CONSERVATION PRACTICE SPECIFICATION
Irrigation Water Management – 449

Irrigation Water Management - 449 shall be planned and installed in accordance with the NRCS Standard detailed in the Field Office Technical Guide (FOTG) – Section IV – Conservation Practices. This document provides conservation planners with additional parameters, procedures, and requirements for developing site-specific specifications for the design and installation of this practice.

Irrigation Water Management (IWM) Plans

IWM planning is required for ALL irrigation water management practices, components, and systems evaluations (flow measurement /flow meter assistance, scheduling assistance, surge valves, pipelines, reuse, land leveling, etc). *Minimum* requirements apply to all NRCS assistance, whether or not the system is cost shared.

The IWM plan shall be reviewed with the cooperator, and a hard copy given to the cooperator. A copy of the complete plan shall be kept in the cooperator's file.

Note: improvements in delivery efficiency, application efficiency, or other irrigation water management improvements do not always result in "water saved" at the water source.

Basic Requirements (to be addressed in IWM plan or contained within the conservation plan)

1) Statement of purpose or goal and controlling factors of the irrigation method being used
2) Erosion inventory
   a) Slopes, relief, system layout, and other information about existing or potential erosion problems
   b) Erosion rate, located in FOTG – Section I – Erosion Prediction – Erosion Prediction PDF file
3) Conservation plan map (with legal description, field numbers, symbols, legend, pump and pipe locations)
4) Soils
   a) Soils map and map unit description from the published soil survey (additional information as needed)
   b) Available Water Holding Capacity (AWC) of the design soil* in the irrigated area (for each field planned) ** Design soil is the soil type selected as the basis for planning irrigation water management systems - usually the predominant or most representative soil type in the field*
5) Crop data
   a) Effective irrigation rooting depths used for management decisions
   b) Description of consumptive use (peak use and/or seasonal growth curves)
   c) Estimated Seasonal and Monthly Consumptive Use each type of crop (see FOTG - Section I - Reference Subjects – Engineering - North Dakota Irrigation Guide – Chapter 3 - Table 3.1, Sprinkler Irrigation and Table 3.2 - Furrow Irrigation)

Gross application determination

d) System capacity to meet maximum gross application requirements for all crops to be grown
e) The scheduled amount and timing of each application for each crop irrigated by the system

6) Scheduling
   a) Time of operation (i.e., does the cost of power, labor, maintenance affect timing and/or efficiencies – can changes be made)
   b) Day to day effects of wind, heat, and humidity on system performance
   c) Method (i.e. Checkbook Method, NDSU Extension Service, AE-792 or Spreadsheet Version)
7) Operation and Maintenance
   a) Irrigation System, Sprinkler – 442. All conservation practices are located in FOTG – Section IV – Conservation Practices.

Optional Information

The following are examples of optional information that may be included in IWM plans. The information may not apply to every site or system.

8) System
   a) Discussion of application method
   b) System capacity
   c) Expected efficiencies
   d) Pumping plant information
   e) Economics
9) Additional soils information
   a) Detailed soil AWC by soil families
   b) Estimating Soil Moisture by Feel and Appearance (USDA field guide) http://www.wcc.nrcs.usda.gov/nrcsirrig/
   c) Infiltration information
   d) Leaching requirements and methods (required for some situations)
   e) Erosion information and computations
   f) Maximum non-erosive application rate
   g) Organic matter information
   h) Soil test analysis
10) Additional crop information
   a) IWR output
   b) Root depth limitations
   c) Maximum percent by crop and/or crop stage
   d) Actual & predicted Evapo Transpiration (ET) information
   e) NDAWN Climate Sites http://ndawn.ndsu.nodak.edu/index.html
   f) Nutrient management, chemigation, pesticide management, etc.
   g) Crop rotation and yield information
   h) Deficit irrigation information
11) Additional scheduling information
   a) Agronomist (NDSU, Seed Companies, Private Consultants)
   b) Description of soil moisture monitoring equipment and techniques

12) Evaluation and recommendations
    a) Engineering forms plus design data
    b) Models (CPED, FIRS, CPNOZZLE) http://www.wcc.nrcs.usda.gov/
    c) Evaluation results (catch-can tests, cylinder intake information, etc.)
    d) Listing of system planning alternative
    e) RUSLE, WEQ WIN-PST documentation in FOTG – Section I – Erosion Prediction – Erosion Prediction PDF file
    f) Supporting information

References:

North Dakota Irrigation Guide in FOTG - Section I - Reference Subjects – Engineering
National Irrigation Guide (652) in FOTG – Section II – Irrigation
National Engineering Handbook Part 623 http://www.info.usda.gov/CED/
National Agronomy Manual http://policy.nrcs.usda.gov/viewerFS.aspx?hid=19001

Recommended Documentation for IWM Plan

The IWM plan for a specific contracted item or component practice should be coordinated with other aspects of the total farm plan. ND-CPA-449 will be used to document the majority of the information needed. Forms are found in FOTG – Section IV – Forms. Plan maps, soils maps, soils descriptions, and other pertinent maps should be included as applicable.

- A goal for the current activity or practice should be described. The goal should relate to irrigation activities and items that affect a successful outcome.
- A conservation plan map, soils photo, ortho-quad or other image map can be used to locate and describe the water source, control devices, field, and application system. Conditions that might affect operation should also be described.
- A brief description of the soil characteristics should be made. Intake family characteristics or rates, available water holding capacity (AWC), management allowed depletion (MAD), and possible erosion or salinity problems should be outlined for the major soil areas. Details of other soils that could affect operation should also be highlighted.
- All crops grown or being considered by the operator should be characterized for rooting depths, peak and seasonal consumptive use rates, and impacts on production of water shortages during important growth periods.
- The peak period of crop consumptive use for all crops likely to be grown must be determined to calculate the minimum required water delivery. The peak period may be
    - ✓ A one or two week period of maximum consumption for sets where an effective root zone is filled to total water holding capacity
    - ✓ The total seasonal use expected to be needed by the crop
    - ✓ The maximum crop water use to be supplied for an individual day (this is generally the limiting value for sprinklers and a center pivot).
- With the peak period consumptive use determined, a net application needed to meet the crop demand is made. A gross application volume is determined by dividing the required net depth by the system application efficiency, adjusted for effects of wind, field elevation variations, distribution uniformity, or other site-specific conditions.

- A suggested schedule for repeated applications should be made that describes how the system operation can efficiently meet the seasonal needs of the crop. This schedule must be flexible to meet varying crop growth rate demands and changes or interruptions in water delivery. With a center pivot, the schedule must not allow deficits greater than 50 percent; otherwise the system may not be able to keep up to crop needs.
- A method to estimate soil moisture available before or during the irrigation season should be included to help make adjustments to the scheduled applications.
- A measurement method for determining the amount of water applied shall be included. Tools such as flow meters, flumes, measurement weirs, tables for nozzle performance, or other appropriate methods could be used.
- The quantity of water conserved or the improved uniformity of water application, either per application or throughout the entire irrigation season, should be calculated.
- Finally, an operation and maintenance plan to keep the performance of the systems near its original condition should be planned with and signed by the owner/operator, for her/his own benefit.