



Remediation of Salt-Impacted Soils Using Automated Conductivity Monitoring, Leachate Collection, Irrigation, and Injection

Ion Ratiu M.Sc. & Dewey Dunnington, B.Sc.
GeoGrid Environmental Inc.

Salt Remediation

- Salt contamination a major issue in western Canada
- Affects soil, vegetation growth, and groundwater quality
- Available remediation options are costly and often have limited success

Options



- ❑ Removal and landfill disposal of impacted soil
- ❑ In-situ remediation
- ❑ Combination of methods

In-Situ Remediation

- Commonly based on soil flushing, sodium displacement and removal

System Components

- Salt leaching
- Leachate removal
- Leachate treatment/disposal

Objectives

- Reduce/optimize irrigation water usage
- Maintain control of the hydraulic gradient within the treatment area
- Control the irrigation and leachate disposal through continuous monitoring
- Reduce leachate disposal

The Site

- Remediation of a historic produced water release from ruptured pipeline

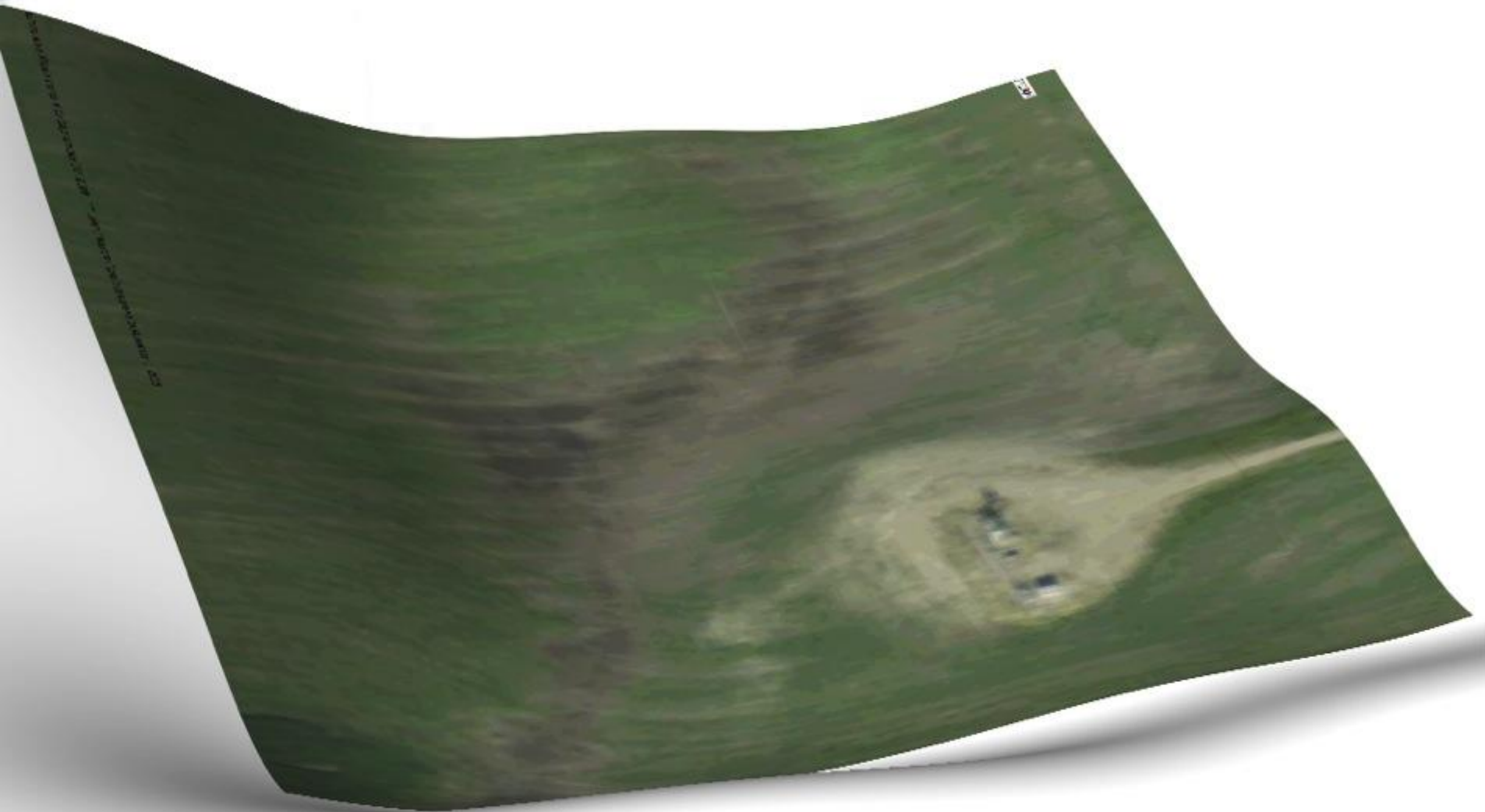
Location

- Release occurred on a hillside
- Near operating wellsite

Land Use

- Agricultural land use

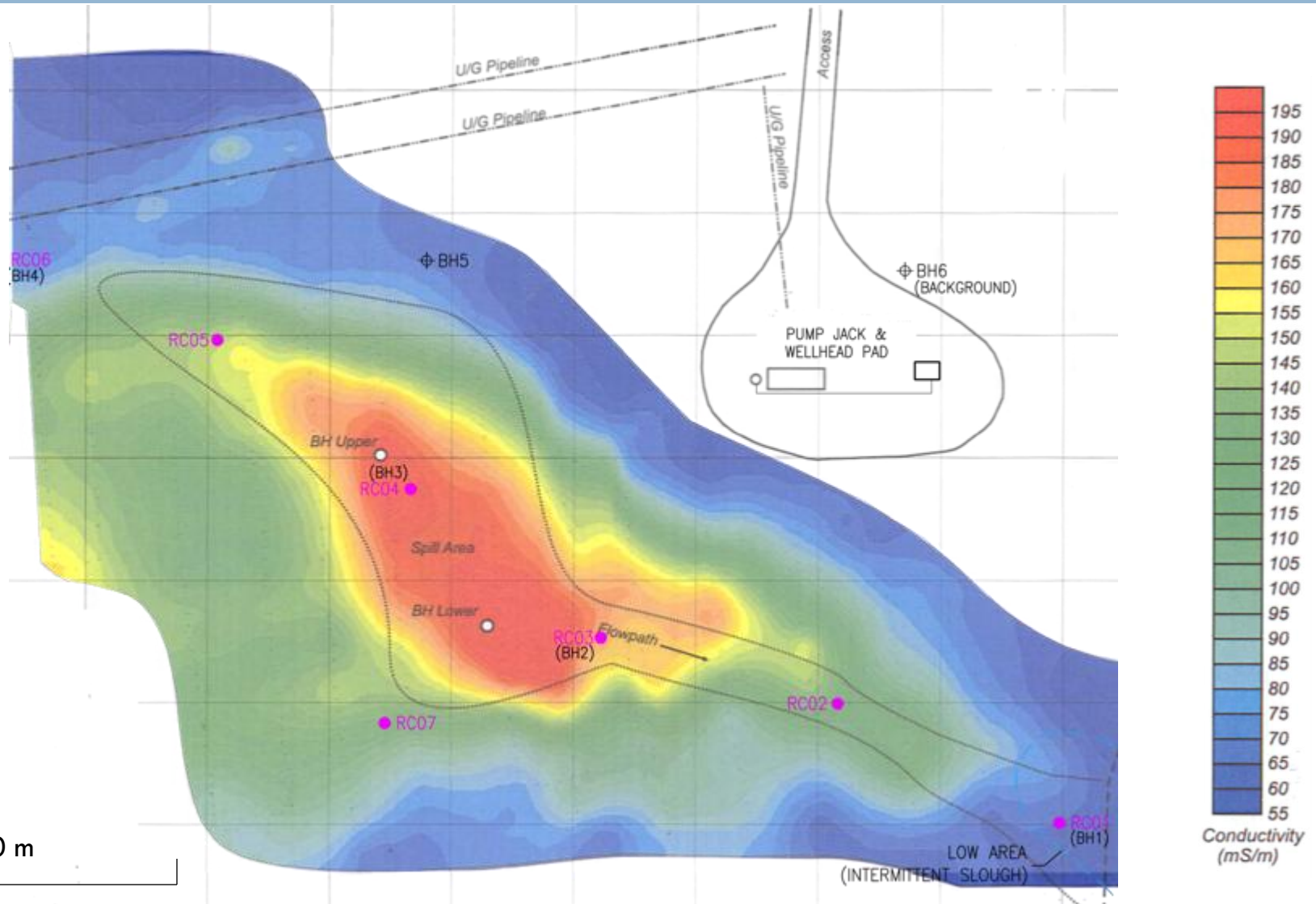
Before Remediation



Site Overview

- Spill pathway located on hillside
- The affected area covers 0.6 ha
- Salt impacts extend to approximately 6.0 mbgs
- Approximately 36,000 m³ of salt impacted materials
- Clay till

EM Survey







Master Plan

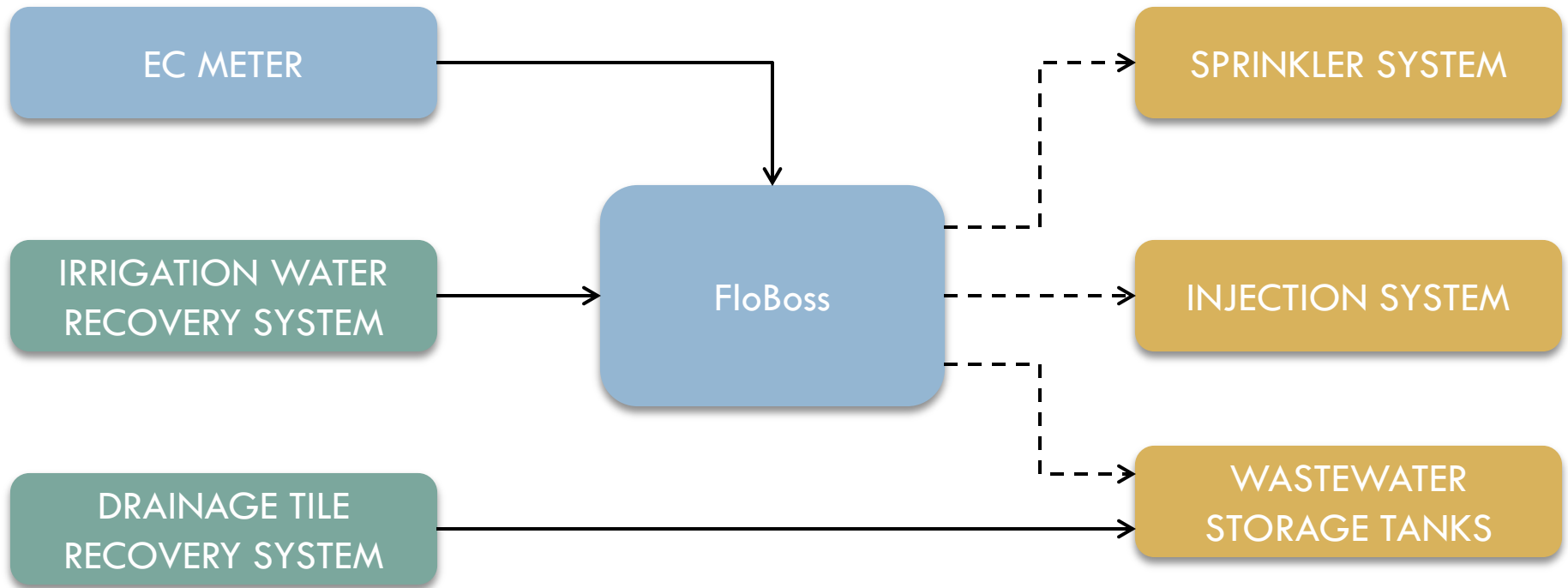
Take good ideas

- Surface irrigation & subsurface injection
- Drainage tile & wastewater recovery system
- Irrigation water recovery system

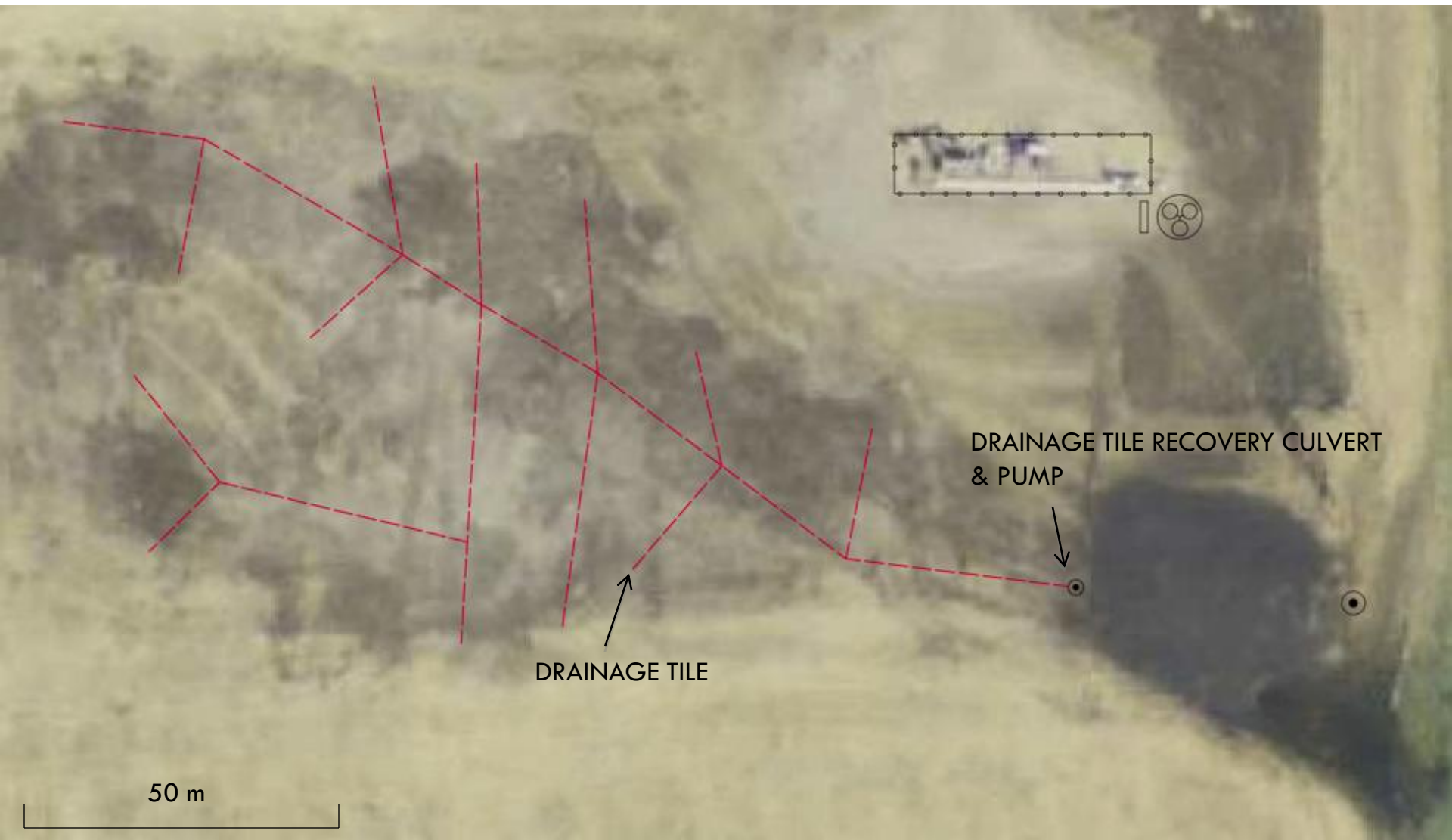
Make them better

- Install EC meter to monitor irrigation water quality
- Install flow-computer to automatically route irrigation water

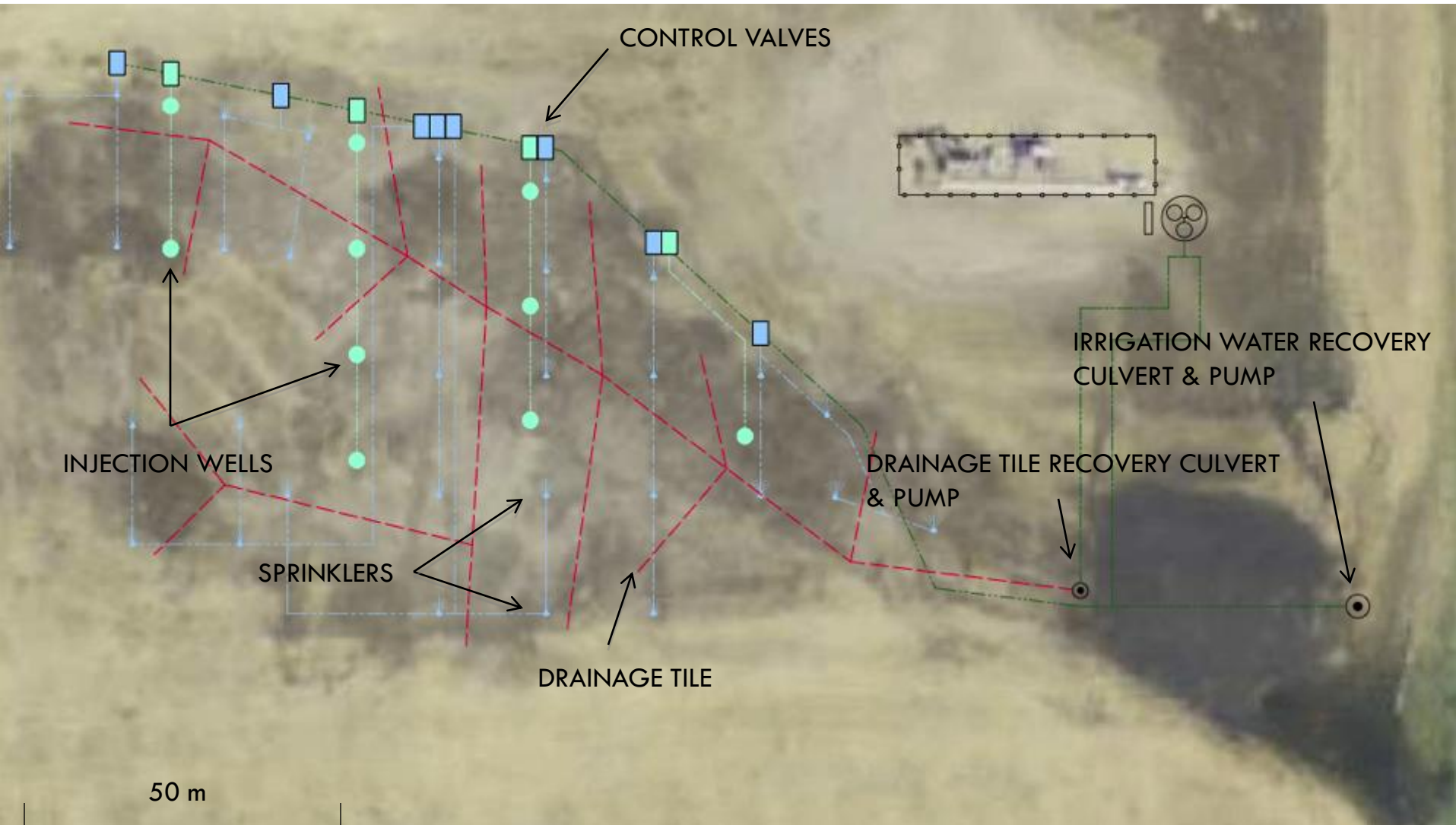
System Model



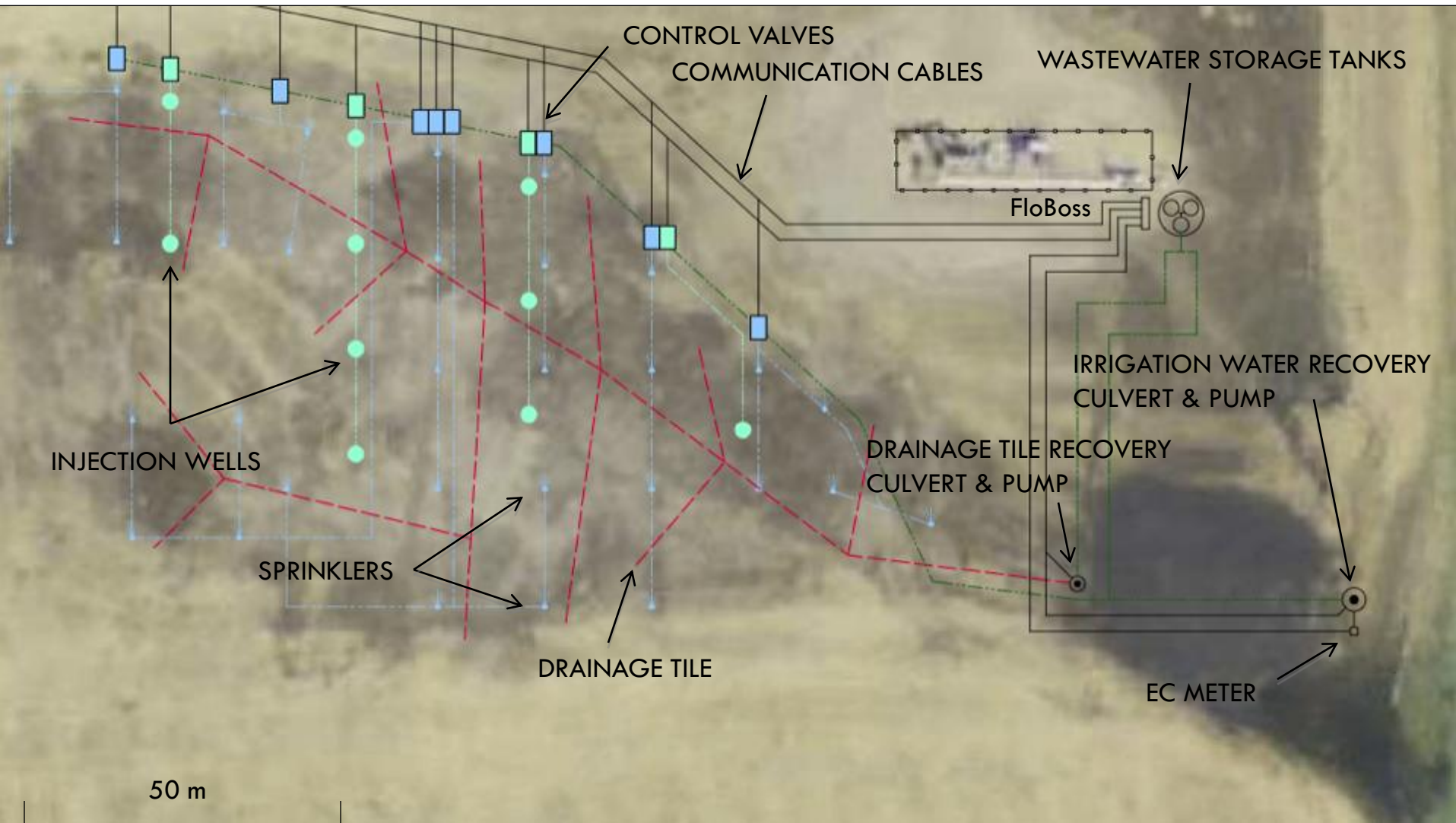
Drainage Tile System



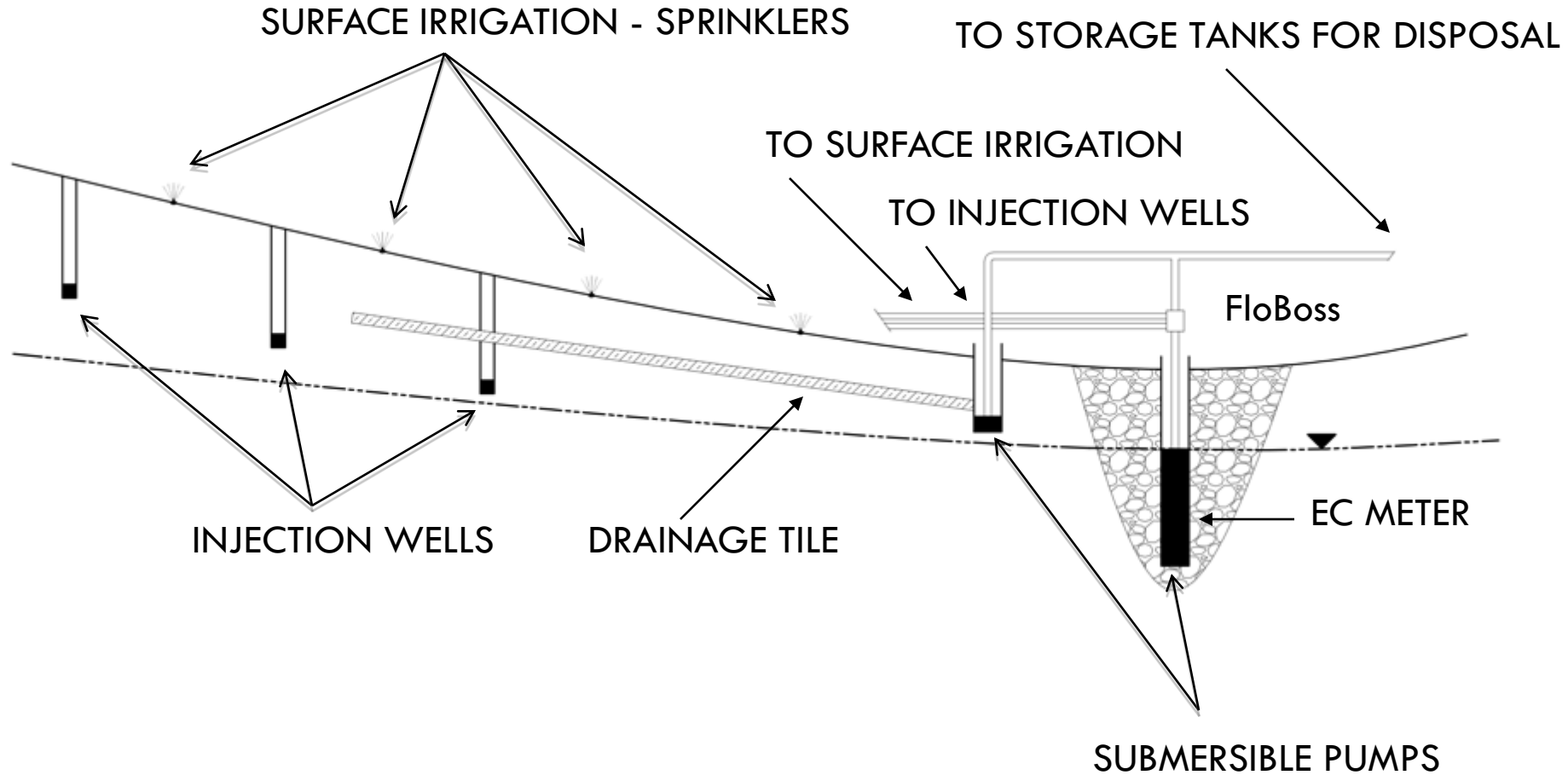
Injection/Sprinkler System



In-Situ Remediation System

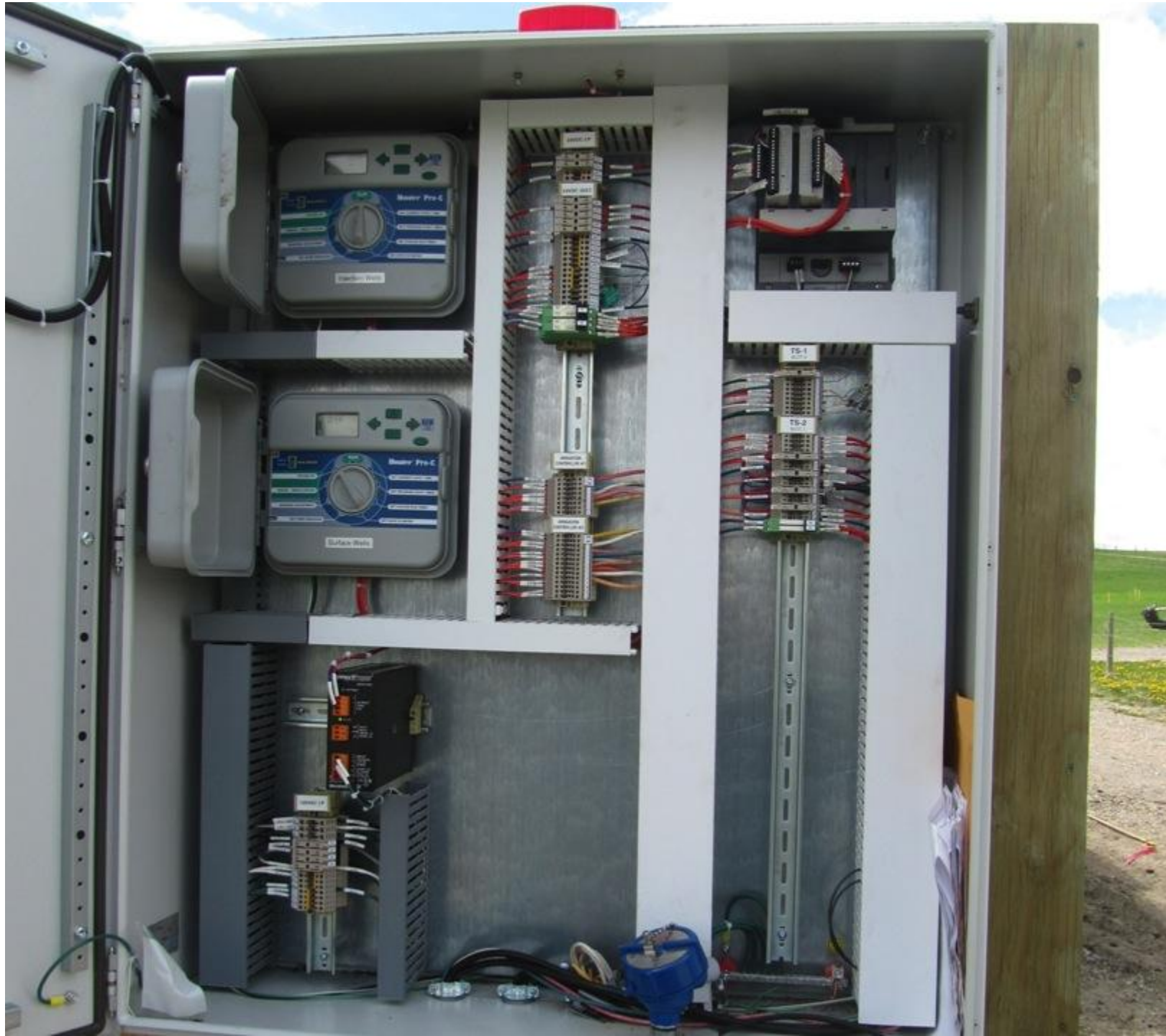


Site Cross-Section

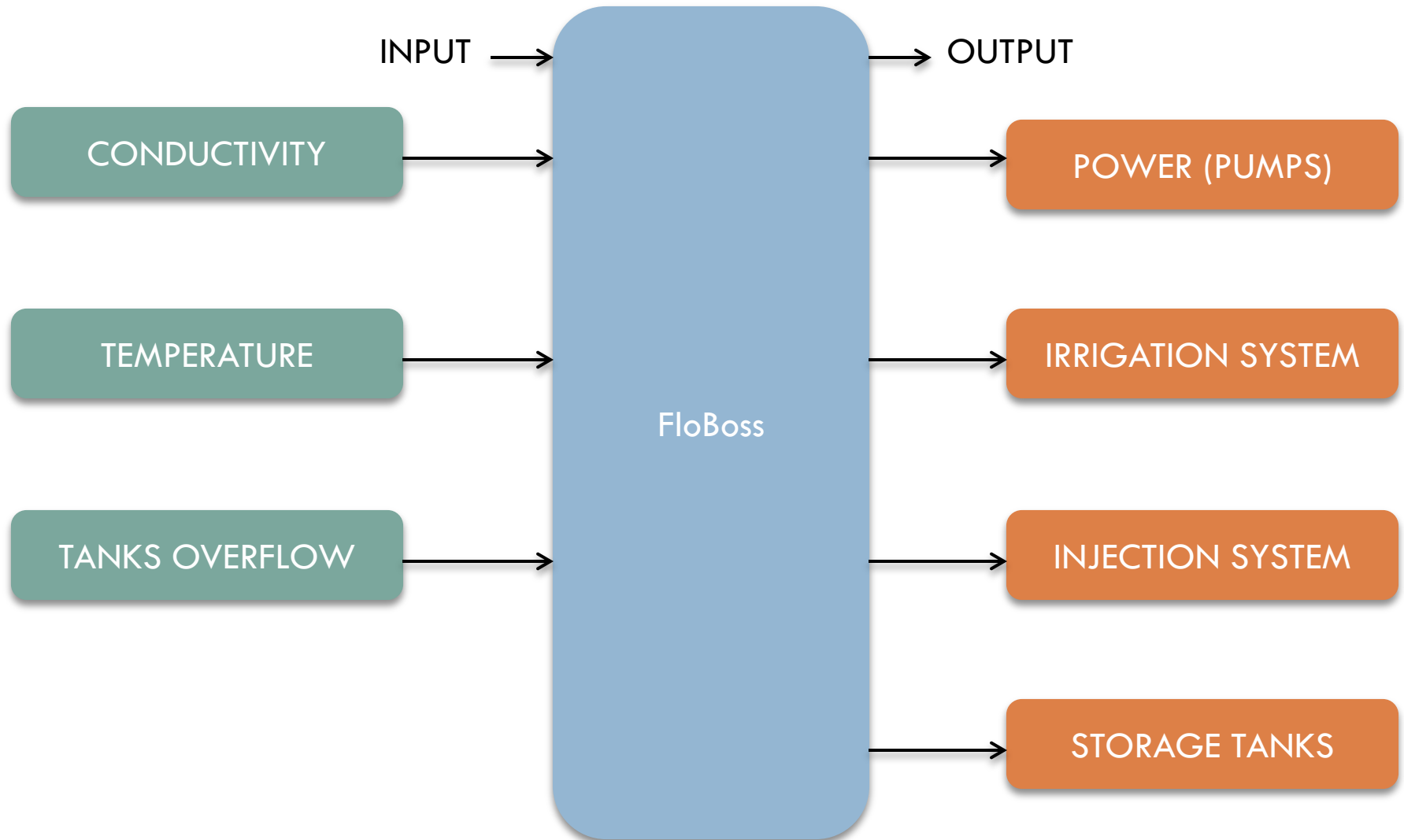




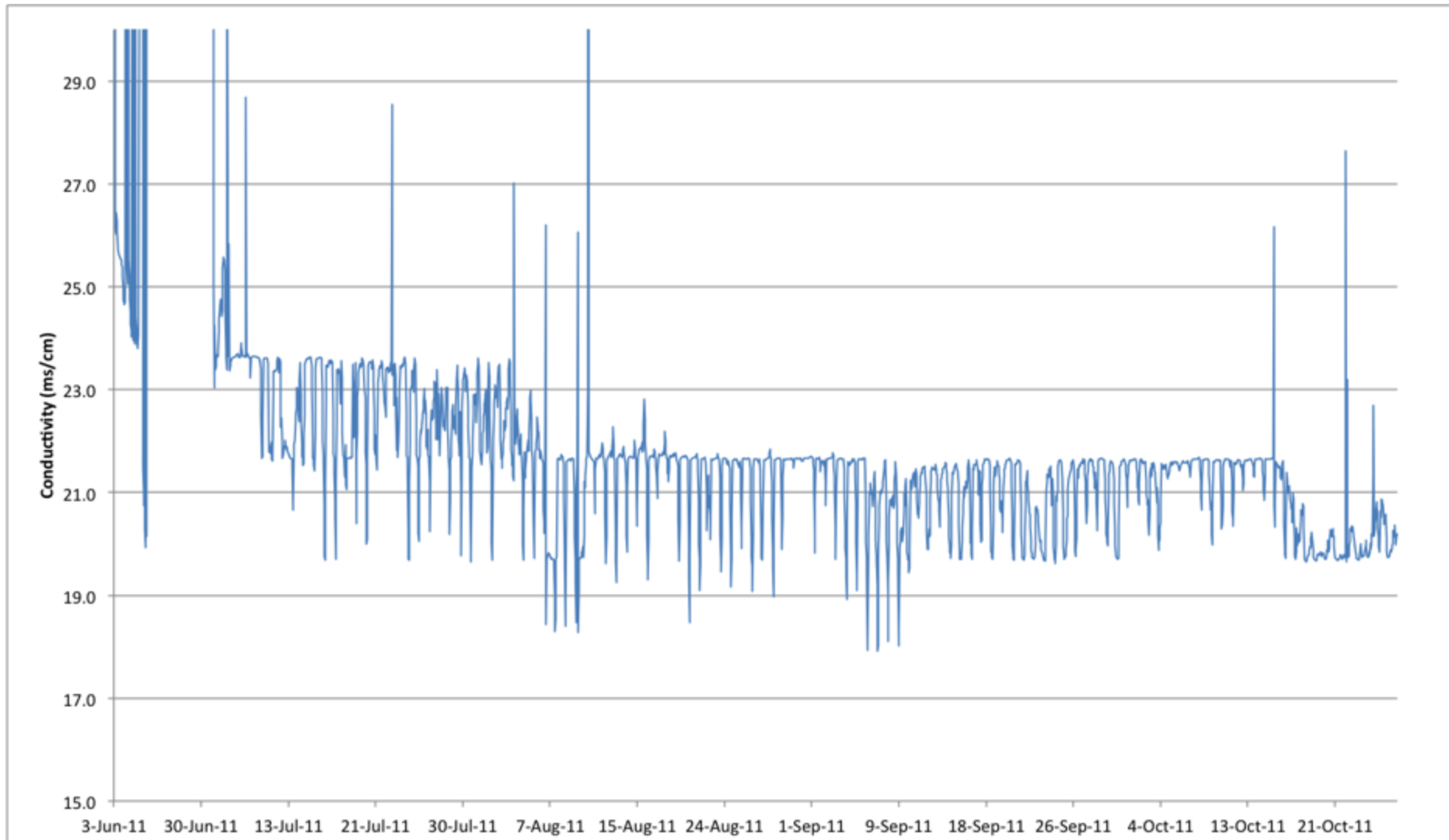




FloBoss Model



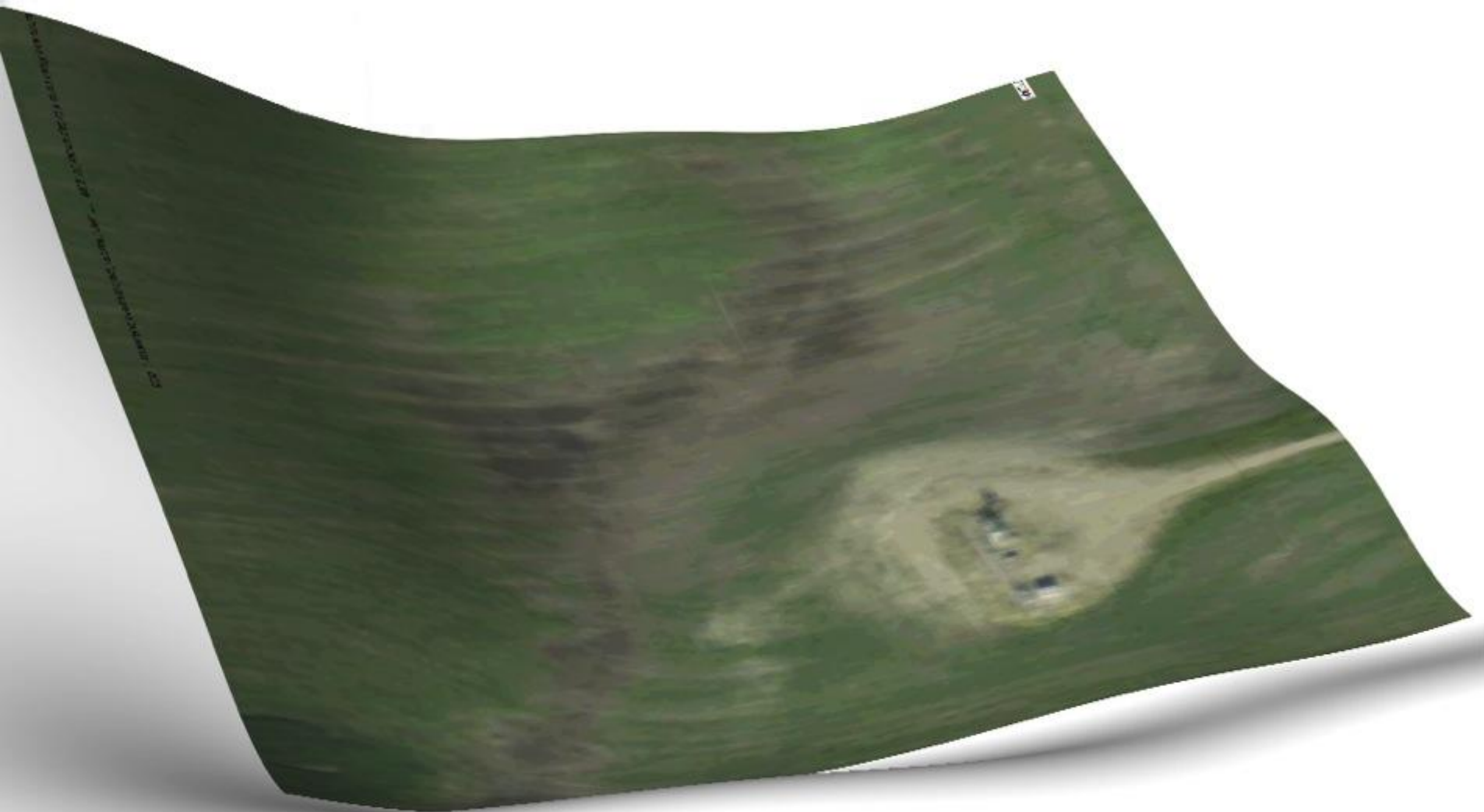
Readings







Before remediation



Today





Accomplishments

- ❑ Reduced/optimized irrigation water usage
- ❑ Maintained control of the hydraulic gradient within the treatment area
- ❑ Maintained control of the irrigation water
- ❑ Reduced leachate disposal
- ❑ Utilized readily available equipment and components

Advantages

- Continuous monitoring of leachate quality & remediation progress
- Automated control of irrigation/injection/disposal
- Reduced disposal costs
- Reduced number of site visits
- System adaptable for diverse implementation

Conclusions

- A variety of in-situ remediation systems are currently operational
- Remote monitoring and flow-computer control technology improves functionality and range of applicability of the remediation system
- Highly adaptable system allows for diverse implementation in the future

Questions

