

From the Cloud to the Stream ...Of Decision-Support:

Taking GIS Beyond the Map

by: Scott Gregory



WILDLANDS
ENGINEERING

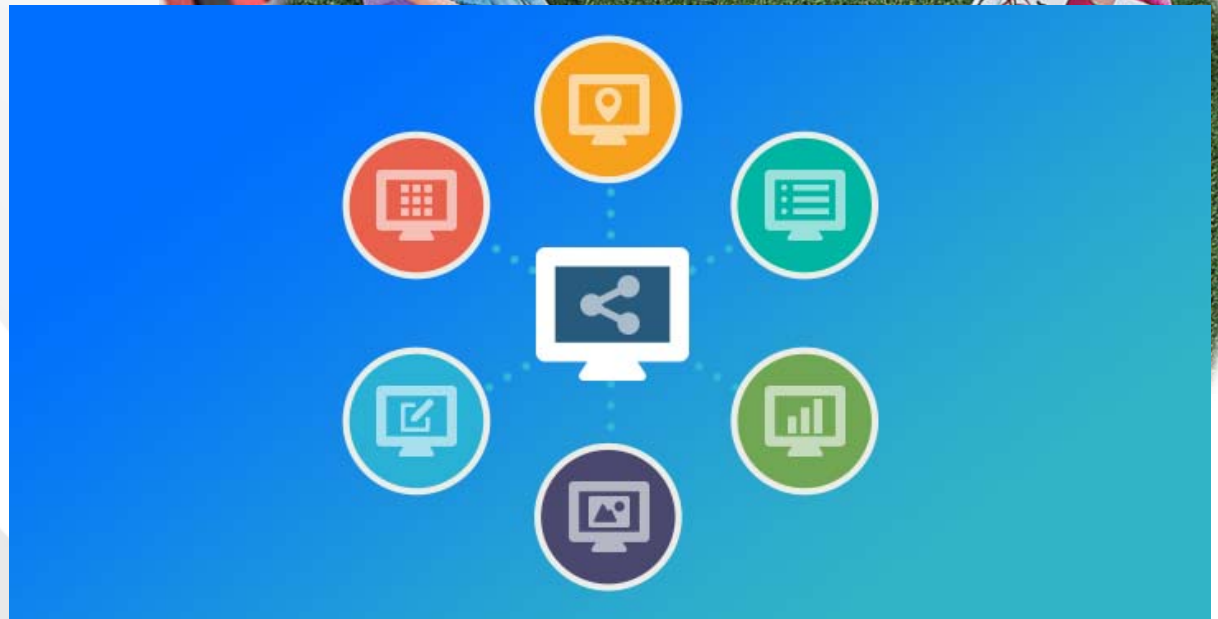
Presentation Overview

- Background
- Example Applications
- Questions

Problem Solving

- Conditions (What)
- Time (When)
- Location (Where)

How
Why



Web GIS

- View
- Manage
- Query
- Share
- Collaborate
- Accessibility
- Dissemination
- Flexibility

Web GIS Also Integrates Organizations and People Breaking Down the Barriers



What's changed?

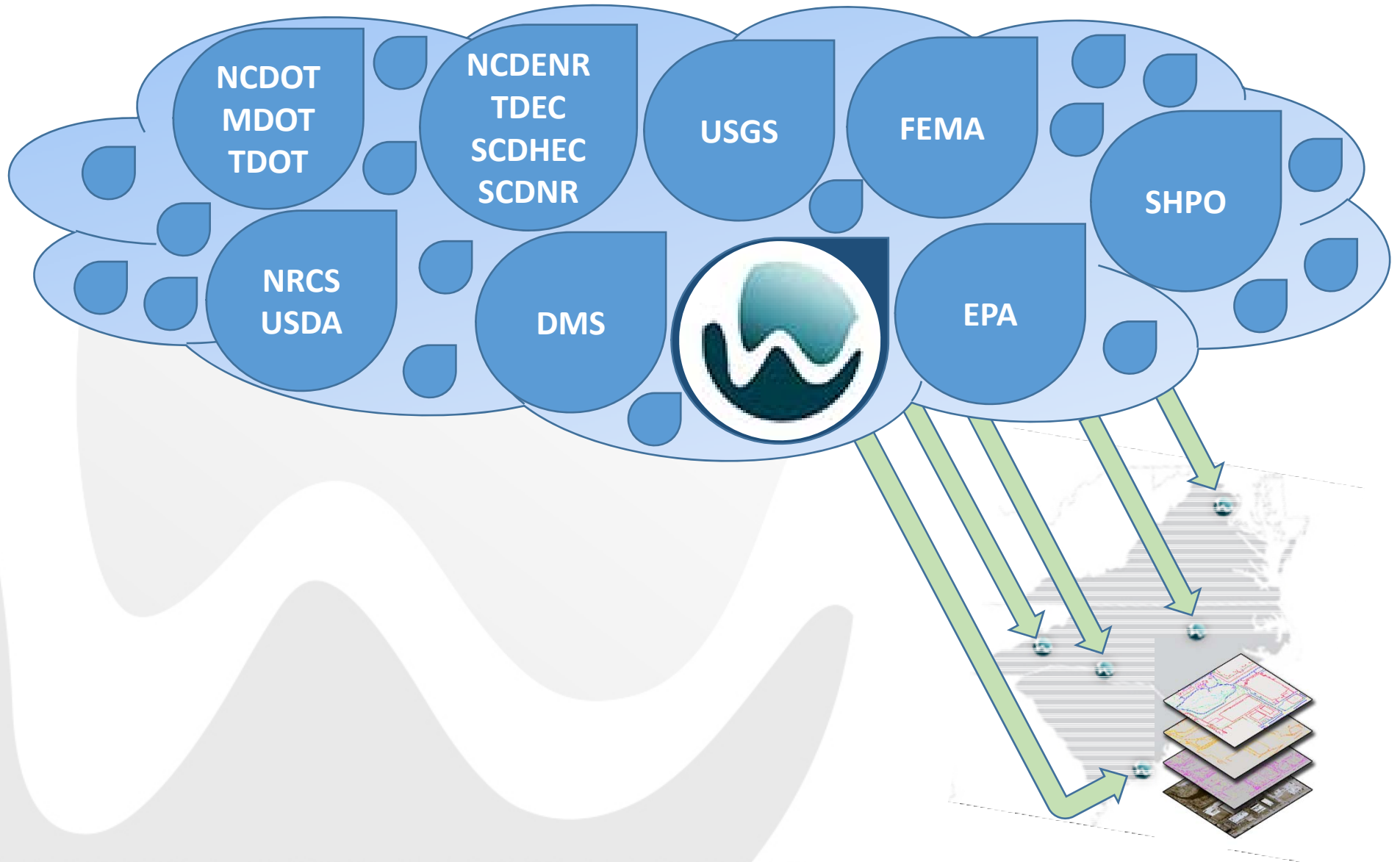
- Increased data availability
- Increased data accessibility

Proliferation of Web GIS

The amount of data is growing exponentially, doubling every two years. However, more data by itself does not necessarily mean more value. For data to be valuable, it needs to be curated and made easily accessible.



Web Mapping Services



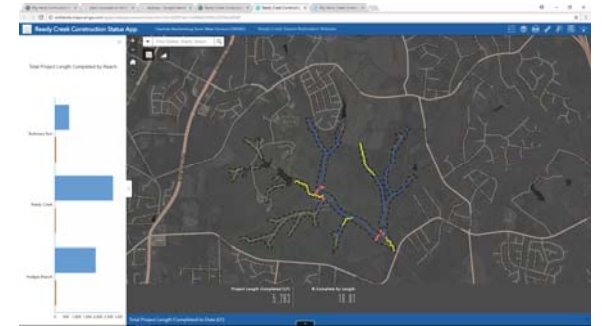
Example Applications

- Watershed Planning
- Field Design Verification
- Stakeholder Coordination
- Construction Management
- Public Relations
- Research & Development

Ideal Project Types

- Medium to large scale projects (*with longer data lifecycles*)
- DMS (Mitigation) projects
- Projects with multiple stakeholders
- High profile projects
 - Public relations component → Public-facing app

How It Works



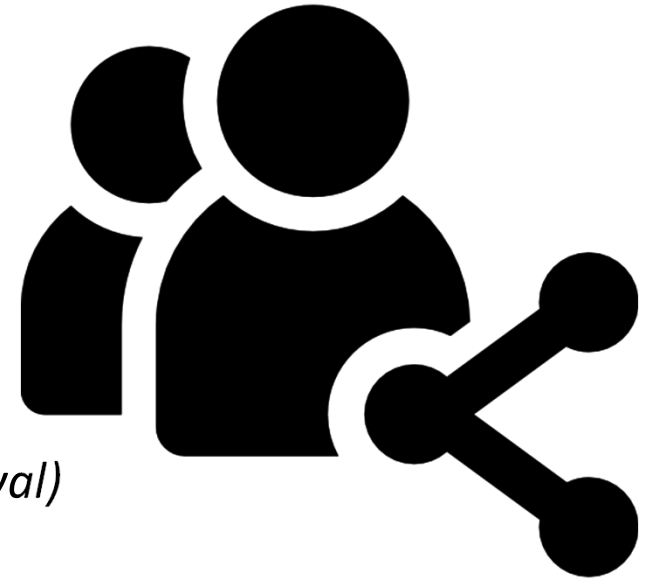
Collector App
or
Custom Web App

AGOL Web Map

Web Application

Sharing and Dissemination

- Internal (*Wildlands Staff*)
- Clients
- Contractors
 - Punchlists
 - Tracking/Mapping Tasks (*Invasive Removal*)
- Public (*for Public Relations*)



Watershed Planning

Smith Mill Creek



Browser tabs: Smith Mill Creek Watershed, Reedy Creek Construction, Shake Rag Info Map View, Shake Rag Info Map WEI

Address bar: https://wildlands.maps.arcgis.com/apps/MapAndAppGallery/index.html?appid=f32b57f54d2146029a5f4e757c5c9adb


Navigation bar: RIVER LINK, Smith Mill Creek Watershed Plan - Web App Gallery, Search, Sort by, Layout, Sign Out


Smith Mill Creek Watershed Plan PUBLIC


Web app deliverables supporting the SMC watershed plan


Tags

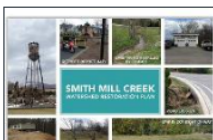
Asheville Flooding French Broad River Greenways Leicester Highway map McKinnish Branch Patton Avenue restoration Riverlink Smith Mill Creek Water Quality watershed West Asheville


- 

SMITH MILL CREEK - Proposed Priority Projects Selected using Ranking Criteria
Web Mapping Application
Smith Mill Creek - Map Journal for Projects
- 

Smith Mill Creek Watershed - Community Engagement and Action Tool
Web Mapping Application
Geoform to map various activities within the Smith Mill Creek watershed
- 

SMITH MILL CREEK WATERSHED 9-ELEMENT PLAN
Web Mapping Application
Smith Mill Creek - Map Journal of the Watershed Plan
- 

Smith Mill Creek Watershed Observations
Web Mapping Application
Geoform to collect field observations within the Smith Mill Creek watershed
- 

SMITH MILL CREEK WATERSHED PLAN - OUTREACH
Web Mapping Application
Smith Mill Creek - Map Journal for Outreach
- 

WorkMap_SMC_22x34_reduced
PDF
Smith Mill Creek - PDF Work Map for Field Assessment and Planning

Smith Mill Creek



Smith Mill Creek Watershed - Community Engagement and Action Tool

Welcome! The purpose of this geofom is to raise awareness of upcoming and ongoing water events in the watershed. Choose from one of the following types of events, then proceeding to complete the remainder of the form.

- Interested Stakeholder - I am interested in the watershed and surrounding community.
- Report a Problem - I want to report a problem in the watershed.
- Watershed Event - I want to request an event in the watershed and surrounding community.

1. Select Form

2. Enter Information

Enter brief description of your interest in the watershed.

May we contact you? (required)

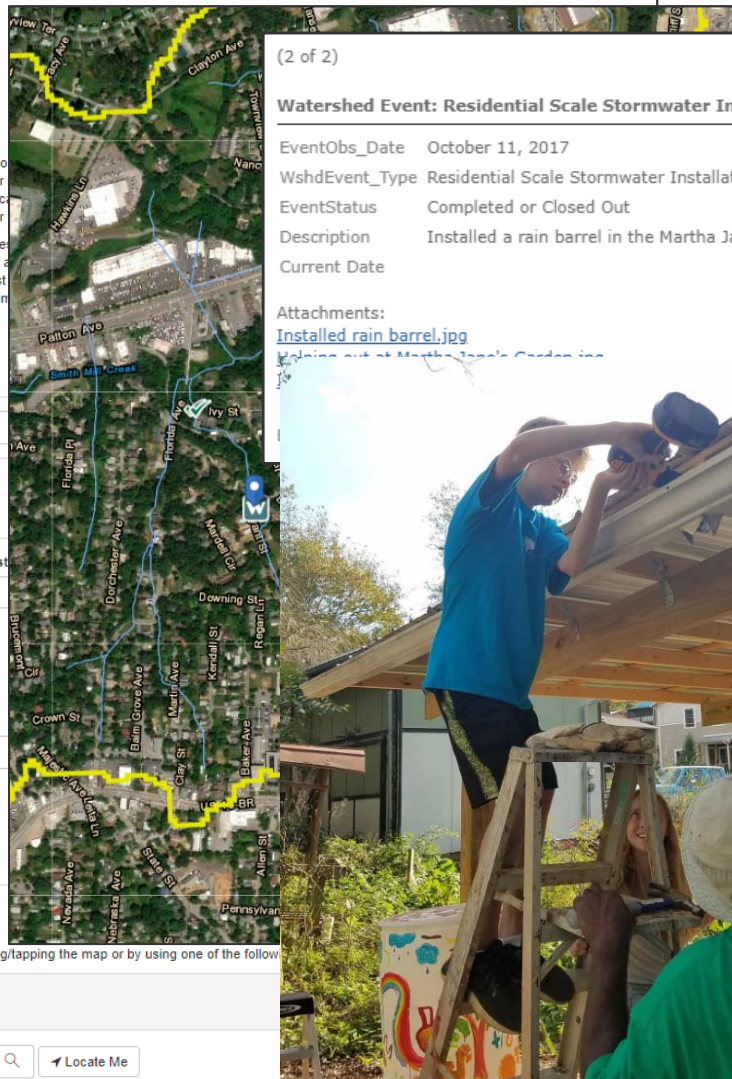
No
 Yes

Enter contact info

Attachment

3. Select Location

Specify the location for this entry by clicking/tapping the map or by using one of the following options.

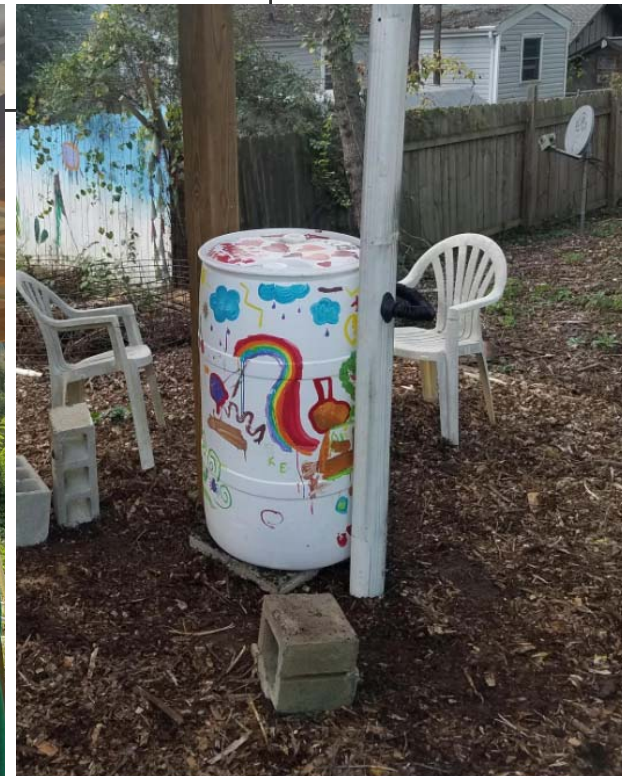


(2 of 2)

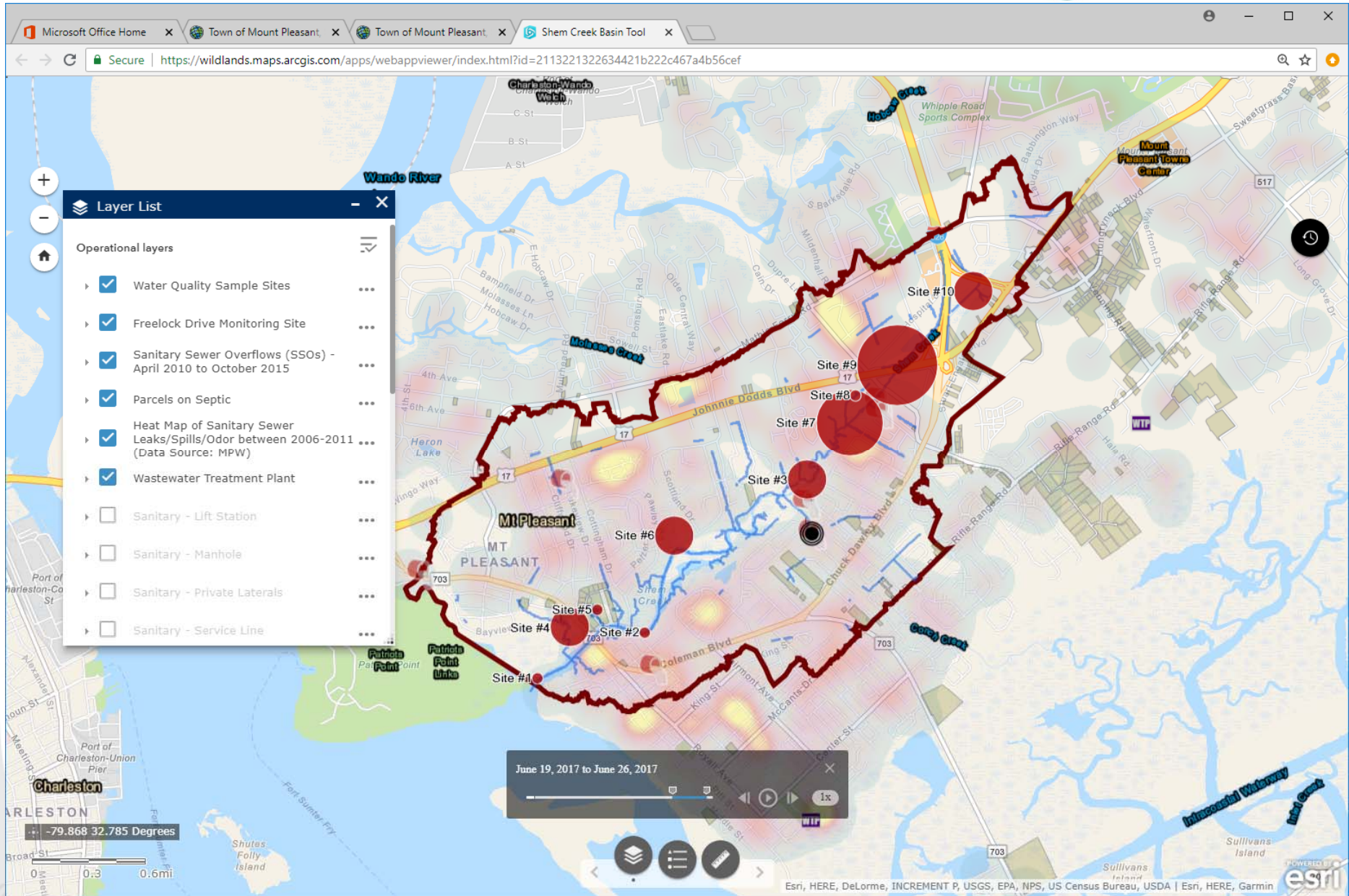
Watershed Event: Residential Scale Stormwater Installation (e.g. Rain Garden)

EventObs_Date October 11, 2017
WshdEvent_Type Residential Scale Stormwater Installation (e.g. Rain Garden)
EventStatus Completed or Closed Out
Description Installed a rain barrel in the Martha Jane Community Garden in the Burton St. Neighborhood
Current Date

Attachments:
[Installed rain barrel.jpg](#)



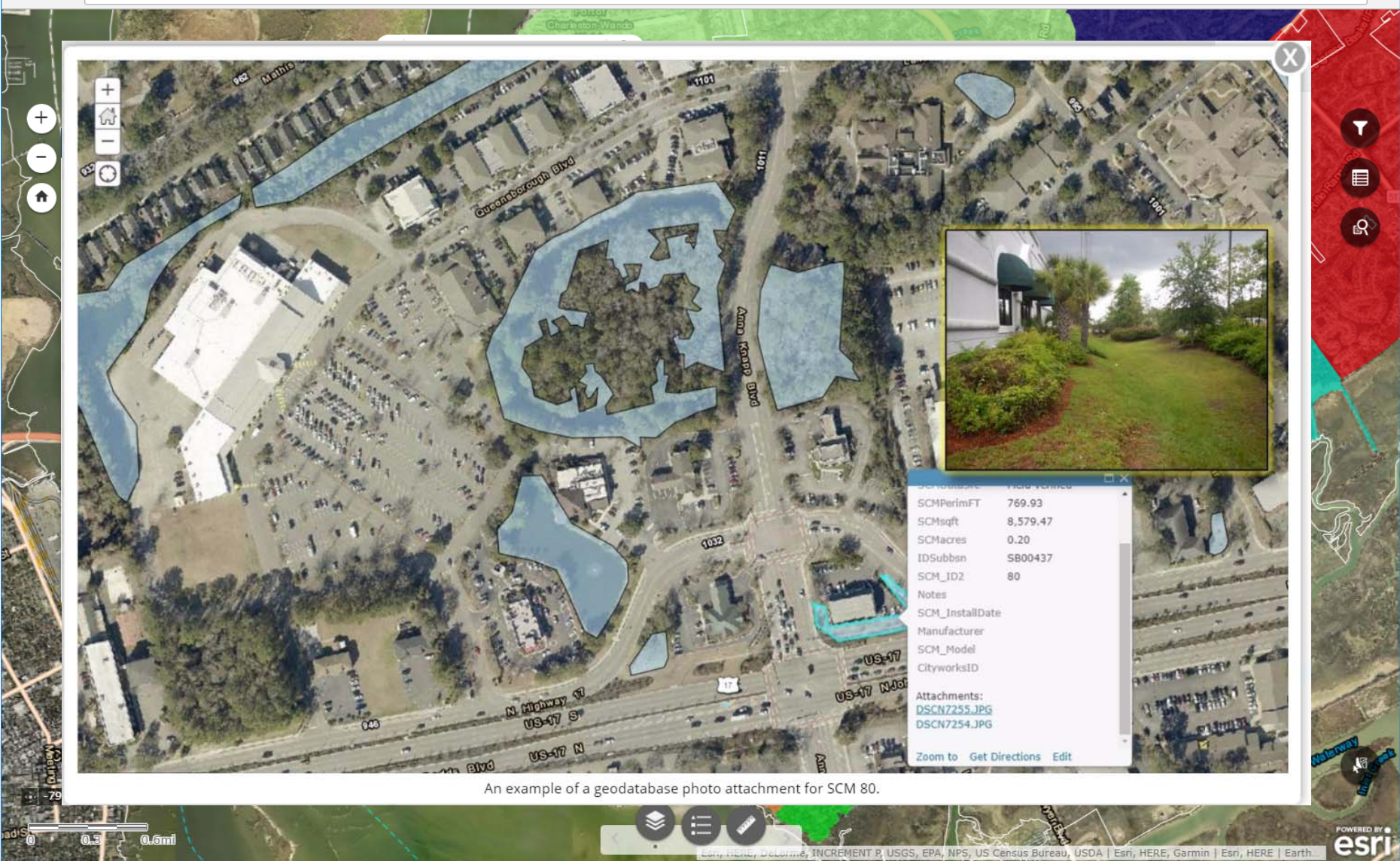
Shem Creek



Shem Creek

Microsoft Office Home | Town of Mount Pleasant | Town of Mount Pleasant | Shem Creek Basin Tool


Secure | <https://wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=b485f483e8e74a81b5addaa0111c9109>



Property	Value
SCMPerimFT	769.93
SCMsqft	8,579.47
SCMacres	0.20
IDSubsn	S800437
SCM_ID2	80
Notes	
SCM_InstallDate	
Manufacturer	
SCM_Model	
CityworksID	
Attachments:	
	DSCN7255.JPG
	DSCN7254.JPG

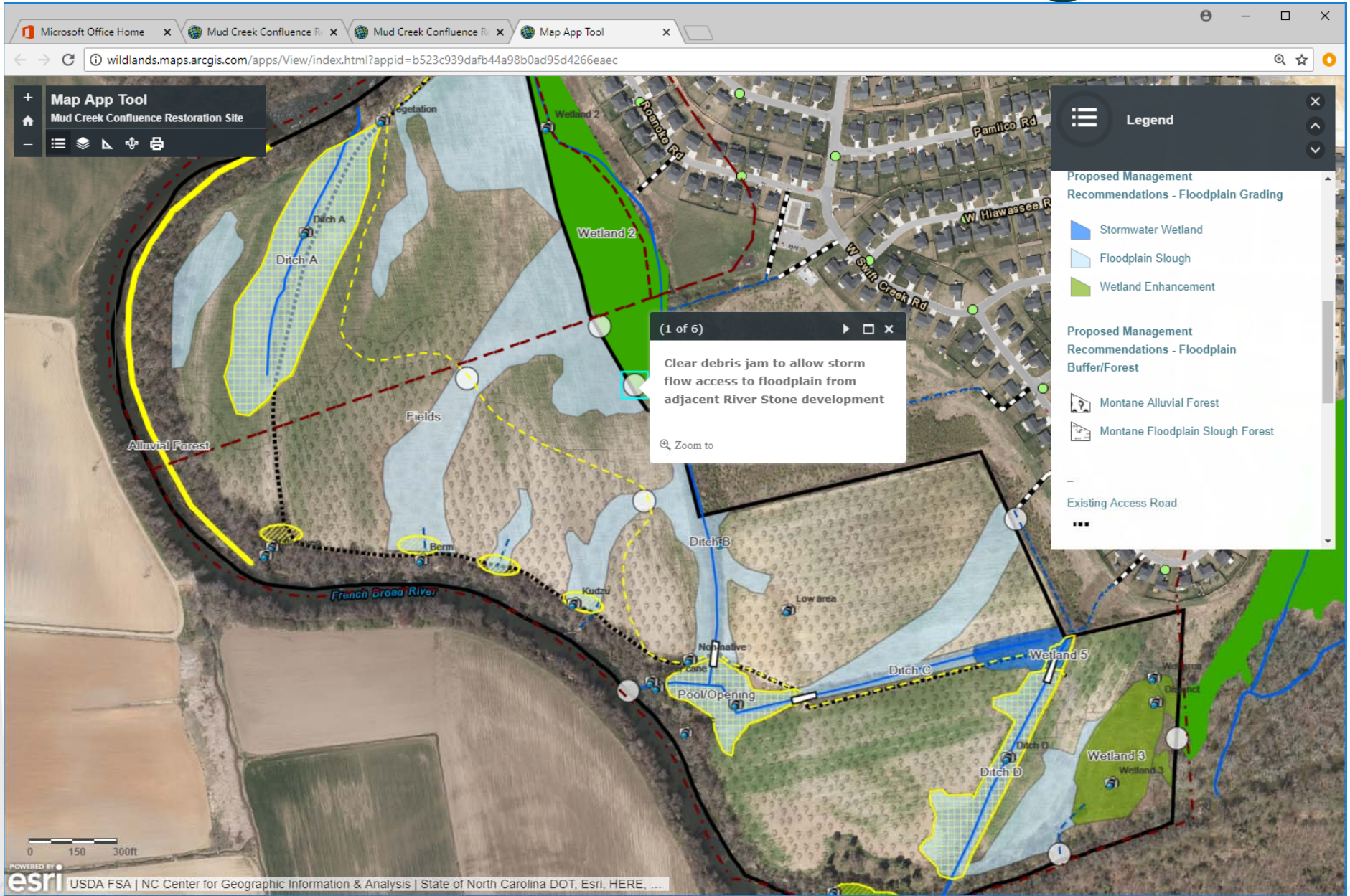
Zoom to | Get Directions | Edit

0 0.3 0.6mi

POWERED BY 

An example of a geodatabase photo attachment for SCM 80.

Mud Creek



Field Design Verification

Field Design Verification



Microsoft Office Home x Reedy Creek Construction x Reedy Creek Construction x funny questions slide for x

wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=d2687ad13ce94eb3b96cd325bcfaf3a9

Reedy Creek Construction Status App Charlotte-Mecklenburg Storm Water Services (CMSWS) Reedy Creek Stream Restoration Website

Find Station, Sheet, Reach

Layer List

- ACTIVE FEATURES - Problem_Line
- ACTIVE FEATURES - Problem_Area
- ACTIVE FEATURES - ESC Problems
- Total Proposed Structures
 - Proposed
 - Constructed Per Plans
 - Constructed With Modifications
 - Constructed - Contractor to Revisit
 - Omitted
 - Other
- ACTIVE PLANSET - Proposed Invasive Treatment Areas
- ACTIVE PLANSET - Proposed Wetlands
- ACTIVE PLANSET - Proposed Planting Areas
- ACTIVE PLANSET - PlanProfile_Sheets
- BASEMAP - Temp Crossings
- BASEMAP - Access Routes/Haul Roads
- BASEMAP - Limits of Disturbance (LOD)
- BASEMAP - StagingAndStockpiling
- Proposed Alignment
- Park Trails
- ReedyBaseMap - ExConditions - Existing

Total Proposed Structures

StructureType	PH-STRUCT-BRUSH TOE
Construction Status	Proposed
Notes	
UpstreamStation	
DownstreamStation	
Shape_Length	55.29
CreationDate	October 20, 2017
Creator	wlasheville
EditDate	October 20, 2017
Editor	wlasheville
Attachments:	No attachments found

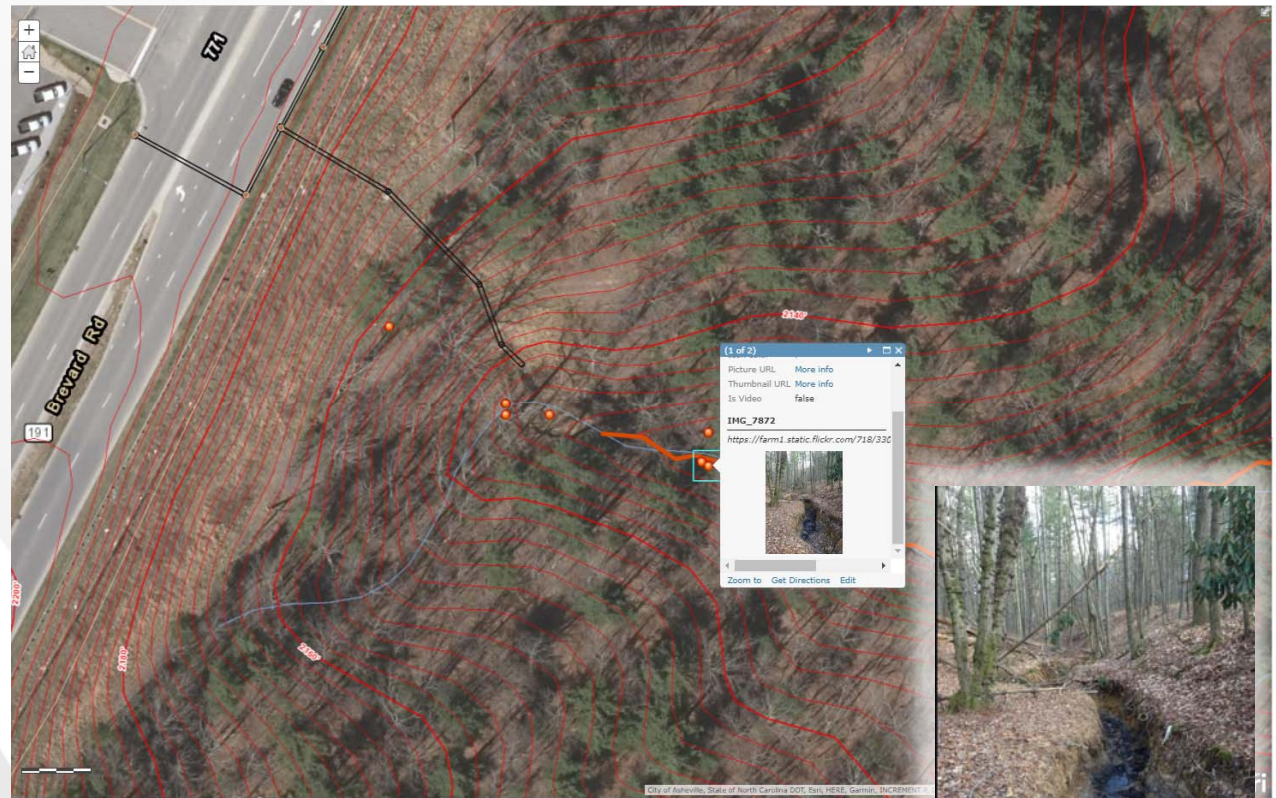
Zoom to

Destroyed

100ft
-80.702303 35.261624 Degrees

Source: Esri, HERE, Garmin, Intermap, increment P. Corp.

Photo Sharing During Design Process



Stakeholder Coordination

Torrence Creek Trib 1



Microsoft Office Home x Torrence Creek Trib 1 - E x Torrence Creek Trib 1 Co x Torrence Creek Trib 1 Fea x funny questions slide for x

wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=b52381f88db8473181c328f9b536861c

Torrence Creek Trib 1 Conceptual Plan

Easement Status App (for CMSWS)

Project Parcel Summary by Easement Status 60

CE Status: Not Contacted Yet 60

- Owner: 16438 AMBERFIELD DR LLC -
- Owner: ABIRACHED - MATTHEW
- Owner: AMH NC PROPERTIES LP -
- Owner: ARBOR RIDGE AT HUNTERSVILLE LLC -
- Owner: ARBOR RIDGE AT HUNTERSVILLE LLC -
- Owner: ARBOR RIDGE AT HUNTERSVILLE LLC -
- Owner: BLANK - AARON ROBERT
- Owner: BYRD - BRICELY KEITH
- Owner: CARVER - STEPHEN WRAY
- Owner: CONLEY - SCOTT W
- Owner: DAUM - ROBERT S
- Owner: DESAUTELS - JEREMY ALAN
- Owner: EARL - TRENTON D
- Owner: ECHERD - BARBARA BROWN
- Owner: ENZWILER - ROBERT MICHAEL
- Owner: FIVE-H LAND CO INC -
- Owner: FLEMING - KEITH GERARD
- Owner: GERRARD - PETER
- Owner: GRIFFITH - MICHELE YOLANDA
- Owner: GROUSE - CHARLES J III
- Owner: GUGLIETTA - JAMES L
- Owner: HAMPTON AT NORTHCROSS - HOMEOWNERS ASSOC INC
- Owner: HAMRICK - CHRISTOPHER

Search by Owner/Address

(1 of 4)

TT (69)

Click on thumbnail to enlarge photo:

[Zoom to](#)

Legend

Torrence Trib 1 - Photo Log Points

- Photo Log Point

Proposed Management Recommendations

- Stream Restoration
- Stream Enhancement I
- Stream Enhancement II

Storm Water Improvement Opportunities

- Stormwater - Storm Water Open Drainage

Project Parcels

- Not Contacted Yet
- Contacted By Phone/Email
- Verbal Agreement
- Signed Easement
- Not Interested

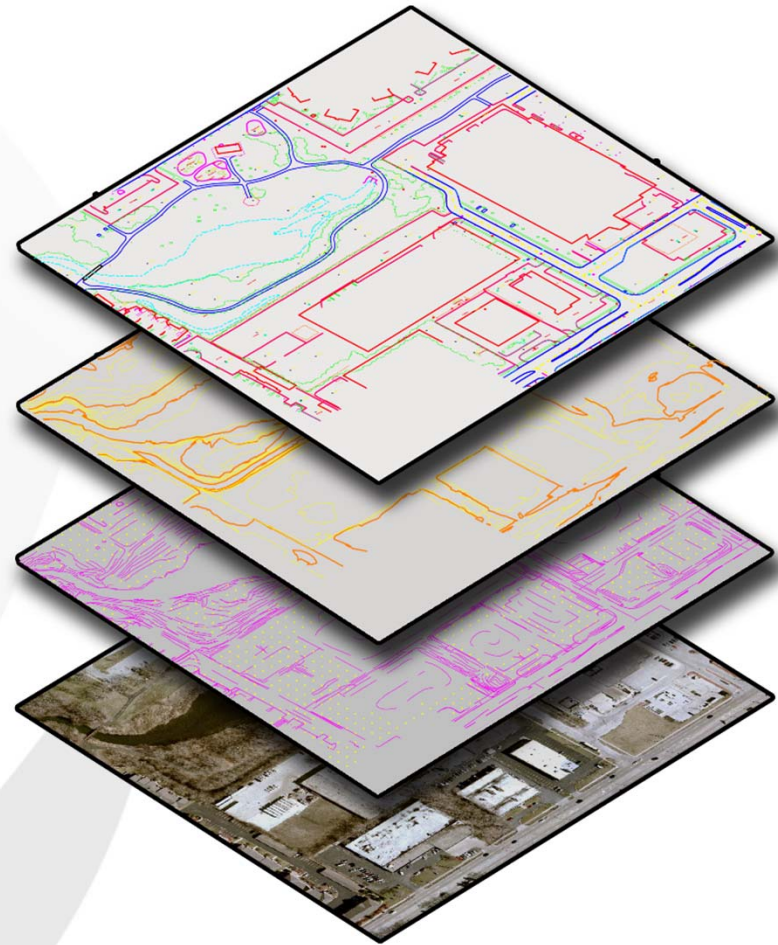
Construction Management

Configuration & Setup

- CAD objects formatted to GDB
- Domains (pulldown/picklist menus)
- Scalable across mobile and desktop devices
- Flexibility

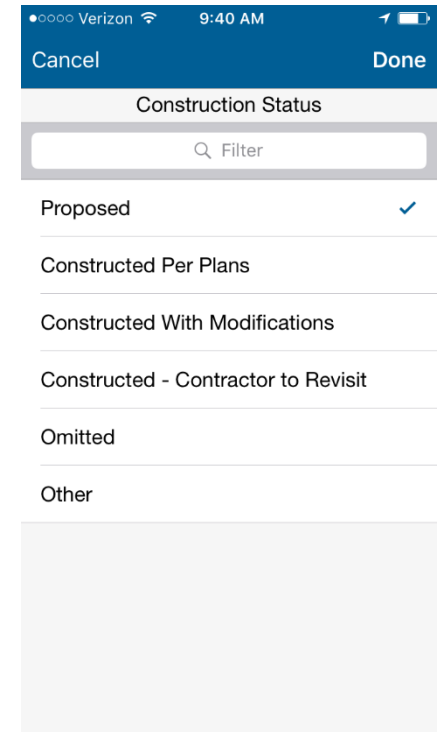
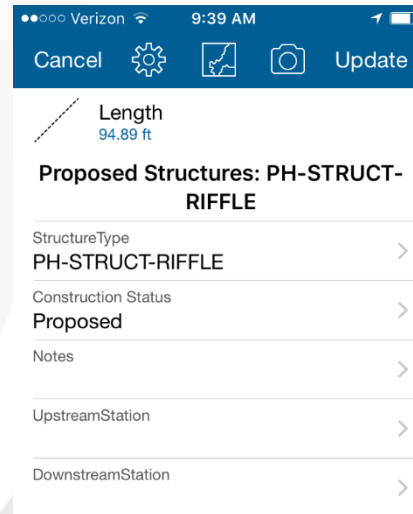
Layer Categories

- Basemapping Layers
- Plan Set Layers
- Inspection Layers



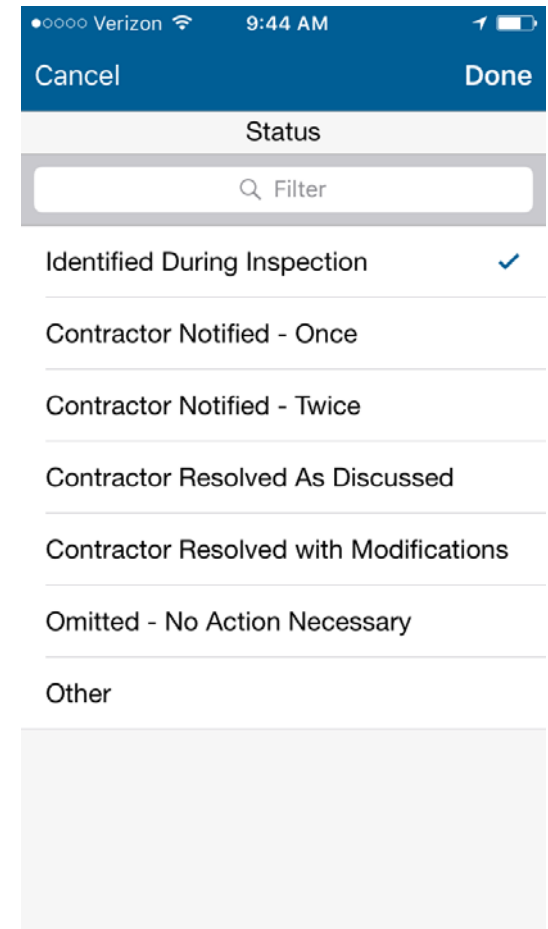
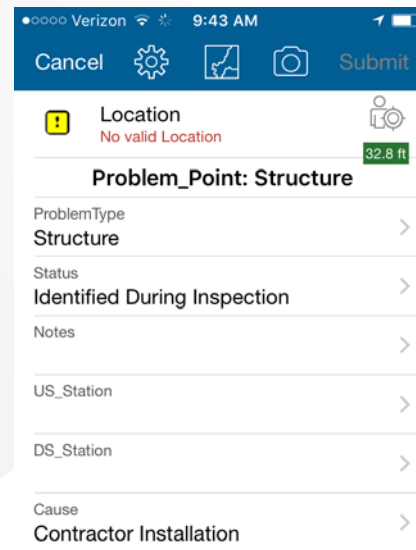
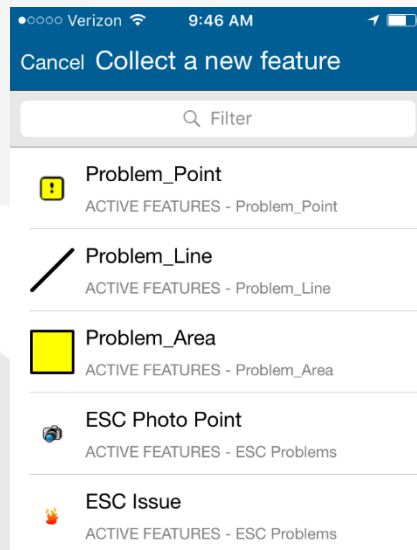
Active Feature Layers – Plan Set

- Proposed Structures
- Proposed Invasive Treatment Areas
- Proposed Wetlands
- Proposed Planting Areas



Active Feature Layers – Inspection

- Problem Areas
- ESC Issues



Potential Uses

- Project Status
- Percent Complete
- Invoicing
 - Print/export PDF map
 - Quantities
- Baseline for QA/QC of as-built plans
- Construction admin support

Other Features

- Attach photos or videos
- Records date, time and username
- Search by station, stream name, plan sheet

Reedy Creek



Reedy Creek Stream Rest... Reedy Creek Constructio... Shake Rag Info Map View... Shake Rag Info Map WEI...

wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=d2687ad13ce94eb3b96cd325bcfaf3a9

Reedy Creek Construction Status App Charlotte-Mecklenburg Storm Water Services (CMSWS) Reedy Creek Stream Restoration Website

Find Station, Sheet, Reach

Total Project Length Completed by Reach

Reach	Approximate Length (ft)
South Fork	500
Sassafras Creek	4,500
Reedy Creek	500
Hood Creek	3,500
Hodges Branch	3,500
Grier Branch	4,500
Buckleigh Branch	2,000

Legend

Constructed Structures to Date

- Constructed Per Plans
- Constructed With Modifications
- Constructed - Contractor to Revisit
- Omitted
- Other

UNCC Monitoring Wells

Proposed Alignment

- Stream Restoration
- Stream Enhancement

(1 of 11)

Proposed Structures: PH-STRUCT-BRUSH TOE

StructureType	PH-STRUCT-BRUSH TOE
Construction Status	Constructed With Modifications
Notes	Substituted rock toe due to floodplain slope and for tree preservation.
UpstreamStation	
DownstreamStation	
Attachments:	Photo1.jpg
Edited by charlottePM on Thursday at 3:57 PM	
Zoom to	

Sources: Esri, HERE, Garmin, Intermap, increment P.C.

Reedy Creek



Reedy Creek Stream Rest | Reedy Creek Construction | Shake Rag Info Map View | Shake Rag Info Map WEI

wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=d2687ad13ce94eb3b96cd325bcfaf3a9

View Project Status Statistics

View Project Status Statistics

Options

Chart Results

Overall Project Status

Category	Percentage
Proposed	35.35%
Constructed Per Plans	[Not specified]
Constructed - Contractor to Revisit	[Not specified]
Constructed With Modifications	[Not specified]
Omitted	[Not specified]
Other	[Not specified]

Branch	Value
Grier Branch	~4,000
Buckleigh Branch	~2,000

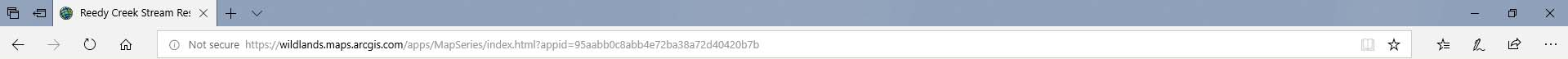
Scale: 600m

Coordinates: -80.705852 35.266411 Degrees

Sources: Esri, HERE, Garmin, Intermap, increment P.Co

Public Relations

Reedy Creek



Reedy Creek Stream Restoration Design Build Project in Charlotte, NC

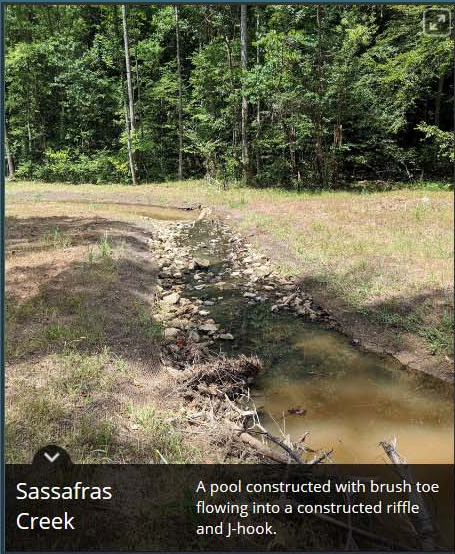


Existing Conditions | **Post-Construction**

A Story Map of Post-Construction Conditions

By Wildlands Engineering, Inc.

Stream reaches highlighted yellow in the map below denote completed channel construction to date in real-time. Blue stream reaches represent remaining channel construction yet to be completed. [CLICK HERE](#) to check out recent drone aerial footage of the project



Research & Development

Reference Reach Database



The screenshot displays the Wildlands Reference Reach App interface. At the top, the browser address bar shows the URL: <https://wildlands.maps.arcgis.com/apps/webappviewer/index.html?id=28e70d7e0753481da9ff451ec30960e7>. The main map area shows a geographic region with various colored overlays representing different river basins and physiographic provinces. A legend on the left side of the map provides details on the symbols used, including 'Wildlands Reference Reaches (by type)' with categories B, C, E, C/E, and Not Classified; 'Major River Basins' with a trapezoidal symbol; and 'Physiography of NC' with categories Blue Ridge, Piedmont, and Coastal Plain. A 'Filter By Parameter' panel is open, listing parameters such as Drainage Area, Discharge (cfs), Rosgen Stream Classification, Channel Slope, Valley Slope, Sinuosity, and W/D Ratio, each with a toggle switch. A data table at the bottom of the screen lists reference reaches with columns for WEI_SiteID, Site Name, Physiographic Province, County, River Basin, HUC8, HUC12, Legacy Site Name, Stream Type, and Drainage Area. A pop-up window titled 'Reference Reach: UT to South Crowders' is open, displaying detailed metadata for a specific reach, including Physiographic Province (Piedmont), County (GASTON), River Basin (CATAWBA), HUC8 (03050101), HUC12 (030501011504), Legacy Site Name (UT to South Crowders (A) (new?)), Stream Type (E4), Drainage Area Sqmi (0.22), Bkfq (cfs) (22.00), BkfcSA (ft2) (7.55), Bkfw (ft) (7.25), Bkfdmax (ft) (1.40), Bkfw/D Ratio (6.90), BHR (1.75), Entrenchment Ratio (4.00), Valley Slope (0.0257), Channel Slope (0.0091), Sinuosity (2.20), and Particle Size (DEQ) (19.70). Three links are highlighted in a red box: 'Link to Photos: [More info](#)', 'Link to Writeup: [More info](#)', and 'Link to Parameter Table: [More info](#)'. Below these links is a 'Preview Photo' section showing a photograph of a stream in a wooded area. The bottom of the interface shows a table with 25 features and 0 selected.

WEI_SiteID	Site Name	Physiographic Province	County	River Basin	HUC8	HUC12	Legacy Site Name	Stream Type	Drainage Area
9	UT to Sandy Run	Piedmont	CLEVELAND	BROAD	03050105	030501050505	UT to Sandy Run	E4	0.15
12	Box Creek Mainstem	Blue Ridge	RUTHERFORD	BROAD	03050105	030501050404	Box Creek Mainstem	C4	2.15

Applications in the Works...

- Land Management & Maintenance
- Monitoring

Questions

Should I ask a question?



Is it lunchtime yet?

What's for lunch?

Should I have attended the other session?

What time is check out?

Should I leave the conference before or after lunch?

Should I buy this guy a beer?

What time do the breweries open?

Cost

- Storage
 - Feature services → 2.4 credits / 10MB / month
 - Tile and other data → 1.2 credits / 1GB / month
- Analytics
 - ≤ 1 credit per 1000 features