## Chapter 10  Conservation Management Systems and Irrigation Planning

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NJ652.10 Conservation Management Systems and Irrigation Planning

(a) General

Irrigation system planning must consider the potential interactive effect on soil, water, air, plants, and animal resources (SWAPA), plus how an action may affect the onsite and offsite human environment. An irrigation water management plan is a component of an overall farm conservation plan. Refer to the National Irrigation Guide, Chapter 10 page 10-2, for more detailed objectives of an irrigation plan and the planning process.

(b) The Planning Process

The first phase of irrigation planning is to conduct a resource inventory, and analyze data. An inventory and evaluation is conducted to collect resource data. Some of the more important data required for planning are soils, crops, topography, water supply, existing physical features, existing irrigation systems, water table presence, existing drainage systems, environmental factors, present farm operation, skill and labor available, operators desires and concerns, and energy resources. Refer to Irrigation Site Evaluation Form and General Planning Worksheet.

Soils: The soil survey is a prime source for soils information. In addition a field investigation is generally necessary to identify actual surface soil texture, plant root zone volume, and compaction. Compaction can limit plant root development and water measurement. Judgment must be used by the planner in determining how reliable existing data are and if additional detail surveying and testing are needed.

Crops: Identify crops grown and determine peak crop evapotranspiration rate. Determine net irrigation water requirements and frequency of irrigation based on soils and crops grown. Find out cultural practices used. This includes cultivation sequence, equipment used, width of equipment, crop varieties, fertilizer usage and time of application, crop rotations, and planting and harvest dates. Discuss crops and cultural practices used in a planned cropping sequence.

Topography: Determine high and low points in the field and direction of irrigation. A detailed topographic map is often necessary for planning and designing micro and low pressure sprinkler irrigation systems. Small changes in elevation can have large effects on irrigation uniformity when using low pressure irrigation systems.

Water Supply: Determine flow rate, source location and elevation of water supply. Water quality, including chemical content, sediment, and debris loads also need to be determined. Quality of runoff water from upstream can determine its suitability for use on certain crops. Runoff water may contain certain pesticides and their metabolites, nutrients (phosphorous) and sediment. Tailwater Recovery and reuse should be considered where allowed by local water regulations. It may be necessary to obtain laboratory tests for chemical content, measure water supply flow rates, and treat tailwater through chlorination or ionization processes. Such practices are being implemented on container nursery operations in New Jersey where runoff from sprinkler systems in hoophouses are collected and reused.

Existing Physical Features: Determine access to all parts of the irrigated area and location of roads, above ground utilities,
buried utilities, and other physical features. Depth to buried utilities may control excavation location and depths. Above ground utilities may limit the use and layout of sprinkler systems (pivot and linear move, travelers). Use aerial photographs and maps as plan base maps and add sketches or overlays.

**Existing Irrigation Systems:** An analysis of the existing irrigation system and management helps to determine if it is appropriate for the resources involved. Make an inventory of the existing system. Gather data on equipment brands, models, and capacities. Talk to the water user regarding their concerns about certain irrigation systems. Users deserve information on the best available method and systems that meet their needs and are most suitable for the site. To often the perception exists that to improve water application a new or different irrigation system must be installed. Using proper water management with the existing system often results in increasing water application efficiency more then 30 percent.

**Water Table:** Determine if there is a seasonal high water table that may contribute to either part or all of the crop water needs. Note the depth, duration, drainage and water quality.

**Existing Drainage Systems:** Analyze existing surface and subsurface drainage facilities. Include condition of existing ditches and underground drains, sources of water and problems created by poor drainage.

**Environmental Factors:** Assess resources within the planning area. This can be facilitated using the environmental for resource management planning (Exhibit 5, Part 600.7, NRCS National Procedures Handbook).

**Energy Resources:** Inventory the existing power equipment or the availability and costs of proposed power sources. Diesel and gasoline engines for powering pumps can be more cost effective then electric. Estimate pump efficiency and consider total pumping plant evaluations.

**(c) Irrigation Water Management Plan**

The Irrigation Water Management (IWM) Plan is a segment of the Farm Conservation Plan and includes data needed by the water user to implement, operate, maintain, and properly manage the selected irrigation system. Components of the IWM Plan are grouped together in the IWM Notebook which is developed for the irrigator to use when implementing irrigation water management. IWM Notebook sections should include the following:

- **IWM Plan:** This includes details needed to manage the irrigation system. Items that should be included include: Soils information (intake and application rates); Operation details; Irrigation scheduling information; Design flow rates, gross and net depth of application; Installation and maintenance recommendations; and Water use log.
- **Irrigation Scheduling Checkbook Worksheets**
- **Design Material:** Site plan and system design worksheets. Location maps, aerial photographs, and soil and topo maps.
• **System Evaluation Reports:** A basic or more detailed evaluation of the irrigation system performance is recommended. Pump operating pressures and pressures throughout the system need to be checked and recorded. Flow measurements and uniformity checks should also be recorded in this section of the plan. The need for adjustments should be fully explained to the water user during the planning process.

• **Information Data Sheets:** Manufacturer specification sheets, irrigation scheduling reference sheets, flowmeter and backflow prevention devices are some examples of literature to include in this section.

(d) **Planning Aids**

The following worksheets can be used for irrigation planning and documentation in New Jersey:

- Irrigation Site Evaluation Form and General Planning Worksheet.
- Excel Irrigation Design Review Worksheets: These include sheets for all methods and systems used in NJ.
- Irrigation Water Management Notebook, template plan