

# Chattanooga WPA Ditch Program

## Innovative Solutions for Rehabilitation Plan Development

September 10, 2015



# CHATTANOOGA LOCATION MAP











**"I pledge you, I pledge myself, to a new deal  
for the American People."**

**Franklin D. Roosevelt, 1932  
Presidential Nomination Acceptance Speech**

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CITY OF CHATTANOOGA

Rehabilitation of

W P A Storm Drainage System

Department of Public Works, Streets and Airports

Ellis L. Spencer, City Engineer

March, 1975

TABLE A

WPA DITCHES

- |      |  |
|------|--|
| I    | <u>St. Elmo</u><br>St. Elmo - North *<br>South *   |
| II   | <u>South East Lake</u><br>Hooker Road - Hamill Road Main<br>Ernest Holmes - 40th Street Branch *<br>45th Street Branch<br>50th Street Branch   |
| III  | <u>East Lake</u><br>Rossville Boulevard - East Lake Main *<br>29th Street Branch<br>31st Street Branch<br>East Lake Park Branch  |
| IV   | <u>Highland Park</u><br>I-24 Main - Highland<br>Wautauga Branch<br>Hawthorne Branch - Orchard Knob<br>Kelly Street - Watkins Branch<br>Ridgedale<br>Dodds Avenue - 8th Avenue Branch |
| V    | <u>Orchard Knob</u><br>Orchard Knob - Glenwood Main<br>Hickory - Solomon Street Branch<br>Glenwood Branch<br>Citico - Chamberlain Branch<br>Wyandot Branch                           |
| VI   | <u>Bushtown</u> - Windsor Street Main  |
| VII  | <u>Avondale</u> - Camden Street Main   |
| VIII | <u>East Chattanooga</u><br>Glass Street - Wheeler Street Main  |
| IX   | <u>Brainerd</u><br>North Terrace to Brainerd Road Main *<br>Oriole Branch<br>North Germantown Road Branch<br>Pinewood Avenue<br>Golf Course System                                   |
| X    | <u>North Chattanooga</u><br>North Market Street Main<br>Riverview Main *   |

# Chattanooga 3-1-1

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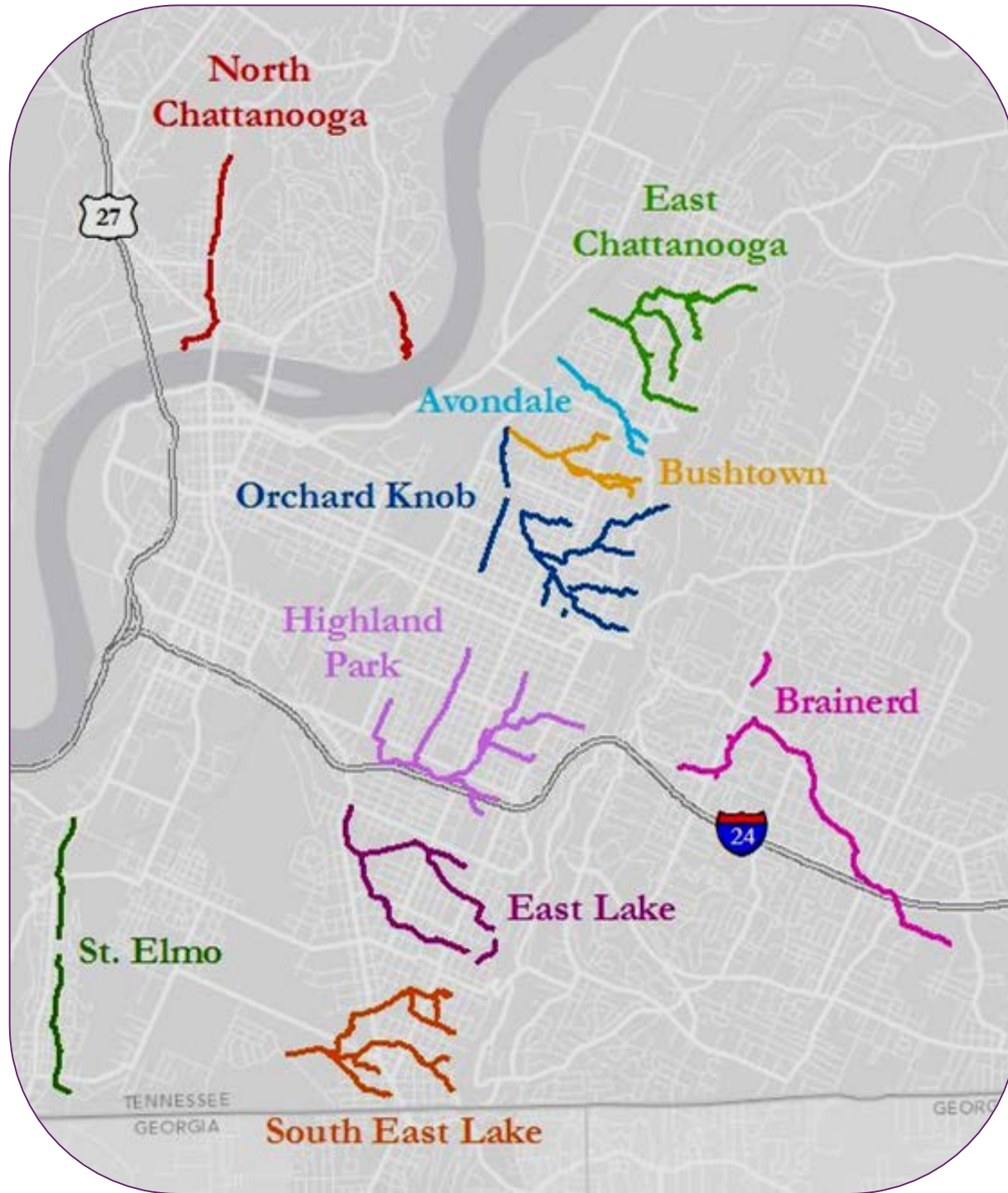




# City-wide Issues





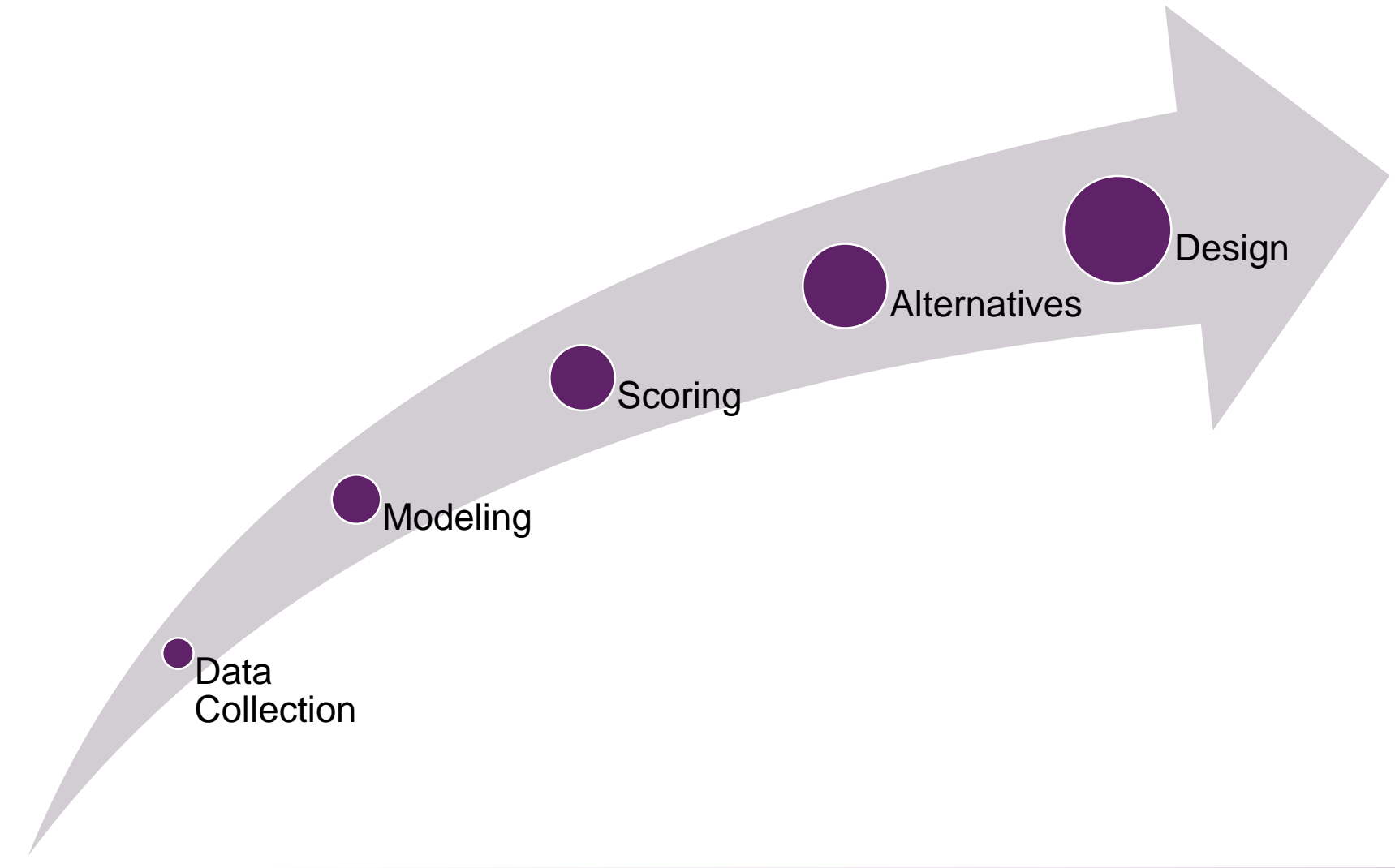




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wheeler

# WPA Phase 1 Project Scope

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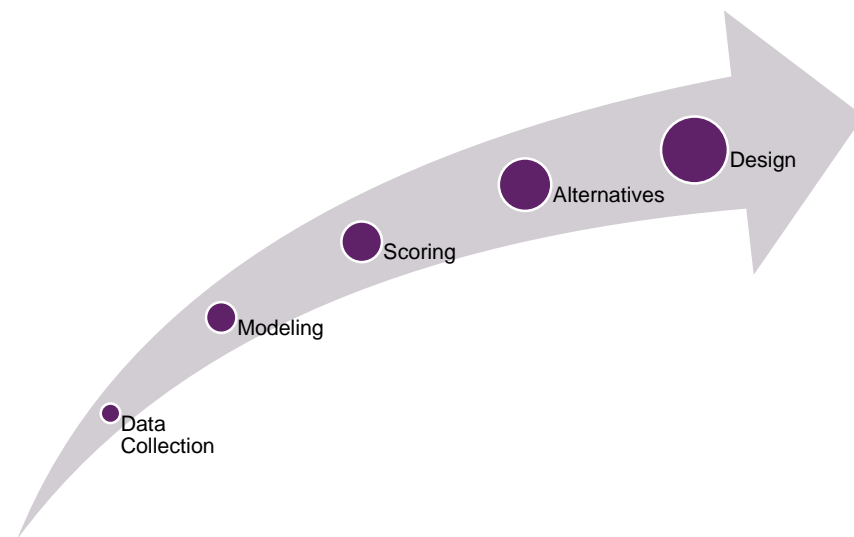




# WPA Phase 1 Project Scope

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- ▶ Cross-Sectional Field Survey
- ▶ Hydrologic & Hydraulic Modeling
- ▶ Condition Assessment
- ▶ Photo and Video Documentation
- ▶ Priority Scoring System
- ▶ Rehabilitation Plan
- ▶ Preliminary Flood Reduction Alternative Designs
- ▶ Data Integration with City's GIS System
- ▶ Outreach Services





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# Three Tasks

- ▶ Cross-Sectional Field Survey
- ▶ Hydrologic & Hydraulic Modeling
- ▶ **Condition Assessment**
- ▶ **Photo and Video Documentation**
- ▶ Priority Scoring System
- ▶ Rehabilitation Plan
- ▶ Preliminary Flood Reduction Alternative Designs
- ▶ **Data Integration with City's GIS System**
- ▶ Outreach Services







# One Tablet

**Mobile Data  
Collection**

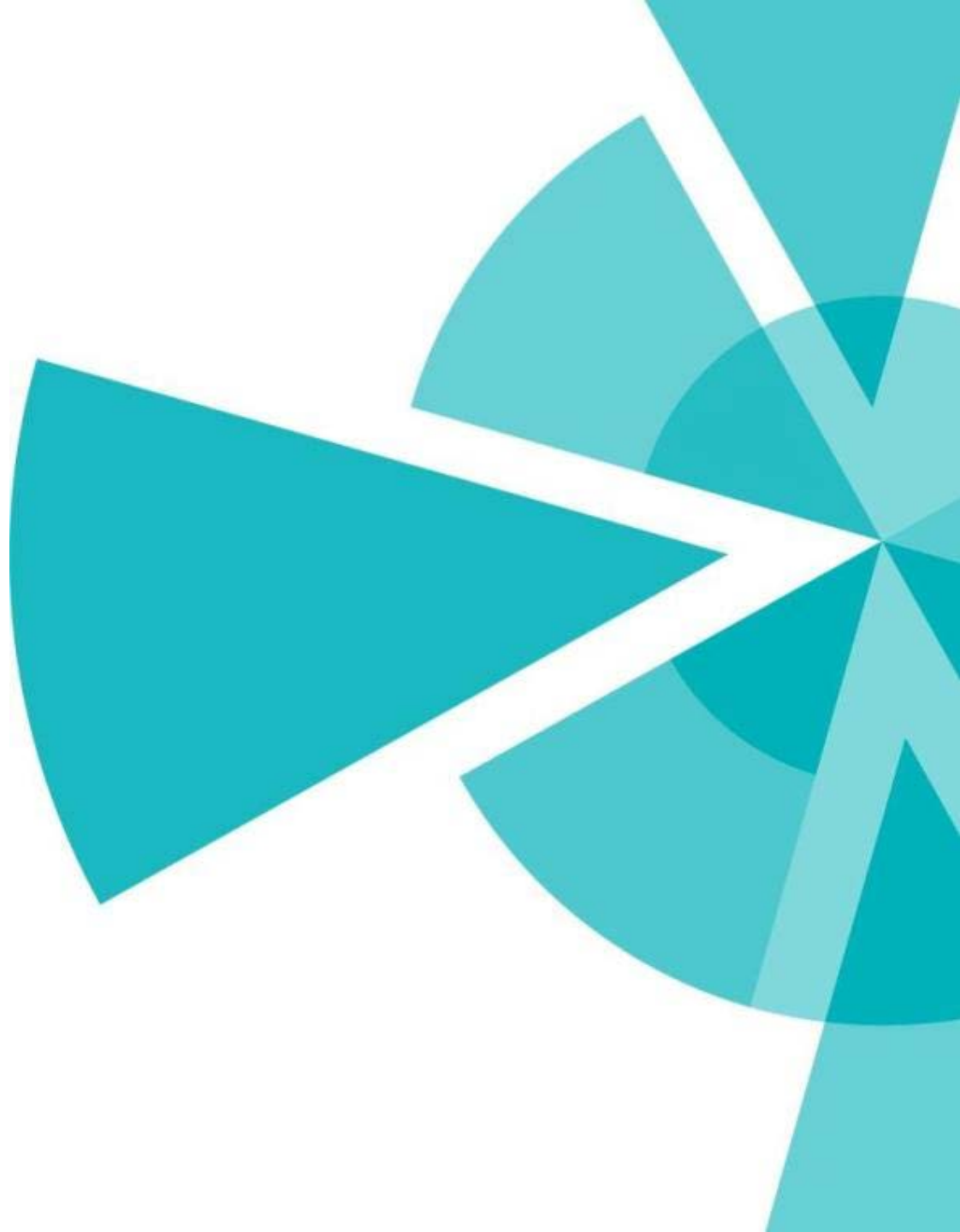
**Data Quality**

**Time Savings**

**Cost Savings**

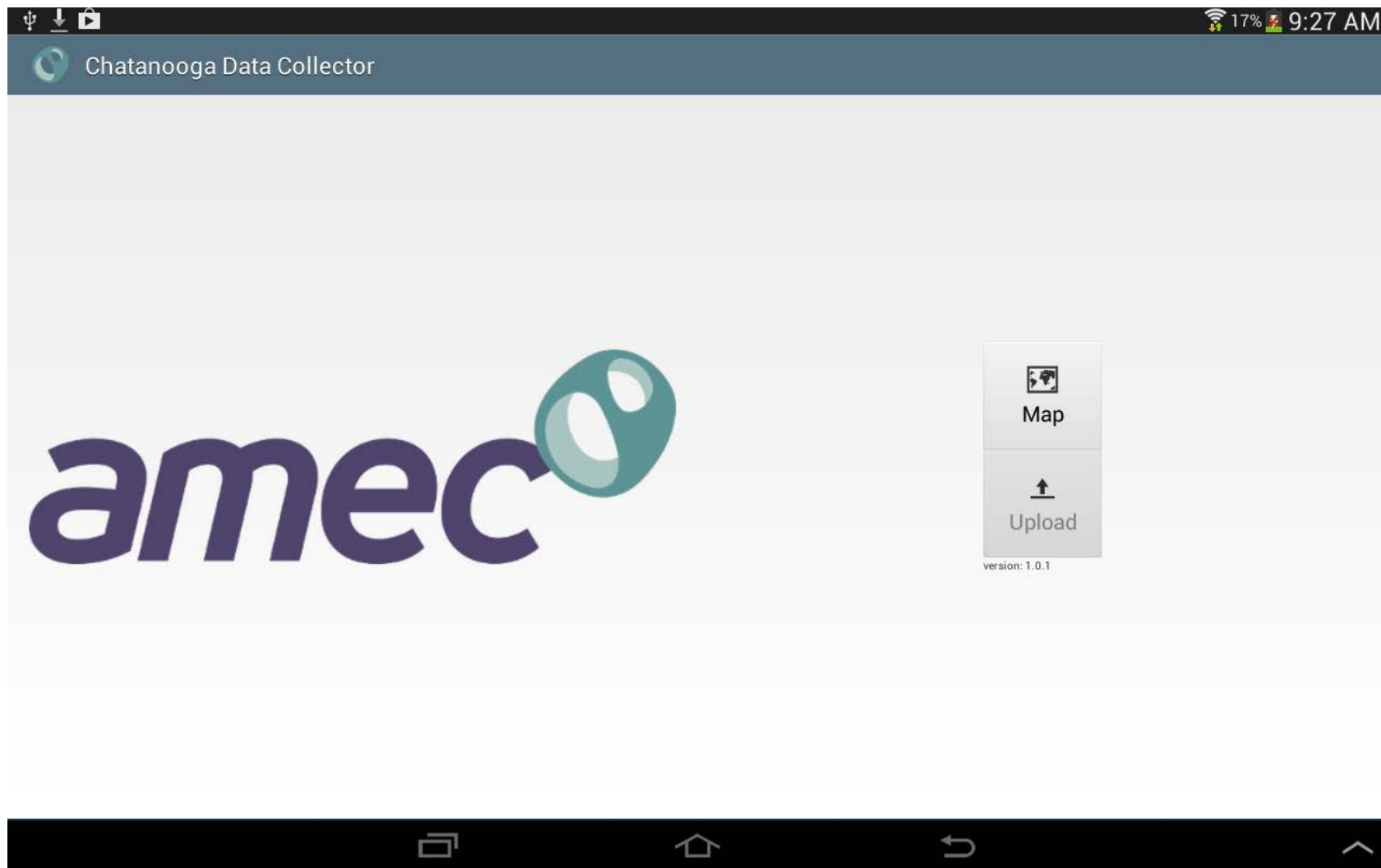


# Demonstration





# Main Page



# Select Neighborhood

ψ ↓ 📁 17% 9:27 AM

Select your work area

Avondale

Avondale

Brainerd

Bushtown

East Chattanooga

East Lake

Highland Park

North Chattanooga

Orchard Knob

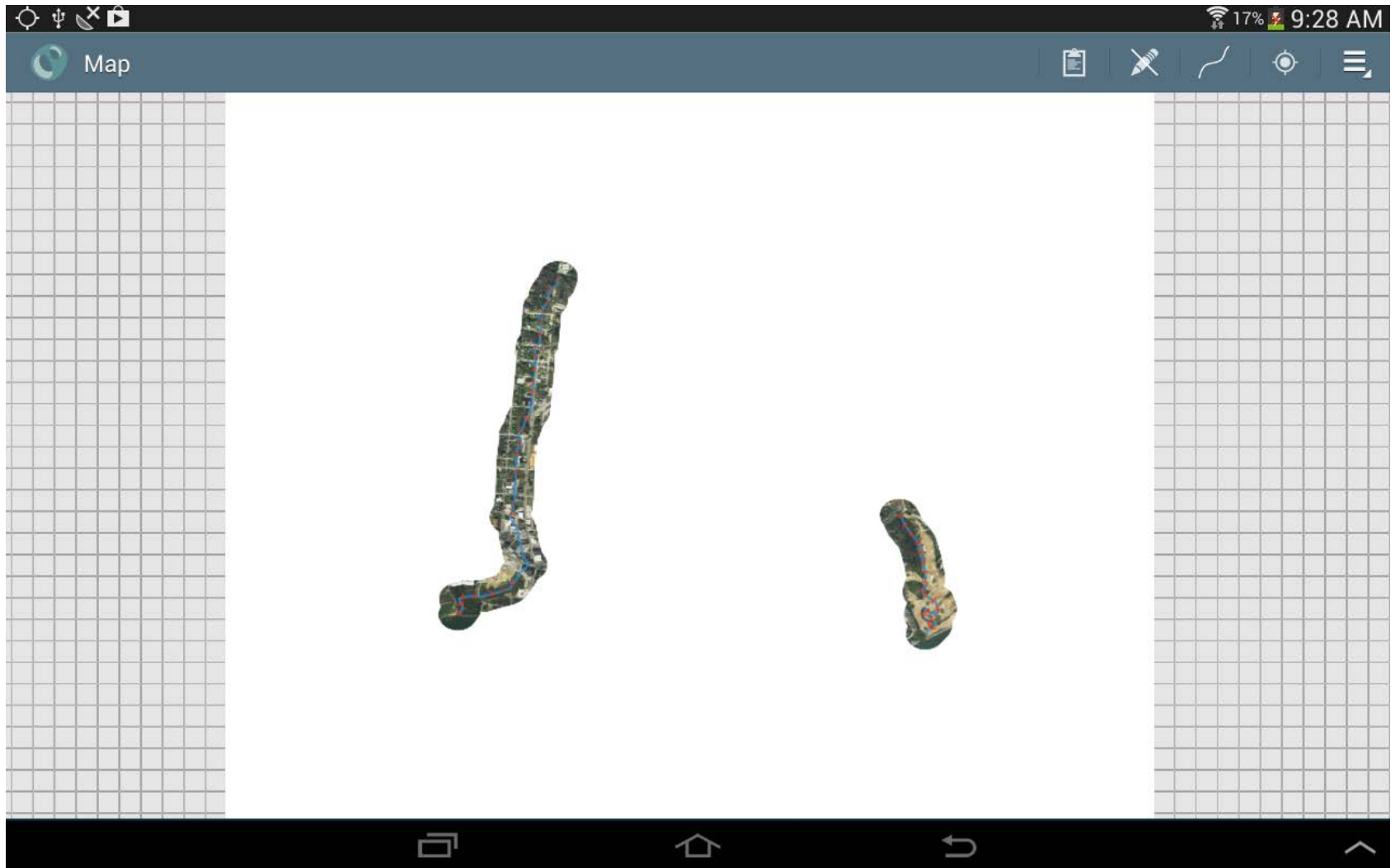
South East Lake

St Elmo

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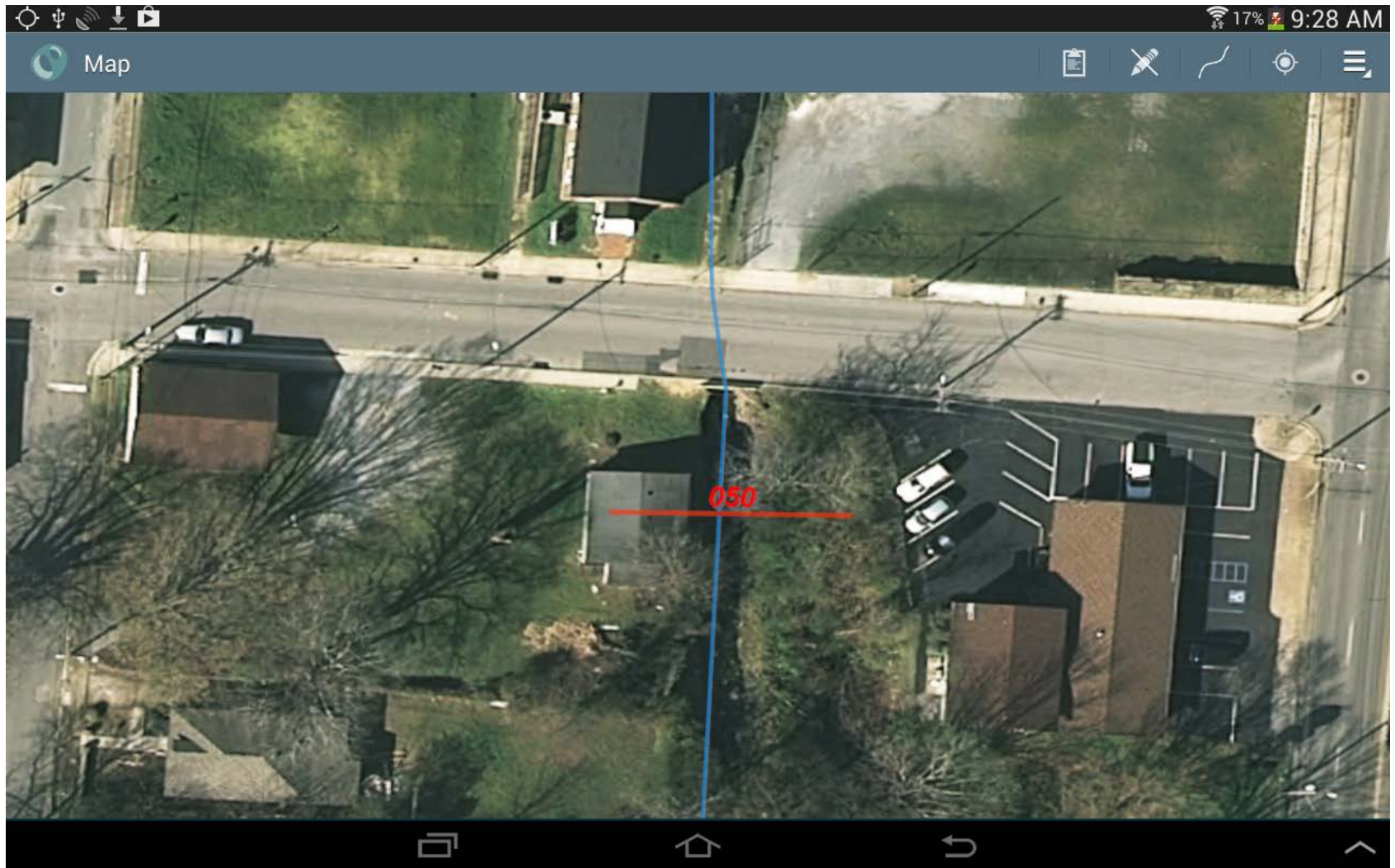
# Pre-Loaded Imagery





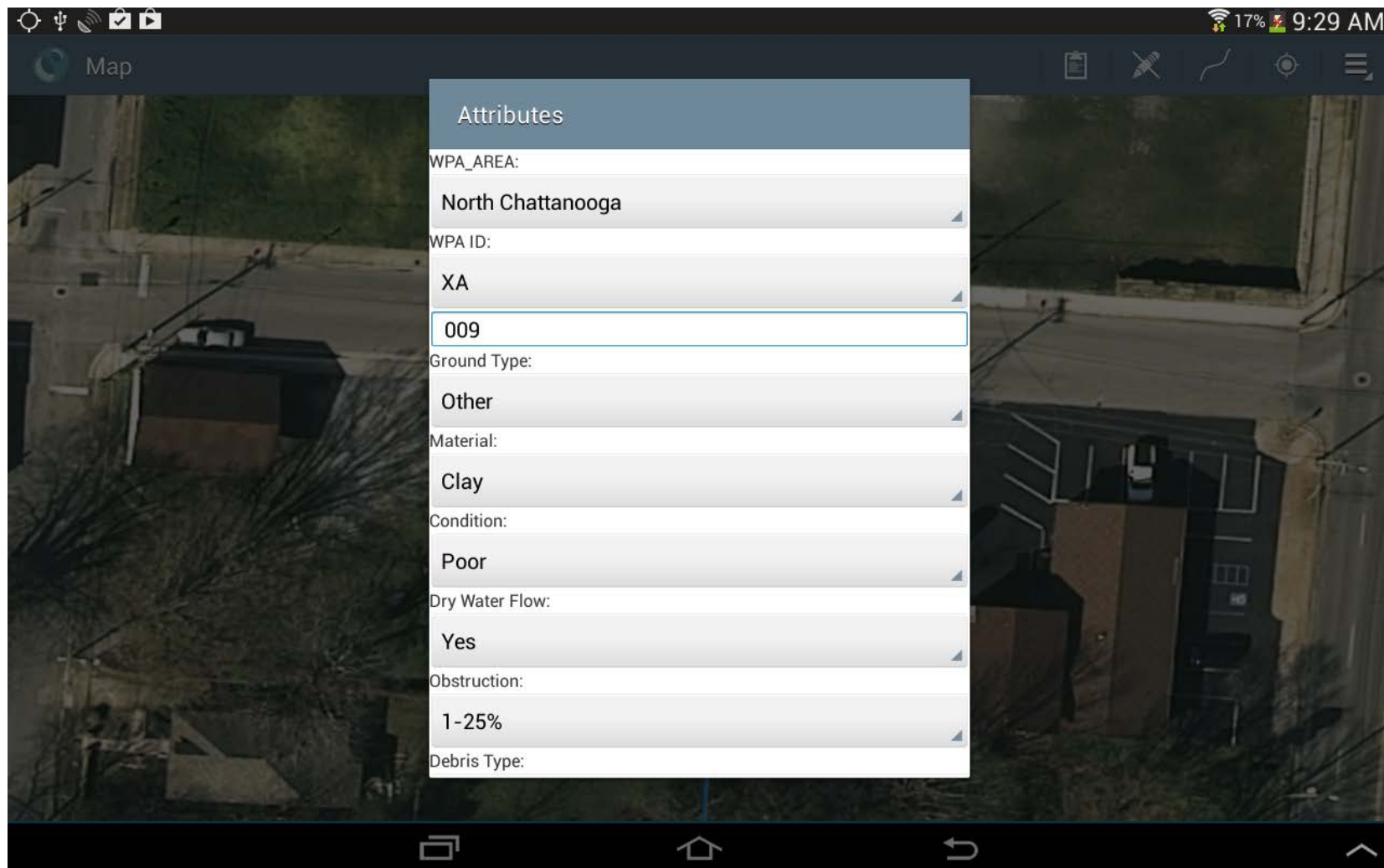


# Data Collection





# Attribute Selection



Map

Attributes

WPA\_AREA:  
North Chattanooga

WPA ID:  
XA  
009

Ground Type:  
Other

Material:  
Clay

Condition:  
Poor

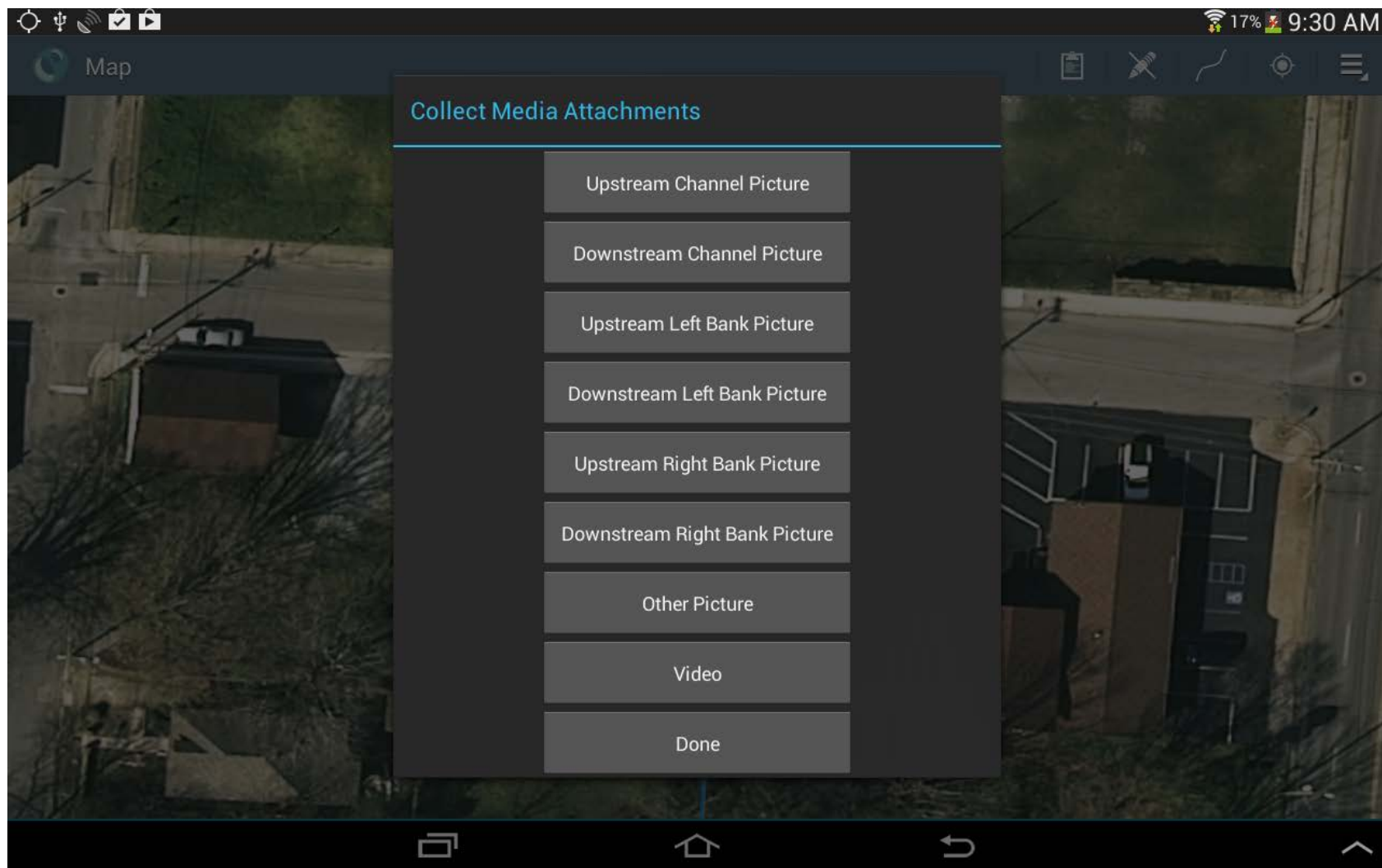
Dry Water Flow:  
Yes

Obstruction:  
1-25%

Debris Type:



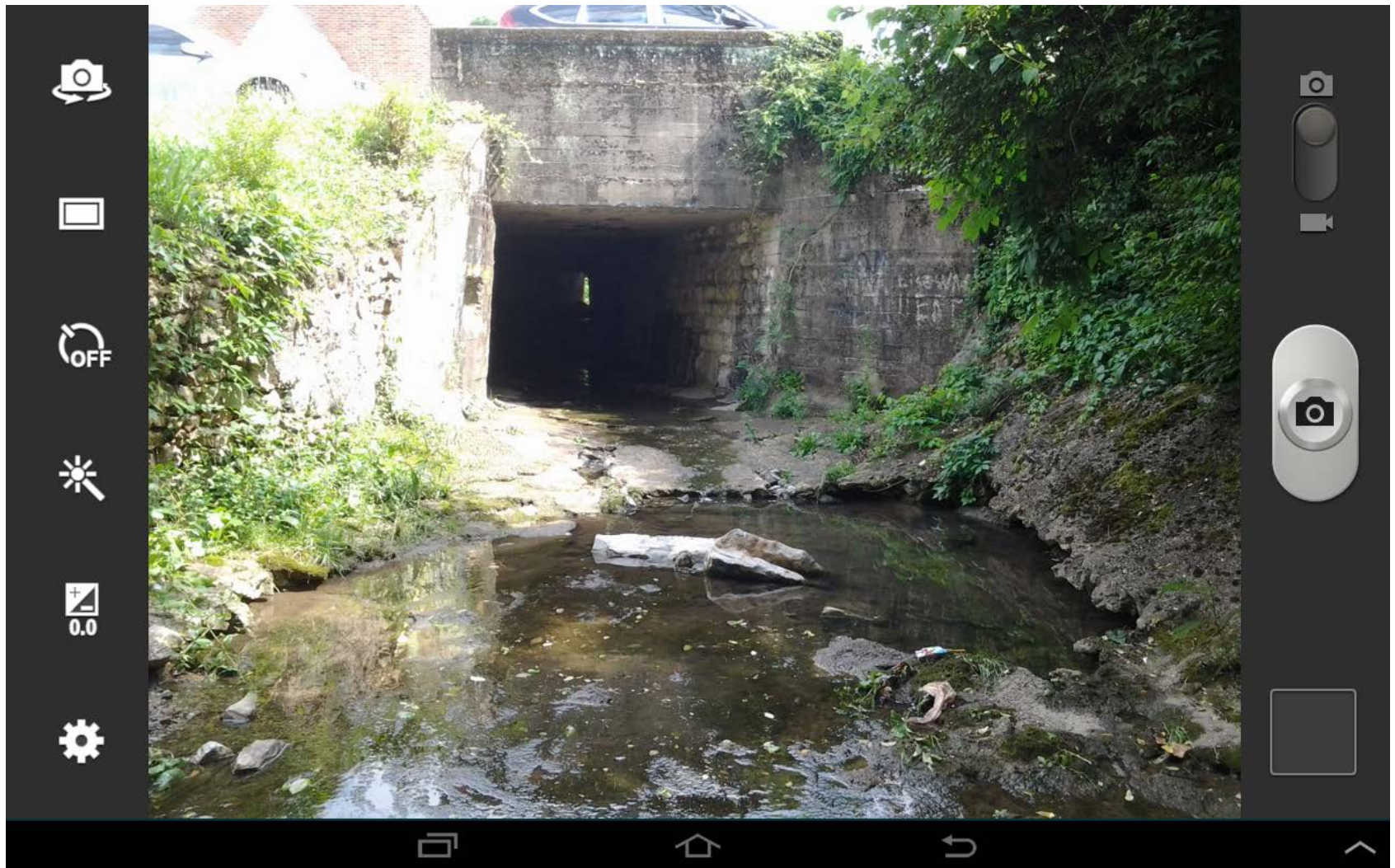
# Media Attachments





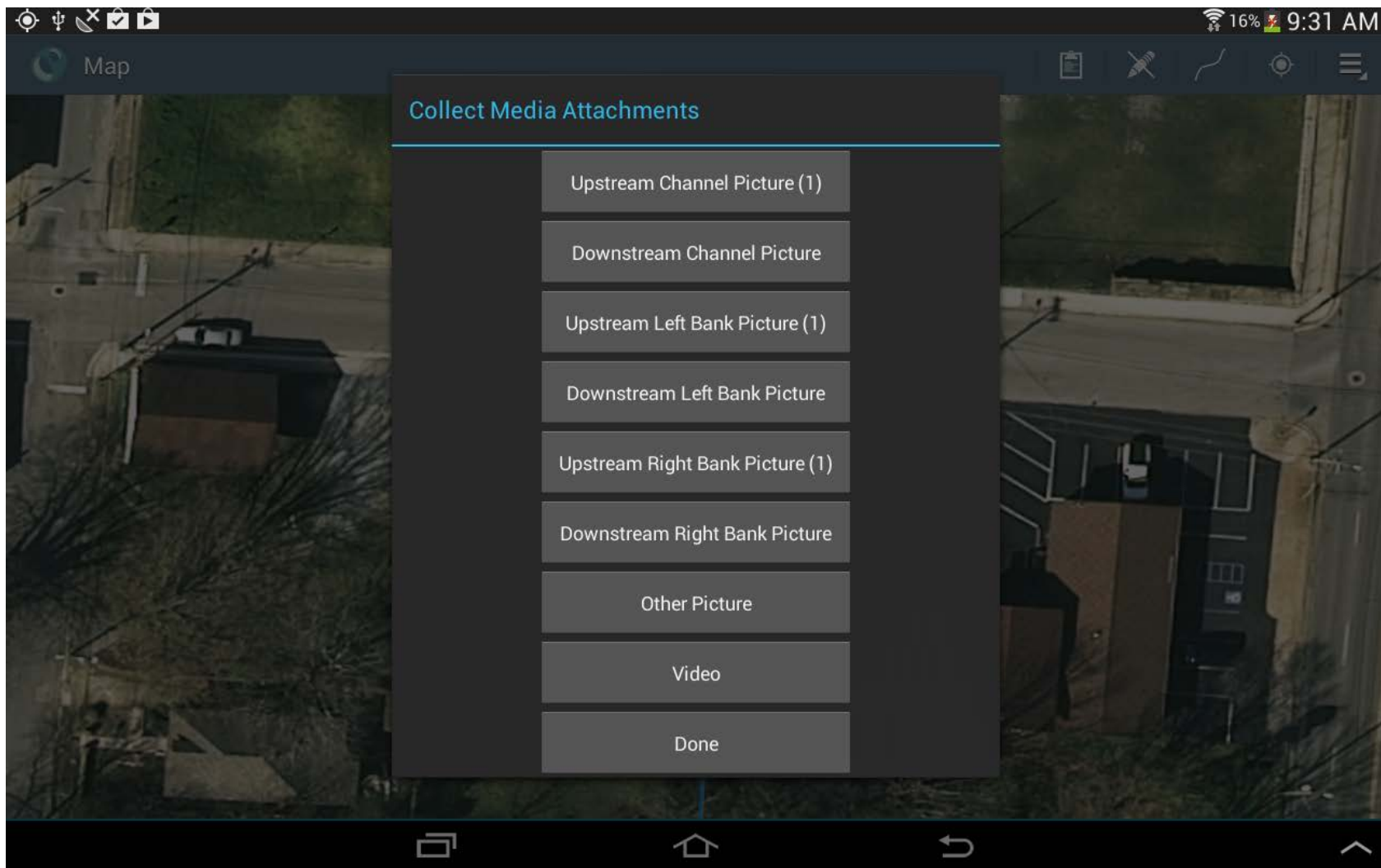


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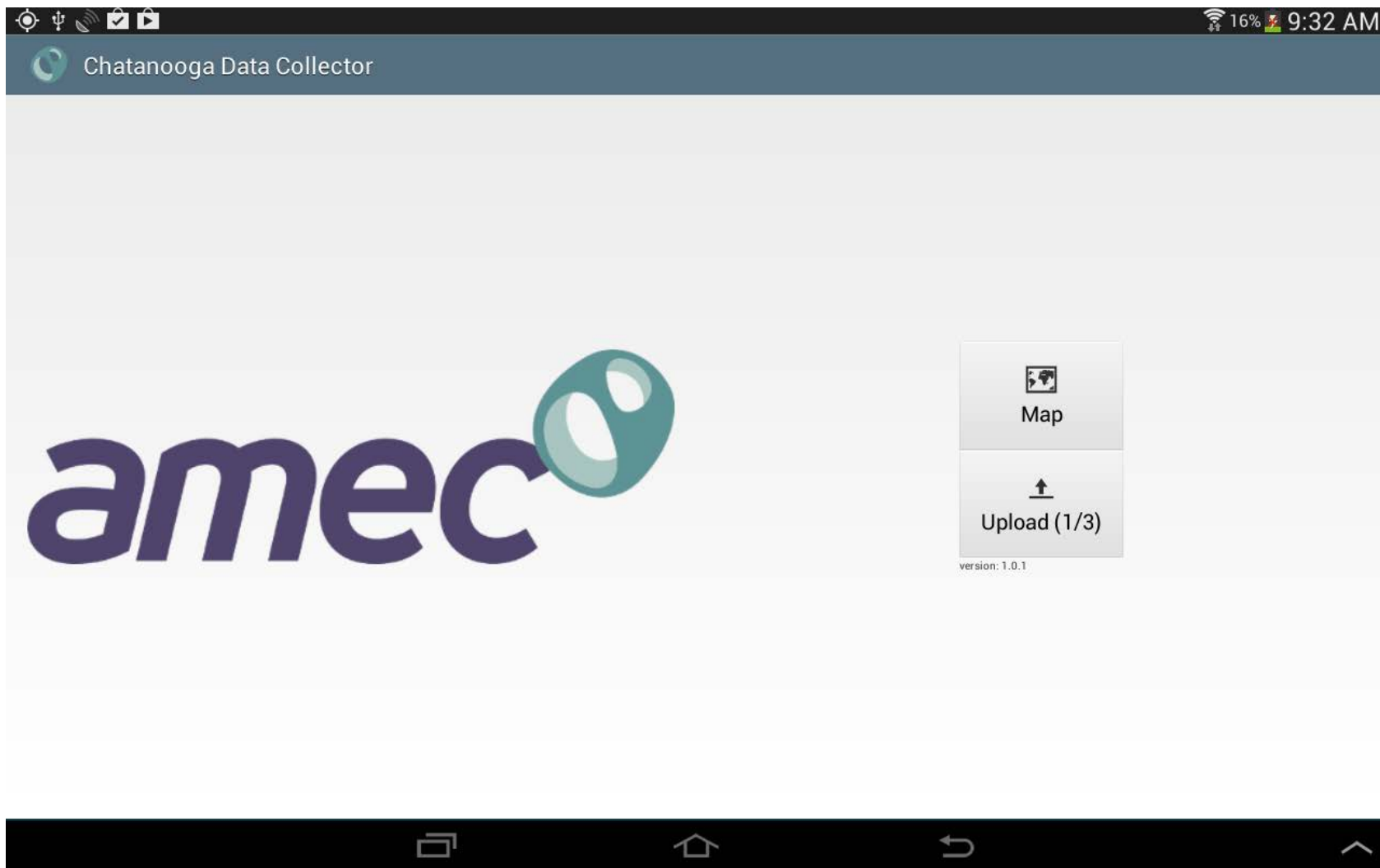




# Media Attachments

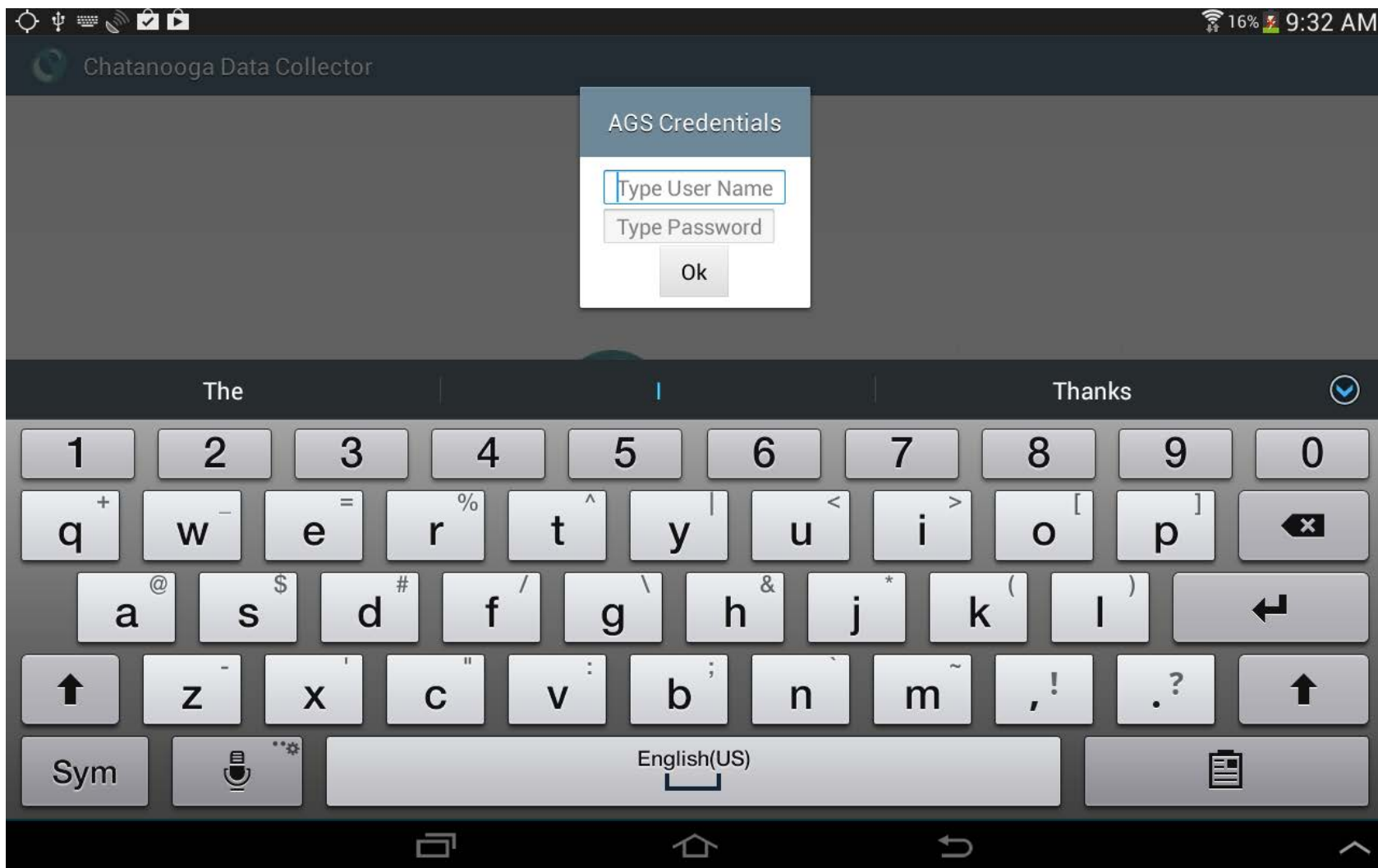


# Upload Data





# Synchronize with Server

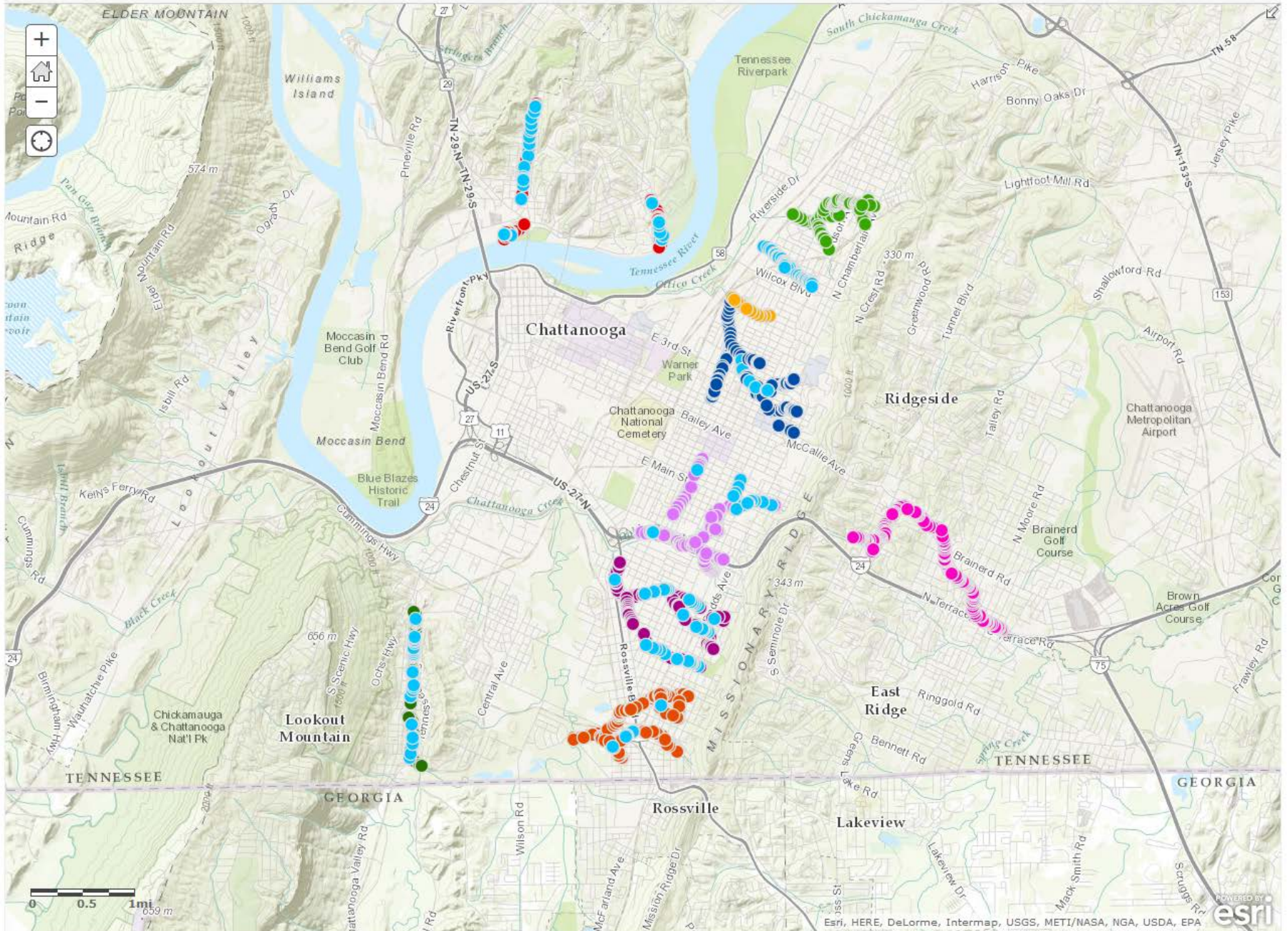




Details Edit Basemap

Print Measure

Find address or place

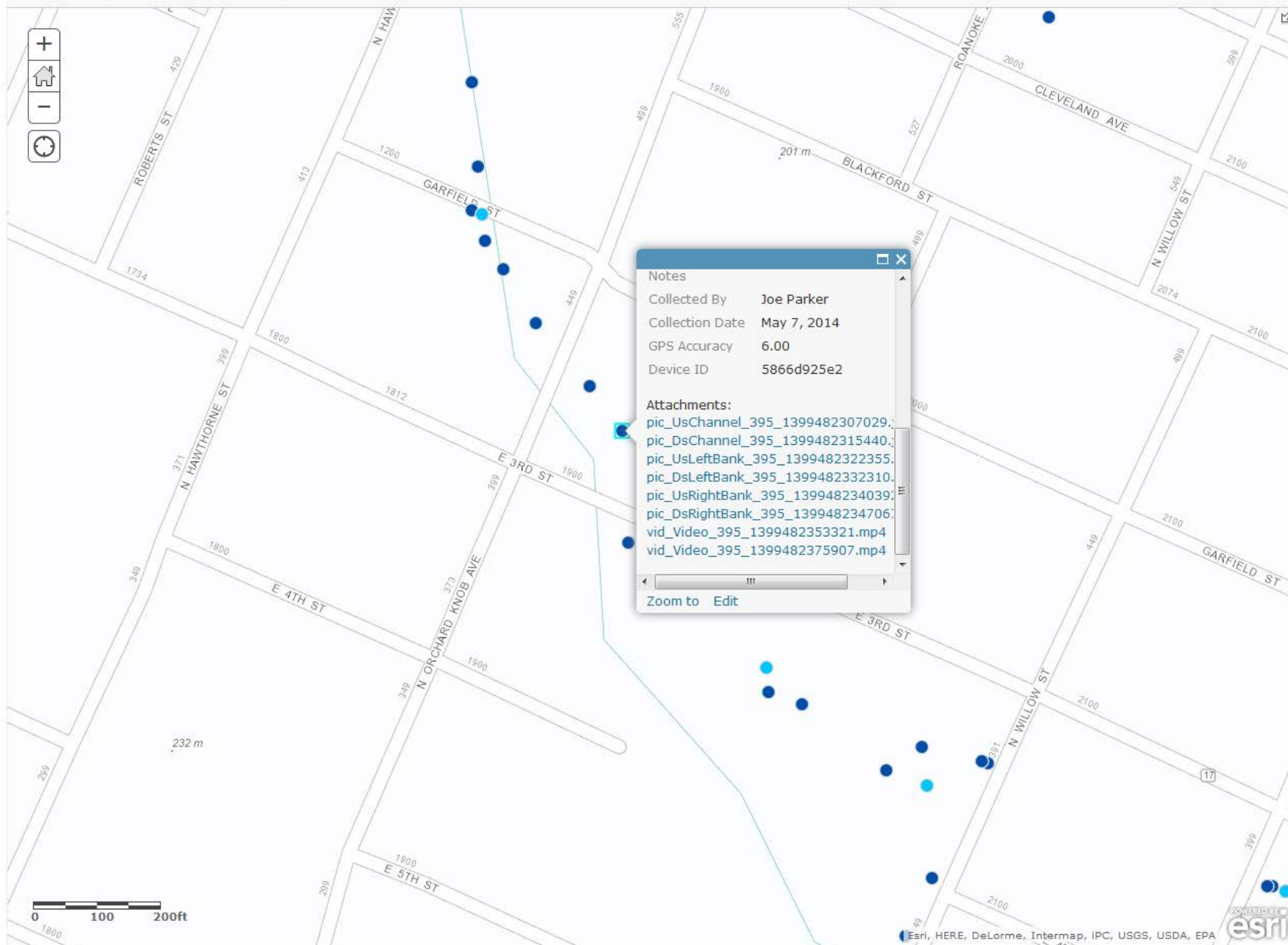




Details Edit Basemap

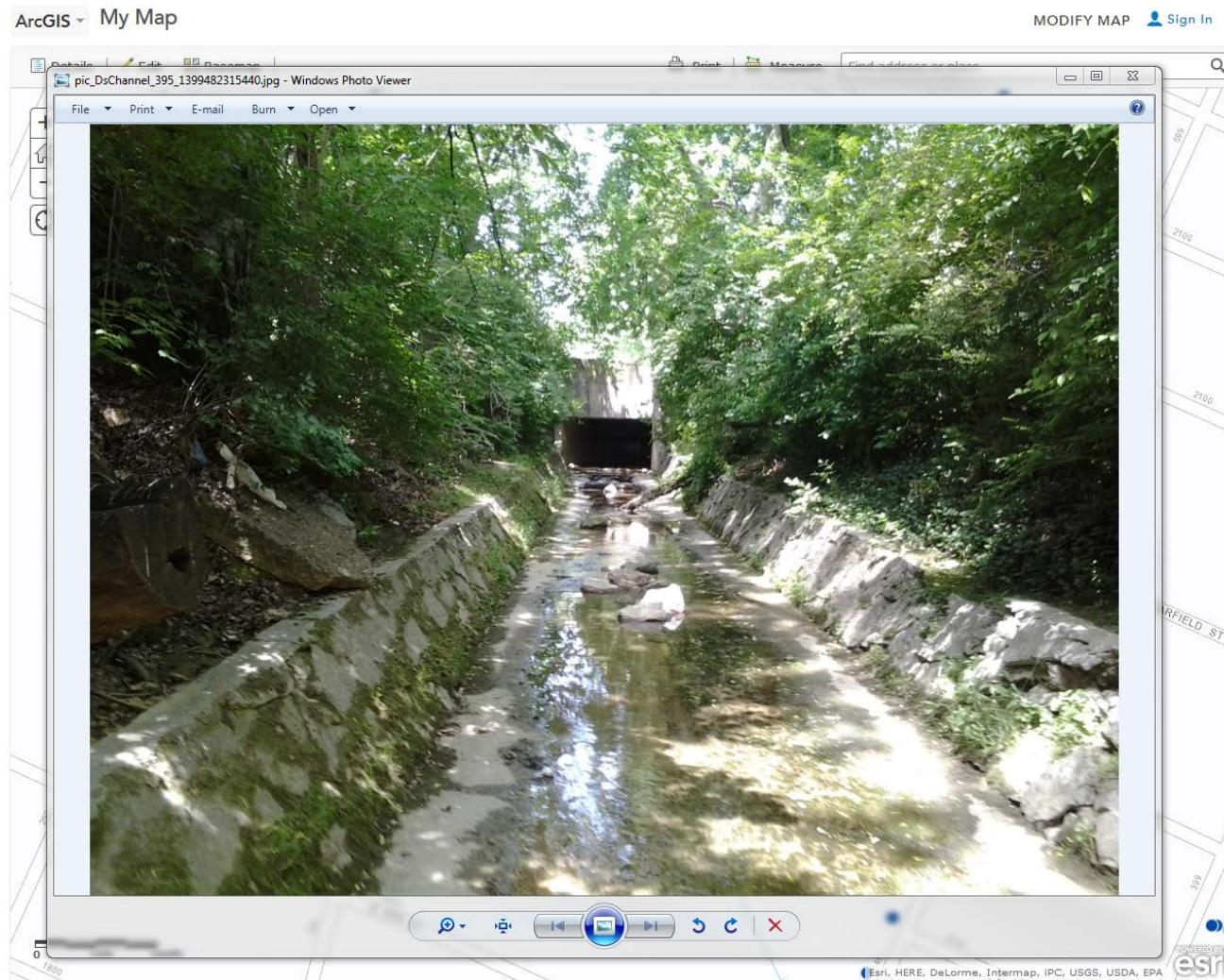
Print Measure

Find address or place





# Open Attachments



# Three Rounds of Data Collection

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# Three Rounds of Data Collection





# Pole Camera

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# Pole Camera

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# Three Rounds of Data Collection

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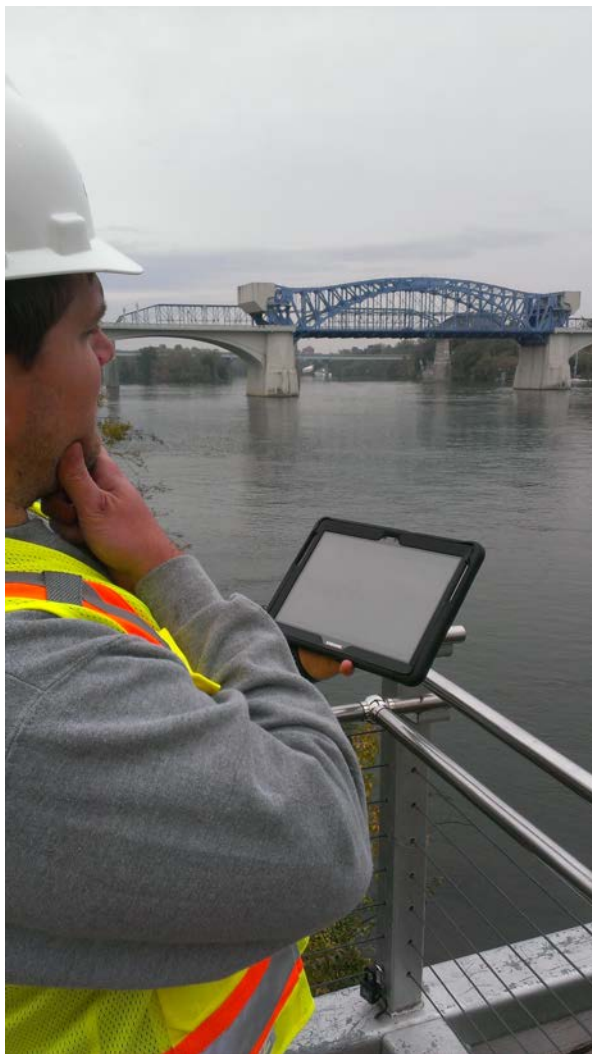




# Crawler



# Cost Savings



## Investment

- 175 hours of developer time

## Savings

- ~1,000 hours of field/office time
- 120 hours of GIS time
- ~\$60k cost savings



An aerial photograph of a city with a river winding through it. Overlaid on the map is a network of points. Most points are blue and form a dense, branching pattern across the city. Some points are yellow and are located at specific junctions or endpoints of the blue network. The points appear to be sampling locations for a study.

1,126 Points



## Identify



Identify from:

&lt;Top-most layer&gt;

Collection Point

IIIA



Location:

2,182,018.858 247,426.964 Feet











Attachments (8)

Field	Value
OBJECTID	6034
WPA Area	East Lake
WPA ID	IIIA
Cross Section ID	30
Device ID	ef8ae8ea84
Collected By	Joe Parker
Ground Type	Concrete
Material	Reinforced Concrete
Condition	Good
Dry Water Flow	Yes
Obstruction	1-25%
Debris Type	Sediment
Maintenance	Clean
Notes	
Collection Date	3/11/2014 11:55:42 AM
GPS Accuracy	-1
SHAPE	Point
WPA_ID_XS	<null>

Identified 1 feature

## Attachments



Name	Size
 pic_DsChannel_106_1394538996446.jpg	455 KB
 pic_DsLeftBank_106_1394539012553.jpg	426 KB
 pic_DsRightBank_106_1394539033799.jpg	455 KB
 pic_UsChannel_106_1394538988297.jpg	551 KB
 pic_UsLeftBank_106_1394539003425.jpg	524 KB
 pic_UsRightBank_106_1394539018851.jpg	571 KB
 vid_Video_106_1394539039639.mp4	948 KB
 vid_Video_106_1394539058773.mp4	728 KB

Open

Save As...

Save All...

Tip: Double-click an item to open.

OK

Cancel

# Modeling

## Hydrology

- Leverage USACE HMS Models
- 7 Recurrence Interval Events

## Hydraulics

- HEC-RAS Models
- Model Limitations
  - Steady-State models
  - Closed Ditches
  - Storage Areas
  - Lateral Connectivity

## Results

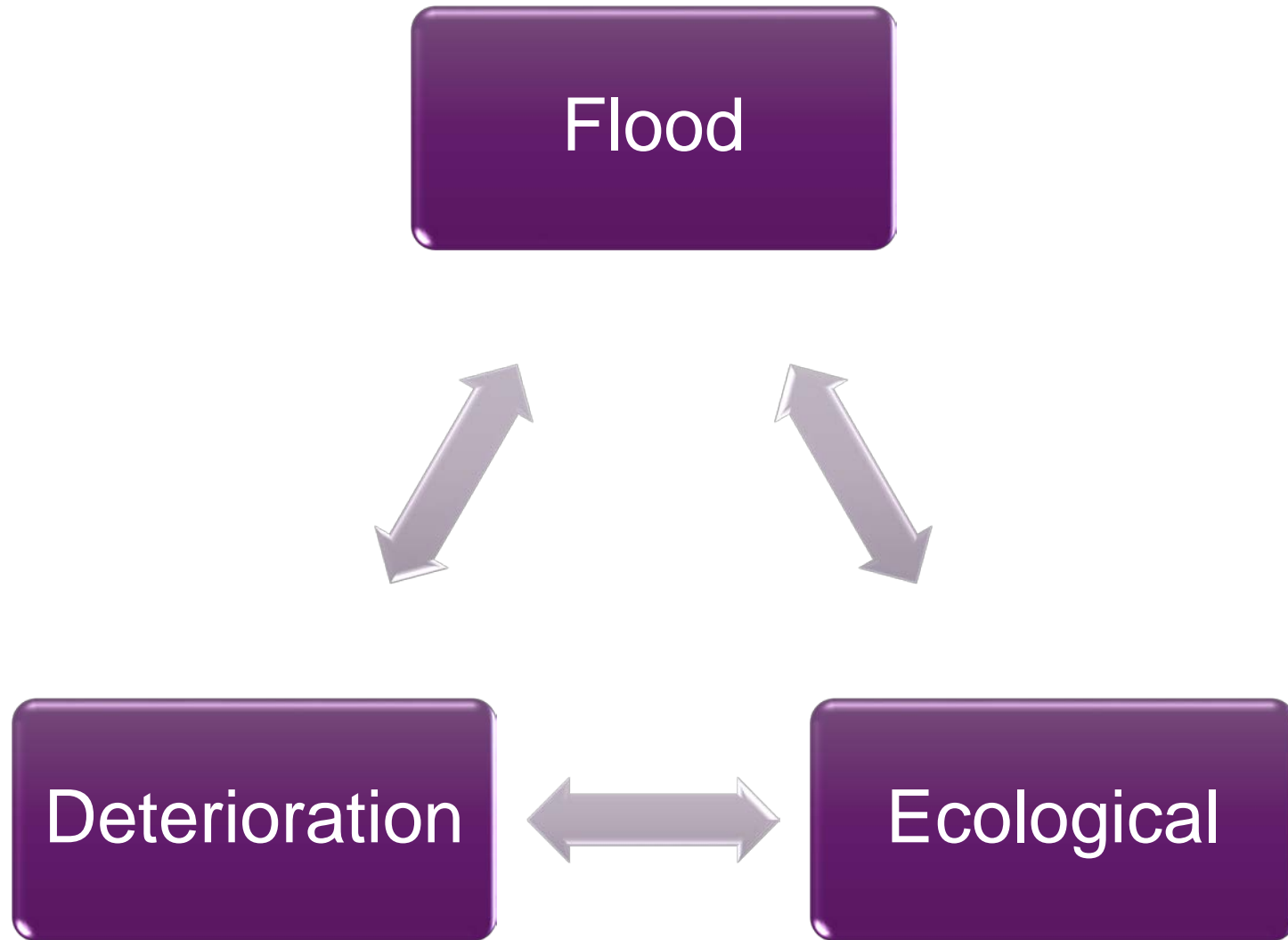
- Flood Elevations
- Inundation Areas





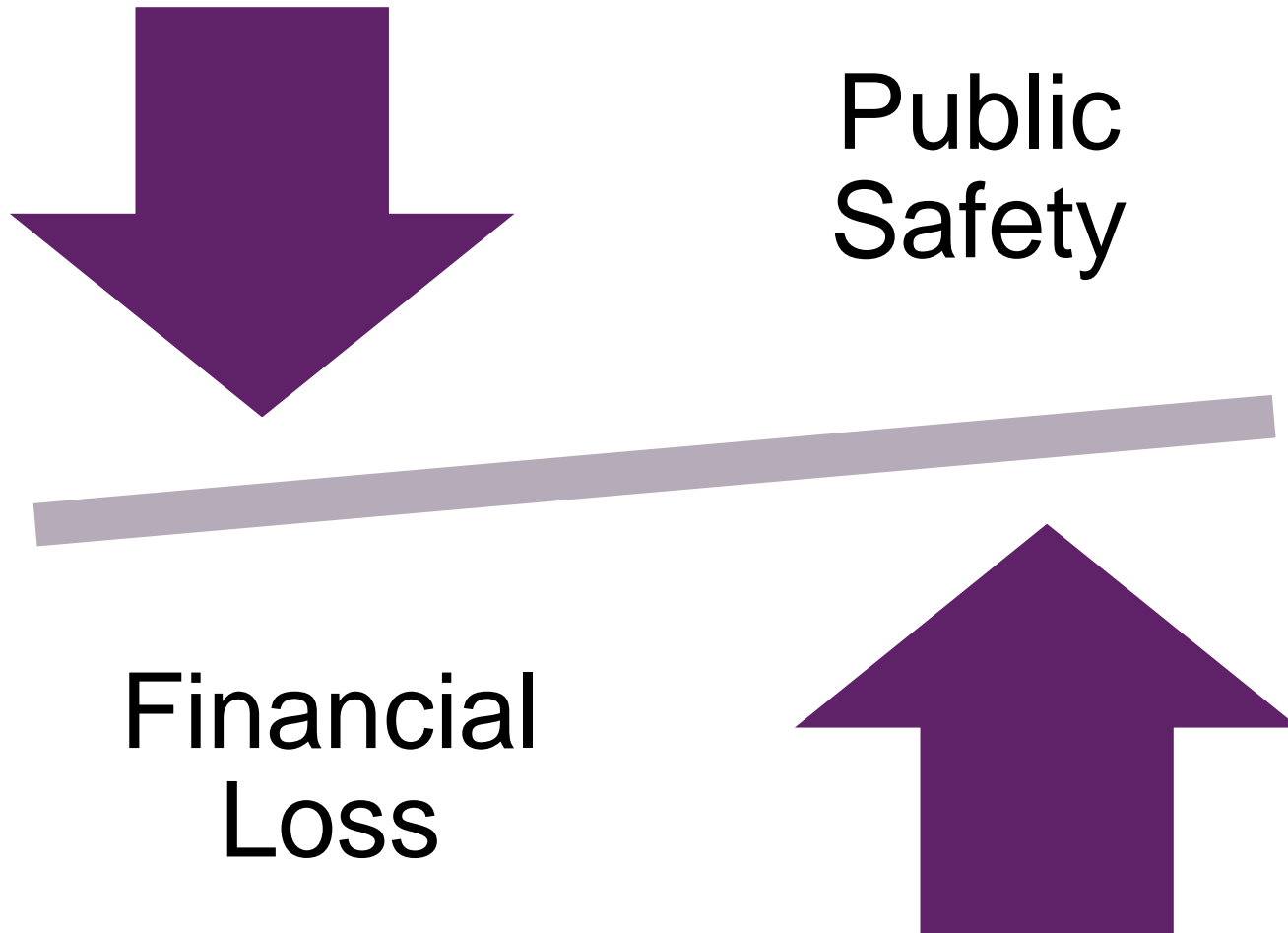
# Scoring

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# Flood Scoring

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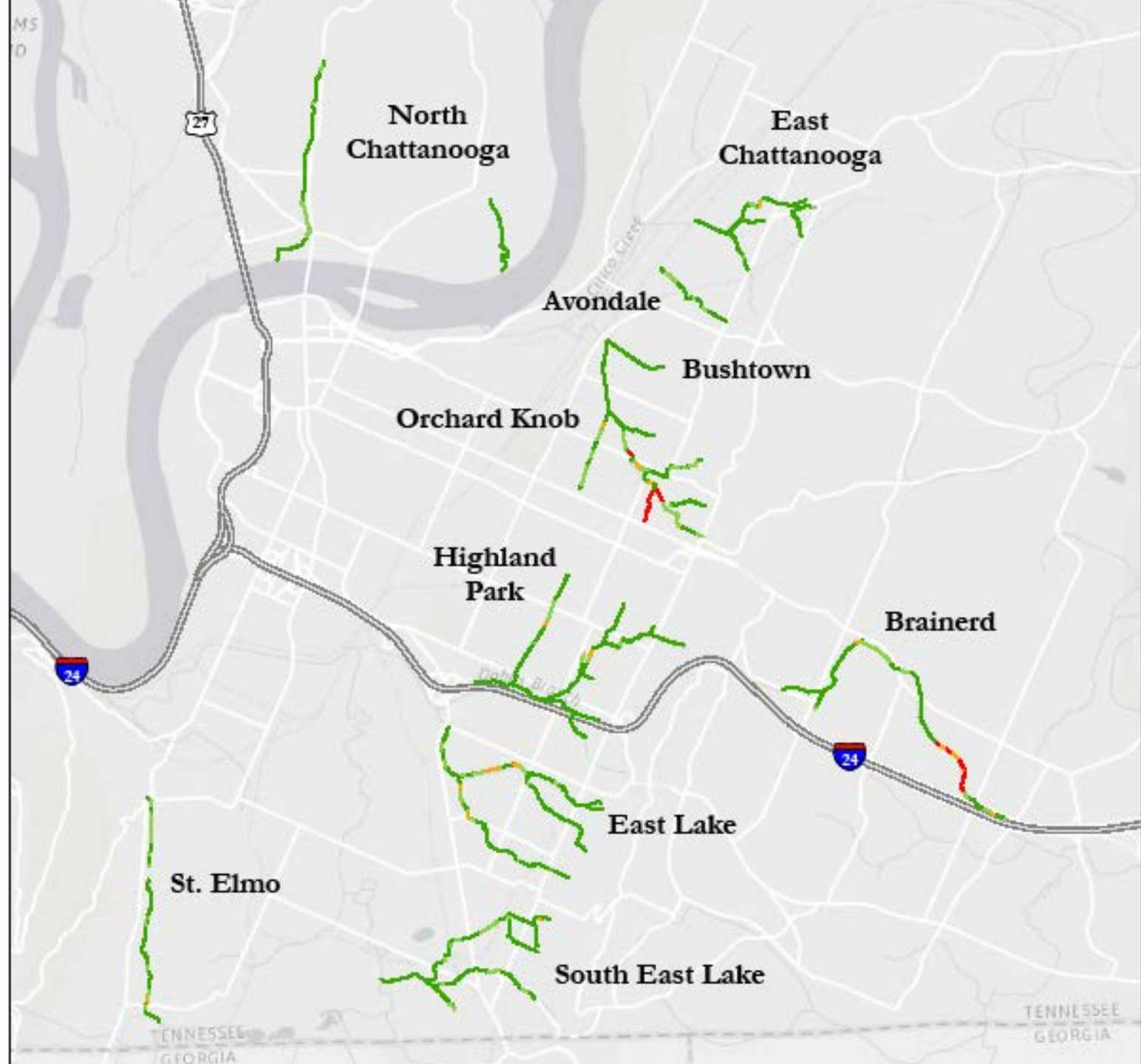


# Flood Scoring

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# Deterioration Scoring

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Public  
Safety

Water  
Quality

Roadways

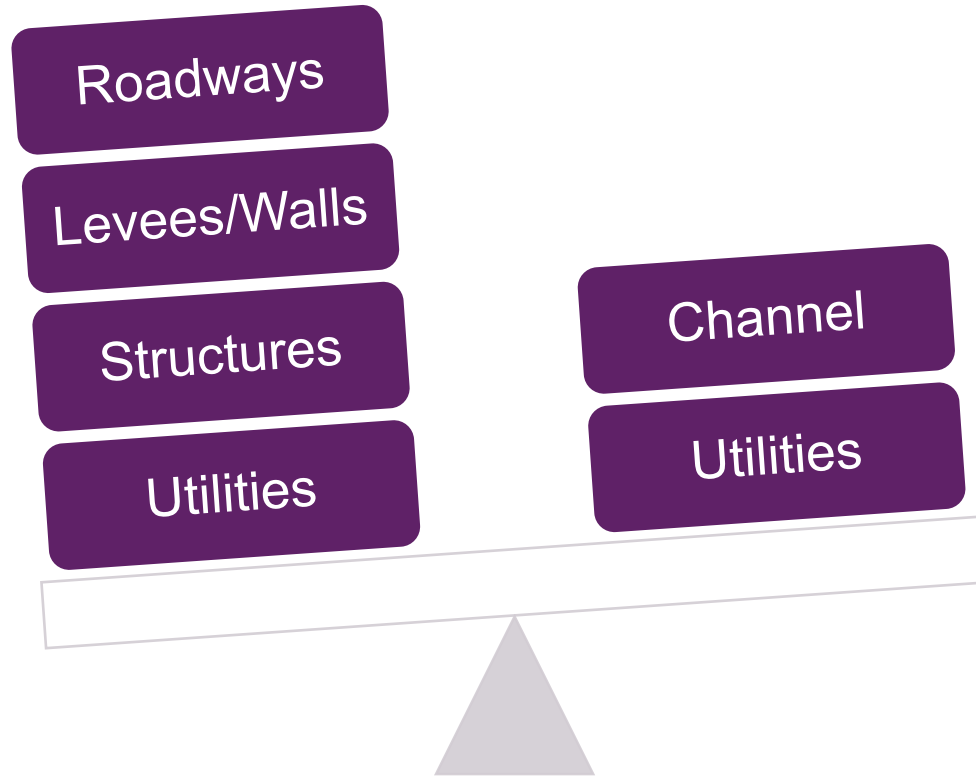
Levees/Walls

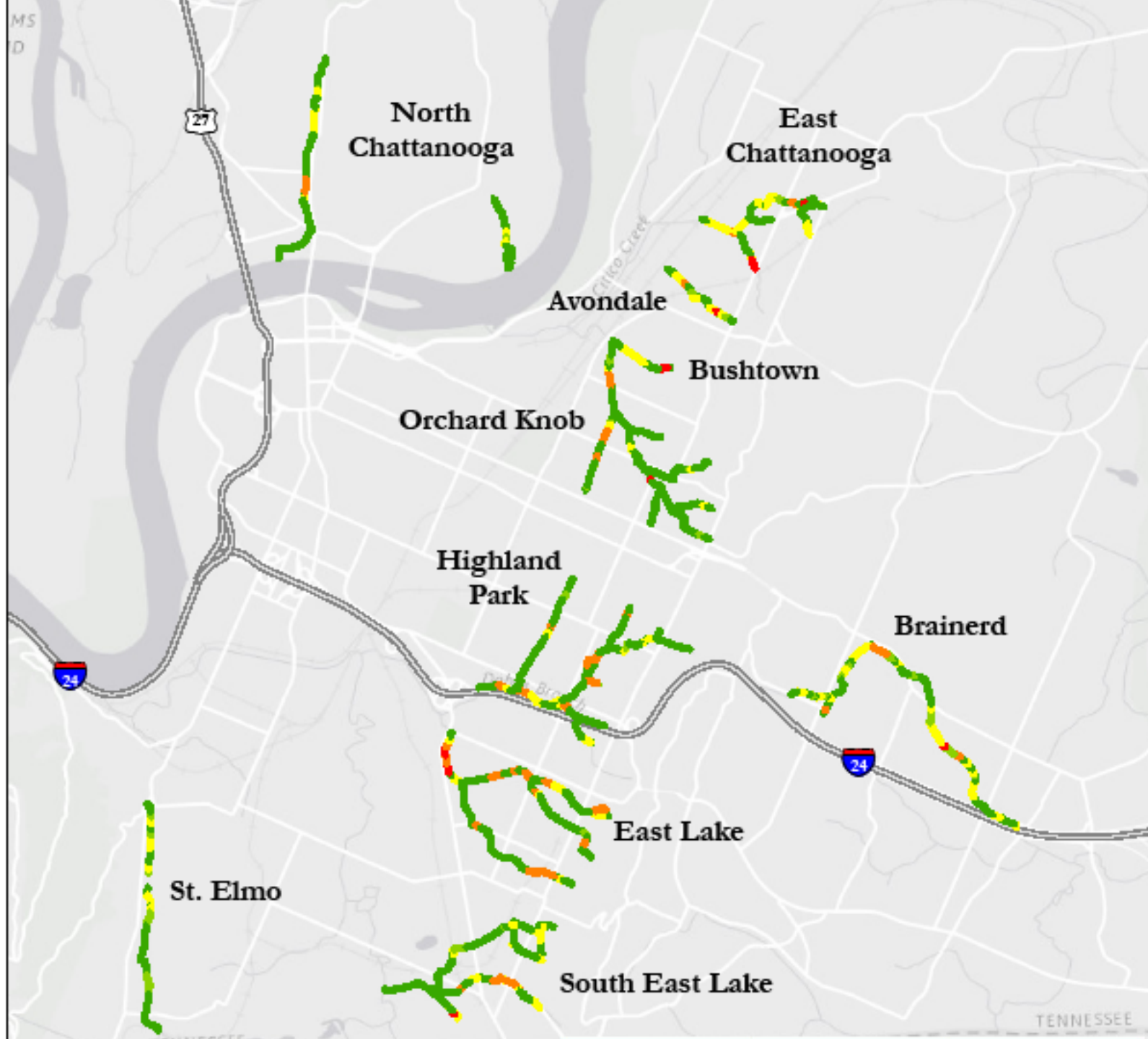
Structures

Utilities

Channel

Utilities





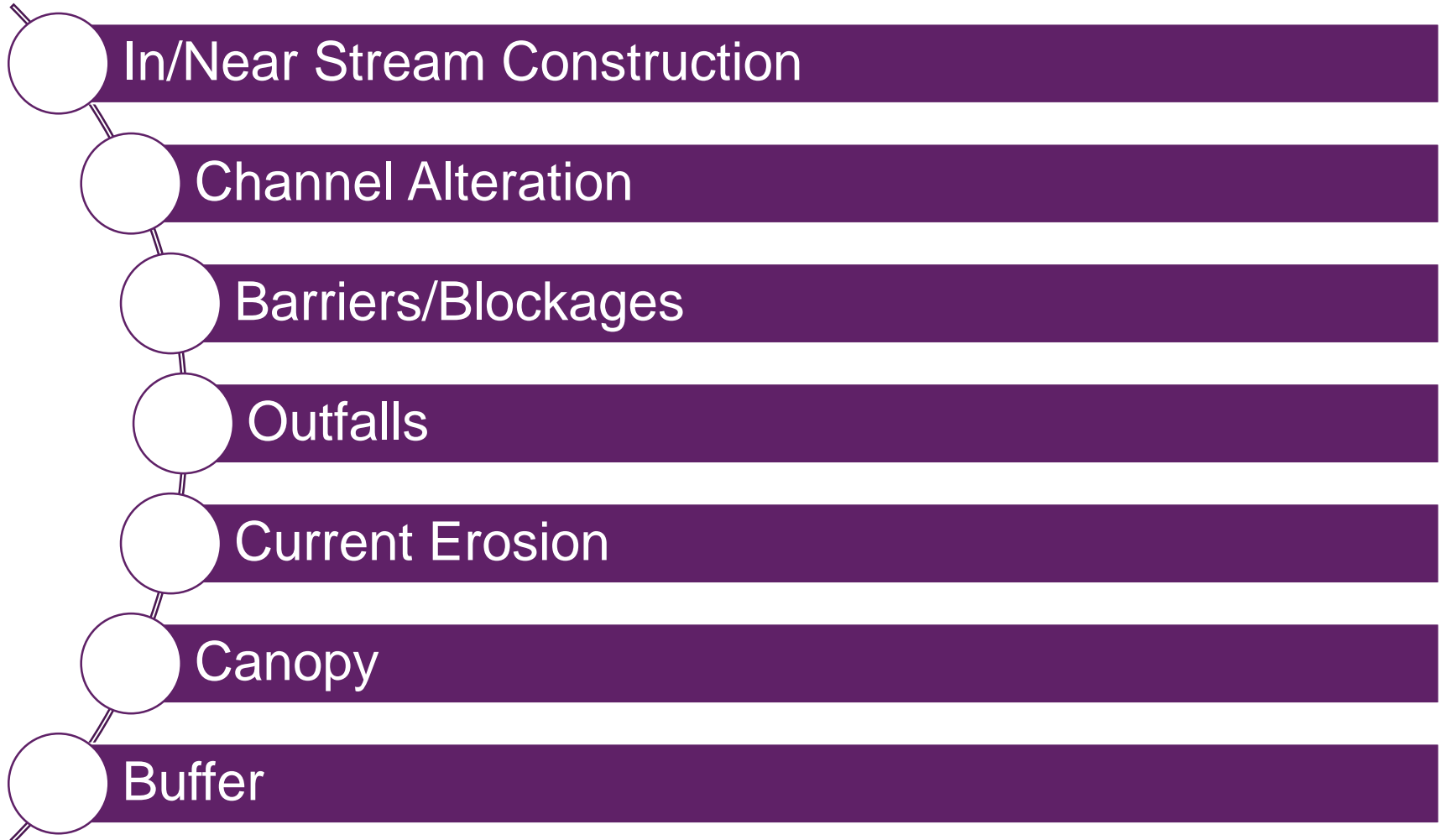


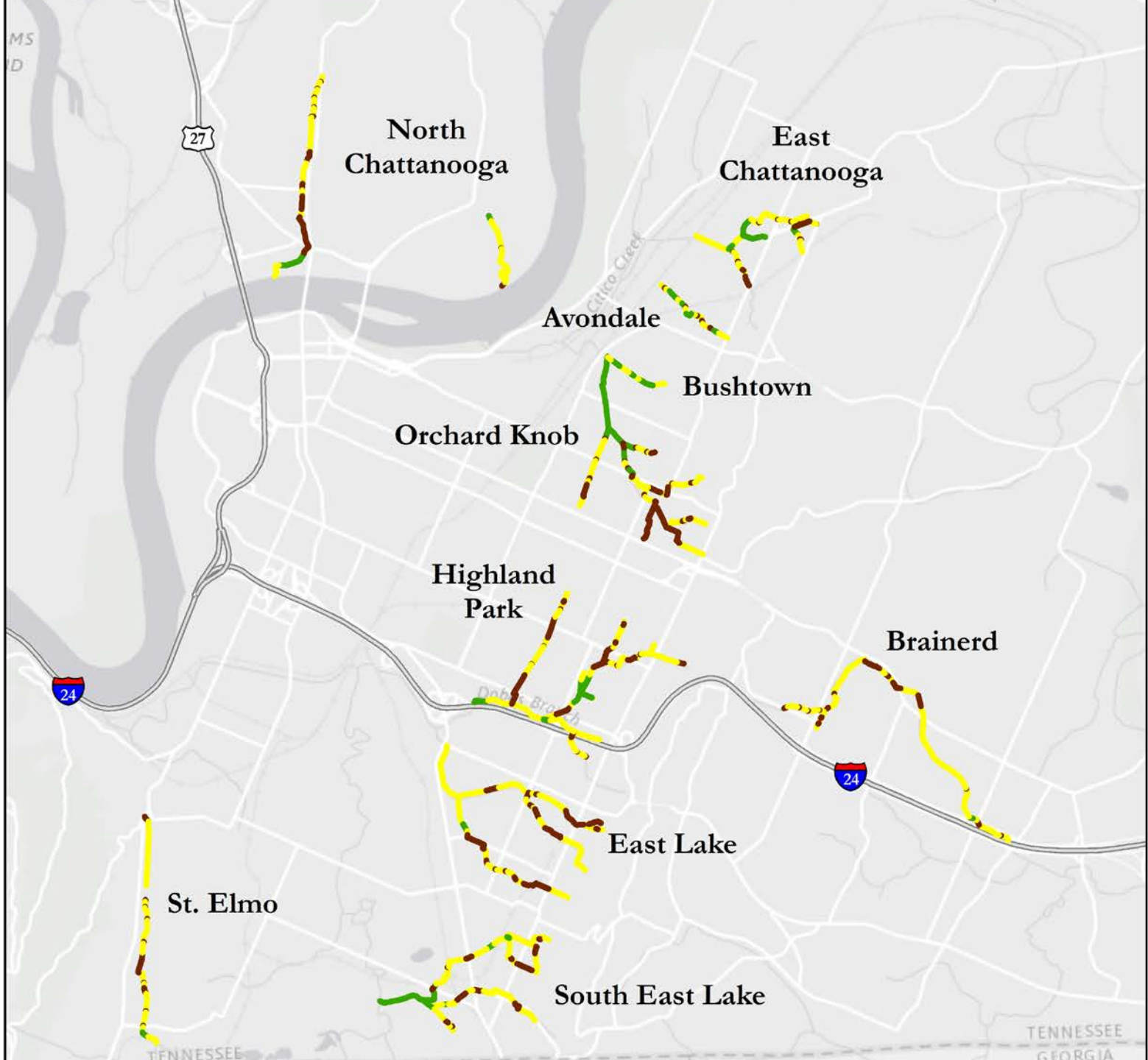


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# Ecological Scoring

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# Takeaway – Be Proactive

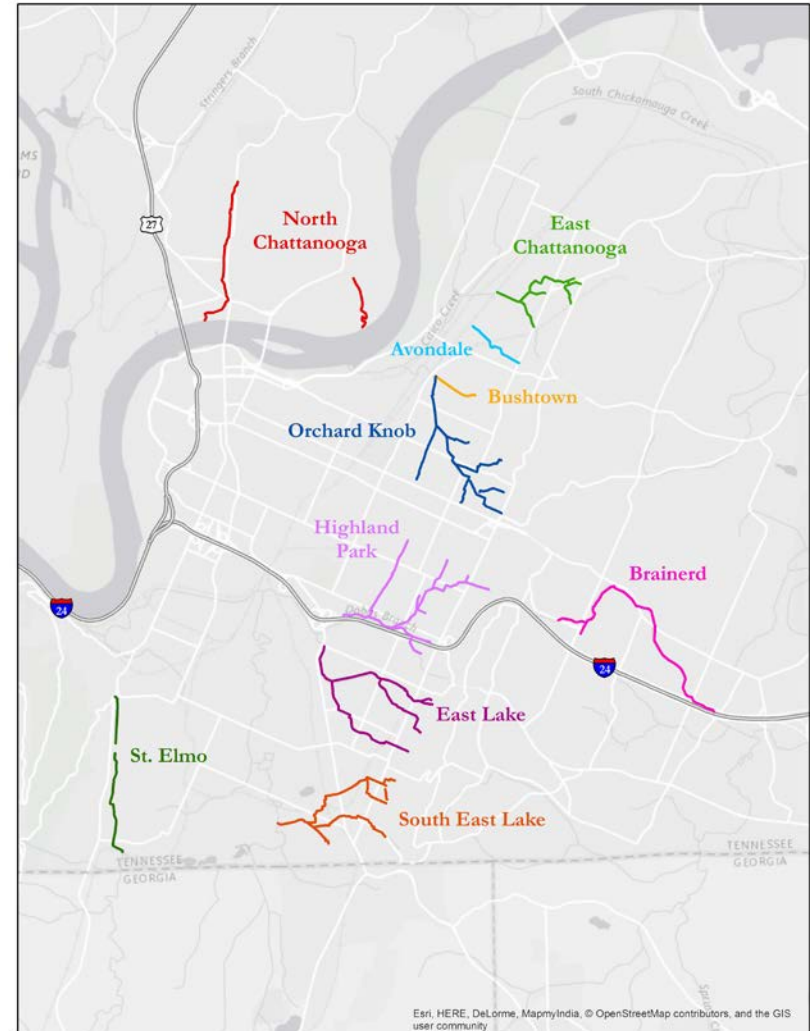
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# Takeaway – Think Big Picture





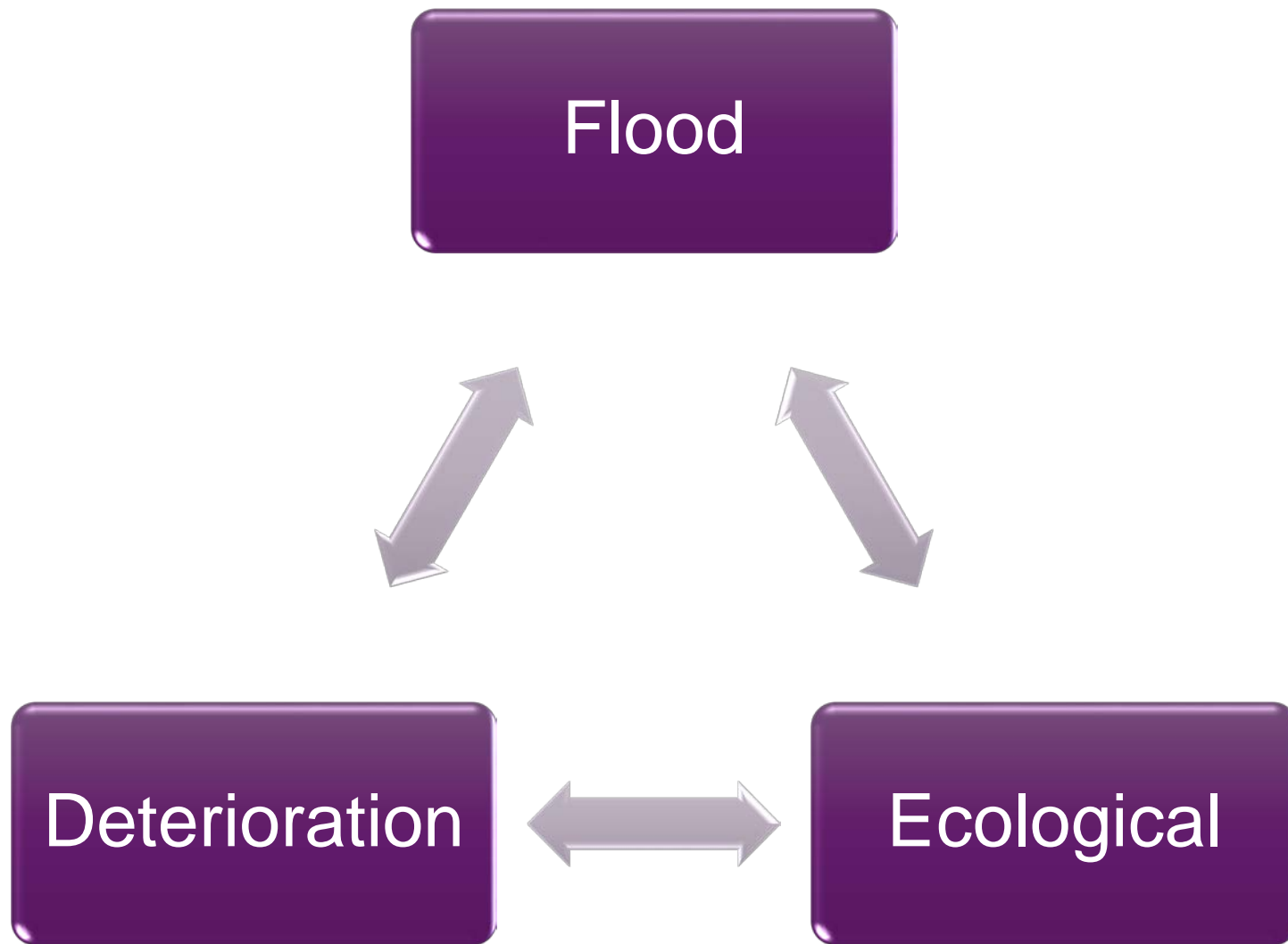
# Takeaway – Integrate Technology

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## Takeaway – Think Win-Win

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An abstract graphic in the top right corner consisting of several overlapping teal-colored sectors or wedges of different sizes, creating a fan-like or sunburst effect.

**Brad Heilwagen**  
**Amec Foster Wheeler**  
**[brad.heilwagen@amecfw.com](mailto:brad.heilwagen@amecfw.com)**