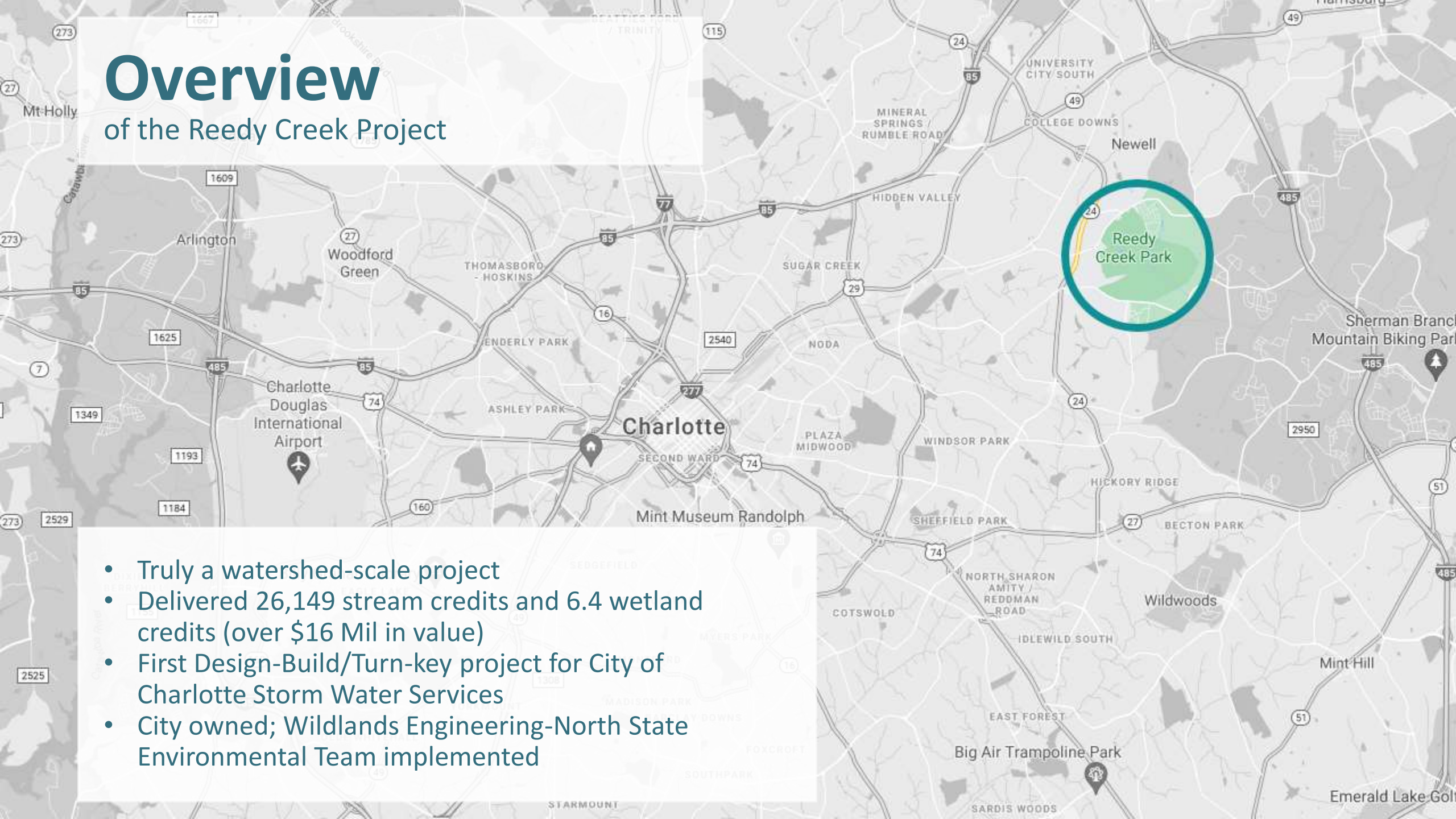
Reedy Creek Stream Restoration: A Watershed Scale Design-Build Project in Charlotte, NC

by: Christine Blackwelder and William Harris

WILDLANDS
ENGINEERING

Overview

of the Reedy Creek Project



- Truly a watershed-scale project
- Delivered 26,149 stream credits and 6.4 wetland credits (over $16 Mil in value)
- First Design-Build/Turn-key project for City of Charlotte Storm Water Services
- City owned; Wildlands Engineering-North State Environmental Team implemented

Challenges

of the Reedy Creek Project

- **Restoration in a Public Park and Nature Preserve**: trees, trails, public perception
- **FEMA LOMR process**: priority one restoration
- **Ground water level**: headwater streams, changes in floodplain
- **DIRT**: needed 70,000 cy of fill
- **Construction**: Rain, Trees, GPS, haul routes

Unique Opportunities

of the Reedy Creek Project

- Priority 1 restoration from pond outlets and jurisdictional headwaters
- Added 94 acres to Park with co-funded (City/County) purchase of a private parcel
- Delivered credits quicker and more cost effectively than conventional design-bid-build projects
- Added post-construction wetland credits (5.3 wetland credits) as ground water levels elevated

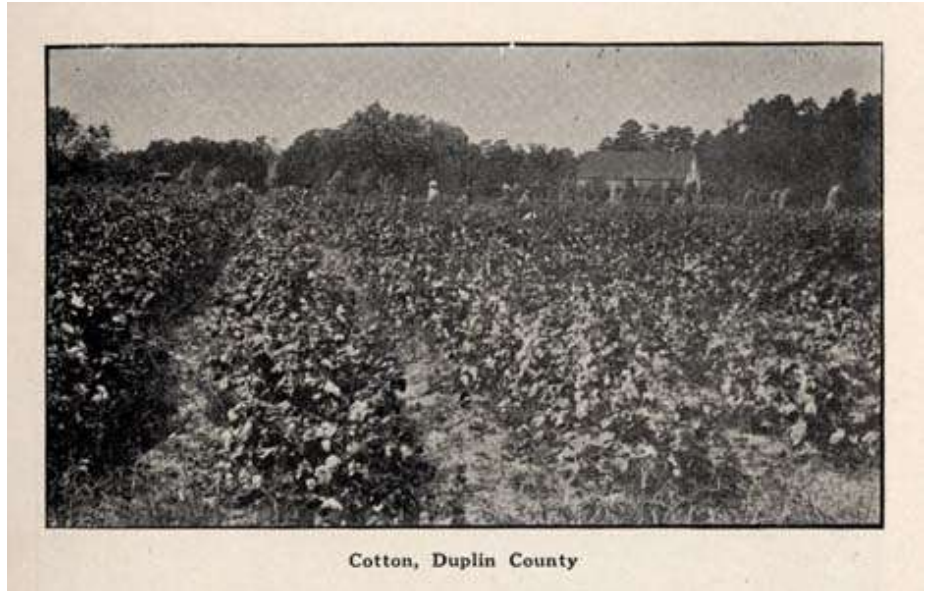
Design-Build Team Responsibilities

- Project Branding, Website, and Public Outreach
- Survey and Assessment
- Easement Acquisition
- Design
- Permitting and IRT Coordination
- Construction
- Monitoring
- Maintenance
- Delivering the Credits!


Buckleigh Pond
UT Buckleigh Branch
UT1 Grier Branch
UT2 Grier Branch
UT3 Grier Branch
Grier Branch
Upper Sassafras Creek
Buckleigh Branch
Hodges Branch
Upper Hood Creek
Hood Creek
Sassafras Creek
UT1 Reedy Creek
Upper Reedy Creek
Kingfisher Pond
Dragonfly Pond
Damselfly Trib
Slider Pond
Dragonfly Trib
UT Slider Creek
Slider Creek
Reedy Creek
South Fork
UT2 Reedy Creek
Robinson Run
Tessa's Trib
UT1 Robinson Run
Oak Branch
Umbrella Branch
South Fork
UT1 South Fork
UT2 South Fork
GRIER RD
KIRKGATE LN
STEEPLETON WAY
CASA LAKE DR
PINEHOLL LN
FAIRES RD
HOLIDAY DR
PLAZA PARK DR
IDLE WHEELS
PLAZA RD EXT
FRANK GRIER RD
Academy
Mecklenburg County Parcels
Private Parcels
Proposed Project Location
Project Wetlands
Impoundments
Existing Streams
73
16
77
85
27
277
24
485
16
51
218
49
485

Past Land Use

- **Historical Robinson Rock House ruins, built sometime in early 1800's**
- **1850's, Rock House known as part of a large plantation**
  - Farmed cotton, also some livestock and crops
  - Channels straightening/ dredging likely
- **1979: acquired by the City of Charlotte to be incorporated into a new park and nature preserve**

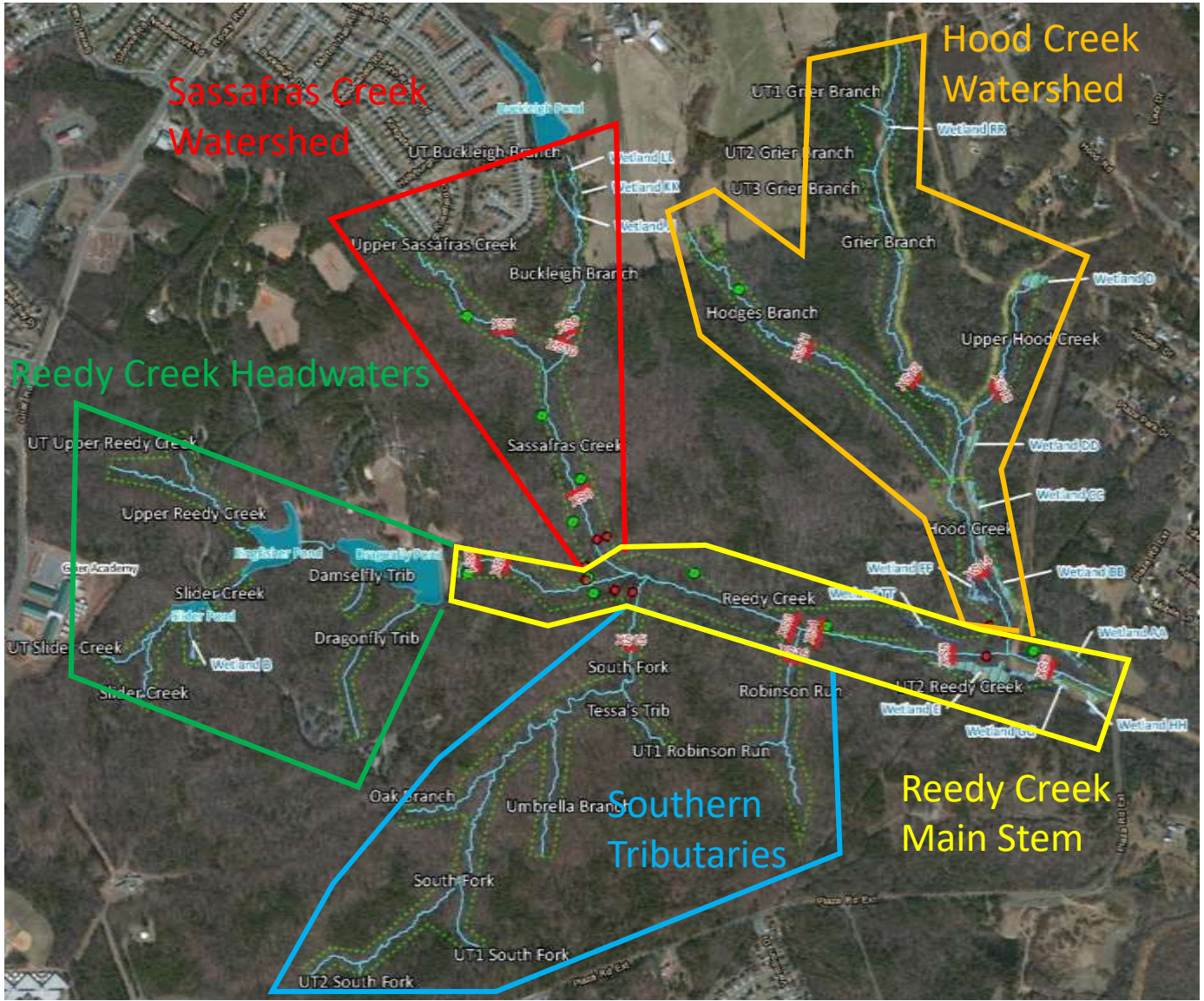


Cotton, Duplin County


1938

Spoil Berms

Existing Conditions



Current(ish) Land Use

Reedy Creek Stream Restoration Land Use						
Stream	Drainage Area (square miles)	% Impervious	2011 NLCD DataSet			
			Forest	Shrub and Grass	Farm/ Cultivated	Developed
Sassafras Creek Watershed (Urban)						
Buckleigh	0.18	13.8	15	2	33	50
Upper Sassafras	0.31	17.8	39	4	7	50
Sassafras Creek	0.56	14.1	40	3	14	43
Hood Creek Watershed (Agricultural)						
Upper Hood Creek	0.27	2.7	63	1	1	35
Grier	0.23	3.4	46	6	14	34
Hodges	0.19	0.6	55	2	40	3
Hood Creek	0.78	2.1	60	3	14	23
Southern Tributaries						
South Fork	0.34	0.5	94	0	0	4
Robinson Run	0.06	0.2	99	0	0	1
Main Stem						
Reedy Creek	2.46	4.3	70	3	9	18
Data from Stream Stats (https://streamstats.usgs.gov/ss/)						

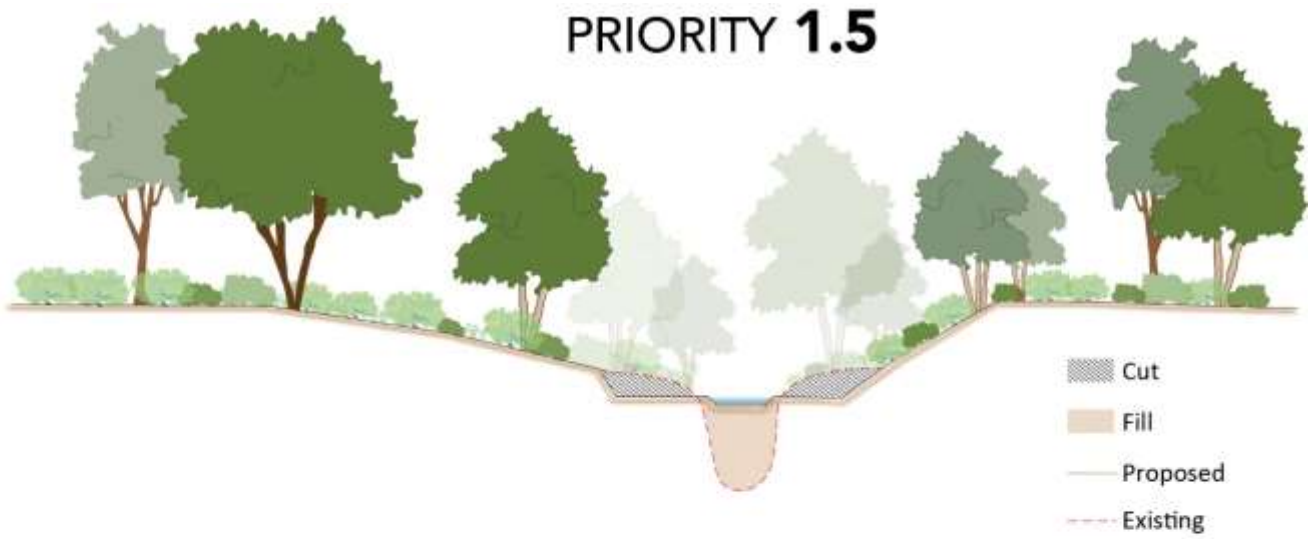
Existing Conditions

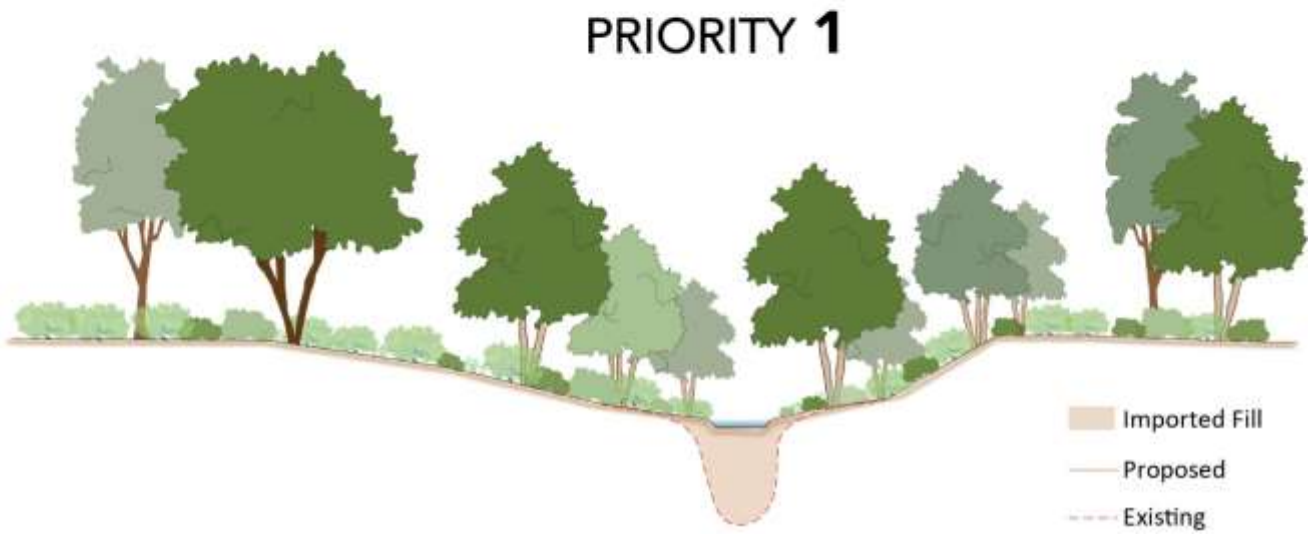
Design Phase

Priority 1 Earthwork

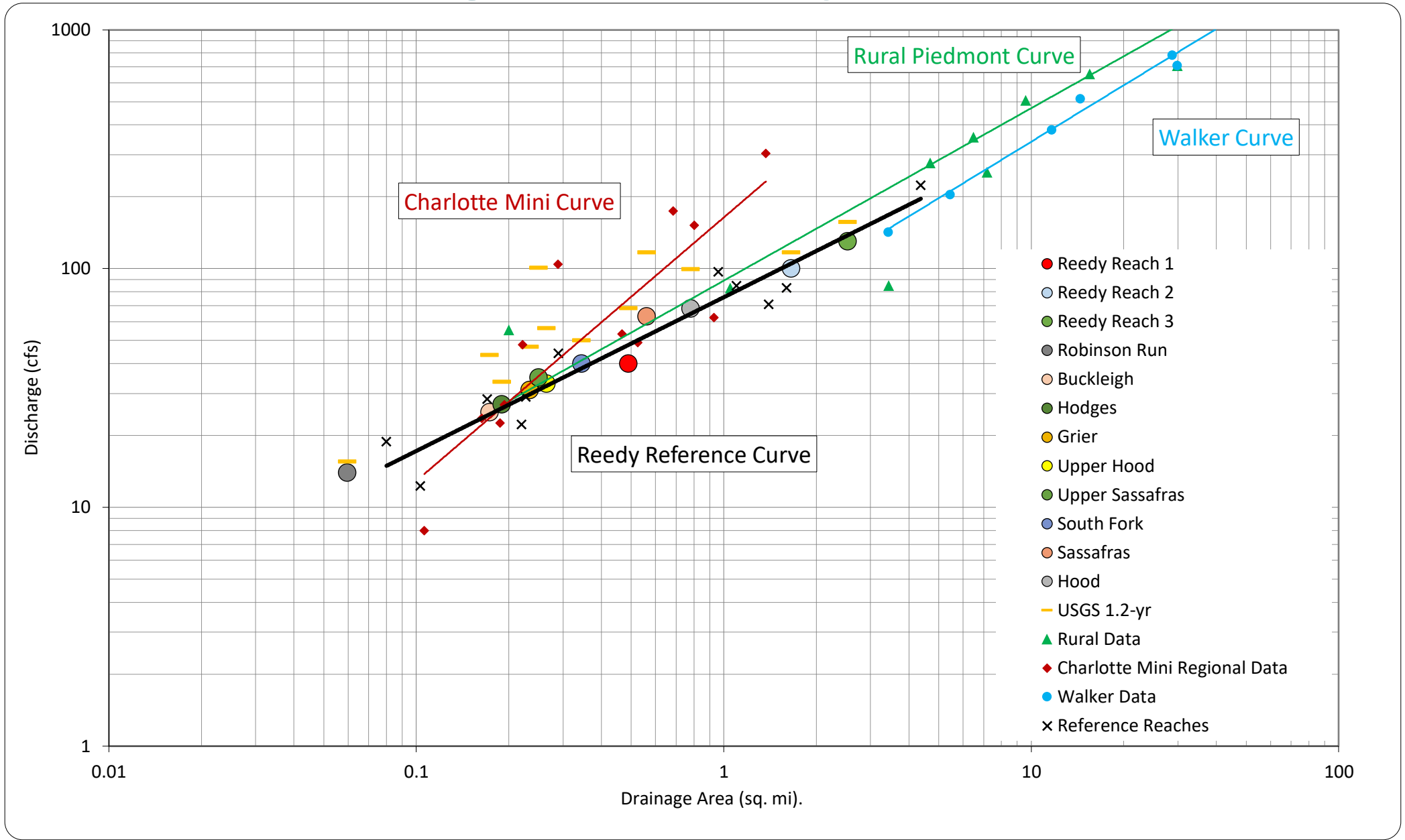
+ most holistic restoration
+ save more trees

- need a lot of dirt
- increase floodplain flows (CLOMR)

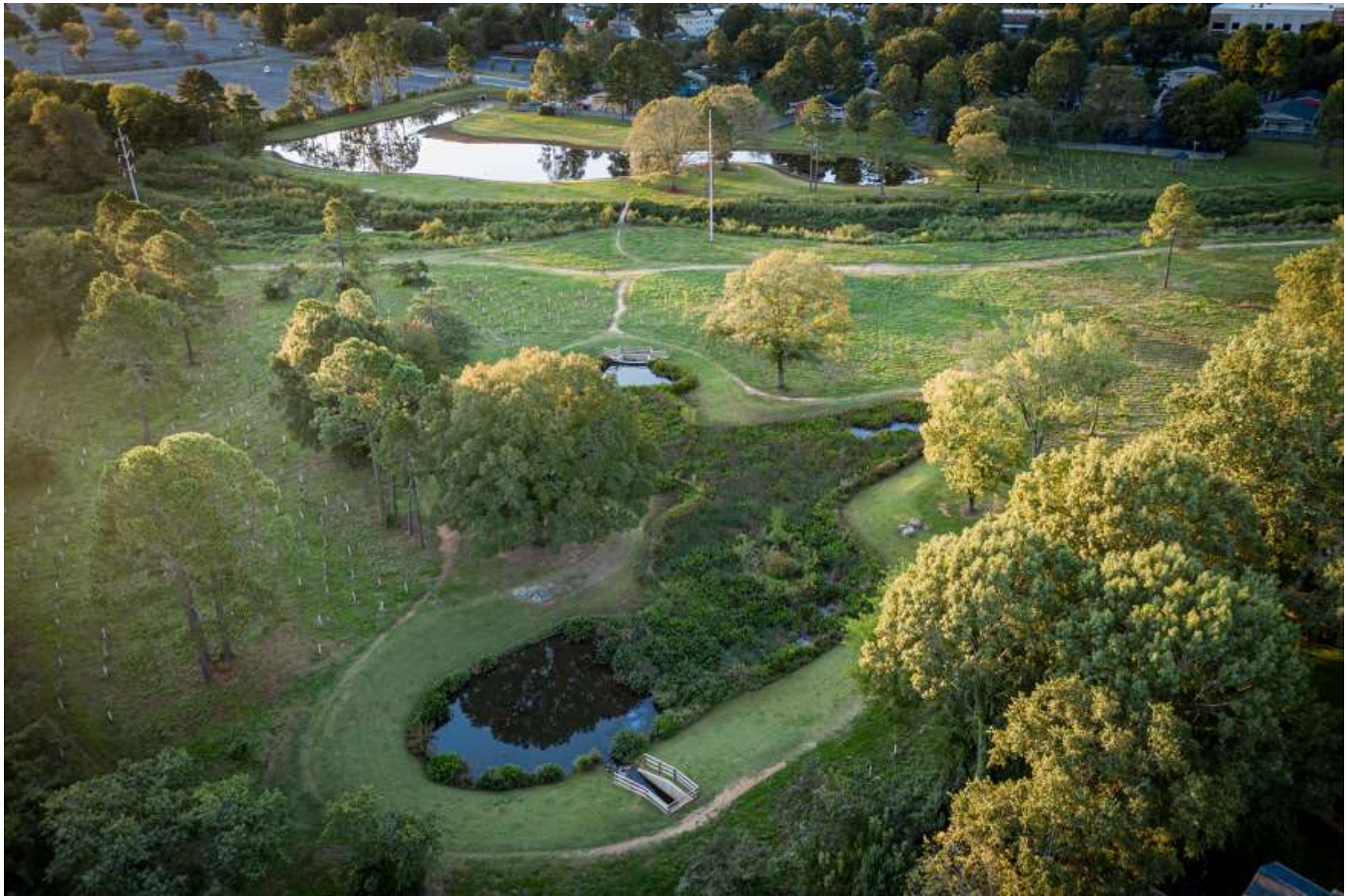




Bankfull Discharge at Reedy

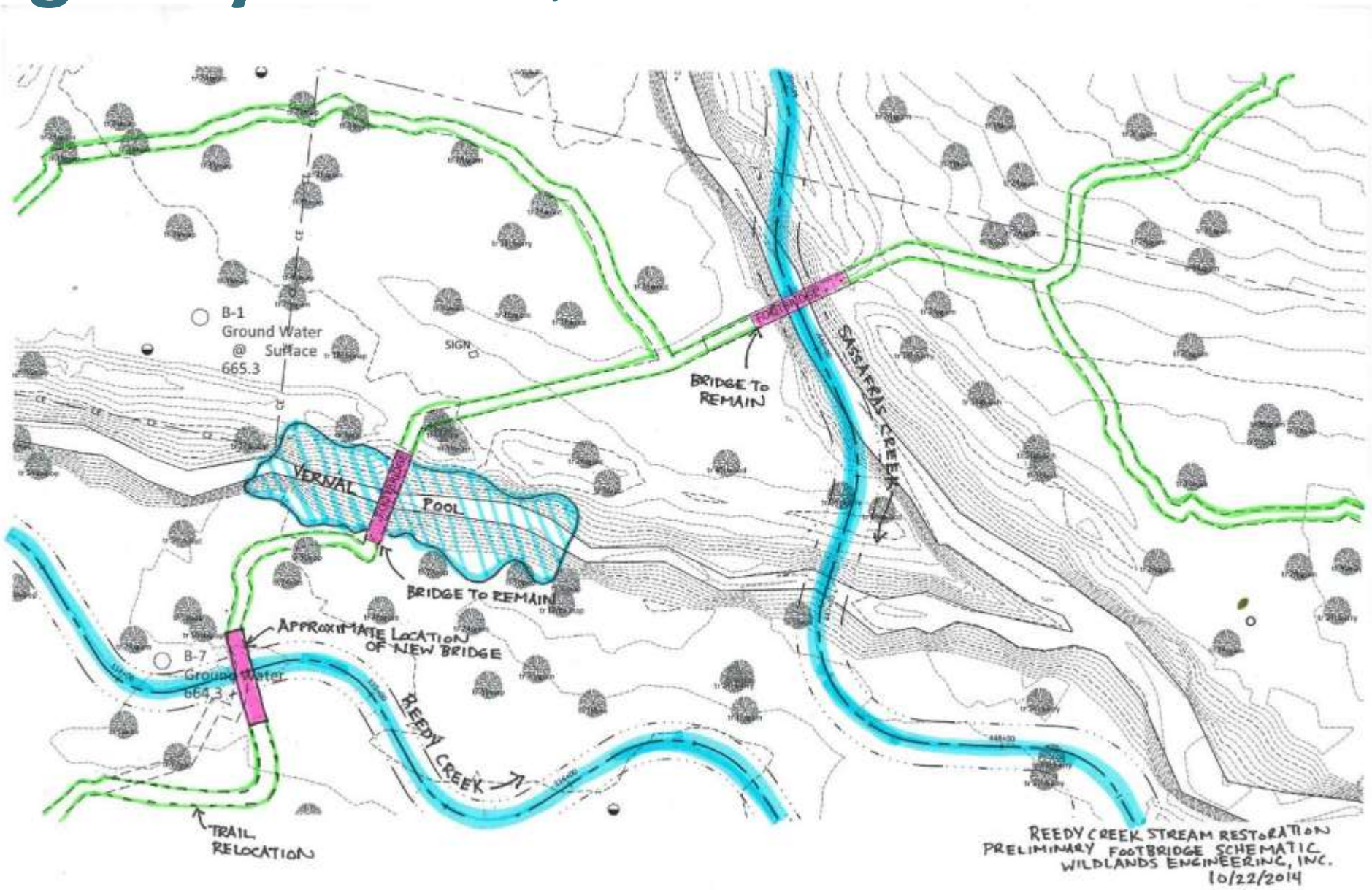


Design Phase

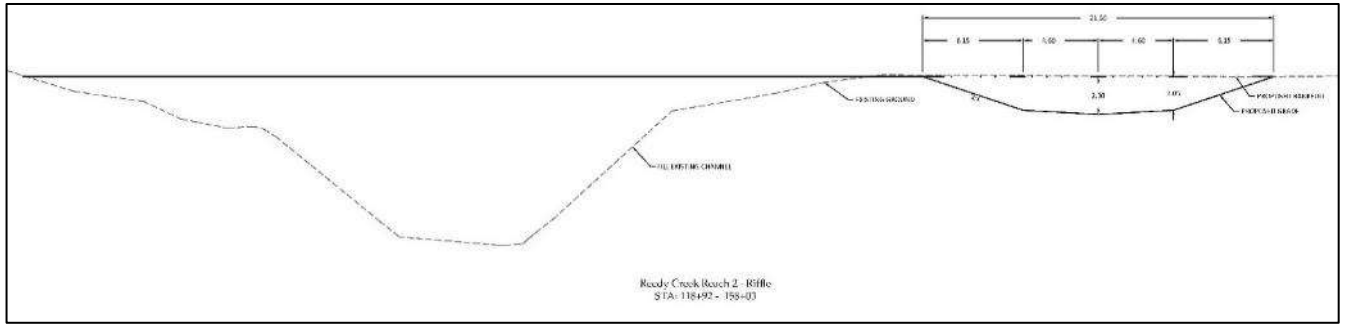


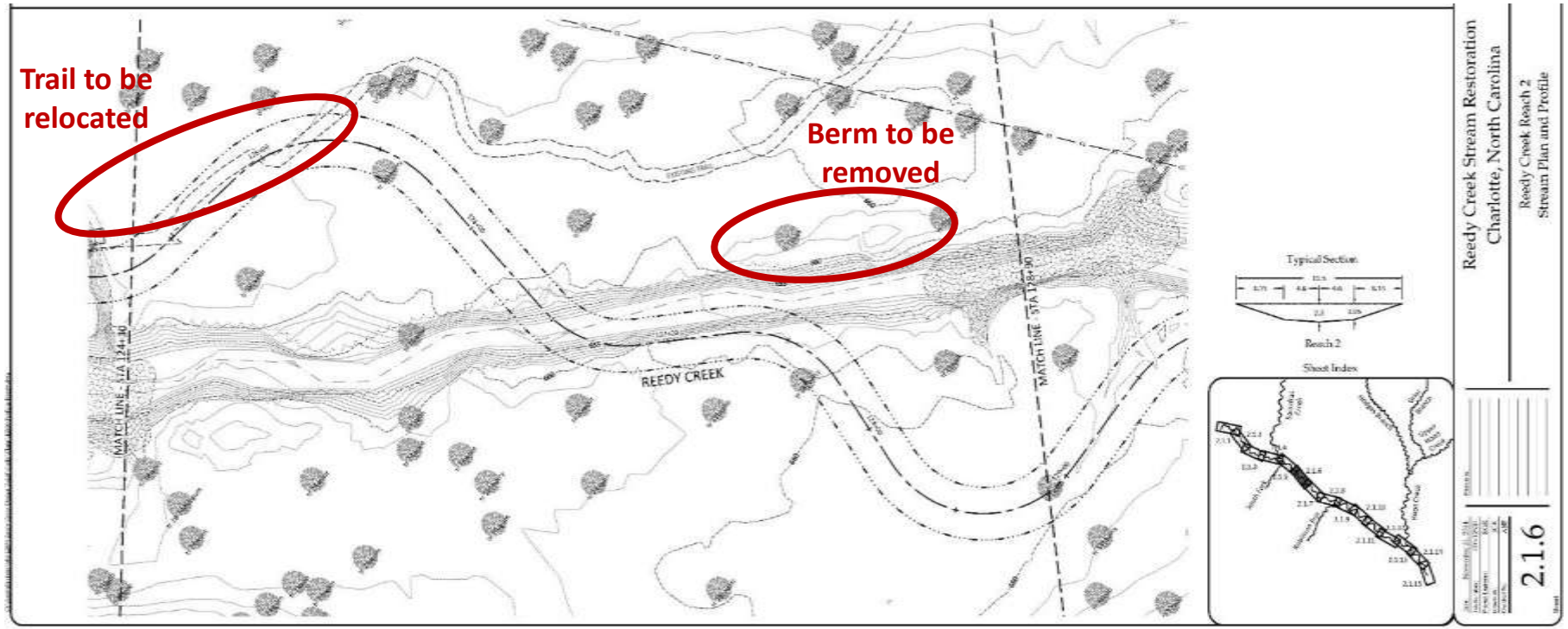
Chantilly Ecological Sanctuary at Briar Creek | *Charlotte, NC*

Design Layout: Reedy Creek Reach

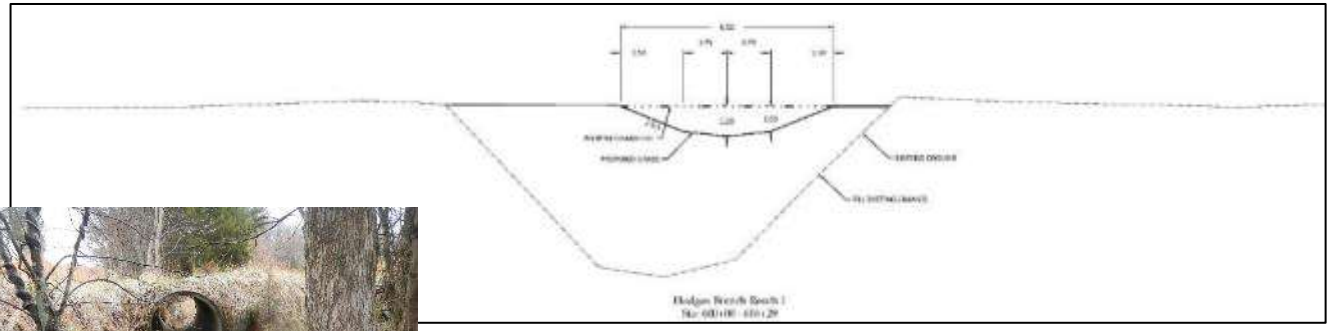


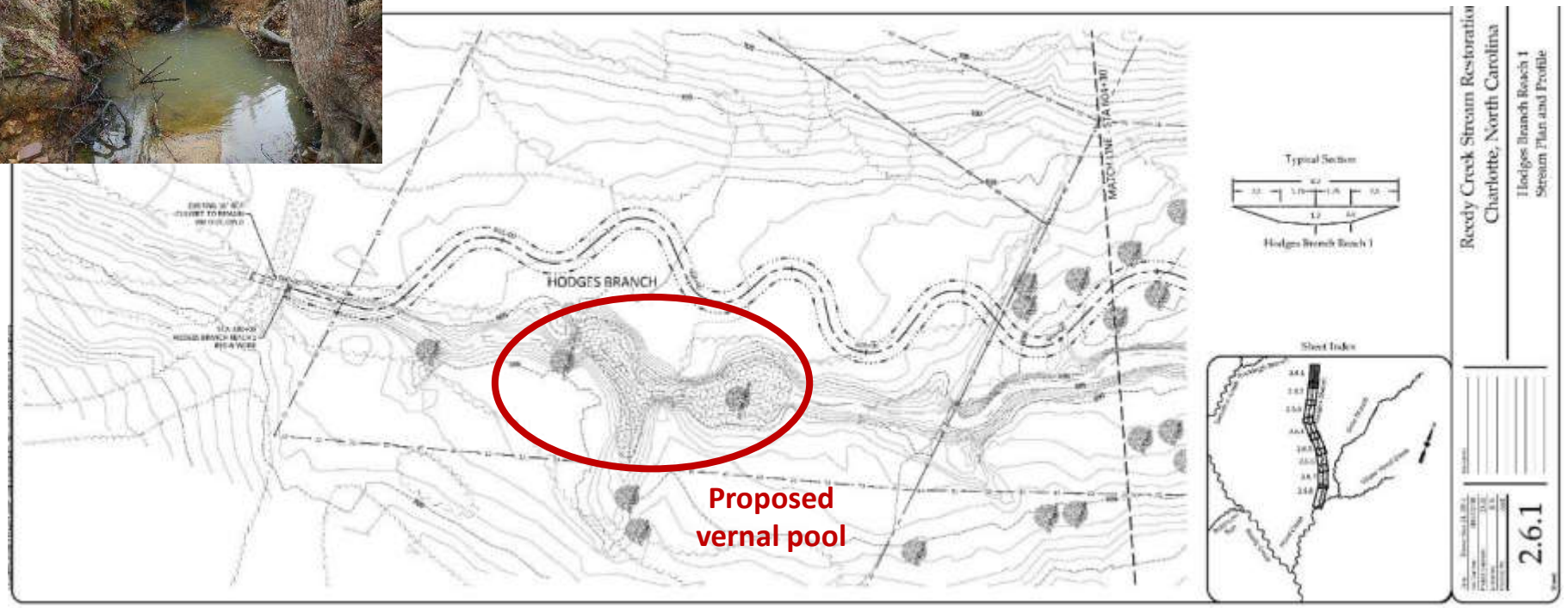
Design Layout: Reedy Creek Reach 2



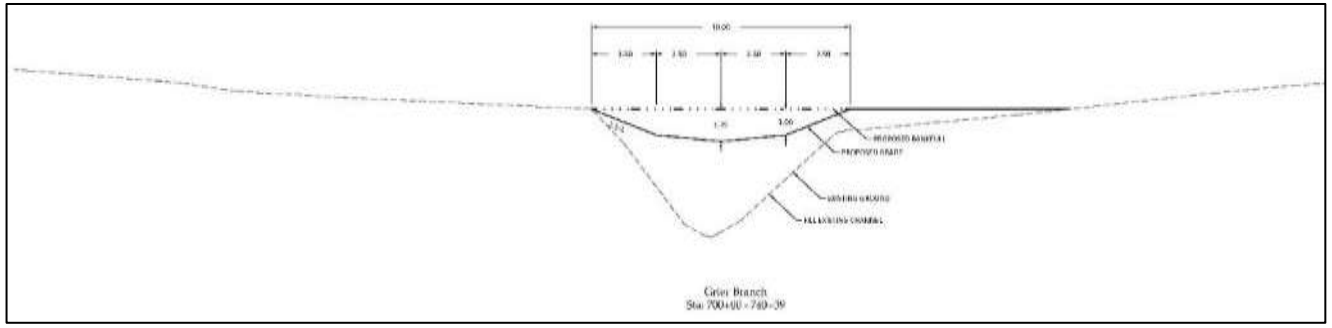


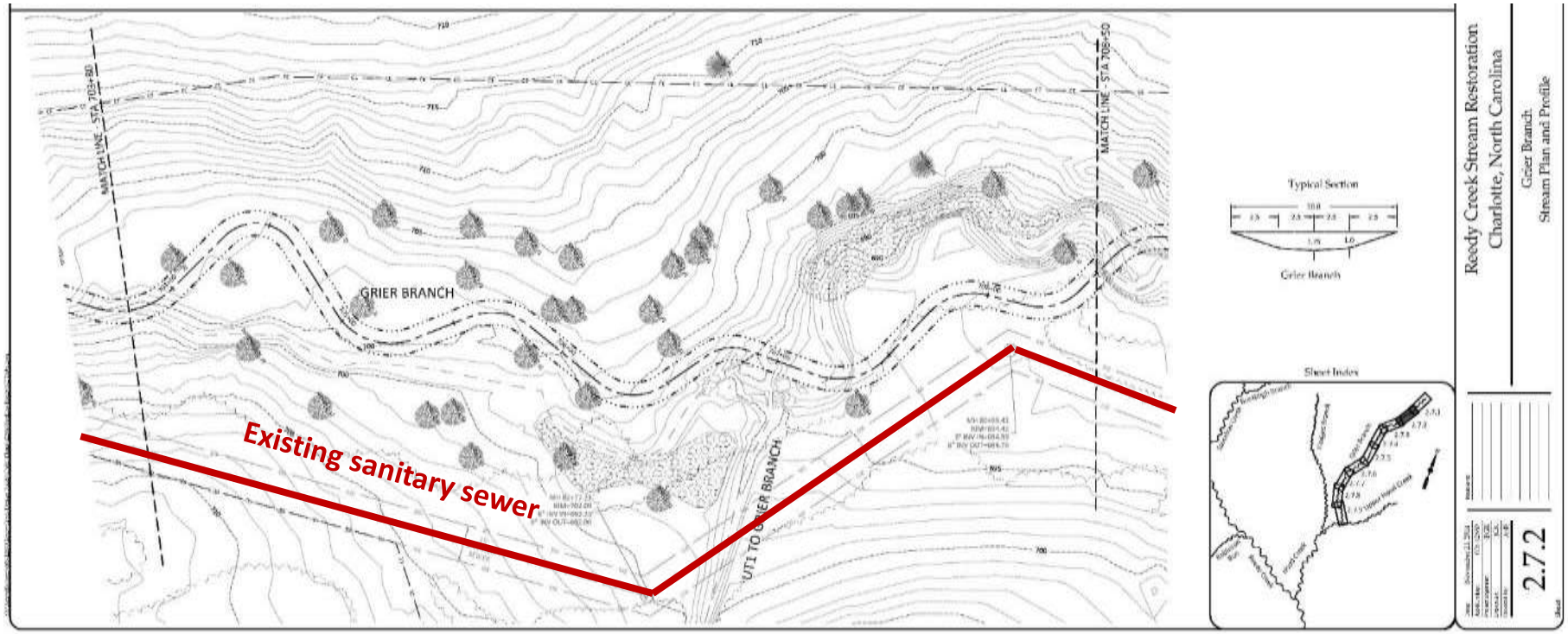
Design Layout: Hodges Branch



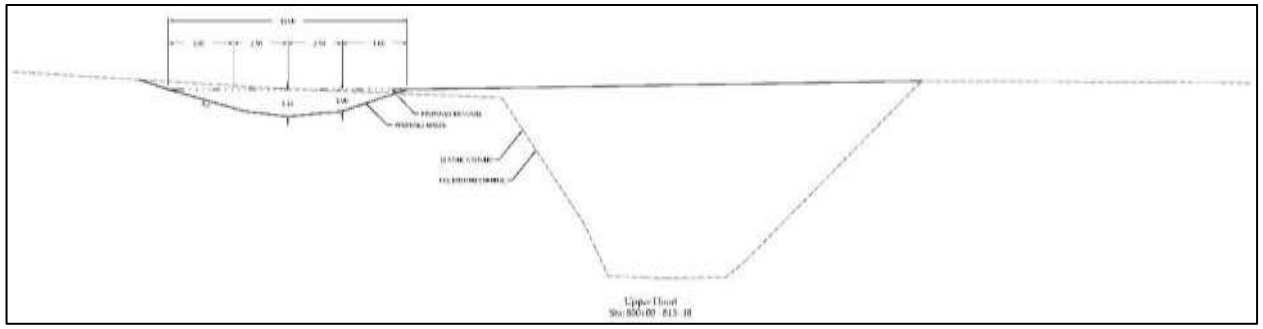


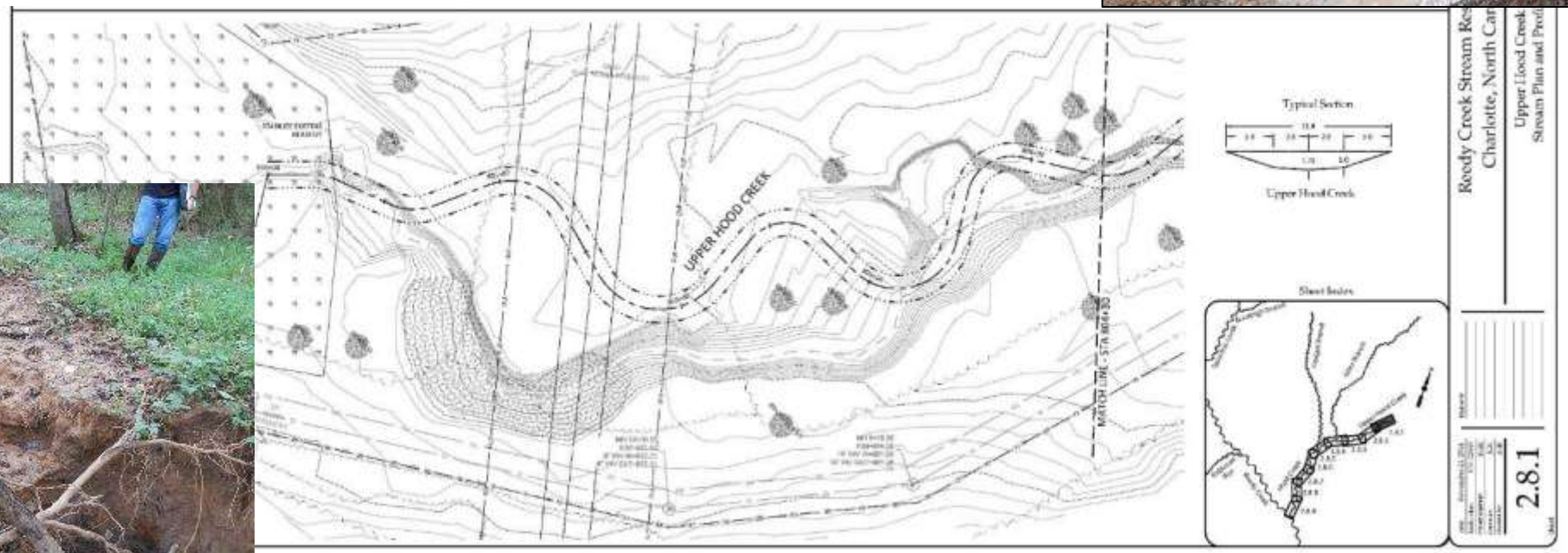
Design Layout: Grier Branch





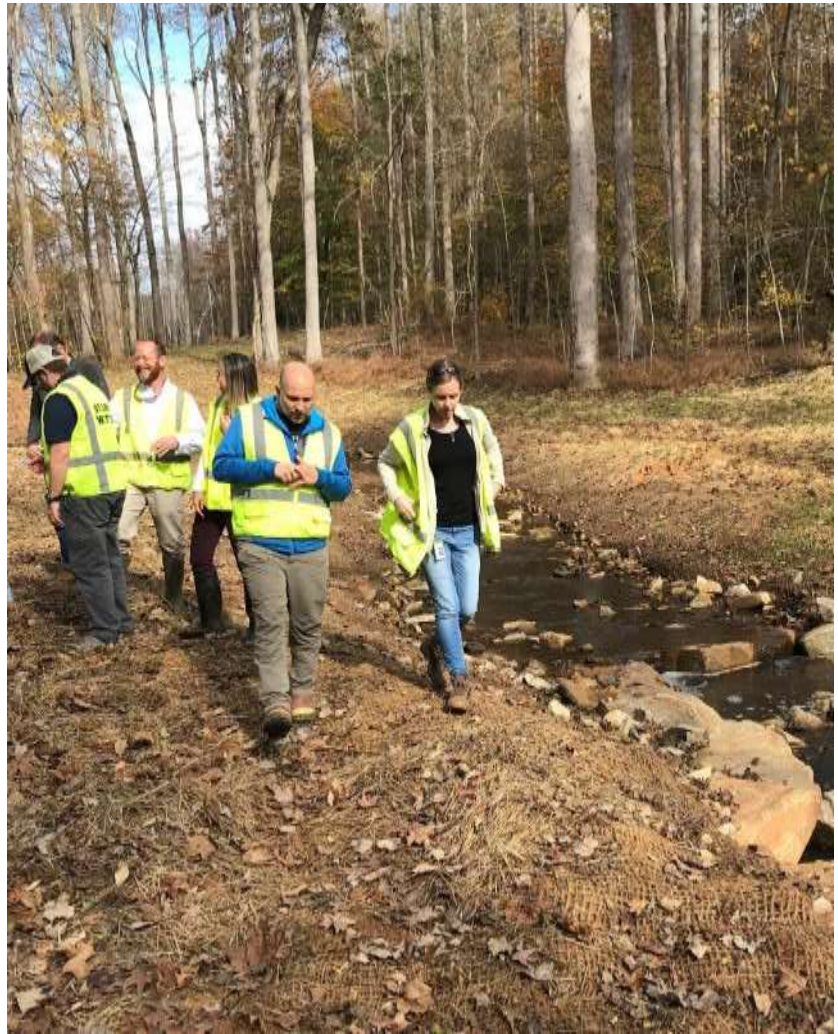
Design Layout: Upper Hood Creek



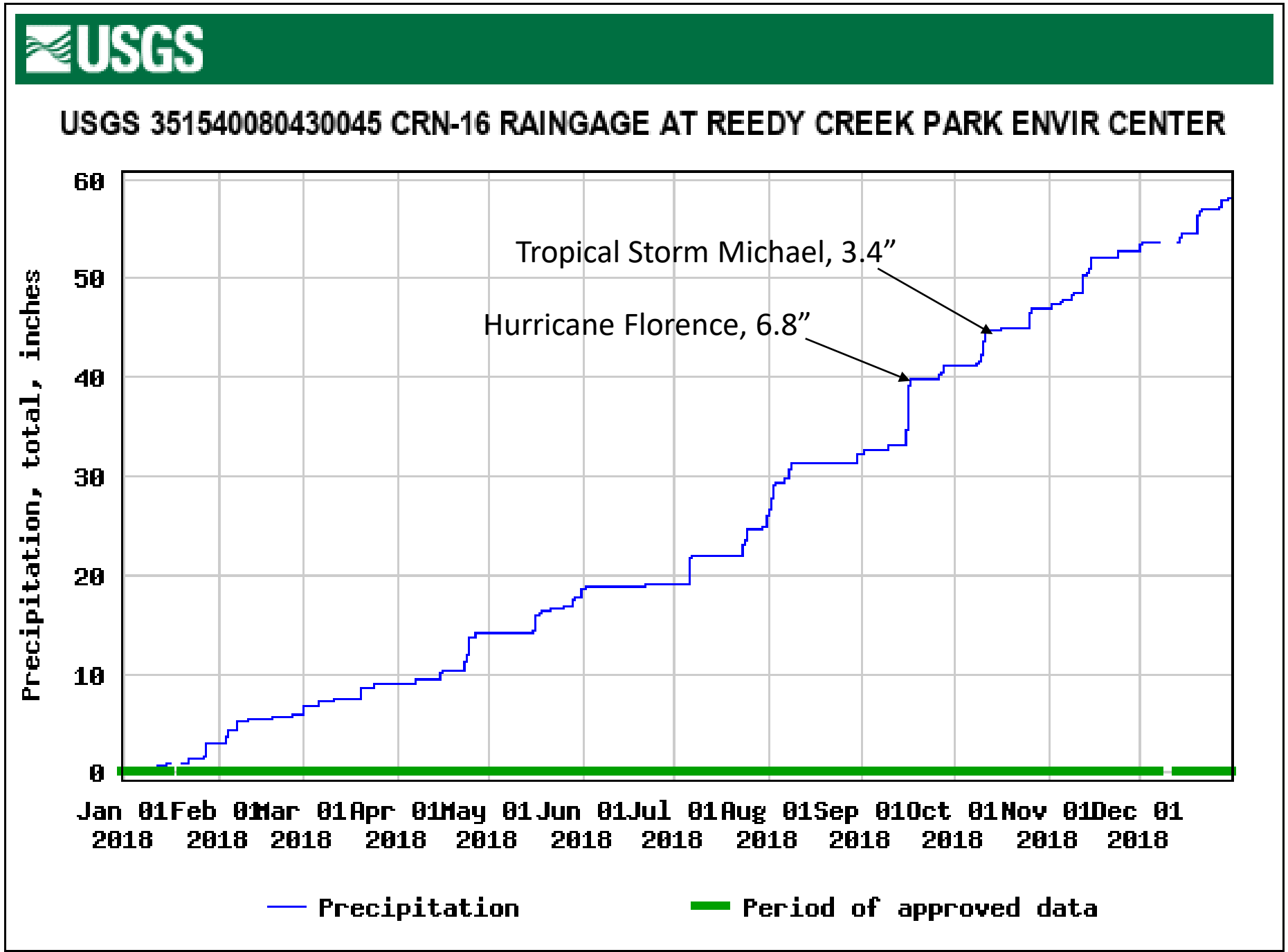


Construction

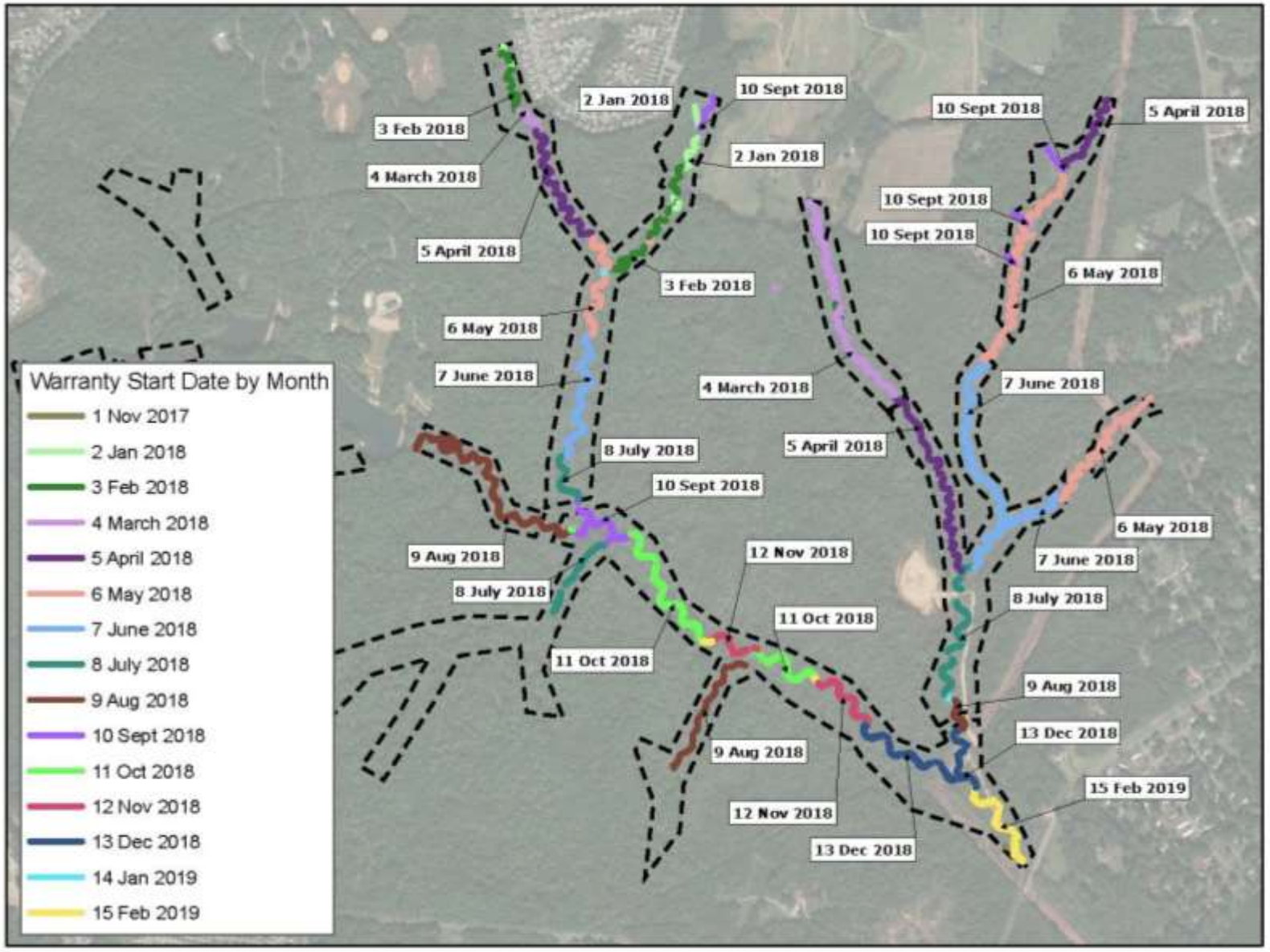
Construction



Construction Workshop


USGS
USGS 351540080430045 CRN-16 RAINGAGE AT REEDY CREEK PARK ENVIR CENTER
Precipitation, total, inches
60
50
40
30
20
10
0
Tropical Storm Michael, 3.4”
Hurricane Florence, 6.8”
Jan 01 2018
Feb 01 2018
Mar 01 2018
Apr 01 2018
May 01 2018
Jun 01 2018
Jul 01 2018
Aug 01 2018
Sep 01 2018
Oct 01 2018
Nov 01 2018
Dec 01 2018
Precipitation
Period of approved data

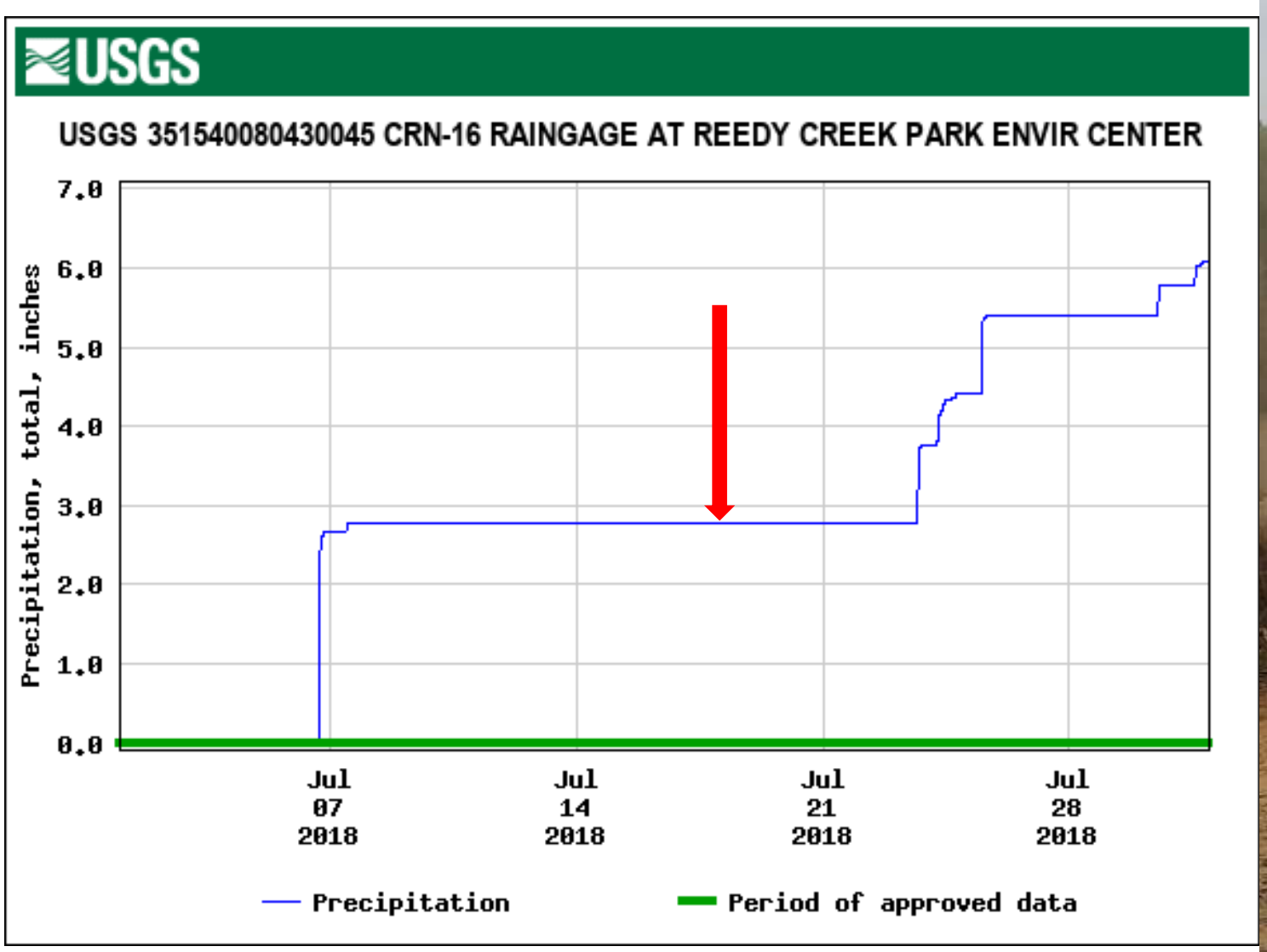
Construction



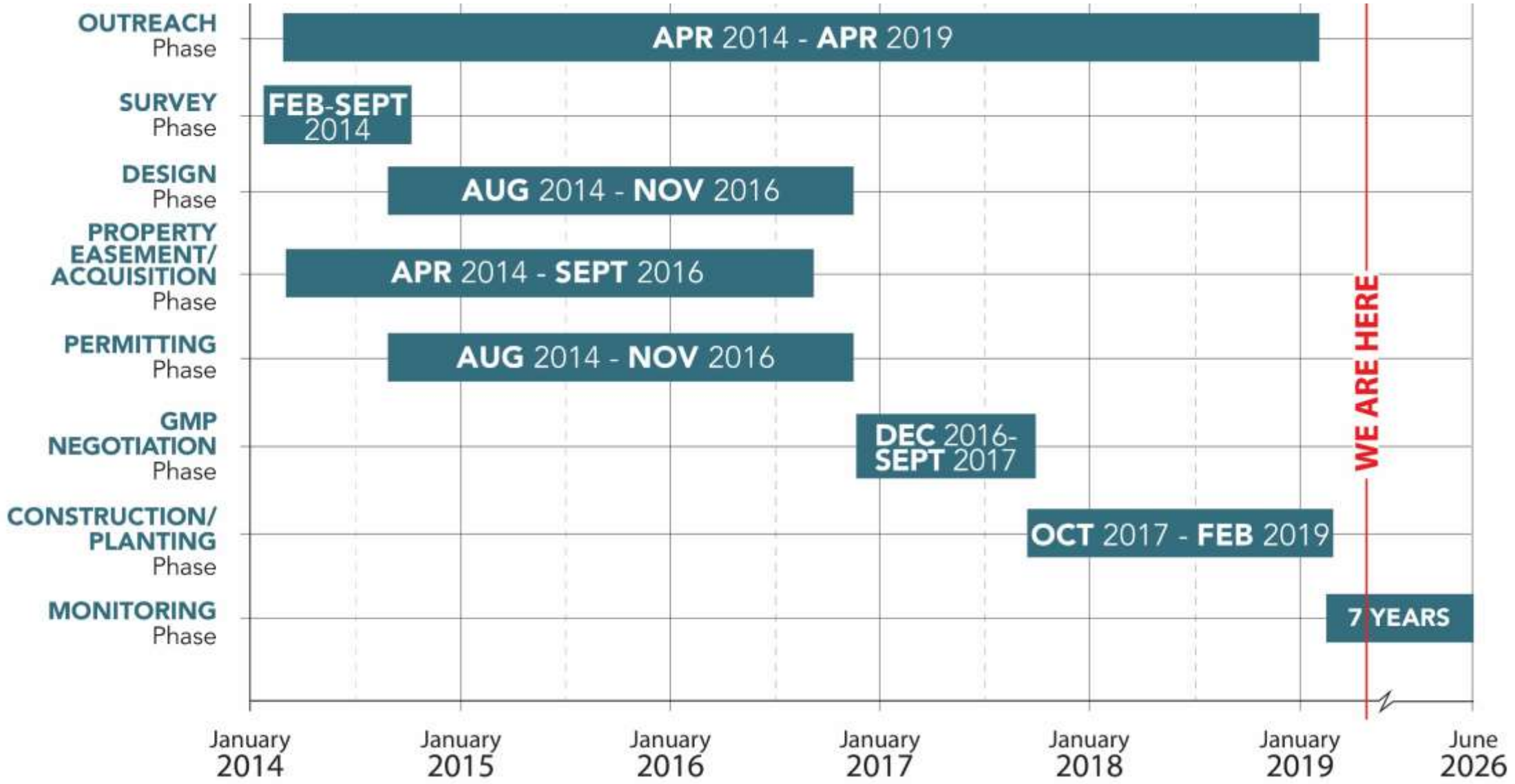
Construction

Construction

Flashy summer storms



Project Timeline



UPPER SASSAFRAS | **AFTER**

UPPER HOOD | **AFTER**

HODGES BRANCH | **AFTER**


Reedy Creek | **AFTER**

How the Different Watersheds Responded

- **Overall, only notable scour on the project is in the Sassafras watershed** (highest % impervious)
  - Also, highest frequency of BKF events first year after construction
- **South Fork watershed** (0.5% impervious, forested)
  - Few ‘bankfull’ events and bench forming at lower elevation within the channel
  - Sand lens encountered during construction (same soil type as Buckleigh, but sand lens not encountered)
  - Next watershed over (Robinson) hits bankfull often, with similar watershed land use/channel sizing
- **Upper Reedy Creek**
  - Pond immediately upstream
  - Few ‘bankfull’ events despite sizing channel down
- **Grier / Hodges / Hood**
  - Frequent bankfull events

QUESTIONS?

William Harris
William.Harris@charlottenc.gov

Christine Blackwelder
cblackwelder@wildlandseng.com

Charlotte-Mecklenburg STORM WATER Services

WILDLANDS ENGINEERING