



## Design and Implementation Activity

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### Irrigation Water Management Design

#### DIA 163

#### Definition

Design the volume, frequency, and application rate of irrigation water. Implementation requirements for CPS 449 Irrigation Water Management along with other supporting conservation practices are developed.

#### REQUIREMENTS

##### General Requirements

A Design and Implementation Activity (DIA) assists a participant with implementing their conservation plan by providing site-specific instructions, requirements, plans, or specifications for putting conservation practices and enhancements on the land.

A DIA may involve providing assistance for a single conservation practice or a combination of structural, vegetative, or land management conservation practices, enhancements, and management activities.

Prior to initiation of the DIA, the Technical Service Provider (TSP) will schedule a conference with the participant and Natural Resources Conservation Service (NRCS) field office staff. The intent is to ensure that an understanding of the participant objectives (including practices to be covered by the DIA), required deliverables, and characteristics of the DIA tasks are met. The meeting between all parties may take place in person or electronically.

The participant and conservation planner have determined which practices a TSP will provide DIA assistance for. The TSP must have certification in NRCS Registry for each practice they will provide assistance for through this DIA. If not certified for a practice(s) within the scope of this DIA, a TSP can use a subcontractor to provide technical services that exceed their certification to the extent allowable by State or Tribal law and in accordance with their certification agreement. If there are no available certified TSPs, then that practice shall be removed from the scope of the participant's DIA.

DIA assistance is based on the participant's conservation plan and applicable conservation practice standards and related technical guidance provided in the NRCS Field Office Technical Guide (FOTG). Each NRCS State Office publishes appropriate technical guidance and reference information in the state's version of the FOTG. DIA assistance must conform with the conservation practice standards included in FOTG, Section 4 for the state where the practice(s) are to be implemented. A TSP may use conservation practice supporting documents found in the applicable state's FOTG, Section 4 to facilitate delivery of appropriate information to the participant. Examples of conservation practice supporting documents include statements of work (SOW), implementation requirements (IR), practice specifications (PS), standard drawings (SD), General Specifications (GS), Construction Specifications (CS), Material Specifications (MS), and design support tools. The FOTG homepage hyperlink is: <https://efotg.sc.egov.usda.gov/#/>.

TSP will complete Preliminary and Final Designs for structural practices as outlined in

each state adopted CPS, SOW, and the NRCS National Engineering Manual (NEM). The steps in the NEM include:

- 1) Preliminary engineering work, site investigations, data collection, and documentation.
- 2) Adherence to CPS criteria, cost estimates, preliminary alternatives.
- 3) Participant's selection.
- 4) Preparation of final plans and specifications based on participant's selections.
- 5) Design report and engineer's cost estimate.
- 6) Operation and maintenance plan.
- 7) Quality assurance plan.

The activity will meet the state adopted NRCS Conservation Practice Standards (CPS) and Statements of Work (SOW) included in the participant's conservation plan or EQIP Contract and include at least one of following:

- Irrigation Water Management (Code 449)
- Irrigation System, Microirrigation (Code 441)
- Sprinkler System (Code 442)
- Irrigation System, Surface and Subsurface (Code 443)
- Irrigation Pipeline (Code 430)
- Irrigation Ditch Lining (Code 428)
- Irrigation Field Ditch (Code 388)
- Irrigation Canal or Lateral (Code 320)
- Structure for Water Control (Code 587)
- Irrigation Reservoir (Code 436)
- Irrigation and Drainage Tailwater Recovery (Code 447)
- Pumping Plant (Code 533)
- Irrigation Land Leveling (Code 464)
- Anionic Polyacrylamide (PAM) Application (Code 450)
- Saline and Sodic Soil Management (Code 610)

### **Technical Requirements**

- 1) Include and update, when needed, results from the NRCS approved assessment or tool used to evaluate irrigation water conservation opportunities and the participant's conservation plan.
  - a) Performance characteristics of existing irrigation systems and management (e.g., estimates of irrigation system Distribution Uniformity (DU), and soil moisture by feel and appearance estimation method).

- b) Inventory of soils, crops, topography, water supply, existing physical features, drainage systems, and energy resources (e.g., soils on-site, crops grown, field high and low points, source water location, above-ground and buried utilities, existing surface and subsurface drainage facilities, and existing power equipment).
  - c) Documentation of past water withdrawals and application, by crop.
  - d) Basis of existing irrigation system and management performance data (e.g., field measurement, original equipment manufacturer (OEM) specification, etc.). Report any differences between reported and expected performance attributed to age, operation, maintenance of equipment or similar factors.
  - e) Rationale for irrigation system of management changes, if any, based on either:
    - i) Participant's needs (e.g., manage salinity levels to within crop tolerance levels); or
    - ii) to comply with CPS criteria.
  - f) Irrigation water conservation recommendations that can meet CPS criteria and that will improve irrigation efficiency, irrigation-induced soil erosion, water quality degradation, concentration of crop root zone constituents, degraded micro- climate, plant vigor, energy efficiency, and/or address the water management concerns of the participant's operation.
- 2) Using the criteria in the applicable state adopted CPS and the participant's needs, develop preliminary design alternatives for each practice and/or scenario contracted in this DIA.
- a) If applicable, provide a variety of different conditions for the same recommendation. For example:
    - i) Operation and maintenance changes of the existing irrigation system(s).
    - ii) Adding technologies to improve demand management (e.g., irrigation scheduling, and conversion of irrigated cropland to dryland farming).
    - iii) Adding technologies to improve supply management (e.g., reuse of drainage water, and increased water storage capacity).
  - b) Estimate installation cost, in dollars, of each preliminary design alternative. Work includes developing preliminary layouts, determining feasibility of current infrastructure, determining performance specifications of proposed equipment, computing approximate quantities of all components, and estimating costs of equipment, materials, labor, permits, certifications, and related items required for installation and start-up of the system.
  - c) All preliminary design alternatives must be linked to improved monitoring and management of the volume, frequency, and application rate of irrigation water on irrigated lands.
  - d) Determine the applicable NRCS financial assistance payment schedule scenario, quantity and payment rates for the implementation of each preliminary design.
- 3) Present each preliminary design alternative to the participant and obtain the participant's selections. Document the selections and date received.

**DELIVERABLES**

The TSP must provide documentation showing all the tasks indicated in the **Technical Requirements** section and the following sections:

**Cover Page**

The cover page must include the following:

- 1) DIA name and number.
- 2) Participant information: Name, farm bill program, contract number (TSP obtains contract number from participant), land identification (e.g., state, county, farm, and tract number).
- 3) TSP name, TSP number, TSP expiration date, mailing address, phone number, email address.
- 4) Farm identification:
  - a) Farm name, owner name, street address, and county/state.
  - b) Primary phone number of the participant.
  - c) List of all practice and/or scenario designs included in this plan.
- 5) A statement by the TSP that services meet the DIA requirements, such as:

*I certify the work completed and delivered for this DIA:*

- *Complies with all applicable Federal, State, Tribal, and local laws and regulations.*
- *Meets the General and Technical Requirements for this DIA.*
- *The planned practices are based on NRCS Conservation Practice Standards in the state Field Office Technical Guide where the practices are to be implemented.*
- *Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.*
- *Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and participant’s objective(s).*

TSP Signature \_\_\_\_\_ Date \_\_\_\_\_

- 6) Participant’s acceptance statement indicating:

- *The plans and specifications adequately represent existing conditions and the selected preliminary design alternatives. I understand and will abide with the operation and maintenance plans.*
- *I accept the completed DIA deliverables as thorough and satisfying my objectives.*

Participant Signature \_\_\_\_\_ Date \_\_\_\_\_

- 7) A designated space for an NRCS reviewer to certify the agency’s acceptance of the completed DIA.

*NRCS administrative review completion by:*

Signature \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

## Notes and Correspondence

- 1) Provide notes, in date-order, that:
  - a) Document each interaction with the participant, results of that interaction, and the date of the interaction.
  - b) Document each site visit, its participants, the activity completed in the field, and results of each site visit.
  - c) Provide initials of the note-maker, if more than one person provides the assistance.
- 2) Provide copies of correspondence between the TSP and the participant relating to decision-making and completion of this DIA. For example, description of alternatives presented for evaluation and decision-making.

## Implementation Maps

Maps for a DIA must include these features:

- a) Map title.
- b) Participant's name.
- c) Assisted By [TSP planner's name].
- d) Name of applicable conservation district, county, and state.
- e) Date prepared.
- f) Map scale.
- g) Information needed to locate the planning area, such as geographic coordinates, public land survey coordinates, etc.
- h) North arrow.
- i) Appropriate map symbols and a map symbol legend on the map or as an attachment.

## Design or Implementation Details

- 1) Develop site-specific written instructions for implementing each planned conservation practice or activity included in the participant's DIA. Those instructions must:
  - a) Include, as a minimum, all items listed in each CPS "Plans and Specifications" section, the Statement of Work (SOW) "Design" section and the applicable Practice Specification (PS).
  - b) Include both graphical and narrative descriptions of the work. Provide descriptive information on the quality of the completed work and the quantities of all materials required for completion of the work.
  - c) A location map, plan view and written information are required. These items may be included in a single document where all specification information is included on the plans, or in multiple documents where the specifications are independent of the plans.
  - d) Include the following certification on the plans, along with the seal and/or signature of the TSP: "To the best of my professional knowledge, judgment, and belief, these plans meet applicable NRCS standards." (Title 210, NEM, Part 505, "Non-NRCS Engineering Services", Subpart B, Section 505.10(3)).

- 2) Prepare an operation and maintenance plan for each design that the participant will use after implementation of the practices are complete.
  - a) Include, as a minimum, all items listed in each CPS "Operation and Maintenance" section, the SOW "Design" section and the applicable PS.
  - b) Include requirements to obtain all applicable manufacturer installation guides, user manuals and warranty information.

### **Supporting Documentation**

- 1) Provide documentation of the following:
  - a) Surveys
  - b) Geological Investigations
  - c) Testing
  - d) Layouts of all components
  - e) Material specifications
  - f) Infrastructure and other considerations
  - g) Structural, foundation, hydraulic, and other design computations and analysis
  - h) Design checking and reviews
  - i) Facilitating practices or components that support the irrigation system(s) or management modification.
- 2) Computations, analysis, and other items that support and ensure adherence to the CPS criteria and are needed to develop the plans and specifications.
- 3) Engineer's cost estimate of each final design, including costs of components, materials, equipment, and labor required for demolition, relocation, installation, disposal and start-up; fees for disposal, permits, and certifications; charges for testing and other quality assurance activities; and all other costs associated with the implementation of each design.
- 4) Quality assurance activities that are required during installation to ensure the equipment, materials, and installations meet the design intent, function properly, provide the computed conservation benefits, and can be certified as meeting the plans and specifications.
- 5) Other information as required in the CPS SOW, including but not limited to, practice purpose, list of permits, facilitating practices, and state required items that affect safety and other environmental concerns.
  - a) Computed conservation benefits of each design using the appropriate baseline of past water withdrawals, applications, irrigation system uniformity, and energy consumption, by crop.
  - b) Analysis and evaluation of resource inventory conducted during preliminary design phase (e.g., soils tests, to include nutrient levels and salinity and/or water tests, to include nutrients, pathogens, salinity, pH, and trace elements).
  - c) Method planned to measure or quantify future water withdrawals, irrigation applications, and energy consumption.

- d) Documentation of the scientific method planned for scheduling the timing and amount of irrigation applications, based on the methods identified in the CPS. Irrigation scheduling method includes:
- e) Estimated volume of water applied by field, irrigation event, season, and/or year;
  - i) Estimated frequency or timing of irrigation applications, by field;
  - ii) Estimated application rates and depths of irrigation events.
- f) Document associated conservation practices and components required to comprise a conservation system for Irrigation Water Management (IWM).

### **Deliver Completed Work**

The TSP must:

- 1) Prepare and provide their participant two sets of the items listed in Deliverables.
  - a) One set is for the participant to keep.
  - b) The other set is for sharing with the local NRCS Office.
  - c) The TSP may transmit a set of the Deliverables to the local NRCS Office, if their participant has authorized it. It is recommended to provide NRCS field office an opportunity to review the DIA deliverables, prior to asking for its acceptance.
- 2) Upload electronic copies of all the Deliverables on NRCS Registry.

### **References**

USDA Natural Resources Conservation Service. Field Office Technical Guide.  
<https://efotg.sc.egov.usda.gov/#/>

USDA Natural Resources Conservation Service. National Planning Procedures Handbook.  
<https://directives.sc.egov.usda.gov/viewerFS.aspx?hid=44407>

USDA Natural Resources Conservation Service. National TSP Resources.  
<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1417414>

USDA Natural Resources Conservation Service. National TSP Website.  
<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/>