



**DESIGN, CONSTRUCTION AND MONITORING OF THE FIRE POND MITIGATION  
SITE: CONVERTING A POND TO A STREAM AND WETLAND COMPLEX**

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**National Stream Restoration Conference ▪ August 1 – 3, 2022**

Mike Miller

August 2, 2022

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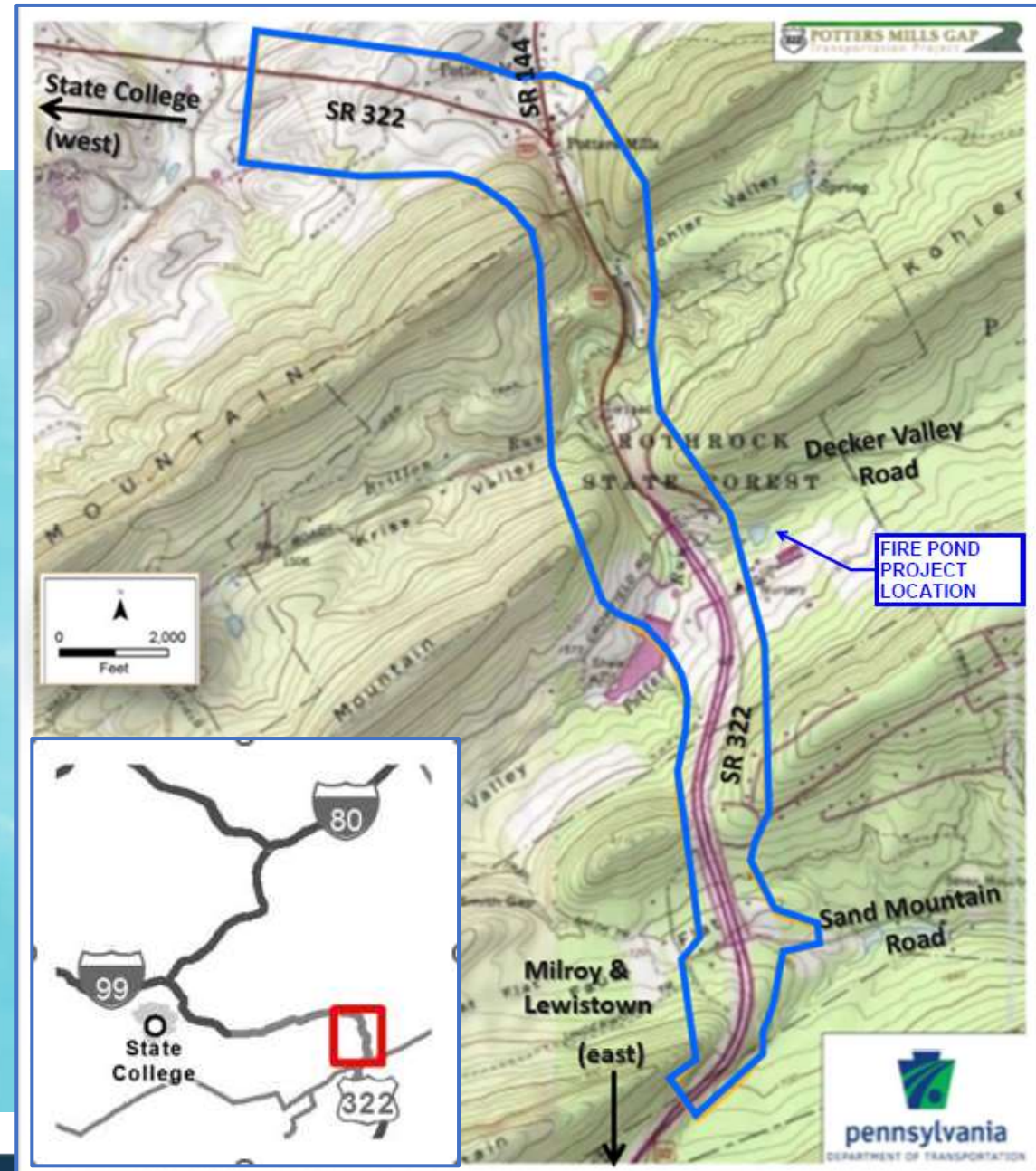
# Project Background

## Project Area

- PennDOT District 2-0
- Potter Township, Centre County, PA
- 3.75-miles along SR 0322

## Project Purpose – Mitigation

- 610 LF of stream mitigation
- 0.80 acres of wetland mitigation
  - 0.39 PFO; 0.11 PSS; 0.30 PEM





# Project Background

## Mira Lloyd Dock Resource Conservation Center

### Penn Nursery

- Seedlings for reforestation and wildlife enhancement on state forests and parks

### Wood Shop

- Signs and picnic tables for DCNR

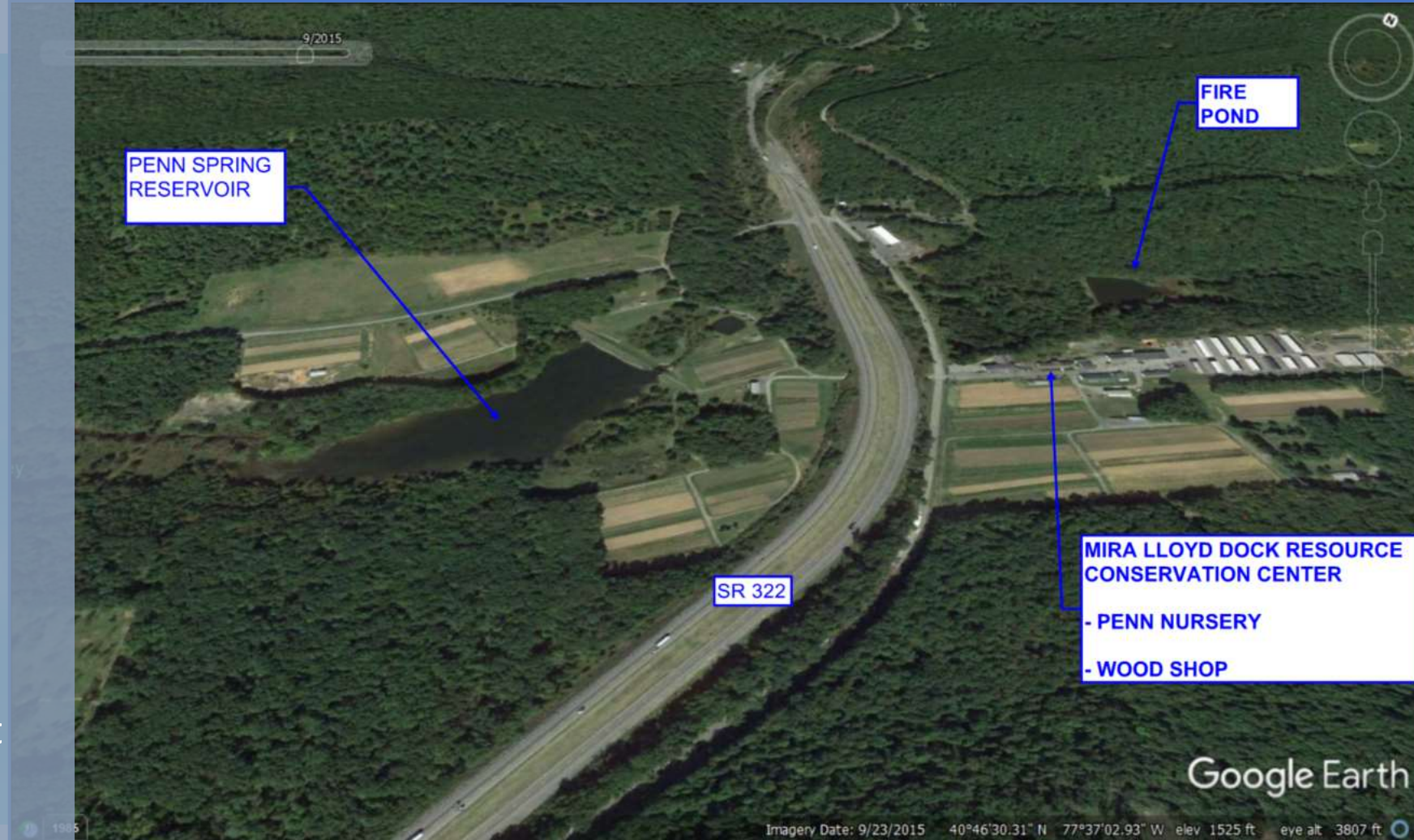
### Fire Pond = 1 acre (approx.)

- Emergency water source

### Penn Spring Res. = 10 acres

### Potter Run

- Class A Wild Trout Stream (Sport Fishery / Natural Reproduction)
- Brown and Brook Trout





# Project Background

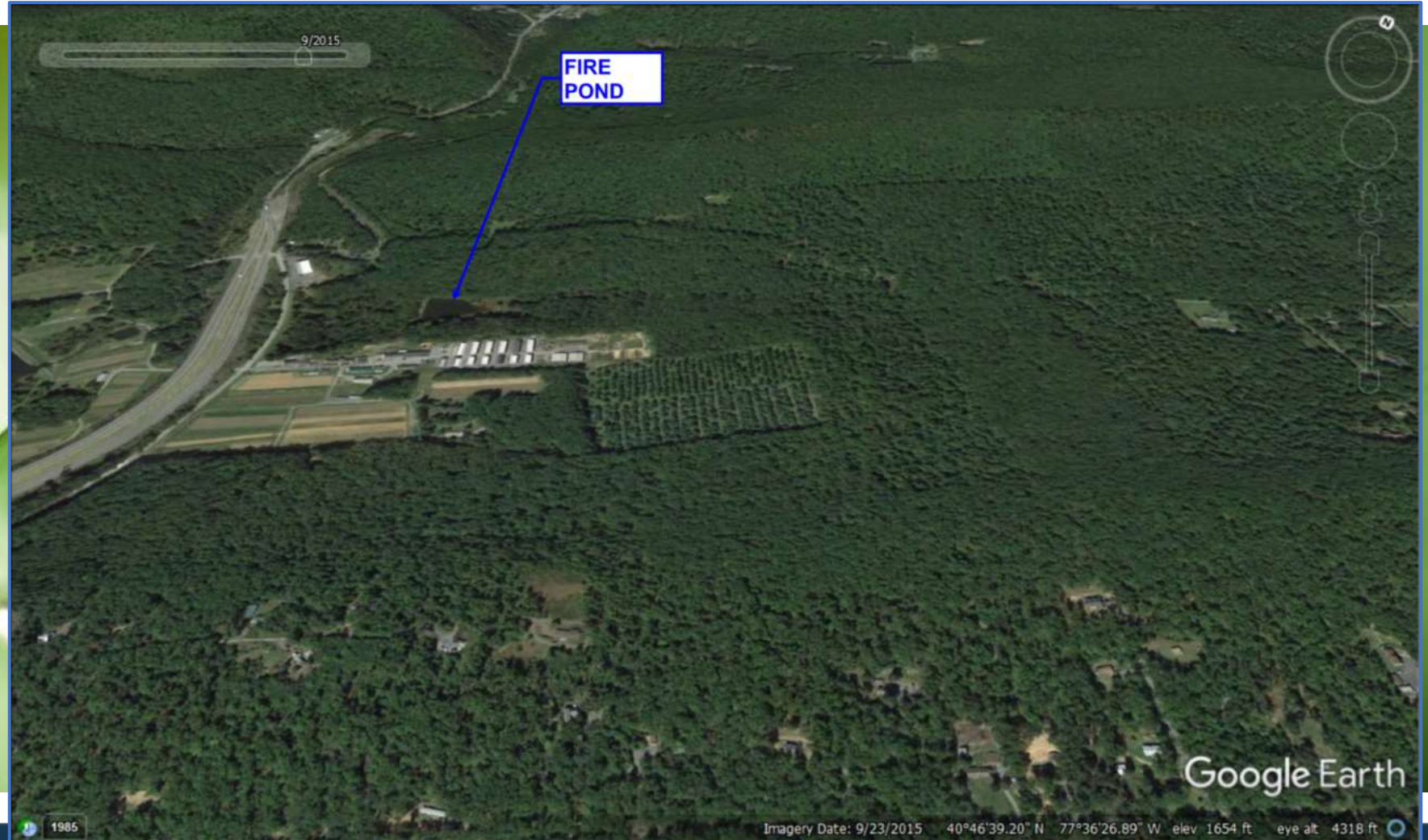
## Land Use

DA = 239 acres

Impervious = 3%

Row Crops = 8%

Forested = 89%





# Project Background

- Two Main Tributaries
  - Northern/Southern
- Main Outflow
  - Riser
- Spillway/High Water Outflow
- Spring House/Seep
- Southern Cove
- Northern Cove





# Project Background

- Wetlands along pond
- Agency requirement
  - Maintain existing wetlands
- Design Implications





# Project Background



May 2015





# Project Background

Spillway/High Water Outflow



May 2015



# Project Background

Main Outflow/Riser



May 2015





# Project Background

Spring House/Seep



May 2015





# Project Background

Southern Cove



May 2015





# Project Background

Southern Tributary



May 2015





# Project Background

Northern Tributary



May 2015

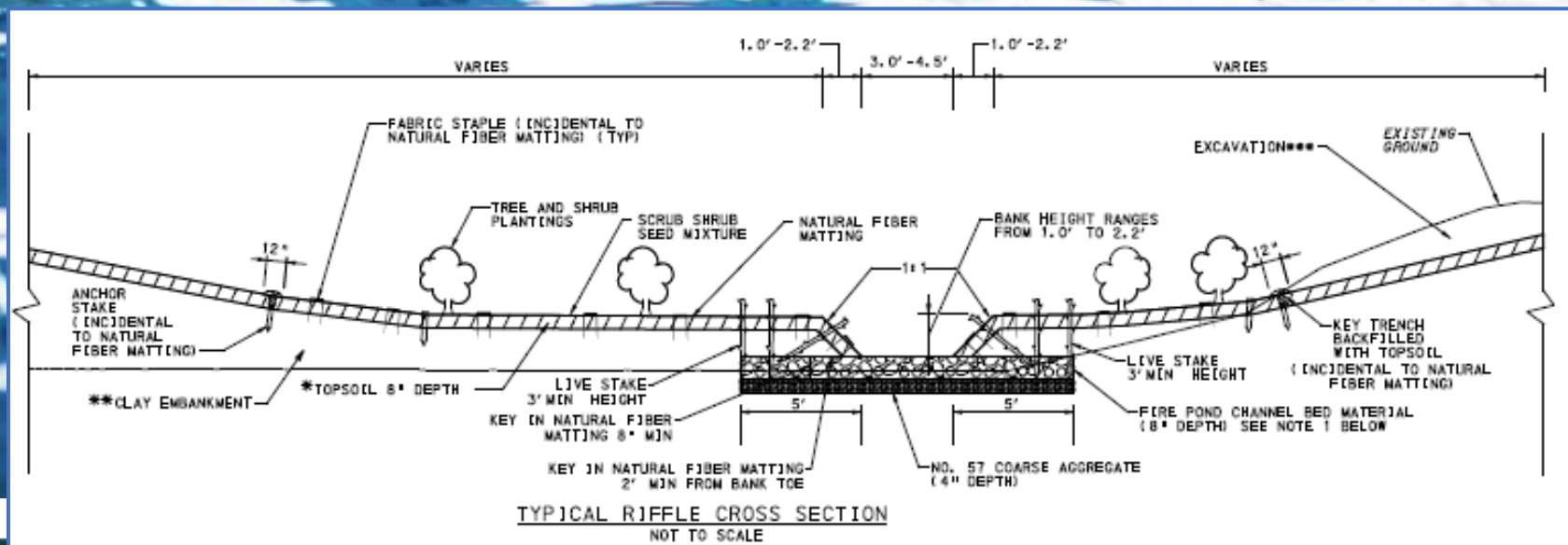
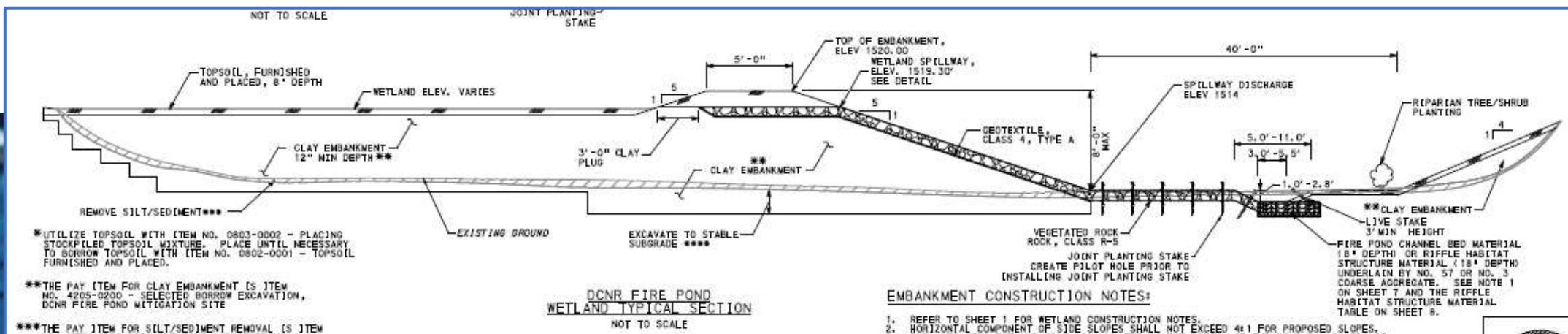








# Design





# Construction



July 2018





# Construction



January 2019





# Construction



February 2019





# Construction

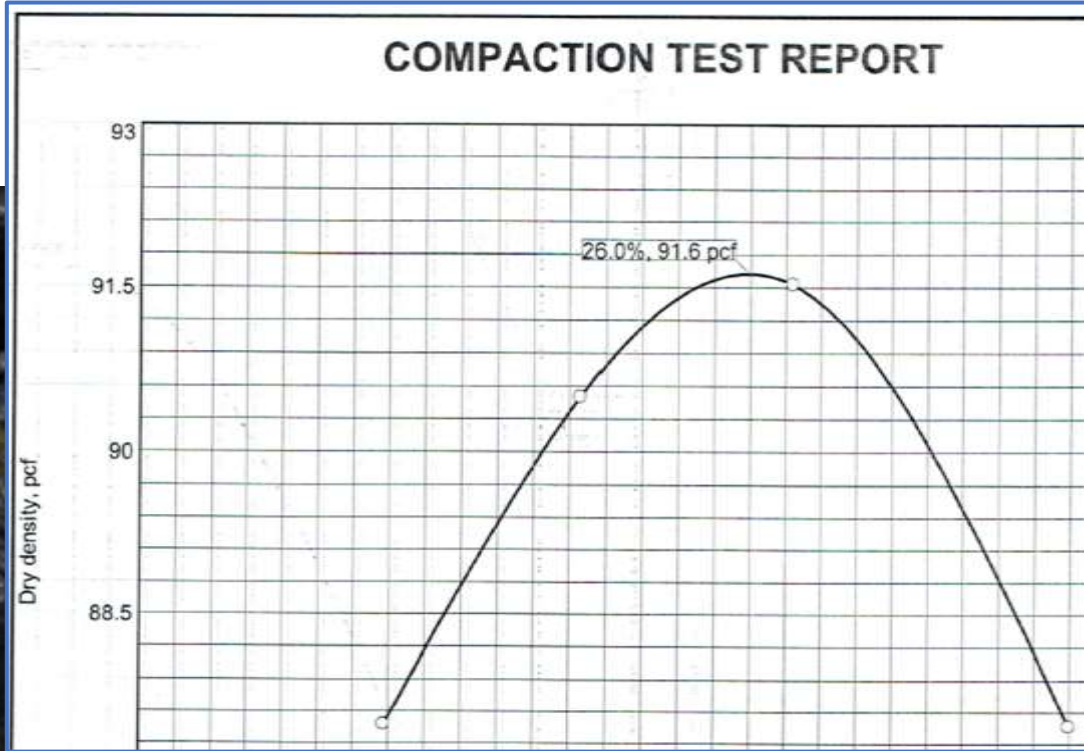


February 2019



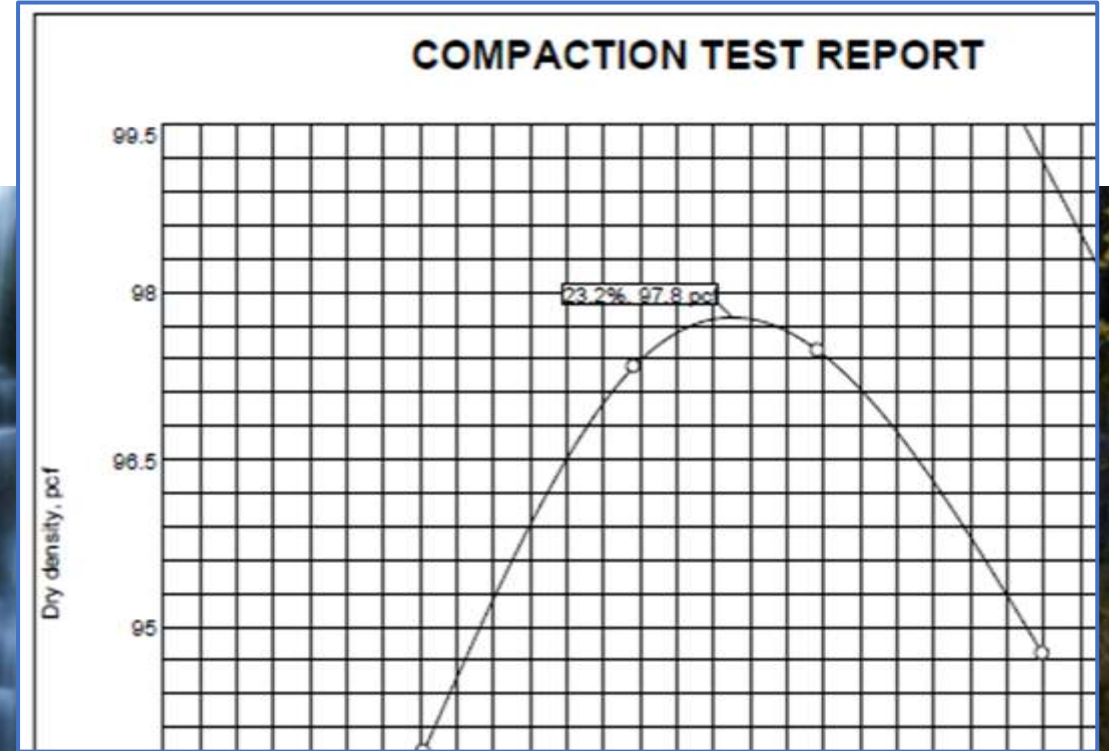


# Construction



## Compaction Test Results

- 91.6 pcf
- 97.8 pcf



## Compaction Requirements

- 97%
- Top 3 feet = 100%





# Construction



February 2019





# Construction



February 2019





# Construction



February 2019





# Construction



March 2019





# Post Construction



June 2019





# Post Construction



June 2019





# Post Construction



June 2019





# Post Construction



June 2019





# Post Construction



June 2019





# Post Construction



July 2021





Credit:  
Skelly and Loy  
2021



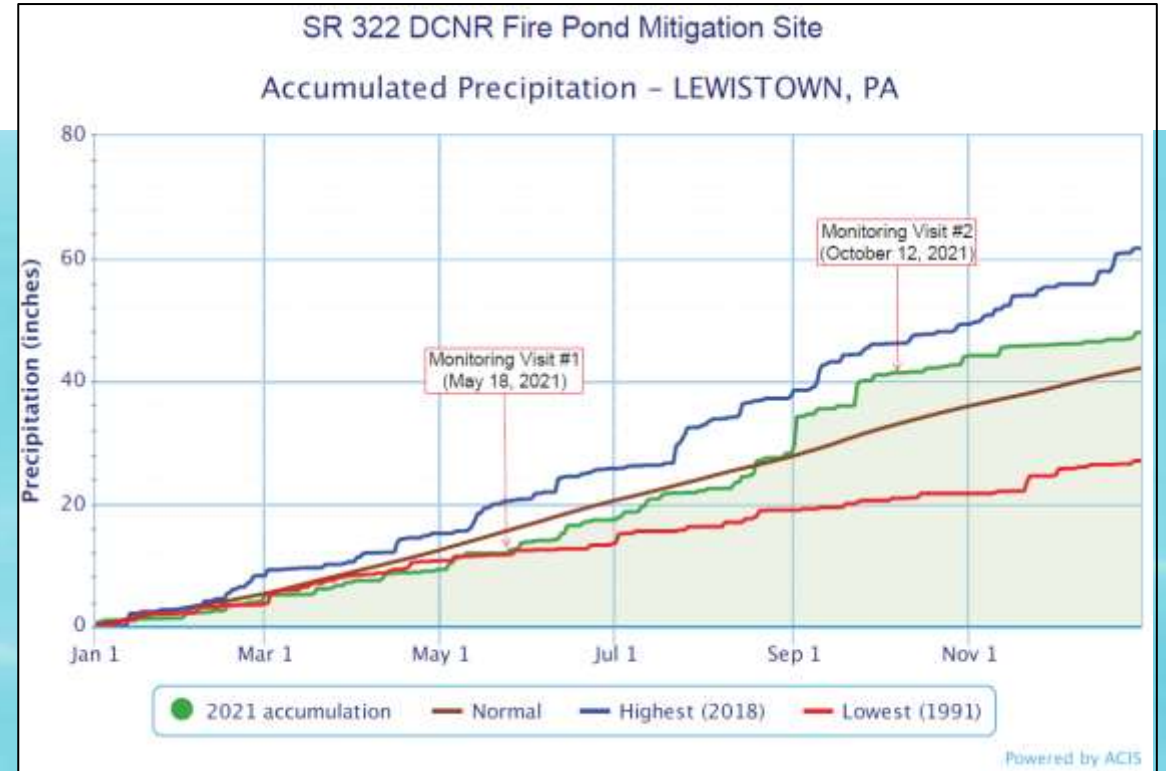
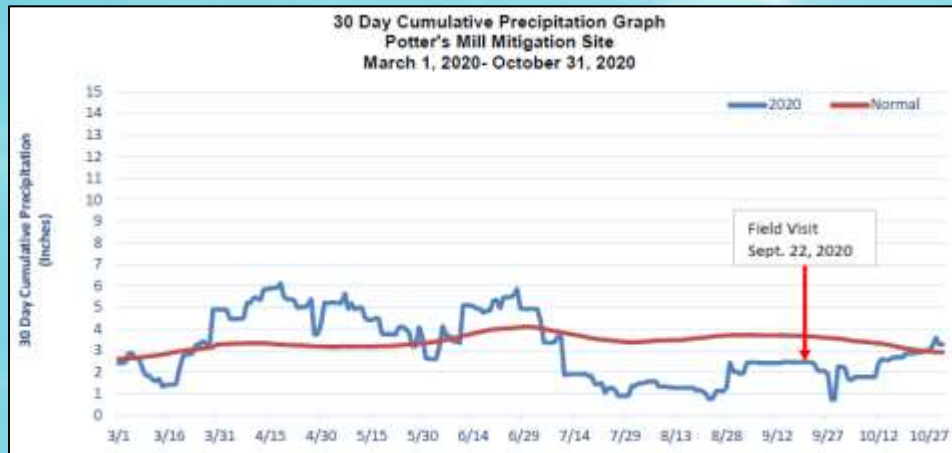
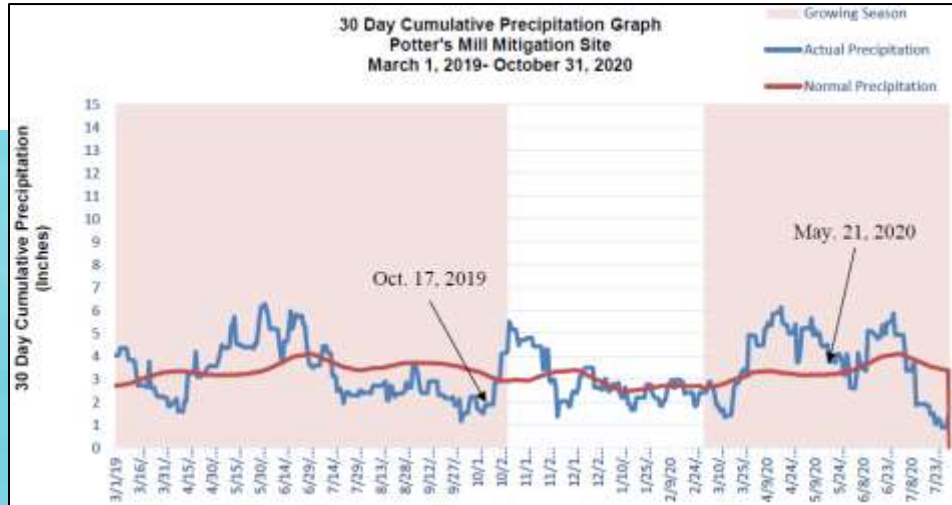
# Preliminary Monitoring Results

- Construction
  - Completed April 2019
- Monitoring
  - 5 years
    - Years 1 and 2: twice per year
    - Years 3 to 5: once per year
  - Started October 2019
    - May & September 2020
    - May & September 2021

- Monitoring Methods
  - Wetland
    - Delineate wetland boundaries
    - Hydrology, soils, vegetation
  - Stream
    - Visual: stability, base flow and riparian establishment
  - Invasive species
- Project Purpose – Mitigation
  - 610 LF of stream mitigation
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# Preliminary Monitoring Results



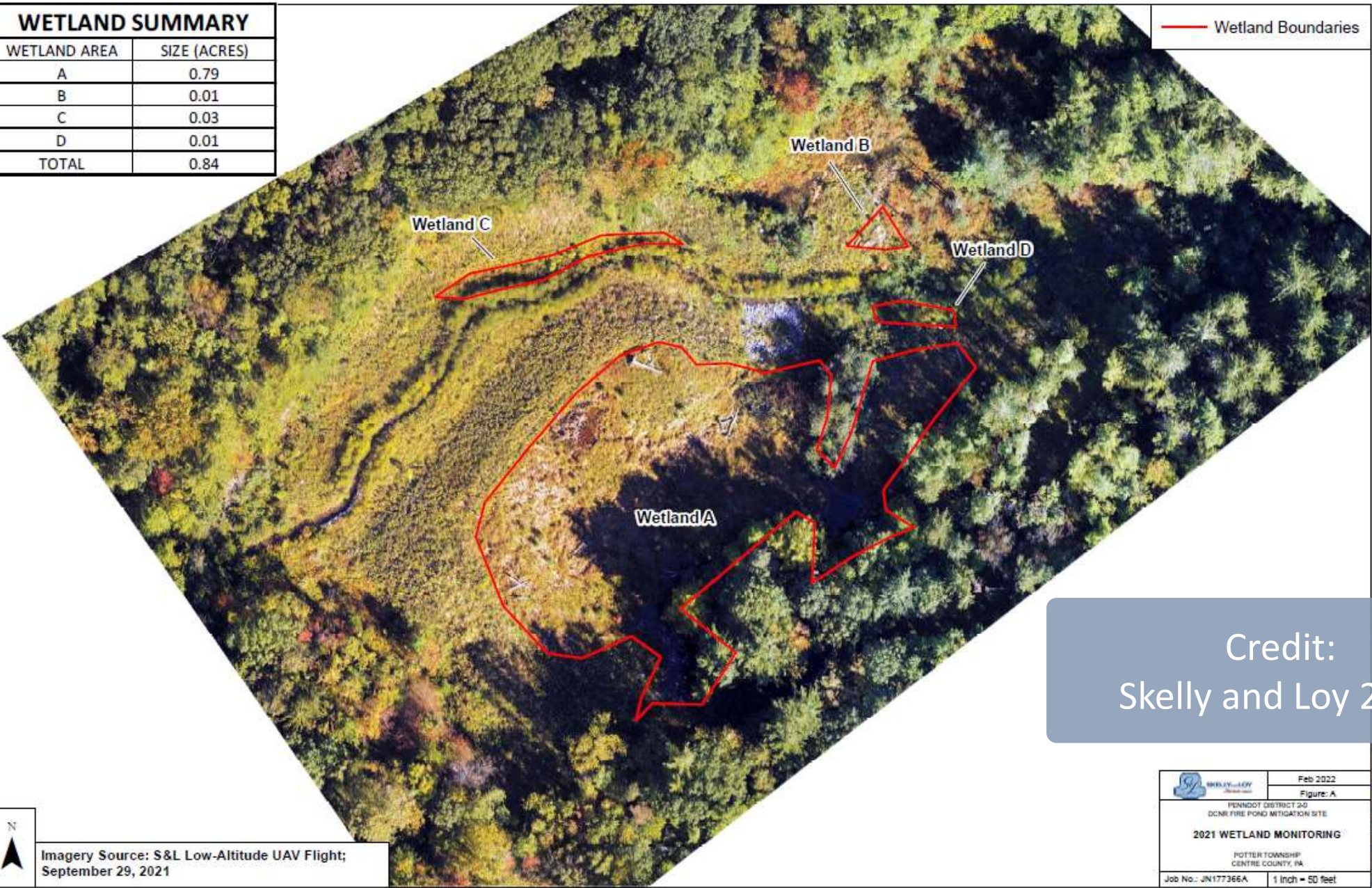
Credit: Skelly and Loy (2020, 2021, 2022)



### WETLAND SUMMARY

WETLAND AREA	SIZE (ACRES)
A	0.79
B	0.01
C	0.03
D	0.01
TOTAL	0.84

— Wetland Boundaries



Imagery Source: S&L Low-Altitude UAV Flight; September 29, 2021

Credit:  
Skelly and Loy 2022

 SKELLY & LOY INCORPORATED	Feb 2022
	Figure: A
PENNDOT DISTRICT 240 DCNR FIRE POND MITIGATION SITE	
2021 WETLAND MONITORING	
POTTER TOWNSHIP CENTRE COUNTY, PA	
Job No.: JN177366A	1 inch = 50 feet



# Preliminary Monitoring Results

## Wetland

- 0.84 acres (0.80 acres required)
  - Expansion observed (B, C and D)
- Vegetative coverage
  - Wetland A: 90%
  - Wetlands B, C and D: 100%
- 148 live shrubs (82% survival)
- 23 live trees (92% survival)
- All PEM
  - PSS and PFO expected as site develops

- Hydrology
  - shallow pools
  - inundated and saturated
  - groundwater seeps
- Soils
  - Portions of A and C = hydric
  - Hydric soil development expected





# Preliminary Monitoring Results

## Stream

- Stable
- Functioning as designed/constructed
- Base flow
  - Intermittent (one event 2019/2020)
  - Perennial (both events 2021)
- Riparian zone well vegetated
- Macroinvertebrates
  - Caddisfly (3 taxa); Mayfly (1 taxa)
  - Pre-construction
    - Abundant
      - Caddisflies, mayflies, stoneflies and beetles
    - Common
      - Dragonflies and crayfish
- Fish observed throughout reach

- Invasive Species
  - Narrow-leaf cattail, Canada thistle, reed canary grass, Japanese stilt grass
  - Insignificant abundance



July 2021



# Thank You!

Questions / Comments ?

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Credit:  
Skelly and Loy 2021