

Appendix 2  
***Land Classification Report or Appendix and  
Land Resources Chapter Outlines***

**Semi-Detailed and Post-Authorization (Detailed) Planning-Grade Investigations**

I. INTRODUCTION

- A. Purpose, Nature, Extent, and Date of Lands Resource Investigations
- B. Summary of Findings and Conclusions
- C. Recommendations
- D. Summary Data Sheet
- E. Names of Land Classifiers Participating in the Investigation

II. GENERAL DESCRIPTION

- A. Location and Extent of Area to be Investigated
  - 1. Include region, major river basin, states, counties, and towns
  - 2. Any division of project area into units
- B. Geology and Geomorphology of the Area
  - 1. Short geologic history of the area, presenting, if available, profiles of the important geologic formations and their areal distribution.
  - 2. Description of the surficial geology in relation to the landforms occurring in the area. Describe prominent landforms occurring in the area and the nature of the understrata immediately below the soils.
  - 3. Soil derivation - loessal, aeolian, lacustrine, residual, etc.
- C. Climate as Related to Irrigation Agriculture
  - 1. Source of weather data (include location of station, length of record, the years used to compute mean values, and relationship between weather at station and at area of investigation)
  - 2. Temperature characteristics
    - a. Mean number of days above 32 °F, after mean and minimum
    - b. Frost hazards as influenced by air drainage
    - c. Mean number of days temperature equals or exceeds 90 °F

- d. Mean annual temperature
  - e. Usual and historical mean minimum and maximum temperatures
3. Precipitation characteristics
    - a. Mean annual precipitation and recorded fluctuations
    - b. Mean precipitation for growing season
  4. Other climatic characteristics
    - a. Wind velocity
    - b. Humidity
    - c. Hail frequency
  5. Effect of weather on irrigation practices, crops, and other management practices

#### D. Agricultural Development

1. History
2. Present land use
3. Native vegetation
4. Rainfed farming
  - a. Crops
  - b. Yields
5. Irrigation development
  - a. Crops
  - b. Yields
  - c. Cultural practices
  - d. Water supply
  - e. Water suitability
  - f. Drainage
  - g. Problems
  - h. Extent

### III. PRINCIPAL NATURAL LAND BODIES (repeat items for each principal body)

#### A. Soils

1. Describe Natural Resources Conservation Service's Soil Series
2. Parent material

3. Genesis
  4. Associated landform
  5. Description of typical profiles
    - a. Color
    - b. Texture
    - c. Stoniness
    - d. Gravel
    - e. Depth
    - f. Structure
    - g. Consistency
    - h. Mottling
    - i. Density
    - j. Pans
  6. Soil-moisture relationships
    - a. Water intake
    - b. Permeability
    - c. Water retention
  7. Chemical characteristics
    - a. Soil reaction (pH)
    - b. Salinity
    - c. Sodicity
    - d. Acidity
    - e. Cation-exchange capacity
    - f. Mineralogy
    - g. Toxic constituents
    - h. Fertility
  8. Location and extent
  9. Variability
  10. Suitability for irrigation
  11. Representative profiles or master sites
- B. Topography
1. General description of main topographic features
    - a. Position and extent (relief in relation to surroundings)
    - b. Slope
    - c. Surface - macrorelief and microrelief
    - d. Elevations

- e. Irrigation field sizes and shapes
  - f. Cover (i.e., tree or brush and rock removal needs)
2. Suitability of topography for gravity, sprinkler, and drip methods or irrigation
    - a. Slope
    - b. Field configuration
    - c. Land grading
    - d. Cover
    - e. Air drainage
  3. Specific problems associated with the topography, in relation to the proposed irrigation method(s)
- C. Drainage
1. General discussion of drainage conditions
    - a. Describe present water table condition, water table gradients, and conditions of the understrata, which are thought to cause present or anticipated future drainage problems.
    - b. Location of areas where future subsurface and surface drainage relief will be most urgently needed
    - c. General nature of flood problems, if any
    - d. Construction requirements with development
    - e. Responsibilities for drainage construction (project versus farm)
  2. General suitability of the area for irrigation from standpoint of surface and subsurface drainage
  3. Effect methods of irrigation will have on anticipated drainage problems
- D. Salinity and Sodidity
1. General discussion of present salinity
  2. Specific areas affected
    - a. Extent
    - b. Type, distribution, and amount of salts
    - c. Source of accumulations

- d. Possibility for change
3. General suitability of the area for irrigation from the standpoint of salinity or sodicity
4. Impact of irrigation development or other land uses and special investigations, where needed
5. General statement on effects of land salinity on return flow quality

#### IV. WATER

##### A. Sources - Stream Diversion, Impoundments, or Groundwater

##### B. Characteristics

1. Analysis of anticipated water quality - include total dissolved solids (milligrams per liter), pH, electrical conductivity, cations (milliequivalents per liter), anions (milliequivalents per liter), Sodium Adsorption Ratio (SAR), and boron (milliequivalents per liter)
2. Discuss anticipated variations in chemical composition

##### C. Leaching Requirements

1. Anticipated leaching requirement for specific crops
2. Salinity anticipated at equilibrium conditions
3. Anticipated leaching fraction in meeting leaching requirement
4. Water management considerations

##### D. Suitability for Irrigation

1. Statement summarizing suitability of the water for irrigation, in relation to the lands, cropping, and management.
2. Anticipated Exchangeable Sodium Percentage (ESP) and salinity levels at equilibrium (cite basis for these predictions)

##### E. Quality of Return Flows

1. Characteristics including physical, chemical, and biological over time
2. Impacts

#### V. LAND CLASSIFICATION

A. General Description of Land Classification Investigation

1. Objective
2. Factors considered
3. Segregations involved
4. Type of survey
5. Previous soil and land classification investigations and dates, including evaluation
6. Cooperation with other agencies

B. Land Classification Specifications

1. Irrigation method anticipated and factors influencing selection
2. Correlation with economic, drainage, and water quality factors
3. General description of land classes
4. Specifications chart

C. Methods

1. Personnel and equipment
2. Base maps
3. Field procedures for establishing and identifying delineations
  - a. Traverses of the area
  - b. Type and frequency of borings
4. Role of drainage
5. Role of economics
6. Laboratory support
  - a. Screenable testing procedures
  - b. Detailed site analyses
  - c. Source of laboratory procedures (may be included in appendix)
7. Special investigations
  - a. Land development
  - b. Special soil studies such as water-holding capacity, leaching, infiltration, hydraulic conductivity, and other
  - c. Quality of return flows
  - d. Master site selection

## D. Results of Land Classification Investigation

### 1. Detailed descriptions of land classes and subclasses\*

- a. Arable lands - Classes 1, 2, and 3, and subclasses
- b. Class 5 and its disposition
- c. Nonarable land - Classes 6 and 6W
- d. Urban and suburban developments - Class "H"

\*(These data should include the characteristics and qualities of soil, topography, and drainage features that will affect land use or management factors under irrigation. Such data may be advantageously set forth in a tabular form. It should be noted that this is one of the most important portions of the report, so care should be used in developing these descriptions.)

### 2. Arability results

- a. Sample of typical land classification sheet
- b. General and arable area map
- c. Tabulation of arable land classes, subclasses, and deficiencies

## VI. DETERMINATION OF IRRIGABLE AREA

### A. Basis for Irrigable Area

### B. Factors Affecting Selection of General Land Areas or Subareas of the Project

1. Feasibility of water service
2. Adequacy of water supply to serve arable land
3. Feasibility of drainage service
4. Effects of return flow quality
5. District boundaries

### C. Factors Affecting Onfarm Irrigability

1. Elevation and location
2. Topographic or natural barriers
3. Rights-of-way
4. Ownership boundaries
5. Others

### D. Tabulation of Irrigable Land Area

1. Unit or subdivision of project

2. Land classes
  3. Irrigated and nonirrigated
  4. Method or irrigation to be used
- E. Map of Irrigable Land, if Significantly Different than Arable Acreage
- F. Productive Acreage and How Derived

## VII. SPECIAL PROBLEMS

In this portion, briefly discuss any problems relating to land classification that may affect the ultimate suitability of the area for irrigation development. Suggested solutions to the problem should be given, together with the effect these problems have had on land classes and total arable acreage. Typical items for inclusion in this portion are slick spots; low-cation exchange capacity; high or low infiltration rates; low water-holding capacity; need for amendments; high grading, clearing, or stone picking costs; bedrock outcrops; numerous isolations; lack of drainage outlets; or poor surface drainage conditions. If all factors are favorable, this chapter may be omitted. It is suggested this discussion be organized as follows. Delete items that are not pertinent.

- A. Soil Problems
1. Fertility
  2. Salinity
  3. Sodicity
  4. Acidity
  5. Toxicity (e.g., boron and selenium)
  6. Pans
  7. Water retentivity
- B. Topographic
- C. Drainage
- D. Water Quality
- E. Land Development

## VIII. APPENDED MATERIAL AND SUPPORTING DATA

- A. Master Site Descriptions and Method of Location
- B. Description of Analytical Procedures (may be filed with Supporting Data)
1. Particle size
  2. Textural class (laboratory)
  3. Hydraulic conductivity
  4. Settling volume



5. Moisture retentivity
  6. Soil reaction
  7. Organic carbon
  8. Available phosphorus
  9. Saturation extract with constituents
  10. Exchange acidity
  11. Total titratable acidity
  12. Exchangeable bases
  13. Cation-exchange capacity
  14. Gypsum
  15. Gypsum requirement
  16. Insoluble carbonates
  17. Other
- C. Supporting Data (In all cases, a description of the data used is required; however, actual data need only be filed in the project, area, or district office)
1. Examples
    - a. Tabulations of acreage by sections
    - b. Detailed report of physical and chemical analysis
    - c. Detailed description of procedures and special studies
    - d. Profiles of deep borings
    - e. Land classification maps
    - f. Common and scientific names of crops referred to in this appendix
    - g. Glossary of terms
    - h. Symbols and abbreviations
    - i. Conversion formulas and factors
    - j. Bibliography

## LAND RESOURCES CHAPTER OUTLINE

### I. Introduction

### II. Review and Evaluation of Available Data

### III. Description of Resources

- A. Soils
- B. Topography
- C. Drainage
- D. Geology
- E. Quality of Water
- F. Land Use

### IV. Investigation

- A. General Discussion
- B. Mapping Specifications
- C. Land Characterization
- D. Field and Laboratory Characterization of Soil Profiles
- E. Findings
  - 1. Water suitability for irrigation
  - 2. Land suitability for irrigation development
  - 3. Land use including special cultural considerations
  - 4. Impacts of development on other uses
  - 5. Special problems
- F. Conclusions
- G. Recommendations

Relation of land classes and subclasses to irrigated crop adaptability and management

Land class	Principal subclasses	Descriptive characteristics of soil, topography, and drainage	Gross area (acres)	Percent of arable	Crop adaptability	Management factor
3	3st vg 22	Smooth, steeply sloping alluvial fans of loamy fine sand underlain by gravelly, cobbly sandy loam. Well drained.	840	6.2	Apples and peaches with ground cover should be most profitable. Alfalfa and pasture would do well. Clean cultivated not recommended.	Light, frequent irrigations needed. Soils are erosive and have high intake rates. Sprinkle irrigation or gated pipe with drop structures best. Frequent fertilization required.
Note: Information shown above is an example of detail desired.						

