NORTH PLATTE NRD SURFACE WATER RECHARGE PILOT PROJECT VIRTUAL TOUR

OVERVIEW, ENGINEERING, GEOTECHNICAL INFORMATION, AND NEXT STEPS

By John Berge
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North Platte NRD

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Surface Water Recharge Pilot Project Overview

- Leased 350.7 Acres at $325/Acre/Year
- Annual Lease Cost of $113,977.50
- 5 Year Lease with Option to Renew at End of Lease

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Project Location

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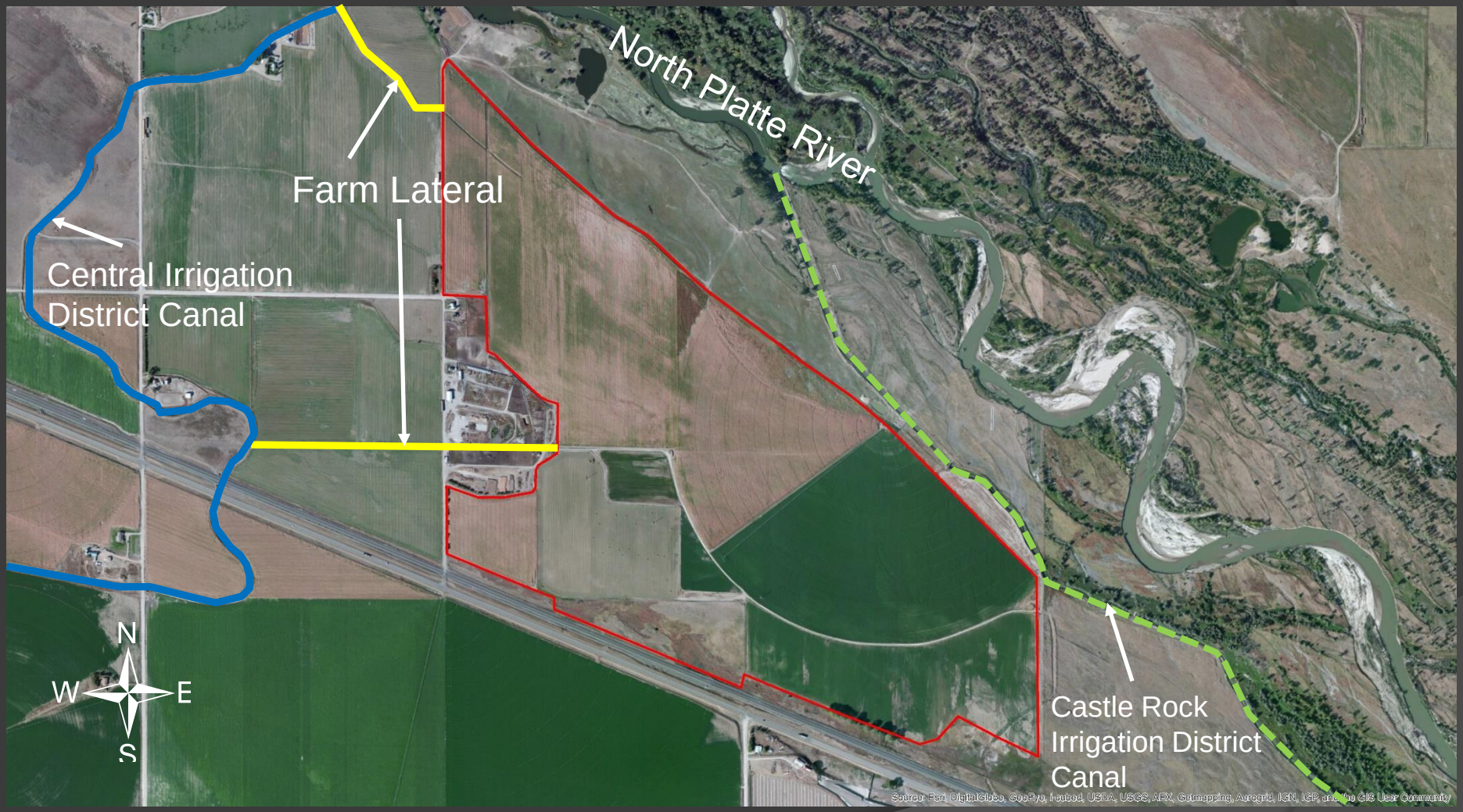
Project Location



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Historical Farm Statistics

- Irrigated Farm under the Central Canal District
  - 386 Acres of Water Rights
- A total of 322 Historical Irrigated Acres
  - 195 Acres of Flood Irrigation
  - 127 Acres of Sprinkler Irrigation
- Mostly Corn and Alfalfa Rotation
- Farmed Continuously for the Entire Study Period
- Good Yields and Records

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Historical Consumptive Use Analysis

- Determine Historical Irrigated Crop Water Use
  - Use as Credits against NPNRD Obligations
  - Water will be Recharged or Directly Returned to the North Platte River
- Determine Historical Canal Loss and Historical Irrigation Inefficiency Return Flows
  - These will be preserved to Protect Downstream Water Rights

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Data Needed for Historical CU Analysis

- Records Gathered for Analysis
  - FSA Records (USDA FSA)
  - Canal Diversion Records (Nebraska DNR)
  - Soils Information (NRCS)
  - Elevation Information (USGS)
  - Weather Information (Scottsbluff Airport Weather Information on NOAA)
  - On Farm Information (Farm interviews)
  - Canal Loss and Lateral Information (Irrigation District Interview)

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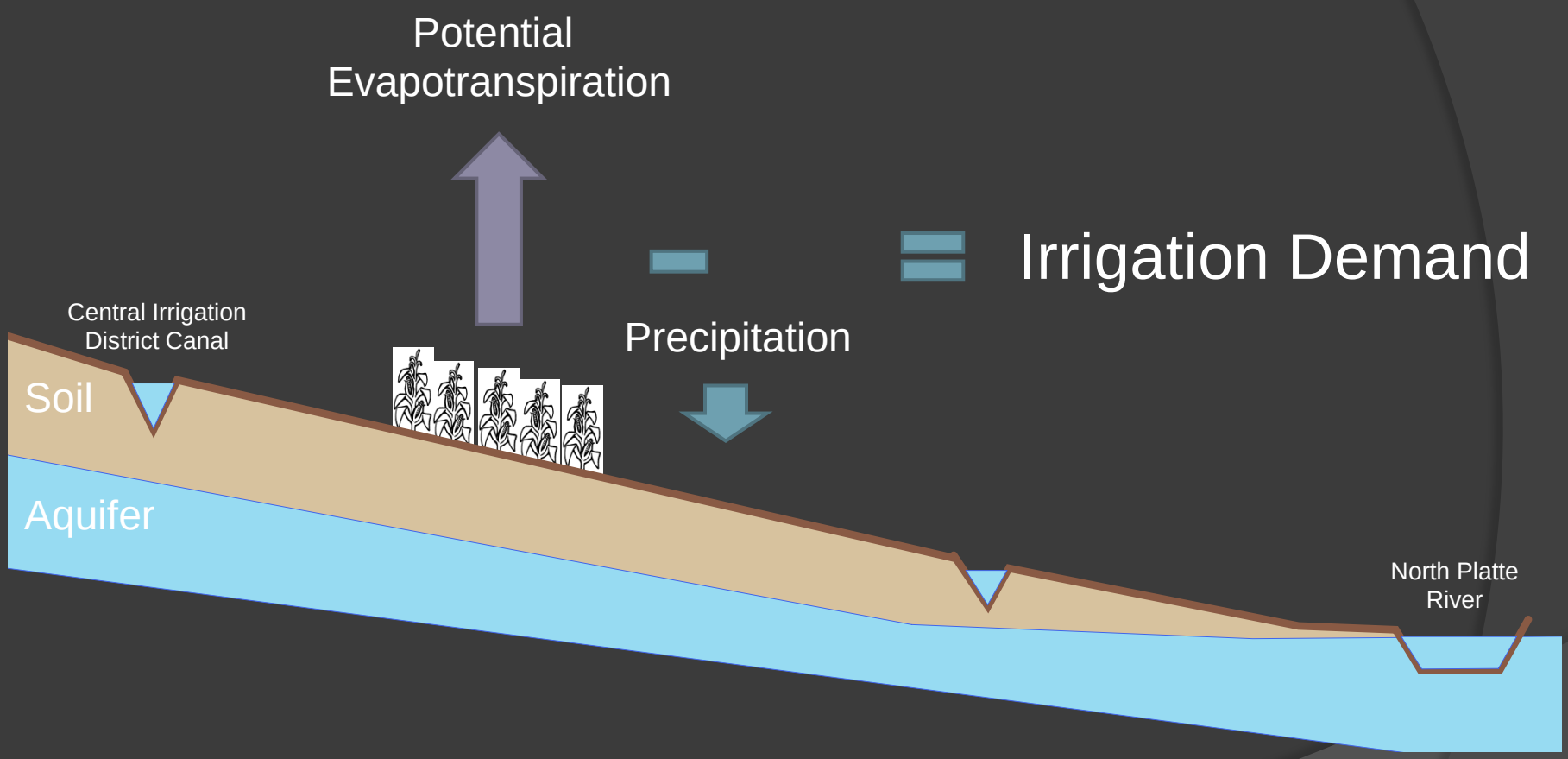
Historical CU Analysis Method



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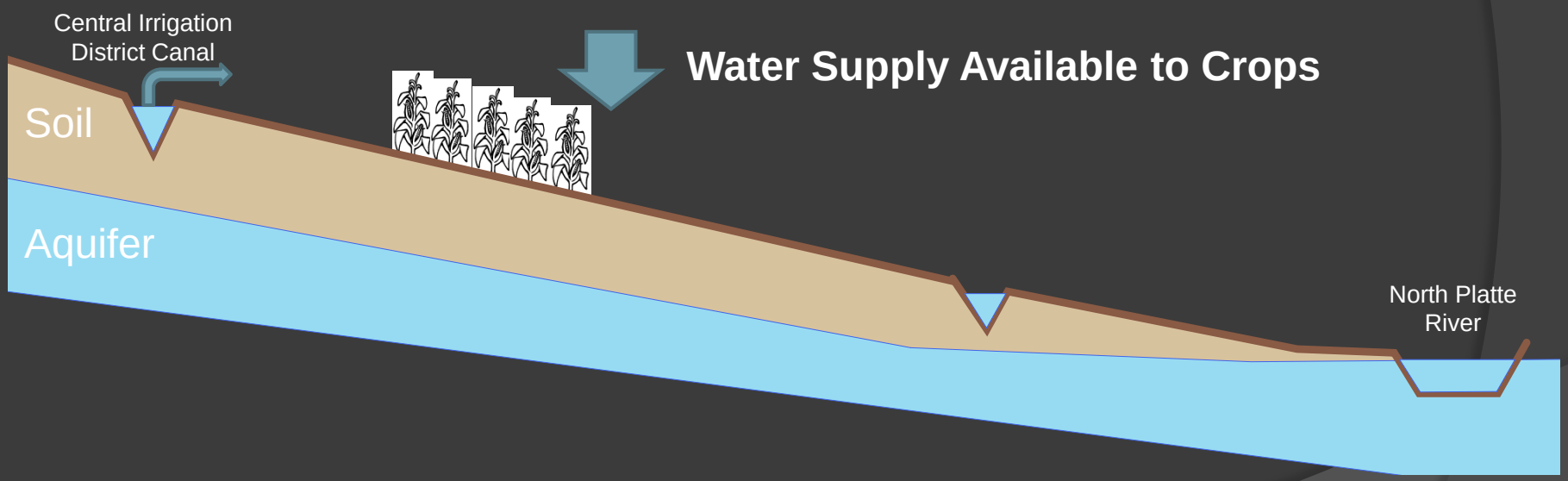
Historical CU Analysis Method

Total Ditch Supply from River − Average Canal Loss (45%) × $\frac{386 \text{ Acres}}{1{,}841 \text{ Total Acres}}$ =

Farm Turnout Supply × Average Irrigation Efficiency (77%) =

Water Supply Available to Crops



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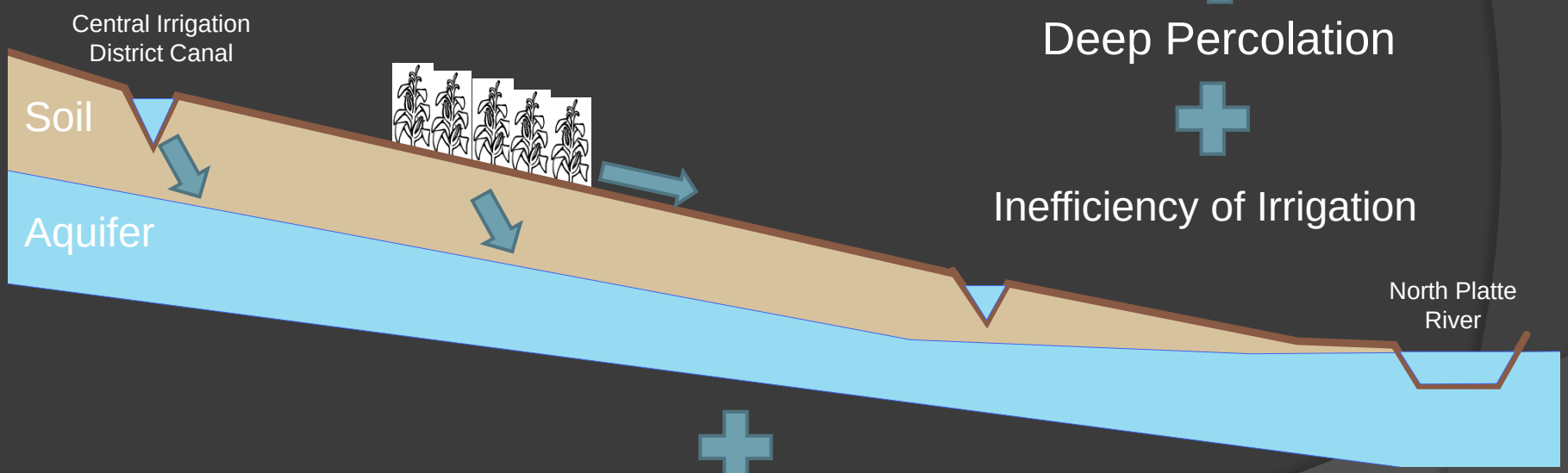
Historical CU Analysis Method

Total Return Flows = Canal Losses + Tail Water from Farm Fields (Returns to river same month diverted)

+ Deep Percolation

+ Inefficiency of Irrigation



+ Over Application of Water Supply Available to Crops

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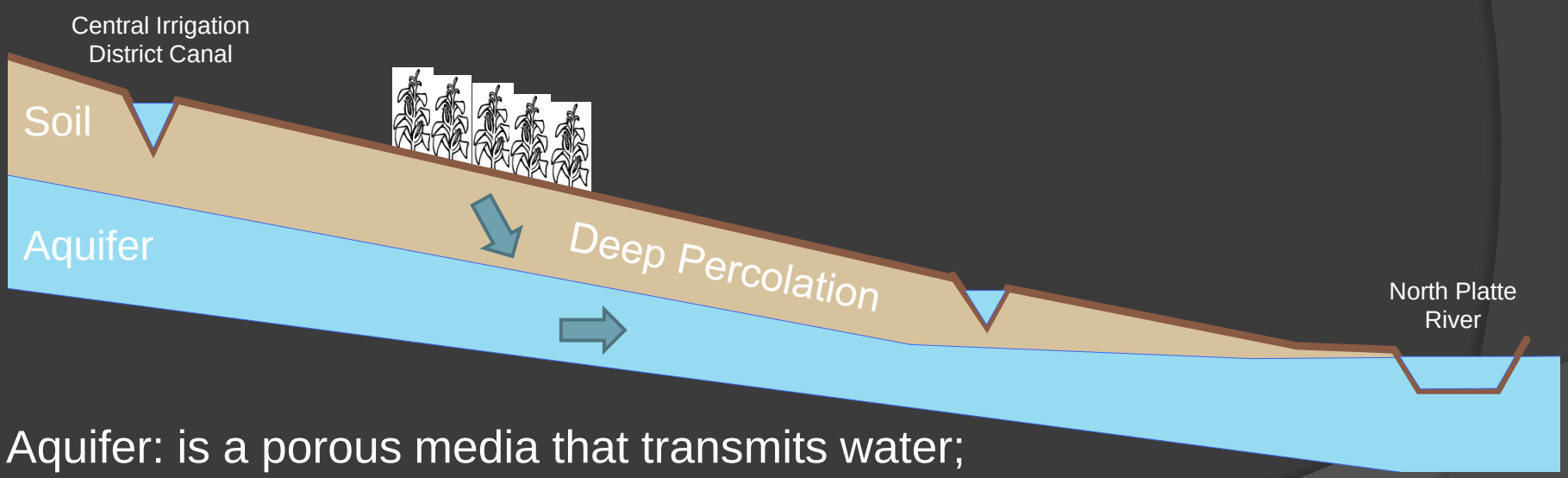
Historical CU Analysis Method

Return Flow: Amount of time it takes for recharged surface water or deep percolation to move through the aquifer and discharge into the River



Aquifer: is a porous media that transmits water; water can take months to years to reach River

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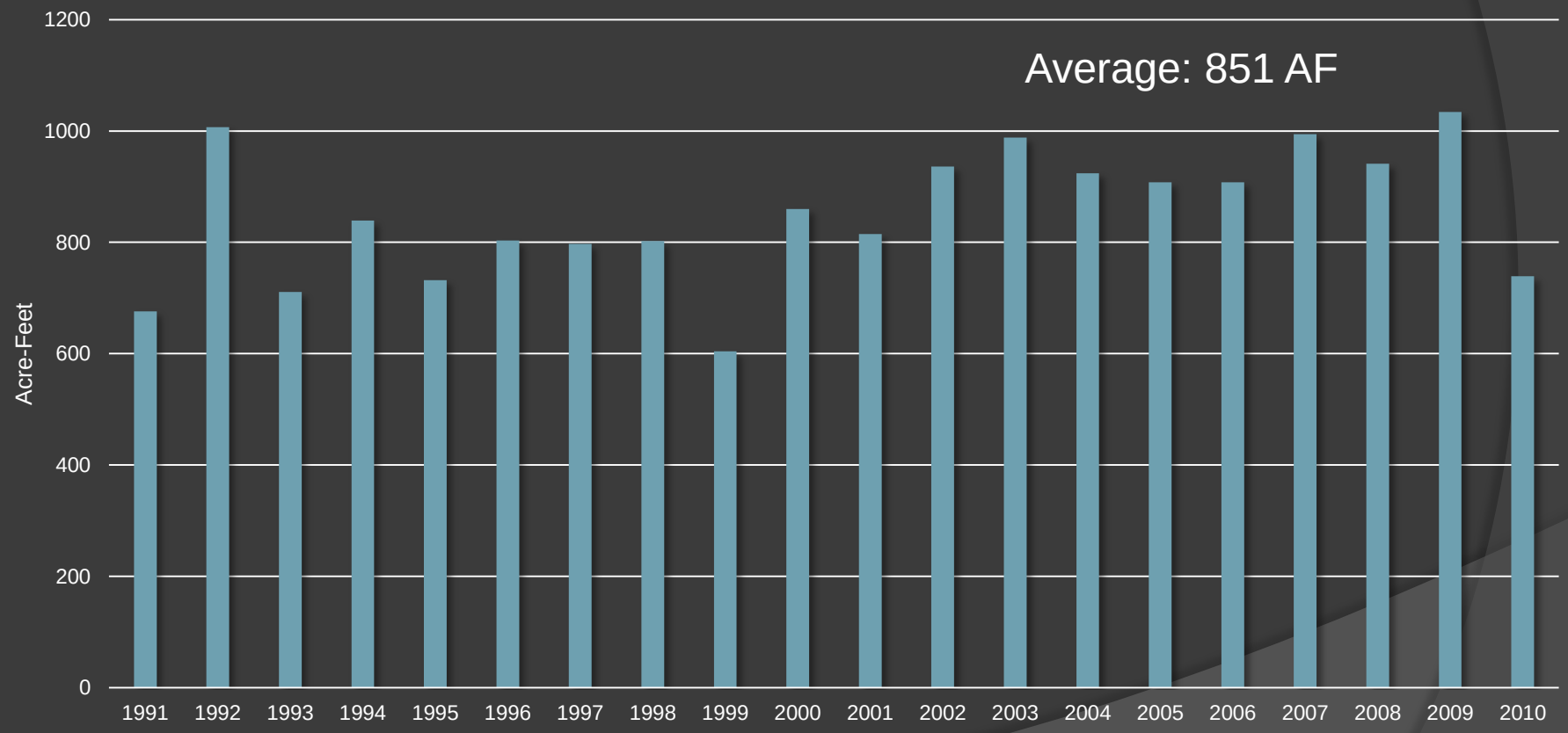
Historical Consumptive Use Analysis

- Annual Diversion to Project Farm



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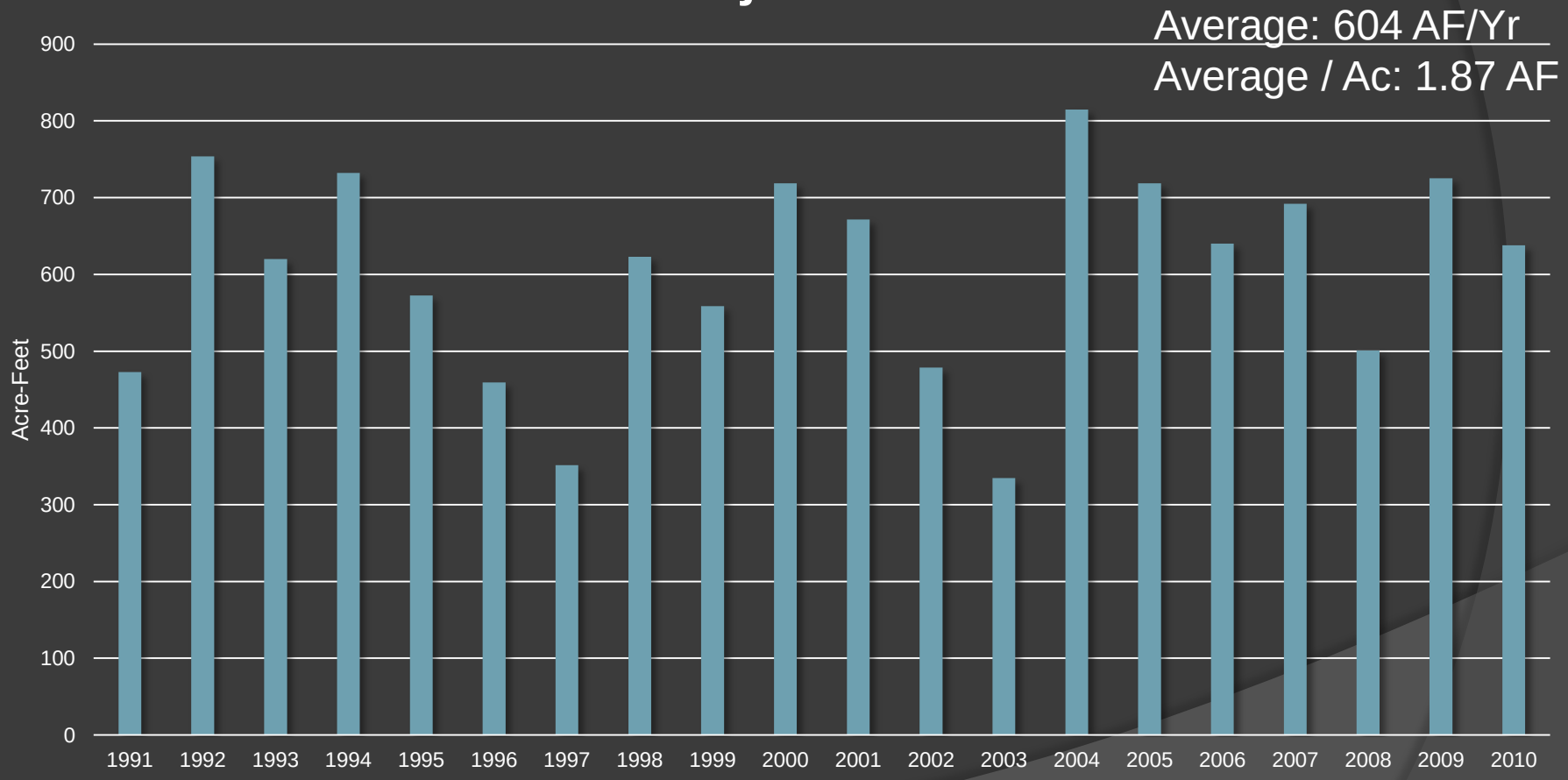
Historical Consumptive Use Analysis

- Annual Credit from Project Farm



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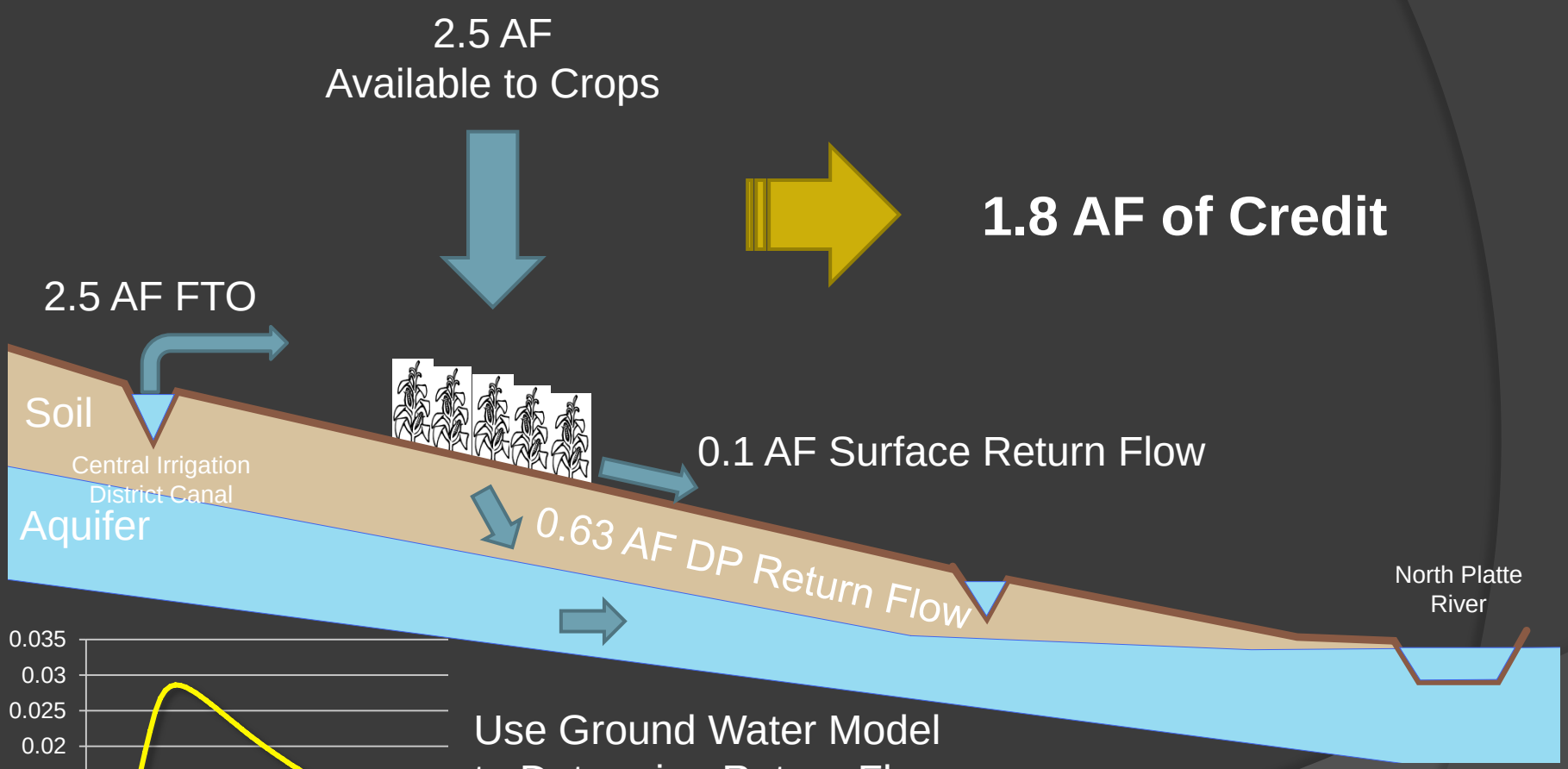
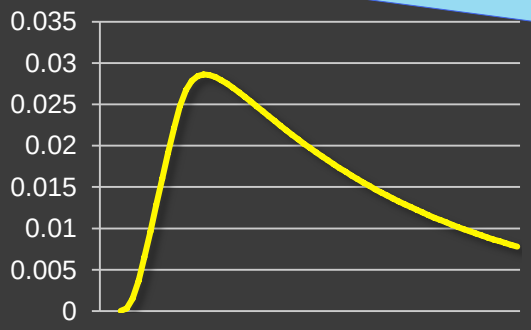
Results of Historical CU Analysis per Acre





Return Flow Pattern

Use Ground Water Model to Determine Return Flow Pattern

All Values based on Average of 1990 through 2010

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Cost Benefit Analysis for Pilot Project

- 350.7 Acres Leased
- $325/Acre/Year
- 604 Acre-Feet/Year Average Credit
  - Based on Actual Irrigated Land

- $188.70 per Acre-Foot of Credit
  - Yearly
  - Assumes Average Credit
  - Colorado Water Cost Comparison: South Platte River
    - Augmentation Water
      - $300 to $500 per Acre-Foot

Note: All costs do not include legal, engineering, construction, and accounting fees.

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Historical Consumptive Use Analysis

- Assuming Average Credit over the 5 Year Lease
  - 3020 Acre Feet of Water Credit
  - Credit will Return to the North Platte River Over Time
    - Determined through the Western Water Use Management Modeling Ground Water Model

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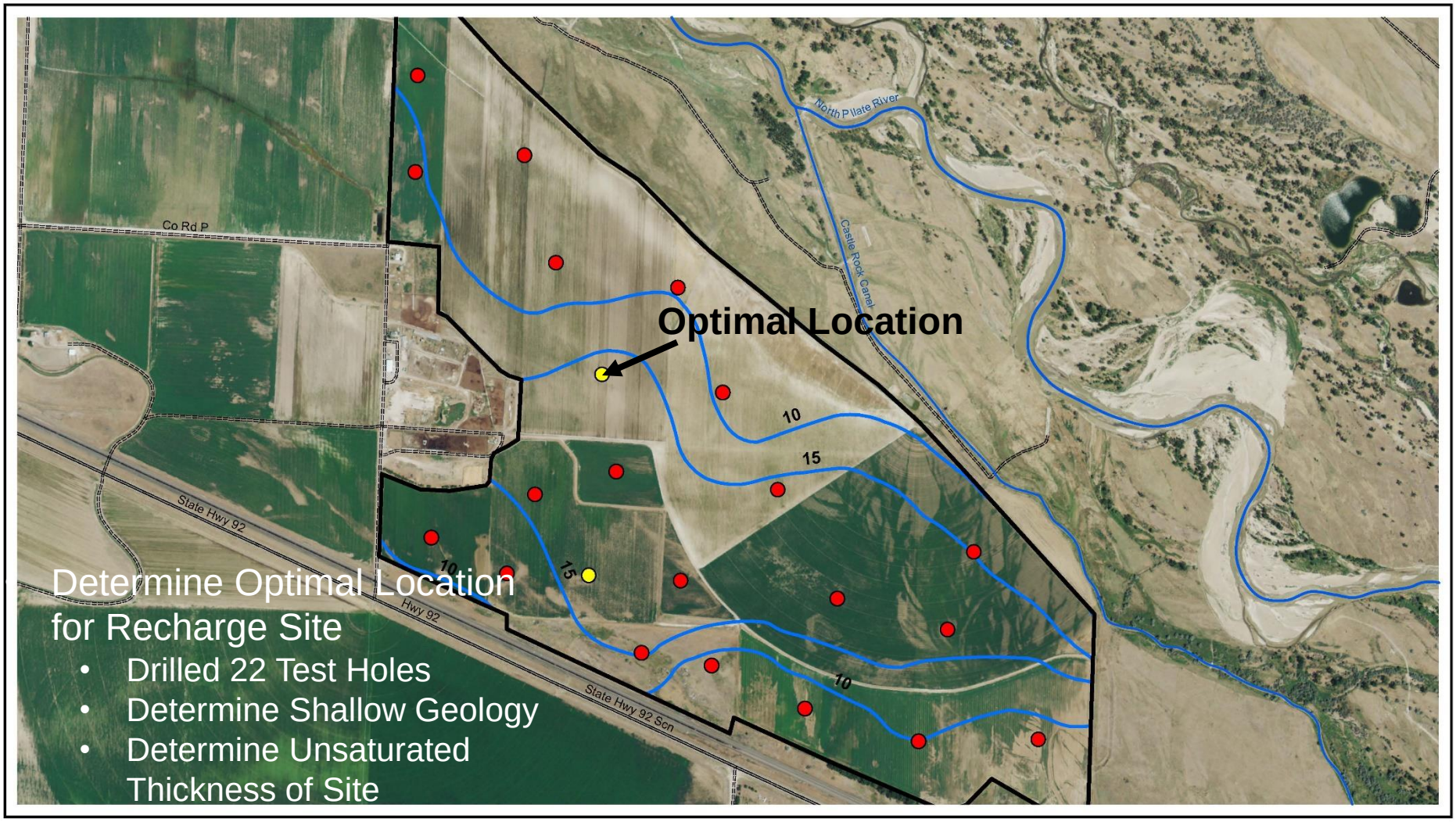
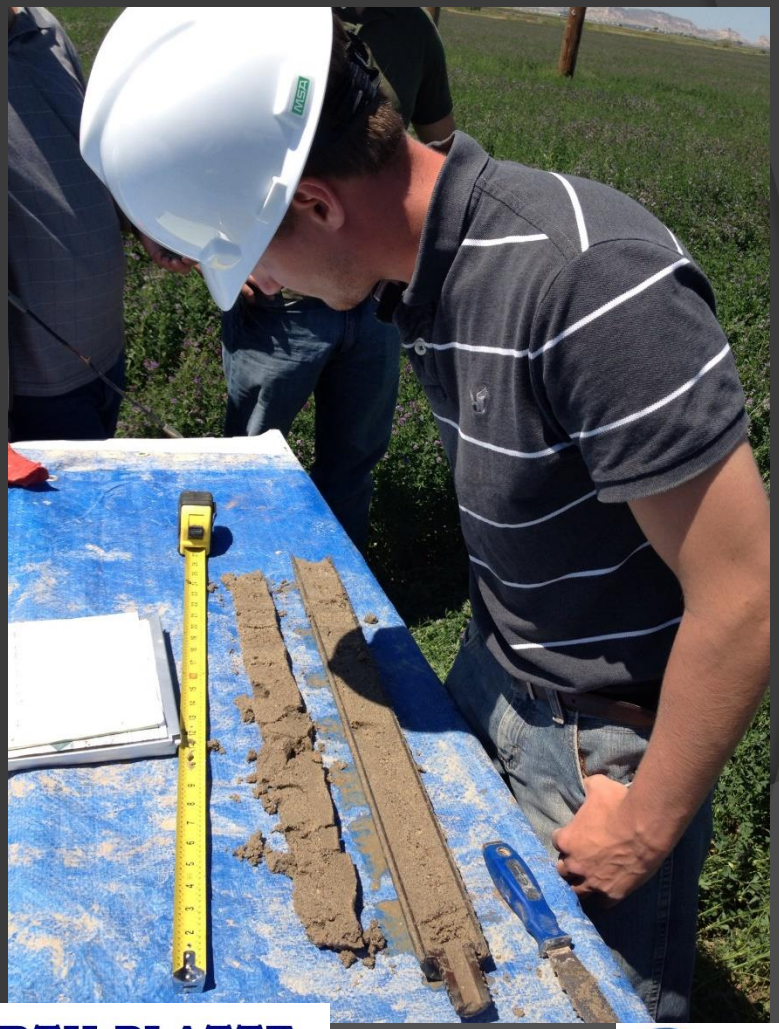
Geotechnical Survey Locations and Results



Geotechnical Survey Sampling



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Aquifer Test

- Test Two Existing Irrigation Wells
  - Determine Aquifer Properties
  - Refine Ground Water Model with Site Specific Information

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Next Steps of Project – 2 Month Outlook

- Analyze Aquifer Test Information and Modify Ground Water Model
- Complete Return Flow Pattern Analysis using the Ground Water Model
- Historical Consumptive Use Documentation Write-up
- Complete Preliminary Engineering Design of Recharge Pit and Measurement Devices
- Meet with NDNR Permitting
- Complete and Submit Permit Application to NDNR

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Next Steps of Project – 2 to 6 Month Outlook

- Receive Permit for Project from NDNR
- Complete Final Engineering Design of Recharge Pit and Measurement Devices
- Put Together Bidding Documents and Bid Out Recharge Pit and Measurement Device Construction
- Construct Recharge Pit and Measurement Devices
- Start Diverting, Operating, and Accounting

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Thanks!

- Questions
- Comments

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