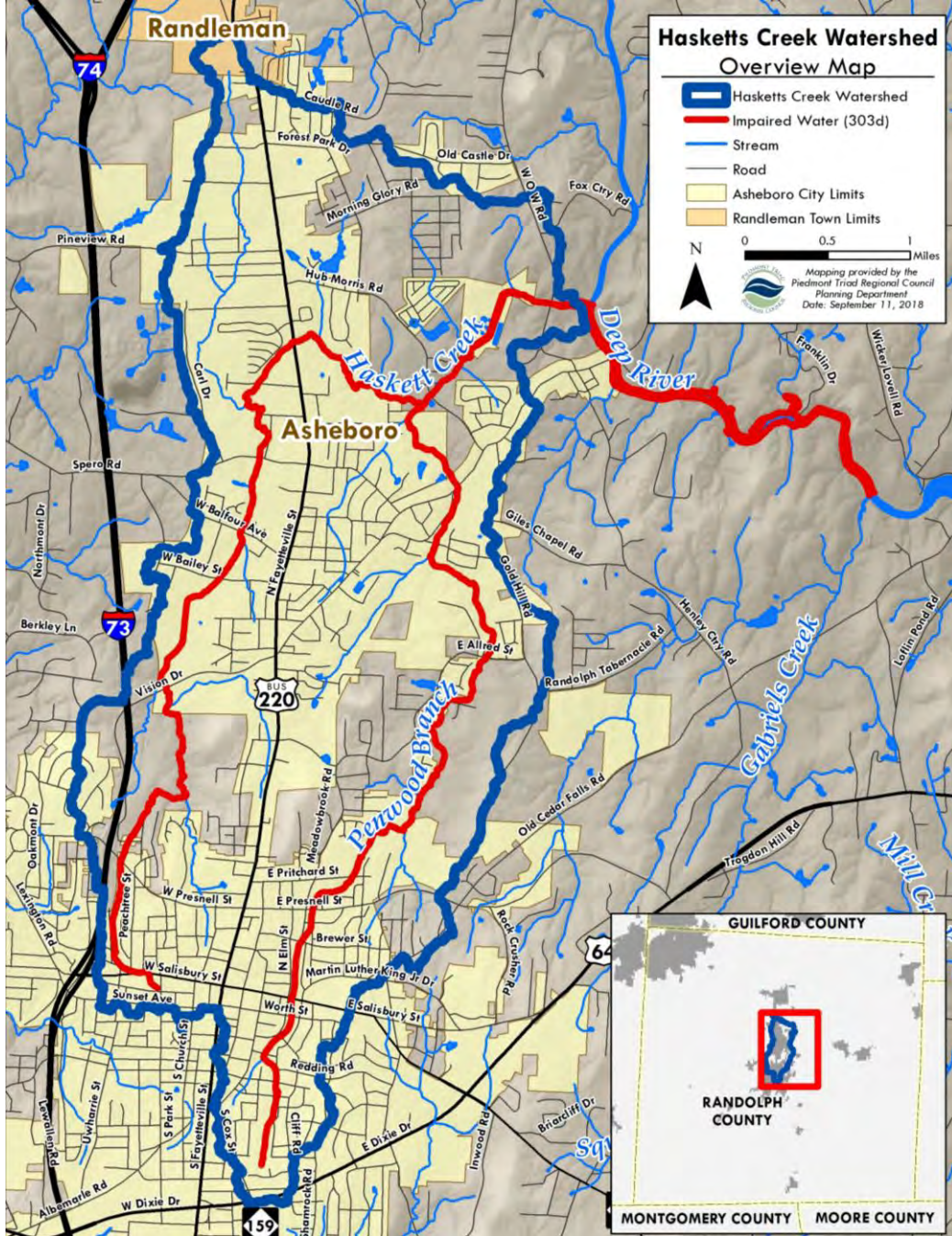




HASKETT CREEK WATERSHED PLAN

STAKEHOLDER MEETING #2





PROJECT UPDATES

- NEW Project Deadline = June 30, 2020
 - Will enable us to tie-in to Randolph County Creek Week in late March/early April
- Completed Watershed Inventory
- Began GIS Modeling to Identify Priorities





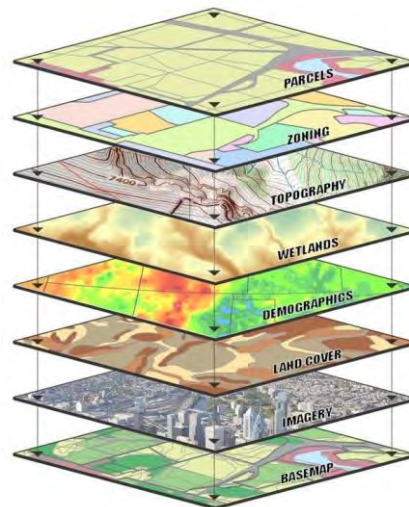
WATERSHED INVENTORY

The watershed inventory will examine potential sources of pollution and include information about natural characteristics, land uses, activities, and other factors that could influence water quality.



Desktop Analysis

- Water Quality Data
- Aerial Imagery
- GIS Analysis
- Ordinance Review



Field Work

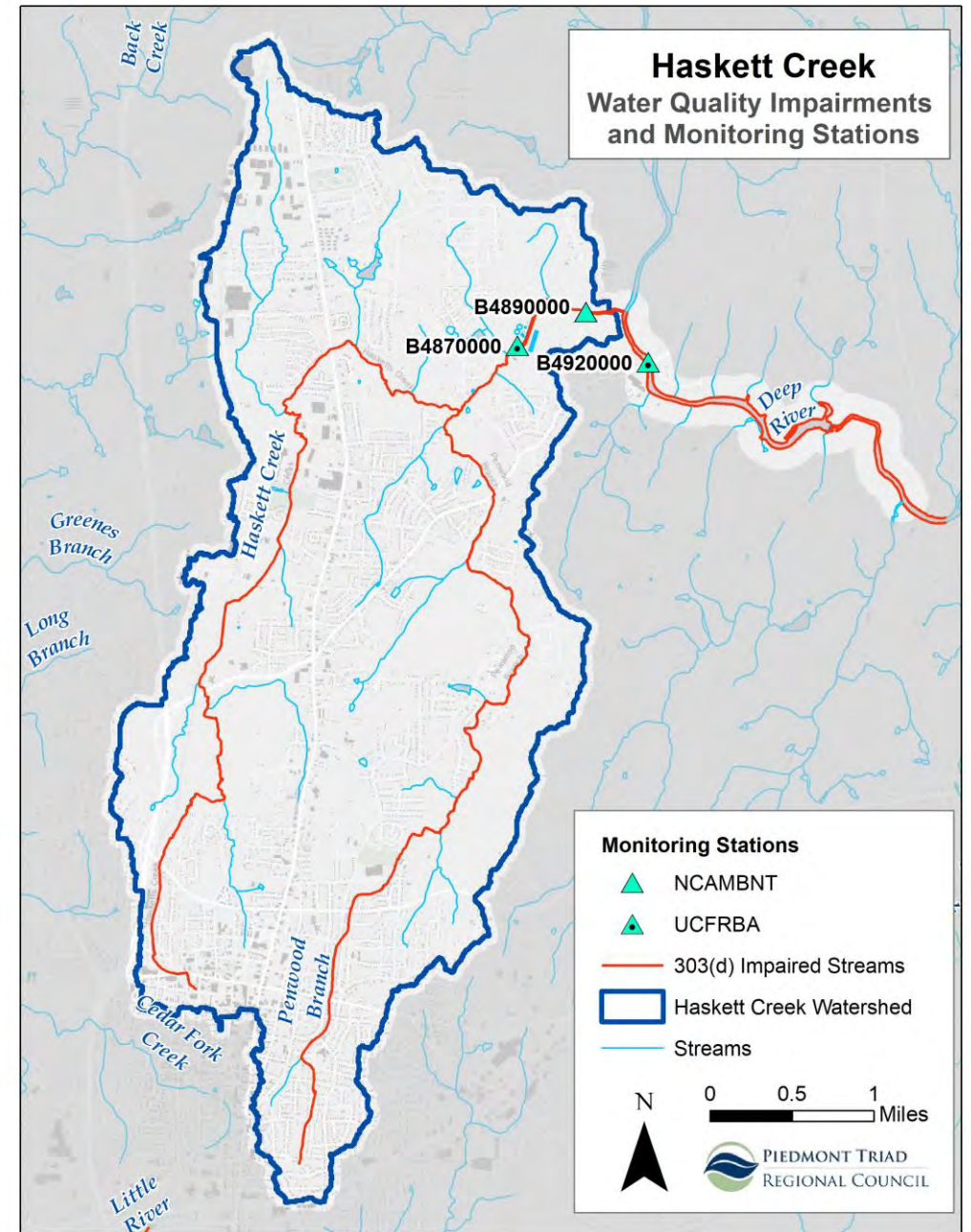
- Ground truth results
- Identify additional areas of concern/BMP opportunity areas
- NC DWR has developed series of field work applications to assist with watershed planning





WATER QUALITY IMPAIRMENTS

AU	Stream Name	Parameter	Category	Collection Year
17-12a	Haskett Creek (Source to SR 2149)	Benthos	4s	2003
17-12a	Haskett Creek (Source to SR 2149)	Fish Tissue Mercury	4t	2012
17-12-1	Penwood Branch (Source to Haskett Creek)	Benthos	5	2003
17-12-1	Penwood Branch (Source to Haskett Creek)	Fish Tissue Mercury	4t	2012
17-12b1	Haskett Creek (SR 2149 to WWTP)	Benthos	5	2003
17-12b1	Haskett Creek (SR 2149 to WWTP)	Fish Tissue Mercury	4t	2012
17-12b2	Haskett Creek (WWTP to Deep River)	Copper	5	2008
17-12b2	Haskett Creek (WWTP to Deep River)	Benthos	4s	2003
17-12b2	Haskett Creek (WWTP to Deep River)	Fish Tissue Mercury	4t	2012





BIOLOGICAL INDICATORS

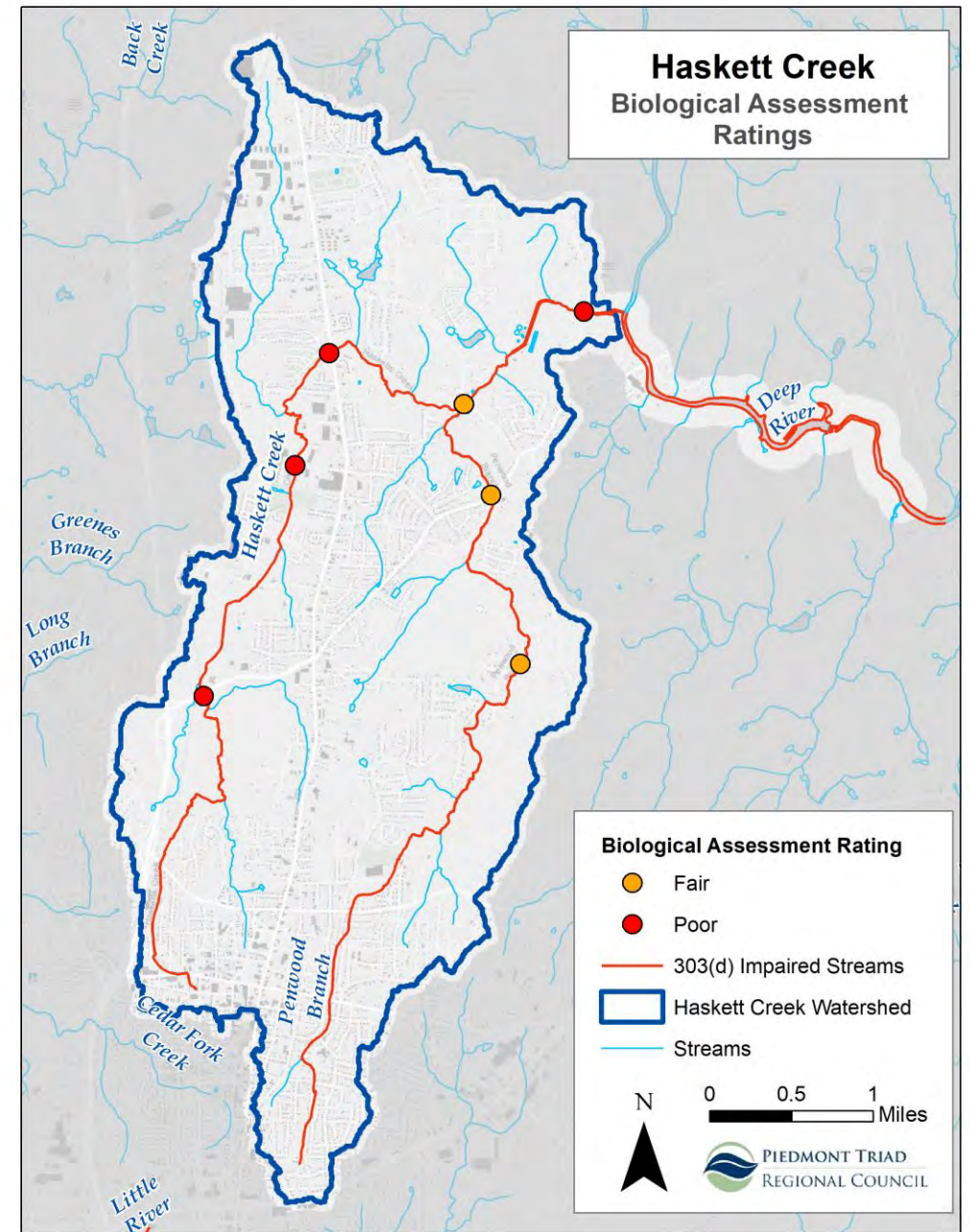
Sensitive: Good WQ



Tolerant: Fair WQ

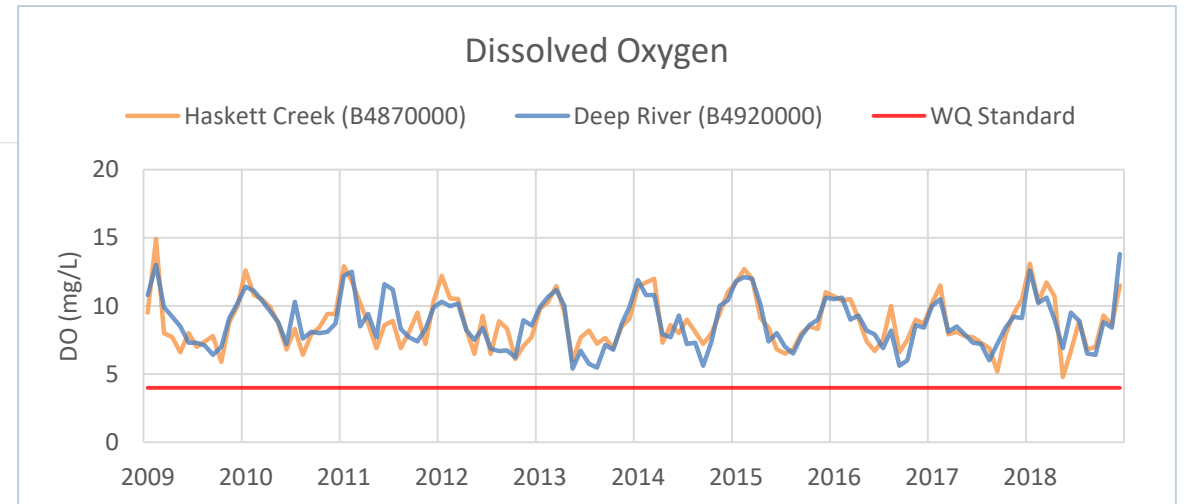
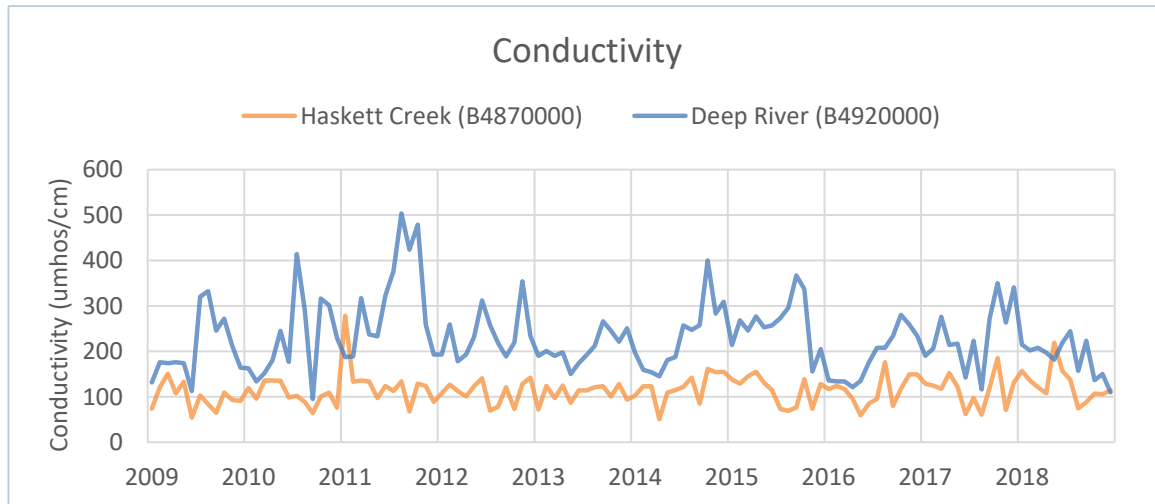
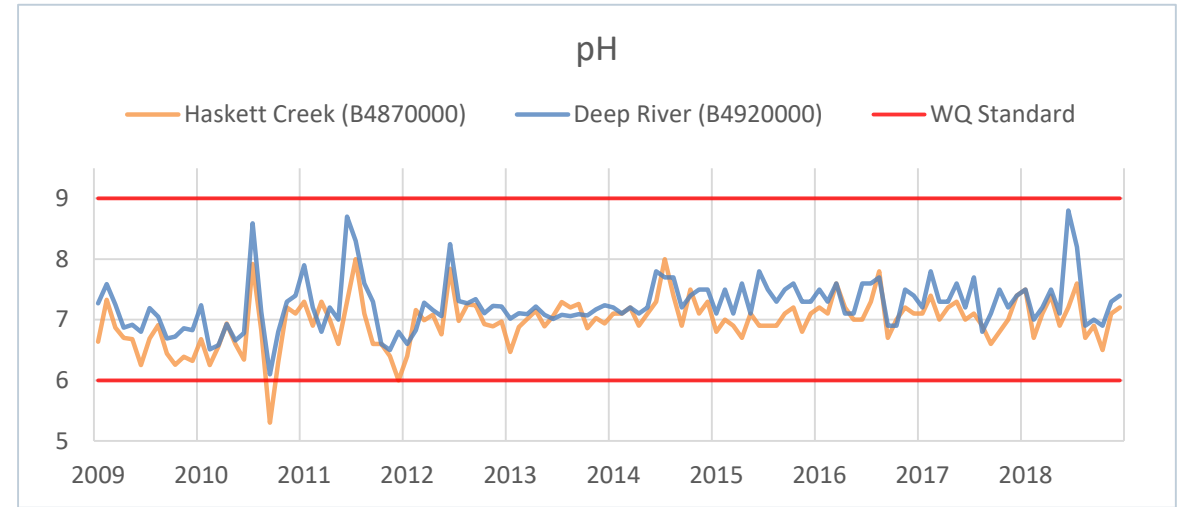
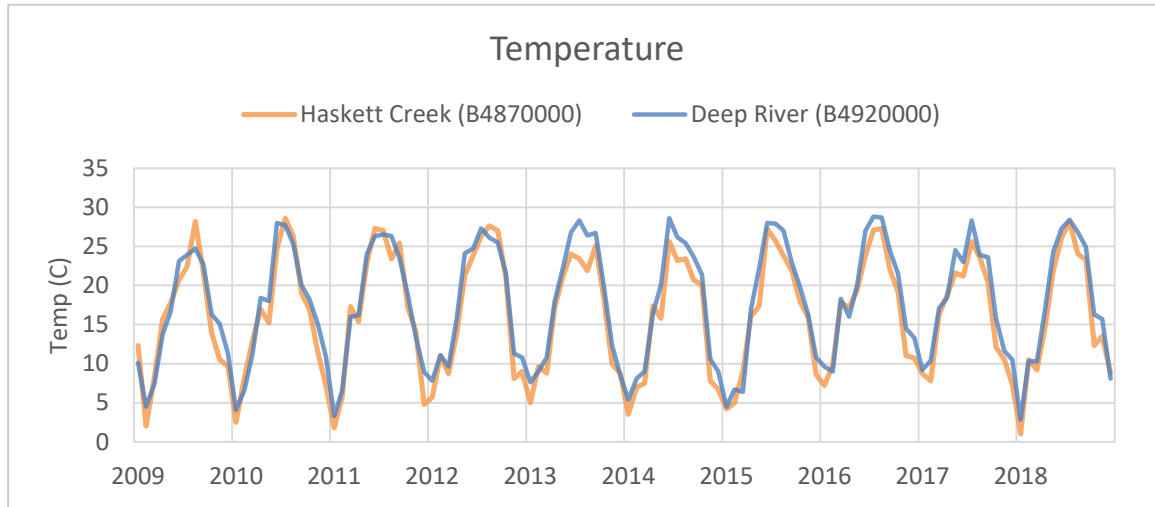


Very Tolerant: Poor WQ



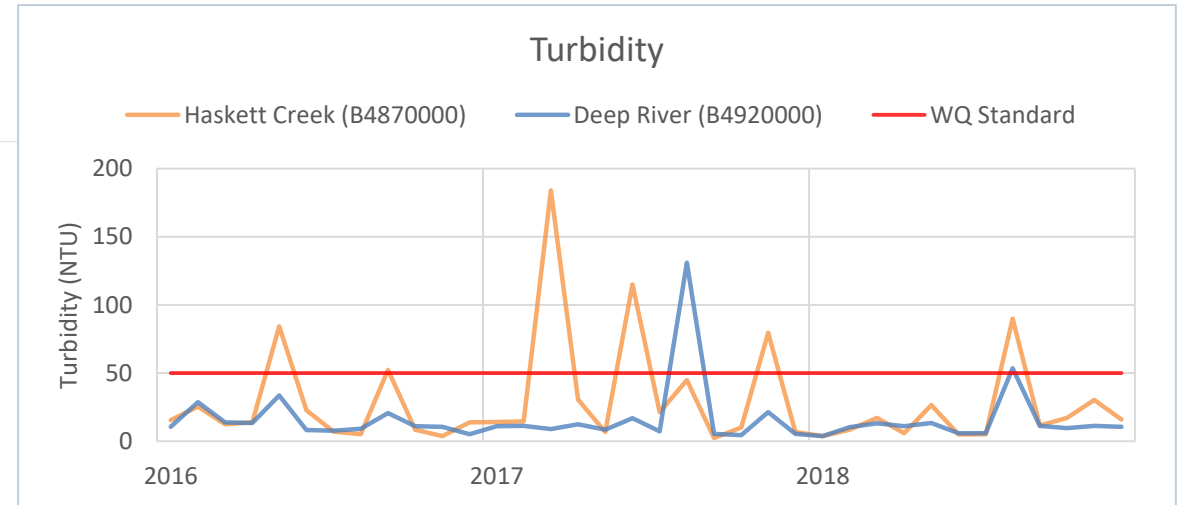
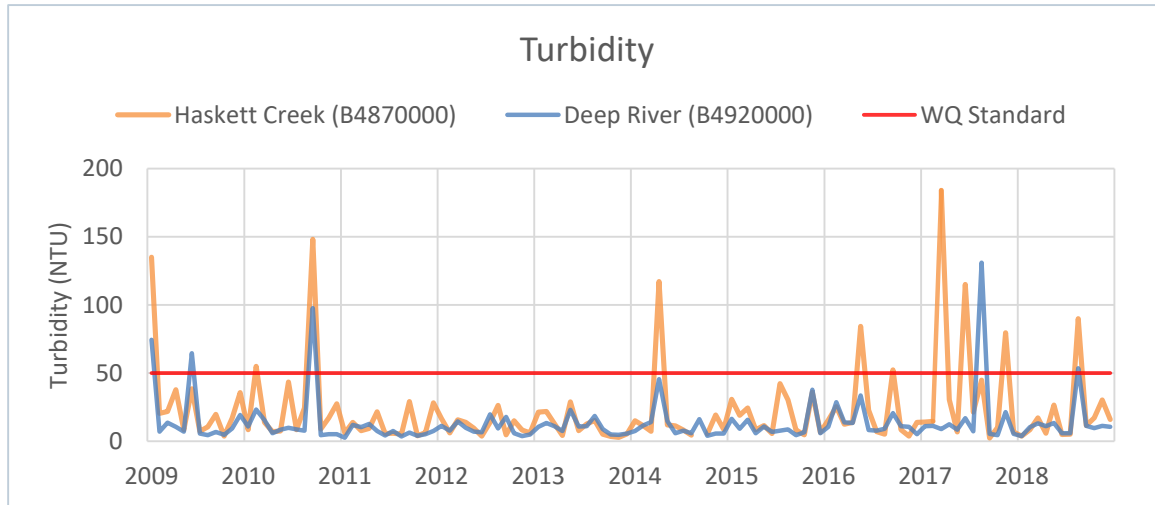
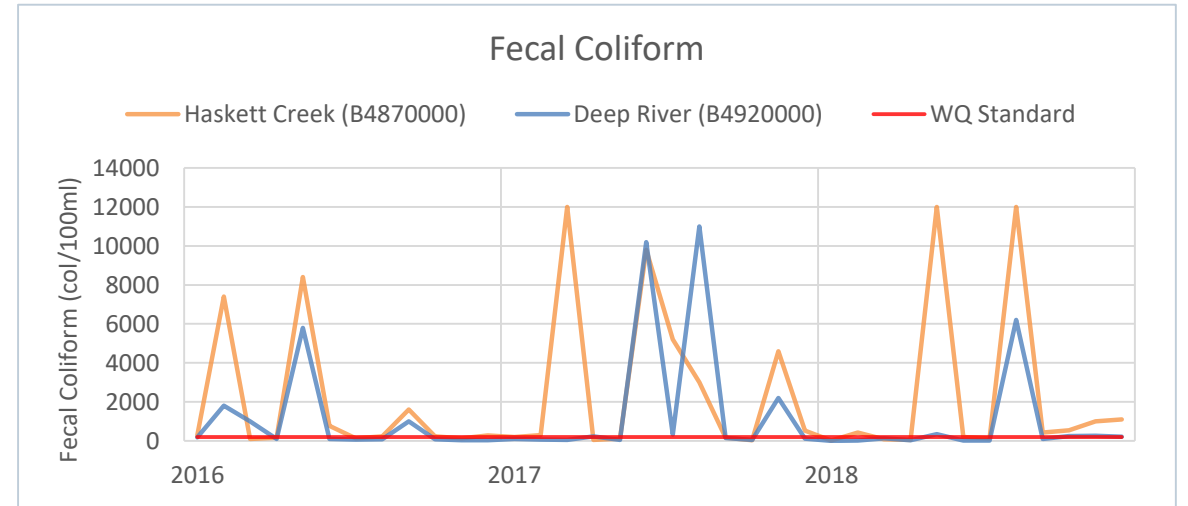
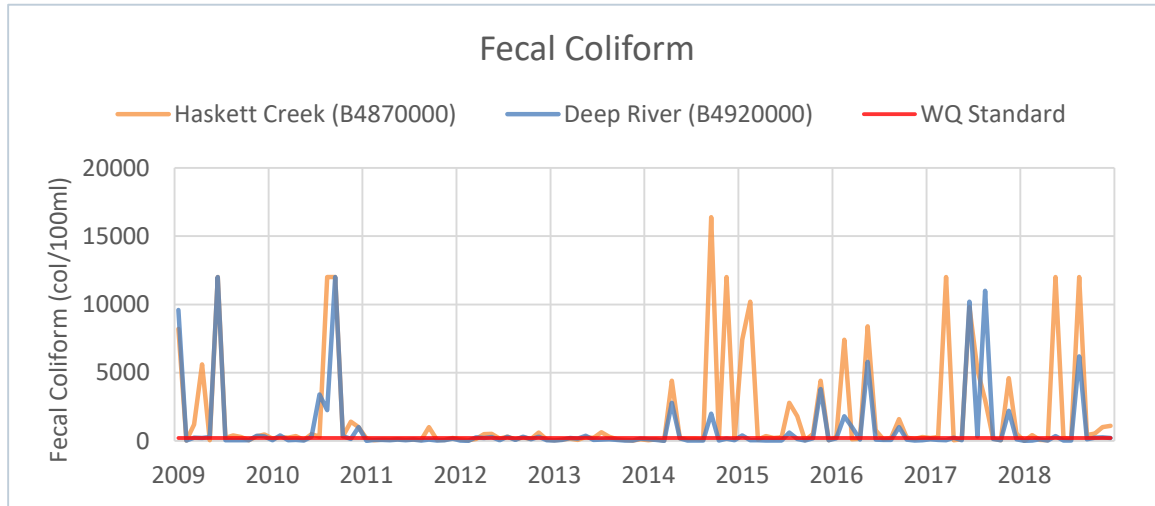


WATER QUALITY DATA



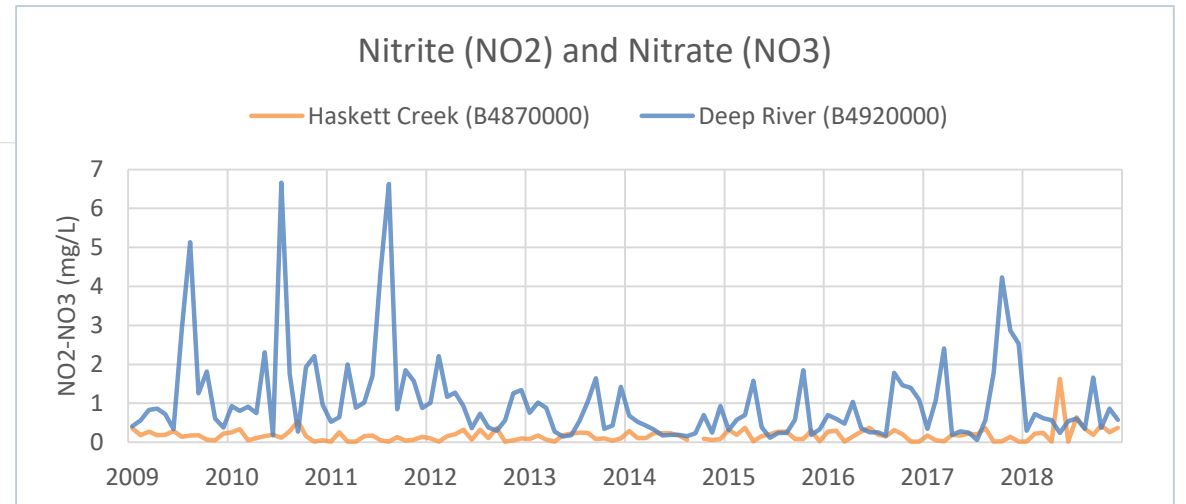
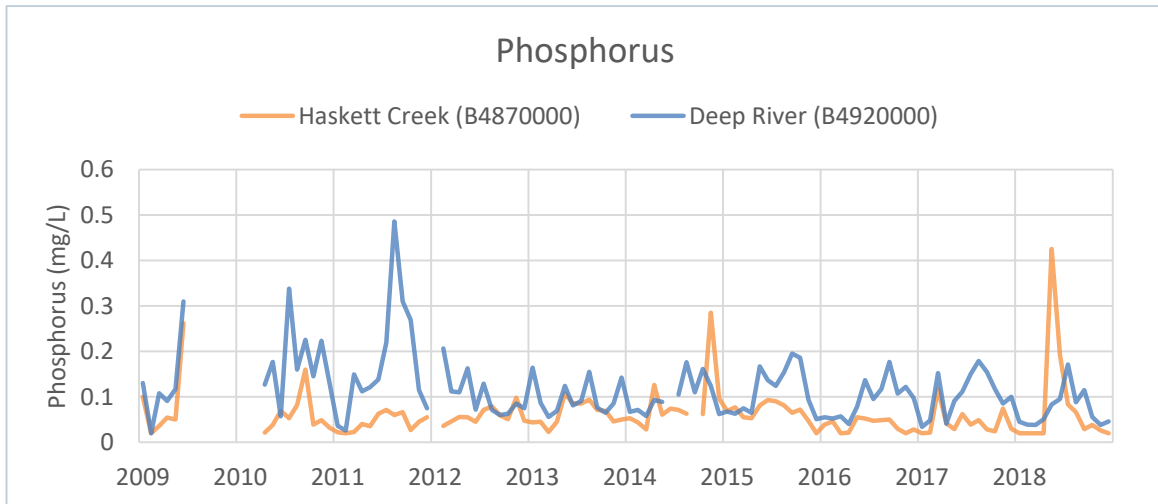
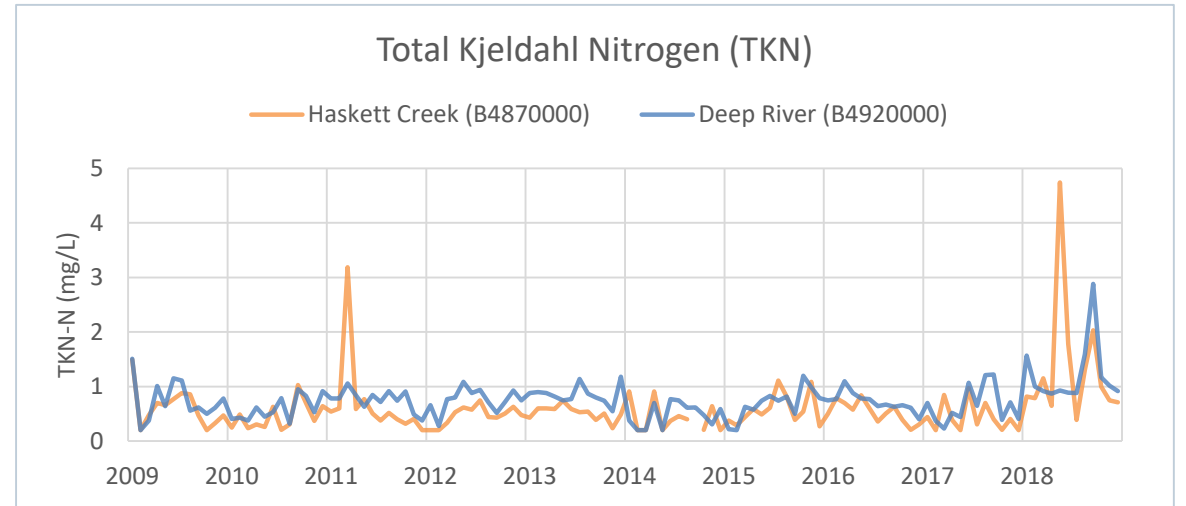
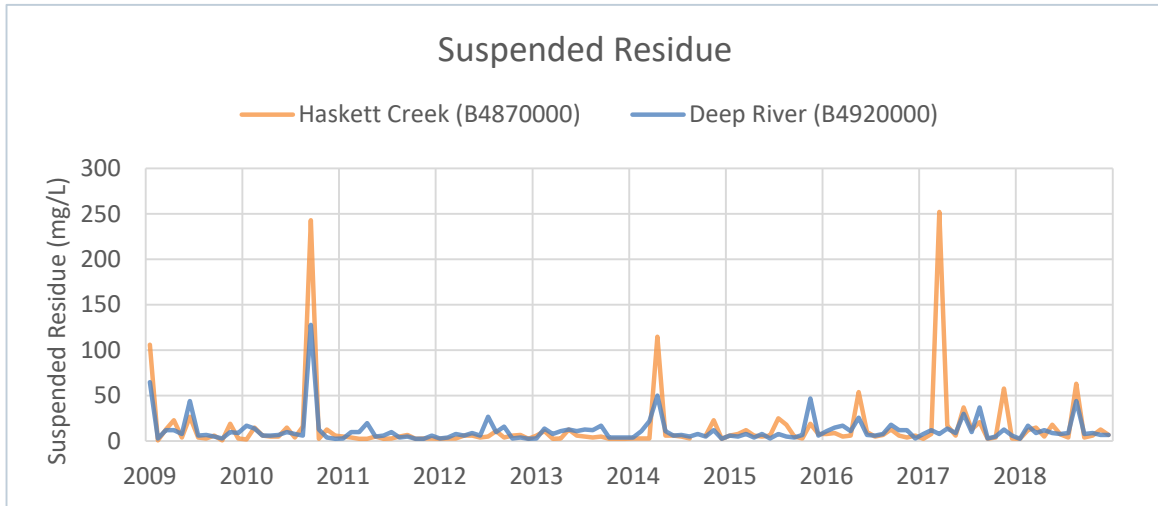


WATER QUALITY DATA





WATER QUALITY DATA





WATER QUALITY DATA

01/01/2009-12/31/2018 Summary Report

Station Id: Haskett Crk at Asheboro WWTP Bridge nr Asheboro

B4870000/UCFRBA_32

Stream Class C

Sub Basin CPF09

County Randolph

Latitude 35.7647 **Longitude** -79.7862

HUC 3030003

Parameter	Count	< DT	WQS	#Exceed	MIN	MAX	AVG	Median	Std Dev***	% of Samples	% of Exceed
Temperature(C)	132	0	32	0	1	28.6	16.08	17.1	7.52		
pH(su)	132	0	6~9	1	5.3	8	7	7	0.4	1%	2%
Diss. Oxy.(mg/L)	132	0	4	0	4.8	14.9	8.88	8.6	1.88		
Conductivity(umhos/cm)	132	0	NA	0	51	278	114.82	117.5	32.76		
Fecal Coliform(col/100ml)	132	0	400	44	9	16400	327.97*	220	3563.63	33%	76%
Lab Turbidity(NTU)	132	0	50	13	2.3	184	23.37	12.65	31.7	10%	22%
TSS(mg/L)	132	16	NA	0	1	252	15.11	6	34.78		
NH3-N(mg/L)	132	97	NA	0	0.01	3.51	0.06	0.01	0.32		
TKN-N(mg/L)	132	16	NA	0	0.1	4.74	0.59	0.51	0.54		
NO2-NO3(mg/L)	132	10	NA	0	0.01	1.63	0.18	0.17	0.17		
T. Phos.(mg/L)	122	9	NA	0	0.01	0.42	0.06	0.05	0.06		
Total	1442			58							

(* Fecal Coliform Geomean)

(** The Aluminum standard comes from the EPA's 2006 recommended water quality criteria.)

(** Copper and Zinc and Iron are considered Action Levels and not NC state water quality standards.)

(*** Standard Deviation range of values is also affected by climate and storm events and etc.)



WATER QUALITY DATA

01/01/2016-12/31/2018 Summary Report

Station Id: Haskett Crk at Asheboro WWTP Bridge nr Asheboro

B4870000/UCFRBA_32

Stream Class C

Sub Basin CPF09

County Randolph

Latitude 35.7647 **Longitude** -79.7862

HUC 3030003

Parameter	Count	< DT	WQS	#Exceed	MIN	MAX	AVG	Median	Std Dev***	% of Samples	% of Exceed
Temperature(C)	36	0	32	0	1	28.1	16.67	17.5	7.13		
pH(su)	36	0	6~9	0	6.5	7.8	7.11	7.1	0.29		
Diss. Oxy.(mg/L)	36	0	4	0	4.8	13.1	8.72	8.65	1.92		
Conductivity(umhos/cm)	36	0	NA	0	59	219	118.47	118	35.66		
Fecal Coliform(col/100ml)	36	0	400	17	9	12000	494.46*	285	3865.97	47%	74%
Lab Turbidity(NTU)	36	0	50	6	2.3	184	28.67	14.4	38.04	17%	26%
TSS(mg/L)	36	3	NA	0	1.25	252	19.73	7.35	42.71		
NH3-N(mg/L)	36	27	NA	0	0.01	3.51	0.15	0.01	0.6		
TKN-N(mg/L)	36	3	NA	0	0.1	4.74	0.76	0.61	0.8		
NO2-NO3(mg/L)	36	6	NA	0	0.01	1.63	0.23	0.2	0.28		
T. Phos.(mg/L)	36	7	NA	0	0.01	0.42	0.05	0.03	0.07		
Total	396			23							

(* Fecal Coliform Geomean)

(** The Aluminum standard comes from the EPA's 2006 recommended water quality criteria.)

(** Copper and Zinc and Iron are considered Action Levels and not NC state water quality standards.)

(*** Standard Deviation range of values is also affected by climate and storm events and etc.)



WATER QUALITY DATA

01/01/2009-12/31/2018 Summary Report

Station Id: Deep Riv at SR 2261 Old Liberty Rd nr Central Falls

B4920000/UCFRBA_35

County

Randolph

Stream Class

C

Sub Basin CPF09

Latitude

35.7635

Longitude

-79.77213

HUC

3030003

Parameter	Count	< DT	WQS	#Exceed	MIN	MAX	AVG	Median	Std Dev***	% of Samples	% of Exceed
Temperature(C)	187	0	32	0	2.8	29.9	19.6	21.5	7.35		
pH(su)	187	0	6~9	0	6.1	8.8	7.3	7.2	0.44		
Diss. Oxy.(mg/L)	187	0	4	0	5.39	13.8	8.48	8.2	1.73		
Conductivity(umhos/cm)	187	0	NA	0	78	590	235.19	218	84.34		
Fecal Coliform(col/100ml)	132	0	400	20	4	12000	120.31*	95	2246.44	15%	80%
Lab Turbidity(NTU)	132	0	50	5	2.7	131	13.38	9.05	16.7	4%	20%
TSS(mg/L)	132	7	NA	0	1.25	128	11.62	8	14.61		
NH3-N(mg/L)	132	55	NA	0	0.01	0.31	0.06	0.03	0.06		
TKN-N(mg/L)	132	3	NA	0	0.1	2.88	0.72	0.74	0.35		
NO2-NO3(mg/L)	132	0	NA	0	0.06	6.66	0.98	0.63	1.1		
T. Phos.(mg/L)	122	1	NA	0	0.01	0.49	0.11	0.1	0.07		
Total	1662			25							

(* Fecal Coliform Geomean)

(** The Aluminum standard comes from the EPA's 2006 recommended water quality criteria.)

(** Copper and Zinc and Iron are considered Action Levels and not NC state water quality standards.)

(*** Standard Deviation range of values is also affected by climate and storm events and etc.)



WATER QUALITY DATA

01/01/2016-12/31/2018 Summary Report

Station Id: Deep Riv at SR 2261 Old Liberty Rd nr Central Falls

B4920000/UCFRBA_35

County Randolph

Stream Class C

Latitude 35.7635 **Longitude** -79.7721

Sub Basin CPF09

HUC 3030003

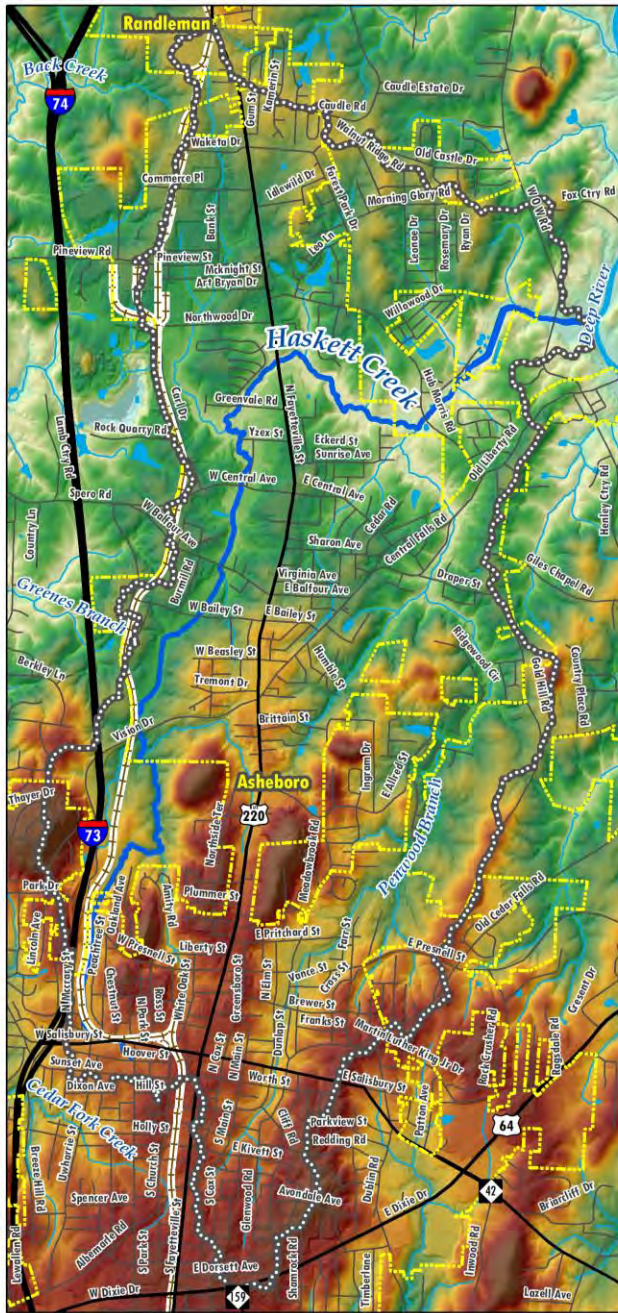
Parameter	Count	< DT	WQS	#Exceed	MIN	MAX	AVG	Median	Std Dev***	% of Samples	% of Exceed
Temperature(C)	51	0	32	0	2.8	29.9	20.3	21.8	7.07		
pH(su)	51	0	6~9	0	6.8	8.8	7.39	7.4	0.4		
Diss. Oxy.(mg/L)	51	0	4	0	5.6	13.8	8.33	8.2	1.62		
Conductivity(umhos/cm)	51	0	NA	0	110	350	202.22	208	52.28		
Fecal Coliform(col/100ml)	36	0	400	8	4	11000	174.30*	109.5	2714.87	22%	80%
Lab Turbidity(NTU)	36	0	50	2	3.7	131	16.03	10.9	21.83	6%	10%
TSS(mg/L)	36	1	NA	0	1.25	44	12.26	9	9.06		
NH3-N(mg/L)	36	14	NA	0	0.01	0.31	0.06	0.02	0.08		
TKN-N(mg/L)	36	0	NA	0	0.23	2.88	0.87	0.78	0.46		
NO2-NO3(mg/L)	36	0	NA	0	0.06	4.23	0.93	0.59	0.91		
T. Phos.(mg/L)	36	0	NA	0	0.03	0.18	0.09	0.09	0.04		
Total	456			10							

(* Fecal Coliform Geomean)

(** The Aluminum standard comes from the EPA's 2006 recommended water quality criteria.)

(** Copper and Zinc and Iron are considered Action Levels and not NC state water quality standards.)

(*** Standard Deviation range of values is also affected by climate and storm events and etc.)

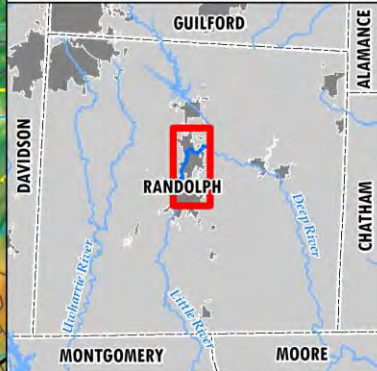


Haskett Creek ELEVATION

Elevation (Feet)

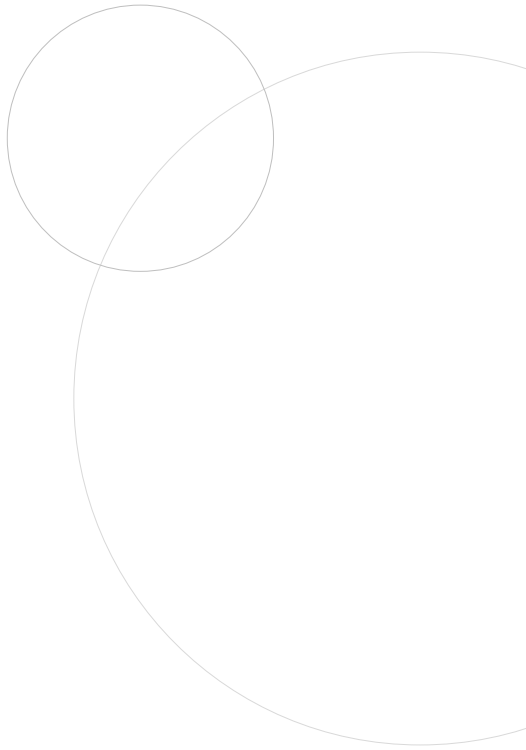


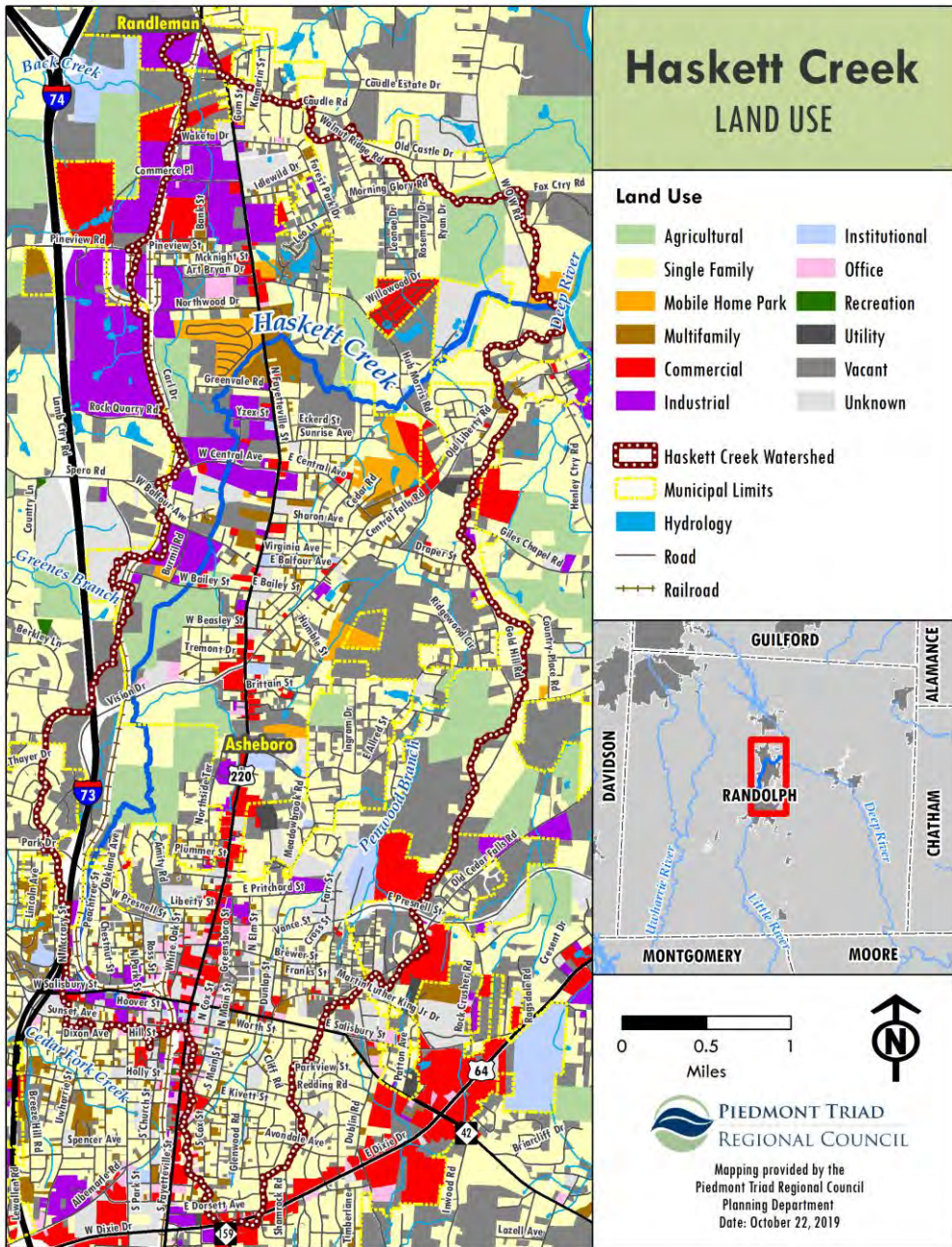
- Haskett Creek Watershed
- Municipal Limits
- Hydrology
- Road
- Railroad



**PIEDMONT TRIAD
REGIONAL COUNCIL**
Mapping provided by the
Piedmont Triad Regional Council
Planning Department
Date: October 22, 2019

ELEVATION

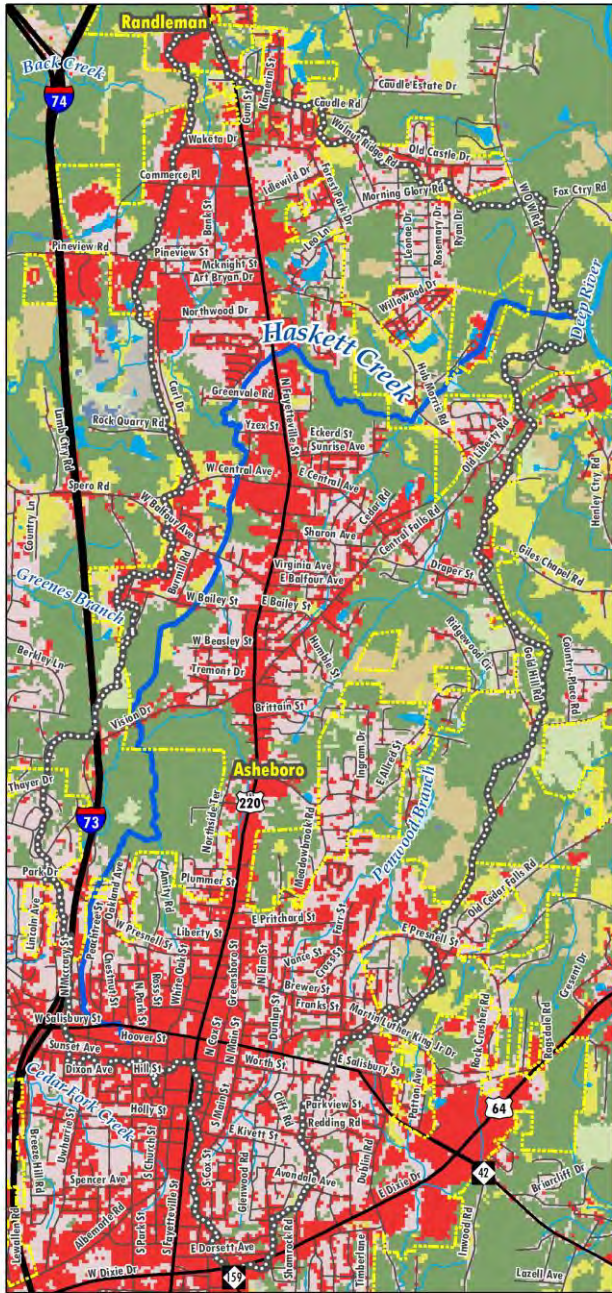




LAND USE



LAND COVER

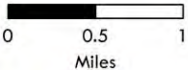


Haskett Creek LAND COVER

NLCD Land Cover (2016)

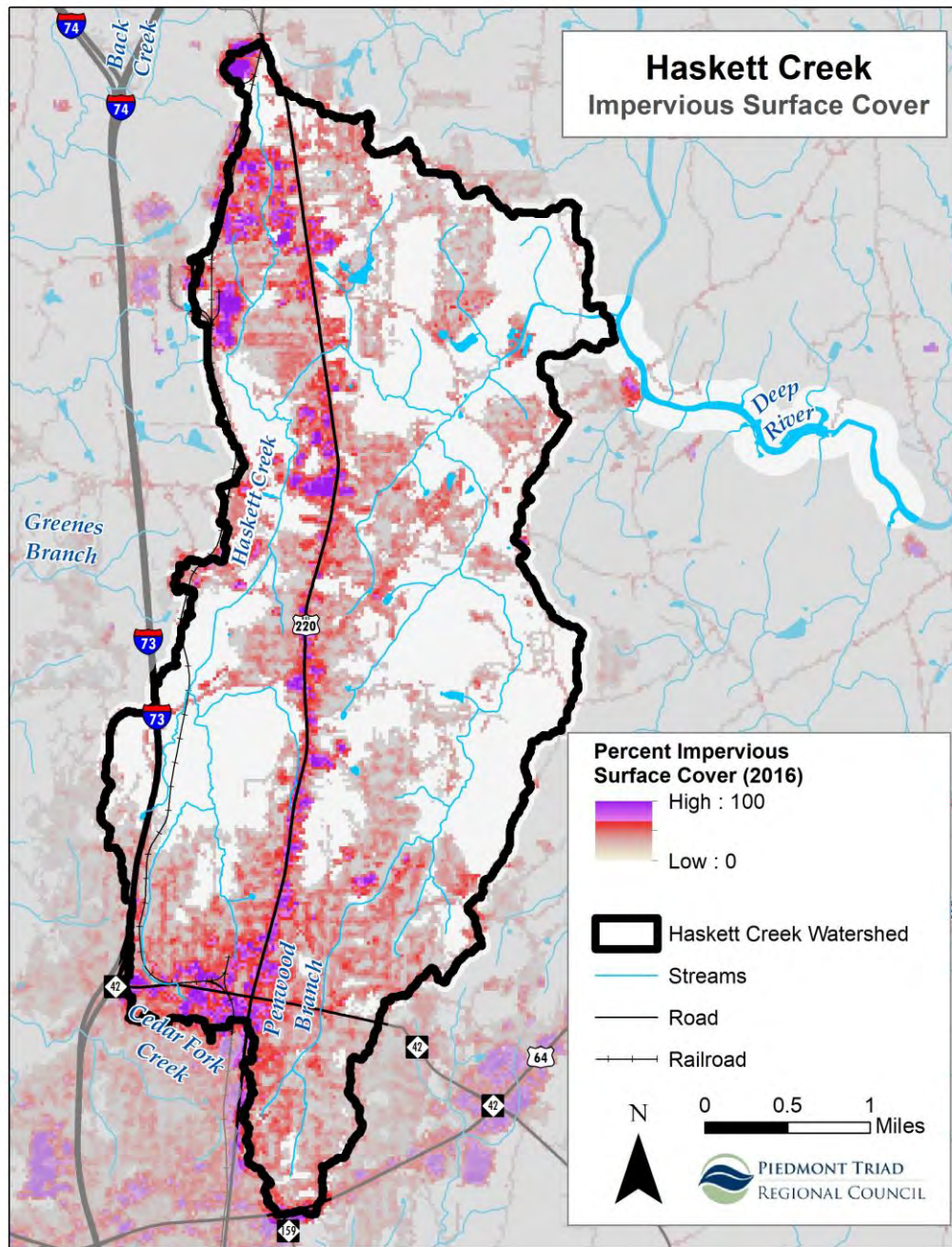
- Barren Land
- Cultivated Crops
- Forest
- Developed
- Developed, Open Space
- Wetland
- Hay/Pasture
- Herbaceous
- Open Water
- Shrub/Scrub

- Haskett Creek Watershed
- Municipal Limits
- Hydrology
- Road
- Railroad

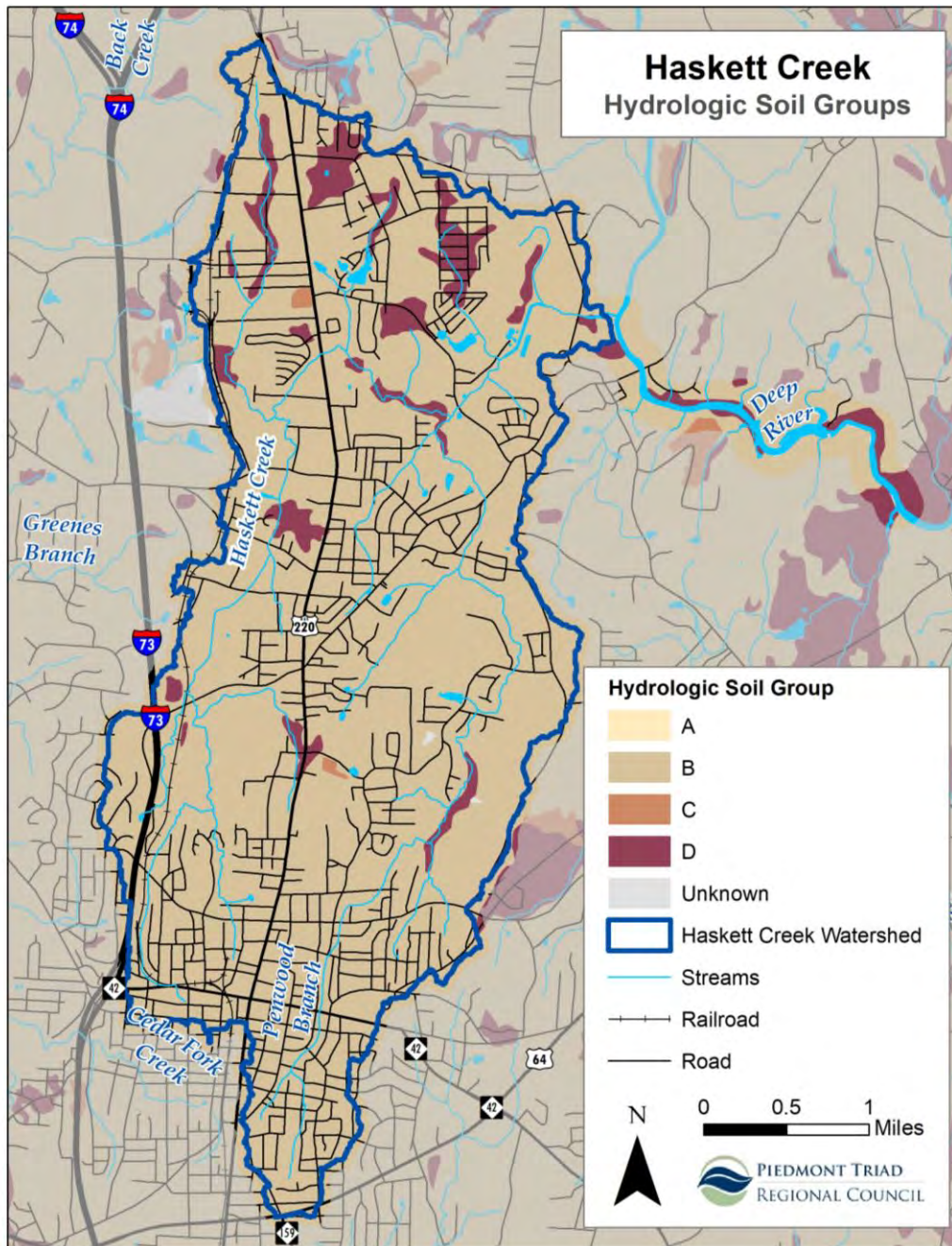


**PIEDMONT TRIAD
REGIONAL COUNCIL**

Mapping provided by the
Piedmont Triad Regional Council
Planning Department
Date: October 22, 2019



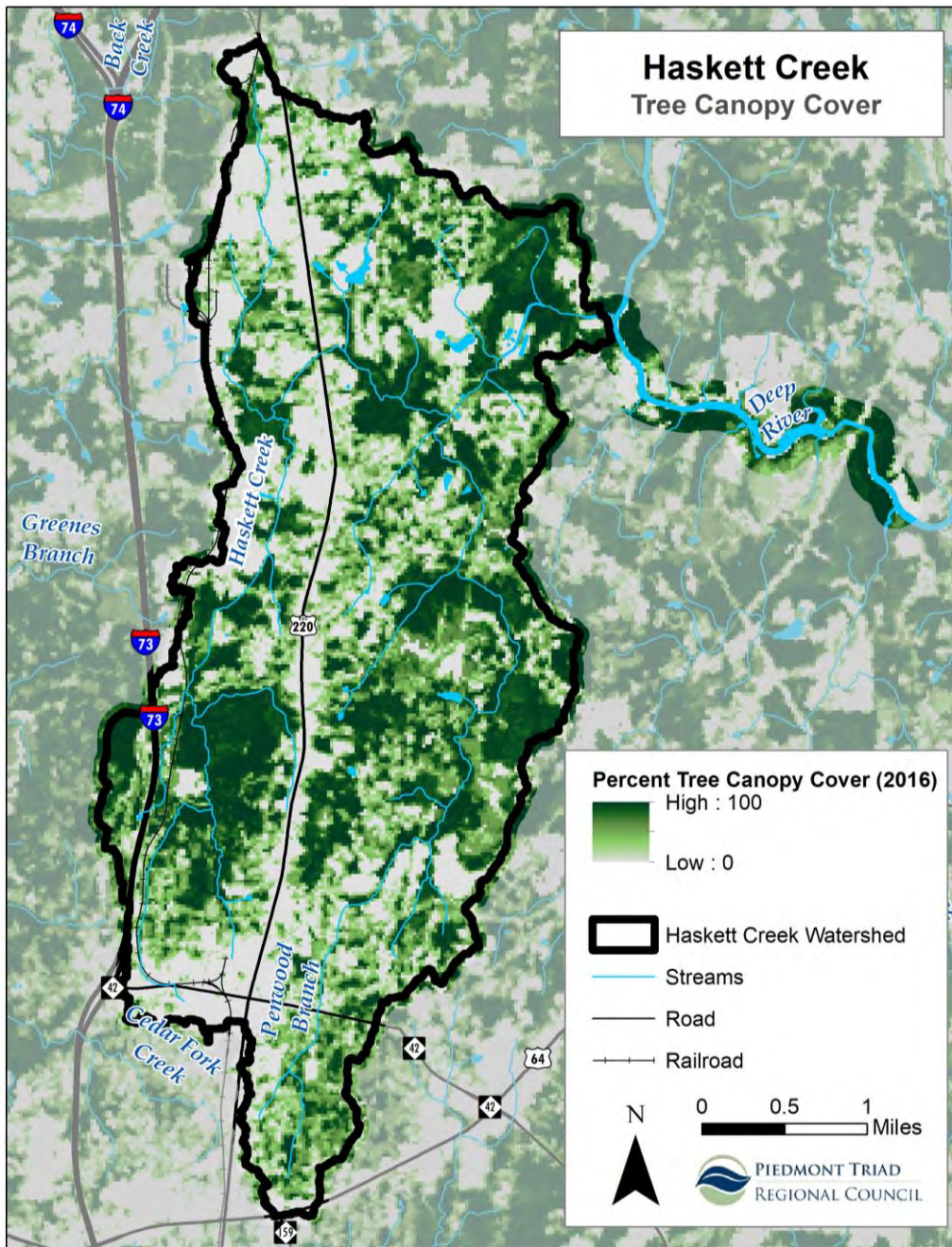
IMPERVIOUS COVER



HYDROLOGIC SOIL GROUPS

Soil Group

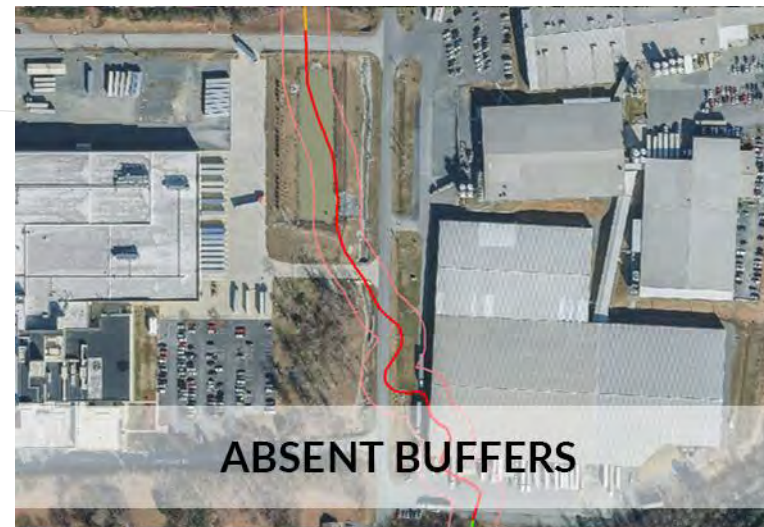
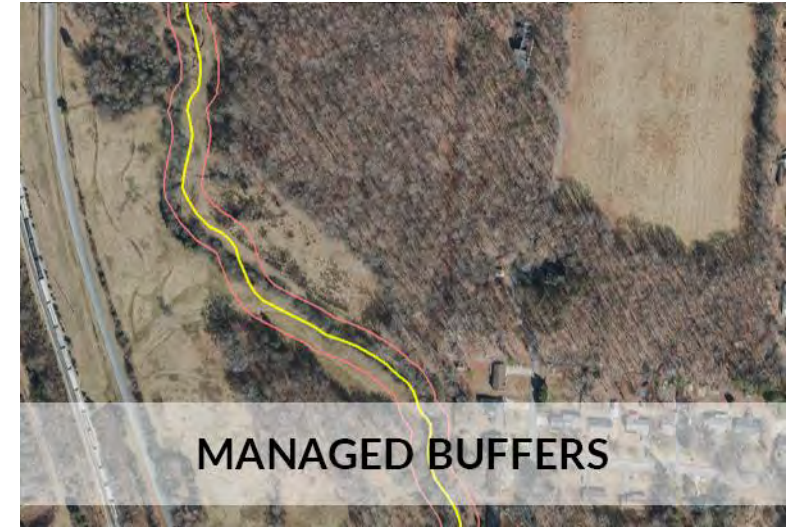
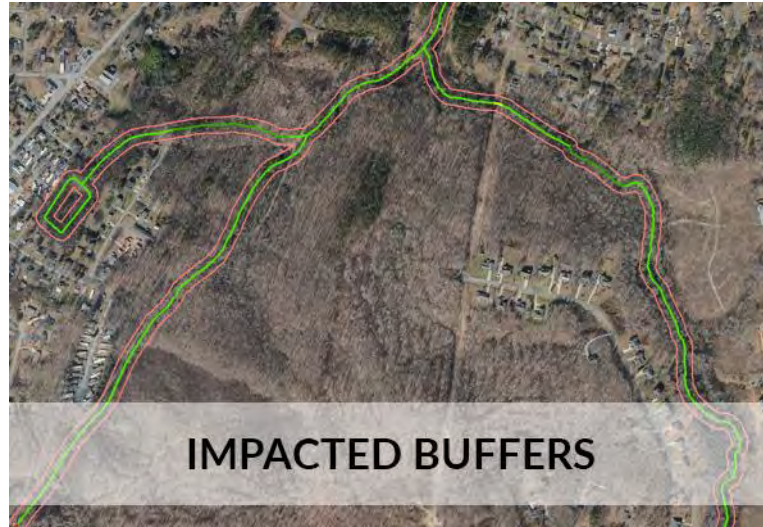
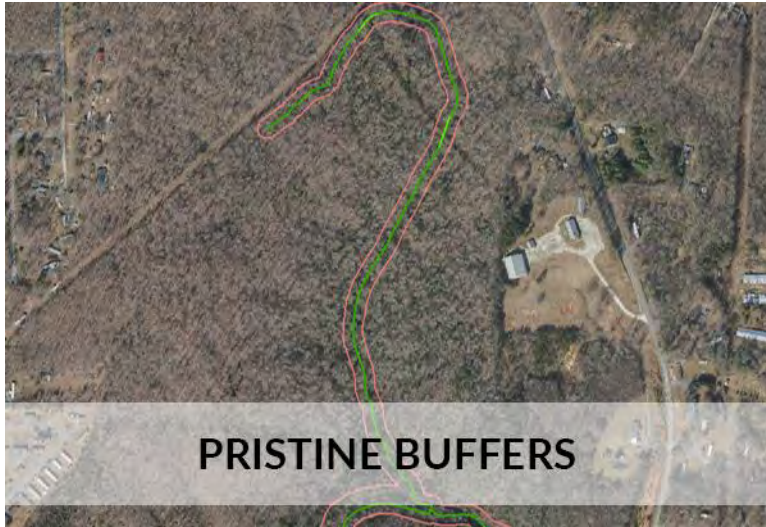
- A. Lowest Runoff Potential
- B. Moderately Low Runoff Potential
- C. Moderately High Runoff Potential
- D. Highest Runoff Potential

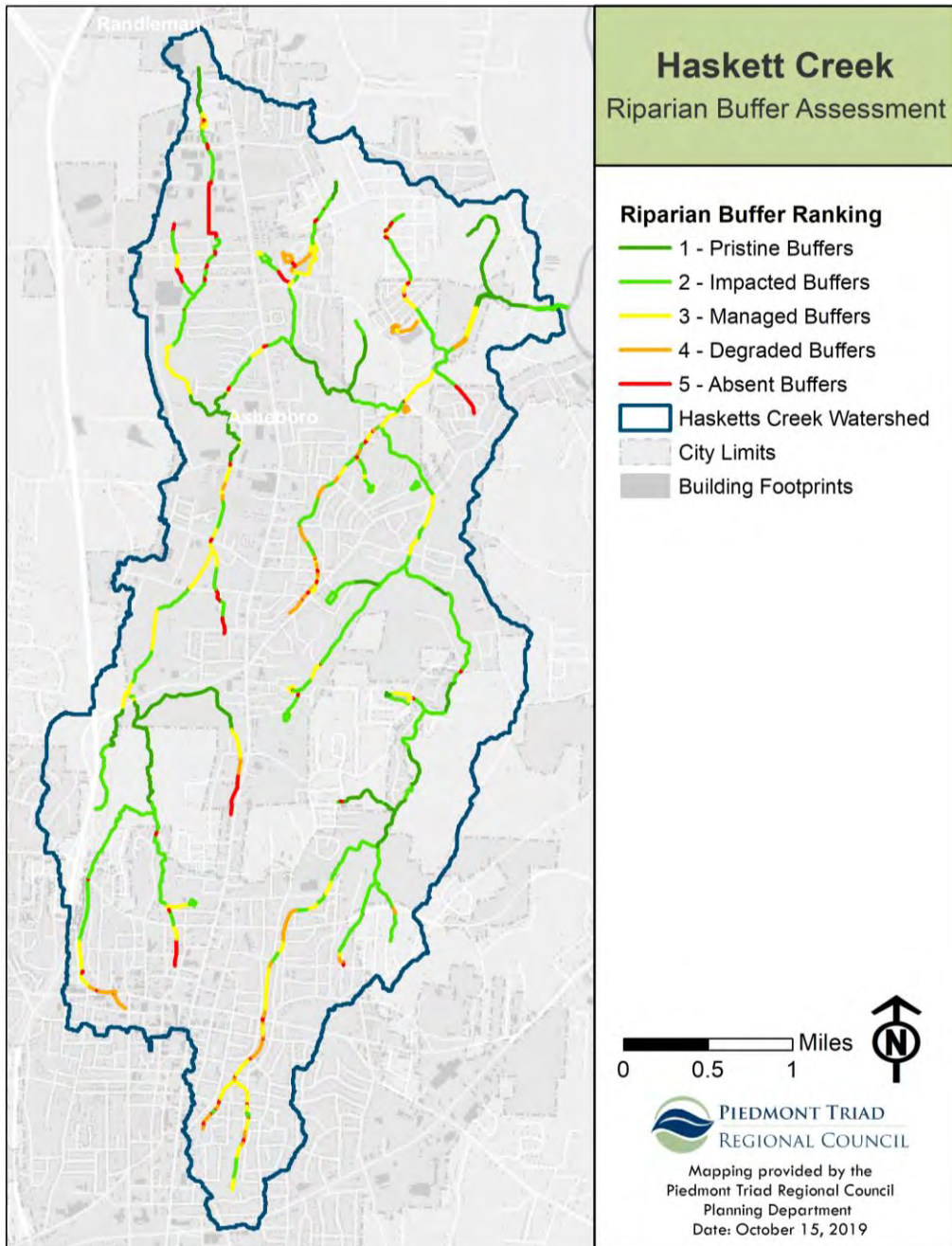


TREE CANOPY COVER



RIPARIAN BUFFER INVENTORY





RIPARIAN BUFFER INVENTORY

20% = Pristine Buffers

46% = Impacted Buffers

19% = Managed Buffers

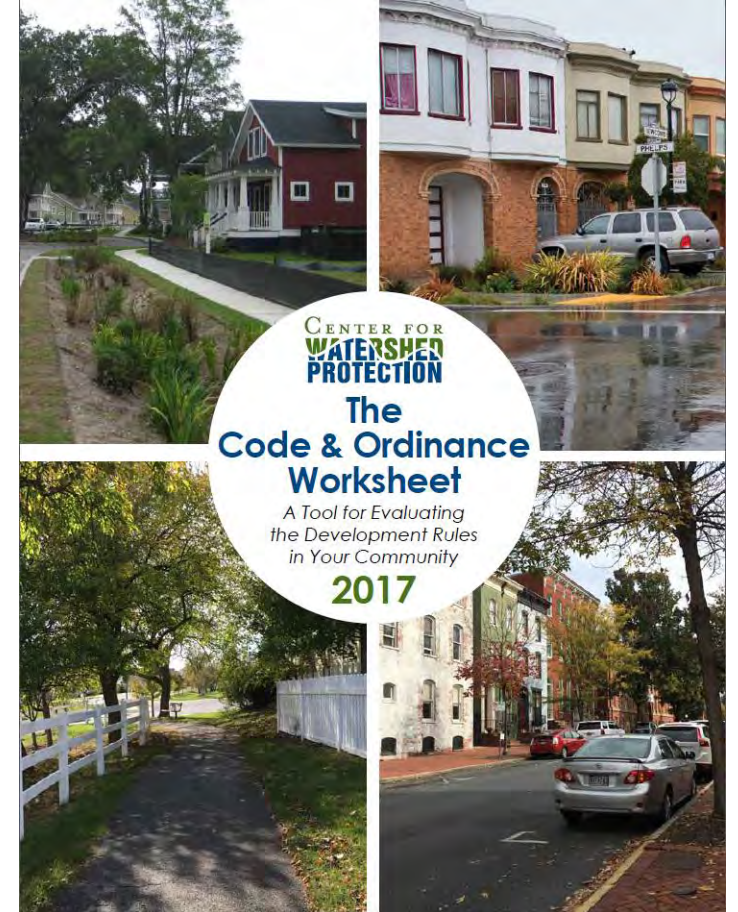
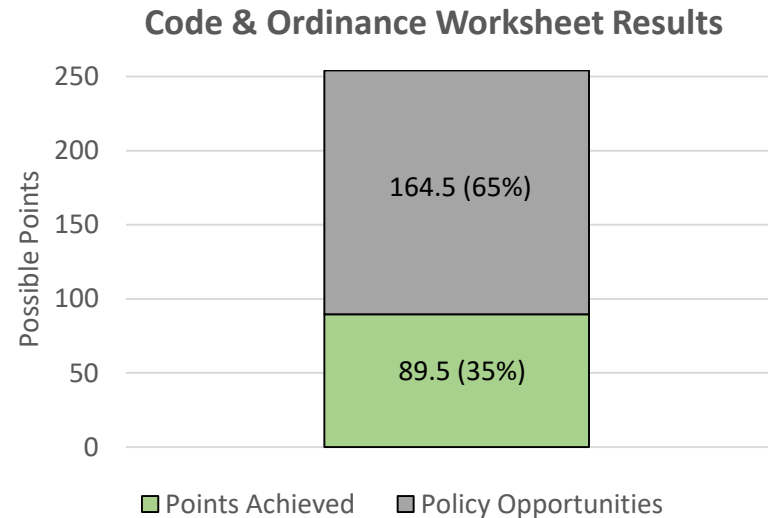
8% = Degraded Buffers

7% = Absent Buffers



CODE & ORDINANCE WORKSHEET

- Tool created by the Center for Watershed Protection to help communities evaluate how well their local development regulations protect natural resources
- Takes into account different community types: rural, suburban, urban, and highly urban.
- Questions are divided into four categories:
 1. Residential Streets and Parking Lot
 2. Lot Development
 3. Conservation of Natural Areas
 4. Runoff Reduction





CODE & ORDINANCE WORKSHEET

Residential Streets and Parking Lots



Category	Possible Points	Asheboro		Randolph County	
		Points Achieved	Percentage	Points Achieved	Percentage
Street Width	3	0	0%	0	0%
Street Length	1	1	100%	1	100%
Right-of-Way	3	2	67%	1	33%
Cul-de-Sacs	5	0.5	10%	0	0%
Vegetated Open Channels	2	1	50%	1	50%
Parking Ratios	2	0	0%	0	0%
Parking Codes	6	4	67%	0	0%
Parking Lots	5	4	80%	2	40%
Structured Parking	1	0	0%	0	0%
Parking Lot Runoff	7	5	71%	0	0%
	35	17.5	50%	5	14%

Lot Development



Open Space Design	10	5	50%	9	90%
Setbacks and Frontages	2	2	100%	2	100%
Sidewalks	5	0	0%	0	0%
Driveways	5	0	0%	2	40%
Open Space Management	9	3	33%	7	78%
Rooftop Runoff	7	1	14%	1	14%
	38	11	29%	21	55%



CAUSES AND SOURCES OF POLLUTION

Conservation of Natural Areas



		Asheboro		Randolph County	
Buffer Systems	9	5	56%	6	67%
Buffer Management	5	1	20%	2	40%
Clearing and Grading	5	1	20%	1	20%
Tree Conservation	10	3	30%	2	20%
Land Conservation Incentives	4	0	0%	4	100%
Stormwater Outfalls	5	2	40%	2	40%
	38	12	32%	17	45%

Runoff Reduction



Stormwater Codes	8	2	25%	2	25%
Installation and Maintenance of Practices	6	1	17%	1	17%
Off-Site Compliance	2	0	0%	0	0%
	16	3	19%	3	19%



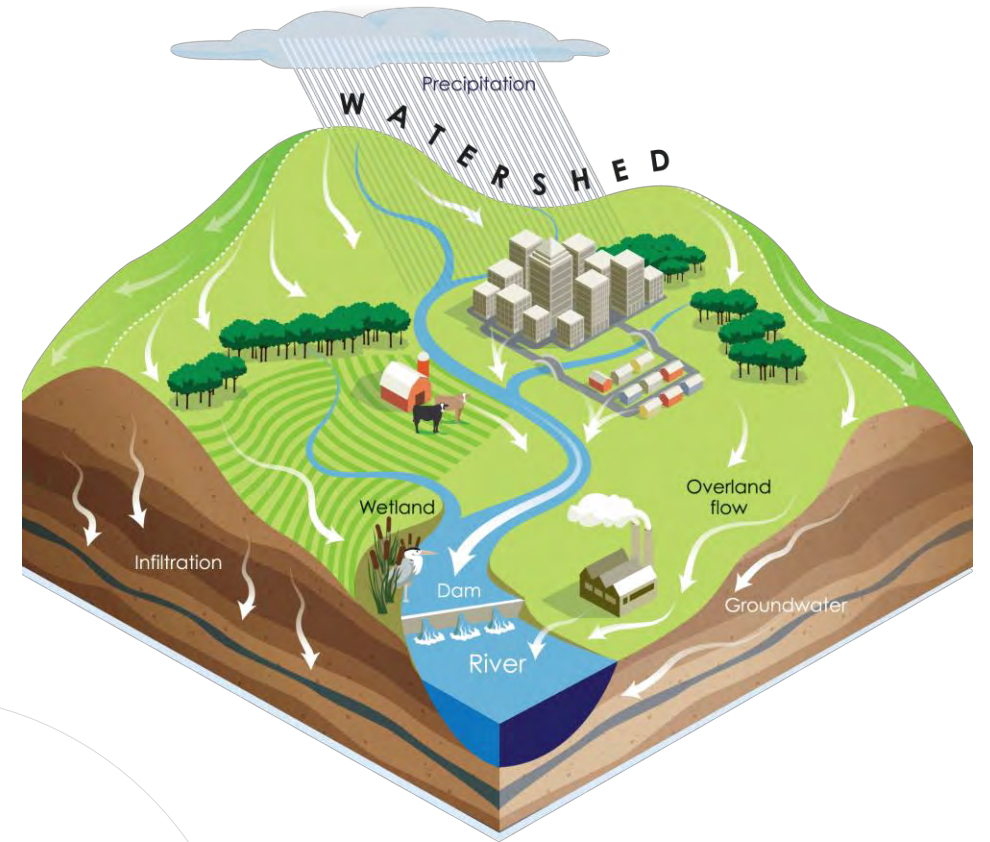
QUESTIONS & DISCUSSION





DEFINE WATERSHED GOALS

1. Based on your local knowledge and existing information about the watershed, list your **TOP 5 GOALS** to improve water quality. (I.e. What should we address **FIRST**?)
 - Share & discuss





1. Vegetated buffers,
 - increase availability of low-cost buffer plants
 - Protection of 100-foot pristine buffers through incentives/conservation design.
 - Restoration of 100-foot pristine buffers where degraded through native plantings.
2. Stream Watch & Adopt-a-Stream volunteer group
 - Citizen science tools available
3. Litter removal and prevention
 - Cigarette waste
4. Preserving open space
 - Establish cap on maximum built upon area
 - Increase access for passive recreation (no trails, but through parks, Future Center City Garden)
5. Increase Street Trees & vegetation
 - Tree management plan. Guidance for developers & residents.
6. Increase Stormwater BMPs
 - Rain gardens
 - Bioretention areas – parking and along streets (Street Treat)
 - Effective & enforced construction erosion (regional branch)
7. DOT Projects (DOT will automatically prioritize areas)



1. Increase public knowledge
 - Don't think of as habitats
 - Pesticide and fertilizer application
 - Watershed literacy, signage, stormdrain marking
 - Name unnamed streams contest
 - Schools
2. Ordinance Rule for low-impact development projects and redevelopments projects
3. Further Identification of Stormwater Sources (SCITS Tool)
 - GIS database of stormwater network
4. Reduce pet waste
5. Reduce sources of I/I
 - Aging infrastructure



STRESS MODEL

Haskett Creek Stress Layers

RANK	Criteria	Data Source	Factors	Value	Weight	Total Possible Points
1	High Impervious Surface Cover	NLCD 2016 Percent Developed Imperviousness	25% +	2	4	8
			10-24%	1		
2	Stream Buffer Analysis (100-Foot Buffer)	PTRC	5 - Absent	2	4	8
			4 - Degraded	1		
3	Large Parcel Size	County Data (Dissolved by owner name)	> 20 Acres	3	2	6
			10-19 Acres	2		
			5-9 Acres	1		
4	High Soil Erodibility	SSURGO (K factor)	0.40 - 0.49	2	3	6
			0.24 - 0.39	1		
5	Hydric Soils	SSURGO	All Hydric	2	3	6
			Partially Hydric	1		
6	Low Canopy Cover	NLCD 2016 Percent Canopy	< 50%	1	5.5	5.5
7	High Density of Impact Sites	NC DWQ (SWAP PCS)	High (3-6 per quarter square mile)	2	2.25	4.5
			Low (1-2 per quarter square mile)	1		
8	High Population Density (Persons Per Acre)	Census Bureau, 2010	High (3.0+)	3	1	3
			Med (1.0-2.9)	2		
			Low (0.1-0.9)	1		
9	Steep Slope	USGS NED (1 arc second)	> 15%	1	3	3
10	Publically Owned Lands	Tax Parcels	Public Parcel	2	1.3	2.6
11	High Impact Zoning	County Zoning Layer	Commercial, Industrial	2	1.2	2.4
			Institutional, Office, Multifamily	1		
12	Streams & Wetlands	NCDENR CPT	1 to 4 - CPT (Wetlands and streams)	1	1	1
13	Floodplain	NC Floodplain Mapping Program	Within 500 Year Floodplain	1	1	1

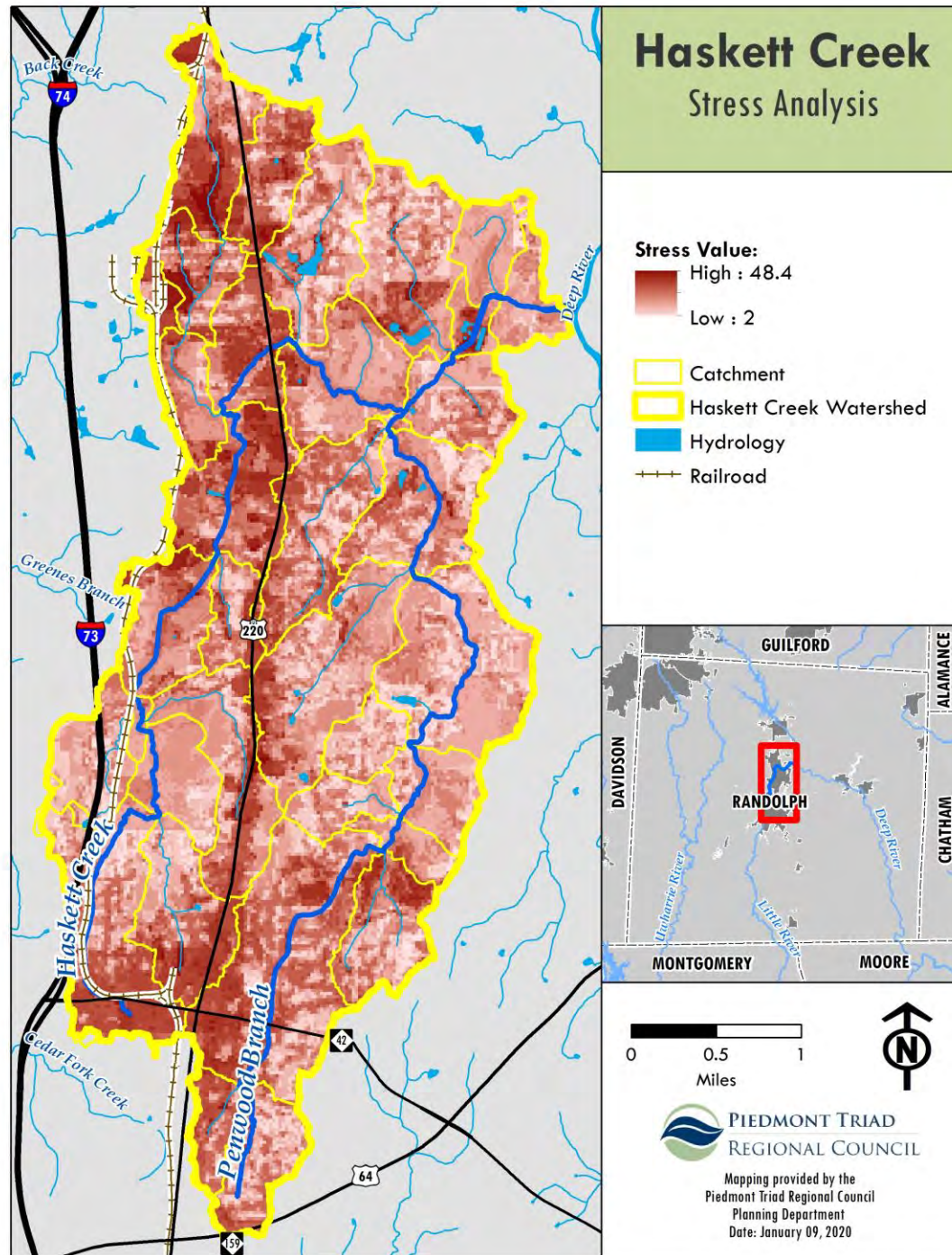
Total Possible Points

24

57

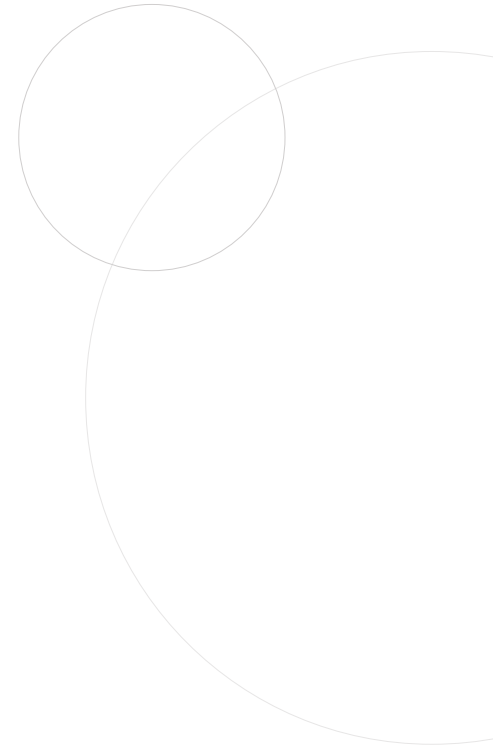
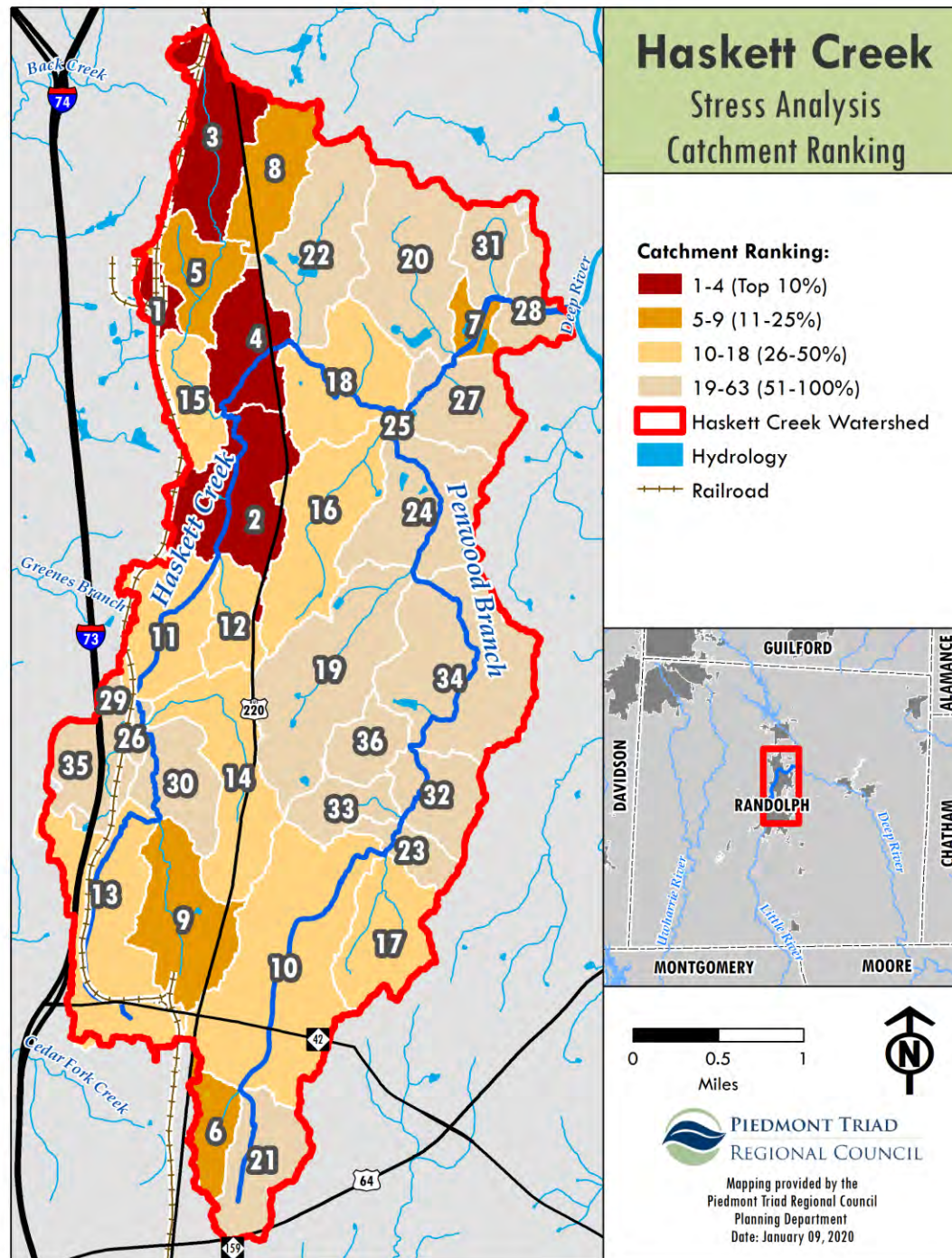


STRESS MODEL





STRESS MODEL





BEST MANAGEMENT PRACTICES

- A successful watershed management strategy will require a multi-pronged approach:
 - Projects
 - Programs
 - Policies
- Will need list of specific projects for 319 funding
- Wide-range of best management practices that can be implemented at multiple levels





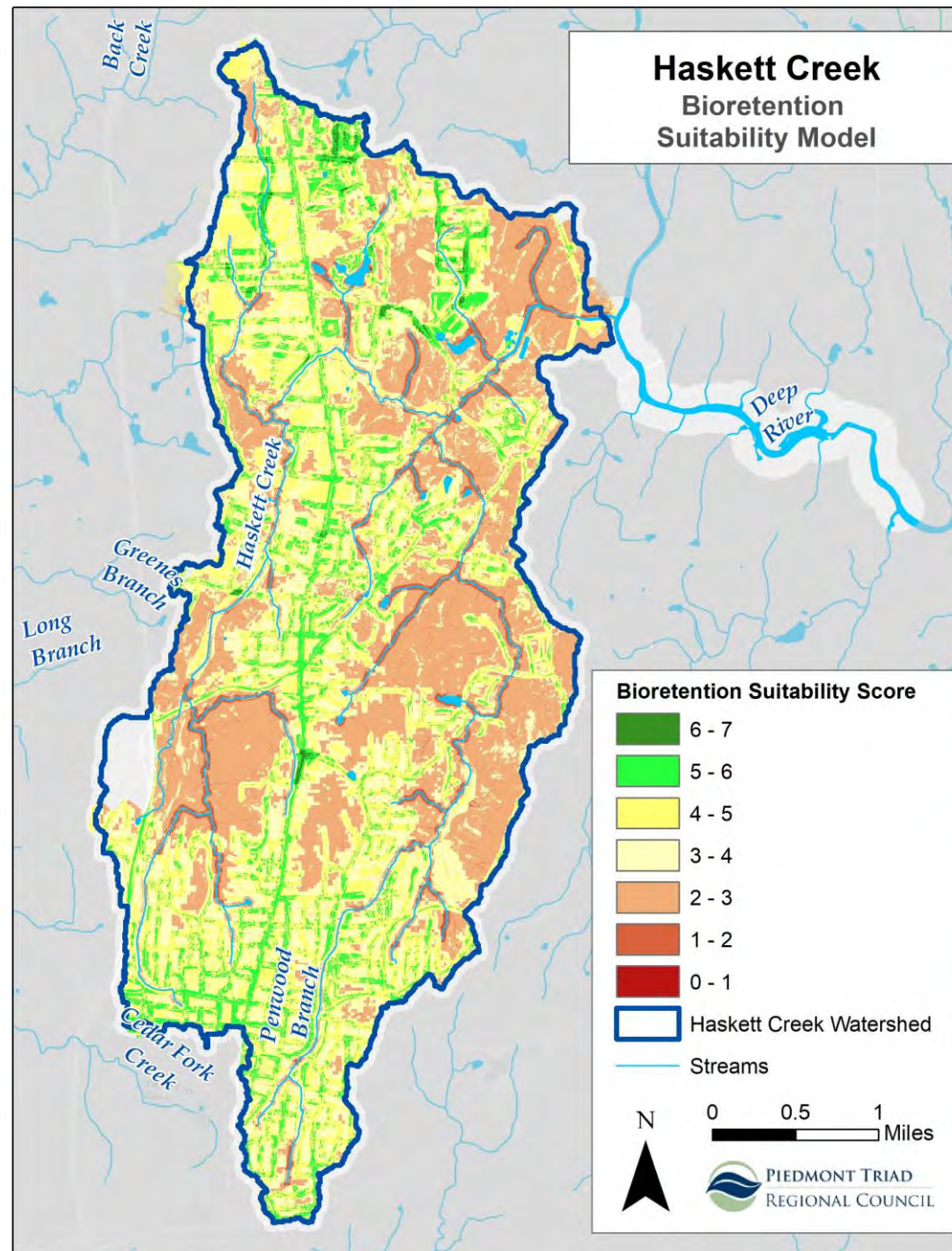
BMP SUITABILITY MODEL

- Based off of US EPA's System for Urban Stormwater Treatment and Integration (SUSTAIN) tool.
- Identifies areas that are most suitable for stormwater BMPs

BMP type	Drainage area (acre)	Drainage slope (%)	Impervious (%)	Hydrologic soil group	Water table depth (ft)	Road buffer (ft)	Stream buffer (ft)	Building buffer (ft)
Bioretention	< 2	< 5%	> 0%	A-D	> 2	< 100	> 100	--
Cistern	--	--	--	--	--	--	--	< 30
Constructed Wetland	> 25	< 15%	> 0%	A-D	> 4	--	> 100	--
Dry Pond	> 10	< 15%	> 0%	A-D	> 4	--	> 100	--
Grassed Swale	< 5	< 4%	> 0%	A-D	> 2	< 100	--	--
Green Roof	--	--	--	--	--	--	--	--
Infiltration Basin	< 10	< 15%	> 0%	A-B	> 4	--	> 100	--
Infiltration Trench	< 5	< 15%	> 0%	A-B	> 4	--	> 100	--
Porous Pavement	< 3	< 1%	> 0%	A-B	> 2	--	--	--
Rain Barrel	--	--	--	--	--	--	--	< 30
Sand Filter (non-surface)	< 2	< 10%	> 0%	A-D	> 2	--	> 100	--
Sand Filter (surface)	< 10	< 10%	> 0%	A-D	> 2	--	> 100	--
Vegetated Filterstrip	--	< 10%	> 0%	A-D	> 2	< 100	--	--
Wet Pond	> 25	< 15%	> 0%	A-D	> 4	--	> 100	--

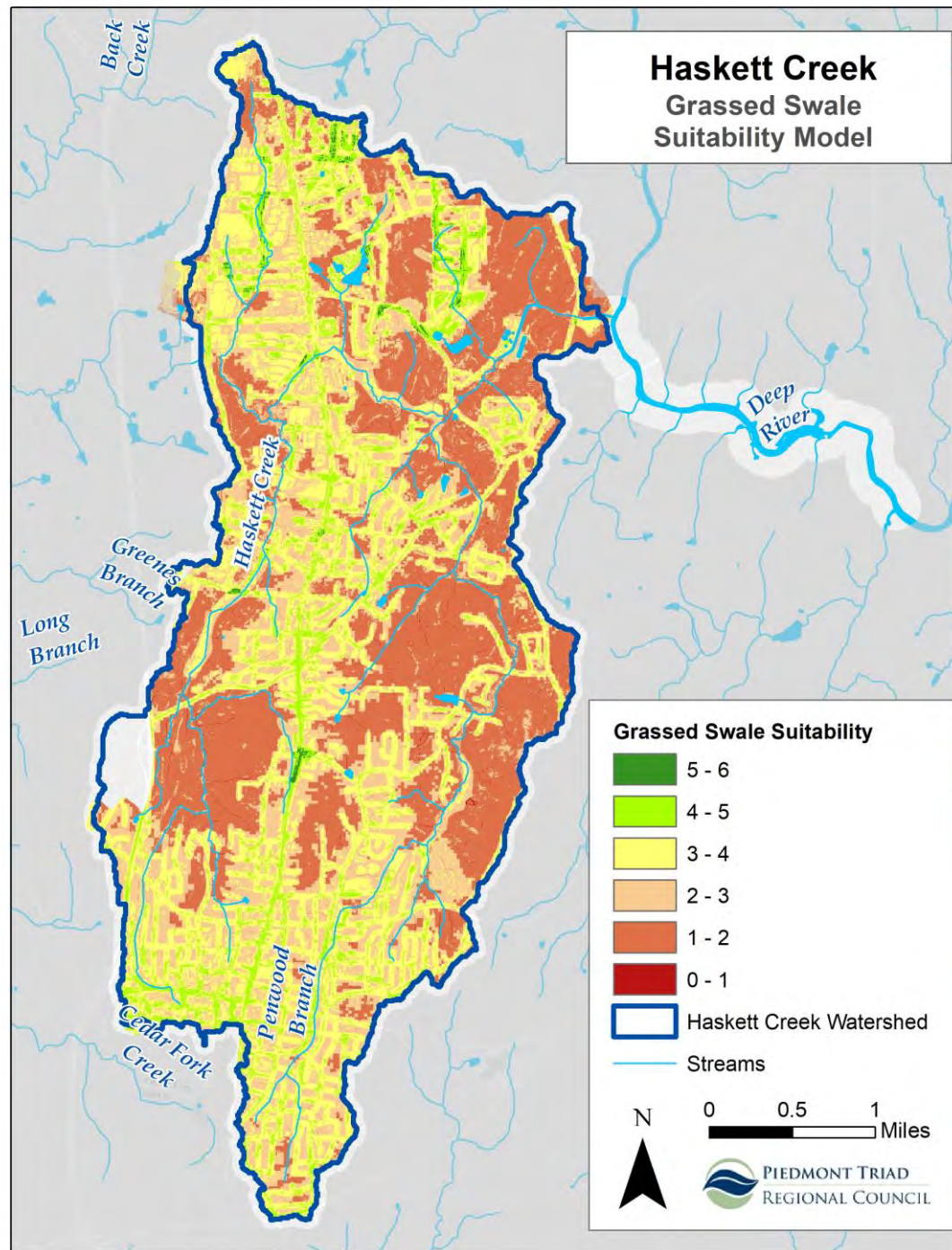


BIORETENTION



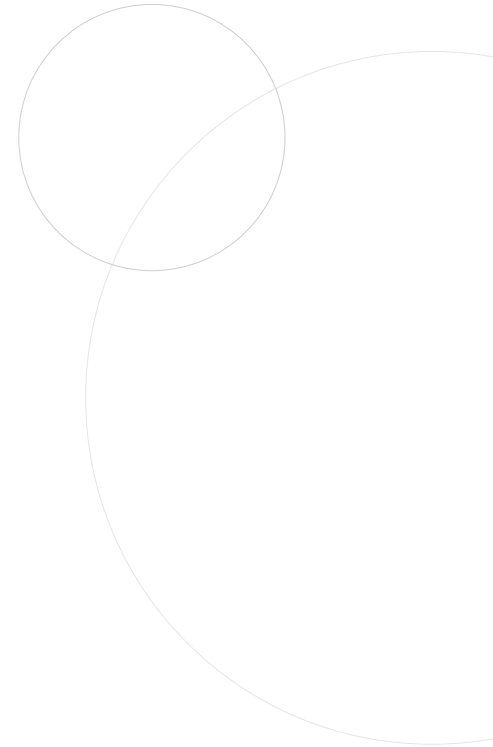
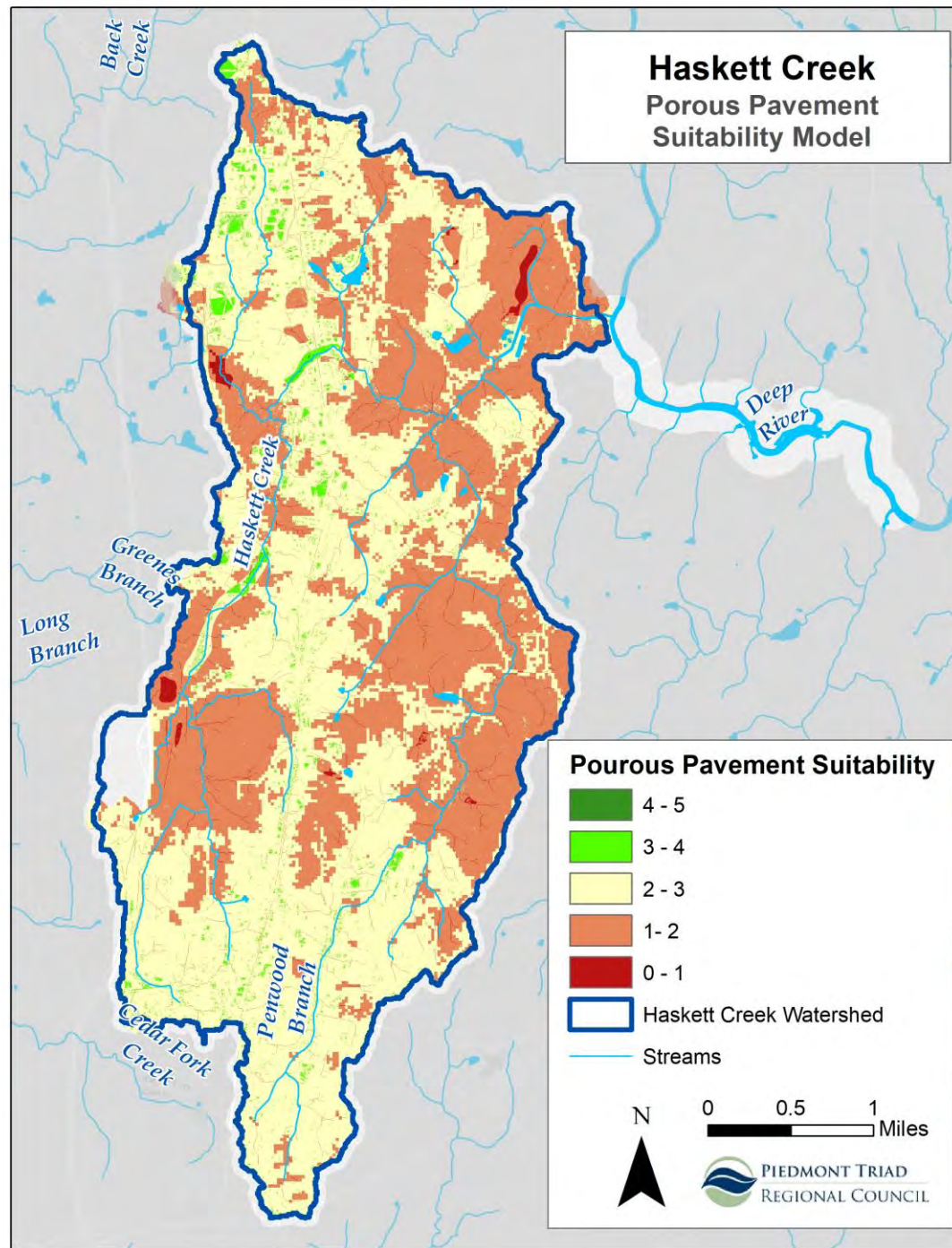


GRASSED SWALE



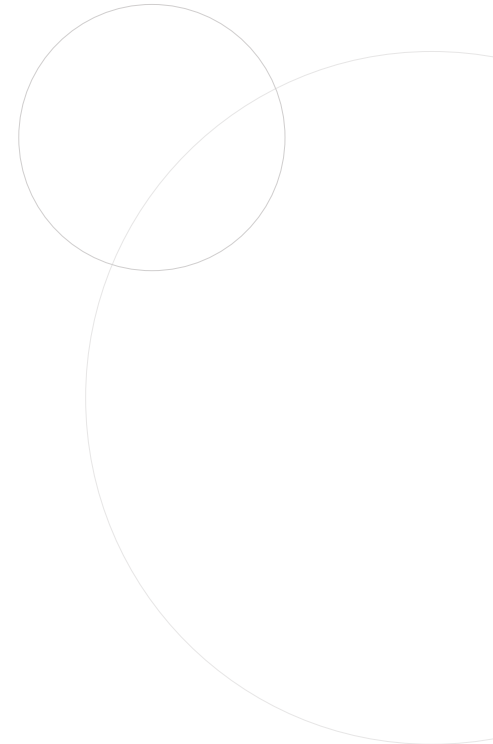
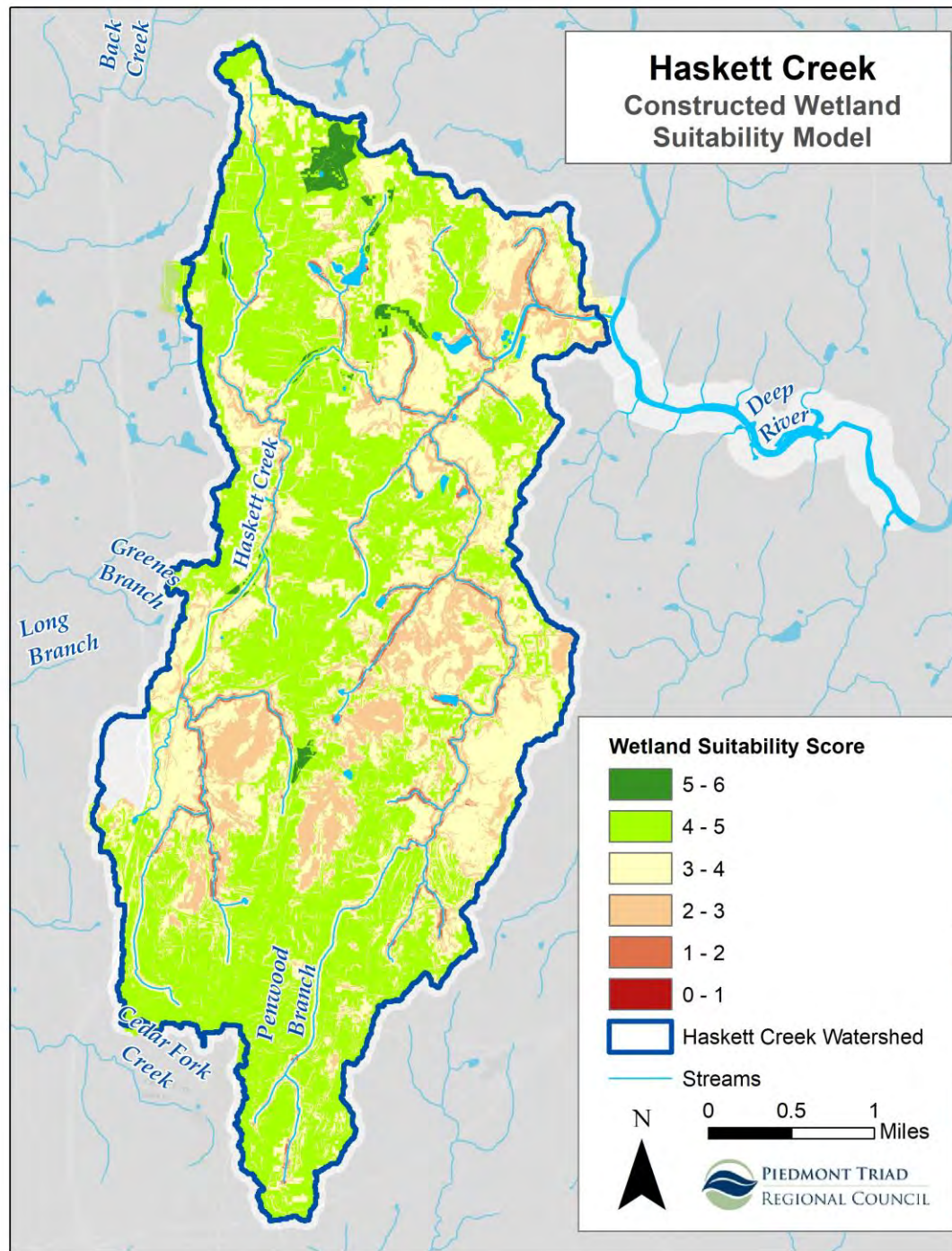


POROUS PAVEMENT



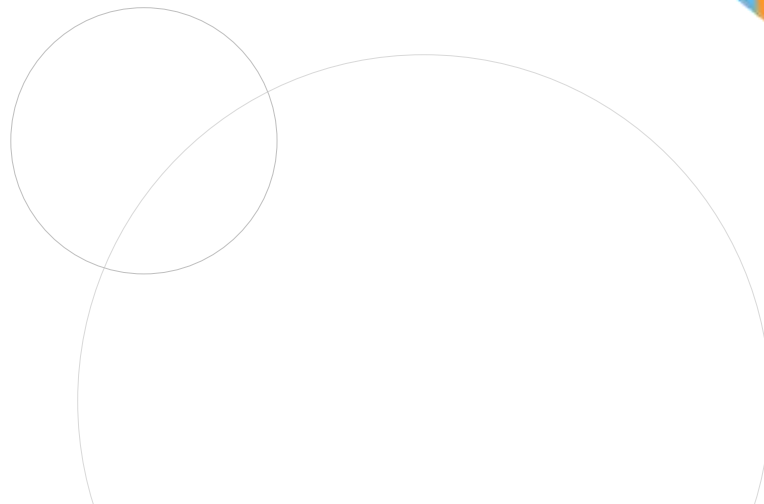


CONSTRUCTED WETLANDS





DISCUSSION





THANK YOU



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