

# Rock Hill, SC

## Proactive Stormwater Program

David Dickson, PE, CFM, CSM, CMS4S  
[davidf.dickson@cityofrockhill.com](mailto:davidf.dickson@cityofrockhill.com)

Stephen Sands, PE, CFM  
[ssands@hazenandsawyer.com](mailto:ssands@hazenandsawyer.com)



**Hazen**

SESWA 2020 Annual Conference  
October 8, 2020

Rock Hill, SC  
Proactive Stormwater Program  
Presentation Outline

- **Rock Hill City-Wide Modeling**
- **Modeling Results - CIP**
- **Land Development Support**
- **Project Support**

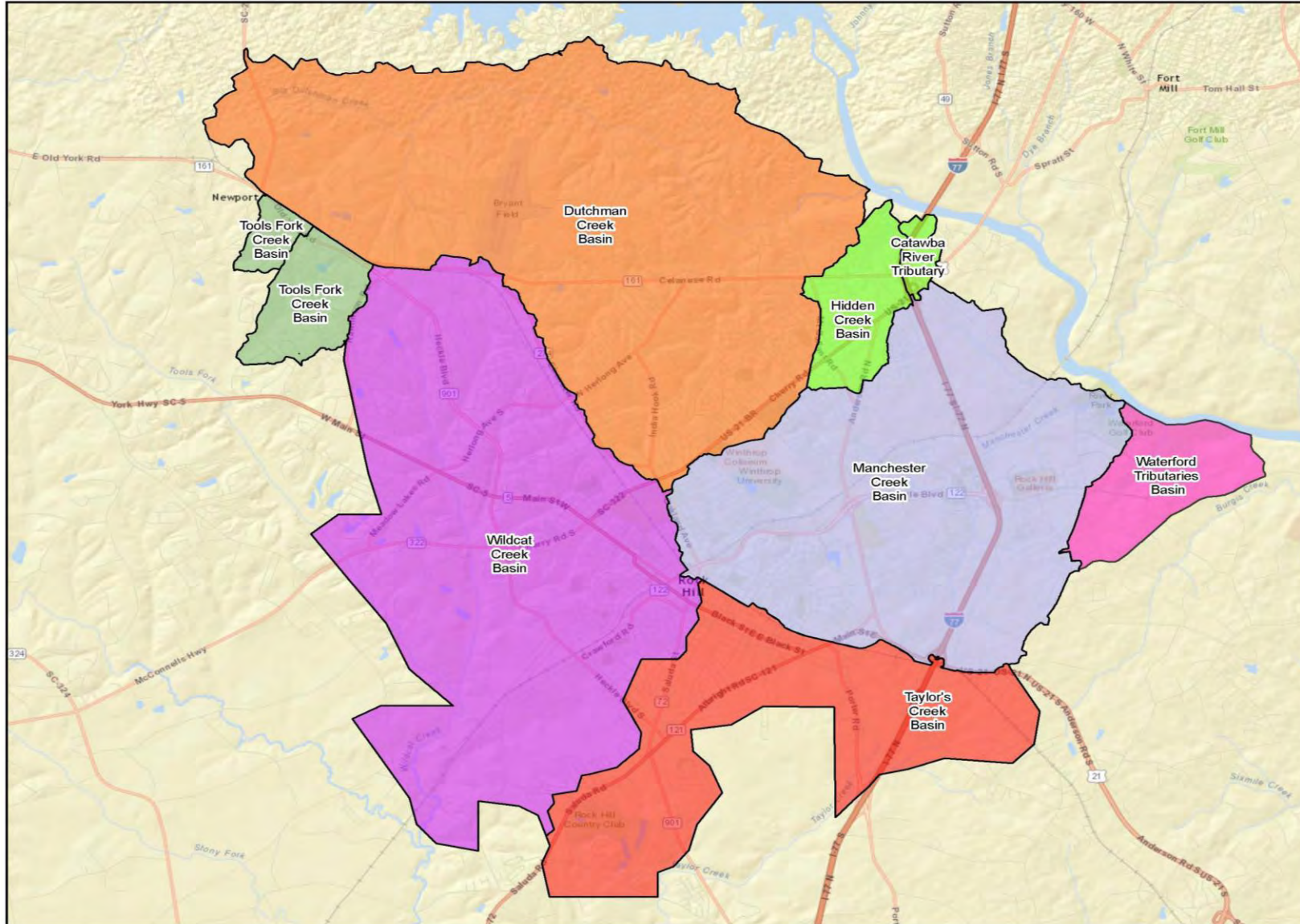




# Rock Hill, SC

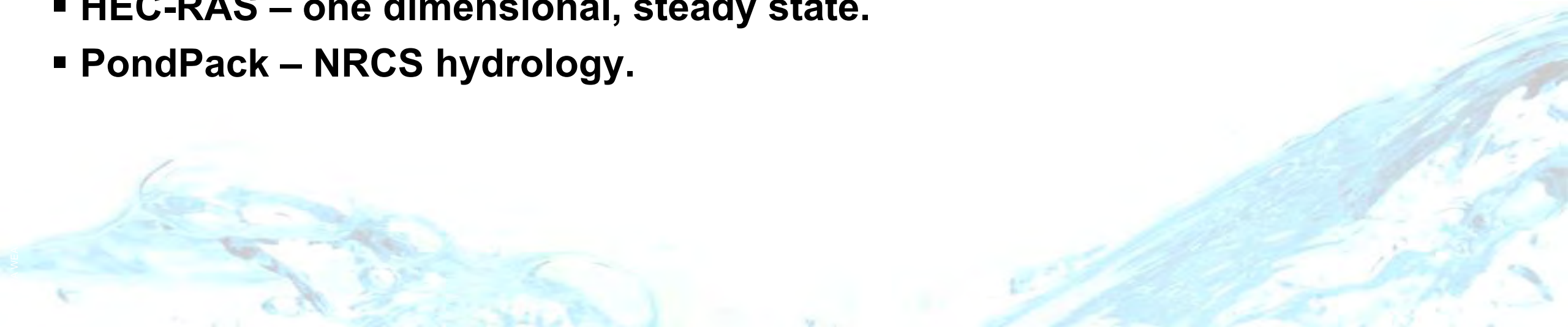
## Proactive Stormwater Program

### Streams Studied



**Rock Hill, SC  
Proactive Stormwater Program  
Limits of Study**

- **Study of flooding upstream from FEMA study limits - 1.0 square miles (640 acres).**
- **Rock Hill studied to 0.1 square miles (64 acres).**
- **Streams that convey runoff from neighborhoods to the larger streams.**
- **FEMA studied areas were not duplicated.**
- **Did not model closed drainage systems.**
- **HEC-RAS – one dimensional, steady state.**
- **PondPack – NRCS hydrology.**



Rock Hill, SC  
Proactive Stormwater Program  
CIP Results - Criteria

- **Road ownership**
- **Number of flooded buildings**
- **Severity of roadway flooding**
- **Construction cost**

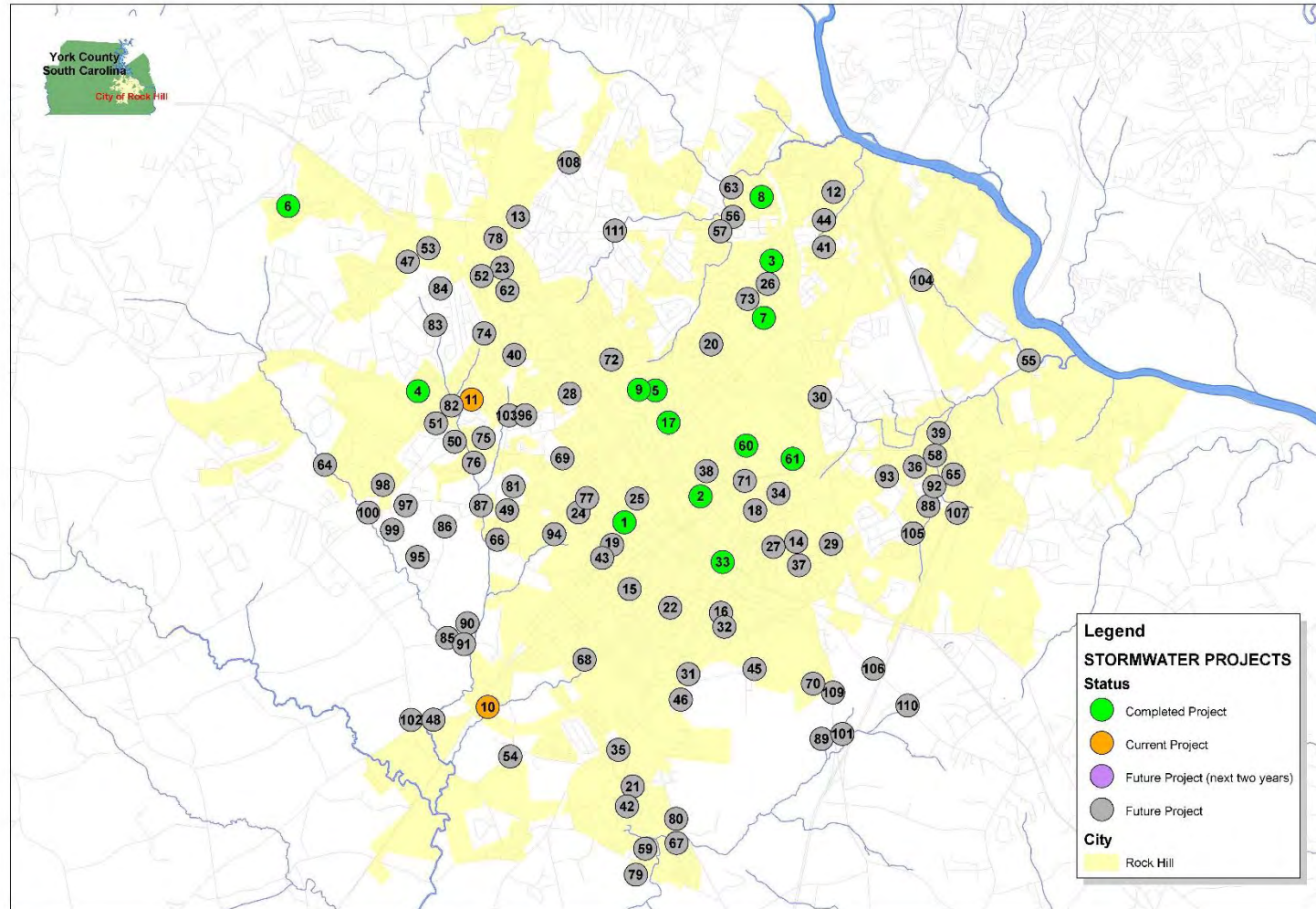




# Rock Hill, SC

## Proactive Stormwater Program

### CIP Results



- **2, 10, 25, and 100-year, 6-hour flood control**
- **Local floodplain compliance**
- **Downstream impacts analysis – hydrologic and hydraulic timing**
- **Downstream 25-year capacity**
- **Detention waiver**
- **Regional approach**



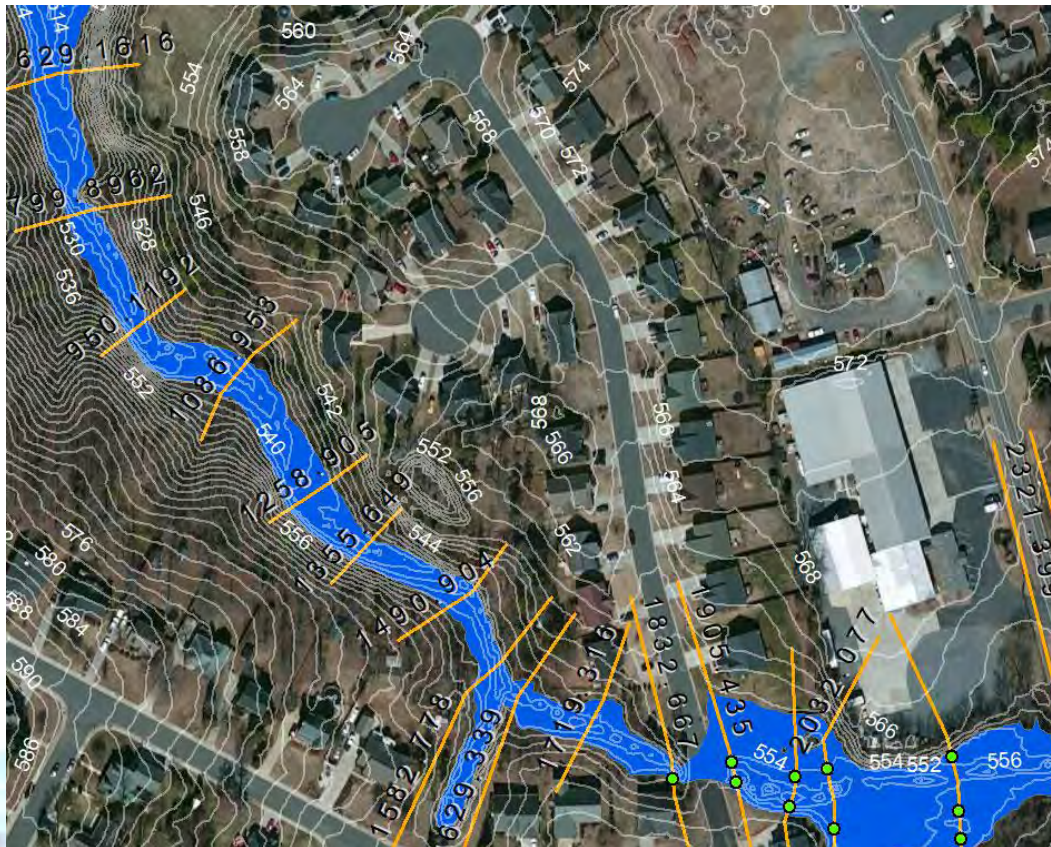


# Rock Hill, SC

## Proactive Stormwater Program

### Aldersgate Culvert Improvement

- **Undersized Culvert**
- **Isolated Homes**



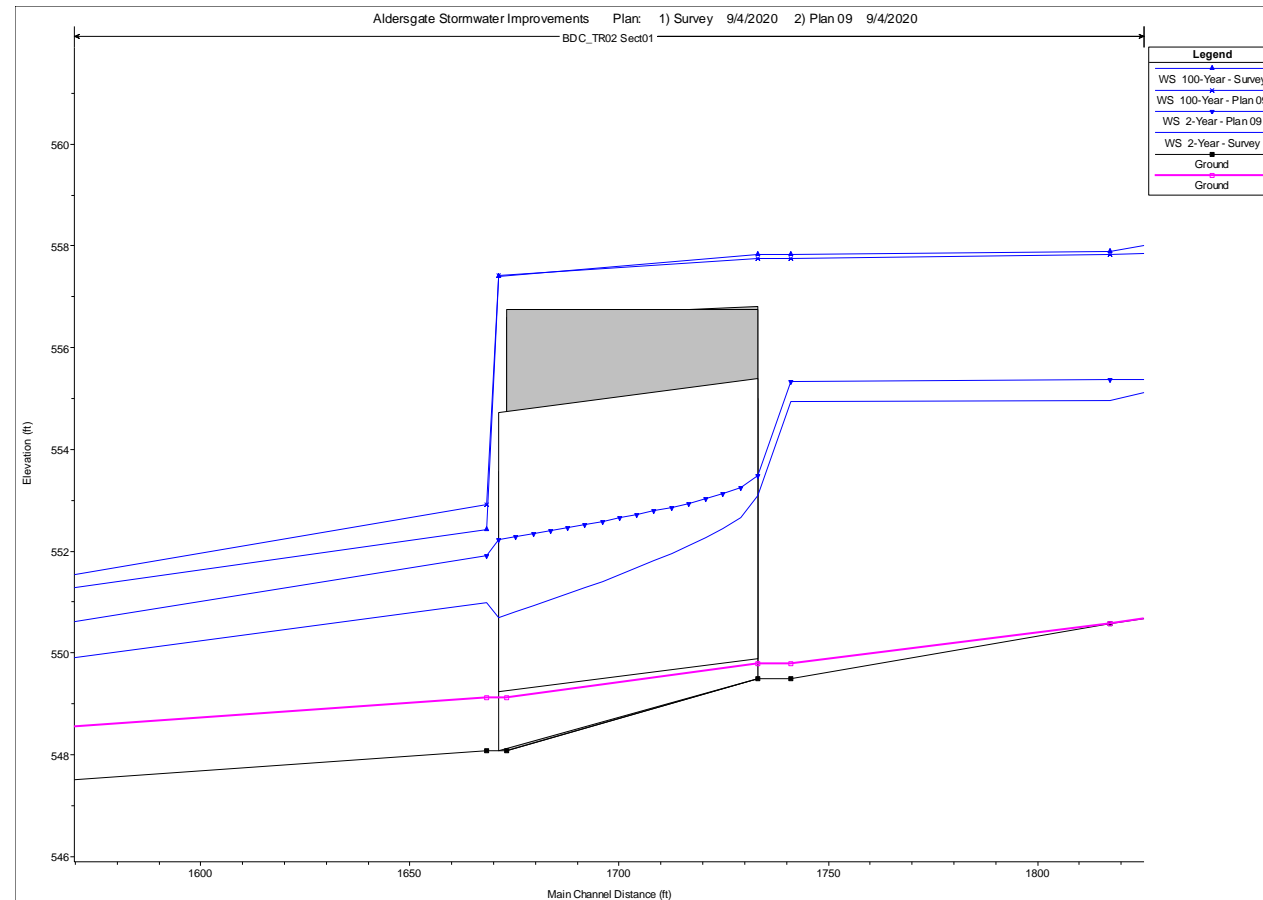


# Rock Hill, SC

## Proactive Stormwater Program

### Aldersgate Culvert Improvement

- City-wide Model
  - Upstream invert – 549.89
  - Downstream invert – 549.23
  - Slope – 0.011 foot/foot
- Project Design
  - Upstream invert – 549.5
  - Downstream invert – 548.07
  - Slope – 0.023 foot/foot



# Rock Hill, SC

## Proactive Stormwater Program

### Aldersgate Culvert Improvement





Rock Hill, SC  
Proactive Stormwater Program  
Cavendale Culvert Improvement and Stream Restoration

- Roadway overtopping (10-year – 1.3 feet)
- Primary access for 53 homes
- Channel bank erosion

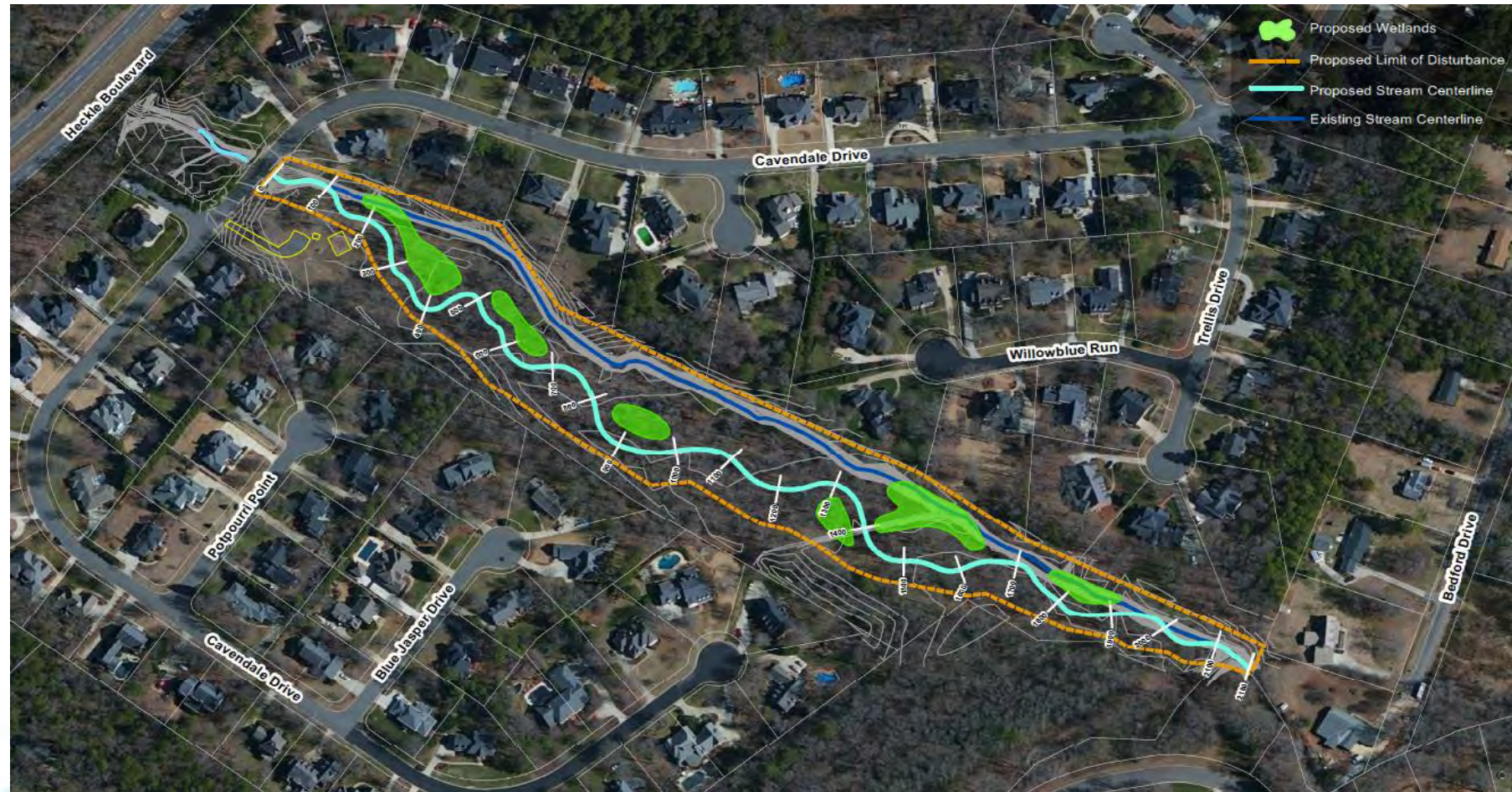




# Rock Hill, SC

## Proactive Stormwater Program

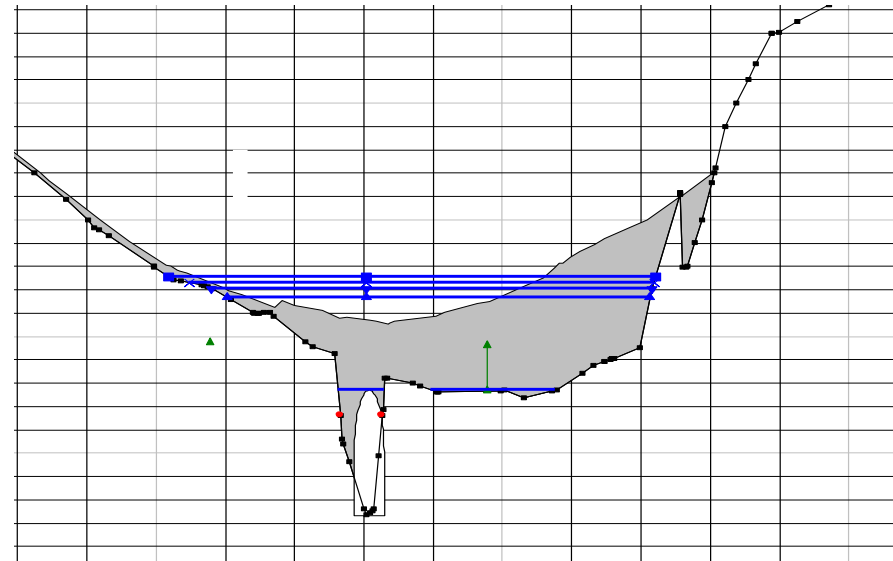
### Cavendale Culvert Improvement and Stream Restoration





**Rock Hill, SC**  
**Proactive Stormwater Program**  
**Cavendale Culvert Improvement and Stream Restoration on**

- **April 13, 2019 flood event**
- **3.1 inches rainfall**
- **Antecedent moisture - III**
- **Model flood elevation – 637.3**
- **Observed flood elevation – 637.0**

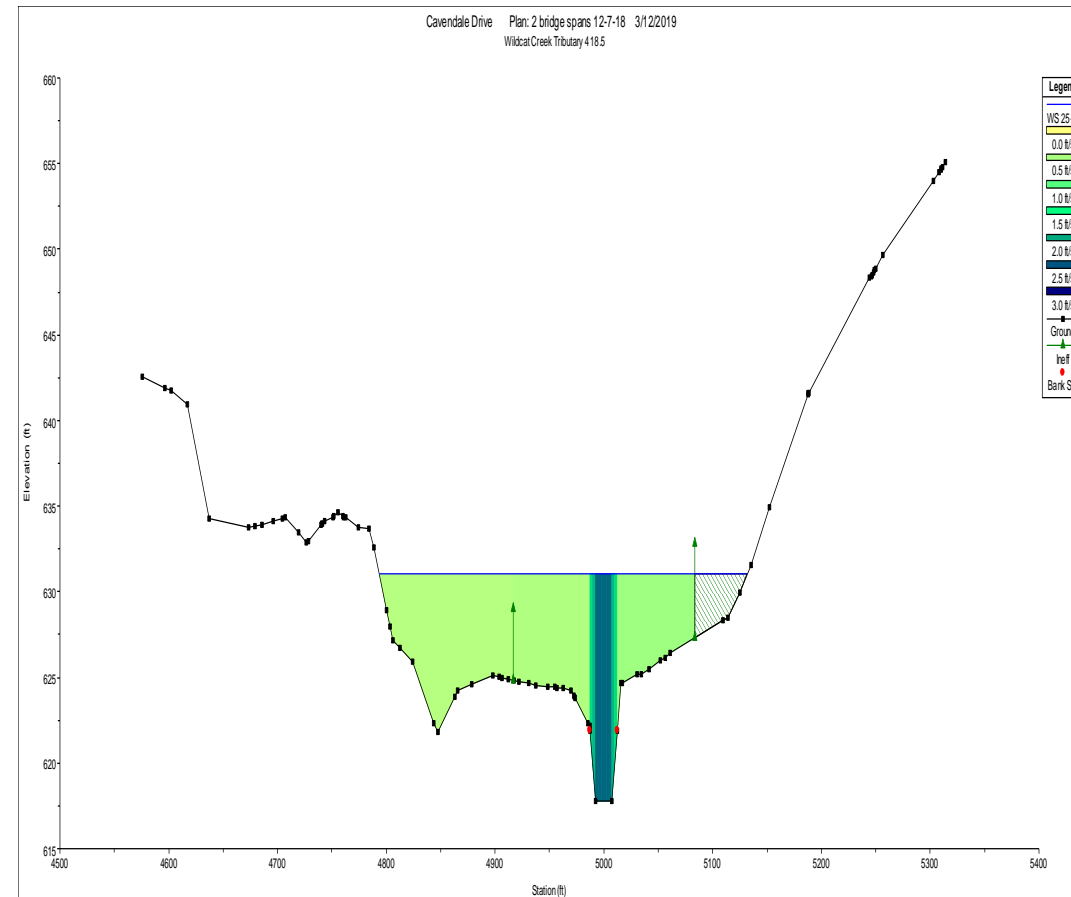


# Rock Hill, SC

## Proactive Stormwater Program

### Cavendale Culvert Improvement and Stream Restoration

- Sediment transport
- Scour depth
- Lining design
- Scour pool dimensions
- Bankfull validation
- Bridge scour





**Rock Hill, SC**  
**Proactive Stormwater Program**  
**Cotton Mill Stream Enhancement**

- **Degraded Stream Reach**
- **Exposed Sanitary Sewer Infrastructure**
- **Stream Enhancement Design**
- **Construction by City Crews**
- **Leverage Duke Power Water Quality Grant**





**Rock Hill, SC**  
**Proactive Stormwater Program**  
**Cotton Mill Stream Enhancement**

August 2018





**Rock Hill, SC**  
**Proactive Stormwater Program**  
**Cotton Mill Stream Enhancement**

September 2019





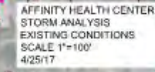
**Rock Hill, SC**  
**Proactive Stormwater Program**  
**Cotton Mill Stream Enhancement**

June 2020





## Proactive Stormwater Program Tech Park Pipe Improvements









# Rock Hill, SC

## Proactive Stormwater Program

### Tech Park Pipe Improvements





# Rock Hill, SC

## Proactive Stormwater Program

### Tech Park Pipe Improvements

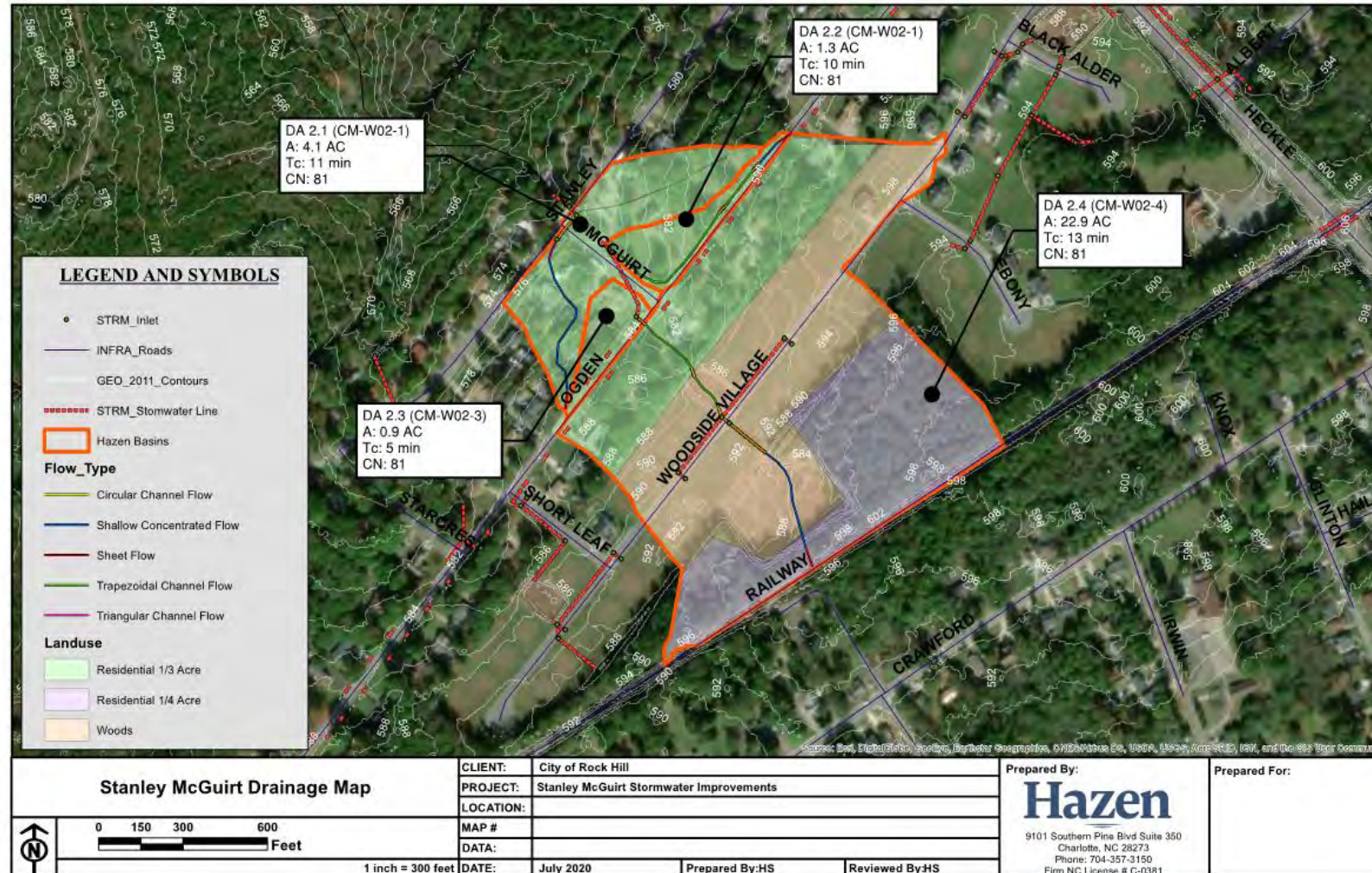




# Rock Hill, SC

## Proactive Stormwater Program

### Stanley-McGuirt Pipe Improvements

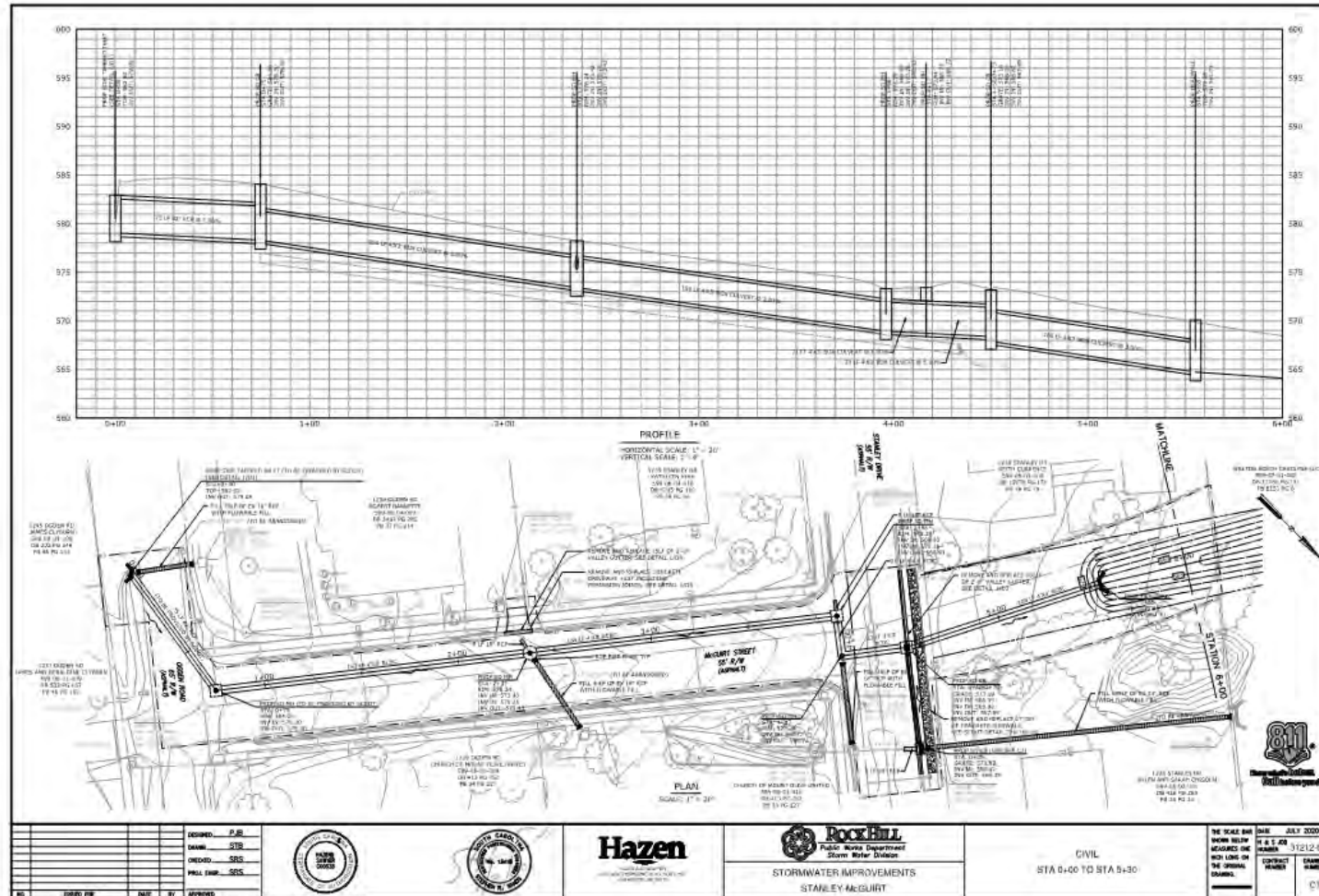




# Rock Hill, SC

## Proactive Stormwater Program

### Stanley-McGuirt Pipe Improvements





**Rock Hill, SC**  
**Proactive Stormwater Program**  
**College Downs Floodplain Improvements**

- [illegible]





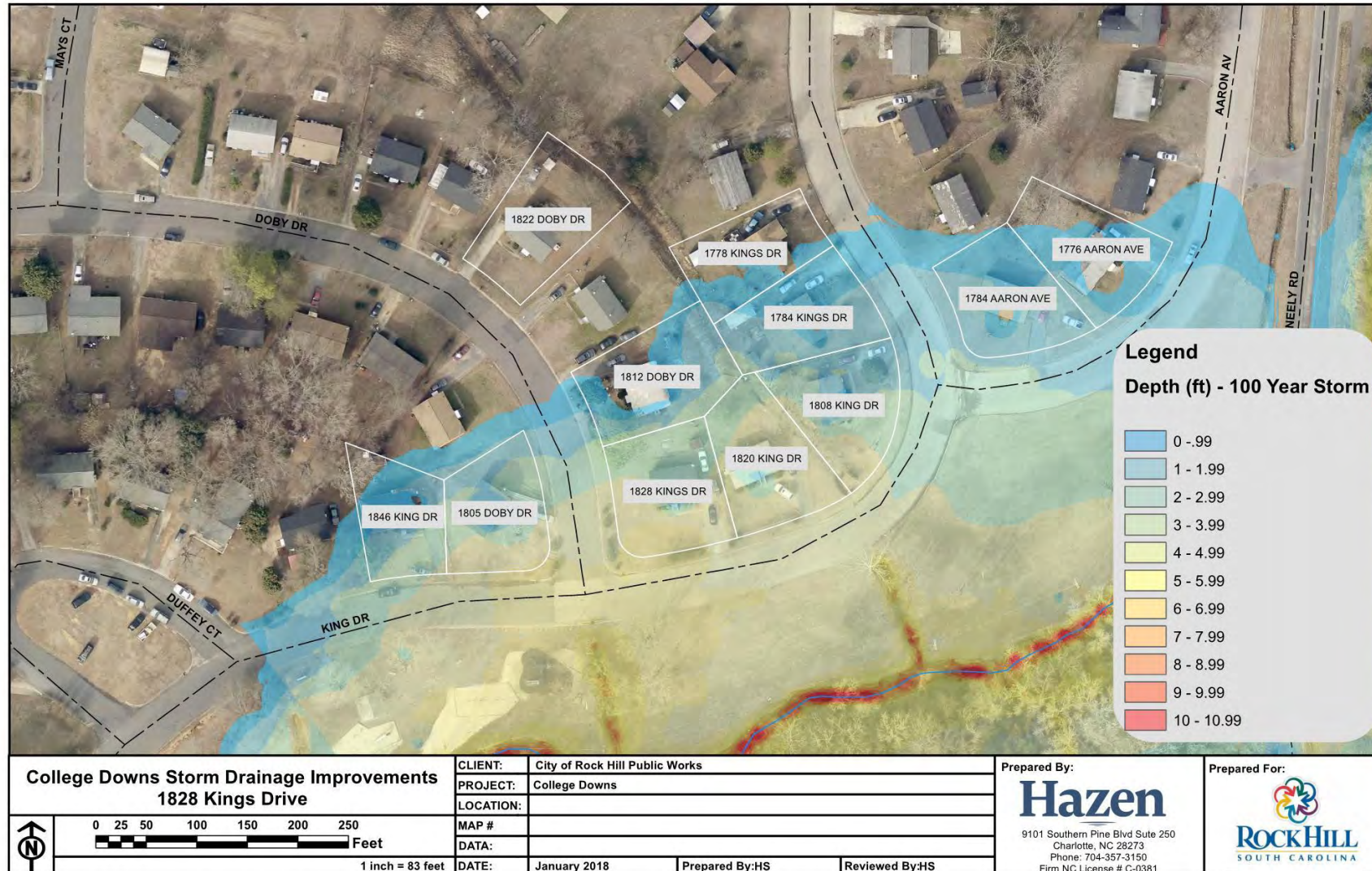




# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements

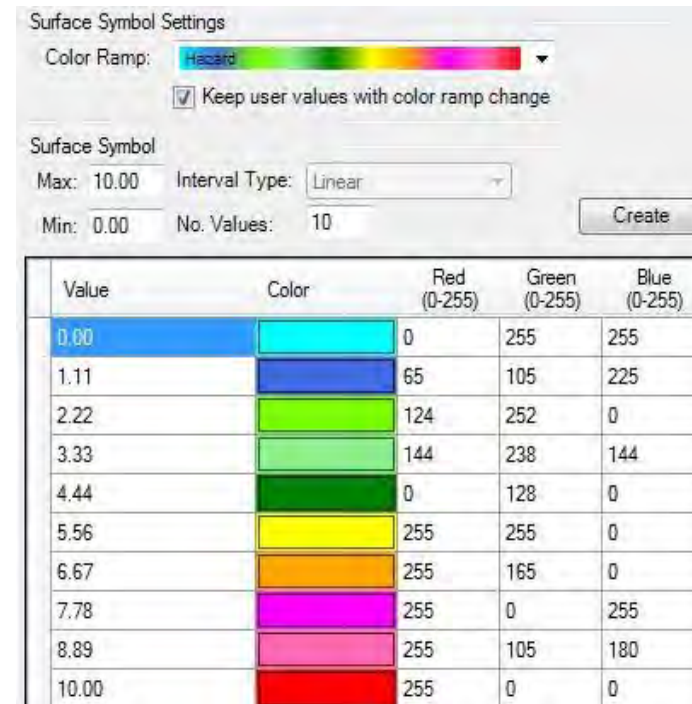
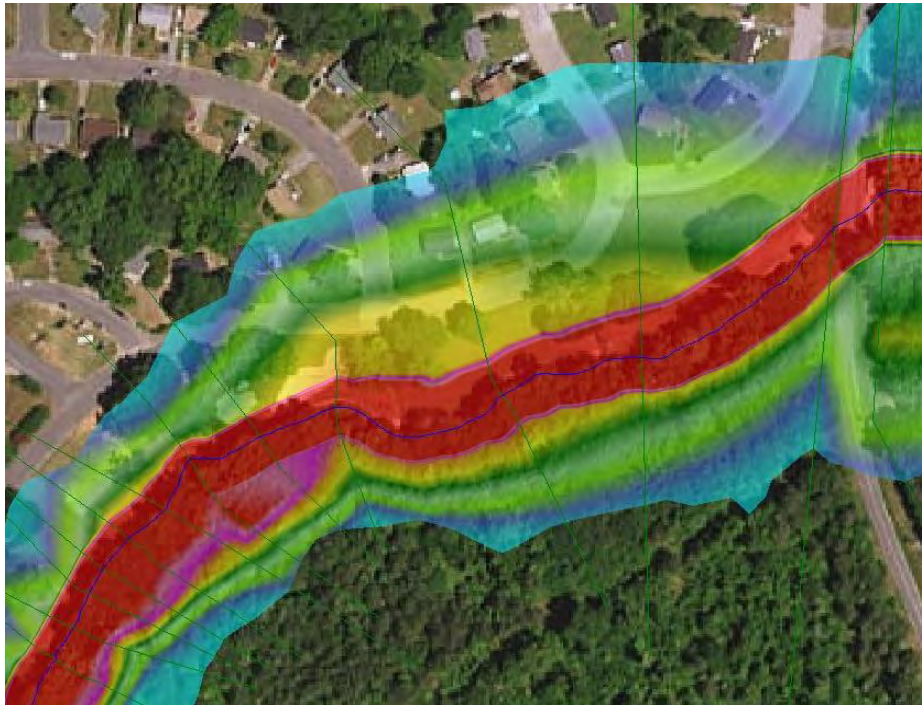




# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements







# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements

	Address	Depth Above Ground Elevation	Velocity	Depth Times Velocity
	<u>1846 King Dr</u>	1.5	0.9	1.3
	<u>1852 King Dr</u>	0.0	0.0	0.0
	<u>1828 King Dr</u>	3.6	1.4	4.0
	<u>1805 Doby Dr</u>	2.9	1.4	3.0
	<u>1812 Doby Dr</u>	1.5	0.7	0.9
	<u>1813 Doby Dr</u>	0.0	0.0	0.0
	<u>1818 Doby Dr</u>	0.0	0.0	0.0
	<u>1822 Doby Dr</u>	0.0	0.0	0.0
	<u>1773 King Dr</u>	0.0	0.0	0.0
	<u>1774 King Dr</u>	0.0	0.0	0.0
	<u>1778 King Dr</u>	0.8	0.2	0.1
	<u>1779 King Dr</u>	0.1	0.5	0.3
	<u>1784 King Dr</u>	1.7	0.8	1.0
	<u>1808 King Dr</u>	3.0	1.2	2.6
	<u>1820 King Dr</u>	3.8	1.4	4.0
	<u>1764 Aaron Ave</u>	0.0	0.0	0.0
	<u>1768 Aaron Ave</u>	0.0	0.0	0.0
	<u>1776 Aaron Ave</u>	1.5	0.7	1.2
	<u>1784 Aaron Ave</u>	1.4	0.9	1.7

 Purchased  
 Not interested

# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements



Purchased - Removed



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements



Purchased - Removed



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements



Purchased - Removed



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs



Purchased - Removed



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements



Not Purchased



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements



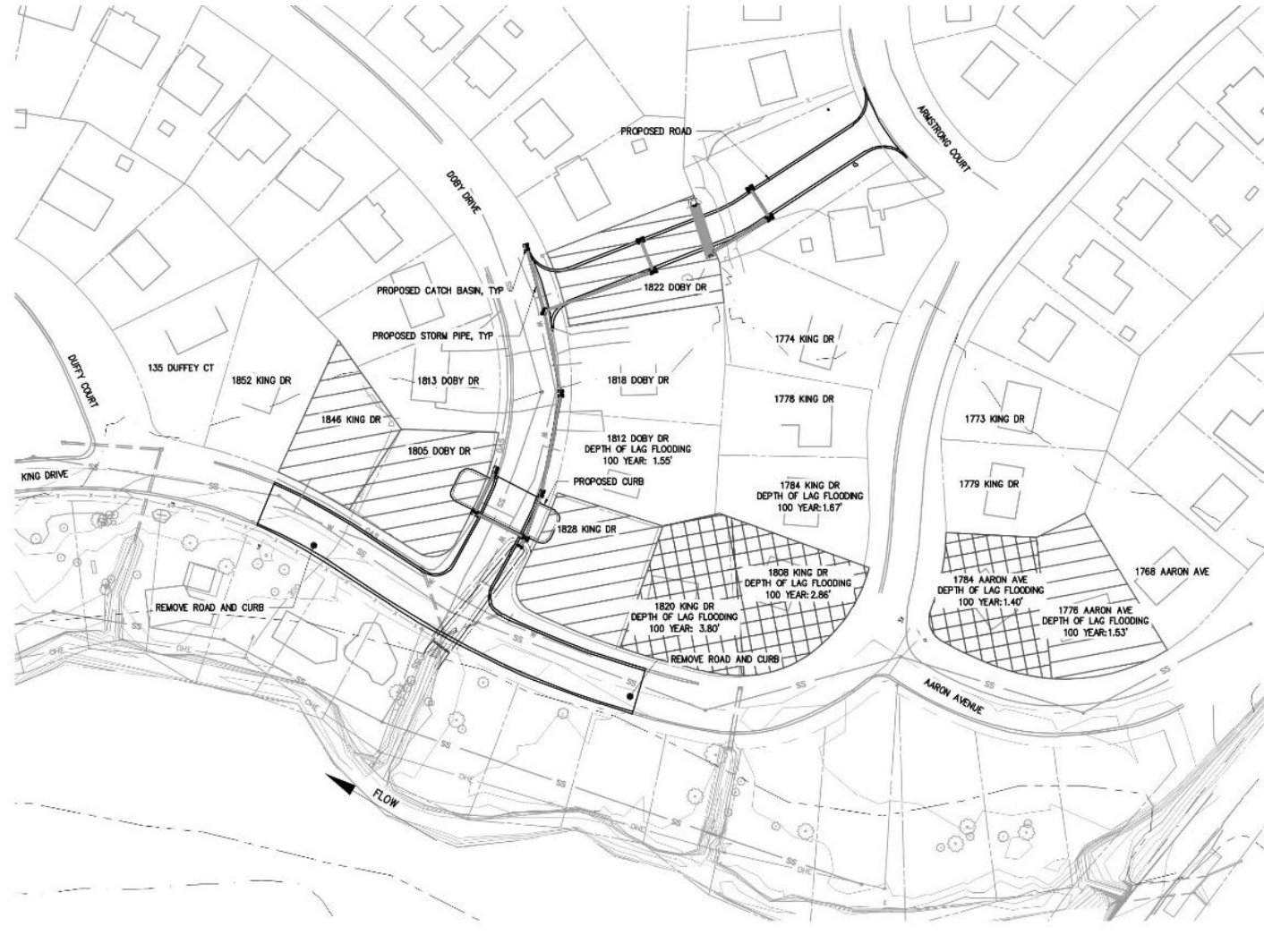
Not Purchased



# Rock Hill, SC

## Proactive Stormwater Program

### College Downs Floodplain Improvements





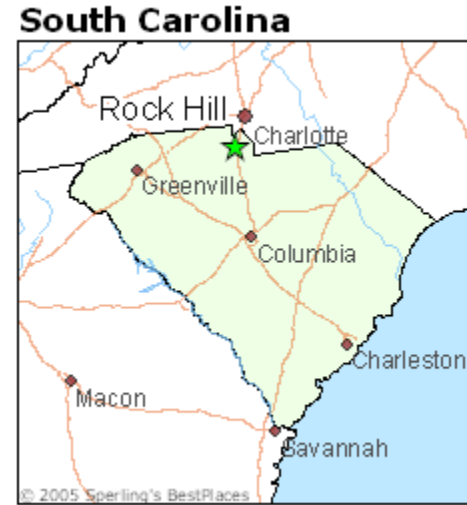
**Rock Hill, SC**  
**Proactive Stormwater Program**  
**College Downs Floodplain Improvements**

- **Calibration and design support**
- **Floodplain buyout prioritization**
- **Human factor**



Rock Hill, SC  
Proactive Stormwater Program  
Presentation Outline

- **Rock Hill City-Wide Modeling**
- **CIP Results**
- **Land Development Support**
- **Design Support**
- **Floodplain Buy-Out Support**





# Rock Hill, SC

## Proactive Stormwater Program

David Dickson, PE, CFM, CSM, CMS4S  
[davidf.dickson@cityofrockhill.com](mailto:davidf.dickson@cityofrockhill.com)

Stephen Sands, PE, CFM  
[ssands@hazenandsawyer.com](mailto:ssands@hazenandsawyer.com)



**Hazen**

SESWA 2020 Annual Conference  
October 8, 2020

# Rock Hill, SC

## Proactive Stormwater Program

### College Downs

Address	Appraisal (\$)	Moving Cost (\$)	Replacement housing - 180 day	Replacement housing -90- day	Total (\$)	Actual Paid
109 Armstrong (vacant lot)	\$ 7,000.00	\$ -			\$ 7,000.00	\$ 8,200.00
1776 Aaron	\$ 56,000.00	\$ 1,890.00			\$ 57,890.00	\$ 60,890.00
1778 King	\$ 62,000.00	\$ 2,075.00			\$ 64,075.00	n/a
1784 Aaron	\$ 48,000.00	\$ 1,735.00			\$ 49,735.00	
1784 King	\$ 56,000.00	\$ 1,890.00			\$ 57,890.00	n/a
1812 Doby	\$ 52,000.00	\$ 1,890.00			\$ 53,890.00	n/a
1822 Doby	\$ 30,000.00	\$ 1,735.00	\$ 31,000.00	\$ 7,200.00	\$ 69,935.00	\$65,000
1846 King	\$ 70,000.00	\$ 2,075.00			\$ 72,075.00	\$72,075
1805 Doby	\$ 30,000.00	\$ 1,735.00		\$ 7,200.00	\$ 38,935.00	\$65,000
1808 King	\$ 35,000.00	\$ 1,735.00			\$ 36,735.00	
1820 King	\$ 30,000.00	\$ 1,735.00			\$ 31,735.00	
1828 King	\$ 35,000.00	\$ 1,890.00		\$ 7,200.00	\$ 44,090.00	\$55,000
Total	\$ 511,000.00	\$ 20,385.00	\$ 31,000.00	\$ 21,600.00	\$ 583,985.00	