

Nordick Controlled Drainage, Saturated Buffer and Subirrigation Water Management Demonstration Project

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Introduction

The goal of this project is to mitigate flooding and minimize unwanted negative impact of agricultural subsurface drainage. The objective is to demonstrate the water quality and quantity benefits of several conservation drainage practices. The study has two field sites located approximately 3 miles apart in West-central Minnesota, Figure 1.

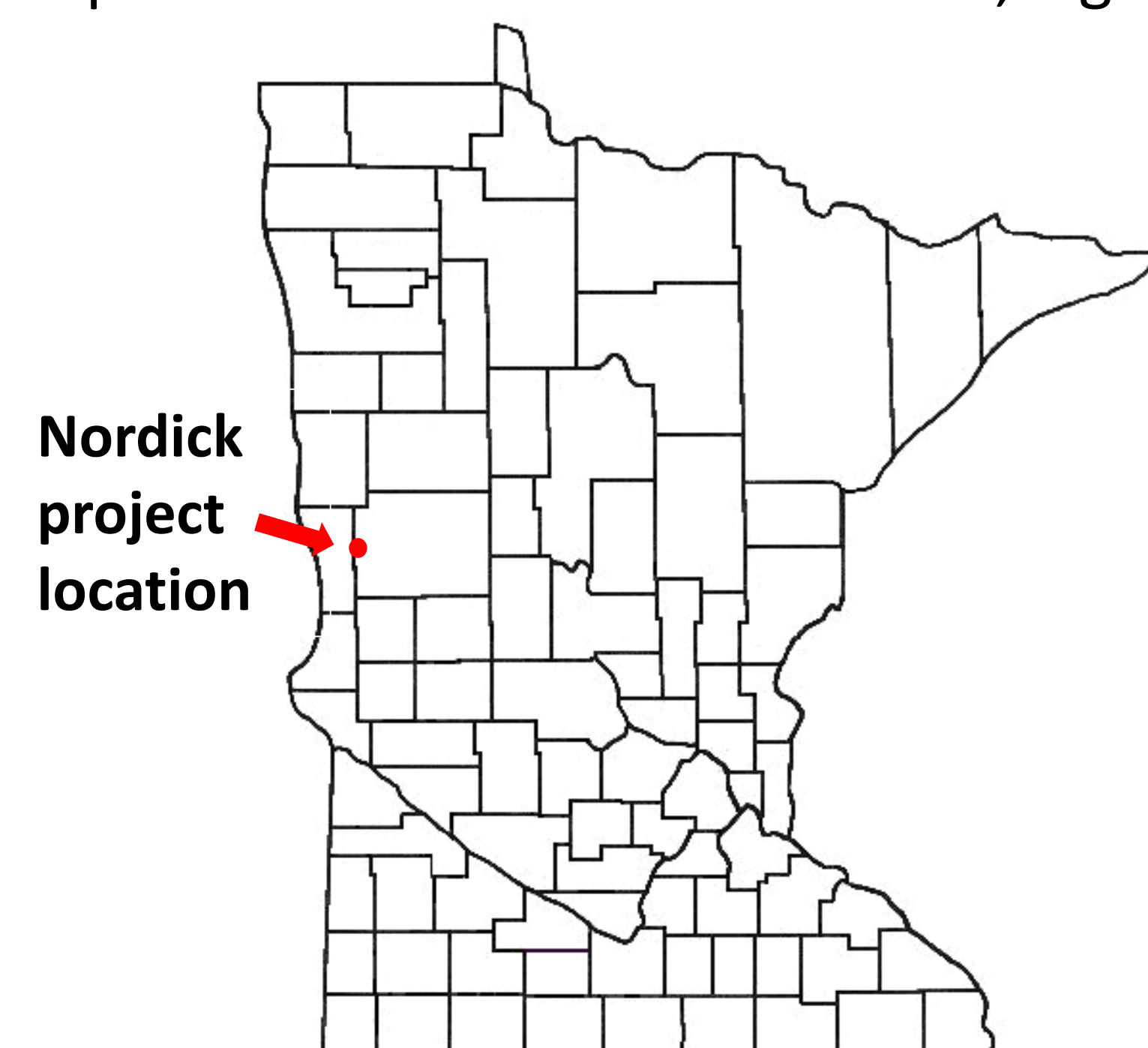


Figure 1. Location of the project site within the state of Minnesota.

Site 1 – 155 acres

Paired watershed approach, Figure 3, comparing

- controlled drainage and subirrigation,
- conventional subsurface drainage, and
- surface drainage only.

Tile spacing 45 feet, tile depth 3 feet, grade 0.1%. Storage pond holds 3 acre-inch/acre for 50 acres.

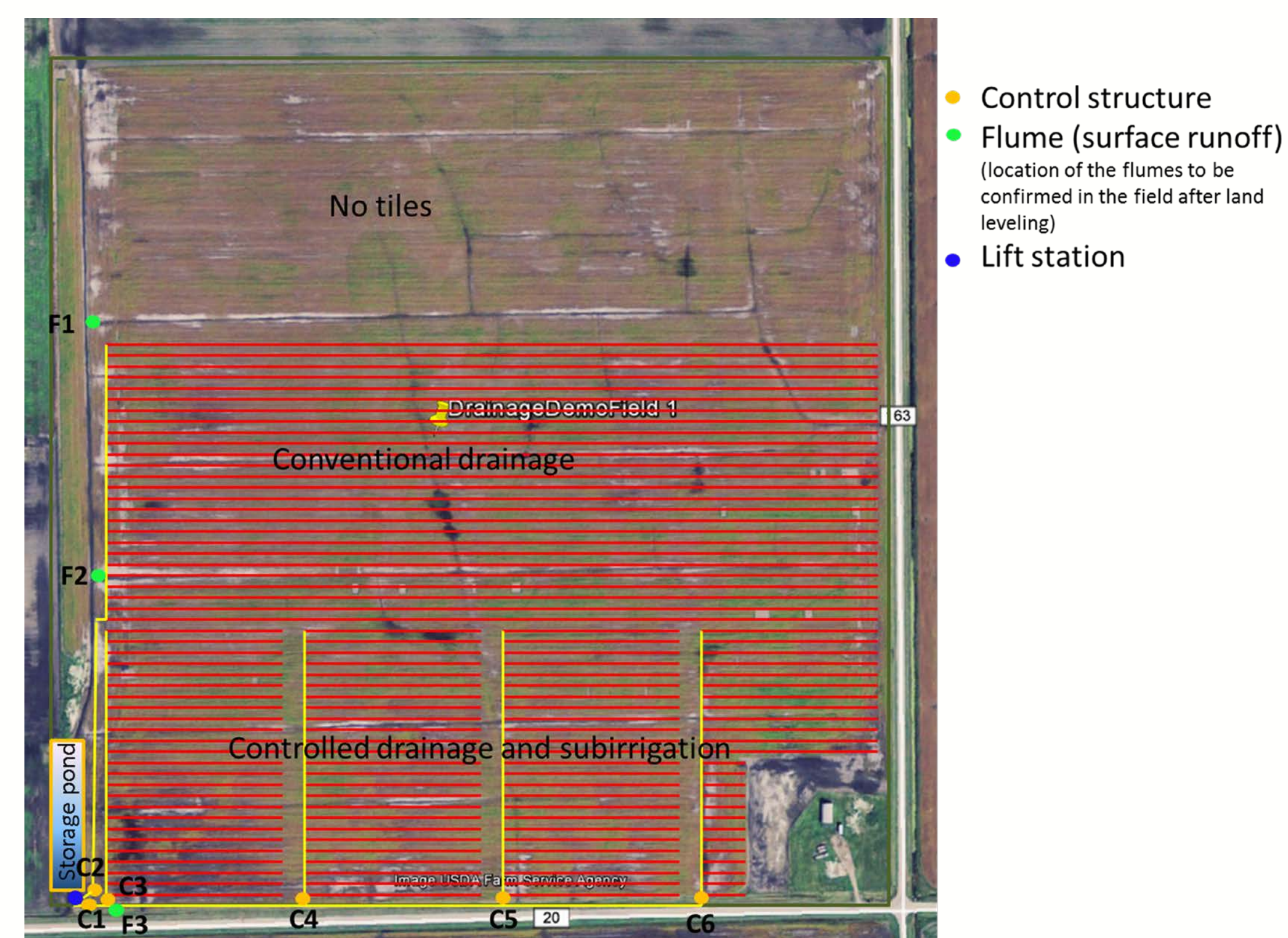


Figure 3. Layout of site 1 with controlled drainage and subirrigation, conventional subsurface drainage and surface drainage only.

Monitoring

- Surface runoff from 3 treatments.
- Subsurface drainage flow from conventional drainage.
- Subsurface drainage flow from 4 controlled drainage zones.
- Rainfall and irrigation water use.
- Soil water content and soil temperature.
- Nitrate-nitrogen in surface runoff and subsurface drainage.
- Salt concentration in the storage pond.

Time and management required for controlled drainage and subirrigation.



Site 2 – 65 acres

Two zones of controlled drainage and a saturated buffer, Figure 4. Field is divided into 3 zones:

- 2 zones managed with controlled drainage.
- 1 zone with a saturated buffer.

Tile spacing 60 feet, tile depth 3 feet, grade 0.1%.

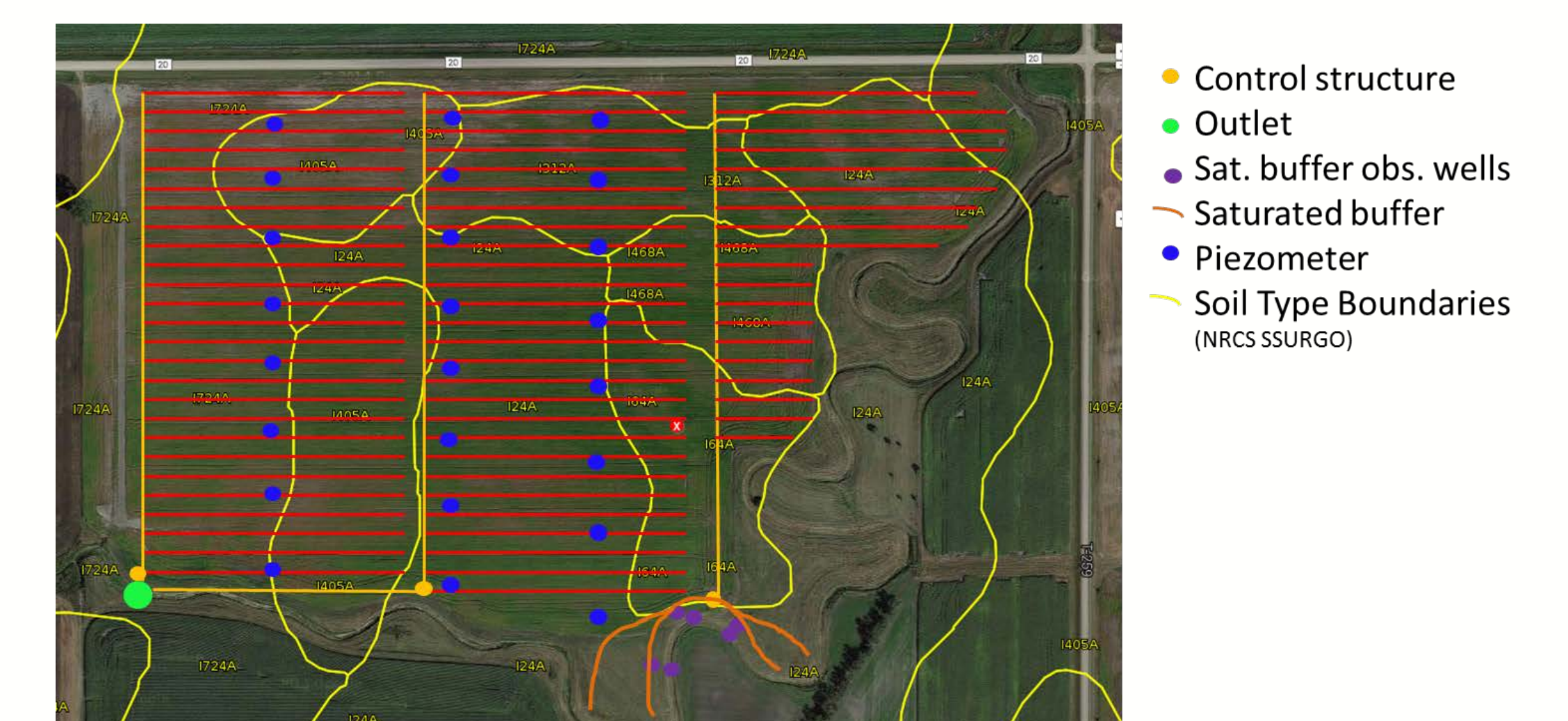


Figure 4. Layout of site 2 with controlled drainage and saturated buffer.

Monitoring

- Subsurface drainage flow from controlled drainage.
- Subsurface drainage flow through saturated buffer.
- Nitrate-nitrogen in subsurface drainage.
- Depth to saturated soil within the root zone.
- Rainfall, air temperature and air humidity.

Installation

Installation of the below-ground structures was completed in the fall of 2015, Figure 5. The storage reservoir is scheduled to be completed in 2016.

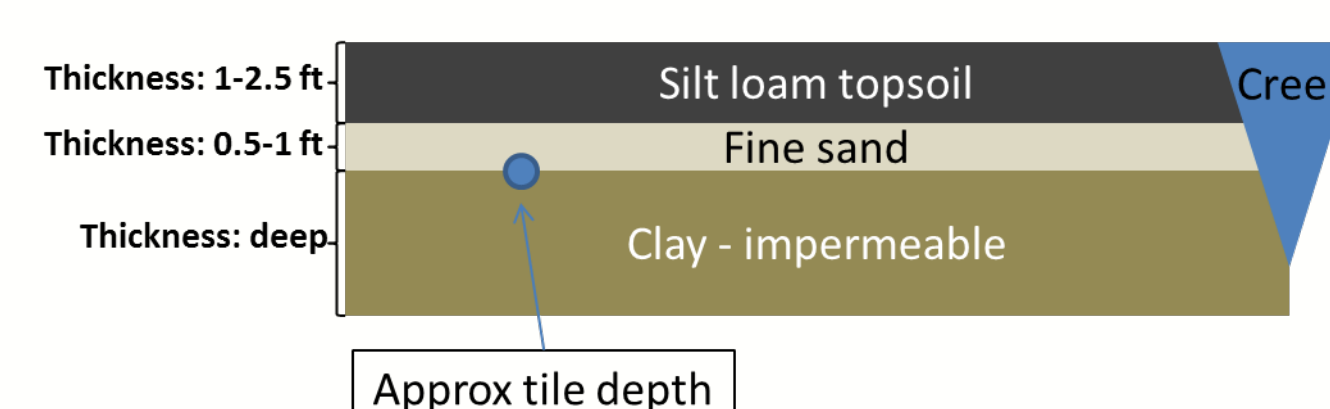


Figure 5. Trenching in 12 inch main line (left), plowing in 6 inch sub-main line (center), water control structure after installation (right).

Site characterization

The project area is located in the Red River Valley on soils formed by glacial Lake Agassiz. The soil profiles are relatively typical of the area. Site 1 has 3-4 feet of silt loam over clay. Site 2 has silt loam over a contiguous layer of fine sand above the clay, Figure 2. Both sites are in a corn-soybean rotation with an occasional year of wheat.

Figure 2. Generalized soil profile for project site 2.



Project partners

The project partners are Gerald and Jared Nordick, the Minnesota Department of Agriculture, USDA Natural Resources Conservation Service, Wilkin Soil and Water Conservation District, Buffalo-Red River Watershed District, Agridrain Corp., Prinsco, Advanced Drainage Systems (ADS), Tightline Drainage, and Jemco.