**PROJECT NARRATIVE**

**Cover Page**

**Applicant: Capital Resource Conservation & Development Council (Capital RC&D)**

**Project Title: *Monitoring of Carbon Sequestration for Carbon Credit Development***

**Proposed Start and End Dates**: Start August 29, 2022. End August 28, 2025 – 36 month duration

**Federal Funding Requested:** $73,943.93

**Non-Federal Funds Committed**: $87,196.00

*Applicant’s Technical Contact/Project Director:*

 Barry Frantz; (717) 798-5186 cell; cnbfrantz@verizon.net

**Applicant’s Administrative Contact:** Susan Richards (717) 241-4361; srichards@capitalrcd.org

**Geographic Location of the Project:** The project will be carried out in the seven-county region in south central Pennsylvania served by Capital RC&D, which are the counties of Adams, Cumberland, Dauphin, Franklin, Lancaster, Lebanon, York.

**Pennsylvania NRCS State CIG Priority Addressed by the Project:** Carbon Sequestration; specifically encouraging the use of new technologies to measure carbon in soils. The project will use soil probes to directly measure soil carbon changes resulting from implementation of conservation practices and systems. Practices and management to increase carbon sequestration will also be demonstrated.

**Historically Underserved Set Aside Declaration**: Primary applicant **does not qualify** as underserved. Participating farmers have not been confirmed so we cannot verify HU status of farmers.

**Brief Description of the innovative conservation approach(es):** The project will demonstrate new technology (soil probe) to continuously monitor soil organic carbon, NPK, soil moisture and soil temperature on a real time basis. The probe allows improved fertility management by farmers and advisors and also can be used to document carbon sequestration for purposes of verifying carbon credits. Lab-based soil testing will also be conducted as an alternative method of monitoring soil carbon.

**Project Background**

Increased soil organic carbon and soil organic matter in cropland and pastures has multiple benefits, including increasing nutrient and moisture storage capacity, increasing resilience to climate change, and increasing soil carbon sequestration which can help reduce carbon dioxide in the atmosphere. Companies wanting to offset their carbon footprint are willing to pay farmers to implement practices that sequester additional carbon dioxide in the soil. Access to these carbon markets can be an attractive new source of revenue to both encourage farmers to implement and maintain new practices.

A carbon offset market that works with agricultural producers is developing in the United States but appears to be more attractive to farms in the Midwest with a larger amount of land to generate carbon credits. In Pennsylvania, although numbers are not available, it appears from information directly from carbon credit aggregators and word of mouth that most small to mid-sized farms are not currently engaged in measuring their soil carbon to generate credits.

EQT Corporation, a natural gas producer working in PA, WVA and Ohio, is interested in developing carbon credits via sustainable agriculture/forestry and other land-based methods. They have retained project partner, Climate Smart Environmental Consulting LLC, a business owned in part by Leonard Jordan. Mr.  Jordan is a former NRCS Chief, he contacted PA NRCS who put them in contact with Capital RC&D, to assist in their efforts to sponsor the CIG proposal outlined below.

EQT has engaged with TCP Ag Research (www.tcp-agresearch.com), who has developed an innovative soil probe that can measure N-P-K, pH, soil moisture, soil temperature, carbon dioxide and soil organic carbon. Probe data is transmitted wirelessly to the cloud and accessible via internet dashboard on a real-time basis. The TCP soil probes have just completed a proof of concept administered by a professor from Purdue University in which probe measurements were compared to lab testing of soil samples.  The probe accuracy was validated through this study, journal article forthcoming for peer review.

This project will evaluate if farmers in our region can generate sufficient credits with existing or enhanced practices to consider taking steps to measure and sell their carbon credits. The project will use the TCP probe and also newer soil sampling and testing methods to measure soil carbon to derive the required information and consider the economics of the effort.

Use of the probes is expected to increase accuracy/credibility of soil carbon measurement and monitoring, and may decrease development cost for carbon credits. Cost reductions may allow for carbon credit development on smaller land sizes (Indigo Carbon average farm size is 1000 acres), and is anticipated to enable credit development with small, limited resource, beginning, and socially disadvantaged farms which are currently marginalized in this space. EQT plans to administer a regional initiative to encourage landowners to develop carbon credits on their land that are validated using TCP soil probes.

## The project will also demonstrate use of new advanced soil health testing methods that also test for soil carbon. Testing conforming to the NRCS-216 Soil Health Testing standard will be done for all plots.

**Project goal/objectives**

The main goal of the project is to demonstrate innovative new soil carbon monitoring tools. An important associated goal is to demonstrate that practical tools are available for farmers and consultants to plan new crop and pasture systems that can generate additional soil carbon that can be measured by the new monitoring tools.

New NRCS Conservation Evaluation and Management Assessment standards (Soil Health Management Plan 116; Carbon Sequestration and Greenhouse Gas Mitigation Assessment 218/COMET-Farm Tool) will be used to demonstrate how accepted NRCS technical tools can help farmers plan and develop new systems that can measurably increase soil carbon. The Soil Health Management Plan is very new and therefore has not been used extensively to date. The COMET-Farm tool which is incorporated into the new Carbon Sequestration and Greenhouse Gas Mitigation Assessment 218 has been available for a number of years but is new to Pennsylvania producers.

New soil monitoring tools and standards (TCP soil probe; NRCS Soil Health Testing 216, tests to be done by Cornell Soil Health Testing Lab) will be used to monitor changes in soil organic carbon resulting from changes in management practices implemented as a result of the planning component of the project. As both of these tools are very recent developments, there is very little awareness of how they can be used to monitor soil carbon.

The project in general will demonstrate applicability of new NRCS Conservation Evaluation and Management Activity (CEMA) standards for planning and implementing new systems to increase soil carbon.

The project will demonstrate applicability of soil carbon planning and monitoring tools across common agricultural land uses (cropland and pasture), management practices and soil types in southcentral Pennsylvania.

The project will document the benefits, costs, advantages and limitations of currently available tools and procedures to plan, implement and monitor systems.

**Project design and methods**

Project design will demonstrate tools to plan improved crop and pasture systems to sequester carbon, and demonstrate new technology to monitor soil organic carbon in soils typical of southcentral Pennsylvania. The project will incorporate several new NRCS Conservation Evaluation and Management Activities to illustrate how these integrate with soil carbon management, monitoring and quantification efforts.

The Capital RC&D Council and partners will work with four farmers in South-Central Pennsylvania to develop and implement new systems on cropland and pasture that can increase soil carbon, then use new soil carbon measuring tools to quantify any changes/increases in soil carbon. We will work with EQIP eligible farmers within the seven counties of the Capital RC&D region. Farms will be selected from a pool of producers who are currently working with Capital RC&D’s agronomist or NRCS to implement cropland management practices, and farms currently working directly with Capital RC&D on establishment of rotational grazing systems.

Farmers will work with an agronomist throughout the project. The NRCS Carbon Sequestration and Greenhouse Gas Mitigation Assessment (218) CEMA standard which includes using the COMET tool will be used to assess current management and to plan new practices and systems with a reasonable potential to measurable increase soil carbon. At least two farmers will develop a Soil Health Management Plan (116) as part of this process, to help them evaluate their current operation and make decisions about new practices, and to evaluate the benefits of a Soil Health Management Plan as part of a soil carbon/carbon sequestration development and monitoring program.

A paired field approach with control and test fields will be used. Each farmer will host at least one paired trial consisting of one area maintained under existing baseline conditions, and another area where one or more new practices will be implemented that can increase soil organic carbon and may reduce greenhouse gas (GHG) emissions; with focus on increasing carbon sequestration and reducing atmospheric CO2. Conservation Crop Rotation 328, Residue Management No-Till 329, Cover Crop 340, Nutrient Management 590, (Prescribed Grazing 528) and variations of them are anticipated to be the primary practices used to increase soil carbon. Project funding will be used to offset costs to participating farmers to adopt new practices that they would not otherwise adopt.

Demonstrations will be done on cropland and pasture and also on both limestone-based soils and shale/sandstone-based soils. This will show applicability of planning and testing tools on the primary agricultural land uses and principal soil types in the region.

Soil monitoring/measurement of soil carbon on baseline and new systems will be done at the start of the project and then throughout the remainder of the project.

Two primary methods will be used to monitor soil carbon: a new probe developed and marketed by TCP Ag Research Company, and soil health testing services by Cornell Soil Health Lab that conform to the NRCS 216 Soil Health Testing standard.

Soil tests following the NRCS Soil Health Testing (216) Conservation Evaluation and Monitoring Activity standard represent a monitoring method that meets current NRCS standards for soil health testing including soil carbon. Testing will be done at a 6” depth at the beginning of the project and again at the end. These tests also report on soil fertility and will also be used to help farmers and agronomists develop regular soil fertility programs.

The TCP soil probes will be installed at the beginning of the project and kept in place for the life of the project. They represent a significant improvement in monitoring soil organic carbon and soil fertility as compared to conventional soil testing. Conventional soil testing typically must be done at the same time of the year, with similar soil moisture conditions, to develop consistency of records and data. They represent a single point in time and do not show changes over a cropping year. Probes monitor and transmit data continuously over an entire cropping year and eliminate the need to take samples at specific times and conditions. They show in-season changes in soil carbon and fertility, and can be used for P and K testing, and also nitrate which tends to be more volatile and normally requires additional testing. The TCP probes test CO2 and soil organic carbon at 6” and 18” and are better suited to show how carbon sequestration and fertility may differ at different horizons. For soil organic carbon management and measurement, probes provide a state-of-the-art approach to providing the data to determine if systems are working as intended, and when making decisions about certifying and marketing credits, provide highly reliable information to help determine costs of production, carbon credit generation, and break-even costs. TCP will provide assistance in selecting locations for the probe within fields, installing probes, and making data available to farmers, agronomist and project partners.

Conventional soil tests following the Penn State Agricultural Analytical Services Lab soil fertility test or equivalent testing for P and K, soil organic matter and total carbon will be done. This is not expected to be adequate for quantifying sequestered soil carbon for carbon credits. They will be done because they are standard tests that farmers are familiar with and may help compare current soil testing procedures to new testing that can quantify soil organic carbon.

Farms that side-dress nitrogen on corn will also have a standard PSNT performed, which will be compared to nitrate monitoring enabled by the TCP probe. Farmers planting corn silage will have a CSNT taken in the fall. While not directly related to carbon sequestration, these tests can improve nitrogen management and help reduce greenhouse gases, which are commonly a part of carbon credit programs and can make adoption of a complete system more attractive to farmers.

Each farm will have an annual follow-up meeting to review results with the farmer and agronomist and to plan activities for the coming year. Any changes needed in management practices will be re-run through assessment tools.

Economic analysis of the costs to implement and monitor each system will be done by Climate Smart Environmental Consulting LLC. The project will quantify soil carbon change and develop a simple cost/revenue analysis to determine potential revenues for the practice given at various monitoring and verification costs and potential carbon credit values. Soil carbon data will be used to estimate how many carbon credits farmers can generate. Estimates of the costs to develop additional carbon credits over baseline will be conducted, which can provide information about the break-even cost for carbon credits.

While certification of carbon credits is not a primary objective of the project, the option to pursue carbon credits will be offered to participating farmers on a voluntary basis. Support for that option will be provided by Climate Smart Environmental Consulting LLC.

**Project outcomes and benefits**

Farmers, agency staff, and agricultural consultants in Pennsylvania have been following the agricultural carbon credit market with no local examples or experience of how it might be implemented in the state or how many credits could be developed on typical operations.

The expected outcome of this project is that farmers will be more willing to plan new practices and systems that can increase soil carbon. Cost-effective improvements in soil health and soil fertility are expected to justify adopting the new practices, and the additional benefit of a practical way to account for increased soil carbon and potential carbon credits provides another reason for farmers to make these improvements.

Use of the NRCS CEMA standards will help integrate the methods used in this project into established NRCS Field Office Technical Guide standards and procedures, making it available for NRCS staff to use with their customers, and also available to third party providers and private sector agronomists. This is expected to significantly expand the field of who has access to information on how to generate and measure soil carbon, and who can be involved with the carbon credit market.

The monitoring tools being demonstrated will at the least be excellent tools for improved nutrient management and improved soil health. We expect they will be very good tools for monitoring soil carbon sequestration and measuring additional carbon generated by improved management, and that is the starting point for certifying, aggregating and selling carbon credits.

For carbon credit purposes, a well-documented plan and baseline report for how additional carbon will be sequestered is a critical part of the process. The project will provide insight into what should be considered by farmers prior to starting a carbon credit/carbon sequestration program, and how the current NRCS soil health and carbon sequestration Conservation Evaluation and Management Activities can support that process.

The project will remove some of the mystery about how to increase and measure soil carbon in Pennsylvania. Farmers and public/private professionals will have a localized example demonstrating several ways to plan, implement and monitor a soil carbon improvement program. This is expected to provide immediate benefits to the farmer in improved soil fertility and health, and could also be the basis for entering the carbon credit market as an additional source of revenue.

In Pennsylvania, although numbers are not available, it appears in information from carbon credit aggregators and word of mouth that most small to mid-sized farms are not currently engaged in measuring carbon to generate credits. This project will help answer the question of how many credits per acre or per farm could be developed in our region, and practices farmers can implement to generate those credits. While a local market is not yet developed, other benefits from implementation of practices that increase soil carbon may be sufficient to increase farmers’ interest in planning and implementing those practices, regardless of size of farm operation. Farmers will then be in a better position to enter a carbon market if it becomes available.

**Geographic location and size of project area**

The Capital RC&D Council, in the Pennsylvania RC&D community, represents the seven south-central Pennsylvania counties of Adams, Cumberland, Dauphin, Franklin, Lancaster, Lebanon and York. Demonstrations will be done on four farms, two with cropland and two pasture and also on both limestone-based soils and shale/sandstone-based soils. This will show applicability of planning and testing tools on the primary agricultural land uses and principal soil types in the region.

A map of the Capital RC&D region in the context of the state appears below.



**EQIP-eligible producer participation**

Four EQIP-eligible producers are expected to participate in the project. Farmers will meet with Capital RC&D staff and agronomist at start of project to confirm their interests and needs, document baseline conditions, identify locations for trial plots, develop plans of proposed practices to implement to increase soil carbon. Farmers will continue to work with this team over course of project to monitor ongoing activities and make adjustments as needed. Farmers will be asked to agree to host field days. If farmers express interest, Climate Smart Environmental Consulting LLC will work with them to quantify carbon credits and evaluate potential to sell credits.

Specific farmers have not been confirmed but Capital RC&D has had initial discussions with several farmers and with local NRCS staff about potential participants. In addition, potential consulting agronomist has indicated they may have some current clients would might be willing to participate.

Capital RC&D will ensure that all participating farmers meet EQIP applicant eligibility requirements and, if receiving payments through the project, will meet Adjusted Gross Income (AGI) requirements. As farmers have not been confirmed, Capital RC&D cannot confirm if any would meet Historically Underserved criteria.

**Project deliverables/products**

a) Profiles of cropping and pasture systems used by participating farmers: types of operations, management practices used, new practices adopted, changes in soil carbon and soil fertility, estimated and measured changes in soil organic carbon.

b) Recommendations for use of probes to measure soil organic carbon:  number, spacing, location, depth, relation to soil types.

c) Procedures for integrating probe data with other crop and pasture management data.

d) Costs associated with the use of the probe to measure soil organic carbon.

e)  Comparison of results of using of the soil probe to directly measure soil organic carbon, compared to other methods such as modeling or conventional soil sampling. The probe provides a continuous monitoring of soil organic carbon, NPK and soil moisture levels which greatly aid producers’ management.  Where the conventional soil samples are a snap shot of conditions at the specific time it’s taken and will needed to be sampled annually under similar conditions and time of year. The modeling concept is an assumption base on a few tests and applied to the entire field(s). The soil probe provides improved accuracy of the assumptions.

f) Evaluation of the suitability of the NRCS Soil Health Testing 216 CEMA and Carbon Sequestration and Greenhouse Gas Mitigation Assessment (218) CEMA for use in soil carbon management or carbon credit projects. Development of a specification that could accompany and existing standard, revisions to an existing standard, or if needed a new standard.

g) At least two Soil Health Management Plans (116) will be developed for the new practice plots on participating farms. At conclusion of the project, direct or indirect benefits of these plans to carbon sequestration development and monitoring will be evaluated.

h) An evaluation of how the TCP technology can be adopted, used and paid for by farmers, should the probe prove useful for continuous monitoring of soil organic carbon and other soil nutrients. Recommendations and/or considerations for farmers interested in using this technology will be included in the fact sheet and final report.

i) A fact sheet on the project will be produced.

j) At least one field day will be offered.

k) All data, inputs, outputs, analyses, specifications, geodata, and products generated through the course of this project will be fully shared with NRCS along with the submission of the final report.

**Project action plan and timeline**

Start: August 29, 2022

Fall 2022

* Confirm participating farmers
* Confirm agronomist
* Document baseline conditions on participating farms with farmers, agronomist, project partners
	+ If time allows, yield results for 2022 cropping year
	+ If possible, fall 2022 CSNT
* Develop plan to place probes
* Develop plan for comparison soil testing
* Cornell and PSU soil tests
* Place probes
* As needed, carry out initial comparison soil testing, including NRCS Soil Health Testing (216) compliant tests
* Document baseline conditions on participating farms with farmers, agronomist, project partners
	+ If time allows, yield results for 2022 cropping year
	+ If possible, fall 2022 CSNT

Winter 2022

* Develop plan for proposed new practices with farmers
* Develop at least two Soil Health Management Plans (116)
* Quantify baseline soil organic carbon levels based on probes and tests
* Work with farmers for pre-planning 2023 practices
* Meet with the project partners to review current activities
* Capital RC&D to develop project webpage

Spring 2023

* Farmers implement new activities
* Meet with the project partners to review current activities

Summer 2023

* Collect conventional PSNT tests if needed, compare to probes
* Meet with the project partners to review current activities

Fall 2023

* Yield Checks
* CSNT if needed
* Meet with the project partners to review current activities

Winter 2023

* Work with farmers to evaluate 2023 cropping year, plan for 2024
* Meet with the project partners to review current activities

Spring 2024

* Farmers implement new activities
* Meet with the project partners to review current activities

Summer 2024

* Collect conventional PSNT tests if needed, compare to probes
* Meet with the project partners to review current activities

Fall2024

* Yield Checks
* CSNT if needed
* Meet with the project partners to review current activities

Winter 2024

* Work with farmers to evaluate 2024 cropping year, plan for 2025
* Meet with the project partners to review current activities

Spring 2025

* Farmers implement new activities
* Meet with the project partners to review current activities

Summer 2025

* Collect conventional PSNT tests if needed, compare to probes
* Late summer
* Cornell and PSU soil tests
* Work on Final Report
* On-Farm Demonstration of Probes
* Presentation of Findings at Appropriate Venues
	+ On-Farm Field Day
	+ Capital RC&D website update
	+ Farmer podcast
	+ Pa. Soil Health Coalition
	+ Pa. State Technical Committee (optional)

End: September 2025

**Project management**

Project partners include Capital RC&D who will manage the overall project including in-field collaboration and oversight of technical work and outreach about the project results. We will also plan project updates on our website and organize project team meetings. Climate Smart Environmental Consulting, LLC will provide technical support, economic analysis, carbon credit development and provide regular communication with EQT Corporation. TeamAg, Inc. is projected to be contracted to provide agronomic support for the project as well as working with the demonstration farms and the project partners to review and analyze the project results. EQT Corporation is providing all matching funding for the project and is interested in taking lessons learned to generate *local* carbon credits. Although TCP Ag Research is more of a vendor than a project partner, we anticipate working with them to ensure data monitoring and storage from the soil probe system.

To make sure all partners are kept up to date, data is being collected, stored and analyzed and other elements of the project are on track, we plan to hold quarterly project meetings. The project contractors will also be required to provide reports with all invoices.

**Project technology transfer**

Capital RC&D is experienced in producing events and materials for a producer audience. For this project we will:

* Hold two on-farm field days to be conducted for a producer and ag agency staff audience.
* At least one fact sheet about the project will be developed, and posted on the Capital RC&D web page.
* At least one podcast about the project will be created.
* Capital RC&D will offer to present information about the project at a Pennsylvania State Technical Committee meeting.

If the project identifies areas where NRCS CEMA standards could be supplemented or modified to be more effective for use in planning or monitoring soil carbon, potential revisions or Specifications will be developed.

**Project evaluation**

Several aspects of the project will be evaluated:

* Suitability of the NRCS Soil Health Management Plan 116 standard and Carbon Sequestration and Greenhouse Gas Mitigation Assessment (218) to develop crop and pasture management systems to increase soil carbon.
* Suitability of the NRCS Soil Health Testing 216 standard and TCP soil probe to monitor soil carbon.
* Compare and contrast several soil moitoring tools (Penn State Soil Test with soil organic matter test); NRCS Soil Health Testing 216, TCP soil probe) against each other for their use as soil carbon monitoring tools.
* Evaluate the extent to which the TCP soil probe is compatible with the NRCS Soil Health Testing (216) standard.
* Evaluate actual in-soil changes after 2-3 years of a new system being implemented.
* Compare soil monitoring data collected at the end of the project, to predicted results as estimated using COMET-Farm.
* Document labor requirements and costs for each of the soil monitoring methods.
* Assess perceived accuracy of each of the monitoring methods, and other pros and cons such as ease of data collection, differences in ability to collect quality samples, etc.
* Evaluation of the viability of generating additional soil organic carbon which can be documented for carbon credits on Pennsylvania farms.

**Project Team Qualifications**

**Capital RC&D Project Staff**

**Barry Frantz – Technical Lead (Technical contact/project director)**

Barry worked with the USDA Natural Resources Conservation Service/Soil Conservation Service from 1977 to 2020 in soil, water and land conservation programs and projects at the local, state and national level. Positions held with NRCS/SCS include Soil Conservationist, District Conservationist, Resource Conservationist, State Resource Conservationist, Assistant State Resource Conservationist (Programs), and Conservation Initiative Coordinator. His background has given him much experience in using and working with NRCS conservation practice standards on a daily basis, providing a very solid background in applying and adapting practices to new situations.

He currently works for Capital RC&D as a field technician for cover crop and tillage surveys. In addition, he works through NEW Solutions as an ACES employee for NRCS Easement Programs Division.

For this project, he will work closely with the project team to ensure all deliverables are met and use his extensive experience managing agricultural and natural resource management programs and projects at the state and national level to support the transfer of the project results to NRCS.

**Susan Richards – Executive Director and Administrative Lead**

Richards has 25 years of experience managing projects in the nonprofit sector both with Alliance for the Chesapeake Bay as a Project Coordinator and then at Capital RC&D. At Capital RC&D, she initially worked both in project implementation and also functioned as the bookkeeper until the businesses revenues allowed the organization to hire specialized bookkeeping and administrative services. Since 2012, she has served as Capital RC&D’s Executive Director providing oversight to all of the functions of the organization and also implementing project work when needed.

For this project she will work with the project team to support communication through quarterly meetings. Will work with the four participating farmers ensure appropriate contracting and reimbursement and work with the Capital RC&D bookkeeper for project invoicing and reporting.

**Cheryl Burns –Outreach Manger**

Ms. Burns has over 15 years experience developing outreach information including websites podcasts, videos and webinars. She has worked for Capital RC&D for over 10 years. Her experience also includes working as acting Executive Director for Farm Link developing educational programs for farm transition. For this project, she will develop a project webpage, plan the field day(s), develop a project podcast and work with the partners to produce a project fact sheet.

**Climate Smart Environmental Consulting, LLC**

**Owners: Leonard Jordan & Charles Zelek**

Founded on over 50 plus years of cumulative experience at senior levels with direct experience related to Clean Energy technologies and greenhouse gas (GHG) management.

Climate Smart has direct experience evaluating entities GHG emissions profiles and developing a best-in-class plan for GHG emissions reductions and carbon offset/tax credit generation based on carbon capture, carbon storage, hydrogen, fuel cells, and a myriad of other technological solutions.

Climate Smart posses the expertise to evaluate, quantify and identify markets for carbon credit purchases that can be made available to participating landowners if they’re interested and desires such assistance.

**Technical Staff**

**Charles (Chuck) Zelek, Ph.D.**, is founding partner at Climate Smart Environmental Consulting LLC, and principal at Zelek Consulting LLC. In these roles, Zelek provides expert perspective to clients on technologies and policies in both the energy and agricultural sectors as they relate to climate change and economic development, particularly in the area of carbon credits. This perspective is based on an over 20 year federal government career, including senior positions at both the US Department of Energy (DOE) and US Department of Agriculture (USDA).

Chuck was a senior economist with the U.S. Department of Agriculture (USDA) in Washington DC, focusing on energy and climate change-related USDA programs and policies. While at USDA, Chuck helped support the Energy and Conservation Titles of the 2008 Farm Bill, sections of the Energy Independence and Security Act of 2007, as well as supporting development and leading implementation of numerous conservation programs. At the beginning of his civil service career, Chuck was USDA’s state economist for Indiana.

For this project, Chuck will work with the project team to keep apprised of the project activities and ensure that the data needed to generate the project deliverables is collected. Chuck will develop carbon credits for the four farms and develop an overall economic analysis of the practices implemented on each farm. In addition, he will support communication with EQT Corp concerning the project outcomes.

**Leonard Jordan** has spent more than four decades building a portfolio focused on conserving our natural resources. Having worked across the nation, Jordan has worked with several interest groups, government agencies and non-profit organizations to ensure that our environment is protected. His passion is to work with the American public, providing assistance that helps improve their lives and bring resilience to rural America.

As Acting Chief of the USDA’s Natural Resources Conservation Service, Leonard Jordan oversaw programs that preserve our natural resources and improve agricultural sustainability through voluntary, private-lands conservation. He led a staff of more than 10,000 employees across the country.

Jordan served as NRCS’ Associate Chief for Conservation 2013 to 2017 where he led the agency’s conservation mission area, including all of NRCS’ conservation programs. Leonard served as Regional Conservationist for the East from 2009 to 2012. He also previously served as State Conservationist in multiple states including Georgia and Washington State.

For this project Leonard with work with Chuck to support the project work.

**Team Ag, Inc.**

The Team Ag Regenerative Ag team has more than 75 years of professional experience supporting farmers through an array of regenerative ag work including: soil health, crop-livestock integration, emissions analysis/reductions, ecosystem services quantification,, new markets certifications and enterprise analysis.

**Eric Sauder, Regenerative Ag Manager, Team Ag**

Sauder received a BS in Mechanical Engineering and MS in Architectural Engineering from Penn State University. He is passionate about the opportunities for farmers to be a part of the solution for climate change. As the manager of regenerative ag and geospatial services, he works to create opportunities for farmers exploring regenerative agriculture.

For this project he will work with the project team and his staff to implement the agronomic activities described in the proposal. They will work with each farm to take soil tests, meet annually with each producer to develop a plan for improving soil carbon dynamics and carbon storage, process each farm’s data in COMETFarm, prepare a soil health management plan for two of the four farms, work in coordination with the project team and report to Capital RC&D.

**EQT Corporation**

EQT Corp. has a strong interest in involvement in the carbon market as stated in the project narrative. The company will not actively take part in the project but will stay apprised of the project activities and outcomes for their purposes in supporting carbon credit generation in the region they are active.

EQT Corporation is a leading independent natural gas producer with an evolutionary focus on our future. EQT has operations in Pennsylvania, West Virginia and Ohio and is dedicated to responsibly developing our world-class asset base in the core of the Appalachian Basin. While we are currently the largest producer of natural gas in the United States, we know being the biggest doesn’t always mean being the best. With that in mind, EQT is making strides toward becoming the best producer by creating long-term value for all stakeholders, including employees, landowners, communities, industry partners and investors.

**Assessment of Environmental Impacts**

Physical, Chemical, or Biological Impacts on the Environment

Project activities that may have a physical, chemical, or biological impacts on the environment are associated with taking soil samples, installation of the TCP soil probes, and implementation of conservation practices.

Soil testing and soil probe placement have a very small footprint, possibly five to ten square feet per plot depending on number of samples needed, to a depth of 6 to 18 inches for soil tests and 36 inches for soil probes. As soil tests and probes are monitoring tools only, and extent of disturbance is minimal, they are not expected to have either a positive or negative environmental impact.

Participating farmers will implement new crop and pasture management practices. Specific practices are not yet determined, but are expected to be almost entirely management practices that increase soil organic matter/soil organic carbon, improve nutrient management or reduce greenhouse gas emissions. Conservation Crop Rotation 328, Residue Management No-Till 329, Cover Crop 340, Nutrient Management 590, (Prescribed Grazing 528) are the primary practices anticipated to be used.

It is anticipated these practices will increase soil carbon and carbon sequestration. Based on anecdotal reports of carbon sequestered in other projects, 0.5 tons/acre/year of carbon could be sequestered. If plots being tested for carbon increase average 10 acres, the amount of carbon sequestered per plot would be 0.5 tons/acre x 10 acres = 5 tons/year x 3 years = 15 tons. Four plots will have improved management to increase soil carbon, giving an estimated total increase of sequestered carbon for the demonstration of 60 tons from 40 acres. Plot size and actual sequestration are not yet determined and these numbers are for illustration only.

The management practices to be implemented will also have soil health, water quality, and greenhouse gas emission reduction benefits. COMET runs may indicate GHG benefits and those will be reported as part of project results if they occur.

No negative environmental impacts are anticipated from implementation of conservation practices. All practices will be implemented on land currently in cropland or pasture; no land use changes are anticipated.

Earth Disturbing Activities

Taking soil samples and installation of TCP probes will involve minor, localized earth disturbance. Soil samples will be taken at random locations, within 2 plots per farm, on 4 farms, in the first year and last year of the project. Samples will be taken to the plow layer depth and a second set at 12 to 18 inches depth. We anticipate this is similar to earth disturbance as projected under the NRCS Soil Health Testing 216 CEMA. TCP soil probes will be installed on two plots per farm, on 4 farms, to a depth of approximately 36 inches and then remain in place for the project with no further disturbance. Neither activity is anticipated to be a significant disturbance activity.

National Historic Preservation Act (NHPA) Section 106

Specific farm operations and test field location have not been finalized.

**Declaration of previous CIG projects involvement and past performance**

**Capital Resource Conservation and Development Area Council, Inc.**

**Project Title**: *Employing Short-Term Adaptive Management Strategies to Improve Pasture Soil Health and Climate change resilience on Prescribed Grazing Operations.*

**CIG Agreement Number**: Agreement 69-2D37-13-671

**Award funding amount**: $42,847.93

**Year of award expiration**: 2016

**Summary of Outcomes**:

The primary objective of this project was to support the documentation of the implementation of prescribed grazing practices that help the producer develop and improve their pasture resources for long term success as defined by improved soil health and resilience in the face of climate change. Completed activities of the project included:

* Working with selected producers (known as *grazing champions)* to monitor soil and pasture parameters;
* Documenting the selected grazing champions management methods in a series of video case studies available on the Capital RC&D website;
* Supporting peer-to-peer instruction by organizing grazing champions to hold a field day to demonstrate their management strategies and discuss the results of the pasture and soil monitoring
* Support for additional trainings and on-farm demonstrations supported by Capital RC&D and/or the Pennsylvania Grassland Coalition (PA GLC).

**Declaration of Historically Underserved and veteran farmers or ranchers**

Participating farmers have not been identified, so we cannot confirm participation by HU producers.