

**A G E N D A**

**JAMES CITY COUNTY BOARD OF SUPERVISORS**

**READING FILE**

**February 10, 2009**

---

**FOR YOUR INFORMATION**

1. Updated Impervious Cover Estimates for Powhatan and Yarmouth Creek Watersheds

021009bosrf\_age

MEMORANDUM

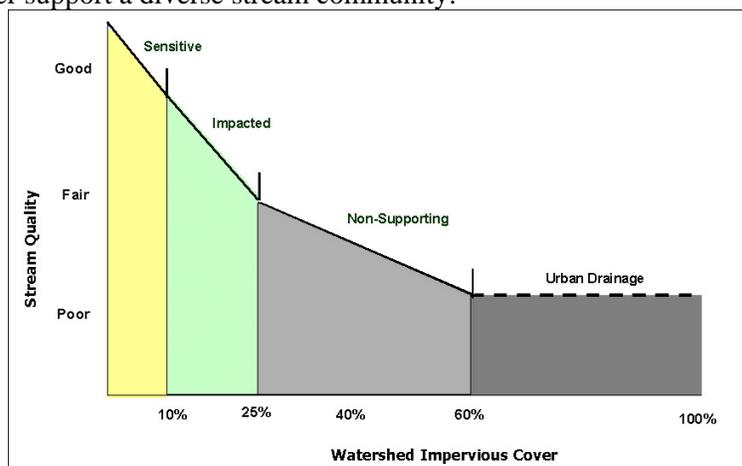
DATE: February 10, 2009  
 TO: The Board of Supervisors  
 FROM: Michael D. Woolson, Senior Watershed Planner  
 SUBJECT: Updated Impervious Cover Estimates for Powhatan and Yarmouth Creek Watersheds

The impervious cover estimates for Powhatan and Yarmouth Creeks have been updated using a variety of sources including aerial photography; information from Real Estate Assessments, Planning, Stormwater, and Environmental Divisions; the Center for Watershed Protection (CWP) Powhatan Creek and Yarmouth Creek reports; and the Williamsburg Environmental Group Powhatan Creek Floodplain Study. In addition, staff analyzed the projected impervious cover figures at build-out based upon the underlying Comprehensive Plan land use designation instead of the by-right density. The latter was completed by CWP in 2001.

**Impervious Cover Model**

Stream research generally indicates that certain zones of stream quality exist, most notably at 11 percent impervious cover, where sensitive stream elements are lost from the system and a second threshold appearing at around 25 percent impervious cover, where indicators of stream quality consistently shift to a poor condition (e.g., diminished aquatic diversity, water quality, and habitat scores). The model classifies streams into one of three categories: 1) sensitive, 2) impacted, and 3) non-supporting. Each stream category can be expected to have unique characteristics as follows:

- 1) Sensitive Streams. These streams typically have a watershed impervious cover of zero to 10 percent. Consequently, sensitive streams are of high quality and are typified by stable channels, excellent habitat structure, good to excellent water quality, and diverse communities of both fish and aquatic insects. Since impervious cover is so low, it does not experience the hydrological changes that accompany urbanization.
- 2) Impacted Streams. Streams in this category possess a watershed impervious cover ranging from 11 to 25 percent and show clear signs of degradation due to watershed urbanization.
- 3) Non-Supporting Streams. Once watershed impervious cover exceeds 25 percent, stream quality crosses a second threshold. Streams in this category essentially become conduits for conveying stormwater flows and can no longer support a diverse stream community.



**Impervious Cover Estimates**

The sub-watersheds and baseline percentages for each creek were determined from the study for each applicable creek. The current (2007 data) percentages for Powhatan Creek were taken from the “Powhatan Creek Floodplain Study” by Williamsburg Environmental Group, July 2008, as were the projected percentages. The current (2007 data) percentages for Yarmouth Creek were arrived at through a comparative analysis between the baseline and 2007 aerial photography. The projected percentages for Yarmouth Creek were also arrived at through a comparative analysis between the current built-on parcels and the underlying land use designations. The impervious cover estimates for both creeks are as follows:

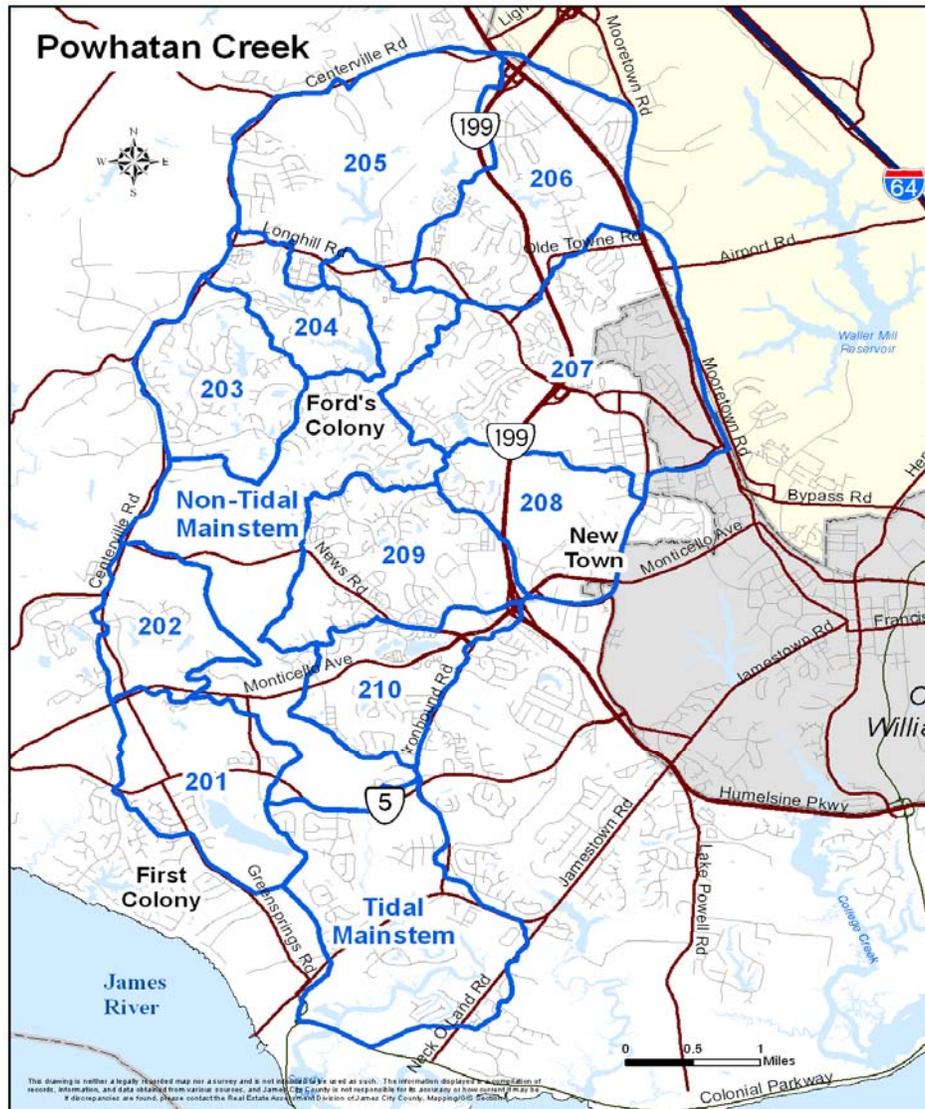
**Analysis – Powhatan Creek**

Current Powhatan Creek impervious cover numbers increases in seven categories over the baseline numbers established in 2001. Powhatan Creek is entirely contained within the Primary Service Area (PSA) and has seen growth during the last seven years, including New Town, Prime Outlets expansion, Warhill, and new residential communities.

Using the Impervious Cover Model to determine overall watershed health, there were eight sub-watersheds that were classified as “*Sensitive*” with only three sub-watersheds that were classified as “*Impacted*” in the baseline study. Under current conditions, four sub-watersheds would remain “*Sensitive*” and the remaining sub-watersheds are classified as “*Impacted.*” Under the projected build-out scenario, one sub-watershed would remain “*Sensitive*” and eight would be “*Impacted*” and only two would be classified as “*Non-Supporting.*”. The sub-watershed that will see the least amount of change is sub-watershed 201 while the one that will see the greatest amount is sub-watershed 208.

**Powhatan Creek**

<b>Sub-watershed</b>	<b>CWP Baseline (%)</b>	<b>Current (%)</b>	<b>Projected (%)</b>
<b>201</b>	6.8	8.31	8.31
<b>202</b>	6.4	6.63	14.87
<b>203</b>	10.5	16.05	16.60
<b>204</b>	10.0	18.88	22.10
<b>205</b>	6.4	9.45	19.06
<b>206</b>	16.9	20.78	21.30
<b>207</b>	16.4	24.64	29.30
<b>208</b>	5.8	14.19	27.13
<b>209</b>	5.3	16.4	21.88
<b>210</b>	18.6	22.63	23.67
<b>Mainstems</b>	7.9	9.06	12.51



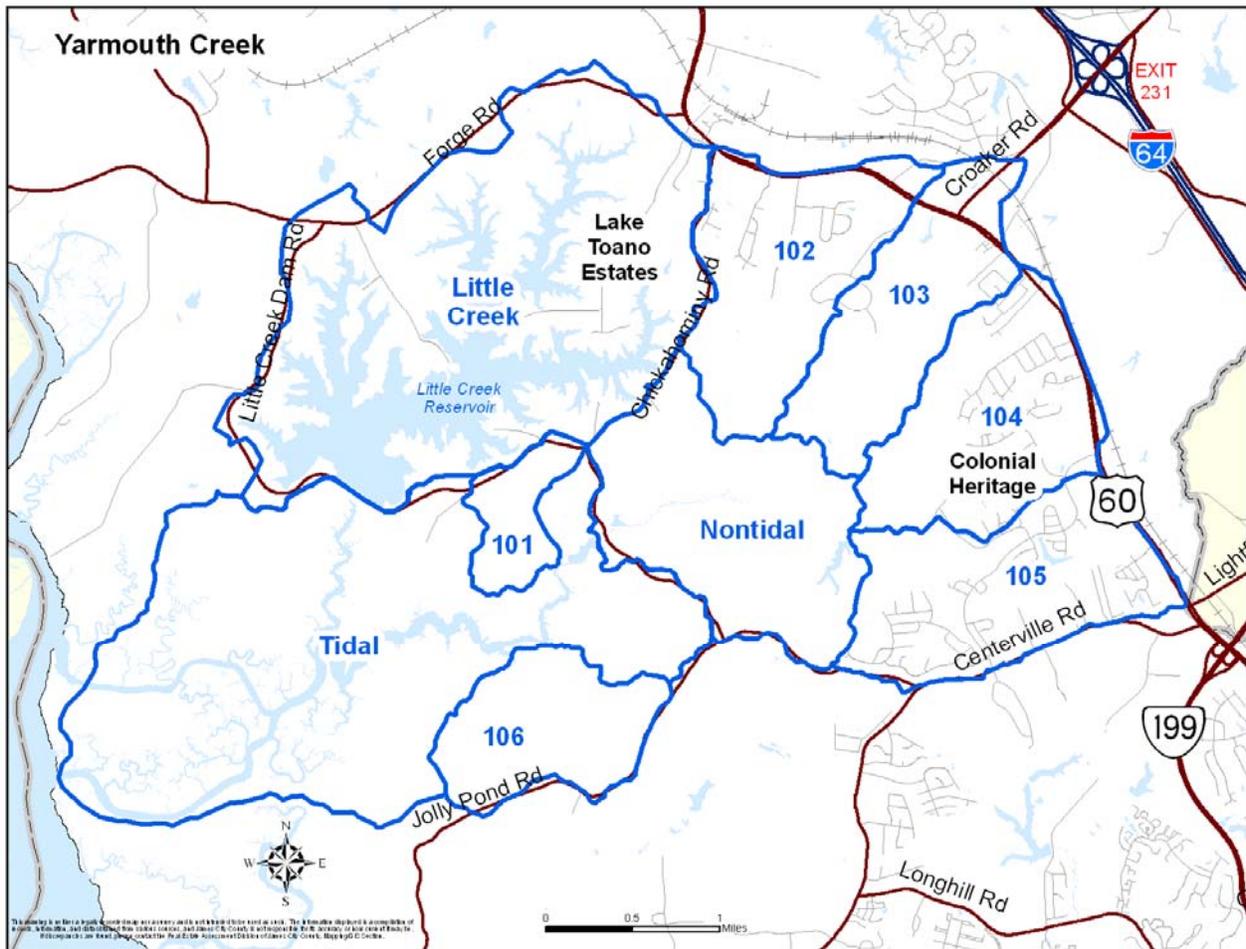
**Analysis – Yarmouth Creek**

Current Yarmouth Creek impervious cover numbers increased only in one category: Sub-Watershed No. 104 over the baseline numbers established in 2003. Portions of Sub-Watershed Nos. 102, 103, 104, and 105 that have increased slightly are within the PSA and have seen growth during the past five years, including Colonial Heritage, Liberty Crossing, and Walnut Grove.

Again, using the Impervious Cover Model to determine overall watershed health, the entire watershed was classified as “Sensitive” in the baseline study. Under current conditions, as mentioned previously, only one of the sub-watershed now moves into the “Impacted” classification. In the projected build-out scenario, there are three sub-watersheds that would be classified as “Impacted” and one that would be classified as “Non-Supporting” while the remaining watersheds remain “Sensitive.” The sub-watershed that will see the least amount of change is the tidal segment while the one that will see the greatest amount of change is sub-watershed 105.

**Yarmouth Creek**

Sub-watershed	CWP Baseline (%)	Current (%)	Projected (%)
<b>101</b>	2.2	6.29	8.70
<b>102</b>	7.3	7.80	17.80
<b>103</b>	5.1	6.30	22.00
<b>104</b>	9.0	14.00	19.50
<b>105</b>	5.5	9.60	26.90
<b>106</b>	0.4	0.50	8.70
<b>Non-tidal</b>	1.1	1.11	8.50
<b>Tidal</b>	0.3	0.34	5.00
<b>Little Creek</b>	2.0	2.20	7.30



---

Michael D. Woolson

CONCUR:

A handwritten signature in black ink, reading "Steven W. Hicks". The signature is written in a cursive style with a large initial "S".

---

Steven W. Hicks

MDW/gb  
WtrshedsCover\_mem