

Roanoke Stormwater Utility



Livable Roanoke Valley
March 30, 2018

Dwayne R. D'Ardenne, Stormwater Utility Manager



What?

Why?

How?

3



Drainage Projects



Maintenance

WARNING
UNSAFE
FOR
SWIMMING
AND
DRINKING

WARNING
Health advisory on eating fish

Eating some fish from this location may be harmful to your health. These fish may contain chemicals called PCBs. Eating fish that contain PCBs may increase your risk for cancer.

Women who are pregnant or may become pregnant, nursing mothers and young children should not eat the fish listed in the table. Others should follow the directions in the table on the type and amount of fish to eat.

For more information:
Virginia Department of Health
804-864-8182
www.vdh.virginia.gov

VDH VIRGINIA DEPARTMENT OF HEALTH
DEQ DEPARTMENT OF ENVIRONMENTAL QUALITY

**Roanoke River
PCB Advisory Locations**

Roanoke River (upper section) from the confluence of the North Fork and South Fork of the Roanoke River near Gaging Station at Lafayette downstream to Niagara Dam, including its tributaries Peters Creek up to the Route 460 bridge crossing and Tinker Creek up to the confluence with Deer Branch Creek near Route 115

Affected localities: Montgomery and Roanoke counties, and Salem and Roanoke

The warning applies to the fish listed below:
No more than two meals per month

- Carp
- Eastern Sunfish
- Rock Bass
- Smallmouth Bass
- Large-mouth Bass
- Rock Bass
- Brookhead Chub

Water Quality



Why Need a Utility?

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VADEQ MS4 Permit



Caretaker of the Roanoke River

1+13

Sediment TMDL:

1. Roanoke River
2. Back Creek
3. Barnhardt Creek
4. Mason Creek
5. Mudlick Creek
6. Murray Run
7. Peters Creek
8. Tinker Creek

PCB TMDL:

1. Roanoke River
2. Peters Creek
3. Tinker Creek

Bacteria TMDL:

1. Roanoke River
2. Back Creek
3. Carvin Creek
4. Glade Creek
5. Lick Run
6. Mason Creek
7. Mudlick Creek
8. Murray Run
9. Ore Branch
10. Peters Creek
11. Tinker Creek



The River is "Listed" - Who Cares?

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- Largemouth Bass
- Rock Bass
- Brook Trout

Signs are gone = Safe, Right?



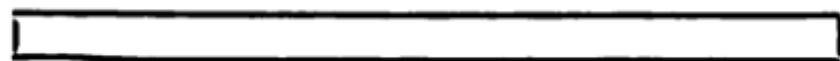
Caretaker of the Roanoke River

What?

Why?

How?

REMODELING
ROANOKE



*Report to the Committee on
Civic Improvement by John
Nolen, Landscape Architect*
CAMBRIDGE, MASSACHUSETTS

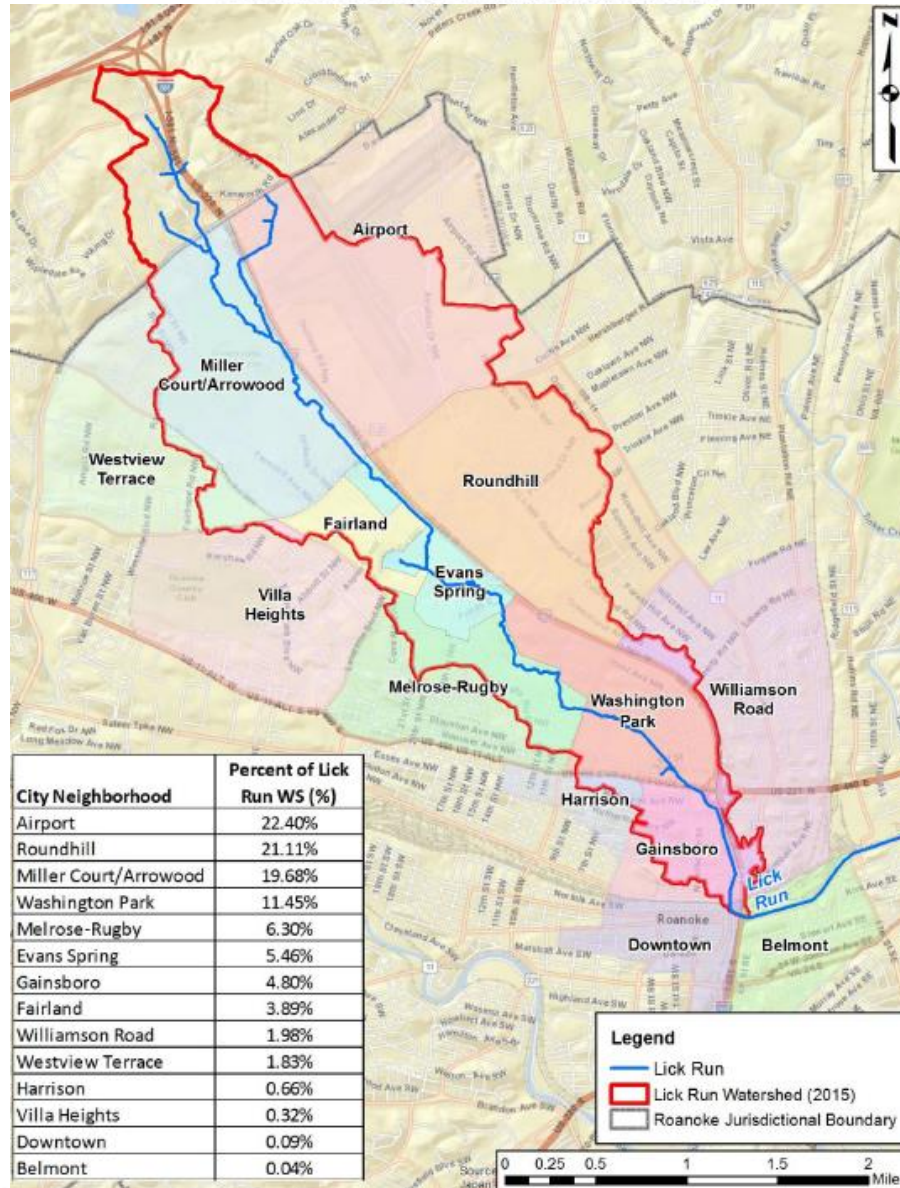
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“... Roanoke has a **golden opportunity**, one that any city in the land might envy.

Its **rivers, hills, and rural country, its creeks and the views** of its surrounding mountain ridges are singularly available and beautiful beyond description.”

LICK RUN

WATERSHED MASTER PLAN



Randel L. Dymond, Ph.D., P.E.; Marcus F. Aguilar, EIT; Paul Bender, EIT; Clayton Hodges, P.E.

Via Department of Civil and Environmental Engineering

Virginia Tech

**“Transform the
Roanoke River into a
community asset, focal
point, and source of
pride for those that
live, work, learn, and
play in its watershed.”**

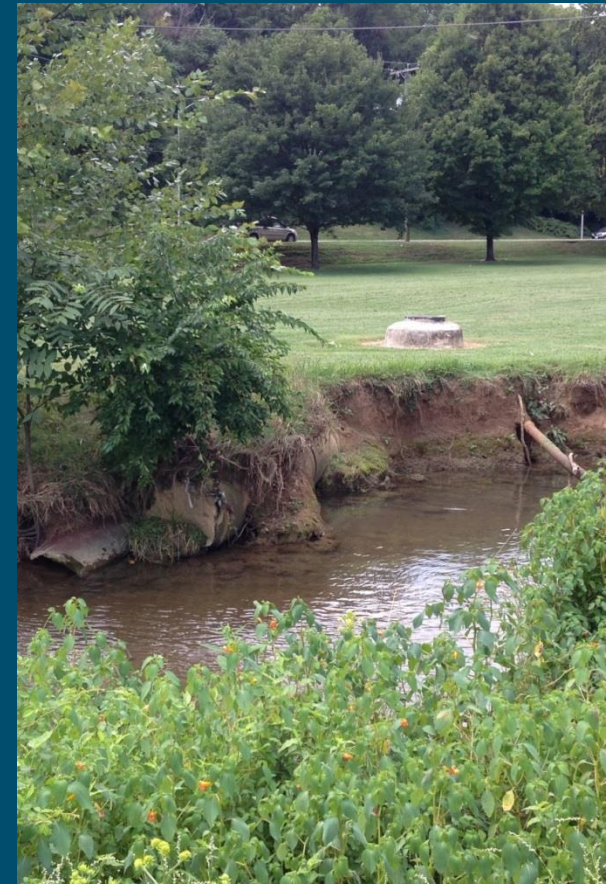
“Rivers have always been a big part of our DNA”



3

- 1. Maximize** watershed resiliency and sustainability;
- 2. Minimize** watershed hazard to public health, safety, and property;
- 3. Connect** citizens, businesses, students, and others to their watershed

1. Maximize Watershed Resiliency & Sustainability

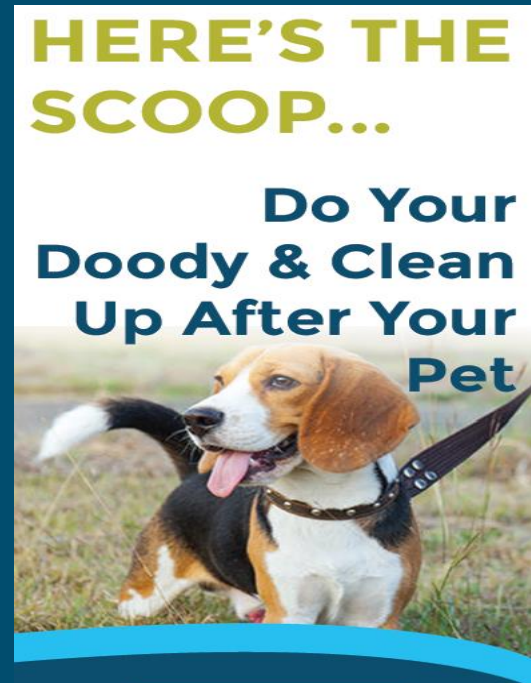
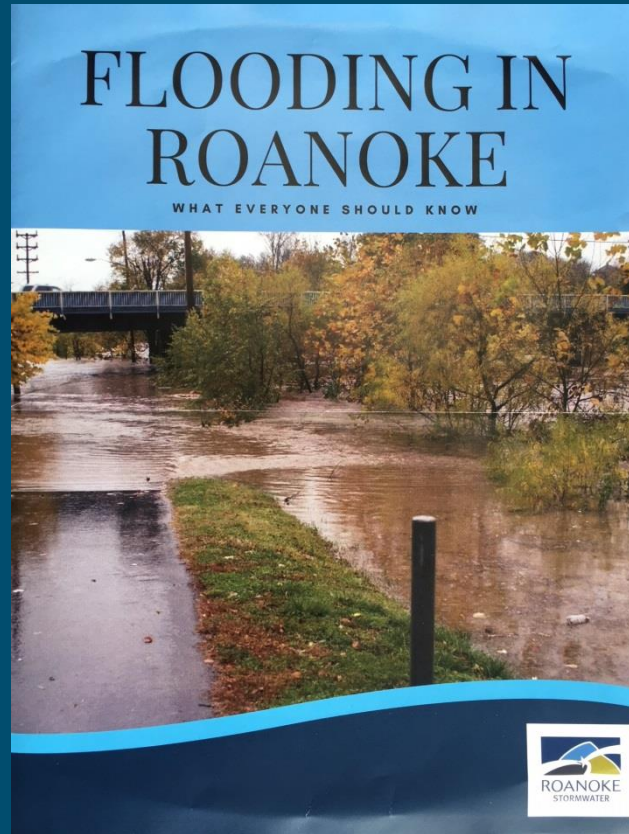


A. Green Infrastructure

B. Riparian Buffers/Disconnected Impervious

C. Stream Restorations

2. Minimize watershed hazards



- A. CIP Drainage Projects also Improve W.Q.
- B. Community Rating System (CRS)
- C. Septic Systems and Pet Waste

3. Connect citizens to their watershed



A. Life-Long Learning Opportunities

B. Outdoor Rec & Stewardship

C. Connect Daily Actions & Water Quality

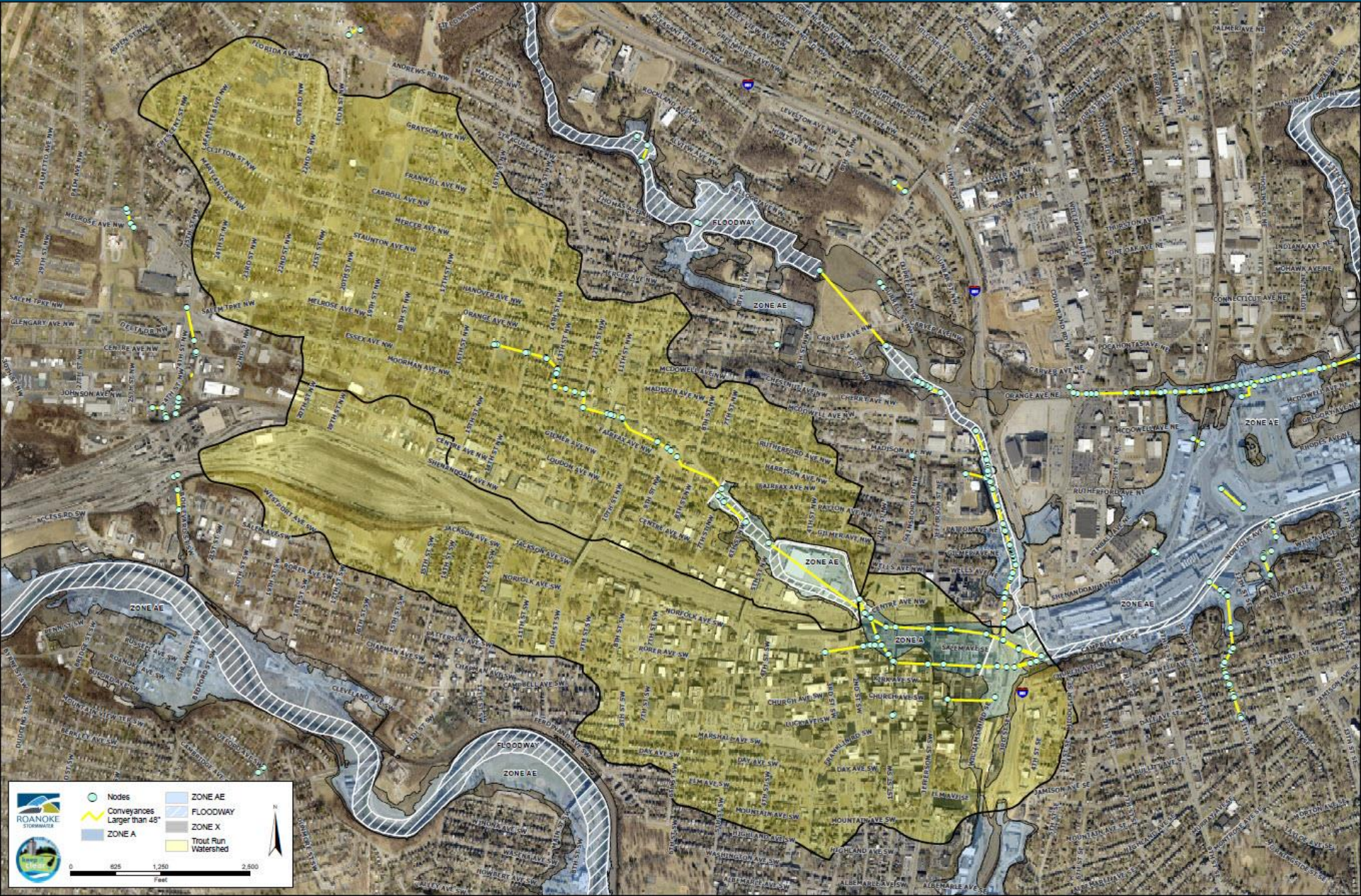


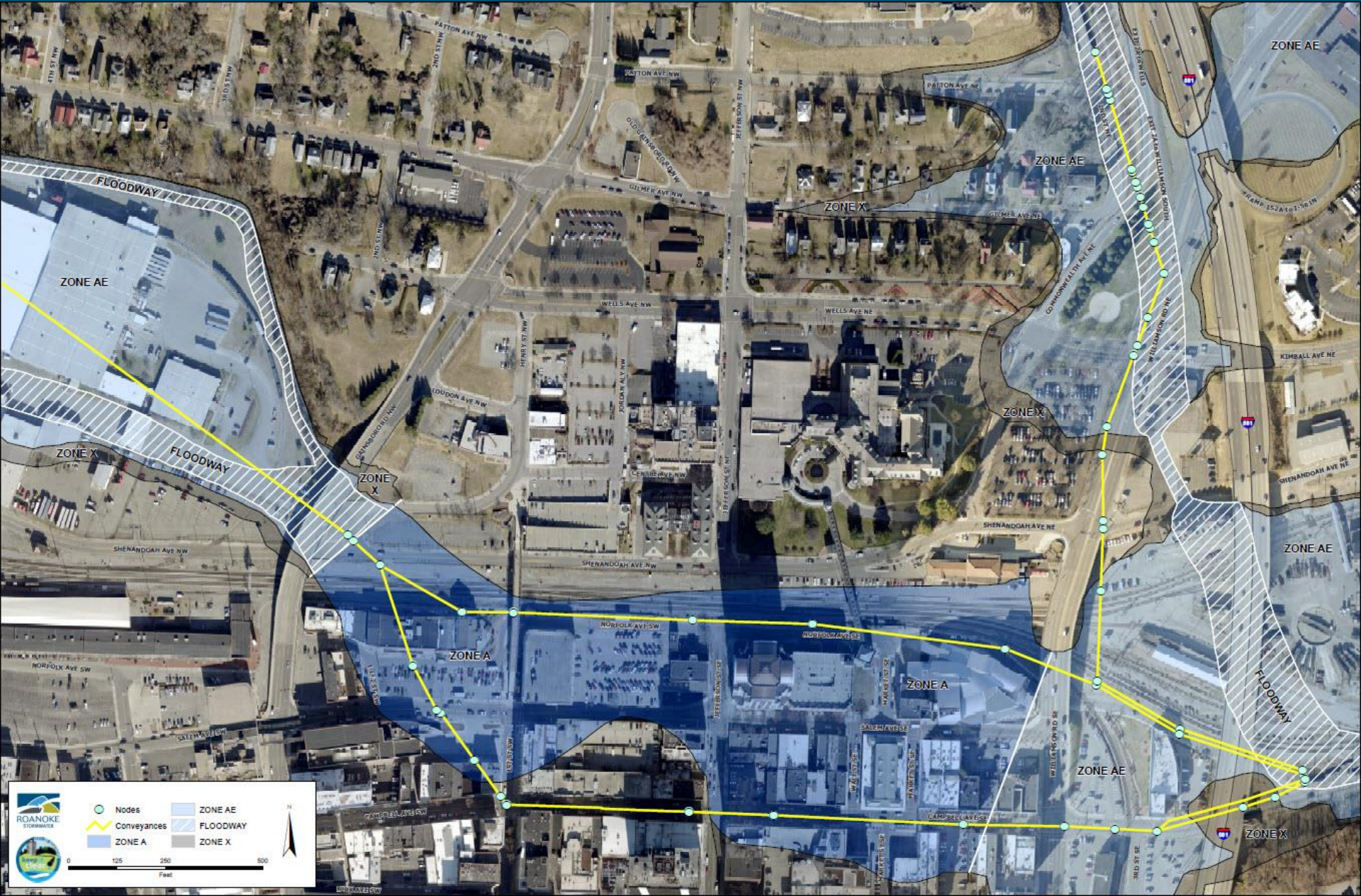
**“Be Part of the Solution,
Not the Pollution”**

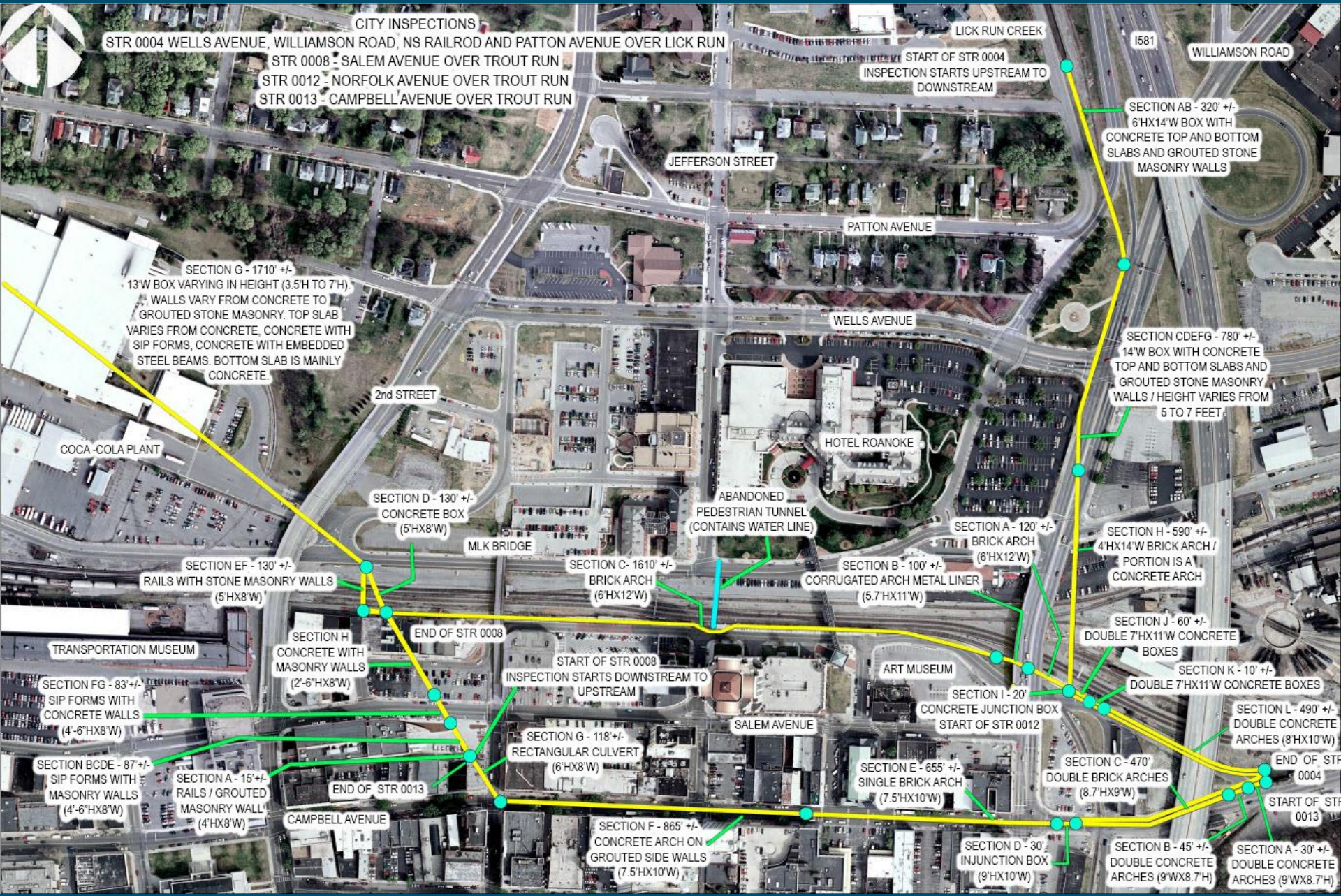


**Create a Clean Water Legacy
for the Citizens of Tomorrow**

Downtown Roanoke Floodplain







CITY INSPECTIONS

- STR 0004 WELLS AVENUE, WILLIAMSON ROAD, NS RAILROAD AND PATTON AVENUE OVER LICK RUN
- STR 0008 - SALEM AVENUE OVER TROUT RUN
- STR 0012 - NORFOLK AVENUE OVER TROUT RUN
- STR 0013 - CAMPBELL AVENUE OVER TROUT RUN

LICK RUN CREEK
START OF STR 0004
INSPECTION STARTS UPSTREAM TO
DOWNSTREAM

SECTION AB - 320' +/-
6'HX14'W BOX WITH
CONCRETE TOP AND BOTTOM
SLABS AND GROUTED STONE
MASONRY WALLS

SECTION CDEFG - 780' +/-
14'W BOX WITH CONCRETE
TOP AND BOTTOM SLABS AND
GROUTED STONE MASONRY
WALLS / HEIGHT VARIES FROM
5 TO 7 FEET

SECTION H - 590' +/-
4'HX14'W BRICK ARCH /
PORTION IS A
CONCRETE ARCH

SECTION J - 60' +/-
DOUBLE 7'HX11'W CONCRETE
BOXES

SECTION K - 10' +/-
DOUBLE 7'HX11'W CONCRETE
BOXES

SECTION L - 490' +/-
DOUBLE CONCRETE
ARCHES (8'HX10'W)

END OF STR
0004

SECTION B - 45' +/-
DOUBLE CONCRETE
ARCHES (9'WX8.7'H)

SECTION A - 30' +/-
DOUBLE CONCRETE
ARCHES (9'WX8.7'H)

SECTION G - 1710' +/-
13'W BOX VARYING IN HEIGHT (3.5H TO 7H).
WALLS VARY FROM CONCRETE TO
GROUTED STONE MASONRY. TOP SLAB
VARIES FROM CONCRETE, CONCRETE WITH
SIP FORMS, CONCRETE WITH EMBEDDED
STEEL BEAMS. BOTTOM SLAB IS MAINLY
CONCRETE.

SECTION D - 130' +/-
CONCRETE BOX
(5'HX8'W)

SECTION EF - 130' +/-
RAILS WITH STONE MASONRY WALLS
(5'HX8'W)

SECTION H
CONCRETE WITH
MASONRY WALLS
(2'-6'HX8'W)

SECTION FG - 83' +/-
SIP FORMS WITH
CONCRETE WALLS
(4'-6'HX8'W)

SECTION BCDE - 87' +/-
SIP FORMS WITH
MASONRY WALLS
(4'-6'HX8'W)

SECTION A - 15' +/-
RAILS / GROUTED
MASONRY WALL
(4'HX8'W)

SECTION C - 1610' +/-
BRICK ARCH
(6'HX12'W)

SECTION B - 100' +/-
CORRUGATED ARCH METAL LINER
(5.7'HX11'W)

SECTION A - 120' +/-
BRICK ARCH
(6'HX12'W)

SECTION G - 118' +/-
RECTANGULAR CULVERT
(6'HX8'W)

SECTION E - 655' +/-
SINGLE BRICK ARCH
(7.5'HX10'W)

SECTION C - 470'
DOUBLE BRICK ARCHES
(8.7'HX9'W)

SECTION F - 865' +/-
CONCRETE ARCH ON
GROUTED SIDE WALLS
(7.5'HX10'W)

SECTION D - 30'
INUNCTION BOX
(9'HX10'W)

SECTION A - 30' +/-
DOUBLE CONCRETE
ARCHES (9'WX8.7'H)

COCA-COLA PLANT

2nd STREET

JEFFERSON STREET

PATTON AVENUE

WELLS AVENUE

HOTEL ROANOKE

ABANDONED
PEDESTRIAN TUNNEL
(CONTAINS WATER LINE)

MLK BRIDGE

END OF STR 0008

START OF STR 0008
INSPECTION STARTS DOWNSTREAM TO
UPSTREAM

ART MUSEUM

SALEM AVENUE

CAMPBELL AVENUE

1581

WILLIAMSON ROAD

START OF STR
0013

4% Chance Rain Event

AUGUST 15, 2016 - WEATHER STATION @ HURT PARK ELEMENTARY SCHOOL

TIME RANGE	RAIN DURING RANGE	CUMULATIVE RAINFALL	RAINFALL RATE/HOUR
1:30-1:45 PM	.61"	.61"	2.45"/hour at 1:35 PM
1:45-1:55 PM	.58"	1.19"	
1:55-2:05 PM	.74"	1.93"	5.65/hour at 2:00 PM
2:05-2:20 PM	.66"	2.26"	

- 2.26" of rain fell within 50 minutes.
- Translates to a 25-year storm (4% chance/yr)
- 2.45"/hr period being >50-year (2% chance/yr)
- 5.65"/hr period being >1000-year (0.1% chance)

Unusual Precipitation?

◆ LOCATION	◆ ST	◆ 2016 VALUE	◆ 1981-2010 AVERAGE	◆ JUN-AUG DEPARTURE	◆ UNUSUALNESS	◆ JUN-AUG RANK	◆ #YRS IN RECORD
Norfolk	VA	20.14"	14.92"	+5.22"	+1.1 σ	10th Wettest	71 yrs
Richmond	VA	12.81"	13.10"	-0.29"	-0.2 σ	32nd Driest	75 yrs
Roanoke	VA	16.04"	11.43"	+4.61"	+1.2 σ	8th Wettest	69 yrs
Washington (Reagan National)	VA	9.61"	10.44"	-0.83"	-0.5 σ	26th Driest	71 yrs

- NOAA Overview: June-August 2016
- 8th Wettest of 69 year records

Hurricane Matthew

PDS-based point precipitation frequency				
Duration	Average			
	1	2	5	10
12-hr	2.07 (1.91-2.29)	2.51 (2.31-2.76)	3.18 (2.92-3.49)	3.73 (3.41-4.10)
24-hr	2.60 (2.39-2.84)	3.14 (2.89-3.44)	4.00 (3.67-4.37)	4.70 (4.30-5.12)
2-day	3.07 (2.83-3.34)	3.71 (3.42-4.04)	4.69 (4.33-5.10)	5.49 (5.04-5.96)

- ROA Airport: 4.26" ; Hurt Park Elem: 5.06"
- Mill Mountain iFlows: $3.28 + 1.96 = 5.24$ "
- More typical 5 to 10 year storm event
- Only 7 street closures due to flooding, None CBD

Moving Forward:

1. Ensure system flowing to full capacity through routine maintenance;
3. Review priority of 18 downtown projects in relation to 192 other Citywide CIP projects;
4. Encourage Green Infrastructure (slow the flow) both downtown and upstream;
5. During 2017, create a Watershed Master Plan (WMP) for the Trout Run watershed.

Trout Run WMP

1. Reestablish watershed vegetative cover to slow, store, and evaporate runoff;
2. Construct new flood mitigation and storage facilities;
3. Improve hydraulic function of existing stormdrain infrastructure;
4. Develop policies and incentive systems that help work towards watershed goals on private land; and
5. Install monitoring tools needed to evaluate the outcomes of these recommendations.