground Mounted Grid Tied PV System for Blue Acre Aquaponic (BAA)
1.2. Location: 15 Lower Burning Creek, Kermit WV 25674
1.3. Site map: Included in appendix A, see property layout, boundaries and initial proposed solar panel location. Final location and/or placement of solar panels will be determined through this design and build project.
1.4. Proposal questions: All questions shall be submitted in writing to MCRA, attention Leasha Johnson, by email at ljohnson@developmingo.com, no later than Monday, December 16, 2020, by 4:00pm. All questions and answers will be shared publicly.
1.5. Proposal submission: All proposals shall be submitted no later than Wednesday, December 23, 2020, by 4:00pm. Hard copy proposals shall be submitted to MCRA, attention Leasha Johnson, Post Office Box 298, Williamson, WV 25661. Digital copies shall be submitted to Leasha Johnson at ljohnson@developmingo.com.
1.6. Project award: Project award will be announced by January 13, 2021.
1.7. Utility records: All utility records and project usage will be provided to contractor upon request. Contact MCRA, attention Leasha Johnson, by email at ljohnson@developmingo.com.
1.8. Site Visits: Contractors are encouraged to conduct a site visit. Coordinate and schedule any site visit with BAA manager, Jack Smith at jack@blueacreaquaponics.org or by phone at (606) 626-9092.

2. BACKGROUND

2.1. Background: The MCRA has built a state-of-the-art aquaponics facility on an abandoned mine land (AML) site in Kermit, West Virginia. MCRA has partnered with Sprouting Farms (SF) to perform the operational functions of the aquaponics facility. SF and MCRA are partnering to develop and operate an Aquaponics Production and Training center. This project is funded by the WVDEP and US OSM Abandoned Mine Land Pilot program and has been in operations since the spring of 2020. Aquaponics is a system in which the waste produced by farmed fish supplies nutrients for plants grown hydroponically, which in turn purify the water. Our greenhouse will produce over 150,000 heads of fresh lettuce and over 20,000 pounds of fresh tilapia each year. Our aim is to operate the facility sustainability by installing a solar array to support project power needs. Additionally, we hope this operation can become a production model that can be replicated across Central Appalachia and build our ability to provide healthy and

nutritious local food to our communities. Our facility, once fully operational, will implement an education and training program and invite would-be farmers, school groups, and others interested in learning about running an aquaponics operation. MCRA is requesting proposals from selected solar installers to bid on the design, development, and installation of a solar system for the aquaponics facility.

2.2. Objective. Contractor shall provide a total "turnkey" project including all necessary equipment, materials, design, manufacturing and installation services for the installation of a utility-interactive photovoltaic system that shall produce minimum power kWh AC (based on the design) per year at the point of interconnection. Larger capacity systems that produce more than the minimum are an alternative and will be evaluated. The contractor should prepare system summary detailing each location, applicable equipment/size, predicted system energy production (kWh). In relation to any building mounted system, the contractor shall evaluate roof and alternative site conditions. This project shall meet all requirements of this Statement of Work and other specifications included that apply.

2.3. Scope. The contractor shall perform all professional services as necessary to provide MCRA with a complete design package including the requirements outlined in this Statement of Work. The contractor shall install the project such that it is operational and compliant with all applicable standards, building codes, UTILITY interconnection requirements, and STATE requirements. The contractor shall include specifications, calculations and drawings in the design package, and turn it over to MCRA. After approval by MCRA of the final design package, the contractor shall provide all necessary construction to successfully complete the photovoltaic system installation. The awarded contractor shall apply for and manage the rebate funding under a utility and with renewable energy certificates (RECs) paperwork.

2.4. Design Guidelines. It is anticipated, although not required, that the solar array will be installed using a ground mount system located on a bench behind and above the facility (see the site map). Not all locations need to be utilized. It is the responsibility of the contractor to assess site topography and geotechnical attributes (geotechnical assessment can be provided upon request) to estimate costs related to project installation.

- **2.4.1.** Mounting system shall be either directly anchored into the ground (driven piers, concrete footers, etc.) or ballasted on the surface without ground penetration. Mounting system design needs to meet applicable local building code requirements with respect to snow, wind, and earthquake factors.
- **2.4.2.** Panels' orientation or azimuth shall be within 20-30 degrees of due south.
- **2.4.3.** Panels' tilt shall be based on site latitude and wind conditions.
- **2.4.4.** Ground cover and vegetation management shall be included in the proposal.
- **2.4.5.** Stormwater management and erosion control management plan shall be included in the proposal.

2.5. Performance Criteria. The following performance criteria shall be met for all arrays:

- **2.5.1.** Power provided shall be either 208V, 480V or 13.8 kV three phase compatible with the onsite distribution system. See drawings for options for connection voltage and location.
- **2.5.2.** Proposal shall provide estimated energy delivery for each array, for each month of the year and total for the year at the delivered voltage (208V, 480V or 13.8 kV).

The estimated annual energy delivery for all arrays shall be the minimum] kWhAC/year at point of interconnection (POI).

2.5.3. The STC-rated power value will be entered into PVWatts (http://pvwatts.nrel.gov/) using the nearest weather file to determine estimated energy delivery in kWh AC. A default value for the system losses of 14% shall be used.

2.5.4. PV array shall mean one or more PV modules having that same orientation and on the same maximum power point tracking (MPPT) system. Every array with differing orientation shall have a separate MPPT system.

2.5.5. All proposed/implemented PV array locations shall be shade free from 9AM until 3PM (solar time). Contractor shall provide documentation of shading calculations for exterior extents for each proposed array. These calculations may be modified for shading obstructions that will be removed and mitigated as part of the project. Suggested documentation would include sun path diagrams for exterior array locations or SunEye measurements.

2.5.6. All PV hardware components shall be either stainless steel or aluminum. PV structural components shall be corrosion resistant (galvanized steel, stainless steel, composites, or aluminum).

2.5.7. The project, including supports and power conductors, shall not interfere with roof drains, water drainage, expansion joints, air intakes, existing electrical and mechanical equipment, existing antennas, and planned areas for future installation of equipment shown on drawings.

2.6. Production Metering. The project shall have:

- At least one production meter at POI.

2.7. Construction. Perform all construction necessary for the successful installation of the system based upon the design generated from 2.2.1., 2.2.2., and 2.2.3.

2.8. Technical Requirements and Reference Materials

2.8.1. Code Compliance. Installation and equipment shall comply with applicable building, mechanical, fire, seismic, structural and electrical codes. Only products that are listed, tested, identified, or labeled by UL, FM, ETL, or another Nationally Recognized Testing Laboratory shall be used as components in the project. Non-listed products are only permitted for use as project components when a comparable useable listed component does not exist. Non-listed products proposed for use as components must be identified as such in all submittals.

The contractor shall use project components that are or are made of materials that are recyclable, contain recycled materials, and that are EPA or Energy Star rated if they are available on the market.

The publications listed below form a part of this document and are hereby incorporated by reference:

- National Electrical Code (NEC)
- UL 1703 Flat – Plate PV Modules and Panels
- UL 1741 – Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems

- FM Approved – Fire Protection Tests for Solar Component Products
- IEC 62446 Grid Connected Photovoltaic Systems- Minimum Requirements for System Documentation, Commissioning Tests, and Inspections

Other technical codes that shall apply include:

- ASME PTC 50 (solar PV performance)
- ANSI Z21.83 (solar PV performance and safety)
- NFPA 853 (solar PV systems near buildings)
- IEEE 1547 (interconnections)
- ASCE/ SEI-7 – American Society of Civil Engineers – "Minimum Design Loads for Buildings and Other Structures".
- NRCA – National Roofing Contractors Association

2.9. Roles and Responsibilities.

2.9.1. Contractor. The contractor is required to provide:

- Design concepts
- Construction documents and engineering calculations that are signed and sealed by a licensed architect or engineer
- Submittals for materials and products
- Construction materials, equipment and labor
- Design and construction supervision / contract management
- Quality control plan (QCP)
- Safety plan
- Inspections and tests (per QCP)
- Manuals (design calculations, operation/maintenance, shop drawing, etc.)
- Commissioning of project
- Mentoring and training tribal building operating staff for operation and maintenance
- Operation and Maintenance during first year and optional service plan after the first year
- Web-based monitoring system for 20 years

2.9.2. MCRA will:

- Review for approval design submittals and QCP
- Witness inspections and test witnesses to verify attainment of performance requirements
- Make progress payments for design / construction as agreed

3. PROPOSAL CONCEPT DRAWINGS AND SPECIFICATIONS SUBMISSIONS

3.1. Concept Drawings. The contractor shall provide MCRA with concept drawings with the proposal. The drawings must indicate the proposed location of the PV array(s) and access points along with a one-line electrical diagram showing inverters, transformers, meters, and interconnection locations. All drawings shall be submitted with dimensions shown in English units.

3.2. Concept Information. The proposal shall include major equipment information, proposed installation/interconnection information, applicable incentive information, and performance characteristics of the system. Identify an appropriate location for the solar PV inverter equipment and its related components and environmental control systems that will meet the following criteria:

- Ease of maintenance and monitoring
- Efficient operation
- Low operating losses
- Secured location and hardware
- Compatibility with existing facilities
- Avoidance of flood-prone areas
- Visual harmony

All products shall comply with the technical requirements shown under section 8, "Solar Electric Module Array". At a minimum, the proposed concept information shall include:

Equipment Information:

- System description
- Layout of installation
- Selection of key equipment and layout of equipment
- Performance of equipment components, and subsystems
- Specifications for equipment procurement and installation
- All engineering associated with structural and mounting details
- Controls, monitors, and instrumentation
- Operation and maintenance service plan

Installation Interconnection Information:

- Solar electric array orientation (degrees)
- Solar electric module tilt (degrees)
- Electrical grid interconnection requirements
- Integration of solar PV system with other power sources
- System type and mode of operation (utility interactive)

Performance Characteristics

- Shading calculation documentation
- Total system output
- Estimated kWh/month per array (shown over a 12 month period)
- Warranties and guarantees

Applicable Incentives

- Identify all applicable incentives

Interconnection Agreement

- Provide confirmation that the PV systems will be designed to comply with applicable UTILITY interconnection requirements.

Cost

- Total bid price of project including operation and maintenance for the first year, and optional service plan after the first year.

4. DESIGN SERVICES

Solar PV system shall be designed and engineered to maximize the solar energy resources, taking into consideration the customer's electrical demand and load patterns, proposed installation site, available solar resources, existing site conditions, proposed future site improvements, and other relevant factors.

Design Services for this project shall require a schematic design submission, a design development submission, a check set submission and a construction document submission. A final set of as-built drawings shall also be provided to MCRA. These submissions shall be delivered to MCRA based on the project schedule submitted and approved by MCRA. The design package shall include the following details (4.1-4.6).

4.1. Timeline/Project Schedule. Contractor is required to provide an estimate on project timeline and schedule.

4.2. Post Award Conference. Within 21 calendar days after receipt of the contract award. The meeting will be attended by MCRA team members and the contractor's personnel. At a minimum, the prime contractor's project manager and foreman, the primary designer, and a representative of any subcontractor performing over 25% of the work must attend. The meeting will be held at the project location. The purpose of the meeting will be to discuss the contractor's plan for completing the design and construction, including a construction schedule. A walk-through of the site will occur at the end of the meeting.

4.3. Specifications. A full set of specifications shall not be required for this project. However, specifications that express all information and demonstrate sufficient detail so as to direct the construction work outlined in this Statement of Work shall be required. The specifications package shall be coherent enough that any contractor not familiar with the project would be able to construct the project design. The specifications shall include all equipment information, proposed installation and interconnection information, and performance characteristics of the system.

4.3.1. All drawings, estimates, calculations, and specifications shall be in English units.

4.3.2. The contract shall take into account a construction plan producing a minimum disruption of day-to-day activities, utilities, services, etc.

4.4. Construction Drawings

4.4.1. Provide drawings for each discipline required (architectural, structural, electrical, etc.), with separate plans for new work and demolition as well as special types of drawings where necessary, such as enlarged plans, equipment curbing and flashing details, roof penetration details etc. Drawings shall clearly distinguish between new and existing work.

4.4.2. Each drawing shall indicate project title, project number, array identification and location, A/E firm, A/E's address and/or phone number, contract number, drawing title, drawing type, drawing number, and key plan. A cover sheet shall be provided and shall include a list of the drawings, legend, vicinity map, and location map in addition to all items required for each drawing. Each A/E submission shall be clearly dated and labeled (e.g. 75% Design Development Submission, 100% Check Set Submission, Construction Document Submission, As-Built Drawings, etc.). Each drawing sheet submitted shall include a graphic scale in the lower right-hand portion of the sheet. The final set shall be stamped by a registered engineer and/or registered architect for the state in which the building is located. At a minimum, the following drawings are required:

- Site plan including utility locations and connections – shall show staging and phasing requirements.
- Electrical plans – including single line diagram and utility interconnection.
- Electrical details.
- Roof plan – showing the full layout of the system and detailing any obstacles that must be permanently or temporarily removed or relocated.
- Array support and mounting details.
- Any drawings that may be required to install a complete project.
- Water proofing details

4.4.3. The contract documents shall sufficiently define the Statement of Work and shall stand on their own.

4.4.4. Specifically address the means to keep the existing building accessible and operational by means of relocation and / or phasing.

4.5. Calculations. The contractor will provide the following calculations.

4.5.1. System Electrical Calculations. Provide with design development and again with 100% check set.

- PVWatts calculation
- System energy production calculation showing estimated monthly and yearly energy output for each array
- Energy value and project cash flow

4.5.2. OPTIONAL. Energy performance calculated by a detailed PV analysis program such as System Advisory Model (SAM: https://sam.nrel.gov/) or PVsyst using proposed specific PV modules and inverters.

4.5.3. If rooftop PV arrays are proposed, include roof structural loading calculations. These calculations shall specifically address roof loading from the PV array and confirmation that the loading does not exceed existing roof framing capacity as determined by your analysis. The documents included in this contract include a preliminary *Roof Structural Analysis.* This document provides some preliminary indications on the existing roofs capability to carry additional loading and is intended to assist during the proposal process in developing your concept design. It is not intended to alleviate the need to do array specific structural calculations during the subsequent design phases.

4.6. Registration Seals. Each final working drawing and each submitted specification and calculation document shall be signed by, bear the seal of, and show the state certificate number of the architect and/or engineer who prepared the document and / or is responsible for its preparation.

5. DESIGN SUBMISSIONS

Awarded contractor will secure from governing agencies and the utility company all required rights, permits, approvals, and interconnection agreements at no additional cost to MCRA. The awarded Contractor will complete and submit in a timely manner all documentation required to qualify for available rebates and incentives.

5.1. Design Reviews. For each design / drawing submissions, MCRA reserves the right to make comments and request changes after the receipt of the submission. Reviews will be made by MCRA staff. As part of its review, MCRA may offer submission reviews to local code officials. MCRA shall provide review comments within fourteen (14) calendar days of receipt of the 75% Design Development Submission and the 100% Check Set Submission.

5.2. Purpose. MCRA will review the contractor design submissions to verify adherence to contract requirements. Design reviews by MCRA are not to be interpreted as resulting in an approval of the contractor's apparent progress toward meeting contract requirements but are intended to discover any information that can be brought to the contractor's attention that might prevent errors, misdirection, or rework later in the project. The contractor shall remain completely responsible for designing, constructing, operating and maintaining the project in accordance with the requirements of this Statement of Work.

5.3. Resolution of Comments. The contractor shall respond to all design review comments in writing, indicating one of the following: (1) adoption and action taken, (2) adoption with modifications and action taken, (3) alternative resolution and action taken, or (4) rejection. In cases other than unqualified adoption, the contractor shall provide a statement as to why the reviewer's comment is inappropriate. If the contractor believes that any MCRA design comments or requested changes will result in a change in the contract cost, they shall notify MCRA within seven calendar days of receiving the comment(s) and provide a detailed cost estimate of anticipated contract modifications. Rejection items shall not go forward to the construction phase until adequate resolution to the rejected item has been approved by MCRA. Design review comments shall not relieve the contractor from

compliance with terms and conditions of this contract. The contractor's comment resolution shall be transmitted to MCRA within seven (7) calendar days of comment receipt and incorporate discussions from the scheduled design comment review meetings.

6. UTILITY INTERCONNECTION AGREEMENT

6.1. The contractor shall coordinate with UTILITY to ensure that the project satisfies all UTILITY criteria for interconnection of the project to the UTILITY electric distribution system. This includes coordinating all negotiations, meeting with UTILITY, design reviews, and participating in any needed interaction between UTILITY and MCRA.

6.2. The contractor is responsible for preparing required submissions for obtaining the Net Energy Metering (NEM) and interconnection agreement from the utility. MCRA will sign the NEM and interconnection agreements, not the contractor.

6.3. The contractor shall manage interconnection and startup of project in coordination with the Site and UTILITY. The contractor shall at its own expense pay any interconnection, processing, and other fees and expenses as may be required by UTILITY for interconnection and operation of the project.

7. Quality Control Plan

7.1. Content. For each performance and installation requirement, the QCP shall identify: item/system to be tested, exact test(s) to be performed, measured parameters, inspection/testing organization, and the stage of construction development when tests are to be performed. Each inspection/test shall be included in the overall construction schedule. The contractor is not relieved from required performance tests should these not be included in the plan.

The QCP is intended to document those inspections and tests necessary to assure MCRA that product delivery, quality and performance are as required. It also serves as an inspection coordination tool between the contractor and MCRA. An example of these inspections/tests is the final test/inspection for overall performance compliance of the system. Results from tests and inspections shall be submitted within 24 hours of performing the tests and inspections.

At a minimum, the QCP should conform to “IEC 62446 Grid Connected Photovoltaic Systems - Minimum Requirements for System Documentation, Commissioning Tests, and Inspections (2009)”.

Performance tests will be conducted at the final commissioning/acceptance testing, and one year after the acceptance date. Performance tests will include I-V curve traces for all PV strings. For project acceptance, measured performance at maximum power point must be at least 90% of expected performance, which will be adjusted for concurrently measured cell temperature and plane of array (POA) irradiance. This can be accomplished using a current industry standard I-V curve tracer with capability to compare measured PV string I-V curves with nameplate performance of PV string compensated for concurrent cell temperature and POA irradiance measurements. If performance is less than 90% at the one year performance tests (measured using the same method as for project acceptance), contractor shall promptly troubleshoot and

correct any malfunction or issues as necessary to return project to 90% measured performance or better. The contractor shall supply MCRA with detailed documentation of malfunction or errors and all corrective actions taken.

7.2. Submissions. The QCP shall be prepared and submitted within 21 calendar days of the post award conference meeting and prior to any construction on-site. The QCP may be rejected as incomplete and returned for resubmission if there is any performance, condition or operating test that is not covered therein.

7.3. Updating. During construction, the contractor shall update QCP if any changes are necessary due to any changes or schedule constraints. MCRA shall be notified immediately of any schedule and/or procedural changes.

8. SOLAR ELECTRIC MODULE ARRAY

8.1. Photovoltaic Modules

8.1.1. PV modules shall be a commercial off-the-shelf product, shall be UL listed, and shall be to be eligible for Construction Specifications Institute (CSI), and shall be properly installed according to manufacturer's instructions, NEC, and as specified herein.

8.1.2. The PV modules shall be installed such that the maximum amount of sunlight available year-round on a daily basis should not be obstructed. At a minimum, all PV arrays shall be shade free from 9 a.m. until 3 p.m. (solar time). All projects must include documentation of the impact from any obstruction on the seasonal or annual performance of the solar electric array.

8.1.3. The solar electric system shall produce the minimum annual AC energy output. If the system is proposed to produce more than the minimum required energy output to reduce the cost per delivered kWh then the system shall produce the "proposed" energy. The output will be adjusted if the actual yearly solar insulation received is less than that indicated by PVWatts. A normalizing calculation will be made to correct the output, so a contractor is not penalized for an extremely cloudy year.

8.1.4. System wiring shall be installed in accordance with the provisions of the NEC.

8.1.5. All modules installed in a series string shall be installed in the same plane/orientation.

8.1.6. PV modules shall have a 25-year limited warranty that modules will generate no less than 80% of rated output under STC. PV modules that do not satisfy this warranty condition shall be replaced.

8.1.7. Panel installation design shall allow for the best ventilation possible of panels to avoid adverse performance impacts.

8.1.8. Provide MCRA with 1% extra PV panels.

8.1.9. Warranty. Provide a panel manufacturer's warranty as a minimum: No module will generate less than 90% of its specified minimum power when purchased. PV

modules shall have a 25-year limited warranty guarantying a minimum performance of at least 80% of the original power for at least twenty-five (25) years. Measurement made under actual installation and temperature will be normalized to standard test conditions using the temperature and coefficients published in the module specifications.

8.2. Inverter and Controls

8.2.1. Each inverter and associated controls shall be properly installed according to manufacturer's instructions.

8.2.2. Inverters shall be commercial off-the-shelf product, listed to UL 1741 and IEEE 1547.

The inverter shall have at a minimum the following features:

- UL/ETL listed
- Peak efficiency of 96% or higher
- Inverter shall have operational indicators of performance and have built-in data acquisition and remote monitoring.
- The inverter shall be capable of parallel operation with the existing AC power. Each inverter shall automatically synchronize its output waveform with that of the utility upon restoration of utility power.

8.2.3. Warning labels shall be posted on the control panels and junction boxes indicating that the circuits are energized by an alternate power source independent of utility-provided power.

8.2.4. Operating instructions shall be posted on or near the system, and on file with facilities operation and maintenance documents.

8.2.5. Provide detailed lock out /tag out instructions for all equipment.

8.2.6. Power provided shall be compatible with onsite electric distribution systems.

- Install inverters and control panels in most optimum locations with appropriate environmental protection. Roofs may be used if structurally sufficient. If inverters are mounted outside they shall be shaded from direct sun from 10 a.m. to 6 p.m. in the months of June to August and be able to be secured.

8.2.7. The inverter and system shall utilize an astronomical timer or other means to shut down the inverter during night time to avoid energy usage at night.

8.2.8. Warranty. A 10-year manufacturers' warranty shall be provided.

8.3. Control Panel to Solar Electric Array Wire Runs

8.3.1. Areas where wiring passes through ceilings, walls or other areas of the building shall be properly restored, booted, sealed and returned to their original condition.

8.3.2. All wiring between buildings and the point of interconnection shall be underground and meet applicable codes.

8.3.3. Thermal insulation in areas where wiring is installed shall be replaced to "as found or better condition." Access doors to these areas shall be properly sealed and gasketed.

8.3.4. All field electrical devices shall have the capability to be locked as appropriate.

8.4. PV Monitoring

8.4.1. The PV systems installed shall provide for monitoring by MCRA as well as by the general public on a vendor provided website. The public site is intended for education and outreach regarding renewable energy production and information on avoided greenhouse gas production. The public site shall be maintained for ten years.

8.4.2. Monitor by an IP addressable device and displayed graphically in a user-friendly manner the following parameters:

- AC energy
- Solar irradiance
- Show status of all equipment
- Provide electrical one line showing operation and performance of all equipment

Data shall be available both in real time and in archived in 15-minute averages. All monitoring hardware and monitoring equipment shall be provided by the contractor.

System shall also include metering for remote data collection and display on vendor-provided web site of system performance. System performance shall allow display during different monitoring periods from one hour to one year.

8.4.3. Provide networking equipment, engineering, programming, wiring, and software to allow remote connection by MCRA to the local area network.

8.4.4. Meters utilized for the project shall be listed on CEC List of Eligible System Performance Meters per SB1 Guidelines, shall be UL listed, and shall comply with UTILITY net energy metering requirements.

8.4.5. Meters shall be installed in the main distribution panel (MDP) when possible. Meters shall not be mounted to the transformer housing without prior approval when there is no other reasonable place to mount it.

8.5. Transformers

8.5.1. Stand-alone boost up transformers not incorporated into the inverters shall be National Electrical Manufactures Association (NEMA) premium efficiency. Exterior transformers shall be housed in a NEMA 3R enclosure and be pad

mounted. They shall be located next to switchgear housings where indicated on drawings.

8.6. Structural Requirements

8.6.1. All structures, including array structures, shall be designed in accordance with all applicable state and local codes and standards.

8.6.2. The contractor shall provide structural calculations, stamped by a licensed professional structural engineer in the appropriate state.

8.6.3. All structural components shall be non corrosive (galvanized steel, stainless steel or aluminum). All hardware shall be stainless steel or aluminum. All components shall be designed to obtain a minimum 40 year design life.

8.6.4. If applicable, all roof penetrations shall be designed and constructed in collaboration with the roofing professional or manufacturer responsible for the roof and roofing material warranty for the specific site. The number and size of the penetrations necessary to extend the power and control cable into the building must be kept to a minimum and grouped in a single location when practicable. All roof installations and weather proofing of penetrations shall not compromise the roof warranty, or if roof has no warranty, accepted best practice. The roof penetrations and roof connections shall be warranted for weather tightness for ten (10) years from the installer including parts and labor.

8.6.5. If applicable, rooftop installations where there is no parapet or the parapet is less than 42", a 6' safety zone from the roof edge to the PV system shall be maintained. A 3' clear path of travel shall be maintained to and around all rooftop equipment. Design shall address access for maintenance and replacement of the equipment. Appropriate fall protection or temporary platforms shall be incorporated into the design to allow for this maintenance and replacement work. If the inverters are mounted on the roof this equipment shall have permanent access walkways installed to facilitate monitoring and maintenance.

8.7. Attachment to Roof

8.7.1. If applicable, the system shall be mounted using the best means practicable, such as direct attachment or a fully ballasted system. All penetrations and structural connections associated with supports and conduit shall be kept to a minimum and shall be water-proof.

8.8. Lightning Protection. Provide surge protection on all electrical systems.

8.9. PV System Installation Warranty. The PV systems shall carry a ten (10) year workmanship warranty by both the manufacturer and the installer including parts and labor.

9. QUALIFICATIONS FOR INCENTIVES

9.1. Incentives and Benefits: Contractor shall determine and select all incentives and benefits available to the project, except that it shall select from among any mutually exclusive incentives for which the project might qualify in a way reasonably expected to maximize net present value to MCRA of all incentives and benefits, RECs, energy cost savings that might be realized in relation to the project.

Contractor shall make application and pay all deposits and fees for the selected incentives and ensure that MCRA receives all benefits of incentives to the extent reasonably within Contractor's control.

Project shall be designed and constructed to comply with requirements of all other benefits programs for which it might qualify such as accreditation for RECs, green tags, and tradable renewable energy certificates (TRECs). Contractor shall complete all paperwork and application processes associated with certification on behalf of MCRA,

10. SHOP DRAWINGS/PRODUCT DATA

10.1. Submissions. The Contractor shall submit shop drawings and product data / submittals, catalog cuts, etc. as stipulated herein. Shop drawing/product data submissions to MCRA shall be made after review and approval by the contractor. All approved product data and shop drawings shall be delivered to MCRA in one submission electronically.

The contractor shall combine all product data submission material into hard copy manuals for reference during all phases of construction. Shop drawings shall be bound with product data.

See also Electronic Project Management requirements in Section 1, General Requirements. .

10.2. Reviews. Reviews of shop drawings and product data by MCRA are not to be interpreted as an approval of the Contractor's product selections. The contractor shall remain completely responsible for constructing the PV system in accordance with all contract performance requirements.

10.3. Products for Submission. The contractor shall provide shop drawings and product data for all systems, equipment and materials.

11. INSPECTIONS AND TESTS

11.1. General. The contractor shall perform inspections and tests throughout the construction process including: existing conditions/needs assessments, construction installation placement/qualification measurements and final inspections/tests performance certification. Periodic "quality" inspections shall also be conducted to support progress payments as identified in the contractor's QCP.

11.2. MCRA Witness. All inspections and tests, to verify documented contract assumptions, to establish work accomplishment, or to certify performance attainment shall be witnessed by MCRA and/or construction management (CM) and coordinated through the QCP.

11.3. Final Inspections and Tests. In order to ensure compliance with provisions of the NEC, an inspection by a licensed electrical inspector is mandatory after construction is complete. Unless otherwise identified, manufacturer recommendations shall be followed for all inspection and test procedures. The NEC inspection shall be conducted by an independent third party electrical inspector familiar with PV systems. Provide qualifications of the proposed third party inspector for review and approval prior to conducting the NEC inspections.

Tests shall include a commissioning of the array. Commissioning tests shall conform with the requirements in Section 7 (QCP). Commissioning shall be performed for the entire PV system. This data shall be used to confirm proper performance of the PV system.

11.4. Documentation. Inspections/tests required in the QCP shall result in a written record of data/observations. The Contractor shall provide two (2) copies of documents containing all test reports/findings. Test results shall typically include: item/system tested, location, date of test, test parameters/measured data, state of construction completion, operating mode, contractor inspector/MCRA witness, test equipment description and measurement technique.

12. Project Closeout

12.1. Preparation for Final Inspection and Tests. The following steps shall be taken to assure the project is in a condition to receive inspections and tests.

Finalize record drawings and manuals, indicating all “as-built” conditions.

12.2. Record Drawings. The contractor shall maintain on site the working record drawings of all changes/deviations from the original design. Notations on record drawings shall be made in erasable red pencil or other color to correspond to different changes or categories of work. Marked-up drawings shall always be maintained at the contractor’s on-site construction office, available for MCRA and/or CM to review. Record drawings shall note related change order designations on impacted work. When shop drawings indicate significant variations over design drawings, shop drawings may be incorporated as part of record drawings. Review of record drawings may be required before monthly payments can be processed.

12.3. As-Built Drawings and Specifications. The Contractor shall provide "as-built drawings" and documents based upon actual site installation. Should MCRA determine that variations exist between finished construction and the as-built drawings, the contractor shall correct drawings to the satisfaction of MCRA.

The contractor shall submit six (6) hard copies and two (2) CDs containing the “as-built” drawings and specifications as CAD and PDF files.

12.4. Warranties and Guarantees. Submit specific warranties and guarantees, final certifications and similar documents to MCRA upon substantial completion and prior to final payment. Include copies with operations and maintenance manual. All warranties shall be signed by a principal of the contractor's firm and sealed if a corporation.

12.5. Maintenance Manual. Provide a detailed operation and maintenance manual including diagram of system components, description of normal operation; description of operational indicators and normal status of each, table of modes of operation, safety considerations, preventative maintenance requirements, troubleshooting and corrective actions; sources of spare parts and cut-sheets for all components. The contractor shall prepare six (6) hardcopies and two (2) CDs containing the detailed Maintenance Manual. Submit to MCRA.

12.6. Spare Parts. The contractor shall provide a recommend list of spare parts. At the minimum a set of combiner box fuses for each array shall be provided along with the required spare panels noted in Section 8.

12.7. Demonstration and Training. Provide MCRA approved training for designated personnel in the operation of the entire photovoltaic energy system, including operation and maintenance of inverter(s), transfer switches, panel board, disconnects and other features as requested by MCRA. Instruct the designated MCRA personnel in removal and installation of panels, including wiring and all connections. Provide MCRA with written instructions and procedures for shut-down and start-up activities for all components of the system. MCRA shall be permitted to video tape this training for official use.

13. Operations and Maintenance Service.

13.1. Provide operation and maintenance of the solar array systems for one year. Work shall include all manufacturer recommended maintenance as well as a 12 month performance commissioning as outlined in in section 7.1 (QCP). MCRA shall be invited to witness all performance commissionings. A maintenance log shall be maintained to note dates, equipment and issues being resolved. Contractor should be available within 48 hours to respond to natural disasters (extreme storm, hail, wind events) to inspect array for damage.

14. Selection Process

MCRA shall evaluate each proposal based on the Proposal and Evaluation Criteria section of this RFP. Proposals will be ranked based on the evaluation criteria, which will determine the final award recipient. Respondents who do not meet the Requirements listed in the Respondent Qualifications section above are not eligible for the final award. Respondents will also be vetted by the West Virginia Department of Environmental Protection's division of Abandoned Mine Lands (AML), and a final selection will be subject to the final approval and documentation by the AML. All Respondents will be notified of the outcome of the selection.

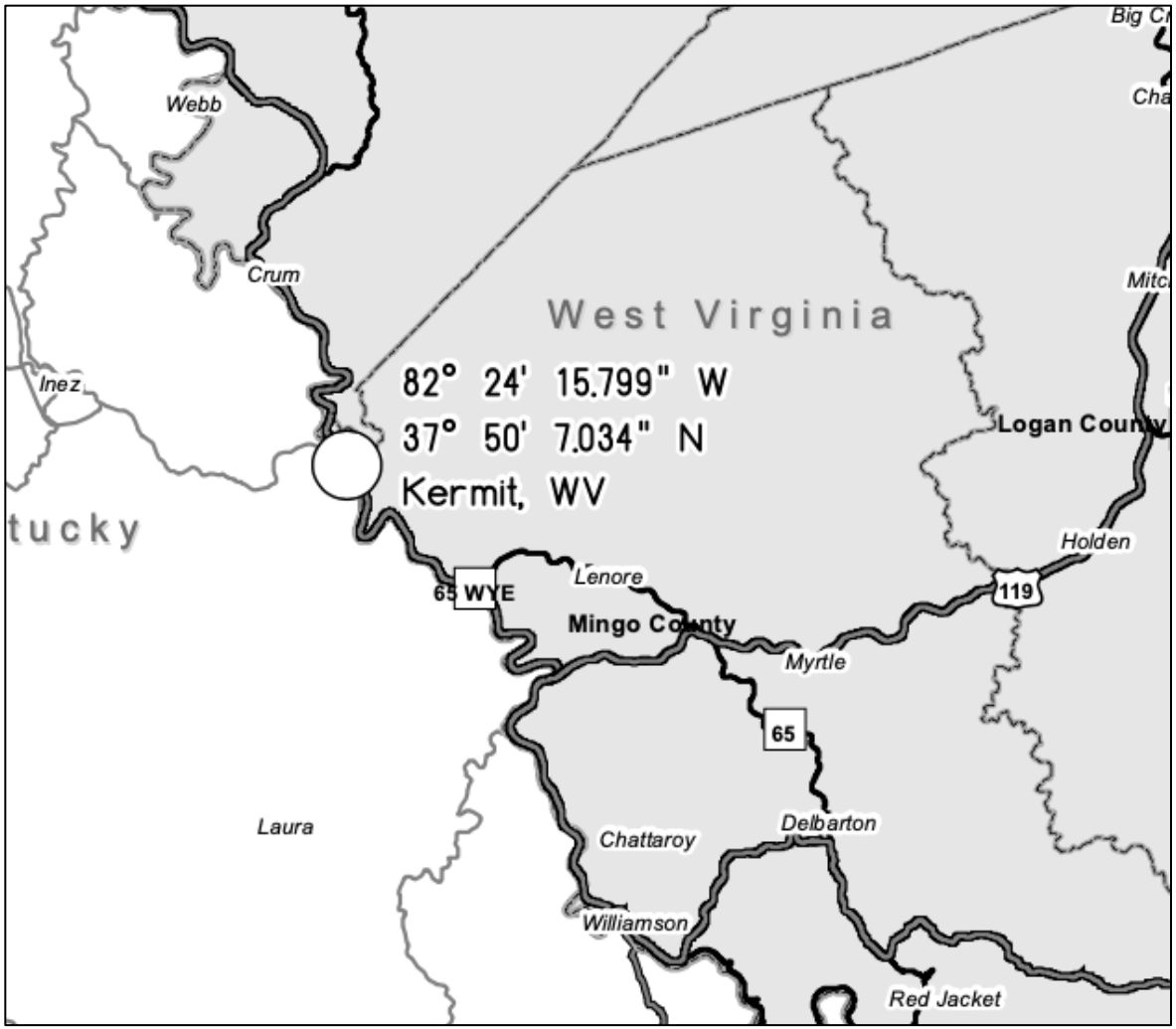
Depending on the number and quality of the proposals received, MCRA plans to interview a shortlist of select Respondent teams. Shortlisted Respondents will be asked to present their proposal to MCRA in person.

15. Proposal Requirements

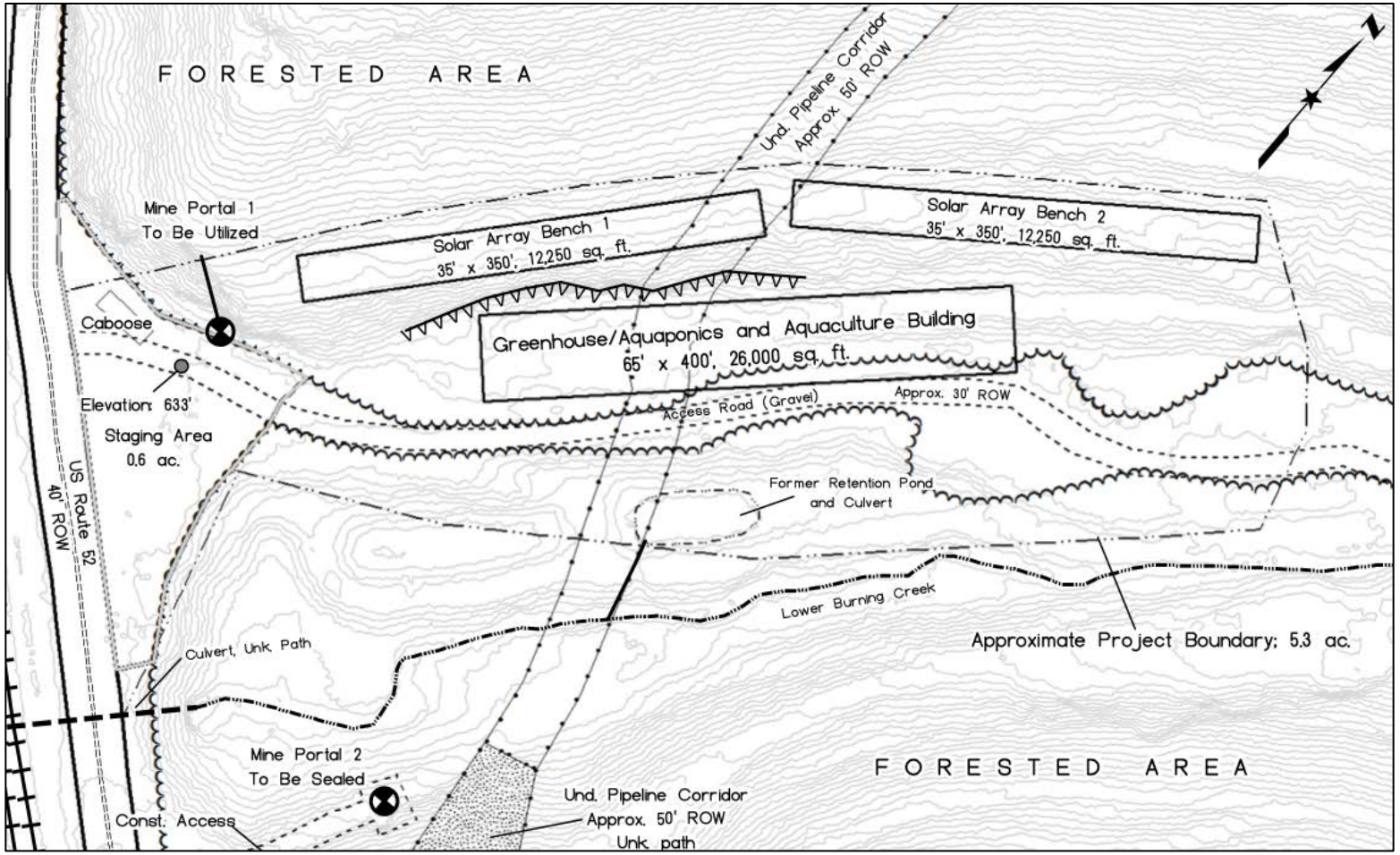
Please create project proposals in 8½" x 11" document size using a minimum 10-point font size and submit according to the instructions in section 1.5. Hard copies are required in duplicate, and digital submissions shall be submitted as one PDF file, or if multiple files are required, one ZIP file containing the proposal folder and files.

- **Cover Letter:** The cover letter shall discuss the highlights, key features and distinguishing points of the proposal. As part of this discussion, please describe specifically why Respondent wants to work with MCRA and why the proposal should be considered superior. The cover letter must be prepared and signed by a manager having the authority to make offers and enter into financial agreements on behalf of the Respondent or Respondent team, as the case may be.
- **Cost Proposal:** Respondents should present pricing and include pricing options The price is to apply to all work described in the Request for Proposal and as required to achieve an interconnected and operational solar system.

Appendix A: Site Maps



Site location map of Blue Acre Aquaponics Facility



Preliminary site design of Blue Acre Aquaponics Facility. Building location is not accurate, this drawing identified the proposed location for solar array, for reference.