United States Department of Agriculture

Soil Health Demo Trial Minimum Data Sets for Environmental, Financial and Social Data

The Soil Health Demo Trial (SHD) statute in the 2018 Farm Bill requires NRCS to establish protocols for measuring carbon levels in the soil and testing carbon levels on land where SHD conservation practices and systems are applied to evaluate gains in soil health. In developing these consistent protocols, NRCS determined that analysis of carbon levels alone would not be sufficient to evaluate soil health gains. Successful implementation of soil health practices and systems relies on: 1) consideration of the physical, chemical and biological components of soil, 2) an understanding of the economics and financial benefits that accrue to farmers implementing soil health practices and management systems, and 3) the social factors that influence adoption of soil health management systems.

To support successful implementation of a SHD and the collection and reporting of a consistent set of soil health outcomes data, NRCS has developed this guidance document to inform SHD awardees of the required soil health, management, and economics/financial evaluation protocols and methods. Environmental, financial, and social (to the extent possible) data reporting protocols will be established in collaboration with awardees. Consistency in protocols and methods is critical as NRCS develops a national soil health database to support required reporting to Congress and to inform NRCS and partner soil health efforts and initiatives.

SHD awardees consent to contributing their data and evaluations to NRCS as part of a SHD study to be submitted to Congress, as required by the SHD statute. An SHD Field Operations Template and an SHD Soils Template are provided on the CIG Website to capture soil health status, management history and change, and outcome data that are anticipated to be standardized in content and format across all on farm trials. Additional data and evaluations that are specific to your project should also be provided. The NRCS team will work with awardees to establish sharing mechanisms that best help NRCS integrate project results and make them available to stakeholders and customers.

Awardees must complete the following minimum requirements:

I. Soil Assessment and Additional Environmental Assessments:

- Use NRCS standard in-field and laboratory methods for soil carbon and other soil health indicator measurements, including soil sampling and submission guidance found in Conservation and Evaluation Monitoring Activity, Code 216, Soil Health Testing (CEMA 216). Awardees are encouraged to include additional measurements beyond the required NRCS standard methods.

- In-field assessments must include the State-approved in-field soil health assessment, based on the National In-field Assessment Template, for each conservation management unit. (Reference: Technical Note 450-06, *Cropland In-Field Soil Health Assessment Guide*).
  - Beginning with Fiscal Year 2023 CIG Awardees, all data will be entered directly into the NRCS-provided data system. The system will follow data collection requirements provided on the Excel spreadsheets on the CIG OFSHDT website.
- Laboratory soil health assessments must include the following set of indicators according to methods in (CEMA 216) soil organic carbon (ppm), aggregate stability (%), bioavailable nitrogen (mg/g dry weight), respiration (mg CO_2/g dry weight) and active carbon (ppm), soil texture (% sand, % clay at a minimum), and pH (1:1 water method or 0.01M $CaCl_2$ method, as appropriate for the region in which the sample is taken).
- A comprehensive chemical soil test (pH, EC, organic matter, soil texture by hydrometer (% sand and % clay), nitrate-N, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, zinc, and boron) based on state-approved procedure is required.
- In arid regions and for high tunnel systems, an irrigation water analysis is required. At a minimum, the test should include: pH, sodium adsorption ratio (SAR, includes sodium, calcium and magnesium), total dissolved solids (TDS), total alkalinity or carbonates and bicarbonates, chlorides, sulfates, phosphates and nitrates.
- Measurements of bulk density and infiltration are also required beginning with the FY20 awardees. Standardized methods for data collection for these measurements can be discussed with NRCS technical contact.

- Field data for field activities and inputs are to be recorded with the Excel data sheet entitled "Conservation Innovation Grant Field Data Record - Natural Resources Conservation Service, Soil Health Division" which is linked on the webpage. This data can be entered into the Producer Operations Data System - Soil Health (PODS-SH) using the spreadsheet provided online for upload, or it can be entered manually into PODS-SH.
- Tabs across the bottom of the spreadsheet need to be filled out systematically as applicable. Specifically, cells highlighted in red and containing an asterisk (*) in the column need to be populated. Some tabs do not need to be filled out if no pertinent information is available. For instance, irrigation water sample test results and soil health assessments may not be part of your CIG.
- Irrigation information should include the power source for pumps (diesel, electricity, natural gas, liquid petroleum, or gasoline), as well as the water source, such as well (include pumping depth) or surface source. Electric systems should state either a vertical line shaft pump or a submersible pump. Row width is recorded as inches.
- Some activities may be associated with farm production but are not reported on a per-acre basis (for example maintenance). The portion attributable to the CIG field in question may be adjusted based on field acreage and total tract acres.

II. Financial Assessments:

Awardees must collect financial outcomes data to include the profitability (cost of production, current yield and historic yield where available) of implementation of Soil Health Management Systems (SHMS) and practices.

At minimum, the economic analysis for each On-Farm Trial (OFT) must consist of a Partial Budget Analysis (PBA) which captures, to the fullest extent practicable, all agro-economic changes resulting from the adoption of new Soil Health Practices or the transition to a SHMS *and* an associated Economic Case Study (ECS), unless such analysis is deemed unfeasible by NRCS economists. Additionally, all primary economic data used to generate the PBA and ECS are to be submitted as a deliverable using the "Conservation Innovation Grant Field Data Record - Natural Resources Conservation Service, Soil Health Division". The economic data collected will serve as the starting point for the economic component of a National Soil Health Database. Financial assistance payments provided to producers are encouraged to be captured in the data but *should not* be reflected in the final economic analysis (PBA/ECS). This is to ensure the economic data are standardized and that the case studies are not affected by temporary financial assistance.

Comparison sites that do not meet SHMS principles (high disturbance, low diversity, low cover, low root presence) nearby on similar soil types (same field, farm, or close by farms) and in the same climate are *strongly* desired *and awardees should make every effort to find such comparison sites to validate economic findings if possible*. If a suitable comparison site cannot be identified, then the development of the required PBA and ECS can be performed via producer interview of historical management practices using the "Conservation Innovation Grant Field Data Record - Natural Resources Conservation Service, Soil Health Division". For more information on developing an ECS, please reference Technical Note 200-06, *Developing Conservation Case Studies for Decision-making.*

Generating a PBA and ECS using NRCS tools:

If an awardee *does not have* an outlined plan to develop the above minimum required PBA and ECS, then the adaptive economic plan provided below by NRCS may be used.

Year 1: Grantee works with participating producers to develop a Level I T-Chart per Technical Note 200-01, *Basic Economic Analysis Using T-Charts*. If a comparison site is not available for a project site, the producer should be asked to keep a personal account of the practices, systems, costs and other pertinent data points for reference for multiple years (as feasible) before the start of the study. The producer will not be asked to provide enterprise-level data to the study but should be able to confirm whether sufficient data are available for the PBA. If the producer has previously transitioned to a SHMS, then the above data must be available for several years prior to transition to a SHMS or the addition of another SH practice if a suitable comparison site cannot be established, in order for the producer to participate in the economic section of the study.

Year 2, subsequent years: Producer/grantee reviews the Level I chart and makes any additions or deletions as necessary to the list of inputs, outputs, costs and benefits. Values are assigned for each item on the Level-II T-chart using the Technical Note 200-01, as a guide to determine the values for each section. If the value of an item cannot be identified, the project's NRCS Technical Contact must be consulted. Once the Level-II chart is complete, the Level-III T- chart is generated using standardized units per Tech Note 200-01. Finally, a PBA can be created using the Level-III T-chart and the methods described in the Tech Note 200-01.

Final Year: Economic case study is developed using the PBA for the entire project period and draft Technical Note, Developing Conservation Case Studies for Decision-Making. Primary economic data collected for the PBA/ECS must be provided to NRCS using the "Conservation Innovation Grant Field Data Record - Natural Resources Conservation Service, Soil Health Division" for inclusion in the National Soil Health Database.

III. Social Assessment

- Develop summary information on social outcomes and profiles of participating producers with any available information about why management changes were adopted, and challenges and benefits of the changes.

- Describe the impact on producer communities through on-farm field days and other activities to facilitate broader adoption.

Resources:

NRCS Technical Note 470-SH-01 *Choosing a Laboratory for SH Testing*

NRCS Technical Note 470-SH-07 *Guidance on Field Grab Sampling for SH Testing*

NRCS Technical Note 450-04, *The Basics of Addressing Resource Concerns with Conservation Practices within Integrated Management Systems on Cropland*

NRCS Technical Note 450-06, *Cropland In-Field Soil Health Assessment Guide*

NRCS Technical Note 200-ECN-01, *Basic Economic Analysis Using T-Charts*

NRCS Technical Note 200-ECN-06, *Developing Conservation Case Studies for Decision-making*

EQIP CPAs, DIAs, and CEMAs

CIG Grantee Templates and Forms are available for download on the CIG website