OVERALL CREEK WATERSHED

VISUAL STREAM ASSESSMENT

June 2016

VSA points, benthic, Ph, Cnductivity, temperature, hydrology

Puckett Creek

MURFREESBORO STORMWATER PROGRAM
improving the quality of local streams

MIDDLE TENNESSEE STATE UNIVERSITY
Stormwater Program
Environmental Health and Safety

Overall Creek VSA – Executive Summary

Overall Creek and its tributaries may be some of the best examples of karst streams in Tennessee's Central Basin. Overall Creek originates in the vast Snail Shell Cave which drains much of western Rutherford County. The cave is formed above the water table (vadose) in the Ridley Limestone and is thought to have cut down to join a phreatic or water table conduit which ultimately spills over to form overall spring. The stream then demonstrates a losing and gaining sequence; in losing segments the stream may be totally dry outside of storm events. In these dry segments, a lack of flow leaves large boulders or even limestone pavement resembling a moonscape. Because of this lack of substrate development and hydrology, these segment have little aquatic life and look more like glades. On the other hand, in gaining segments where flow is perennial, a vast array life is found. In these segments the substrate is made up of gravel and cobble; aquatic plants are found in islands and point bars in gaining segments. Through many dye traces, geologic studies, and cave diving it is thought there is a subterranean component to Overall Creek. This conduit or set of conduits sometimes is under the stream, sometimes running parallel, and sometimes far away from overall creek.

Status

Overall Creek and all its tributaries are currently clean with no impairments. Puckett Creek is listed on the 2016 draft 303d.

Draft

Stream	Entity ID	Impairment	Cause
Puckett Creek	TN05130203015_0100	Alteration in stream-side or littoral vegetative cover	development

VSA Quick Facts

Puckett Creek

- Healthy riparian zone intact in most places – WQPA (map attached)
- Minor bank erosion has increased
- Substrate embeddedness also increased
- Low base flow this year
- Bedrock joints support life in extreme low flow

Overall Creek

- Lower and Upper Overall Creek samples sites scored good for biological diversity
- Springs emerge on impermeable rock units (Rucker, Asbury) and flow sinks into cavernous rock units especially around Franklin Rd
- Construction debris in stream bed near Franklin Rd

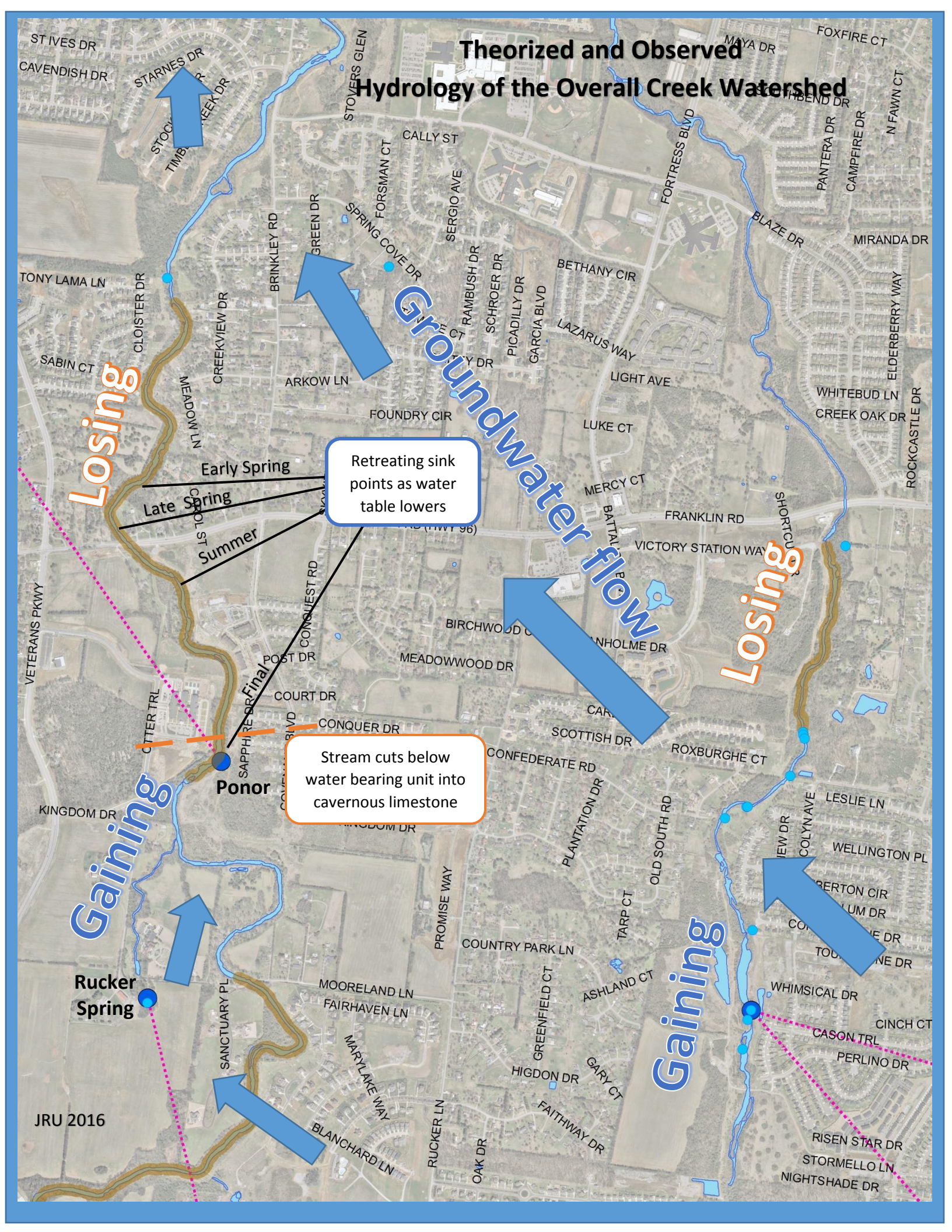
- Flow sinks in retreating sink points (early spring – behind Kroger, late summer back to Kingdom Ridge).
- Stream lacks substrate development in losing segments and therefore makes bad habitat
- Near Kingdom Ridge would be a great place for education

Sample Results

Benthic macroinvertebrate samples were pulled from two locations in Overall Creek and one location in Puckett Creek. Staff obtained the sampling using a 1m kick net and using SQKICK methods. Samples were pulled from segments which have reliable flow and adequate substrate habitat. Extensive research shows that in losing section of the Overall Creek very little biology is found due to the lack of flow and geomorphology in the stream. Once samples were collected and preserved they were delivered to Aquatic Resources Center, Inc. for lab analysis.

Benthic Macro Invertebrate Sample Results

Sample Location	Date	Segment ID	TMI
D/s of Rucker Spring (6/13/2016)	6/13/2016	TN05130203015_2000	32
D/s of NW Broad St	5/10/2016	TN05130203015_1000	36
Puckett Creek at Blaze Dr	5/6/2016	TN05130203015_0100	28


Theorized and Observed
Hydrology of the Overall Creek Watershed
Losing
Groundwater flow
Losing
Gaining
Gaining
Early Spring
Late Spring
Summer
Final
Retreating sink points as water table lowers
Stream cuts below water bearing unit into cavernous limestone
Ponor
Rucker Spring
JRU 2016
ST IVES DR
CAVENDISH DR
STARNES DR
STOVERS GLEN
CALLY ST
FORSMAN CT
SERGIO AVE
SPRING COVE DR
BRINKLEY RD
GREEN DR
TONY LAMA LN
CLOISTER DR
CREEKVIEW DR
MEADOW LN
SABIN CT
ARKOW LN
FOUNDRY CIR
RAMBUSH DR
SCHROER DR
PICADILLY DR
GARCIA BLVD
BETHANY CIR
LAZARUS WAY
LIGHT AVE
LUKE CT
FORTRESS BLVD
MAYA DR
FOXFIRE CT
SCUPPERNONG DR
PANTERA DR
CAMPFIRE DR
N FAWN CT
BLAZE DR
MIRANDA DR
ELDERBERRY WAY
WHITEBUD LN
CREEK OAK DR
ROCKCASTLE DR
MERCY CT
FRANKLIN RD
VICTORY STATION WAY
SHORTCUT
BATTALION
NHOLME DR
BIRCHWOOD
MEADOWWOOD DR
POST DR
COURT DR
CONQUEST RD
CONQUER DR
SAPPHIRE DR
CUTTER TRL
VETERANS PKWY
KINGDOM DR
SCOTTISH DR
ROXBURGHE CT
CONFEDERATE RD
PLANTATION DR
OLD SOUTH RD
COLYN AVE
LESLIE LN
WELLINGTON PL
PROMISE WAY
COUNTRY PARK LN
TARP CT
ASHLAND CT
GREENFIELD CT
WHIMSICAL DR
CINCH CT
CASON TRL
PERLINO DR
MOORELAND LN
FAIRHAVEN LN
SANCTUARY PL
MARYLAKE WAY
HIGDON DR
GARY CT
FAITHWAY DR
BLANCHARD LN
RUCKER LN
OAK DR
RISEN STAR DR
STORMELLO LN
NIGHTSHADE DR

Overall Creek VSA 2016

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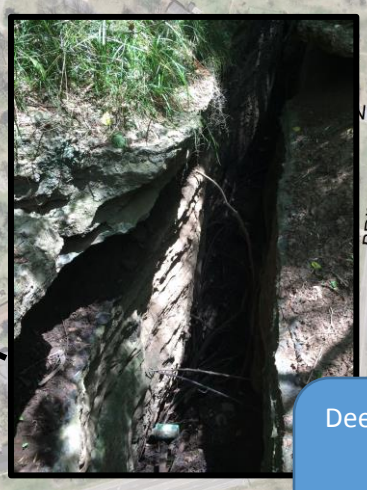
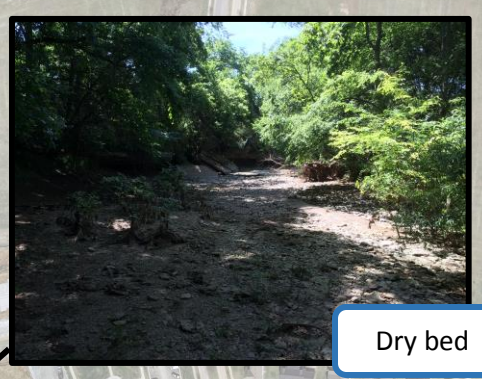


Deep limestone joint

- Right bank
- Receives flow
- Concrete slab

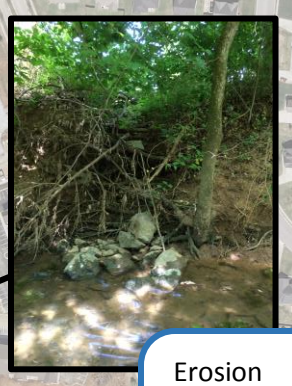
Minor debris dam



Dry bed

Transition from pool to riffle - sink

8.3



Utility crossing

Erosion
Right bank
50 feet length
4 feet height

Debris blockage
6-9-2016
minor

Boulder check dam
6-13-2016
Erosion around downstream side

Algae and debris blockages
6-9-2016
Increase in alage

8.2

7.72

Macro invertebrate sample 6-13-2016
TMI: 32

- Good flow
- Well-developed substrate habitat in perennial flow

8.16

8.32

Legend

- Benthic Macro Sites
- Misc. Sites
- Erosion Site
- Probe Readings (Ph)
- Springs

CLOISTER DR
ARKOW LN
CREEKSIDE DR
BRINKLEY RD
SKYVIEW DR
CAROL ST
FRANKLIN RD (HWY 96)
HICKORY HILLS DR
JACK BYRNES DR
CONQUEST RD
LENTIL DR
OTTER TRL
ARK LN
BERYL DR
COMPASSION LN
MOORELAND LN

Puckett Creek VSA
June 2016

JUNEBERRY WAY

BLAZE DR

ELDERBERRY WAY

FRANKLIN RD

VICTORY STATION WAY

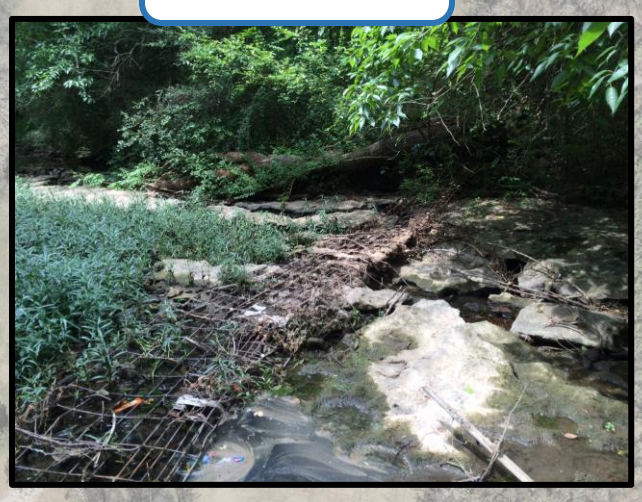
8.36

Small ephemeral channel

Erosion left bank
100 ft
Landuse - pasture

8.46

Fence causing debris dam



8

8.3

Good vegetative cover

Joint NW
332°

8.35

7.9

Upper side channel –

Dries in summer

Spring flow

Dry limestone pavement/ moonscape

Fossils

Perennial pool – pool sustains life in deep, limestone joints during dry months

8.18

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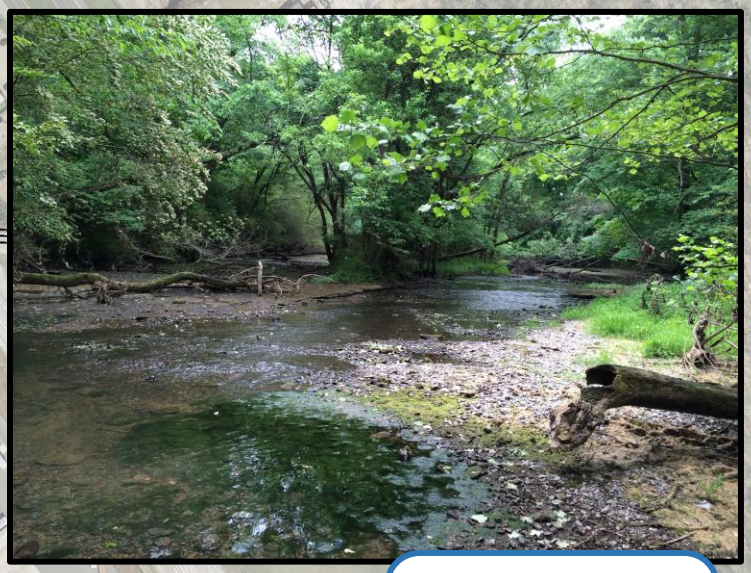
Lower Overall Creek VSA and

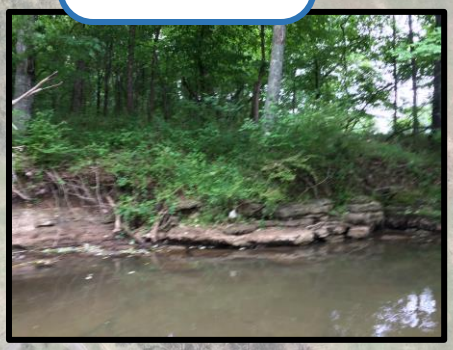
Macroinvertebrate Sample May 2016



7.88

Macroinvertebrate sample site
May 10th, 2016
TMI - 36

Erosion – right bank
100 feet
Agriculture



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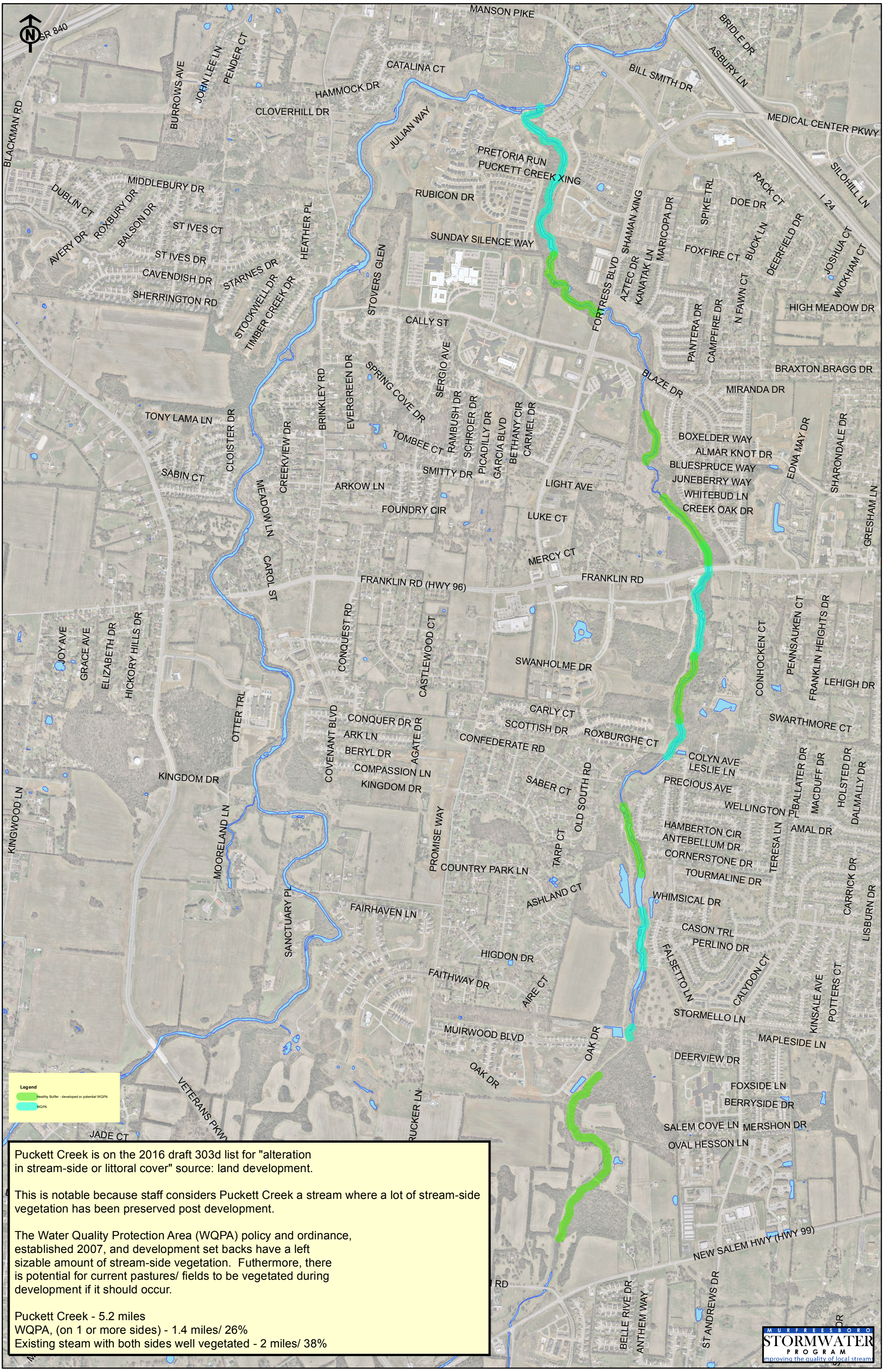

Puckett Creek is on the 2016 draft 303d list for "alteration in stream-side or littoral cover" source: land development.

This is notable because staff considers Puckett Creek a stream where a lot of stream-side vegetation has been preserved post development.

The Water Quality Protection Area (WQPA) policy and ordinance, established 2007, and development set backs have a left sizable amount of stream-side vegetation. Futhermore, there is potential for current pastures/ fields to be vegetated during development if it should occur.

Puckett Creek - 5.2 miles
WQPA, (on 1 or more sides) - 1.4 miles/ 26%
Existing steam with both sides well vegetated - 2 miles/ 38%

Stream-side Vegetative Cover Status along Puckett Creek