A G E N D A
JAMES CITY COUNTY BOARD OF SUPERVISORS
REGULAR MEETING
County Government Center Board Room
101 Mounts Bay Road, Williamsburg, VA 23185
September 27, 2016
6:30 PM

A. CALL TO ORDER

B. ROLL CALL

C. MOMENT OF SILENCE

D. PLEDGE OF ALLEGIANCE

1. Pledge Leader - Alexi Chauvin, an 8th grade student at Hornsby Middle School and resident of the Berkeley District

E. PUBLIC COMMENT - Until 7 p.m.

F. PRESENTATIONS

1. Clean County Commission Annual Update

G. CONSENT CALENDAR

1. Department of Motor Vehicles Grant Award – Alcohol Enforcement - $23,299
2. Department of Motor Vehicles Grant Award – Speed Enforcement - $19,404
3. Department of Motor Vehicles Grant Award - Occupant Protection - $5,390
4. Middle Peninsula Juvenile Detention Commission Service Agreement Amendments
5. Dedication of Streets in Section 2 of the White Hall Subdivsion
6. Initiation of Consideration of Amendments to the Zoning Ordinance to Allow Mobile Food Vending Vehicles (Food Trucks) in the B-1, General Business District

H. PUBLIC HEARING(S)

1. An Ordinance to Amend Section 10-4 of the County Code
2. Chesapeake Bay Preservation Ordinance Amendments Due to Revisions of the State Chesapeake Bay Preservation Act, the Virginia Stormwater Management Act, and Related Regulations

I. BOARD CONSIDERATION(S)

1. Ware Creek Watershed Management Plan - Board Adoption

J. BOARD REQUESTS AND DIRECTIVES

K. REPORTS OF THE COUNTY ADMINISTRATOR

1. County Administrator's Report

L. PUBLIC COMMENT

M. CLOSED SESSION

N. ADJOURNMENT

1. Adjourn until 6:30 pm on October 11, 2016 for the Regular Meeting

AGENDA ITEM NO. D.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board of Supervisors

FROM: Teresa J. Fellows, Administrative Coordinator

SUBJECT: Pledge Leader - Alexi Chauvin, an 8th grade student at Hornsby Middle School and resident of the Berkeley District

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REVIEWERS:

Department	Reviewer	Action	Date
Board Secretary	Fellows, Teresa	Approved	9/15/2016 - 8:34 AM

AGENDA ITEM NO. F.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board of Supervisors

FROM: Peg Boarman, Chair of Clean County Commission

SUBJECT: Clean County Commission Annual Update

ATTACHMENTS:

	Description	Type
	CCC Report	Cover Memo

REVIEWERS:

Department	Reviewer	Action	Date
Board Secretary	Fellows, Teresa	Approved	9/16/2016 - 12:27 PM

James City Clean County Commission FY16 Report Summary

I. Commissioners: Co-Chairs Will Barnes and Peg Boarman, Charles Loundermon, Robert Marin, Marc Meiring, Betty Peterson, Kensett Teller and Andy Netzel

II. Good Neighbor Environment Grant: Projects included sustainable entryway landscaping, beautification of common areas with sustainable plants and erosion control methods and a sidewalk extension to encourage existing foot and bicycle traffic and improve soil stabilization.

1. Berkeley's Green HOA
2. Brandon Woods Garden Club
3. Governor's Land Adopt-an-Island
4. Greensprings Plantation HOA
5. Kingspoint HOA
6. Longhill Station
7. New Town Residential Association
8. Page Landing HOA
9. Powhatan Crossing HOA
10. Powhatan Place
11. Seasons Trace HOA
12. St. George's Hundred Association
13. St. Thomas HOA
14. Villas at Five Forks HOA
15. Westmoreland HOA

III. Second Annual Litter and Recycling Expo

1. Presentations:

    a. Craig Coker, Croker Composting
    b. Virginia Living Museum

2. Exhibitors:

    a. Leave No Trace
    b. JCC Stormwater
    c. America Recycles Day
    d. Virginia Peninsulas Public Service Authority
    e. Cooperative Extension
    f. JCC Law Enforcement
    g. JCC Civic Engagement
    h. JCC Parks & Recreation
    i. WJCC Public Schools
    j. City of Williamsburg

IV. Community Education and Outreach Events

1. WJCC Elementary Schools
2. askHRgreen.org events
3. Hampton Roads Sustainability Expo in Virginia Beach
4. Warhill Boosters Club Auto Show
5. VRA Conference
6. James River Fest
7. Arbor Day
8. Marine Debris Summit at VIMS
9. Anheuser Busch Environmental Health Day
10. Ford's Colony Trailblazers

V. Quarterly Clean Business Forum

1. 2015 3rd Quarter - Williamsburg Pottery
2. 2015 4th Quarter - Advanced Vision Institute
3. 2016 1st Quarter - Delightful Gardens
4. 2016 2nd Quarter - Coleman Nursery

VI. Adopt A Spot Program

1. JCC Ruritans on Centerville Road
2. Anheuser Busch at the Capital Trail
3. Ball Metal on Endeavor Drive in Grove
4. Williamsburg Plantation on Longhill Road

VII. County-Wide Spring Cleanup

1. 27 cleanup sites
2. 400 volunteers
3. 69 tons of debris
4. 428 tires

VIII. DEQ Litter Grant Reporting

1. 1,320 volunteer hours = $32,947 in-kind services
2. Six group presentations - 750 total attendance
3. Nine staffed displays - 2,500 total attendance
4. Five unstaffed displays
5. Materials distributed: coloring books, litterbags, pencils, stickers, pocket ashtrays, pens, snack clips, letter openers, recycling tattoos and fans
6. Communication: brochures, emails, Facebook postings, newsletters, newspapers, PSA radio/TV, twitter and website
7. Twenty-four total cleanup events - 561 volunteers - 657 cubic yards of litter
8. 260-cubic-yards collected from Jolly Pond Road by probationers

IX. Cigarette Litter Prevention Program at Croaker Road Commuter Parking Lot and Jamestown Beach

AGENDA ITEM NO. G.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: Board of Supervisors

FROM: Bradley J. Rinehimer

SUBJECT: Department of Motor Vehicles Grant Award – Alcohol Enforcement - $23,299

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $23,299. The funds are to be used toward alcohol traffic enforcement overtime, traffic enforcement equipment and highway safety related training. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

ATTACHMENTS:

	Description	Type
🗋	mem	Cover Memo
🗋	res	Resolution

REVIEWERS:

Department	Reviewer	Action	Date
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:44 AM
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:44 AM
Publication Management	Burcham, Nan	Approved	9/7/2016 - 10:28 AM
Legal Review	Kinsman, Adam	Approved	9/7/2016 - 10:50 AM
Board Secretary	Fellows, Teresa	Approved	9/9/2016 - 10:56 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:19 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:38 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Bradley J. Rinehimer, Chief of Police

SUBJECT: Grant Award - Department of Motor Vehicles Alcohol Enforcement - $23,299

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $23,299. The funds are to be used toward alcohol traffic enforcement overtime, traffic enforcement equipment and highway safety related training. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

The DMV typically administers annual recurring grants passed through the National Highway Transportation Safety Administration for the purpose of supporting statewide goals in enforcing highway safety laws. Each grant has a different enforcement focus area including alcohol, speed and occupant protection.

Staff recommends adoption of the attached resolution.

BJR/nb
GA-DMV-AlEnfmt-mem

Attachment

R E S O L U T I O N

GRANT AWARD - DEPARTMENT OF MOTOR VEHICLES

ALCOHOL ENFORCEMENT - $23,299

WHEREAS, the James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $23,299; and

WHEREAS, the funds are to be used towards alcohol traffic enforcement overtime, traffic enforcement equipment and highway safety related training; and

WHEREAS, the grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby authorizes the following appropriation to the Special Projects/Grants Fund:

Revenue:

FY 17 DMV - Alcohol Enforcement	$23,299

Expenditure:

FY 17 DMV - Alcohol Enforcement	$23,299

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

GA-DMV-AlEnfmt-res

AGENDA ITEM NO. G.2.

ITEM SUMMARY

DATE: 9/27/2016

TO: Board of Supervisors

FROM: Bradley J. Rinehimer

SUBJECT: Department of Motor Vehicles Grant Award – Speed Enforcement - $19,404

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $19,404. The funds are to be used toward speed traffic enforcement overtime. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

ATTACHMENTS:

	Description	Type
🗋	mem	Cover Memo
🗋	res	Resolution

REVIEWERS:

Department	Reviewer	Action	Date
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:45 AM
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:45 AM
Publication Management	Burcham, Nan	Approved	9/7/2016 - 10:49 AM
Legal Review	Kinsman, Adam	Approved	9/7/2016 - 10:50 AM
Board Secretary	Fellows, Teresa	Approved	9/9/2016 - 10:57 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:20 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:39 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Bradley J. Rinehimer, Police Chief

SUBJECT: Grant Award - Department of Motor Vehicles Speed Enforcement - $19,404

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $19,404. The funds are to be used toward speed traffic enforcement overtime. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

The DMV typically administers annual recurring grants passed through the National Highway Transportation Safety Administration for the purpose of supporting statewide goals in enforcing highway safety laws. Each grant has a different enforcement focus area including alcohol, speed and occupant protection.

Staff recommends adoption of the attached resolution.

BJR/nb
GA-SpeedEnforce-mem

Attachment

R E S O L U T I O N

GRANT AWARD - DEPARTMENT OF MOTOR VEHICLES

SPEED ENFORCEMENT - $19,404

WHEREAS, the James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $19,404; and

WHEREAS, the funds are to be used towards speed traffic enforcement overtime; and

WHEREAS, the grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby authorizes the following appropriation to the Special Projects/Grants Fund:

Revenue:

FY 17 DMV - Speed Enforcement	$19,404

Expenditure:

FY 17 DMV - Speed Enforcement	$19,404

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

GA-SpeedEnforce-res

AGENDA ITEM NO. G.3.

ITEM SUMMARY

DATE: 9/27/2016

TO: Board of Supervisors

FROM: Bradley J. Rinehimer

SUBJECT: Department of Motor Vehicles Grant Award - Occupant Protection - $5,390

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $5,390. The funds are to be used towards traffic enforcement overtime where officers will focus on the enforcement of laws related to proper use of occupant restraints. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

ATTACHMENTS:

	Description	Type
🗋	mem	Cover Memo
🗋	res	Resolution

REVIEWERS:

Department	Reviewer	Action	Date
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:45 AM
Police	Rinehimer, Bradley	Approved	9/7/2016 - 9:45 AM
Publication Management	Burcham, Nan	Approved	9/7/2016 - 10:31 AM
Legal Review	Kinsman, Adam	Approved	9/7/2016 - 10:50 AM
Board Secretary	Fellows, Teresa	Approved	9/9/2016 - 10:57 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:19 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:39 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Bradley J. Rinehimer, Police Chief

SUBJECT: Grant Award - Department of Motor Vehicles Occupant Protection - $5,390

The James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $5,390. The funds are to be used towards traffic enforcement overtime where officers will focus on the enforcement of laws related to proper use of occupant restraints. The grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties. These funds will not take the place of budgeted expenses.

The DMV typically administers annual recurring grants passed through the National Highway Transportation Safety Administration for the purpose of supporting statewide goals in enforcing highway safety laws. Each grant has a different enforcement focus area including alcohol, speed and occupant protection.

Staff recommends adoption of the attached resolution.

BJR/nb
GA-DMV-OccProt-mem

Attachment

R E S O L U T I O N

GRANT AWARD - DEPARTMENT OF MOTOR VEHICLES

OCCUPANT PROTECTION - $5,390

WHEREAS, the James City County Police Department has been awarded a highway safety grant from the Virginia Department of Motor Vehicles (DMV) Highway Safety Office for $5,390; and

WHEREAS, the funds are to be used towards alcohol traffic enforcement overtime; and

WHEREAS, the grant requires only an in-kind match, which is available through the fuel and maintenance costs for police vehicles that participate in traffic enforcement duties.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby authorizes the following appropriation to the Special Projects/Grants Fund:

Revenue:

FY 17 DMV - Occupant Protection	$5,390

Expenditure:

FY 17 DMV - Occupant Protection	$5,390

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

GA-DMV-OccProt-res

AGENDA ITEM NO. G.4.

ITEM SUMMARY

DATE: 9/27/2016

TO: Board of Supervisors

FROM: Bradley J. Rinehimer

SUBJECT: Middle Peninsula Juvenile Detention Commission Service Agreement Amendments

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The Merrimac Juvenile Detention Center is operated by the Middle Peninsula Juvenile Detention Commission for the Commonwealth of Virginia. It serves both the 9th and the 15th District Court Service Units for a total of 18 localities, including James City County. Merrimac is a 48 bed facility, which provides secure detention for juveniles who are awaiting court hearings or who have been found guilty and have been sentenced to serve time in detention.

Merrimac was established in 1994 and a service agreement was executed by all members. Since that time, there have been no changes to the service agreement. On July 22, 2016 the Middle Peninsula Juvenile Detention Center Commission unanimously voted to recommend the attached service agreement changes to the respective governing boards. There were twelve members present.

Proposed Amendment 1 would use a rolling five year average of member utilization for purposes of budgeting. This would greatly reduce uncertainty in any given year, especially for those members who have experienced wide variations in detention center utilization. Once the budget is approved, members would know their assessment for the following year, barring any unforeseen circumstances. Any year-end balance would be carried over to the next budget year. Additionally, members would be billed quarterly instead of monthly. The $2,500 minimum assessment remains unchanged.

Proposed Amendment 2 would establish a separate maintenance and replacement fund which would be shared equally among all 18 members. This amount would be budgeted annually and billed separately. If the approved budget includes a maintenance and replacement fund of $36,000, for example, then members would be assessed a separate amount of $2,000 each. This would help to share in the costs of the upkeep of the facility (separate from any capital expenses, such as a van).

These proposed amendments have been reviewed by the center's attorneys and shared with James City County, the fiscal agent for Merrimac.

Any changes to the service agreement must be approved by the governing bodies of all eighteen member localities.

ATTACHMENTS:

	Description	Type
🗋	Memo	Cover Memo
🗋	Resolution	Resolution
🗋	Resolution 2	Resolution
🗋	Existing Agreement	Backup Material

REVIEWERS:

Department	Reviewer	Action	Date
Police	Rinehimer, Bradley	Approved	9/9/2016 - 7:35 AM
Police	Rinehimer, Bradley	Approved	9/9/2016 - 7:35 AM
Publication Management	Burcham, Nan	Approved	9/9/2016 - 7:37 AM
Legal Review	Kinsman, Adam	Approved	9/9/2016 - 2:17 PM
Board Secretary	Fellows, Teresa	Approved	9/13/2016 - 8:41 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:21 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:39 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Bradley J. Rinehimer, Chief of Police

SUBJECT: Middle Peninsula Juvenile Detention Commission Service Agreement Amendments

---

The Merrimac Juvenile Detention Center is operated by the Middle Peninsula Juvenile Detention Commission for the Commonwealth of Virginia. It serves both the 9th and the 15th District Court Service Units for a total of 18 localities, including James City County. Merrimac is a 48-bed facility, which provides secure detention for juveniles who are awaiting court hearings or who have been found guilty and have been sentenced to serve time in detention.

Merrimac was established in 1994 and a service agreement was executed by all members. Since that time, there have been no changes to the service agreement. On July 22, 2016, the Middle Peninsula Juvenile Detention Center Commission unanimously voted to recommend the attached service agreement changes to the respective governing boards. There were 12 members present.

Proposed Amendment 1 would use a rolling five year average of member utilization for purposes of budgeting. This would greatly reduce uncertainty in any given year, especially for those members who have experienced wide variations in detention center utilization. Once the budget is approved, members would know their assessment for the following year, barring any unforeseen circumstances. Any year-end balance would be carried over to the next budget year. Additionally, members would be billed quarterly instead of monthly. The $2,500 minimum assessment remains unchanged.

Proposed Amendment 2 would establish a separate maintenance and replacement fund which would be shared equally among all 18 members. This amount would be budgeted annually and billed separately. If the approved budget includes a maintenance and replacement fund of $36,000, for example, then members would be assessed a separate amount of $2,000 each. This would help to share in the costs of the upkeep of the facility (separate from any capital expenses, such as a van).

These proposed amendments have been reviewed by the center's attorneys and shared with James City County, the fiscal agent for Merrimac.

Any changes to the service agreement must be approved by the governing bodies of all 18 member localities.

Staff recommends adoption of the attached amendments.

BJR/nb
MerrimacJDCtr-mem

Attachments

R E S O L U T I O N

MEMBER JURISDICTIONS OF THE MIDDLE PENINSULA JUVENILE DETENTION

COMMISSION AMENDING SECTIONS 3.7 AND 4.1 OF THEIR 1994 SERVICE AGREEMENT

BE IT CONCURRENTLY RESOLVED by the Middle Peninsula Juvenile Detention Commission, the Boards of Supervisors of the Counties of Caroline, Charles City, Essex, Gloucester, Hanover, James City, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northumberland, Richmond, Westmoreland and York, and the Councils of the Cites of Poquoson and Williamsburg, that Sections 3.7 and 4.1 of the Service Agreement adopted by all of them effective December 12, 1994, are amended and readopted as follows:

Section 3.7 Annual Budget

The Commission shall provide to each Member Jurisdiction on or before each January 1, the Commission's Annual Budget for the next fiscal year, including any proposed capital projects. Beginning with the budget for Fiscal Year 2018, and in each fiscal year thereafter, the Commission shall establish each Member Jurisdiction's annual charge for the fiscal year based on the ratio of such Member Jurisdiction's usage of space in the Detention Center during the preceding five fiscal years to the aggregate usage of space by all Member Jurisdictions during the same five fiscal years.

Section 4.1 Payments from Member Jurisdictions

a) Each Member Jurisdiction agrees to pay the Commission its annual charge for each fiscal year based on usage as determined by the method prescribed in Section 3.7.
b) One fourth of the annual charges due from Member Jurisdictions shall be invoiced quarterly by the Commission not later than the first day of the quarter. Such charges shall be due and payable to the Commission no later than 30 days from the date of the invoice, and if not paid when due shall bear interest at the rate set forth in Section 11-62.10 of the Code of Virginia unless otherwise provided by law.
c) If the amount owed by any Member Jurisdiction based on the usage calculation in Section 3.7 is below $2,500 for any fiscal year, such Member Jurisdiction shall pay the Commission a minimum charge for such fiscal year of $2,500 to cover general and administrative expenses.

_____
Michael J. Hipple
Chairman, Board of Supervisors

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

MerrimacJDCtr-res1

R E S O L U T I O N

MEMBER JURISDICTIONS OF THE MIDDLE PENINSULA JUVENILE DETENTION

COMMISSION AMENDING SECTIONS 3.7 AND 4.1 OF THEIR 1994 SERVICE AGREEMENT

BE IT CONCURRENTLY RESOLVED by the Middle Peninsula Juvenile Detention Commission, the Boards of Supervisors of the Counties of Caroline, Charles City, Essex, Gloucester, Hanover, James City, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northumberland, Richmond, Westmoreland and York, and the Councils of the Cites of Poquoson and Williamsburg, that the Service Agreement adopted by all of them effective December 12, 1994, is amended by adding a Section 4.1:1, as follows:

Section 4.1:1. Maintenance and Replacement Reserve

Notwithstanding any other provision of this Agreement, the Commission may, as part of any annual budget, set an amount to be held in a Maintenance and Replacement Fund, which will be in addition to any usage charges and will be divided equally among all Member Jurisdictions and invoiced with the first billing to them in each fiscal year.

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

MerrimacJDCtr-res2

MIDDLE PENINSULA JUVENILE DETENTION COMMISSION

SERVICE AGREEMENT

By and Among

THE MIDDLE PENINSULA JUVENILE DETENTION COMMISSION

THE COUNTY OF CAROLINE,
THE COUNTY OF CHARLES CITY,
THE COUNTY OF ESSEX,
THE COUNTY OF GLOUCESTER,
THE COUNTY OF HANOVER,
THE COUNTY OF JAMES CITY,
THE COUNTY OF KING GEORGE,
THE COUNTY OF KING & QUEEN,
THE COUNTY OF KING WILLIAM,
THE COUNTY OF LANCASTER,
THE COUNTY OF MATHEWS,
THE COUNTY OF MIDDLESEX,
THE COUNTY OF NEW KENT,
THE COUNTY OF NORTHUMBERLAND,
THE COUNTY OF RICHMOND,
THE COUNTY OF WESTMORELAND,
THE COUNTY OF YORK,

and

THE CITY OF POQUOSON,
THE CITY OF WILLIAMSBURG

Dated: December 12, 1994

SERVICE AGREEMENT

THIS SERVICE AGREEMENT (the "Agreement") is made as of December 12, 1994, by and among the MIDDLE PENINSULA JUVENILE DETENTION COMMISSION (the "Commission"), the COUNTY OF CAROLINE, VIRGINIA; the COUNTY OF CHARLES CITY, VIRGINIA; the COUNTY OF ESSEX, VIRGINIA; the COUNTY OF GLOUCESTER, VIRGINIA; the COUNTY OF HANOVER, VIRGINIA; the COUNTY OF JAMES CITY, VIRGINIA; the COUNTY OF KING GEORGE, VIRGINIA; the COUNTY OF KING & QUEEN, VIRGINIA; the COUNTY OF KING WILLIAM, VIRGINIA; the COUNTY OF LANCASTER, VIRGINIA; the COUNTY OF MATHEWS, VIRGINIA; the COUNTY OF MIDDLESEX, VIRGINIA; the COUNTY OF NEW KENT, VIRGINIA; the COUNTY OF NORTHUMBERLAND, VIRGINIA; the COUNTY OF RICHMOND, VIRGINIA; the COUNTY OF WESTMORELAND, VIRGINIA; the COUNTY OF YORK, VIRGINIA; and the CITY OF POQUOSON, VIRGINIA; and the CITY OF WILLIAMSBURG, VIRGINIA; each of which is a political subdivision of the Commonwealth of Virginia (collectively the "Member Jurisdictions").

RECITALS

WHEREAS, the Commission has been created to enhance the region for the protection of the citizens by the construction, equipping, maintenance and operation of a new juvenile detention facility (the "Center") serving the Member Jurisdictions; and

WHEREAS, the Member Jurisdictions desire to enter into a Service Agreement with the Commission governing the parties' respective obligations before, during and after construction of the Center.

NOW THEREFORE, the parties agree as follows:

ARTICLE I
Definitions

The capitalized terms in this Agreement have the meanings set forth below unless the context otherwise requires.

"Annual Budget" has the meaning given to such term in Section 3.7.

"Applicable Laws" mean all applicable laws, ordinances, judgments, decrees, injunctions, writs and orders of any court, arbitrator or governmental agency or authority and all rules, regulations, orders, interpretations, licenses and permits of any Federal, state, county, municipal, regional, foreign or other governmental body, instrumentality, agency or authority.

"Bonds" mean obligations issued by the Commission for the design, site acquisition, construction, equipping, financing and other costs of the Center.

"Center" means the Middle Peninsula Juvenile Detention Center as constructed and equipped by the Commission together with any additions or improvements thereto.

"Commission" means the Middle Peninsula Juvenile Detention Commission.

"Commission Default" has the meaning given to such term in Section 8.1.

"Expenses" mean all expenses which may reasonably be determined by the Commission to be attributable directly or indirectly to the ownership or operation of the Center and payable as operating expenses in accordance with generally accepted accounting principles and shall also include debt service payments and other capital costs, required payments to

the Operating Reserve Fund established in Section 4.3, required payments to any debt service reserve established in connection with any Bonds and other reasonable or necessary payments required to comply with debt service coverage requirements imposed in connection with any Bonds.

"Fiscal Year" means the annual accounting period from July 1 of one year to June 30 of the following year.

"Juvenile(s)" means those individuals who may under Applicable Law be held in a juvenile detention facility.

"Member Jurisdictions" means the County of Caroline, Virginia; the County of Charles City, Virginia; the County of Essex, Virginia; the County of Gloucester, Virginia; the County of Hanover, Virginia; the County of James City, Virginia; the County of King George, Virginia; the County of King & Queen, Virginia; the County of King William, Virginia; the County of Lancaster, Virginia; the County of Mathews, Virginia; the County of Middlesex, Virginia; the County of New Kent, Virginia; the County of Northumberland, Virginia; the County of Richmond, Virginia; the County of Westmoreland, Virginia; the County of York, Virginia; and the City of Poquoson, Virginia; and the City of Williamsburg, Virginia, each a political subdivision of the Commonwealth of Virginia, and each other political subdivision joining the Commission but excluding any political subdivision that may have withdrawn from the Commission, as provided in Sections 5.7 and 5.8.

"Member Jurisdiction Default" has the meaning given to such

term in Section 8.2.

"Net Expenses" mean Expenses reduced by an amount equal to revenue from (i) non-member jurisdictions (including the federal government) (ii) reimbursements from the Commonwealth of Virginia and (iii) all other non-member revenue.

"Notes" means bond anticipation notes issued by the Commission.

"Obligations" means the Notes or Bonds issued by the Commission.

"Operating Reserve Fund" means the reserve fund established in Section 4.3.

"Per Diem Charge" means the uniform daily charge to Member Jurisdictions for each Juvenile as set forth in Section 3.7.

"Placed in Service" means the first day on which the Center has been certified by the appropriate authority of the Commonwealth to accept Juveniles.

ARTICLE II
Construction and Financing

Section 2.1 **Construction of Center**. The Commission agrees to construct and equip the Center, designed initially to hold 32 Juveniles, at a site selected by the Commission in accordance with Applicable Laws. The initial construction of the Center shall include core facilities to accommodate a capacity of 48 Juveniles. At such time as the Commission determines that the construction to a total of 48 beds is necessary, the Commission shall proceed with such additional construction.

Section 2.2 Permits. The Commission shall construct and operate the Center in accordance with the requirements of all Applicable Laws. The Member Jurisdictions agree to provide reasonable assistance to the Commission in complying with any such requirements, and shall provide the Commission with any and all information that may be necessary in this regard.

Section 2.3 Agreement to Finance. The initial construction cost of the Center is estimated at $3,451,000. The Commission intends to finance the cost of constructing and equipping the Center, including expenses associated with financing, through the issuance of Bonds or other indebtedness. In addition, in advance of the issuance of Bonds or other indebtedness, the Commission may issue bond anticipation notes or other short-term obligations. One-half of the eligible construction cost of the Center is expected to be funded by the Commonwealth of Virginia. Such funding has been approved by the Board of Family and Youth Services. In the event the 1995 General Assembly does not appropriate funds to cover one-half of the eligible construction cost or does not adopt language indicating its intent to do so in the Fiscal Year following completion of the Center, the Commission shall not enter into a construction contract (other than for site work) or issue permanent financing without giving each Member Jurisdiction the opportunity to withdraw from the Commission.

ARTICLE III
Provision of Services, Operation and Maintenance

Section 3.1 Acceptance of Juveniles. Immediately after the

Center is Placed in Service, the Commission shall be responsible for accepting and housing all Juveniles from each Member Jurisdiction. Each Member Jurisdiction shall have the right to house at least one Juvenile at the Center at all times, with the exception that the four jurisdictions who have had the most juvenile bed days the previous fiscal year shall have the right to house at least three juveniles at the Center at all times for the next fiscal year and the five jurisdictions who have had the next most juvenile beds days over the previous fiscal year shall have the right to house at least two Juveniles at the Center at all times for the next Fiscal Year. Upon expansion to 48 beds, each Member Jurisdiction shall have the right to house two Juveniles at the Center, and the six jurisdictions who have had the most Juveniles under the previous formula shall each have the right to hold an additional Juvenile than under the previous formula. In the event a Juvenile from one of the Member Jurisdictions is placed by the Court in a secure detention facility and the Center is at capacity, the Commission shall be responsible for finding bed space for such Juvenile. Even if the bed space is in a facility other than the Center the Member Jurisdiction will be charged the same Per Diem Charge as if the Juvenile were housed in the Center. To the extent space is available, the Commission will endeavor to accept Juveniles from other jurisdictions.

Section 3.2 **Commitment of Juveniles.** Each Member Jurisdiction agrees, to the extent permitted by Applicable Laws, to commit all of its eligible Juveniles to the custody of the

Commission.

Section 3.3 **Transportation of Juveniles.** Unless the Commission agrees otherwise, each Member Jurisdiction shall be responsible for the initial transportation of Juveniles from such Jurisdiction to the Center. Thereafter, the Commission shall be responsible for transporting Juveniles to and from the Center and for all costs, expenses and security relating to such Juveniles during transportation.

Section 3.4 **Operation and Maintenance.** The Commission shall operate and maintain the Center in accordance with all other Applicable Laws. The Commission shall be an equal opportunity employer.

Section 3.5 **Insurance.** The Commission shall maintain hazard, liability or such other insurance as may be required by Applicable Law or which the Commission may deem advisable.

Section 3.6. **Annual Report.** The Commission shall provide to each Member Jurisdiction on or before each October 1 a report showing the activities and the revenues, expenditures, and employee compensation schedules and other similar data of the Commission for the preceding Fiscal Year.

Section 3.7 **Annual Budget.** The Commission shall provide to each Member Jurisdiction on or before each January 1 the Commission's Annual Budget for the next Fiscal Year including any proposed capital projects. For each Fiscal Year in which the Center will be in operation, such Annual Budget shall set forth the Per Diem Charge for each Juvenile committed to the Commission by

the Member Jurisdictions as well as the projected number of Juveniles from each Member Jurisdiction. Such Per Diem Charge shall be sufficient to generate revenue adequate to pay anticipated Net Expenses and to fund any required reserves. The Per Diem Charge shall be revised during the year when necessary. Within ten days of any revision to the Per Diem Charge, the Commission shall notify each Member Jurisdiction of such revision.

Section 3.8 **Books and Records.** The Commission shall maintain proper books of record and account in which proper entries shall be made in accordance with generally accepted accounting principles for governmental bodies, consistently applied, of all of its business and affairs related to the Center. The Commission shall also establish and maintain adequate financial policies and procedures to ensure the safeguarding of Commission assets. All books of record and account and documents in the Commission's possession relating to the Center shall at all reasonable times be open to inspection by such agents or employees of the Member Jurisdictions as they may designate.

Section 3.9 **Preliminary Responsibilities.** Before the Center is Placed in Service, the Commission shall be responsible for (i) the final design, construction and equipping of the Center, (ii) the employment or procurement of administrators and staff, (iii) the adoption of rules, regulations, policies and guidelines for the operation and maintenance of the Center, not inconsistent with standards of the Virginia Board of Youth and Family Services, and (iv) the arrangements for financing the Center.

ARTICLE IV
Payments

Section 4.1 Payments from Member Jurisdictions.

(a) Each Member Jurisdiction agrees to pay the Commission the Per Diem Charge for each day a Juvenile from that Member Jurisdiction is held at the Center or in another detention facility secured by the Commission. A substantial portion of the operating costs of the Center are currently funded by the Commonwealth, and are expected to be in the future.

(b) The Per Diem Charges due from Member Jurisdictions shall be invoiced monthly by the Commission. Such charges shall be due and payable to the Commission no later than 30 days from receipt of the charges and if not paid when due shall bear interest at the rate set forth in Section 11-62.10 of the Code of Virginia unless otherwise provided by law.

(c) If for any reason the Center is not constructed or Placed In Service, or if no Juveniles have been placed at the Center, each Member Jurisdiction shall reimburse the Commission for an equal share of all Net Expenses not previously paid by the Member Jurisdictions; provided, however, that the payment required by any Member Jurisdiction will be subject to the appropriation of funds for such purpose by the governing body of the Member Jurisdiction. In addition, in the event the cumulative Per Diem Charges paid by a Member Jurisdiction during a Fiscal Year is below $2,500, such Member Jurisdiction shall pay the Commission an amount which, when combined with the Per Diem Charges, equals $2,500 to cover general administrative expenses.

Section 4.2 **Payments from Other Jurisdictions.** Within the limits allowed by law, the Commission shall establish a per diem charge or charges for the care, maintenance and subsistence of Juveniles from non-member jurisdictions. Such non-member per diem charges shall be due and payable to the Commission from non-member jurisdictions having Juveniles in the Center no later than 30 days from receipt of the charges and if not paid when due shall bear interest at the such rate as the Commission shall establish unless otherwise provided by law.

Section 4.3 **Operating Reserve Fund.** The Commission agrees to provide for an Operating Reserve Fund in each of its Annual Budgets in an amount equal to not less than 60 days of its projected Annual Budget for each year less debt service. The Operating Reserve Fund shall be established as a separate account and shall be used to cover periods of revenue shortfall when the Commission's revenues are not sufficient to cover its Net Expenses other than debt service.

Section 4.4 **Limitation of Liability.** The only obligation of the Member Jurisdictions to pay for the establishment, operation or maintenance of the Center arises out of this Agreement. No such payment responsibility shall constitute a debt of any Member Jurisdiction within the meaning of any constitutional or statutory limitation.

ARTICLE V
Additional Agreements

Section 5.1 **Sale or Other Conveyance.** The Commission will not sell, lease, sublease, assign, convey or otherwise voluntarily

dispose of the Center unless the Notes, Bonds and any other debt incurred by the Commission have been or will be paid or deemed defeased in accordance with the agreements pursuant to which they were issued. Any amounts remaining after such disposal shall be returned to the then current Member Jurisdictions on a pro rata basis based on the total of Per Diem Charges paid by each such Member Jurisdiction since the Center was Placed in Service.

Section 5.2 **Further Documents and Data.** The parties to this Agreement will execute and deliver all documents and perform all further acts that may be reasonably necessary to perform the obligations and consummate the transactions contemplated by this Agreement.

Section 5.3 **Right to Access.** Each Member Jurisdiction will have reasonable access to the Center in order to monitor the Commission's compliance with the terms of this Agreement.

Section 5.4 **Confidentiality.** The Commission will maintain all records and files on the Juveniles on a confidential basis in accordance with all Applicable Laws.

Section 5.5 **Notification.** The Commission will promptly furnish to each Member Jurisdiction a copy of any notice or order of any governmental authority asserting that the Commission or the Center is not in compliance in any material respect with any Applicable Law.

Section 5.6 **Tax-Exemption Covenant.**

(a) The Commission intends to issue the Notes and Bonds in a manner such that their interest is excludable from gross

income for Federal income tax purposes under Section 103(a) and related provisions of the Internal Revenue Code of 1986, as amended, and applicable rules and regulations. The Commission and each Member Jurisdiction agree that after the Notes and Bonds have been issued they will not take any action or omit to take any action which would adversely affect such exclusion.

(b) The Member Jurisdictions, each of whom will receive a benefit from the construction of the Center and the financing thereof by the Commission, agree pursuant to Section 265(b)(3)(C)(iii) of the Internal Revenue Code to allocate the amount of each issue of tax-exempt obligations issued by the Commission for the initial construction of the Center, including design and preliminary site work, as well as the expansion to 48 beds, to themselves on an equal basis.

Section 5.7 **Additional Members.** Any city or county in Virginia may, with the approval of its governing body and with the consent of the Commission and the governing bodies of all of the Member Jurisdictions, join and participate in the Commission under such additional terms and conditions for membership as may be prescribed by the Commission.

Section 5.8 **Withdrawal of Membership.** Any Member Jurisdiction may withdraw from membership in the Commission by resolution or ordinance of its governing body; however, other than as set forth in Section 2.3, no Member Jurisdiction shall be

permitted to withdraw from the Commission after any Obligations have been incurred and are outstanding except by unanimous vote of all Member Jurisdictions. A withdrawing Member Jurisdiction shall not receive any payment from the Commission unless agreed to by all of the governing bodies of the remaining Member Jurisdictions.

ARTICLE VI
Representations, Warranties and Covenants of Commission

In addition to the covenants in other Articles of this Agreement, the Commission represents, warrants and covenants as follows:

Section 6.1 **Organization, Authorization and Validity.** The Commission is a political subdivision of the Commonwealth duly organized and validly existing under the laws of the Commonwealth and has duly authorized, executed and delivered this Agreement.

Section 6.2 **Authority.** The Commission has all requisite authority to execute and deliver and perform its obligations under this Agreement and is not a party to any indenture, contract or other agreement or arrangement, the performance of which by the Commission would prevent or materially and adversely affect the Commission's ability to perform the terms of this Agreement.

Section 6.3 **Non-Contravention.** The execution and delivery of this Agreement by the Commission and the consummation of the transactions contemplated in it will not conflict with or result in a breach of or constitute a default under or violate any of the terms, conditions or provisions of the bylaws of the Commission or any material indenture, contract or other agreement or arrangement

to which the Commission is a party or by which any of its properties are bound, or any Applicable Law by which the Commission or the Center is bound.

Section 6.4 **Litigation.** The Commission is not a party to any legal, administrative, arbitration or other proceeding or controversy pending, or, to the best of the Commission's knowledge, threatened, which would materially adversely affect the Commission's ability to perform under this Agreement.

Section 6.5 **Approvals.** Except for approvals that may be required by the Virginia Board of Family and Youth Services and as otherwise stated herein, the Commission does not require the consent or approval of any governmental body to carry out the terms of this Agreement.

ARTICLE VII
Representations, Warranties and Covenants of Member Jurisdictions

Each Member Jurisdiction represents, warrants and covenants for itself as follows:

Section 7.1 **Organization, Authorization and Validity.** Each Member Jurisdiction is a political subdivision of the Commonwealth duly organized and validly existing under the laws of the Commonwealth, and each has duly authorized, executed and delivered this Agreement.

Section 7.2 **Authority.** Each Member Jurisdiction has all requisite authority to execute and deliver and perform its obligations under this Agreement and is not a party to any indenture, contract or other agreement or arrangement, the

performance of which by it would prevent or materially and adversely affect its individual performance under this Agreement.

Section 7.3 **Non-Contravention**. The execution and delivery of this Agreement by each Member Jurisdiction and the consummation of the transactions contemplated in it will not conflict with or result in a breach of or constitute a default under or violate any of the terms, conditions or provisions of any charter, resolution or ordinance, any material indenture, contract or agreement or arrangement to which it is a party or by which any of its properties are bound, or any Applicable Law by which it is bound.

Section 7.4 **Litigation**. No Member Jurisdiction is a party to any legal, administrative, arbitration, or other proceeding or controversy pending, or, to the best of its knowledge, threatened, which would materially and adversely affect its ability to perform under this Agreement.

ARTICLE VIII
Defaults and Remedies

Section 8.1 **Default by Commission**. The occurrence of any one or more of the following events will constitute an "Event of Default" by the Commission ("Commission Default"):

(i) failure of the Commission to pay principal of or interest when due on any Notes, Bonds or other temporary or permanent financing for the Center issued or obtained by the Commission pursuant to this Agreement;

(ii) if the Commission is for any reason rendered incapable of performing any of its material obligations under this Agreement;

(iii) the Commission makes an assignment of all or a portion of its obligations under this Agreement without the prior consent of the Member Jurisdictions;

(iv) the Commission defaults on any of its material obligations under any agreement pursuant to which any Note, Bonds or other temporary or permanent financing for the Center is issued or obtained by the Commission pursuant to this Agreement and such default is not cured within the applicable cure period;

(v) any proceeding is instituted, with the consent or acquiescence of the Commission, for the purpose of effecting a composition between the Commission and its creditors or for the purpose of adjusting the claims of such creditors pursuant to any federal or state statute now or hereafter enacted, if the claims of such creditors are under any circumstances payable from the funds of the Commission; or

(vi) the Commission defaults in the due and punctual performance of any other of the covenants, conditions, agreements and provisions contained in this Agreement, and the default continues for thirty days after written notice specifying the default and requiring it to be remedied has been given to the Commission by any Member Jurisdiction.

Section 8.2 **Default by Member Jurisdictions.** The occurrence of any one or more of the following events will

constitute an "Event of Default" by any Member Jurisdiction ("Member Jurisdiction Default"):

(i) failure of any Member Jurisdiction to make payments of Per Diem Charges or other charges when due;

(ii) any Member Jurisdiction shall for any reason be rendered incapable of fulfilling its obligations under this Agreement; or

(iii) any proceeding is instituted, with the consent or acquiescence of any Member Jurisdiction, for the purpose of effecting a composition between such Member Jurisdiction and its creditors or for the purpose of adjusting the claims of such creditors pursuant to any federal or state statute now or hereafter enacted, if the claims of such creditors are under any circumstances payable from the funds of such Member Jurisdiction; or

(iv) any Member Jurisdiction defaults in the due and punctual performance of any of the other covenants, conditions, agreements and provisions contained in this Agreement, and the default continues for thirty days after written notice specifying the default and requiring it to be remedied has been given to such Member Jurisdiction by the Commission.

Section 8.3 **Remedies of Member Jurisdictions.** Upon the occurrence of a Commission Default, any Member Jurisdiction, after giving notice of such Commission Default to all parties, may bring suit by mandamus or other appropriate proceeding to require the

Commission to perform its duties under this Agreement or to enjoin any acts in violation of this Agreement.

Section 8.4 **Remedies of Commission.** Upon the occurrence of a Member Jurisdiction Default, the Commission, after giving notice of such Member Jurisdiction Default to all parties, may bring suit by mandamus or other appropriate proceeding to require the Member Jurisdiction to perform its duties under this Agreement or to enjoin any acts in violation of this Agreement.

Section 8.5 **Remedies Not Exclusive.** No remedy in this Agreement conferred upon or reserved to the parties is intended to be exclusive of any other remedy, and each remedy is cumulative and in addition to every other remedy given under this Agreement or now or hereafter existing at law, in equity or by statute.

ARTICLE IV
Miscellaneous

Section 9.1 **Severability of Invalid Provisions.** If any clause, provision or section of this Agreement is held to be illegal or invalid by any court, the invalidity of the clause, provision or section will not affect any of the remaining clauses, provisions or sections, and this Agreement will be construed and enforced as if the illegal or invalid clause, provision or section has not been contained in it.

Section 9.2 **Notices.** Any notice or other communication under or in connection with this Agreement shall be in writing, and shall be effective when delivered in person or sent in the United States mail, postage prepaid, to the following persons and addresses or to such other persons and addresses as any of such

persons may from time to time specify in writing.

If to the Commission:

Chairman
Middle Peninsula Juvenile Detention Commission

If to a Member Jurisdiction:

The County or City Administrator from such Member Jurisdiction.

Section 9.3 **Governing Law.** This Agreement shall be governed by, and construed and enforced in accordance with, the laws of the Commonwealth of Virginia.

Section 9.4 **Amendments.** This Agreement may be changed or amended only with the consent of the Commission and each Member Jurisdiction. No such change or amendment may be made which will affect adversely the prompt payment when due of all moneys required to be paid by the Member Jurisdictions under the terms of this Agreement, and no such change or amendment shall be effective which would cause a violation of any provision of any resolution, indenture or agreement pursuant to which any Notes, Bonds or other temporary or permanent financing for the Center is issued or obtained by the Commission.

Section 9.5 **Effective Date of Agreement.** This Agreement will be effective from the date of its approval by all of the Member Jurisdictions and the Commission. If a Member Jurisdiction does not wish to enter into this Agreement, it shall so signify by adopting a resolution indicating its intent to withdraw from the Commission, and the Agreement shall be effective as to the rest of the parties.

Section 9.6 **Waiver**. Any waiver by any party of its rights under this Agreement must be in writing, and will not be deemed a waiver with respect to any matter not specifically covered. Nothing in this Agreement authorizes the waiver of any Member Jurisdiction's obligation to make payments when due of all monies required to be paid by the Member Jurisdictions under the terms of this Agreement.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed as of the date above written.

MIDDLE PENINSULA JUVENILE DETENTION COMMISSION

By: _____
Chairman

COUNTY OF CAROLINE

By: _____
County Administrator

COUNTY OF CHARLES CITY

By: _____
County Administrator

COUNTY OF ESSEX

By: _____
County Administrator

COUNTY OF GLOUCESTER

By: _____
County Administrator

COUNTY OF HANOVER

By: _____
County Administrator

COUNTY OF JAMES CITY

By: _____
County Administrator

COUNTY OF KING GEORGE

By: _____
County Administrator

COUNTY OF KING & QUEEN

By: _____
County Administrator

COUNTY OF KING WILLIAM

By: _____
County Administrator

COUNTY OF LANCASTER

By: _____
County Administrator

COUNTY OF MATHEWS

By: _____
County Administrator

COUNTY OF MIDDLESEX

By: _____
County Administrator

COUNTY OF NEW KENT

By: _____
County Administrator

COUNTY OF NORTHUMBERLAND

By: _____
County Administrator

COUNTY OF RICHMOND

By: _____
County Administrator

COUNTY OF WESTMORELAND

By: _____
County Administrator

COUNTY OF YORK

By: _____
County Administrator

CITY OF WILLIAMSBURG

By: _____
City Manager

CITY OF POQUOSON

By: _____
City Manager

AGENDA ITEM NO. G.5.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board Of Supervisors

FROM: Scott J. Thomas, Director of Engineering and Resource Protection

SUBJECT: Dedication of Streets in Section 2 of the White Hall Subdivision-Stonehouse District

---

Initiation of a street acceptance into the Virginia Secondary System of Highways.

ATTACHMENTS:

	Description	Type
🗋	mem	Cover Memo
🗋	res	Resolution
🗋	VDOT Form AM-4.3	Exhibit
🗋	Map	Exhibit

REVIEWERS:

Department	Reviewer	Action	Date
Engineering & Resource Protection	Thomas, Scott	Approved	9/9/2016 - 4:17 PM
Development Management	Holt, Paul	Approved	9/9/2016 - 4:20 PM
Publication Management	Burcham, Nan	Approved	9/9/2016 - 4:40 PM
Legal Review	Kinsman, Adam	Approved	9/12/2016 - 3:57 PM
Board Secretary	Fellows, Teresa	Approved	9/13/2016 - 8:40 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:19 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:38 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Scott J. Thomas, Director of Engineering and Resource Protection

SUBJECT: Dedication of Streets in Section 2 of the White Hall Subdivision

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Attached is a resolution requesting acceptance of the streets in Section 2 of the White Hall Subdivision which are proposed as public right-of-ways into the State Secondary Highway System. The streets proposed for acceptance are shown in red on the attached map. The streets have been inspected and approved by representatives of the Virginia Department of Transportation (VDOT) as meeting the minimum requirements for secondary roadways.

VDOT's Secondary Street Acceptance Requirements (SSAR), effective March 2009 and updated December 2011, outline processes on how streets are designed, constructed, and officially accepted for maintenance as part of the secondary system of State highways. Upon the satisfactory completion of construction of streets, VDOT advises and coordinates with the local governing body of the street's readiness for acceptance through the use of VDOT's Form AM-4.3. As part of the initial acceptance process, the County Board of Supervisors must request, by resolution, that VDOT accept the street for maintenance as part of the secondary system of state highways. Administrative procedures outlined in the SSAR/24VAC30-92-70 lists criteria for street acceptance and what information is required on the local resolution. Once the resolution is approved, the signed Form AM-4.3 and the resolution are then returned to VDOT. VDOT then officially notifies the locality of the street's acceptance into the secondary system of state highways and the effective date of such action. This notification serves as the start of VDOT maintenance responsibility. As part of the process, the County will hold an appropriate amount of subdivision or public improvement surety for the roadway, as required by local ordinances, until the acceptance process is complete. Also, within 30 days of the local governing body's request (resolution), VDOT requires a maintenance surety to be posted by the developer to guarantee performance of the street for one year from the date of acceptance.

Staff recommends the adoption of the attached resolution.

SJT/nb
WhiteHallSection2StDed-mem

Attachments

R E S O L U T I O N

DEDICATION OF THE STREETS IN SECTION 2 OF THE WHITE HALL SUBDIVISION

WHEREAS, the streets described on the attached AM-4.3, fully incorporated herein by reference, is shown on plats recorded in the Clerk's Office of the Circuit Court of James City County; and

WHEREAS, the Residency Administrator for the Virginia Department of Transportation (VDOT) advised the Board that the street meets the requirements established by the Subdivision Street Acceptance Requirements of VDOT; and

WHEREAS, the County and VDOT entered into an agreement on July 1, 1994, for comprehensive stormwater detention which applies to this request for addition.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby requests VDOT to add the street described in the attached Additions Form AM-4.3 to the secondary system of state highways, pursuant to §33.2-705 of the Code of Virginia, and the Department's Subdivision Street Acceptance Requirements.

BE IT FURTHER RESOLVED the Board guarantees a clear and unrestricted right-of-way, as described and any necessary easements for cuts, fills and drainage.

BE IT FURTHER RESOLVED that a certified copy of this resolution be forwarded to the Residency Administrator for VDOT.

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

WhiteHallSection2StDed-res

In the County of James City

By resolution of the governing body adopted September 27, 2016

The following VDOT Form AM-4.3 is hereby attached and incorporated as part of the governing body's resolution for changes in the secondary system of state highways.

A Copy Testee *Signed (County Official):* _____

Report of Changes in the Secondary System of State Highways

Project/Subdivision White Hall Section 2

Type Change to the Secondary System of State Highways: **Addition**

The following additions to the Secondary System of State Highways, pursuant to the statutory provision or provisions cited, are hereby requested; the right of way for which, including additional easements for cuts, fills and drainage, as required, is hereby guaranteed:

Reason for Change: New subdivision street

Pursuant to Code of Virginia Statute: §33.2-705

Street Name and/or Route Number

- **Lindsey Lane, State Route Number 1819**

  Old Route Number: 0

  - From: Wescott Drive (Route 1818)

    To: Taverns Lane (Route 1817), a distance of: 0.18 miles.

    Recordation Reference: N/A

    Right of Way width (feet) = 50

Street Name and/or Route Number

- **Sheldon Branch Place, State Route Number 1814**

  Old Route Number: 0

  - From: Wescott Drive (Route 1818)

    To: Geddy Terrace (Route 1815), a distance of: 0.08 miles.

    Recordation Reference: N/A

    Right of Way width (feet) = 50

Street Name and/or Route Number

- **Hickory Neck Boulevard, State Route Number 1813**

  Old Route Number: 0

  - From: Sheldon Branch Place (Route 1814)

    To: Wescott Drive (Route 1818), a distance of: 0.05 miles.

    Recordation Reference: N/A

    Right of Way width (feet) = 60

Street Name and/or Route Number

♦ **Hickory Neck Boulevard, State Route Number 1813**

Old Route Number: 0

- From: Wescott Drive (Route 1818)

  To: Taverns Lane (Route 1817), a distance of: 0.18 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Geddy Terrace, State Route Number 1815**

Old Route Number: 0

- From: Rochambeau Drive (Route 30)

  To: Sheldon Branch Place (Route 1814), a distance of: 0.04 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Geddy Terrace, State Route Number 1815**

Old Route Number: 0

- From: Taverns Lane (Route 1817)

  To: Sheldon Branch Place (Route 1814), a distance of: 0.13 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Taverns Lane, State Route Number 1817**

Old Route Number: 0

- From: Lindsey Lane (Route 1819)

  To: Geddy Terrace (Route 1815), a distance of: 0.05 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Taverns Lane, State Route Number 1817**

Old Route Number: 0

- From: Hickory Neck Boulevard (Route 1813)

  To: Lindsey Lane (Route 1819), a distance of: 0.06 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Wescott Drive, State Route Number 1818**

Old Route Number: 0

- From: Leighton Boulevard (Route 1816)

  To: Hickory Neck Boulevard (Route 1813), a distance of: 0.07 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Leighton Boulevard, State Route Number 1816**

Old Route Number: 0

- From: Sheldon Branch Terrace (Route 1814)

  To: Wescott Drive (Route 1818), a distance of: 0.06 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Hickory Neck Boulevard, State Route Number 1813**

Old Route Number: 0

- From: Richmond Road (Route 60)

  To: Sheldon Branch Place (Route 1814), a distance of: 0.07 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 75

Street Name and/or Route Number

♦ **Taverns Lane, State Route Number 1817**

Old Route Number: 0

- From: Leighton Boulevard (Route 1816)

  To: Hickory Neck Boulevard (Route 1813), a distance of: 0.06 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Leighton Boulevard, State Route Number 1816**

Old Route Number: 0

- From: Wescott Drive (Route 1818)

  To: Taverns Lane (Route 1817), a distance of: 0.18 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Geddy Terrace, State Route Number 1815**

Old Route Number: 0

- From: Sheldon Branch Place (Route 1814)

  To: Taverns Lane (Route 1817), a distance of: 0.09 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

♦ **Wescott Drive, State Route Number 1818**

Old Route Number: 0

- From: Hickory Neck Boulevard (Route 1813)

  To: Lindsey Lane (Route 1819), a distance of: 0.06 miles.

  Recordation Reference: N/A

  Right of Way width (feet) = 50

Street Name and/or Route Number

- **Sheldon Branch Place, State Route Number 1814**

Old Route Number: 0

- From: stub-out

To: Leighton Boulevard (Route 1816), a distance of: 0.03 miles.

Recordation Reference: N/A

Right of Way width (feet) = 50

Street Name and/or Route Number

- **Sheldon Branch Place, State Route Number 1814**

Old Route Number: 0

- From: Hickory Neck Boulevard (Route 1813)

To: Wescott Drive (Route 1818), a distance of: 0.10 miles.

Recordation Reference: N/A

Right of Way width (feet) = 50

Street Name and/or Route Number

- **Sheldon Branch Place, State Route Number 1814**

Old Route Number: 0

- From: Leighton Boulevard (Route 1816)

To: Hickory Neck Boulevard (Route 1813), a distance of: 0.08 miles.

Recordation Reference: N/A

Right of Way width (feet) = 50

Street Name and/or Route Number

- **Wescott Drive, State Route Number 1818**

Old Route Number: 0

- From: Lindsey Lane (Route 1819)

To: Sheldon Branch Terrace (Route 1814), a distance of: 0.02 miles.

Recordation Reference: N/A

Right of Way width (feet) = 50

Dedication of Streets in Section 2 of the White Hall Subdivision

Legend

Streets to be Dedicated

N

1 inch = 258 feet

AGENDA ITEM NO. G.6.

ITEM SUMMARY

DATE:	9/27/2016
TO:	The Board of Supervisors
FROM:	Roberta Souloff, Planner
SUBJECT:	Initiation of Consideration of Amendments to the Zoning Ordinance to Allow Mobile Food Vending Vehicles (Food Trucks) in the B-1, General Business District.

ATTACHMENTS:

	Description	Type
🗋	Staff Memo	Cover Memo
🗋	Initiating Resolution	Cover Memo
🗋	Letter of Support from the James City County Economic Development Authority	Backup Material

REVIEWERS:

Department	Reviewer	Action	Date
Planning	Holt, Paul	Approved	9/16/2016 - 1:56 PM
Development Management	Holt, Paul	Approved	9/16/2016 - 1:56 PM
Publication Management	Burcham, Nan	Approved	9/16/2016 - 2:05 PM
Legal Review	Kinsman, Adam	Approved	9/19/2016 - 11:47 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 11:57 AM
Board Secretary	Purse, Jason	Approved	9/20/2016 - 10:37 AM
Board Secretary	Fellows, Teresa	Approved	9/20/2016 - 10:40 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Roberta Sulouff, Planner

SUBJECT: Initiation of Consideration of Amendments to the Zoning Ordinance to Allow Mobile Food Vending Vehicles (Food Trucks) in the B-1, General Business District

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On February 9, 2016, the Board of Supervisors asked staff and the Planning Commission to research the issue of food trucks and to initiate a discussion and consideration of the issue, specifically considering what may be the best fit for James City County.

Following the Board's adoption of the Initiating Resolution on April 12, staff began working with the Policy Committee to research and develop draft Zoning Ordinance language to define and allow food trucks in the M-1, Limited Business/Industrial District; M-2, General Industrial District; and PUD-C, Planned Unit Development Commercial District.

On September 7, 2016, the Planning Commission adopted an Initiating Resolution to expand the scope of research to include the PL, Public Land District.

On September 14, 2016, staff received a copy of a letter from Mr. Thomas Tingle, Chairman of the James City County Economic Development Authority, to Mr. Rich Krapf, Chairman of the Policy Committee, requesting consideration of adding food trucks as a Permitted Use in the B-1, General Business District. Amendments to allow this use in B-1 would entail amendments of Sec. 24-390, Use List to add the proposed use as a Permitted Use in this district.

In order to more fully consider this approach, staff recommends that the Board of Supervisors adopt the attached resolution to formally initiate consideration of such amendments to the Zoning Ordinance and refer this matter to the Planning Commission's Policy Committee.

RS/nb
AmendZO-FoodTrucks-mem

Attachment:
1. Initiating Resolution
2. Letter of Support from the James City County Economic Development Authority

R E S O L U T I O N

INITIATION OF CONSIDERATION OF AMENDMENTS TO THE ZONING ORDINANCE

TO ALLOW MOBILE FOOD VENDING VEHICLES (FOOD TRUCKS)

IN THE B-1, GENERAL BUSINESS DISTRICT

WHEREAS, the Virginia Code § 15.2-2286 and County Code § 24-13 permits the Board of Supervisors of James City County, Virginia (the "Board") to, by resolution, initiate amendments to the regulations of the Zoning Ordinance that the Board finds to be prudent; and

WHEREAS, amendments to the Zoning Ordinance are necessary in order to permit operation of mobile food vending vehicles (food trucks) in the B-1, General Business District; and

WHEREAS, the Board is of the opinion that the public necessity, convenience, general welfare or good zoning practice warrant the consideration of amendments to the Zoning Ordinance.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, does hereby, by resolution, initiate staff review of Article I, Section 24-2, Article II, Division 1, and Article V, Division 10, General Business District, B-1, of Chapter 24 of the Zoning Ordinance of the James City County Code in regards to including provisions for the operation of mobile food vending vehicles. The Planning Commission shall hold at least one public hearing on the consideration of amendments to said Ordinance and shall forward its recommendation to the Board of Supervisors in accordance with the law.

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

AmendZO-FoodTrucks-res

Economic Development Authority
101-D Mounts Bay Road
PO Box 8784
Williamsburg, VA 23187
P: 757-253-6607

yesjamescitycountyva.com

September 14, 2016

Mr. Richard Krapf
Chair, Policy Committee
James City County Planning Commission
PO Box 8784
Williamsburg, VA 23187

Dear Mr. Krapf:

On behalf of the James City County Economic Development Authority (EDA), I would like to commend county staff and the Planning Commission for their work drafting the Mobile Food Vending Vehicle (Food Truck) ordinance. Food trucks are growing in acceptance and popularity across the country, and more recently across Hampton Roads. The EDA is supportive of allowing the operation of food trucks in James City County.

As currently proposed, the ordinance applies to the M-1, M-2, PUD-C and PL zoning districts. This would allow reasonably priced and accessible dining options to the employees of our industrial parks and visitors to our public spaces and County parks.

Furthermore, food trucks provide dining options to visitors of craft beer and distillery operations. As breweries and distilleries are currently permitted by-right in the M-1, M-2 and B-1 zoning districts, the EDA unanimously recommends that the ordinance be expanded to include B-1 districts. This would provide consistency for both food truck operators and brewery and distillery operations, and support the symbiotic relationship between these two business sectors.

The EDA is excited about this new opportunity in James City County, which can encourage food service entrepreneurs to offer diverse and interesting food options and provide a lower-cost start up model for new businesses, who may transition their success into brick and mortar operations. I am pleased to offer the EDA's support for the proposed Mobile Food Vending Vehicle ordinance, and strongly encourage you to consider including the B-1 district into the ordinance.

Sincerely,

Thomas G. Tingle
Chairman, EDA

Cc: JCC Planning Staff
JCC County Administration

AGENDA ITEM NO. H.1.

ITEM SUMMARY

DATE:	9/27/2016
TO:	The Board of Supervisors
FROM:	Alyssa D'Angelo, Legal Intern
SUBJECT:	An Ordinance to amend and reordain Chapter 10, Garbage and Refuse, Article I, In General, Section 10-4, Maintenance of premises-duty of owners, occupants and persons in charge, of the James City County Code to define that "other foreign growth" on vacant developed properties includes overgrown shrubs, trees, and natural growth.

ATTACHMENTS:

	Description	Type
🗋	mem	Cover Memo
🗋	ordinance	Ordinance
🗋	ordinance-final	Ordinance

REVIEWERS:

Department	Reviewer	Action	Date
Attorney	Kinsman, Adam	Approved	7/21/2016 - 8:28 AM
Publication Management	Burcham, Nan	Approved	7/21/2016 - 10:02 AM
Legal Review	Kinsman, Adam	Approved	7/22/2016 - 10:52 AM
Board Secretary	Fellows, Teresa	Approved	7/22/2016 - 11:05 AM
Board Secretary	Purse, Jason	Approved	9/20/2016 - 8:24 AM
Board Secretary	Fellows, Teresa	Approved	9/20/2016 - 9:37 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Alyssa D'Angelo, Legal Intern

SUBJECT: Ordinance Amendments to Chapter 10, Garbage and Refuse, Article I, In General, Section 10-4, Maintenance of premises-duty of owners, occupants and persons in charge

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Attached for your consideration is an Ordinance revising Chapter 10, Garbage and Refuse, to reflect an amendment to § 15.2-901 of the Code of Virginia, relating to cutting of grass, weeds and other foreign objects.

The proposed changes to the County Code are as follows:

1. The definition of "other foreign growth" is expanded for vacant developed properties to include overgrown shrubs, trees and natural growth in accordance with the Code of Virginia.

This change will update the County Code to align with the Code of Virginia.

LA/nb
OrdamendCh10-mem

Attachment

ORDINANCE NO._____

AN ORDINANCE TO AMEND AND REORDAIN CHAPTER 10 OF THE CODE OF THE COUNTY OF JAMES CITY, VIRGINIA, BY AMENDING ARTICLE I, IN GENERAL, SECTION 10-4, MAINTENANCE OF PREMISES-DUTY OF OWNERS, OCCUPANTS AND PERSONS IN CHARGE.

BE IT ORDAINED by the Board of Supervisors of the County of James City, Virginia, that Chapter 10, Garbage and Refuse, Article I, In General, is hereby amended and reordained by amending Section 10-4, Maintenance of premises-duty of owners, occupants and persons in charge.

Chapter 10

ARTICLE I. IN GENERAL

Sec. 10-4. Maintenance of premises-duty of owners, occupants and persons in charge.

(a) It shall be the duty of each owner of any real property in the county to maintain such property at all times free from any accumulation of garbage, trash, litter, refuse or other waste matter, whether liquid or solid, which might endanger the health or safety of residents of the county or otherwise constitute a nuisance. Such garbage, trash, litter, refuse or other waste material shall be disposed of in personally owned or privately owned receptacles that are provided for such use and for the use of the persons disposing of such matter or in authorized facilities provided for such purpose and in no other manner not authorized by law.

(b) It shall be the duty of each owner of any vacant developed or undeveloped property including such property upon which buildings or other improvements are located to provide for the cutting of grass, weeds and other foreign growth as often as needed to prevent breeding and harboring places for insects, reptiles and rodents and to prevent other hazards to the health or safety of residents of the county or other nuisances. *For purposes of this provision as it applies to vacant developed properties, "other foreign growth" includes overgrown shrubs, trees and other natural growth.*

(c) It shall be the duty of each owner of any occupied real property within platted subdivisions and areas zoned for residential, business, commercial or industrial use to provide for the cutting of grass, weeds and other foreign growths as often as needed to prevent breeding and harboring places for insects, reptiles and rodents and to prevent other hazards to the health or safety of residents of the county or other nuisances.

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

_____
Bryan J. Hill
Clerk to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 26th day of July, 2016.

OrdAmendCh10-ord

ORDINANCE NO._____

AN ORDINANCE TO AMEND AND REORDAIN CHAPTER 10 OF THE CODE OF THE COUNTY OF JAMES CITY, VIRGINIA, BY AMENDING ARTICLE I, IN GENERAL, SECTION 10-4, MAINTENANCE OF PREMISES-DUTY OF OWNERS, OCCUPANTS AND PERSONS IN CHARGE.

BE IT ORDAINED by the Board of Supervisors of the County of James City, Virginia, that Chapter 10, Garbage and Refuse, Article I, In General, is hereby amended and reordained by amending Section 10-4, Maintenance of premises-duty of owners, occupants and persons in charge.

Chapter 10

ARTICLE I. IN GENERAL

Sec. 10-4. Maintenance of premises-duty of owners, occupants and persons in charge.

(a) It shall be the duty of each owner of any real property in the county to maintain such property at all times free from any accumulation of garbage, trash, litter, refuse or other waste matter, whether liquid or solid, which might endanger the health or safety of residents of the county or otherwise constitute a nuisance. Such garbage, trash, litter, refuse or other waste material shall be disposed of in personally owned or privately owned receptacles that are provided for such use and for the use of the persons disposing of such matter or in authorized facilities provided for such purpose and in no other manner not authorized by law.

(b) It shall be the duty of each owner of any vacant developed or undeveloped property including such property upon which buildings or other improvements are located to provide for the cutting of grass, weeds and other foreign growth as often as needed to prevent breeding and harboring places for insects, reptiles and rodents and to prevent other hazards to the health or safety of residents of the county or other nuisances. For purposes of this provision as it applies to vacant developed properties, “other foreign growth” includes overgrown shrubs, trees and other natural growth.

(c) It shall be the duty of each owner of any occupied real property within platted subdivisions and areas zoned for residential, business, commercial or industrial use to provide for the cutting of grass, weeds and other foreign growths as often as needed to prevent breeding and harboring places for insects, reptiles and rodents and to prevent other hazards to the health or safety of residents of the county or other nuisances.

AGENDA ITEM NO. H.2.

ITEM SUMMARY

DATE:	9/27/2016
TO:	The Board of Supervisors
FROM:	Scott J. Thomas, Director of Engineering and Resource Protection
SUBJECT:	Chesapeake Bay Preservation Ordinance Amendments Due to Revisions of the State Chesapeake Bay Preservation Act, the Virginia Stormwater Management Act, and Related Regulations

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This public hearing agenda item involves required changes to Chapter 23 of the County Code at the request of the Virginia Department of Environmental Quality (DEQ).

Amendments are necessary due to state law and regulation changes involving septic pump-out and inspection requirements and Chesapeake Bay Preservation Act land disturbing activity provisions of the state/local Virginia Stormwater Management Program (VSMP).

ATTACHMENTS:

	Description	Type
🗋	Memorandum	Cover Memo
🗋	Ordinance	Ordinance
🗋	Ordinance-clean	Ordinance
🗋	Attachment 1	Exhibit

REVIEWERS:

Department	Reviewer	Action	Date
Engineering & Resource Protection	Thomas, Scott	Approved	9/14/2016 - 11:35 AM
Development Management	Holt, Paul	Approved	9/14/2016 - 12:00 PM
Publication Management	Burcham, Nan	Approved	9/14/2016 - 1:30 PM
Legal Review	Kinsman, Adam	Approved	9/20/2016 - 11:30 AM
Board Secretary	Fellows, Teresa	Approved	9/20/2016 - 11:41 AM
Board Secretary	Purse, Jason	Approved	9/20/2016 - 11:46 AM
Board Secretary	Fellows, Teresa	Approved	9/20/2016 - 11:56 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Scott J. Thomas, Director of Engineering and Resource Protection

SUBJECT: Chesapeake Bay Preservation Ordinance Amendments Due to Revisions of the State Chesapeake Bay Preservation Act, the Virginia Stormwater Management Act and Related Regulations

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The ordinance revisions as proposed for the County's Chesapeake Bay Preservation Ordinance, as presented in this agenda item, are considered housekeeping in nature and are necessary as a result of changes in state laws and regulations.

The County is one of 84 localities in Virginia subject to the provisions of the Chesapeake Bay Preservation Act (§62.1-44.15:67 et seq.) and the Chesapeake Bay Preservation Area (CBPA) Designation and Management Regulations (9VAC25-830 et seq). Because the County is a Bay Act community and because it locally implements an erosion and sediment control (E&SC) program and operates a regulated small Municipal Separate Storm Sewer System (MS4), the County was required to become a Virginia Stormwater Management Program (VSMP) program authority, by local ordinance, starting on July 1, 2014. On May 13, 2014, the Board of Supervisors adopted the local VSMP Ordinance which is now Article II of Chapter 8 of the County Code. Local administration of the CBPA, E&SC and VSMP nonpoint source pollution control programs are now overseen by the Virginia State Water Control Board and the Virginia Department of Environmental Quality (DEQ). State oversight of these programs used to be by the Virginia Soil & Water Conservation Board, the Chesapeake Bay Local Assistance Board and the Virginia Department of Conservation and Recreation (DCR).

On September 30, 2014 and March 31, 2015, the County was notified by our current Bay Act program liaison with the Virginia DEQ that certain revisions to local ordinances were necessary due to changes in the state Chesapeake Bay Preservation Act §62.1-44.15:72, associated Regulations 9VAC25-830-130 and the Virginia Stormwater Management Act §62.1-44.15:27. The changes pertained to septic system inspection and pump-out requirements of the CBPA program, the need to define "Chesapeake Bay Act land disturbing activity" as part of the local VSMP in the performance standards section of our local CBPA Ordinance, and of the need to remove potential conflicting stormwater management language present in our local CBPA Ordinance (Chapter 23) because of the adoption of the local VSMP and Ordinance. Local adoption of the VSMP and Ordinance resulted in a wholesale change to County's stormwater management design criteria. Methods outlined in the current Chesapeake Bay Preservation Ordinance Chapter 23-10(4) are no longer in use (i.e. 10-point system). New criteria is included in state law, regulations and Section 8-28 of the local VSMP Ordinance. New criteria for stormwater management design is based on use of methods outlined in the Virginia BMP clearinghouse website, the Virginia DEQ Stormwater Design Specifications, the revised Virginia Stormwater Management Handbook and various DEQ issued guidance memorandums. For water quality, the basis is use of the Virginia Runoff Reduction Method (VRRM) and for water quantity the basis is use of channel protection and flood protection using the energy balance method.

In August 2015, draft Chesapeake Bay Preservation Ordinance (Chapter 23) revisions as requested by the Virginia DEQ were completed by the Engineering and Resource Protection Division in conjunction with the County Attorney's office. The draft ordinance revisions were then forwarded to our Bay Act liaison with the

Virginia DEQ on August 19, 2015. On September 10, 2015 the County received word back from the DEQ that the draft revisions were acceptable.

Rather than bring forward these changes in September of 2015, staff felt it was reasonable to wait until the end of the 2016 state legislative session to ensure no other revisions were necessary. In addition, there is no timetable set for the next round of state program consistency review of local programs. Program consistency reviews of the County's local E&SC, CBPA and now VSMP programs are performed by the state, in accordance with state laws and regulations, every five years. The last County CBPA program review was completed in June 2011 and the last E&SC program review was completed in April 2012. It is anticipated these local program consistency reviews will start sometime by the end of calendar year 2017 or early 2018 (FY 18) and it is desired to complete these required ordinance revisions prior to these next program reviews.

Staff recommends adoption of the attached ordinance.

SJT/ab
CBPOrdAmend-mem

Attachments

ORDINANCE NO._____

AN ORDINANCE TO AMEND AND REORDAIN CHAPTER 23, CHESAPEAKE BAY PRESERVATION, OF THE CODE OF THE COUNTY OF JAMES CITY, VIRGINIA, BY AMENDING SECTION 23-2, STATEMENT OF INTENT, SECTION 23-3, DEFINITIONS, SECTION 23-7, DEVELOPMENT CRITERIA FOR RESOURCE PROTECTION AREAS, SECTION 23-8, DETERMINING RESOURCE PROTECTION AREA BOUNDARIES, SECTION 23-9, PERFORMANCE STANDARDS, SECTION 23-10, PLAN OF DEVELOPMENT, SECTION 23-12, WAIVERS FOR NONCOMPLYING STRUCTURES, SECTION 23-13, EXEMPTIONS, SECTION 23-17, APPEALS; AND SECTION 23-18, VIOLATIONS; PENALTIES.

BE IT ORDAINED by the Board of Supervisors of the County of James City, Virginia that Chapter 23, Chesapeake Bay Preservation, is hereby amended and reordained by amending Section 23-2, Statement of intent, Section 23-3, Definitions, Section 23-7, Development criteria for resource protection areas, Section 23-8, Determining resource protection area boundaries, Section 23-9, Performance standards, Section 23-10, Plan of development, Section 23-12, Waivers for noncomplying structures, Section 23-13, Exemptions, Section 23-17, Appeals; and Section 23-18, Violations; penalties.

Chapter 23

Chesapeake Bay Preservation

Sec. 23-2. Statement of intent.

The Chesapeake Bay Preservation Act (Act), ~~chapter 21~~ *chapter 3.1, article 2.5, of title 62.1* of the Code of Virginia, recognizes that healthy state and local economies are integrally related to each other and the environmental health of the Chesapeake Bay. The purpose of this chapter is to control and regulate runoff at the source to protect against and minimize pollution and deposition of sediment in wetlands, streams and lakes in James City County which are tributaries of the Chesapeake Bay. This chapter is intended to assist in protection of the Chesapeake Bay and its tributaries from nonpoint source pollution from land uses or appurtenances within the Chesapeake Bay drainage area. Regulations in this chapter are necessary for:

(1) Protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them;
(2) Safeguarding the clean waters of the commonwealth from pollution;
(3) Prevention of any increase in pollution;
(4) Reduction of existing pollution; and
(5) Promotion of water resource conservation in order to provide for the health, safety and welfare of present and future citizens of the commonwealth.

This chapter establishes criteria used by James City County in granting, denying or modifying requests to subdivide or develop land in Chesapeake Bay Preservation Areas.

Sec. 23-3. Definitions.

For the purpose of this chapter, the following words and phrases shall have the meanings ascribed below:

Act. The Chesapeake Bay Preservation Act, article 2.5 of chapter 3.1 of title 62.1 of the Code of Virginia.

Agricultural lands. Those lands used for tilling soil, planting and harvesting crops or plant growth of any kind in the open, pasture, horticulture, dairying, floriculture or raising poultry and/or livestock. Buildings and structures are not included in this definition.

Best Management Practice (BMP). A practice, or combination of practices, that is determined by a state, local or regional agency to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Board. The Chesapeake Bay Board, which is comprised of the members of the James City County Wetlands Board.

Buffer area. An area of natural or established vegetation managed to protect other components of resource protection areas and county and state waters from significant degradation due to land disturbances or uses.

Caliper. The diameter of a tree trunk measured six inches above the ground for nursery stock.

Chesapeake Bay Preservation Act land-disturbing activity. As defined in section 8-21 of the county code.

Chesapeake Bay Preservation Area (CBPA). All land in James City County designated by the Board of Supervisors pursuant to Part III of the Chesapeake Bay Regulations *in 9VAC25-830-70 et seq*. and *§§* ~~10.1-2107~~ *62.1-44.15:73-:74* of the Act. The CBPA shall consist of Resource Protection Areas (RPAs) and Resource Management Areas (RMAs).

Development. The construction or substantial alteration of residential, commercial, industrial, institutional, recreational, transportation or utility facilities or structures.

Dripline. A vertical projection to the ground surface from the furthest lateral extent of a tree's leaf canopy.

Erosion and Sediment Control Law. Sections 62.1-44.15:51-66 of the Code of Virginia.

Floodplain. All lands that would be inundated by floodwater as a result of a storm event of a 100-year return interval as designated by chapter 24, section 24-586, et seq., of the county code.

Highly erodible soils. Soils (excluding vegetation) with an erodibility index (El) from sheet and rill erosion equal to or greater than eight. The erodibility index for any soil is defined by the Universal Soil Loss Equation as the product of the formula RKLS-/T, where K is the soil susceptibility to water erosion in the surface layer; R is the rainfall and runoff, LS is the combined effects of slope length and steepness; and T is the soil loss tolerance.

Highly permeable soils. Soils with a given potential to transmit water through the soil profile. Highly permeable soils are identified as any soil having a permeability equal to or greater than six inches of water movement per hour in any part of the soil profile to a depth of 72 inches (permeability groups "rapid" and "very rapid") as found in the National Soil Survey Handbook of November 1996, in the "Field Office Technical Guide" of the U.S. Department of Agriculture Natural Resources Conservation Service.

Hydric soils. Soils that are saturated, flooded or ponded long enough during the growing season to support wetland vegetation.

Impervious cover. A surface composed of any material that significantly impedes or prevents natural infiltration of water into the soil. Impervious surfaces include, but are not limited to, roofs, buildings, streets, parking areas and any concrete, asphalt or compacted aggregate surface. Pervious pavement surfaces will not be considered as totally impervious but will be given partial credit based on the open area and runoff characteristics of the paver structure and the proposed installation.

Infill. Utilization of vacant land in previously developed areas.

Local program. Measures by which a local government complies with the Act and this chapter.

Local program adoption date. Date a local government meets the requirements of subdivisions 1 and 2 of 9VAC25-830-60.

Land disturbing activity. As defined in *section 8-21* of the county code.

Manager. The ~~manager of development management or his designee~~ *director of the county division of engineering and resource protection*.

Nonpoint Source Pollution (NSP). Includes, but is not limited to, the following stormwater-borne pollutants resulting from land use activities:

(1) Sediment;
(2) Nutrients, such as phosphorus and nitrogen;
(3) Bacteria; such as fecal coliforms
(4) Viruses;
(5) Oxygen depletion;
(6) Hydrocarbons, such as fuels and lubricants;
(7) Toxic metals, such as lead, zinc, copper;
(8) Toxic chemicals;
(9) Chlorides, chlorinated water; and
(10) Increases in water temperature above normal, ambient levels.

Nontidal wetlands. Those wetlands, other than tidal wetlands, that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, as defined by the U.S. Environmental Protection Agency pursuant to section 404 of the Federal Clean Water Act, in 33 CFR 328.3b.

Noxious weeds. Weeds that are difficult to control effectively, such as Johnson Grass, Kudzu and multiflora rose. A complete list is contained in the Department of Conservation and Recreation, Division of Natural Heritage publication entitled Invasive Plant Species of Virginia.

Plan of development. Site plans, subdivision plans or other plans submitted pursuant to section 23-10 to ensure compliance with this chapter.

Public road. A publicly owned road designed and constructed in accordance with water quality protection criteria at least as stringent as requirements applicable to the Virginia Department of Transportation, including regulations promulgated pursuant to (i) the Erosion and Sediment Control Law ~~(section 10.1-560 et seq. of the Code of Virginia)~~ and (ii) the Virginia Stormwater Management Act ~~(section 10.1-603.1 et. seq. of the Code of Virginia)~~. This definition includes those roads where the Virginia Department of Transportation exercises direct supervision over the design or construction activities, or both.

Redevelopment. The process of developing land that is or has been previously developed.

RMA. That component of the CBPA that is not classified as the resource protection area. Lands of particular sensitivity within RMAs include, but are not limited to, nontidal wetlands not in RPAs, floodplains, highly erodible soils, highly permeable soils *and* hydric soils.

RPA. That component of a CBPA comprised of land adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may result in significant degradation to the quality of state waters. RPAs shall include:

1. Tidal wetlands;
2. Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow;
3. Tidal shores;
4. A buffer area not less than 100 feet in width located adjacent to and landward of the components listed in subdivisions 1 through 3 above, and along both sides of any water body with perennial flow.

Runoff. That portion of precipitation that is discharged across the land surface through conveyances to one or more waterways.

Sightline. A line extending from a fixed point to a viewed object or area through an opening or passageway.

Silvicultural activities. Forest management activities, including but not limited to the harvesting of timber, the construction of roads and trails for forest management purposes and the preparation of property for reforestation that are conducted in accordance with the silvicultural best management practices developed and enforced by the State Forester pursuant to § 10.1-1105 of the Code or Virginia and are located on property defined as real estate devoted to forest use under § 58.1-3230 of the Code of Virginia.

Substantial alteration. Expansion or modification of a building or development which would result in a disturbance of land exceeding an area of 2,500 square feet in the RMA only.

Tidal shore or shore. Land contiguous to a tidal body of water between the mean low water level and the mean high water level.

Tidal wetlands. Vegetated and nonvegetated wetlands, as defined in section 28.2-1300 of the Code of Virginia.

Tidewater Virginia. Those jurisdictions named in § 62.1-44.15:68 of the Act.

Virginia Erosion and Sediment Control program authority or VESCP authority. As defined in section 8-21 of the county code.

Virginia Stormwater Management Act. Article 2.3 of chapter 3.1 of title 62.1 of the Code of Virginia.

Virginia Stormwater Management Program authority or VSMP authority. As defined in section 8-21 of the county code.

Water body with perennial flow. A body of water that flows in a natural or man-made channel year-round during a year of normal precipitation. This includes, but is not limited to, streams, estuaries and tidal embayments, and may include drainage ditches or channels constructed in wetlands or from former natural drainageways, which convey perennial flow. Lakes and ponds through which a perennial stream flows are part of the perennial stream. Generally, the water table is located above the streambed for most of the year and groundwater is the primary source for stream flow. The methodology to determine perennial flow shall be in accordance with section 23-10 (2)(d) of this chapter.

Water-dependent facility. A development of land that cannot exist outside of the RPA and must be located on the shoreline because of the intrinsic nature of its operation. These facilities include, but are not limited to:

(1) Ports;
(2) The intake and outfall structures of power plants, water treatment plants, sewage treatment plants and storm sewers;
(3) Marinas and other boat docking structures;
(4) Beaches and other public water-oriented recreation areas; and
(5) Fisheries or other marine resources facilities.

Wetlands. Tidal and nontidal wetlands.

Sec. 23-7. Development criteria for RPAs.

In addition to the general performance criteria set forth in section 23-9, the criteria in this section are applicable in RPAs.

(a) Development in RPAs may be allowed only when permitted by the manager and if it (i) is water dependent; (ii) constitutes redevelopment; (iii) is a new use subject to the provisions of subsection (c)(2) of this section; (iv) is a road or driveway crossing satisfying the conditions set forth in Subdivision (3) of this section; or (v) is a flood control or stormwater management facility satisfying the conditions set forth is Subdivision (4) of this section.

(1) A new or expanded water dependent facility may be allowed provided that the following criteria are met:

a. It does not conflict with either the comprehensive plan or any applicable approved watershed management plan; and
b. It complies with the performance criteria set forth in section 23-9 of this chapter; and

c. Any nonwater - dependent component is located outside of the RPA; and
d. Access to the water-dependent facility will be provided with the minimum disturbance necessary. Where practicable, a single point of access will be provided.

(2) Redevelopment on isolated redevelopment sites shall be permitted only if there is no increase in the amount of impervious cover and no further encroachment within the RPA and it shall conform to sections 23-9(b)(4) and (5), and the stormwater management requirements outlined ~~under section 23-9(b)(8) of~~ *in* this chapter.

(3) Roads and driveways not exempt under section 23-13 and which, therefore, must comply with the provisions of this chapter, may be constructed in or across RPAs if each of the following conditions are met:

a. The manager makes a finding that there are no reasonable alternatives to aligning the road or drive in or across the RPA; and
b. The alignment and design of the road or driveway are optimized, consistent with other applicable requirements, to minimize encroachment in the RPA and minimize adverse effects on water quality; and
c. The design and construction of the road or driveway satisfy all applicable criteria of this chapter including the submission of a water quality impact assessment; and
d. The manager reviews the plan for the road or driveway proposed in or across the RPA in coordination with the plan of development requirements as required under section 23-10.

(4) Flood control and stormwater management facilities that drain or treat water from multiple development projects or from a significant portion of a watershed may be allowed in RPAs provided *such facilities are allowed and constructed in accordance with the Virginia Stormwater Management Act and this chapter, and provided* that:

a. The manager has conclusively established that location within the RPA is the optimum location, meaning that it is the best place to locate the facility from an engineering/functionality consideration regardless of the presence of an RPA;
b. The size of the facility is the minimum necessary to provide necessary flood control, stream channel protection, stormwater treatment or all three;
c. The facility must be consistent with a *comprehensive* stormwater ~~management~~ program *plan developed and approved in accordance with 9VAC25-870-92 or with a VSMP* that has been approved *prior to July 1, 2012,* by the *State Water Control Board, the* Chesapeake Bay Local Assistance Board ~~as a Phase 1 modification to the county's program~~ *prior to its abolition on July 1, 2012, or the Department of Conservation and Recreation*;
d. All applicable permits for construction in state or federal waters must be obtained from the appropriate state and federal agencies;
e. Approval must be received from the county prior to construction; and
f. Routine maintenance must be performed on the facility to assure that it continues to function as designed.

It is not the intent of this subdivision to allow a stormwater management and/or a BMP facility that collects and treats runoff from only an individual lot or some portion of the lot to be located within a resource protection area.

(b) A water quality impact assessment as outlined in section 23-11 of this chapter shall be required for any proposed land disturbance, development or redevelopment within RPAs and for any other development within RMAs when required by the manager because of the unique characteristics of the site, intensity of development or potential impacts on water quality or RPAs in accordance with the provisions of section 23-11 of this chapter.

(c) Buffer area requirements. To minimize the adverse effects of human activities on the other components of RPAs, state waters and aquatic life, a 100-foot buffer area of vegetation that is effective in retarding runoff, preventing erosion and filtering nonpoint source pollution from runoff shall be retained if present and established during development where it does not exist. The buffer shall have three layers of vegetation comprised of native trees, shrubs and ground covers. Where the buffer is being established, a buffer modification plan will be prepared that may incorporate existing vegetation. A list of acceptable native plants is available from the manager. A buffer area not less than 100 feet in width shall be located adjacent to and landward of other RPA components and along both sides of any water body with perennial flow. The full buffer area shall be designated as the landward component of the RPA. The 100-foot buffer area shall be deemed to achieve a 75 percent reduction of sediments and a 40 percent reduction of nutrients. All subdivision plats submitted for approval after August 6, 1990, shall clearly identify the boundaries of any RPA within the property. Such plat shall contain a statement that all existing vegetation within the RPA shall remain in its undisturbed natural state, except for vegetation weakened by age, storm, fire or other natural cause. Developers shall install signs identifying the landward limit of the RPA. Signs shall be obtained, installed and maintained in accordance with guidelines established by the manager.

(1) Permitted buffer modifications. In order to maintain the functional value of the buffer area, existing vegetation may be removed upon approval by the manager of a buffer modification plan only to provide for reasonable sight lines, access paths, general wood lot management, and BMPs including those that prevent upland erosion and concentrated flows of stormwater, as follows:

a. Trees may be pruned or removed as necessary to provide for sight lines provided, that where removed they shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion and filtering nonpoint source pollution from runoff;
b. Access paths shall be constructed and surfaced so as to effectively control erosion;
c. Dead, diseased or dying trees or shrubbery, or noxious weeds may be removed based upon the approval of the manager, who may require a recommendation by a professional forester or arborist; and
d. For shoreline erosion-control projects, trees and woody vegetation may be removed, necessary control techniques employed and appropriate vegetation established to protect or stabilize the shoreline and restore the function of the buffer in accordance with the best available technical advice and applicable permit conditions or requirements.

(2) Permitted buffer encroachments.

a. When application of the buffer would result in the loss of a buildable area on a lot or parcel recorded prior to August 6, 1990, encroachments into the buffer may be allowed through an administrative process in accordance with the following criteria:

1. Encroachments into the buffer shall be the minimum necessary to achieve a reasonable buildable area for a principal structure and necessary utilities;
2. Where practicable, a vegetated area that will maximize water quality protection, mitigate the effects of the buffer encroachment, and is equal to the area of encroachment into the buffer area shall be established elsewhere on the lot or parcel; and
3. The encroachment may not extend into the seaward 50 feet of the buffer area.

b. When application of the buffer would result in the loss of a buildable area on a lot or parcel recorded between August 6, 1990, and January 1, 2004, encroachments into the buffer may be allowed through an administrative process in accordance with the following criteria:

1. The lot or parcel was created as a result of a legal process conducted in conformity with the county's subdivision regulations;
2. Conditions or mitigation measures imposed through a previously approved exception shall be met;
3. If the use of a BMP was previously required, the BMP shall be evaluated to determine if it continues to function effectively and, if necessary, the BMP shall be reestablished or repaired and maintained as required; and
4. The criteria in subdivision (c)(2)a. of this section shall be met.

(3) On agricultural lands, the agricultural buffer area shall be managed to prevent concentrated flows of surface water from breaching the buffer area and appropriate measures may be taken to prevent noxious weeds from invading the buffer area. Agricultural activities may encroach into the buffer area as follows:

a. Agricultural activities may encroach into the landward 50 feet of the 100-foot wide buffer area when at least one agricultural BMP which, in the opinion of the local soil and water conservation district board, addresses the more predominant water quality issue on the adjacent land - erosion control or nutrient management - is being implemented on the adjacent land, provided that the combination of the undisturbed buffer area and the BMP achieves water quality protection, pollutant removal and water resource conservation at least the equivalent of the 100-foot buffer area. If nutrient management is identified as the predominant water quality issue, a nutrient management plan, including soil tests, must be developed and implemented consistent with the Virginia Nutrient Training and Certification Regulations (~~4 VAC 5-15 et seq~~. *4VAC50-85* ~~et seq.~~) administered by the Virginia Department of Conservation and Recreation.

b. Agricultural activities may encroach within the landward 75 feet of the 100-foot wide buffer area when agricultural BMPs which address erosion control, nutrient management, and pest chemical control, are being implemented on the adjacent land. The erosion control practices must prevent erosion from exceeding the soil loss tolerance level, referred to as "T," as defined in the "Field Office Technical Guide" of the U.S. Department of Agriculture Natural Resource Conservation Service. A nutrient management plan, including soil tests, must be developed and implemented consistent with the Virginia Nutrient Management Training and Certification Regulations (~~4 VAC 5-515~~ *4VAC50-85* ~~et esq~~) administered by the Virginia Department of Conservation and Recreation. In conjunction with the remaining buffer area, this collection of BMPs shall be presumed to achieve water quality protection at least the equivalent of that provided by the 100-foot wide buffer area.

c. The buffer area is not required to be designated for agricultural drainage ditches if at least one BMP which, in the opinion of the local soil and water conservation district board, addresses the more predominant water quality issue on the adjacent land - erosion control or nutrient management - is being implemented on the adjacent land.

(4) When agricultural or silvicultural uses within the buffer area cease, and the lands are proposed to be converted to other uses, the full 100-foot wide buffer area shall be reestablished. In reestablishing the buffer, management measures shall be undertaken to provide woody vegetation that assures the buffer functions are maintained or established.

Sec. 23-8. Determining resource protection area boundaries.

The *county* CBPA map shall be used as a guide to the general location of RPAs. In addition, reference materials that may be used as general guidance for estimating locations of RPAs include federal*, state* and county topographic maps, wetland maps and aerial photography. Site-specific boundaries of the RPA shall be determined by the applicant through the performance of an environmental inventory required as part of the plan of development review process or a water quality impact assessment. Site-specific boundaries determined by the applicant shall be reviewed and approved by the manager.

Sec. 23-9. Performance standards.

(a) Purpose and intent. The performance standards establish the means to minimize erosion and sedimentation potential, reduce land application of nutrients and toxics, and maximize rainwater infiltration. Natural ground cover, especially woody vegetation, is most efficient in holding soil in place and preventing site erosion. Indigenous vegetation, with its adaptability to local conditions without the use of harmful fertilizers or pesticides, filters and infiltrates stormwater runoff. Keeping impervious cover to a minimum enhances rainwater infiltration and effectively reduces increases of stormwater runoff.

The purpose and intent of these requirements is also to implement the following objectives: prevent a net increase in nonpoint source pollution from new development and development on previously developed land where the runoff was treated by a water quality protection best management practice; achieve a 10 percent reduction in nonpoint source pollution from development on previously developed land where the runoff was not treated by one or more water quality best management practices; and achieve a 40 percent reduction in nonpoint source pollution from agricultural and silvicultural uses.

(b) General performance standards:

(1) Land disturbance shall be limited to the area necessary to provide for the proposed use or development.

a. In accordance with an approved plan of development, the limits of clearing and/or grading shall be clearly defined. These limits shall be clearly shown on submitted plans and physically marked on the development site in accordance with subsection (2) b. below.
b. Impervious cover shall not exceed 60 percent of the site unless it can be demonstrated that the project will have the same impact on water quality as the project would have if it were 60 percent impervious. Demonstration of equivalent water quality will be through compliance with guidelines developed by the manager. For projects with an approved Stormwater Master

Plan, compliance with this impervious cover provision can be demonstrated on a project basis rather than an individual site basis. However, in no case shall impervious cover exceed the limits established in section 24-99(c)(4) of the Zoning Ordinance.

c. Ingress and egress during construction shall be limited to one access point, unless otherwise approved by the manager.

(2) Existing vegetation shall be preserved to the maximum extent practicable, consistent with the use or development permitted by an approved plan of development.

a. Existing trees over 12 inches in diameter at breast height shall be preserved except in impervious areas and as necessary to accommodate site grading. Upon approval by the manager, diseased trees or trees weakened by age, storm, fire or other injury may be removed; provided, that when such removal results in a 20 percent or greater reduction in existing tree canopy, a sufficient number of trees with a 1-½ inch caliper shall be planted to restore the full canopy.

b. Prior to clearing or grading, suitable protective barriers, such as safety fencing, shall be erected outside of the dripline of any tree or stand of trees to be preserved unless otherwise approved on the clearing plan. Protective barriers shall remain so erected throughout all phases of construction. The storage of equipment, materials, debris or fill shall not be allowed within the area protected by the barrier.

(3) Land development shall minimize impervious cover to promote infiltration of stormwater into the ground consistent with the proposed use or development permitted.

(4) All development and redevelopment exceeding 2,500 square feet of land disturbance shall be subject to a plan of development review process conducted in accordance with section 23-10 of this chapter.

(5) Any land-disturbing activity exceeding 2,500 square feet, including construction of all single-family houses and septic tanks and drainfields shall comply with the requirements of chapter 8 of the county code.

(6) All on-site sewage disposal systems not requiring a National Pollutant Discharge Elimination System permit shall be pumped out at least once every five years. However, in lieu of requiring proof of septic tank pump-out every five years, owners of on-site sewage disposal systems can submit documentation every five years, certified by ~~a sewage handler permitted by the Virginia Department of Health~~ *an operator or on-site soil evaluator licensed or certified pursuant to §§ 54.1-2300 et seq. of the Code of Virginia as being qualified to operate, maintain, or design on-site sewage systems*, that the septic system has been inspected, is functioning properly, and the tank does not need to have the effluent pumped out of it.

(7) A reserve sewage disposal site, with a capacity at least equal to that of the primary sewage disposal site, shall be provided. This requirement shall not apply to any lot or parcel recorded prior to August 6, 1990, if such lot or parcel is not sufficient in capacity to accommodate a reserve sewage disposal site, as determined by the local health department. Building or construction of any impervious surface shall be prohibited on the area of all sewage disposal sites or on an on-site sewage treatment

system which operates under a permit issued by the State Water Control Board until the structure is served by public sewer.

(8) *Any Chesapeake Bay Preservation Act land-disturbing activity shall comply with the requirements of 9VAC25-870-51 and 9VAC25-870-103 of the Virginia Administrative Code and chapter 8-22(b) of the county code.*

a. A stormwater management plan consistent with these requirements must be designed and implemented during the land disturbing activity;
b. Prior to land disturbance, the stormwater management plan must be approved by the VSMP authority;
c. Exceptions to technical criteria for regulated land disturbing activities (Part IIB or Part IIC) may be requested in accordance with 9VAC25-870-57 and section 8-28(g) of the county code; and
d. Long-term maintenance of stormwater management facilities shall be provided for and conducted in accordance with 9VAC25-870-58 and section 8-29 of the county code.

(~~8~~*9*) For any development or redevelopment~~, stormwater runoff shall be controlled by the use of~~ *BMPs* ~~that are consistent with the water quality protection provisions (4 VAC 3-20-71 et seq.) of the Virginia Stormwater Management Regulations (4 VAC 3-20). This consistency shall be demonstrated by compliance with the criteria and BMP facilities contained in the latest version of the James City County Guidelines for the Design and Construction of Stormwater Management BMPs. In addition, increases in the quantity of stormwater runoff resulting from development or redevelopment shall be addressed by the requirements of chapter 8 of the County Code.~~ *that is designated as a Chesapeake Bay Preservation Act land disturbing activity or is subject to grandfathering provisions of 9VAC25-870-48 and section 8-28(c) of the county code and deemed subject to Part IIC technical criteria of the VSMP regulations, 9VAC25-870-93 - 99, the following applies*:

a. If *stormwater management* compliance ~~for a development~~ is based in whole or part on the use of existing downstream onsite or offsite structural *stormwater management and/or* BMP~~s~~ *facility*, evidence shall be provided that such facilities are currently in good working order and performing at the design levels of service;
b. The manager may require a review of both the original design and maintenance plans to verify this provision; *and*
c. A new maintenance agreement may be required to ensure compliance with this chapter.

(~~9~~*10*)Prior to initiating grading or other on-site activities on any portion of a lot or parcel, all wetlands permits required by federal, state and county laws and regulations shall be obtained and evidence of such submitted to the manager. For those projects where no wetlands are proposed to be impacted or where the impacts do not require written authorization, documentation shall be submitted to the manager by a qualified wetlands professional attesting that the wetlands permitting process has been completed and no further documentation is necessary from the regulatory agencies.

(~~10~~*11*)All lands upon which agricultural activities are being conducted shall undergo a soil and water quality conservation assessment. Such assessment shall evaluate the effectiveness of existing practices pertaining to soil erosion and sediment control, nutrient management and management of

pesticides, and where necessary, results in a plan that outlines additional practices needed to ensure that water quality protection is accomplished consistent with this chapter. Plans of development or water quality impact assessments are not required for activities on agricultural lands except for land disturbing activities not related to food and/or fiber production.

Sec. 23-10. Plan of development.

Any development or redevelopment exceeding 2,500 square feet of land disturbance in the CBPA shall be accomplished through a plan of development process prior to any clearing or grading of the site or the issuance of any building permit to assure compliance with all applicable requirements of this chapter and any applicable approved watershed management plans. Administration of the plan of development process shall be in accordance with chapter 24 of this Code for site plans and chapter 19 of this Code for subdivision plans. The following plans or studies shall be submitted, unless otherwise provided for:

(1) Site and subdivision plans. Site plans in accordance with the provisions of chapter 24 of th~~is~~*e county* code or subdivision plans in accordance with chapter 19 of th~~is~~*e county* code. In the event that chapter 24 does not require the preparation of a site plan for a development activity that exceeds 2,500 square feet of land disturbance, a plan will still be required for the purposes of this chapter that complies with Item Nos. 2, 3 and 5 of this subsection.

(2) Environmental inventory. An environmental inventory shall be submitted in conjunction with preliminary site plan or preliminary subdivision plan approval applications. Except for the perennial stream determination required in Item d. of this subsection, this requirement may be waived by the manager when the proposed use or development would result in less than 5,000 square feet of disturbed area. For existing single-family lots in a RPA, showing items required by subsection a. on the plat plan normally required as part of the building permit application shall satisfy the requirements for an environmental inventory. An environmental inventory is not required for existing single-family lots in the RMA.

a. The environmental inventory shall be drawn to scale clearly delineating the following components:
   1. Tidal wetlands;
   2. Tidal shores;
   3. Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow (i.e., RPA wetlands);
   4. A 100-foot buffer area located adjacent to and landward of the components listed in Item Nos. 1 through 3 above, and along both sides of any water body with perennial flow;
   5. Nontidal wetlands not included in Item No. 3 (i.e., RMA wetlands);
   6. 100-year floodplains as designated by chapter 24 of the county code; and
   7. Slopes 25 percent or greater.

b. Wetlands delineations shall be performed consistent with the procedures specified in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands currently approved for use by the Army Corps of Engineers.

c. The environmental inventory shall be drawn at the same scale as the preliminary site plan or subdivision plan and shall be certified as complete and accurate by a person or firm competent to make the inventory.

d. The environmental inventory shall include a reliable, site specific evaluation to determine whether water bodies on or adjacent to the development site have perennial flow. This evaluation shall be provided by the person applying to use or develop the site using one of the county or state approved methods of in-field indicators of perennial flow unless the county has already made a field determination of perennial flow for the site. These site-specific determinations shall be confirmed by the manager and shall be used to establish the boundaries of the RPA.

(3) Clearing plan. A clearing plan shall be submitted in conjunction with site plan review or subdivision plan review. No clearing or grading of any lot or parcel shall be permitted without an approved clearing plan. For existing single-family lots, a clearing line shown on the plat plan normally submitted as part of the building permit application shall satisfy clearing plan requirements. No clearing or grading shall occur on existing single-family lots until a complete building permit application is submitted.

Clearing plans shall be prepared and/or certified by design professionals practicing within their areas of competence as prescribed by the Code of Virginia.

a. Contents of the plan:
   1. The clearing plan shall be drawn to scale and clearly delineate the location, size and description of existing and proposed plant material. All existing trees on the site 12 inches or greater diameter at breast height (DBH) shall be shown on the clearing plan, or where there are groups of trees, the woodlines of the group may be outlined instead. The specific number of trees 12 inches or greater DBH to be preserved outside of the impervious cover and outside the groups shall be indicated on the plan. Trees to be removed and woodlines to be changed to create desired impervious cover shall be clearly delineated on the clearing plan.
   2. Any required buffer area shall be clearly delineated and any plant material to be added to establish or supplement the buffer area, as required by this chapter, shall be shown on the clearing plan.
   3. Within the RPA buffer area, trees to be removed for sight lines, vistas, access paths and BMPs, as provided for in this chapter, shall be shown on the plan. Vegetation required by this chapter to replace any existing trees within the buffer area shall also be shown on the clearing plan.
   4. Erosion and sediment controls shall be provided as necessary and in accordance with chapter 8 of the county code.

b. Plant specifications:
   1. All plant materials necessary to supplement the buffer area or vegetated areas outside the impervious cover shall be installed according to standard planting practices and procedures.
   2. All supplementary or replacement plant materials shall be living and in healthy condition. Plant materials shall conform to the standards of the most recent edition of the American Standard for Nursery Stock, published by the American Association of Nurserymen.
   3. Where areas to be preserved, as designated on an approved clearing plan, are encroached, replacement of existing trees and other vegetation will be achieved at a ratio of two planted trees to one removed. Replacement trees shall be a minimum 1-½ inches caliper at the time of planting.

c. Maintenance:
   1. The applicant shall be responsible for the maintenance, repair and replacement of all vegetation as may be required by the provisions of this chapter.
   2. In buffer areas and areas outside the impervious cover, plant material shall be tended and maintained in a healthy growing condition and free from refuse and debris. Unhealthy, dying or dead plant materials shall be replaced during the next planting season, as required by the provisions of this chapter.

d. Installation and bonding requirements:
   1. Where buffer areas are required, no certificate of occupancy shall be issued until the installation of required plant material to establish or supplement the buffer is completed, in accordance with the approved clearing plan.
   2. When the occupancy of a structure is desired prior to the completion of the plan, a certificate of occupancy may be issued only if the applicant provides a form of surety satisfactory to the county attorney in an amount equal to the costs of the remaining plant materials, related materials and installation costs.
   3. All required plant material shall be installed and approved by the first planting season following issuance of a certificate of occupancy or the surety may be forfeited.

(4) Stormwater management plan. A stormwater management plan shall be submitted as part of the plan of development process required by ~~this chapter~~ *chapter 8 of the county code* and in conjunction with site plan or subdivision plan preliminary approval. A stormwater management plan is not required for ~~existing~~ *individual* single-family ~~lots~~ *detached residential structures that utilize an agreement in lieu of a stormwater management plan in accordance with section 8-25(a) of the county code*.

~~To control stormwater runoff structural BMPs shall be required for site plans with impervious cover exceeding ten percent of site area and for subdivisions with more than one-half dwelling unit per acre. However, all projects are subject to the stormwater provisions of chapter 8 of this Code. Single family subdivisions of five lots or less shall not be subject to this requirement. Any contiguous property owned by the same subdivider, or deemed by the manager as a logical part of a contiguous subdivision, cannot be subdivided into greater than five lots without complying with the requirements of this chapter. BMPs shall be designed and constructed in accordance with guidelines established by the manager.~~

Performance assurances shall be provided that all *stormwater management and/or*/BMP~~s~~ *facilities* required in plans of development shall be constructed to comply with the performance criteria set forth therein. The form of agreement and type of bond, letter of credit or other security shall be to the satisfaction of and approved by the county attorney. The amount of bond, letter of credit or other security and designated length of completion time shall be set by the manager or his authorized designee.

a. ~~Contents of the plan. At a minimum the stormwater management plan shall contain the following:~~
   ~~1. Location and design of stormwater control devices and BMPs.~~
   ~~2. Procedures for implementing nonstructural stormwater control practices.~~

Contents of the plan must meet the requirements of section 8-25 of the county code;

b. ~~The plan shall establish a long-term schedule for inspection and maintenance of stormwater management facilities that includes all maintenance requirements and persons responsible for performing maintenance. If the designated maintenance responsibility is with a party other than James City County, then a maintenance agreement shall be executed between the responsible party and the county.~~ *Plan must be submitted and reviewed in accordance with 9VAC25-870-108 and section 8-27(a) of the county code;*

c. Prior to land disturbance, the stormwater management plan must be approved by the VSMP authority;

d. Exceptions to technical criteria for regulated land disturbing activities (Part IIB or Part IIC) may be requested in accordance with 9VAC25-870-57 and section 8-28(g) of the county code; and

e. Long-term maintenance of stormwater management facilities shall be provided for and conducted in accordance with 9VAC25-870-58 and section 8-29 of the county code.

(5) Erosion and sediment-control plan. ~~Erosion and sediment control plan in accordance with chapter 8 of this code.~~ *An erosion and sediment control plan consistent with the requirements of the Erosion and Sediment Control Law and chapter 8 of the county code must be designed and implemented during land disturbing activities. Prior to land disturbance, this plan must be approved by the VESCP authority*.

(6) Landscaping plan. Landscaping plan in accordance with chapter 24 of th~~is~~*e county* code.

(7) Final plan. Final site plans or final subdivision plans for all lands within CBPAs shall include the following information:

a. Delineation of the RPA boundary;
b. Delineation of required buffer areas;
c. Delineation of RMA wetlands;
d. All wetlands permits required by law;
e. Delineation of slopes 25 percent or greater; and
f. BMP maintenance agreement to ensure proper maintenance of BMPs in order to continue their functions.

Sec. 23-12. Waivers for noncomplying structures.

The manager through an administrative process may permit the continued use, alteration, or the expansion of any structure in existence on August 6, 1990, which is not in conformity with the provisions of this chapter. The process requires that:

(1) The manager *may* grant a waiver for noncomplying structures on legal nonconforming lots or parcels to provide for alterations or expansions to such nonconforming structures provided that:

a. There will be no increase in nonpoint source pollution load;
b. Any development or land disturbance exceeding an area of 2,500 square feet complies with all erosion and sediment control requirements of this chapter; and

c. For expansion of a principal noncomplying structure, the manager makes the following findings:
   1. The request for the waiver is the minimum necessary to afford relief;
   2. Granting the waiver will not confer upon the applicant any specific privileges that are denied by this chapter to other property owners in similar situations;
   3. The waiver is in harmony with the purpose and intent of this chapter and does not result in water quality degradation;
   4. The waiver is not based on conditions or circumstances that are self-created or self-imposed;
   5. Reasonable and appropriate conditions are imposed, as warranted, that will prevent the waiver from causing a degradation of water quality;
   6. Other findings, as appropriate and required by the manager are met; and
   7. In no case shall this provision apply to accessory structures as defined in chapter 24 of the county code.

d. The waiver does not conflict with the comprehensive plan or any applicable approved watershed management plan.

(2) An application for a waiver shall be made in writing to the manager and shall include for the purpose of proper enforcement of this chapter, the following information:

a. Name and address of applicant and property owner;
b. Legal description of the property and type of proposed use and development;
c. A sketch of the dimensions of the lot or parcel, location of buildings and proposed additions relative to the lot lines, and boundary of the RPA;
d. Location and description of any existing private water supply or sewage system; and,
e. A plan that depicts the impacts to components of the environmental inventory as required by section 23-10(2) of this chapter, and identification of the amount of impact to each component.

(3) A waiver shall become null and void if building foundations are not completed within twelve months from the date issued.

Sec. 23-13. Exemptions.

(a) Public utilities, railroads, public road and related facilities.

(1) Construction, installation, operation and maintenance of electric, natural gas, fiber-optic and telephone transmission lines, railroads and public roads and their appurtenant structures in compliance with (i) the Erosion and Sediment Control Law (sections ~~10.1-560~~ *62.1-44.15:51 - :66* ~~et seq.~~ of the Code of Virginia) and the Stormwater Management Act (sections ~~10.1-603.1~~ *62.1-44.15:24-:50* ~~et seq.~~ of the Code of Virginia), (ii) an erosion and sediment control plan and a stormwater management plan approved by the Virginia Department of ~~Conservation and Recreation~~ *Environmental Quality*, or (iii) this chapter's water quality protection criteria which is at least as stringent as the above state requirements will be deemed to comply with the regulations adopted pursuant to the Act. The exemption of public roads is further conditioned on the following:

a. The road alignment and design have been optimized, consistent with all applicable requirements, to prevent or otherwise minimize the encroachment in the RPA and to minimize the adverse effects on water quality.

(2) Construction, installation and maintenance by public agencies of water and sewer, natural gas, and underground telecommunications and cable television lines owned, permitted or both, by the county or a regional service authority shall be exempt from this chapter; provided that:

a. To the degree possible, the location of such utilities and facilities should be outside RPAs;
b. No more land shall be disturbed than is necessary to provide for the proposed utility installation;
c. All such construction, installation and maintenance of such utilities and facilities shall be in compliance with all applicable federal, state and county permits and designed and conducted in a manner that protects water quality; and
d. Any land disturbance exceeding an area of 2,500 square feet complies with chapter 8 of this code.

(b) Exemptions for silvicultural activities. Silvicultural activities are exempt from the requirements of this chapter; provided that silvicultural operations adhere to water quality protection procedures prescribed by the Department of Forestry in its Virginia's Forestry Best Management Practices for Water Quality.

(c) Exemptions for RPAs. The following land disturbances may be exempted by the manager from the requirements of this chapter provided that they comply with subdivisions 1 through 3 of this subdivision: (i) water wells; (ii) passive recreational facilities, such as boardwalks, trails and pathways; and, (iii) historic preservation and archaeological activities.

(1) Any required permits, except those to which this exception specifically applies, shall have been issued;
(2) Sufficient and reasonable proof is submitted that the intended use will not deteriorate water quality; and,
(3) Any land disturbance exceeding an area of 2,500 square feet shall comply with chapter 8 of this code.

Sec. 23-17. Appeals.

(a) An owner of property subject to an administrative decision, order or requirement under this chapter may appeal by submitting a written ~~application~~ *request* for review to the board no later than 30 days from the rendering of such decision, order or requirement. The board shall hear the appeal as soon as practical after receipt of the ~~application~~ *request*. The appellant, the board of supervisors, the manager, the planning director and any person or agency expressing an interest in the matter shall be notified by the board not less than ten days prior to the date of the hearing. Published notice of the board's public meetings shall state that appeals from decision under the Chesapeake Bay Preservation Ordinance may be heard.

(b) In rendering its decision, the board shall balance the hardship to the property owner with the purpose, intent and objectives of this chapter. The board shall not decide in favor of the appellant unless it finds:

(1) The hardship is not generally shared by other properties in the vicinity;

(2) The Chesapeake Bay, its tributaries and other properties in the vicinity will not be adversely affected; and
(3) The appellant acquired the property in good faith and the hardship is not self-inflicted.

(c) The board may impose conditions to the granting of any waiver, exception or appeal as it may deem necessary in the public interest, and may, to ensure compliance with the imposed conditions, require a cash escrow, bond with surety, letter of credit or other security as is acceptable to the county attorney.

(d) An owner of a property subject to a board decision, order or requirement may appeal to the circuit court of James City County no later than 30 days from the rendering of such decision, order or requirement.

State Law reference - Code of Va., § ~~10.1-2109(F)~~ *62.1-44.15:74(F)*

Sec. 23-18. Violations; penalties.

(a) Without limiting the remedies which may be obtained under this section, any person who violates any provision of this chapter or who violates, fails, neglects or refuses to obey any variance or permit condition authorized under this chapter shall, upon such finding by the circuit court, be assessed a civil penalty not to exceed $5,000.00 for each day of violation. Such penalties may, at the discretion of the court assessing them, be directed to be paid into the treasury of the county for the purpose of abating environmental damage to or restoring Chesapeake Bay Preservation Areas within the county, in such a manner as the court may direct by order.

(b) Without limiting the remedies which may be obtained under this section, and with the consent of any person who has violated any provision of this chapter, or who has violated, failed, neglected or refused to obey any variance or permit condition authorized under this chapter, the county may provide for the issuance of an order against such person for the one-time payment of civil charges for each violation in specific sums, not to exceed $10,000.00 for each violation. Such civil charges shall be paid into the treasury of the county for the purpose of abating environmental damage to or restoring Chesapeake Bay Preservation Areas in the county. Civil charges shall be in lieu of any appropriate civil penalty that could be imposed under subdivision (a) of this section. Civil charges may be in addition to the costs of any restoration required by the board of supervisors.

(c) In addition to, and not in lieu of, the penalties prescribed in sections (a) and (b) hereof, the county may apply to the circuit court for an injunction against the continuing violation of any of the provisions of this ordinance and may seek any other remedy authorized by law.

State Law reference - Code of Va., § ~~10.1-2109(E)~~ *62.1-44.15:74(E)*.

_____
Michael J. Hipple
Chairman, Board of Directors

ATTEST:

_____
Bryan J. Hill
Secretary to the Board

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

Chp23-ChesBayPres-ord

ORDINANCE NO._____

AN ORDINANCE TO AMEND AND REORDAIN CHAPTER 23, CHESAPEAKE BAY PRESERVATION, OF THE CODE OF THE COUNTY OF JAMES CITY, VIRGINIA, BY AMENDING SECTION 23-2, STATEMENT OF INTENT, SECTION 23-3, DEFINITIONS, SECTION 23-7, DEVELOPMENT CRITERIA FOR RESOURCE PROTECTION AREAS, SECTION 23-8, DETERMINING RESOURCE PROTECTION AREA BOUNDARIES, SECTION 23-9, PERFORMANCE STANDARDS, SECTION 23-10, PLAN OF DEVELOPMENT, SECTION 23-12, WAIVERS FOR NONCOMPLYING STRUCTURES, SECTION 23-13, EXEMPTIONS, SECTION 23-17, APPEALS; AND SECTION 23-18, VIOLATIONS; PENALTIES.

BE IT ORDAINED by the Board of Supervisors of the County of James City, Virginia that Chapter 23, Chesapeake Bay Preservation, is hereby amended and reordained by amending Section 23-2, Statement of intent, Section 23-3, Definitions, Section 23-7, Development criteria for resource protection areas, Section 23-8, Determining resource protection area boundaries, Section 23-9, Performance standards, Section 23-10, Plan of development, Section 23-12, Waivers for noncomplying structures, Section 23-13, Exemptions, Section 23-17, Appeals; and Section 23-18, Violations; penalties.

Chapter 23

Chesapeake Bay Preservation

Sec. 23-2. Statement of intent.

The Chesapeake Bay Preservation Act (Act), chapter 3.1, article 2.5, of title 62.1 of the Code of Virginia, recognizes that healthy state and local economies are integrally related to each other and the environmental health of the Chesapeake Bay. The purpose of this chapter is to control and regulate runoff at the source to protect against and minimize pollution and deposition of sediment in wetlands, streams and lakes in James City County which are tributaries of the Chesapeake Bay. This chapter is intended to assist in protection of the Chesapeake Bay and its tributaries from nonpoint source pollution from land uses or appurtenances within the Chesapeake Bay drainage area. Regulations in this chapter are necessary for:

(1) Protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them;
(2) Safeguarding the clean waters of the commonwealth from pollution;
(3) Prevention of any increase in pollution;
(4) Reduction of existing pollution; and
(5) Promotion of water resource conservation in order to provide for the health, safety and welfare of present and future citizens of the commonwealth.

This chapter establishes criteria used by James City County in granting, denying or modifying requests to subdivide or develop land in Chesapeake Bay Preservation Areas.

Sec. 23-3. Definitions.

For the purpose of this chapter, the following words and phrases shall have the meanings ascribed below:

Act. The Chesapeake Bay Preservation Act, article 2.5 of chapter 3.1 of title 62.1 of the Code of Virginia.

Agricultural lands. Those lands used for tilling soil, planting and harvesting crops or plant growth of any kind in the open, pasture, horticulture, dairying, floriculture or raising poultry and/or livestock. Buildings and structures are not included in this definition.

Best Management Practice (BMP). A practice, or combination of practices, that is determined by a state, local or regional agency to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Board. The Chesapeake Bay Board, which is comprised of the members of the James City County Wetlands Board.

Buffer area. An area of natural or established vegetation managed to protect other components of resource protection areas and county and state waters from significant degradation due to land disturbances or uses.

Caliper. The diameter of a tree trunk measured six inches above the ground for nursery stock.

Chesapeake Bay Preservation Act land-disturbing activity. As defined in section 8-21 of the county code.

Chesapeake Bay Preservation Area (CBPA). All land in James City County designated by the Board of Supervisors pursuant to Part III of the Chesapeake Bay Regulations in 9VAC25-830-70 et seq. and §§ 62.1-44.15:73-:74 of the Act. The CBPA shall consist of Resource Protection Areas (RPAs) and Resource Management Areas (RMAs).

Development. The construction or substantial alteration of residential, commercial, industrial, institutional, recreational, transportation or utility facilities or structures.

Dripline. A vertical projection to the ground surface from the furthest lateral extent of a tree's leaf canopy.

Erosion and Sediment Control Law. Sections 62.1-44.15:51-66 of the Code of Virginia.

Floodplain. All lands that would be inundated by floodwater as a result of a storm event of a 100-year return interval as designated by chapter 24, section 24-586, et seq., of the county code.

Highly erodible soils. Soils (excluding vegetation) with an erodibility index (El) from sheet and rill erosion equal to or greater than eight. The erodibility index for any soil is defined by the Universal Soil Loss Equation as the product of the formula RKLS-/T, where K is the soil susceptibility to water erosion in the surface layer; R is the rainfall and runoff, LS is the combined effects of slope length and steepness; and T is the soil loss tolerance.

Highly permeable soils. Soils with a given potential to transmit water through the soil profile. Highly permeable soils are identified as any soil having a permeability equal to or greater than six inches of water movement per hour in any part of the soil profile to a depth of 72 inches (permeability groups "rapid" and "very rapid") as found in the National Soil Survey Handbook of November 1996, in the "Field Office Technical Guide" of the U.S. Department of Agriculture Natural Resources Conservation Service.

Hydric soils. Soils that are saturated, flooded or ponded long enough during the growing season to support wetland vegetation.

Impervious cover. A surface composed of any material that significantly impedes or prevents natural infiltration of water into the soil. Impervious surfaces include, but are not limited to, roofs, buildings, streets, parking areas and any concrete, asphalt or compacted aggregate surface. Pervious pavement surfaces will not be considered as totally impervious but will be given partial credit based on the open area and runoff characteristics of the paver structure and the proposed installation.

Infill. Utilization of vacant land in previously developed areas.

Local program. Measures by which a local government complies with the Act and this chapter.

Local program adoption date. Date a local government meets the requirements of subdivisions 1 and 2 of 9VAC25-830-60.

Land disturbing activity. As defined in section 8-21 of the county code.

Manager. The director of the county division of engineering and resource protection.

Nonpoint Source Pollution (NSP). Includes, but is not limited to, the following stormwater-borne pollutants resulting from land use activities:

(1) Sediment;
(2) Nutrients, such as phosphorus and nitrogen;
(3) Bacteria; such as fecal coliforms
(4) Viruses;
(5) Oxygen depletion;
(6) Hydrocarbons, such as fuels and lubricants;
(7) Toxic metals, such as lead, zinc, copper;
(8) Toxic chemicals;
(9) Chlorides, chlorinated water; and
(10) Increases in water temperature above normal, ambient levels.

Nontidal wetlands. Those wetlands, other than tidal wetlands, that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, as defined by the U.S. Environmental Protection Agency pursuant to section 404 of the Federal Clean Water Act, in 33 CFR 328.3b.

Noxious weeds. Weeds that are difficult to control effectively, such as Johnson Grass, Kudzu and multiflora rose. A complete list is contained in the Department of Conservation and Recreation, Division of Natural Heritage publication entitled Invasive Plant Species of Virginia.

Plan of development. Site plans, subdivision plans or other plans submitted pursuant to section 23-10 to ensure compliance with this chapter.

Public road. A publicly owned road designed and constructed in accordance with water quality protection criteria at least as stringent as requirements applicable to the Virginia Department of Transportation, including regulations promulgated pursuant to (i) the Erosion and Sediment Control Law and (ii) the Virginia Stormwater Management Act. This definition includes those roads where the Virginia Department of Transportation exercises direct supervision over the design or construction activities, or both.

Redevelopment. The process of developing land that is or has been previously developed.

RMA. That component of the CBPA that is not classified as the resource protection area. Lands of particular sensitivity within RMAs include, but are not limited to, nontidal wetlands not in RPAs, floodplains, highly erodible soils, highly permeable soils and hydric soils.

RPA. That component of a CBPA comprised of land adjacent to water bodies with perennial flow that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may result in significant degradation to the quality of state waters. RPAs shall include:

1. Tidal wetlands;
2. Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow;
3. Tidal shores;
4. A buffer area not less than 100 feet in width located adjacent to and landward of the components listed in subdivisions 1 through 3 above, and along both sides of any water body with perennial flow.

Runoff. That portion of precipitation that is discharged across the land surface through conveyances to one or more waterways.

Sightline. A line extending from a fixed point to a viewed object or area through an opening or passageway.

Silvicultural activities. Forest management activities, including but not limited to the harvesting of timber, the construction of roads and trails for forest management purposes and the preparation of property for reforestation that are conducted in accordance with the silvicultural best management practices developed and enforced by the State Forester pursuant to § 10.1-1105 of the Code or Virginia and are located on property defined as real estate devoted to forest use under § 58.1-3230 of the Code of Virginia.

Substantial alteration. Expansion or modification of a building or development which would result in a disturbance of land exceeding an area of 2,500 square feet in the RMA only.

Tidal shore or shore. Land contiguous to a tidal body of water between the mean low water level and the mean high water level.

Tidal wetlands. Vegetated and nonvegetated wetlands, as defined in section 28.2-1300 of the Code of Virginia.

Tidewater Virginia. Those jurisdictions named in § 62.1-44.15:68 of the Act.

Virginia Erosion and Sediment Control program authority or VESCP authority. As defined in section 8-21 of the county code.

Virginia Stormwater Management Act. Article 2.3 of chapter 3.1 of title 62.1 of the Code of Virginia.

Virginia Stormwater Management Program authority or VSMP authority. As defined in section 8-21 of the county code.

Water body with perennial flow. A body of water that flows in a natural or man-made channel year-round during a year of normal precipitation. This includes, but is not limited to, streams, estuaries and tidal embayments, and may include drainage ditches or channels constructed in wetlands or from former natural drainageways, which convey perennial flow. Lakes and ponds through which a perennial stream flows are part of the perennial stream. Generally, the water table is located above the streambed for most of the year and groundwater is the primary source for stream flow. The methodology to determine perennial flow shall be in accordance with section 23-10 (2)(d) of this chapter.

Water-dependent facility. A development of land that cannot exist outside of the RPA and must be located on the shoreline because of the intrinsic nature of its operation. These facilities include, but are not limited to:

(1) Ports;
(2) The intake and outfall structures of power plants, water treatment plants, sewage treatment plants and storm sewers;
(3) Marinas and other boat docking structures;
(4) Beaches and other public water-oriented recreation areas; and
(5) Fisheries or other marine resources facilities.

Wetlands. Tidal and nontidal wetlands.

Sec. 23-7. Development criteria for RPAs.

In addition to the general performance criteria set forth in section 23-9, the criteria in this section are applicable in RPAs.

(a) Development in RPAs may be allowed only when permitted by the manager and if it (i) is water dependent; (ii) constitutes redevelopment; (iii) is a new use subject to the provisions of subsection (c)(2) of this section; (iv) is a road or driveway crossing satisfying the conditions set forth in Subdivision (3) of this section; or (v) is a flood control or stormwater management facility satisfying the conditions set forth is Subdivision (4) of this section.

(1) A new or expanded water dependent facility may be allowed provided that the following criteria are met:

a. It does not conflict with either the comprehensive plan or any applicable approved watershed management plan; and
b. It complies with the performance criteria set forth in section 23-9 of this chapter; and
c. Any nonwater - dependent component is located outside of the RPA; and

d. Access to the water-dependent facility will be provided with the minimum disturbance necessary. Where practicable, a single point of access will be provided.

(2) Redevelopment on isolated redevelopment sites shall be permitted only if there is no increase in the amount of impervious cover and no further encroachment within the RPA and it shall conform to sections 23-9(b)(4) and (5), and the stormwater management requirements outlined in this chapter.

(3) Roads and driveways not exempt under section 23-13 and which, therefore, must comply with the provisions of this chapter, may be constructed in or across RPAs if each of the following conditions are met:

a. The manager makes a finding that there are no reasonable alternatives to aligning the road or drive in or across the RPA; and
b. The alignment and design of the road or driveway are optimized, consistent with other applicable requirements, to minimize encroachment in the RPA and minimize adverse effects on water quality; and
c. The design and construction of the road or driveway satisfy all applicable criteria of this chapter including the submission of a water quality impact assessment; and
d. The manager reviews the plan for the road or driveway proposed in or across the RPA in coordination with the plan of development requirements as required under section 23-10.

(4) Flood control and stormwater management facilities that drain or treat water from multiple development projects or from a significant portion of a watershed may be allowed in RPAs provided such facilities are allowed and constructed in accordance with the Virginia Stormwater Management Act and this chapter, and provided that:

a. The manager has conclusively established that location within the RPA is the optimum location, meaning that it is the best place to locate the facility from an engineering/functionality consideration regardless of the presence of an RPA;
b. The size of the facility is the minimum necessary to provide necessary flood control, stream channel protection, stormwater treatment or all three;
c. The facility must be consistent with a comprehensive stormwater program plan developed and approved in accordance with 9VAC25-870-92 or with a VSMP that has been approved prior to July 1, 2012, by the State Water Control Board, the Chesapeake Bay Local Assistance Board prior to its abolition on July 1, 2012, or the Department of Conservation and Recreation;
d. All applicable permits for construction in state or federal waters must be obtained from the appropriate state and federal agencies;
e. Approval must be received from the county prior to construction; and
f. Routine maintenance must be performed on the facility to assure that it continues to function as designed.

It is not the intent of this subdivision to allow a stormwater management and/or a BMP facility that collects and treats runoff from only an individual lot or some portion of the lot to be located within a resource protection area.

(b) A water quality impact assessment as outlined in section 23-11 of this chapter shall be required for any proposed land disturbance, development or redevelopment within RPAs and for any other development

within RMAs when required by the manager because of the unique characteristics of the site, intensity of development or potential impacts on water quality or RPAs in accordance with the provisions of section 23-11 of this chapter.

(c) Buffer area requirements. To minimize the adverse effects of human activities on the other components of RPAs, state waters and aquatic life, a 100-foot buffer area of vegetation that is effective in retarding runoff, preventing erosion and filtering nonpoint source pollution from runoff shall be retained if present and established during development where it does not exist. The buffer shall have three layers of vegetation comprised of native trees, shrubs and ground covers. Where the buffer is being established, a buffer modification plan will be prepared that may incorporate existing vegetation. A list of acceptable native plants is available from the manager. A buffer area not less than 100 feet in width shall be located adjacent to and landward of other RPA components and along both sides of any water body with perennial flow. The full buffer area shall be designated as the landward component of the RPA. The 100-foot buffer area shall be deemed to achieve a 75 percent reduction of sediments and a 40 percent reduction of nutrients. All subdivision plats submitted for approval after August 6, 1990, shall clearly identify the boundaries of any RPA within the property. Such plat shall contain a statement that all existing vegetation within the RPA shall remain in its undisturbed natural state, except for vegetation weakened by age, storm, fire or other natural cause. Developers shall install signs identifying the landward limit of the RPA. Signs shall be obtained, installed and maintained in accordance with guidelines established by the manager.

(1) Permitted buffer modifications. In order to maintain the functional value of the buffer area, existing vegetation may be removed upon approval by the manager of a buffer modification plan only to provide for reasonable sight lines, access paths, general wood lot management, and BMPs including those that prevent upland erosion and concentrated flows of stormwater, as follows:

a. Trees may be pruned or removed as necessary to provide for sight lines provided, that where removed they shall be replaced with other vegetation that is equally effective in retarding runoff, preventing erosion and filtering nonpoint source pollution from runoff;
b. Access paths shall be constructed and surfaced so as to effectively control erosion;
c. Dead, diseased or dying trees or shrubbery, or noxious weeds may be removed based upon the approval of the manager, who may require a recommendation by a professional forester or arborist; and
d. For shoreline erosion-control projects, trees and woody vegetation may be removed, necessary control techniques employed and appropriate vegetation established to protect or stabilize the shoreline and restore the function of the buffer in accordance with the best available technical advice and applicable permit conditions or requirements.

(2) Permitted buffer encroachments.

a. When application of the buffer would result in the loss of a buildable area on a lot or parcel recorded prior to August 6, 1990, encroachments into the buffer may be allowed through an administrative process in accordance with the following criteria:

1. Encroachments into the buffer shall be the minimum necessary to achieve a reasonable buildable area for a principal structure and necessary utilities;

2. Where practicable, a vegetated area that will maximize water quality protection, mitigate the effects of the buffer encroachment, and is equal to the area of encroachment into the buffer area shall be established elsewhere on the lot or parcel; and
3. The encroachment may not extend into the seaward 50 feet of the buffer area.

b. When application of the buffer would result in the loss of a buildable area on a lot or parcel recorded between August 6, 1990, and January 1, 2004, encroachments into the buffer may be allowed through an administrative process in accordance with the following criteria:

1. The lot or parcel was created as a result of a legal process conducted in conformity with the county's subdivision regulations;
2. Conditions or mitigation measures imposed through a previously approved exception shall be met;
3. If the use of a BMP was previously required, the BMP shall be evaluated to determine if it continues to function effectively and, if necessary, the BMP shall be reestablished or repaired and maintained as required; and
4. The criteria in subdivision (c)(2)a. of this section shall be met.

(3) On agricultural lands, the agricultural buffer area shall be managed to prevent concentrated flows of surface water from breaching the buffer area and appropriate measures may be taken to prevent noxious weeds from invading the buffer area. Agricultural activities may encroach into the buffer area as follows:

a. Agricultural activities may encroach into the landward 50 feet of the 100-foot wide buffer area when at least one agricultural BMP which, in the opinion of the local soil and water conservation district board, addresses the more predominant water quality issue on the adjacent land - erosion control or nutrient management - is being implemented on the adjacent land, provided that the combination of the undisturbed buffer area and the BMP achieves water quality protection, pollutant removal and water resource conservation at least the equivalent of the 100-foot buffer area. If nutrient management is identified as the predominant water quality issue, a nutrient management plan, including soil tests, must be developed and implemented consistent with the Virginia Nutrient Training and Certification Regulations 4VAC50-85 administered by the Virginia Department of Conservation and Recreation.
b. Agricultural activities may encroach within the landward 75 feet of the 100-foot wide buffer area when agricultural BMPs which address erosion control, nutrient management, and pest chemical control, are being implemented on the adjacent land. The erosion control practices must prevent erosion from exceeding the soil loss tolerance level, referred to as "T," as defined in the "Field Office Technical Guide" of the U.S. Department of Agriculture Natural Resource Conservation Service. A nutrient management plan, including soil tests, must be developed and implemented consistent with the Virginia Nutrient Management Training and Certification Regulations (4VAC50-85) administered by the Virginia Department of Conservation and Recreation. In conjunction with the remaining buffer area, this collection of BMPs shall be presumed to achieve water quality protection at least the equivalent of that provided by the 100-foot wide buffer area.
c. The buffer area is not required to be designated for agricultural drainage ditches if at least one BMP which, in the opinion of the local soil and water conservation district board, addresses the

more predominant water quality issue on the adjacent land - erosion control or nutrient management - is being implemented on the adjacent land.

(4) When agricultural or silvicultural uses within the buffer area cease, and the lands are proposed to be converted to other uses, the full 100-foot wide buffer area shall be reestablished. In reestablishing the buffer, management measures shall be undertaken to provide woody vegetation that assures the buffer functions are maintained or established.

Sec. 23-8. Determining resource protection area boundaries.

The county CBPA map shall be used as a guide to the general location of RPAs. In addition, reference materials that may be used as general guidance for estimating locations of RPAs include federal, state and county topographic maps, wetland maps and aerial photography. Site-specific boundaries of the RPA shall be determined by the applicant through the performance of an environmental inventory required as part of the plan of development review process or a water quality impact assessment. Site-specific boundaries determined by the applicant shall be reviewed and approved by the manager.

Sec. 23-9. Performance standards.

(a) Purpose and intent. The performance standards establish the means to minimize erosion and sedimentation potential, reduce land application of nutrients and toxics, and maximize rainwater infiltration. Natural ground cover, especially woody vegetation, is most efficient in holding soil in place and preventing site erosion. Indigenous vegetation, with its adaptability to local conditions without the use of harmful fertilizers or pesticides, filters and infiltrates stormwater runoff. Keeping impervious cover to a minimum enhances rainwater infiltration and effectively reduces increases of stormwater runoff.

The purpose and intent of these requirements is also to implement the following objectives: prevent a net increase in nonpoint source pollution from new development and development on previously developed land where the runoff was treated by a water quality protection best management practice; achieve a 10 percent reduction in nonpoint source pollution from development on previously developed land where the runoff was not treated by one or more water quality best management practices; and achieve a 40 percent reduction in nonpoint source pollution from agricultural and silvicultural uses.

(b) General performance standards:

(1) Land disturbance shall be limited to the area necessary to provide for the proposed use or development.

a. In accordance with an approved plan of development, the limits of clearing and/or grading shall be clearly defined. These limits shall be clearly shown on submitted plans and physically marked on the development site in accordance with subsection (2) b. below.
b. Impervious cover shall not exceed 60 percent of the site unless it can be demonstrated that the project will have the same impact on water quality as the project would have if it were 60 percent impervious. Demonstration of equivalent water quality will be through compliance with guidelines developed by the manager. For projects with an approved Stormwater Master Plan, compliance with this impervious cover provision can be demonstrated on a project basis

rather than an individual site basis. However, in no case shall impervious cover exceed the limits established in section 24-99(c)(4) of the Zoning Ordinance.

c. Ingress and egress during construction shall be limited to one access point, unless otherwise approved by the manager.

(2) Existing vegetation shall be preserved to the maximum extent practicable, consistent with the use or development permitted by an approved plan of development.

a. Existing trees over 12 inches in diameter at breast height shall be preserved except in impervious areas and as necessary to accommodate site grading. Upon approval by the manager, diseased trees or trees weakened by age, storm, fire or other injury may be removed; provided, that when such removal results in a 20 percent or greater reduction in existing tree canopy, a sufficient number of trees with a 1-½ inch caliper shall be planted to restore the full canopy.

b. Prior to clearing or grading, suitable protective barriers, such as safety fencing, shall be erected outside of the dripline of any tree or stand of trees to be preserved unless otherwise approved on the clearing plan. Protective barriers shall remain so erected throughout all phases of construction. The storage of equipment, materials, debris or fill shall not be allowed within the area protected by the barrier.

(3) Land development shall minimize impervious cover to promote infiltration of stormwater into the ground consistent with the proposed use or development permitted.

(4) All development and redevelopment exceeding 2,500 square feet of land disturbance shall be subject to a plan of development review process conducted in accordance with section 23-10 of this chapter.

(5) Any land-disturbing activity exceeding 2,500 square feet, including construction of all single-family houses and septic tanks and drainfields shall comply with the requirements of chapter 8 of the county code.

(6) All on-site sewage disposal systems not requiring a National Pollutant Discharge Elimination System permit shall be pumped out at least once every five years. However, in lieu of requiring proof of septic tank pump-out every five years, owners of on-site sewage disposal systems can submit documentation every five years, certified by an operator or on-site soil evaluator licensed or certified pursuant to §§ 54.1-2300 et seq. of the Code of Virginia as being qualified to operate, maintain, or design on-site sewage systems, that the septic system has been inspected, is functioning properly, and the tank does not need to have the effluent pumped out of it.

(7) A reserve sewage disposal site, with a capacity at least equal to that of the primary sewage disposal site, shall be provided. This requirement shall not apply to any lot or parcel recorded prior to August 6, 1990, if such lot or parcel is not sufficient in capacity to accommodate a reserve sewage disposal site, as determined by the local health department. Building or construction of any impervious surface shall be prohibited on the area of all sewage disposal sites or on an on-site sewage treatment system which operates under a permit issued by the State Water Control Board until the structure is served by public sewer.

(8) Any Chesapeake Bay Preservation Act land-disturbing activity shall comply with the requirements of 9VAC25-870-51 and 9VAC25-870-103 of the Virginia Administrative Code and chapter 8-22(b) of the county code.

a. A stormwater management plan consistent with these requirements must be designed and implemented during the land disturbing activity;
b. Prior to land disturbance, the stormwater management plan must be approved by the VSMP authority;
c. Exceptions to technical criteria for regulated land disturbing activities (Part IIB or Part IIC) may be requested in accordance with 9VAC25-870-57 and section 8-28(g) of the county code; and
d. Long-term maintenance of stormwater management facilities shall be provided for and conducted in accordance with 9VAC25-870-58 and section 8-29 of the county code.

(9) For any development or redevelopment BMPs that is designated as a Chesapeake Bay Preservation Act land disturbing activity or is subject to grandfathering provisions of 9VAC25-870-48 and section 8-28(c) of the county code and deemed subject to Part IIC technical criteria of the VSMP regulations, 9VAC25-870-93 - 99, the following applies:

a. If stormwater management compliance is based in whole or part on the use of existing downstream onsite or offsite structural stormwater management and/or BMPs facility, evidence shall be provided that such facilities are currently in good working order and performing at the design levels of service;
b. The manager may require a review of both the original design and maintenance plans to verify this provision; and
c. A new maintenance agreement may be required to ensure compliance with this chapter.

(10) Prior to initiating grading or other on-site activities on any portion of a lot or parcel, all wetlands permits required by federal, state and county laws and regulations shall be obtained and evidence of such submitted to the manager. For those projects where no wetlands are proposed to be impacted or where the impacts do not require written authorization, documentation shall be submitted to the manager by a qualified wetlands professional attesting that the wetlands permitting process has been completed and no further documentation is necessary from the regulatory agencies.

(11) All lands upon which agricultural activities are being conducted shall undergo a soil and water quality conservation assessment. Such assessment shall evaluate the effectiveness of existing practices pertaining to soil erosion and sediment control, nutrient management and management of pesticides, and where necessary, results in a plan that outlines additional practices needed to ensure that water quality protection is accomplished consistent with this chapter. Plans of development or water quality impact assessments are not required for activities on agricultural lands except for land disturbing activities not related to food and/or fiber production.

Sec. 23-10. Plan of development.

Any development or redevelopment exceeding 2,500 square feet of land disturbance in the CBPA shall be accomplished through a plan of development process prior to any clearing or grading of the site or the issuance of any building permit to assure compliance with all applicable requirements of this chapter and any applicable

approved watershed management plans. Administration of the plan of development process shall be in accordance with chapter 24 of this Code for site plans and chapter 19 of this Code for subdivision plans. The following plans or studies shall be submitted, unless otherwise provided for:

(1) Site and subdivision plans. Site plans in accordance with the provisions of chapter 24 of the county code or subdivision plans in accordance with chapter 19 of the county code. In the event that chapter 24 does not require the preparation of a site plan for a development activity that exceeds 2,500 square feet of land disturbance, a plan will still be required for the purposes of this chapter that complies with Item Nos. 2, 3 and 5 of this subsection.

(2) Environmental inventory. An environmental inventory shall be submitted in conjunction with preliminary site plan or preliminary subdivision plan approval applications. Except for the perennial stream determination required in Item d. of this subsection, this requirement may be waived by the manager when the proposed use or development would result in less than 5,000 square feet of disturbed area. For existing single-family lots in a RPA, showing items required by subsection a. on the plat plan normally required as part of the building permit application shall satisfy the requirements for an environmental inventory. An environmental inventory is not required for existing single-family lots in the RMA.

a. The environmental inventory shall be drawn to scale clearly delineating the following components:
   1. Tidal wetlands;
   2. Tidal shores;
   3. Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow (i.e., RPA wetlands);
   4. A 100-foot buffer area located adjacent to and landward of the components listed in Item Nos. 1 through 3 above, and along both sides of any water body with perennial flow;
   5. Nontidal wetlands not included in Item No. 3 (i.e., RMA wetlands);
   6. 100-year floodplains as designated by chapter 24 of the county code; and
   7. Slopes 25 percent or greater.

b. Wetlands delineations shall be performed consistent with the procedures specified in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands currently approved for use by the Army Corps of Engineers.

c. The environmental inventory shall be drawn at the same scale as the preliminary site plan or subdivision plan and shall be certified as complete and accurate by a person or firm competent to make the inventory.

d. The environmental inventory shall include a reliable, site specific evaluation to determine whether water bodies on or adjacent to the development site have perennial flow. This evaluation shall be provided by the person applying to use or develop the site using one of the county or state approved methods of in-field indicators of perennial flow unless the county has already made a field determination of perennial flow for the site. These site-specific determinations shall be confirmed by the manager and shall be used to establish the boundaries of the RPA.

(3) Clearing plan. A clearing plan shall be submitted in conjunction with site plan review or subdivision plan review. No clearing or grading of any lot or parcel shall be permitted without an approved clearing plan. For existing single-family lots, a clearing line shown on the plat plan normally

submitted as part of the building permit application shall satisfy clearing plan requirements. No clearing or grading shall occur on existing single-family lots until a complete building permit application is submitted.

Clearing plans shall be prepared and/or certified by design professionals practicing within their areas of competence as prescribed by the Code of Virginia.

a. Contents of the plan:
    1. The clearing plan shall be drawn to scale and clearly delineate the location, size and description of existing and proposed plant material. All existing trees on the site 12 inches or greater diameter at breast height (DBH) shall be shown on the clearing plan, or where there are groups of trees, the woodlines of the group may be outlined instead. The specific number of trees 12 inches or greater DBH to be preserved outside of the impervious cover and outside the groups shall be indicated on the plan. Trees to be removed and woodlines to be changed to create desired impervious cover shall be clearly delineated on the clearing plan.
    2. Any required buffer area shall be clearly delineated and any plant material to be added to establish or supplement the buffer area, as required by this chapter, shall be shown on the clearing plan.
    3. Within the RPA buffer area, trees to be removed for sight lines, vistas, access paths and BMPs, as provided for in this chapter, shall be shown on the plan. Vegetation required by this chapter to replace any existing trees within the buffer area shall also be shown on the clearing plan.
    4. Erosion and sediment controls shall be provided as necessary and in accordance with chapter 8 of the county code.
b. Plant specifications:
    1. All plant materials necessary to supplement the buffer area or vegetated areas outside the impervious cover shall be installed according to standard planting practices and procedures.
    2. All supplementary or replacement plant materials shall be living and in healthy condition. Plant materials shall conform to the standards of the most recent edition of the American Standard for Nursery Stock, published by the American Association of Nurserymen.
    3. Where areas to be preserved, as designated on an approved clearing plan, are encroached, replacement of existing trees and other vegetation will be achieved at a ratio of two planted trees to one removed. Replacement trees shall be a minimum 1-½ inches caliper at the time of planting.

c. Maintenance:
    1. The applicant shall be responsible for the maintenance, repair and replacement of all vegetation as may be required by the provisions of this chapter.
    2. In buffer areas and areas outside the impervious cover, plant material shall be tended and maintained in a healthy growing condition and free from refuse and debris. Unhealthy, dying or dead plant materials shall be replaced during the next planting season, as required by the provisions of this chapter.
d. Installation and bonding requirements:

1. Where buffer areas are required, no certificate of occupancy shall be issued until the installation of required plant material to establish or supplement the buffer is completed, in accordance with the approved clearing plan.
2. When the occupancy of a structure is desired prior to the completion of the plan, a certificate of occupancy may be issued only if the applicant provides a form of surety satisfactory to the county attorney in an amount equal to the costs of the remaining plant materials, related materials and installation costs.
3. All required plant material shall be installed and approved by the first planting season following issuance of a certificate of occupancy or the surety may be forfeited.

(4) Stormwater management plan. A stormwater management plan shall be submitted as part of the plan of development process required by chapter 8 of the county code and in conjunction with site plan or subdivision plan preliminary approval. A stormwater management plan is not required for individual single-family detached residential structures that utilize an agreement in lieu of a stormwater management plan in accordance with section 8-25(a) of the county code.

Performance assurances shall be provided that all stormwater management and/or/BMP facilities required in plans of development shall be constructed to comply with the performance criteria set forth therein. The form of agreement and type of bond, letter of credit or other security shall be to the satisfaction of and approved by the county attorney. The amount of bond, letter of credit or other security and designated length of completion time shall be set by the manager or his authorized designee.

a. Contents of the plan must meet the requirements of section 8-25 of the county code;

b. Plan must be submitted and reviewed in accordance with 9VAC25-870-108 and section 8-27(a) of the county code;
c. Prior to land disturbance, the stormwater management plan must be approved by the VSMP authority;
d. Exceptions to technical criteria for regulated land disturbing activities (Part IIB or Part IIC) may be requested in accordance with 9VAC25-870-57 and section 8-28(g) of the county code; and
e. Long-term maintenance of stormwater management facilities shall be provided for and conducted in accordance with 9VAC25-870-58 and section 8-29 of the county code.

(5) Erosion and sediment-control plan. An erosion and sediment control plan consistent with the requirements of the Erosion and Sediment Control Law and chapter 8 of the county code must be designed and implemented during land disturbing activities. Prior to land disturbance, this plan must be approved by the VESCP authority.

(6) Landscaping plan. Landscaping plan in accordance with chapter 24 of the county code.

(7) Final plan. Final site plans or final subdivision plans for all lands within CBPAs shall include the following information:

a. Delineation of the RPA boundary;
b. Delineation of required buffer areas;

c. Delineation of RMA wetlands;
d. All wetlands permits required by law;
e. Delineation of slopes 25 percent or greater; and
f. BMP maintenance agreement to ensure proper maintenance of BMPs in order to continue their functions.

Sec. 23-12. Waivers for noncomplying structures.

The manager through an administrative process may permit the continued use, alteration, or the expansion of any structure in existence on August 6, 1990, which is not in conformity with the provisions of this chapter. The process requires that:

(1) The manager may grant a waiver for noncomplying structures on legal nonconforming lots or parcels to provide for alterations or expansions to such nonconforming structures provided that:

a. There will be no increase in nonpoint source pollution load;
b. Any development or land disturbance exceeding an area of 2,500 square feet complies with all erosion and sediment control requirements of this chapter; and
c. For expansion of a principal noncomplying structure, the manager makes the following findings:
   1. The request for the waiver is the minimum necessary to afford relief;
   2. Granting the waiver will not confer upon the applicant any specific privileges that are denied by this chapter to other property owners in similar situations;
   3. The waiver is in harmony with the purpose and intent of this chapter and does not result in water quality degradation;
   4. The waiver is not based on conditions or circumstances that are self-created or self-imposed;
   5. Reasonable and appropriate conditions are imposed, as warranted, that will prevent the waiver from causing a degradation of water quality;
   6. Other findings, as appropriate and required by the manager are met; and
   7. In no case shall this provision apply to accessory structures as defined in chapter 24 of the county code.
d. The waiver does not conflict with the comprehensive plan or any applicable approved watershed management plan.

(2) An application for a waiver shall be made in writing to the manager and shall include for the purpose of proper enforcement of this chapter, the following information:

a. Name and address of applicant and property owner;
b. Legal description of the property and type of proposed use and development;
c. A sketch of the dimensions of the lot or parcel, location of buildings and proposed additions relative to the lot lines, and boundary of the RPA;
d. Location and description of any existing private water supply or sewage system; and,
e. A plan that depicts the impacts to components of the environmental inventory as required by section 23-10(2) of this chapter, and identification of the amount of impact to each component.

(3) A waiver shall become null and void if building foundations are not completed within twelve months from the date issued.

Sec. 23-13. Exemptions.

(a) Public utilities, railroads, public road and related facilities.

(1) Construction, installation, operation and maintenance of electric, natural gas, fiber-optic and telephone transmission lines, railroads and public roads and their appurtenant structures in compliance with (i) the Erosion and Sediment Control Law (sections 62.1-44.15:51 - :66 of the Code of Virginia) and the Stormwater Management Act (sections 62.1-44.15:24-:50 of the Code of Virginia), (ii) an erosion and sediment control plan and a stormwater management plan approved by the Virginia Department of Environmental Quality, or (iii) this chapter's water quality protection criteria which is at least as stringent as the above state requirements will be deemed to comply with the regulations adopted pursuant to the Act. The exemption of public roads is further conditioned on the following:

a. The road alignment and design have been optimized, consistent with all applicable requirements, to prevent or otherwise minimize the encroachment in the RPA and to minimize the adverse effects on water quality.

(2) Construction, installation and maintenance by public agencies of water and sewer, natural gas, and underground telecommunications and cable television lines owned, permitted or both, by the county or a regional service authority shall be exempt from this chapter; provided that:

a. To the degree possible, the location of such utilities and facilities should be outside RPAs;
b. No more land shall be disturbed than is necessary to provide for the proposed utility installation;
c. All such construction, installation and maintenance of such utilities and facilities shall be in compliance with all applicable federal, state and county permits and designed and conducted in a manner that protects water quality; and
d. Any land disturbance exceeding an area of 2,500 square feet complies with chapter 8 of this code.

(b) Exemptions for silvicultural activities. Silvicultural activities are exempt from the requirements of this chapter; provided that silvicultural operations adhere to water quality protection procedures prescribed by the Department of Forestry in its Virginia's Forestry Best Management Practices for Water Quality.

(c) Exemptions for RPAs. The following land disturbances may be exempted by the manager from the requirements of this chapter provided that they comply with subdivisions 1 through 3 of this subdivision: (i) water wells; (ii) passive recreational facilities, such as boardwalks, trails and pathways; and, (iii) historic preservation and archaeological activities.

(1) Any required permits, except those to which this exception specifically applies, shall have been issued;
(2) Sufficient and reasonable proof is submitted that the intended use will not deteriorate water quality; and,

(3) Any land disturbance exceeding an area of 2,500 square feet shall comply with chapter 8 of this code.

Sec. 23-17. Appeals.

(a) An owner of property subject to an administrative decision, order or requirement under this chapter may appeal by submitting a written request for review to the board no later than 30 days from the rendering of such decision, order or requirement. The board shall hear the appeal as soon as practical after receipt of the request. The appellant, the board of supervisors, the manager, the planning director and any person or agency expressing an interest in the matter shall be notified by the board not less than ten days prior to the date of the hearing. Published notice of the board's public meetings shall state that appeals from decision under the Chesapeake Bay Preservation Ordinance may be heard.

(b) In rendering its decision, the board shall balance the hardship to the property owner with the purpose, intent and objectives of this chapter. The board shall not decide in favor of the appellant unless it finds:

(1) The hardship is not generally shared by other properties in the vicinity;
(2) The Chesapeake Bay, its tributaries and other properties in the vicinity will not be adversely affected; and
(3) The appellant acquired the property in good faith and the hardship is not self-inflicted.

(c) The board may impose conditions to the granting of any waiver, exception or appeal as it may deem necessary in the public interest, and may, to ensure compliance with the imposed conditions, require a cash escrow, bond with surety, letter of credit or other security as is acceptable to the county attorney.

(d) An owner of a property subject to a board decision, order or requirement may appeal to the circuit court of James City County no later than 30 days from the rendering of such decision, order or requirement.

State Law reference - Code of Va., § 62.1-44.15:74(F)

Sec. 23-18. Violations; penalties.

(a) Without limiting the remedies which may be obtained under this section, any person who violates any provision of this chapter or who violates, fails, neglects or refuses to obey any variance or permit condition authorized under this chapter shall, upon such finding by the circuit court, be assessed a civil penalty not to exceed $5,000.00 for each day of violation. Such penalties may, at the discretion of the court assessing them, be directed to be paid into the treasury of the county for the purpose of abating environmental damage to or restoring Chesapeake Bay Preservation Areas within the county, in such a manner as the court may direct by order.

(b) Without limiting the remedies which may be obtained under this section, and with the consent of any person who has violated any provision of this chapter, or who has violated, failed, neglected or refused to obey any variance or permit condition authorized under this chapter, the county may provide for the issuance of an order against such person for the one-time payment of civil charges for each violation in specific sums, not to exceed $10,000.00 for each violation. Such civil charges shall be paid into the treasury of the county for the purpose of abating environmental damage to or restoring Chesapeake Bay Preservation Areas in the county. Civil charges shall be in lieu of any appropriate civil penalty that could

be imposed under subdivision (a) of this section. Civil charges may be in addition to the costs of any restoration required by the board of supervisors.

(c) In addition to, and not in lieu of, the penalties prescribed in sections (a) and (b) hereof, the county may apply to the circuit court for an injunction against the continuing violation of any of the provisions of this ordinance and may seek any other remedy authorized by law.

State Law reference - Code of Va., § 62.1-44.15:74(E).

Chesapeake Bay Preservation Act Land Disturbing Activity and Septic Pump-Out Requirements that need to be Incorporated into Local Ordinances

Statutory/Regulatory Citations	Explanation of Change	Changes to Local Ordinances
§ 62.1-44.15:27 - Stormwater Management Act; 9VAC25-870-51 and 9VAC25-870-103 (Chesapeake Bay Land Disturbing Activities)	Revisions to the Stormwater Management Act require localities subject to the Chesapeake Bay Preservation Act to "adopt requirements set forth in this article and attendant regulations to regulate Chesapeake Bay Preservation Act land-disturbing activities." The VSMP regulations pertaining to CBPA land disturbing activities were revised to comport with the changes to the Stormwater Management Act.	1. 9VAC25-870-51 B 1: An erosion and sediment control plan consistent with the requirements of the Virginia Erosion and Sediment Control Law and regulations must be designed and implemented during land disturbing activities. Prior to land disturbance, this plan must be approved by either the VESCP authority or the department in accordance with the Virginia Erosion and Sediment Control Law and attendant regulations. *Comment: E & S plan requirements contained in existing local E & S ordinances will suffice in meeting this requirement.* 2. 9VAC25-870-51 B 2: Stormwater Management Plan developed and submitted in accordance with 9VAC25-870-55 of the VSMP regulations. Prior to land disturbance, this plan must be approved by the VSMP authority or a non-VSMP locality subject to the Chesapeake Bay Preservation Act. DEQ will not be reviewing stormwater management plans for Chesapeake Bay Land Disturbing activities. *Comment: Existing requirement for the submittal of a stormwater management plan may be amended as necessary to meet the administrative requirements of 9VAC25-870-55.* 3. 9VAC25-870-51 B 3: Provisions for exceptions to the technical criteria (Parts II B & IIC). *Comment: These provisions may be incorporated into the existing exception language in the local Bay Act ordinance.* 4. 9VAC25-870-51 B 4: Long term maintenance of SWM facilities shall be provided for as outlined under 9VAC25-870-112. *Comment: These provisions may be added to existing BMP maintenance requirements contained in the local Bay Act ordinance, but must meet all the criteria contained in 870-112.* 5. 9VAC25-870-51 B 5 – 9: Bay Act localities must require compliance with the following Part II B technical criteria in the VSMP regulations:

		a. 9VAC25-870-63 – Water quality design criteria requirements b. 9VAC25-870-65 – Water quality compliance c. 9VAC25-870-66 – Water quantity d. 9VAC25-870-69 – Offsite compliance options e. 9VAC25-870-72 – Design storms and hydrologic methods f. 9VAC25-870-76 – Linear development projects g. 9VAC25-870-85 – Stormwater management impoundment structures or facilities *Comment: A Bay Act locality may add the Part II B technical criteria to the existing Bay Act water quality criteria contained in the local Bay Act ordinance. The existing Bay Act water quality provisions, which are equivalent to the Part II C water quality technical criteria, will apply to land disturbing activities that are deemed by the locality to be grandfathered pursuant to 9VAC25-870-48 and those projects that obtained coverage under the 2009 Construction General Permit.* 6. 9VAC25-870-103 A 2: A local permit, where applicable, shall be issued permitting the land-disturbing activity. *Comment: A locality's existing land disturbance permit will meet this requirement.* 9VAC25-870-103 A 3 b: Local plan review in accordance with 9VAC25-870-108A-C and E – Stormwater plan review requirements *Existing requirement for the submittal of a stormwater management plan may be amended as necessary to meet the administrative requirements of 9VAC25-870-108.* 7. 9VAC25-870-103 A 3 c: Requirement for the long term stormwater management facility requirements of 9VAC25-870-112 – requires recorded instruments for maintenance of SWM facilities 8. 9VAC25-870-103 A 3 d: Locality shall adhere to the inspection requirements of 9VAC25-870-114 (except for subsections A 3 and A 4)– requires inspection program be approved, that the locality ensure that each stormwater management facility is inspected once every 5 years and that such inspections be documented. 9. 9VAC25-870-103 A 3 e: Locality must incorporate enforcement components of 9VAC25-870-116 10. 9VAC25-870-103 A 3 f: Locality must require the hearing requirements of 9VAC25-870-118

		11. 9VAC25-870-103 A 3 g: Locality must address the exception conditions of 9VAC25-870-122 A-B and D-E 12. 9VAC25-870-103 A 3 h: Local program must address the reporting and recordkeeping requirements of 9VAC25-870-126, except for subsection B 3
§ 62.1-44.15:72 - Chesapeake Bay Preservation Act; 9VAC25-830-130 - General performance criteria.	§ 62.1-44.15:72 of the Chesapeake Bay Preservation Act was amended to remove "a sewage handler permitted by the Virginia Department of Health" and replace it with "an operator or on-site soil evaluator licensed or certified under Chapter 23 (§ 54.1-2300 et seq.) of Title 54.1 as being qualified to operate, maintain, or design on-site sewage systems" as the party who can certify that the septic system has been inspected, is functioning, and does not need to be pumped out.	9VAC25-830-130: Language to be added and/or amended in local ordinances: Remove reference to "a sewage handler permitted by the Virginia Department of Health" and insert "an operator or on-site soil evaluator licensed or certified under Chapter 23 (§ 54.1-2300 et seq.) of Title 54.1 as being qualified to operate, maintain or design on-site sewage systems," before "that the septic system has been inspected, is functioning properly, and the tank does not need to have the effluent pumped out of it."

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

AGENDA ITEM NO. I.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board of Supervisors

FROM: Michael Woolson, Senior Watershed Planner and Fran Geissler, Stormwater Director

SUBJECT: Ware Creek Watershed Management Plan - Board Adoption

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ATTACHMENTS:

	Description	Type
🗋	Cover Memo	Cover Memo
🗋	Resolution	Resolution
🗋	Executive Summary	Backup Material
🗋	Chapter 1, Part 1	Exhibit
🗋	Chapter 1, Part 2	Exhibit
🗋	Chapter 1, Part 3	Exhibit
🗋	Chapter 1, Part 4	Exhibit
🗋	Chapter 2	Exhibit
🗋	Chapter 3	Exhibit
🗋	Chapter 4	Exhibit
🗋	Chapter 5	Exhibit
🗋	Chapter 6	Exhibit
🗋	Appendices	Exhibit

REVIEWERS:

Department	Reviewer	Action	Date
Engineering & Resource Protection	Thomas, Scott	Approved	9/9/2016 - 4:19 PM
Development Management	Holt, Paul	Approved	9/12/2016 - 8:55 AM
Publication Management	Burcham, Nan	Approved	9/12/2016 - 8:59 AM
Legal Review	Kinsman, Adam	Approved	9/12/2016 - 3:58 PM
Board Secretary	Fellows, Teresa	Approved	9/13/2016 - 8:41 AM
Board Secretary	Purse, Jason	Approved	9/19/2016 - 8:38 AM
Board Secretary	Fellows, Teresa	Approved	9/19/2016 - 8:40 AM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Frances C. Geissler, Stormwater Director
Michael D. Woolson, Senior Watershed Planner

SUBJECT: Ware Creek Watershed Management Plan – Board Adoption

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In 1998, James City County began watershed management efforts in response to concerns about rapid development within the County and along the Powhatan Creek, in particular. In James City County, the watershed planning process identifies environmentally sensitive areas and develops specific protection, restoration and infrastructure retrofit recommendations. This information guides development within the watersheds and identifies prioritized capital projects for the County's Capital Improvement and Maintenance Programs.

Plans for Powhatan (2002), Yarmouth (2003), Mill (2011) and Gordon (2011) Creeks are complete and have been adopted by the Board of Supervisors. Since then, staff have continued to work with consultants to develop additional plans for the County watersheds of Ware Creek and York River. The Ware Creek Watershed Management Plan is ready for the Board's consideration and adoption at the September 27, 2016 meeting.

The Ware Creek Watershed Management Plan is similar to other watershed management plans in that it encourages improved management of the County's resources through development and private property owner incentives. Second, data collection and mapping technologies have improved since the adoption of the Powhatan and Yarmouth plans and this plan provides information that is more detailed. Staff started work on the Ware Creek Plan in 2012, held stakeholder meetings in 2012 and 2013 and the final plan has been prepared. Ware Creek has unique challenges and opportunities and this is reflected in the resulting watershed goals and strategies.

Staff recommends adoption of the attached resolution.

FCG/MDW/nb
WareCreek-mem

Attachment

R E S O L U T I O N

WARE CREEK WATERSHED MANAGEMENT PLAN – BOARD ADOPTION

WHEREAS, the Ware Creek is a resource of local and regional significance; and

WHEREAS, the Board authorized staff to prepare management plans to help the County and landowners protect and restore the watersheds and their natural resources; and

WHEREAS, stakeholders, staff and consultants have met over a period of 48 months to share information, set goals and develop the watershed management plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of James City County, Virginia, hereby adopts the Ware Creek Watershed Management Plan dated September 1, 2016.

_____
Michael J. Hipple
Chairman, Board of Supervisors

ATTEST:

	VOTES		
	AYE	NAY	ABSTAIN
MCGLENNON	____	____	____
LARSON	____	____	____
ONIZUK	____	____	____
SADLER	____	____	____
HIPPLE	____	____	____

_____
Bryan J. Hill
Clerk to the Board

Adopted by the Board of Supervisors of James City County, Virginia, this 27th day of September, 2016.

WareCreek-res

Executive Summary

Watershed Overview

The Ware Creek watershed is located in the northern portion of James City County between the Diascund Creek and York River watersheds and north of the Yarmouth Creek watershed (Figure 1-1). Ware Creek acts as the boundary between James City County and New Kent County to the north. The portion of the Ware Creek watershed, approximately 18 percent of the total drainage area, located in New Kent County is not included as part of the County'splanning effort. The Ware Creek watershed lies within the York River Watershed, corresponding to hydrologic unit code (HUC) 02080107. The National Watershed Boundary Dataset code is YO62.

The Ware Creek watershed is approximately 22 square miles in size, though the portion located within James City County subject to this management plan is 17.8 square miles. This figure makes Ware Creek the second-largest watershed of the eight watersheds in James City County. Situated within Coastal Plain geologic province, topography varies from nearly flat tidal marshes to well drained, steep, and erodible slopes. Like the other watersheds in James City County, the established drainage pattern is highly dissected and dendritic (NRCS 1985). This is especially true of the first order tributaries, where side slopes in excess of 15 percent are common. These headwater tributaries often transition in a downstream direction into wide, flat floodplain systems with fairly steep valley walls.

The mainstem of Ware Creek is a significant tributary to the York River, forming the northern boundary of the James City County portion of the watershed, hereafter referred to generically as the watershed, and all water within it flows northward in a series of tributaries. The larger tributaries (*i.e.*, second order or greater) within the watershed are slow-moving and sinuous streams that flow within the topographically-defined floodplains described earlier. The channel substrates were found to be commonly sand or organic material, with surrounding urban development playing a large part in the local substrate type. The larger floodplain reaches of Cow Swamp, Folly Swamp and France Swamp, specifically, are typified by slow moving waters with no well-defined main channel and often have thick layers of organic deposits and in-stream vegetation. The majority of these bottomlands often qualify as jurisdictional wetlands from sideslope to sideslope, sustained by a near-surface groundwater table and by discharge from springs and toe-of-slope seepage. Stream channel geometry is susceptible to dramatic alterations in this setting, as tree and flood debris can present formidable

obstructions and result in the formation of a complex, multi- channel system, as can the intrusion of beaver activity, which was observed to be prevalent in the watershed.

The majority of the soils within the Ware Creek watershed (approximately 92%) are sandy loams, mostly Craven, Emporia, Kempsville, Suffolk, and Slagle. The most notable soil type, comprising roughly 50% of the total watershed, is Emporia, which is notorious for having high erodibility, particularly in the Coastal Plain. The presence of this soil type, particularly around headwaters with significant slopes, coupled with land development, is the primary cause of the sandy substrates typical of Ware Creek watershed stream channels.

Approximately 74% of the Ware Creek watershed is undeveloped. Much of the land within the watershed is owned by a large landowner and is slated to be developed into either residential or commercial properties in the future. While a portion of the large owner's properties have been developed in the western part of the watershed, a large portion of the remaining undeveloped area is leased to a hunt club and consists of existing or cutover forest. Approximately 6,050 acres or 52% of the overall watershed is zoned as existing residential or proposed residential, though only about 60% of that land has been built out to date.

Impervious cover in the Ware Creek watershed totals 670 acres, which accounts for 5.9 percent of the total watershed area. Approximately 90 stormwater management facilities (BMPs) lie within the Ware Creek watershed, for an average of more than 5 BMPs per square mile. The majority of the impervious cover is associated with neighborhoods populated by single family homes in the western and southern part of the watershed and commercial/industrial development in the southern part of the watershed. Thirty subdivisions lie within the Ware Creek watershed, most notably the 1,145-acre Stonehouse development in the western portion of the watershed.

Watershed Assessment

The Ware Creek watershed, while possessing some significant residential communities, is largely undeveloped, and what development exists is relatively new. The impervious cover within the Ware Creek watershed is small, and a substantial portion of the developed areas, greater than 50%, is treated by stormwater management facilities. Moreover, these facilities and other stormwater infrastructure mirror the younger age of the development they are treating, meaning that the technology for this infrastructure is up to date.

However, in addition to the percent of impervious surface and the characteristics and age of the stormwater network that routes runoff from these surfaces, numerous other issues should be evaluated in the planning process. These include the distribution and condition of the sanitary sewer system and the location of other utilities and

infrastructure to areas threatened by erosion. Perhaps the most important factor for an undeveloped watershed such as Ware Creek is the implementation of smart development – understanding the baseline conditions and projected progression through the evaluation of zoning. By characterizing the environmental susceptibility of the watershed, appropriate steps can be instilled to provide for conservation of important natural resources that could not be undertaken after development has occurred. Understanding the extent and implications of potential resource impacts and developing plans to resolve and protect them are the fundamental reasons for pursuing watershed management planning. The conditions within the Ware Creek watershed that provide the impetus for such planning are described briefly below.

Stream, Floodplain, and Conservation Area Assessment

A comprehensive evaluation of most of the streams was carried out within each of the five target subwatersheds. Field efforts were carried out to characterize the condition of in-stream and riparian habitat; document occurrences of stream instabilities such as bank and channel erosion; map the location of stormwater outfalls, utility and other stream crossings, and trash and debris; and to help identify and prioritize potential stormwater retrofit, stream restoration, and/or riparian buffer management opportunities.

The results of the Stream and Floodplain Assessment are summarized below:

- An evaluation of stream habitat found that the vast majority of streams fall into the fair category (56%), with 16% classified as good, 5% as excellent, and 23% as poor.
- Floodplain conditions scored higher that did stream habitat, with 31% ranked as excellent, 43% of streams ranked as good, 24% as fair, and just 1% as poor. Floodplain connectivity is typically optimal for most of the stable meandering stream channels.
- The stream and floodplain assessment determined that the overall Ware Creek watershed is in fair condition, with notable reaches that are considerably impaired by uncontrolled stormwater input and associated bank and channel erosion and excess sedimentation. Most problem areas are located in the upper reaches of first order tributaries.
- A total of 87 stormwater outfalls were assessed as part of the study, and while there were some stormwater issues in the Ware Creek watershed, only eight (8) outfalls were given a severity of 4 or 5. All 87 outfalls are located within the developed France Swamp and Upper Ware Creek subwatersheds, the majority of the severe erosion locations fell within the Upper Ware Creek subwatershed, and most of the trash sites were located in France Swamp. Each of the severe erosion locations corresponded with actual stream bank instabilities and headcutting due to excess stormwater runoff from nearby development or roadways.

Because of the relatively developed condition of the Upper Ware Creek and France Swamp subwatersheds, only three tracts of forested land meeting the general screening criteria were identified in those portions of the Ware Creek watershed. In contrast, a total of seven tracts were identified within the Folly Swamp, Cow Swamp and Lower Ware Creek subwatersheds, which are largely comprised of agricultural land, forested land and rural development. After field verifying these locations, a total of eight tracts were chosen for field evaluation of forest structure, condition, and intactness.

Based on DCR-DNH database review and supporting information from other state and federal agencies, the following conclusions may be drawn regarding previously documented Rare Threatened and Endangered (RTE) species within the Ware Creek Watershed:

- the active and occupied bald eagle nests reported by natural resource agencies reflect the presence of suitable nesting and foraging habitat both in and around the watershed;
- known small whorled pogonia populations are present in the watershed, as well as abundant potential forested upland habitat; and
- potential habitat for other federally listed (sensitive joint-vetch) and state-listed (Mabee's salamander, Henslow's sparrow, and loggerhead shrike) RTE species exists within the watershed.

Existing Stormwater Infrastructure and Pollutant Loading.

Approximately half of the urbanized area of the watershed was developed within the last 10 years. Even with the amount of older, pre-stormwater treatment development, the amount of newer development has resulted in a considerable area of the watershed being treated. Over half of the developed area of the watershed (54 percent) is treated by BMPs.

Based on the County's SWM database, as of 2011, there were 90 stormwater facilities located in the watershed. Drainage areas were delineated for all systems, giving a treatment area of approximately 3,749 acres, or 32 percent of the watershed. The treatment practices include 4 constructed wetlands, 41 detention basins, 6 extended detention basins with water quality treatment, 17 infiltration practices, 3 manufactured treatment devices, and 19 retention basins.

Two elements of the Unified Subwatershed and Site Reconnaissance were conducted as part of the watershed assessment effort: the Hotspot Site Investigation (HSI) and Neighborhood Source Assessment (NSA), which evaluate pollution-producing behaviors and restoration potential in upland areas of the Ware Creek Watershed. A significant portion of the impervious area in the watershed appears to be disconnected. Older subdivision streets have open-section grassed channels for storm drainage, providing some disconnection, at least for smaller rain events. Many of the primary streets are

drained in the same manner. Because of the high level of disconnected downspouts, the main source of runoff appears to be the street network. Neighborhood Source Assessments did not reveal significant sources of pollution other than some areas of highly managed lawns. About half the lawns assessed could be described as high maintenance. These were generally in the newest subdivisions and were generally associated with commercial lawn care services.

Most development is recent. Over half of the residential parcels were developed since 2000, with only a few neighborhoods dating back to the 1970s or 1980s. Residential development is currently underway, as there was evidence of development in several of the areas assessed. Most single-family lots were less than 1 acre in size and impervious coverage of each lot was estimated to be from about 10 to 20 percent on the larger lots and 20 percent to 50 percent on smaller lots. Tree canopy on residential lots varied widely, from no cover in newer, small lot subdivisions, to 50 percent in some of the older areas.

Roof runoff was disconnected to a large degree, even in the multi-family areas, with 80 percent of the downspouts estimated to be directed onto pervious areas rather than driveways, parking lots or streets. In general, only one downspout on each dwelling was directed to the driveway, draining from 1/6 to 1/4 of the roof area. There was no evidence anywhere in the watershed of roof drainage connected to storm drains or sewers. Storm drainage in the older residential areas was primarily in open-section grassed ditches at the edge of pavement. The newer areas were constructed with curb, gutter and storm drain. There were no markings or stenciling seen on any inlets. There was also very little accumulation of litter or organic material in the gutters.

The results of the NSA investigation provide some guidance for outreach to property owners and for internal County activities. Regarding outreach, the most effective improvements will be to restore some of the hydrological effects of the original forested condition in the watershed. Outreach, education and assistance in tree planting to improve the canopy coverage in residential areas by replacing grass lawns with native vegetation is a primary approach. Additionally, encouraging residents to participate in the established rain barrel and rain garden programs will further benefit the water quality conditions.

Approximately 80 parcels were identified from the GIS mapping as potential hotspots, based on their classification as commercial, industrial or institutional sites. The hotspot status for all the sites was either low or potential. No pollution was observed during the assessment. One observation was that most potential sources of runoff from material storage were reduced through storage on pervious areas rather than on hard surfaces. The SWM facility mapping indicates that many of the areas are treated, even though BMPs may not have been observed in the field.

Future land use is forecast to be much more urbanized than existing conditions. Overall, forest cover will be reduced by about 33 percent, but it will up to twice that amount in the

three currently lightly developed watersheds: 47 percent in Lower Ware Creek, 61 percent in Folly Swamp, and 62 percent in Cow Swamp. In the watershed as a whole, residential area (including PUD-Residential) will increase by 34 percent, over six square miles, representing the majority of the new development.

Realizing Watershed Goals through Strategic Actions

JCC has developed four overarching goals for watershed protection and restoration:

1. *Minimize the further degradation of water quality and preserve, restore and maintain the outstanding quality of all streams within the watershed as well as tidal and nontidal wetlands.*
2. *Develop in a manner that is consistent with the protection of living resources: avoid habitat fragmentation and encourage the preservation of riparian and wildlife corridors.*
3. *Promote active stewardship among residents, community associations, businesses, and seasonal visitors.*
4. *Promote viable traditional and emerging rural economic initatives (production of local agricultural and forestry commodities, agri-tourism, eco-tourism, etc.).*

Realizing these goals and addressing watershed issues involves the implementation of two basic principles that represent the core of the watershed management plan.

1. **Address known problem areas with cost effective and sustainable Watershed Restoration Projects** such as restoring degraded stream channels, retrofitting BMPs, and addressing sanitary sewer maintenance in a timely manner;
2. **Programmatic / Technical and Educational Efforts** aimed at increasing JCC staff and stakeholder awareness, fostering watershed stewardship, encouraging responsible development, augmenting baseline information about watershed resources, and realizing opportunities for land conservation and redevelopment through the pursuit of shared goals and transparent communication with and between property owners.

A total of 21 Strategic Actions were developed with the Watershed Goal(s) that are considered as **Programatic / Technical and Educational Efforts** are universal, amounting to a County doctrine for watershed protection and restoration. Others, particularly the **Watershed Protection Projects**, are watershed-specific.

Strategic Actions	
1	Provide incentives for new development (and redevelopment) to add intermittent stream buffers, expanded RPA and mainstem buffers, preserve identified conservation areas, minimize impervious cover and maximize contiguous open space.

2	Identify areas within the watershed where riparian corridors are in an unnatural condition and seek ways, including incentives, to restore those areas to their natural condition.
3	Implement Special Stormwater Criteria for all new plans for development (except those with approved plans or in review)
4	Promote the Purchase of Development Rights (PDR) program for special resource areas (e.g., riparian buffers and conservation areas).
5	Identify key stakeholders within the watershed (landowners, schools, etc.) that can help implement watershed planning objectives. Work with them to develop a shared vision for preserving natural resources through community actions and provide opportunities for them to contribute to the attainment of watershed management goals.
6	Continue to fully implement the requirements of the County's MS4 permit in relation to watershed management throughout County.
7	Update or develop new Better Site Design (BSD) educational materials to be made available to developers, homeowner's associations, and citizens and conduct training.
8	Continue to work with County departments to incorporate BSD requirements into applicable ordinances, into state/county stormwater management regulations and to develop consistent review procedures.
9	Work with private landowner(s) to develop feasibility plans for the dam at Richardson's Mill Pond, including but not limited to evaluating potential funding sources for the repair, monitoring and maintenance of the dam and associated roadway, assessment for archaeological resources, potential impacts to archaeological and environmental resources and public health and safety associated with dam failure.
10	Use subwatershed maps to ensure James City County staff and stakeholder awareness of existing locations for restoration and potential conservation areas.
11	Continue to support and grow a citizen/volunteer-based team of individuals to routinely perform assessments of stream health, including sampling for benthic macroinvertebrates, water quality indicators and photo-documentation.
12	Improve the availability of educational materials by developing materials for use by HOA's and neighborhood associations. Educate people about watershed awareness including proper disposal of fats, oils, grease, other chemicals, pet waste, onsite waste disposal systems, trash, on-lot rainwater harvesting and biofiltration techniques.
13	Conduct additional feasibility assessments, validate and carry out the stormwater retrofits, outfall repairs and stream restorations identified in this watershed plan.
14	Continue to utilize available regional / state / federal data in the County GIS database, including but not limited to data from the DHR-DSS, DCR-DNH and DGIF to: a) assist in prioritizing conservation areas; b) ensure that potential development opportunities fully appreciate the cultural and natural resources within the footprint; and c) be sensitive to potential resources when and where any emergency action is needed.
15	Enhance stewardship by specifically addressing litter and shoreline erosion.
16	Consider participation in the Virginia Big Tree or similar recognition program to identify historic and specimen trees and promote the importance of trees to the landscape

17	Develop an inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure (e.g., leaking sewer lines, storm-related or unpredictable channel and bank erosion, hazmat spills, etc.)
18	Develop guidelines to lessen steep slope threshold to 15% from 25% in areas with highly erodible soils.
19	Develop guidelines for the management of invasive plant species.
20	Promote the use of nutrient management planning for existing residential areas.
21	Promote responsible agriculture or forestry land uses, including coordination with the Colonial Soil and Water District, USDA-NRCS and VDOF.

Watershed Restoration Opportunities

The stream and floodplain assessment determined that bottomland areas represent active and important floodwater and sediment storage areas. In general, stream condition is fair to good in these areas. By contrast, headwater streams were observed to be relatively unstable with bank and channel erosion being noted immediately downstream of stormwater outfalls. Curtailing sediment delivery from these upstream sources and protecting infrastructure should be considered a key goal and can be accomplished through stream restoration or enhancement and/or retrofitting stormwater outfalls. Twenty-seven such opportunities have been identified. Other issues requiring attention are localized concerns at stormwater outfalls (15), sewer line stream crossings and instances of exposed lateral pipes in banks (1), localized bank erosion (10) and occurrences of trash and debris (9).

Potential stormwater retrofit opportunities to improve water quality and protect channels were identified by carrying out a Retrofit Reconnaissance Inventory. Opportunities include wet pond and dry pond retrofits, parking lot retrofits and culvert retrofits. There is also potential for retrofitting the open section drainage system to dry swales or water quality swales in areas where additional water quality treatment is recommended. A total of 13 projects were identified. Besides these projects, storm drain stenciling is generally lacking and could be improved.

The 27 Stream Assessment Reaches (SARs) and 13 stormwater retrofit sites were ranked using a Decision Support System (DSS) that was developed to support organizational decision making activities based on a consideration of watershed goals and the degree to which a project can satisfy these goals based on eight Prioritization Factors including water quality / runoff quantity, floodplain connectivity, aquatic habitat, sedimentation, environmenal awareness, project size/scope, channel condition and condition of contributing watershed; and eight Possible Conflicts including utility conflicts, construction access, neighborhood impact, physical feasibility, level of design, property constraints, permitting issues and negative environmental impacts. The DSS is an integral

part of the watershed planning process and an essential tool for prioritizing TMDL reduction projects.

Components of the Ware Creek Watershed Management Plan

The Ware *Creek Watershed Management Plan* consists of the following Chapters:

Chapter 1 provides a Watershed Overview and discusses why watershed management planning is important.
Chapter 2 summarizes the Baseline Assessment.
Chapter 3 describes the development of Watershed Goals and Strategic Actions for their realization.
Chapter 4 discusses the methods used to select candidate Watershed Restoration Projects and presents their location within the watershed.
Chapter 5 presents the Strategic Action Plan, outlining the tentative timeframe for the execution of the Strategic Actions, their approximate cost and responsible parties.
Chapter 6 includes individual Subwatershed Management Plans that summarize conditions within the four uppermost subwatersheds. These are designed to act as quick reference guides for JCC staff and include a general description of the subwatershed, the proposed watershed restoration opportunities therein and their estimated cost and a variety of other tabular information such as:

- land use;
- impervious area;
- stormwater management practices and drainage areas treated;
- existing condition pollutant loading ;
- existing urban runoff loads; and
- estimated pollutant loading reductions based on proposed retrofits.

Ware Creek Watershed

James City County, Virginia

Contract No. 09-0095:|

Watershed Management Planning Services

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September 2016

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Subwatershed Management Plan: Cow Swamp (COS) Subwatershed

Subwatershed Management Plan: Folly Swamp (FOS) Subwatershed

Subwatershed Management Plan: Lower Ware Creek (LWC) Subwatershed

1 Introduction

1.1 Watershed Overview

The Ware Creek watershed is located in the northern portion of James City County between the Diascund Creek and York River watersheds and north of the Yarmouth Creek watershed (Figure 1-1). Ware Creek acts as the boundary between James City County and New Kent County to the north. A portion of the Ware Creek watershed, approximately 18 percent of the total drainage area, is located in New Kent County and is not included as a part of the County's assessment. The Ware Creek watershed lies within the York River Watershed, corresponding to hydrologic unit code (HUC) 02080107. The National Watershed Boundary Dataset code is YO62.

The Ware Creek watershed is approximately 22 square miles in size, though the portion located within James City County and which is the subject of this management plan is 17.8 square miles. This figure makes Ware Creek the second-largest watershed of the eight watersheds in James City County (Figure 1-1). Situated within Coastal Plain geologic province, topography varies from nearly flat tidal marshes to well drained, steep, and erodible slopes (Figure 1-2). Like the other watersheds in James City County, the established drainage pattern is highly dissected and dendritic (NRCS 1985). This is especially true of the first order tributaries, where side slopes in excess of 15 percent are common. These headwater tributaries often transition in a downstream direction into wide, flat floodplain systems with fairly steep valley walls.

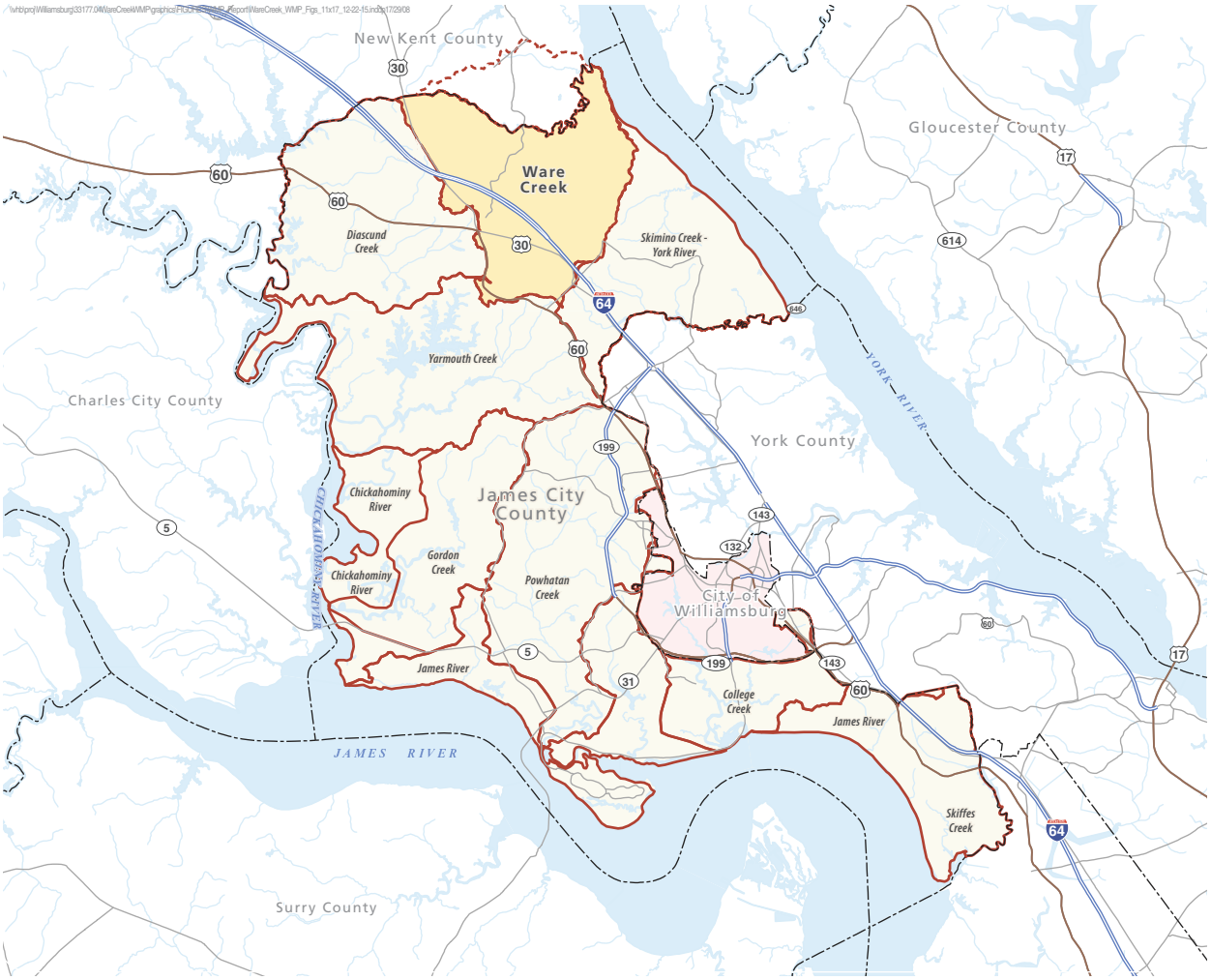
The mainstem of Ware Creek is a significant tributary to the York River, located to the north and east of the Ware Creek watershed. Ware Creek forms the northern boundary of the James City County portion of the watershed, hereafter referred to generically as the Ware Creek watershed or simply watershed, and all water within it flows northward as a series of tributaries (Figure 1-2). The larger tributaries (*i.e.,* second order or greater) within the watershed are slow-moving and sinuous streams that flow within the topographically-defined floodplains described earlier. The channel substrates are commonly sand or organic material, with surrounding urban development playing a large part in the local substrate type. The larger floodplain reaches of Cow Swamp, Folly Swamp, and France Swamp, specifically, are typified by slack waters and floodplain distributary channels and are often floored by a thick layer of organic deposits and in-stream vegetation. The majority of these bottomlands often qualify as jurisdictional wetlands from sideslope to sideslope, sustained by a near-surface groundwater table and by discharge from springs and toe-of-slope seepage. Stream channel geometry is susceptible to dramatic alterations in this setting. Tree

throws, flood debris and beaver acitivity can present formidable obstructions and result in the formation of complex, bifurcated channels.

The majority of the soils within the Ware Creek watershed (approximately 92%) are sandy loams, mostly Craven, Emporia, Kempsville, Suffolk, and Slagle (Figure 1-3). The most notable soil type, comprising roughly 50% of the total watershed, is Emporia, which is highly erodibile in the Coastal Plain. The presence of this soil type, particularly around headwaters with significant slopes, coupled with land development, is the primary cause of the sandy substrates typical of Ware Creek watershed stream channels.

Approximately 74% of the Ware Creek watershed is undeveloped. Much of the land within the watershed is owned by a large developer and is slated to be developed into either residential or commercial properties in the future. While a portion of this particular developer's properties have been developed in the western part of the watershed, a large portion of the remaining undeveloped area is leased to a hunt club and consists of existing or cutover forest. Approximately 6,050 acres or 52% of the overall watershed is zoned as existing residential or proposed residential, though only about 60% of that land has been built out to date.

Impervious cover in the Ware Creek watershed totals 670 acres, which accounts for 5.9 percent of the total watershed area. Approximately 97 stormwater management facilities (BMPs) lie within the Ware Creek watershed, for an average of more than 5 BMPs per square mile (see Figure 1-5). The majority of the impervious cover is associated with neighborhoods populated by single family homes in the western and southern part of the watershed and commercial/industrial development in the southern part of the watershed. Thirty subdivisions lie within the Ware Creek watershed, most notably the 1,145-acre Stonehouse development in the western portion of the watershed (Figure 1-5).



Ware Creek
Watershed Management Plan
James City County, Virginia

LEGEND

- County Boundary
- City of Williamsburg
- James City County Watersheds
- Ware Creek Watershed
- Streams
- Open Water

North

0 1,000 ft.

Figure 1-1
Watershed Location

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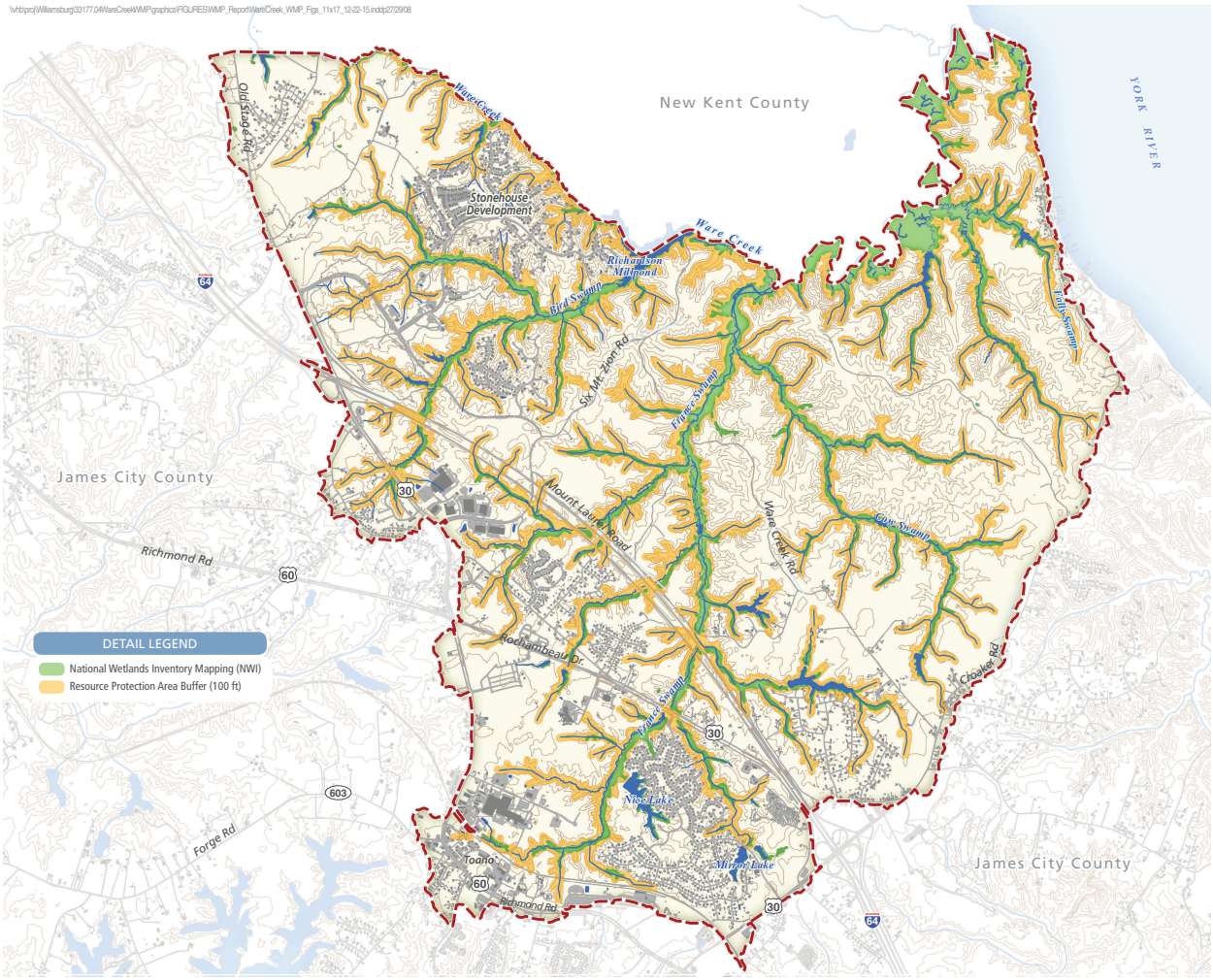

Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 — 3,000 ft.

Figure 1-2
Watershed Detail Map

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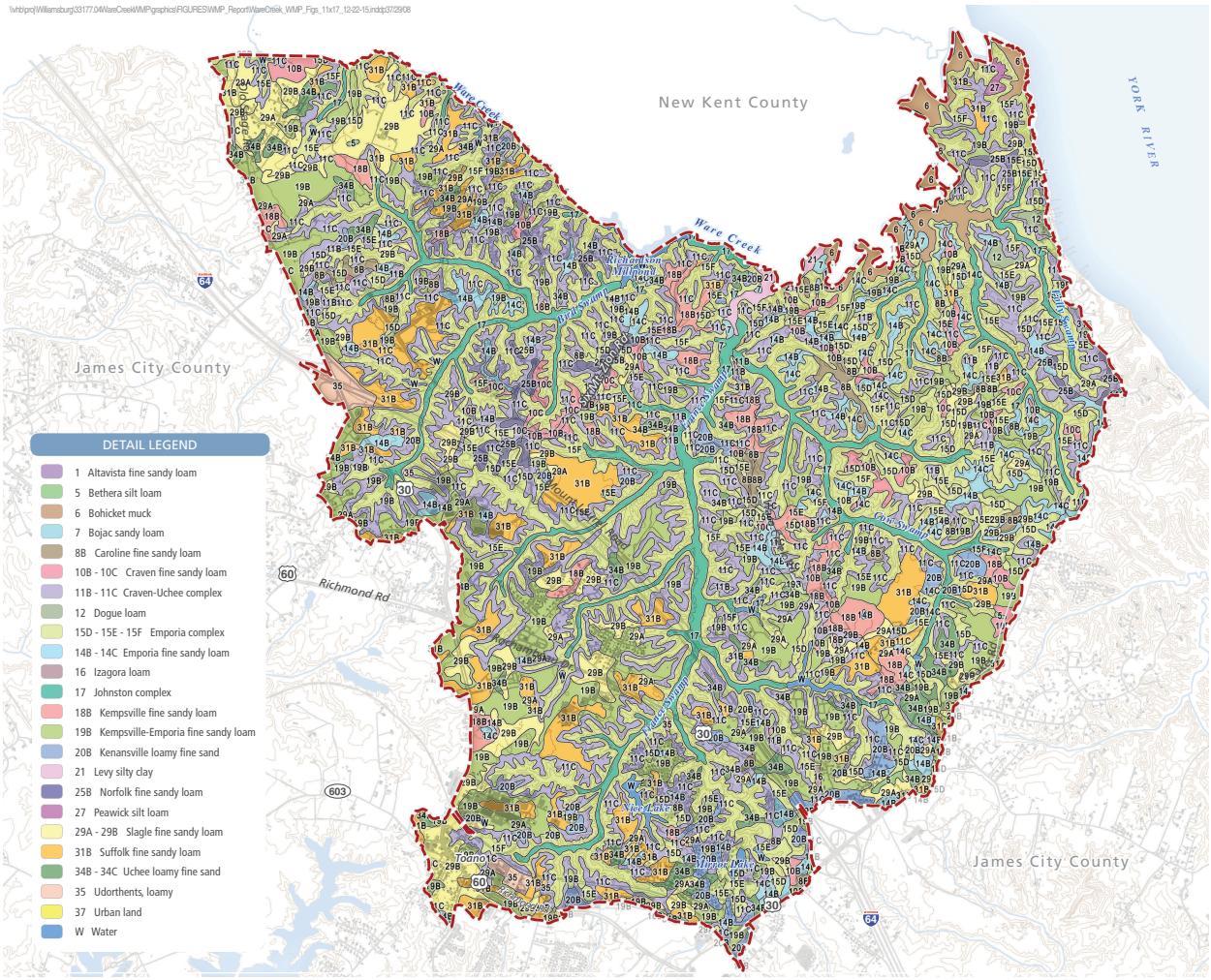

Ware Creek
Watershed Management Plan
James City County, Virginia

Figure 1-3
Soils Map

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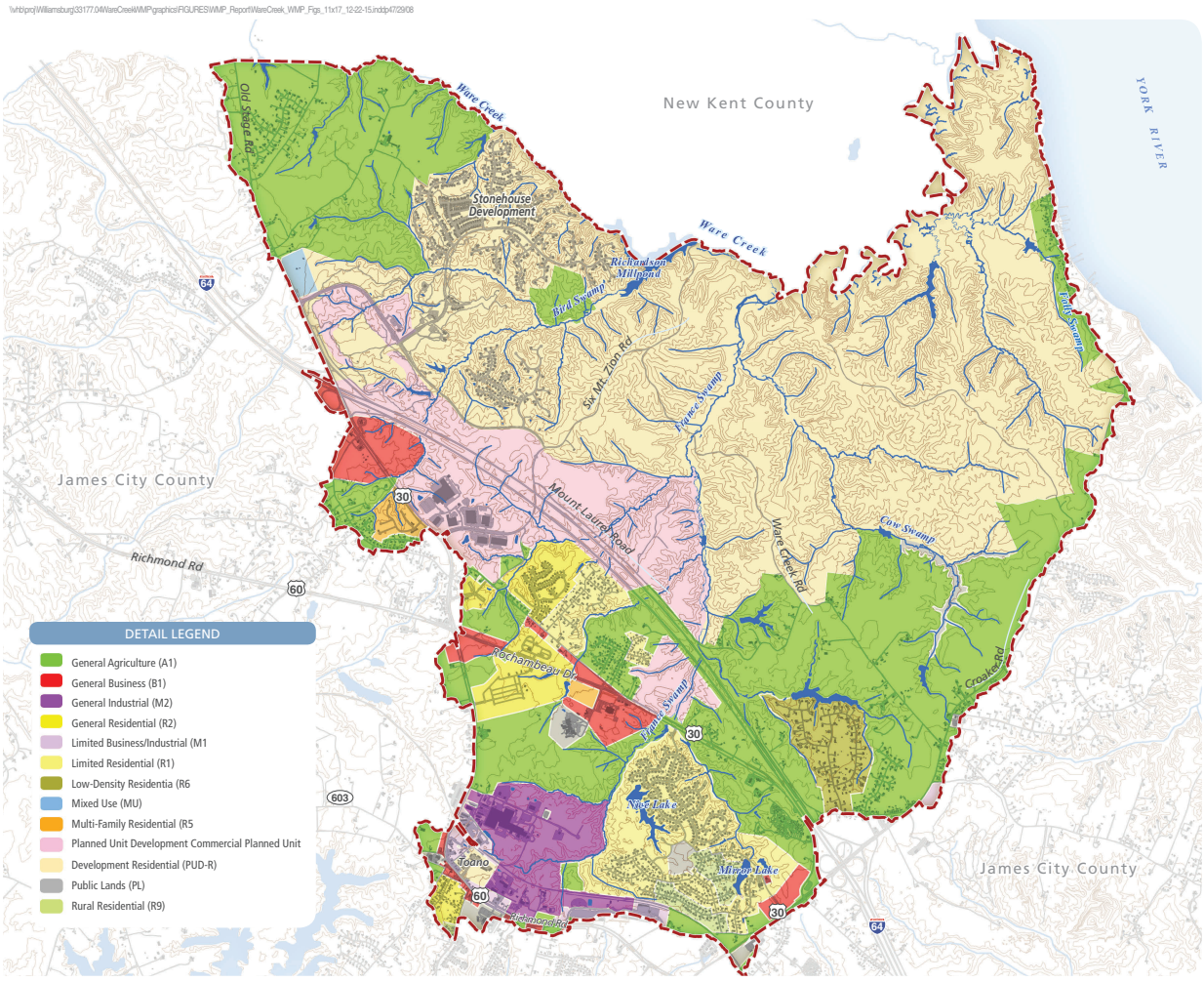

Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 3,000 ft.

Figure 1-4
Zoning

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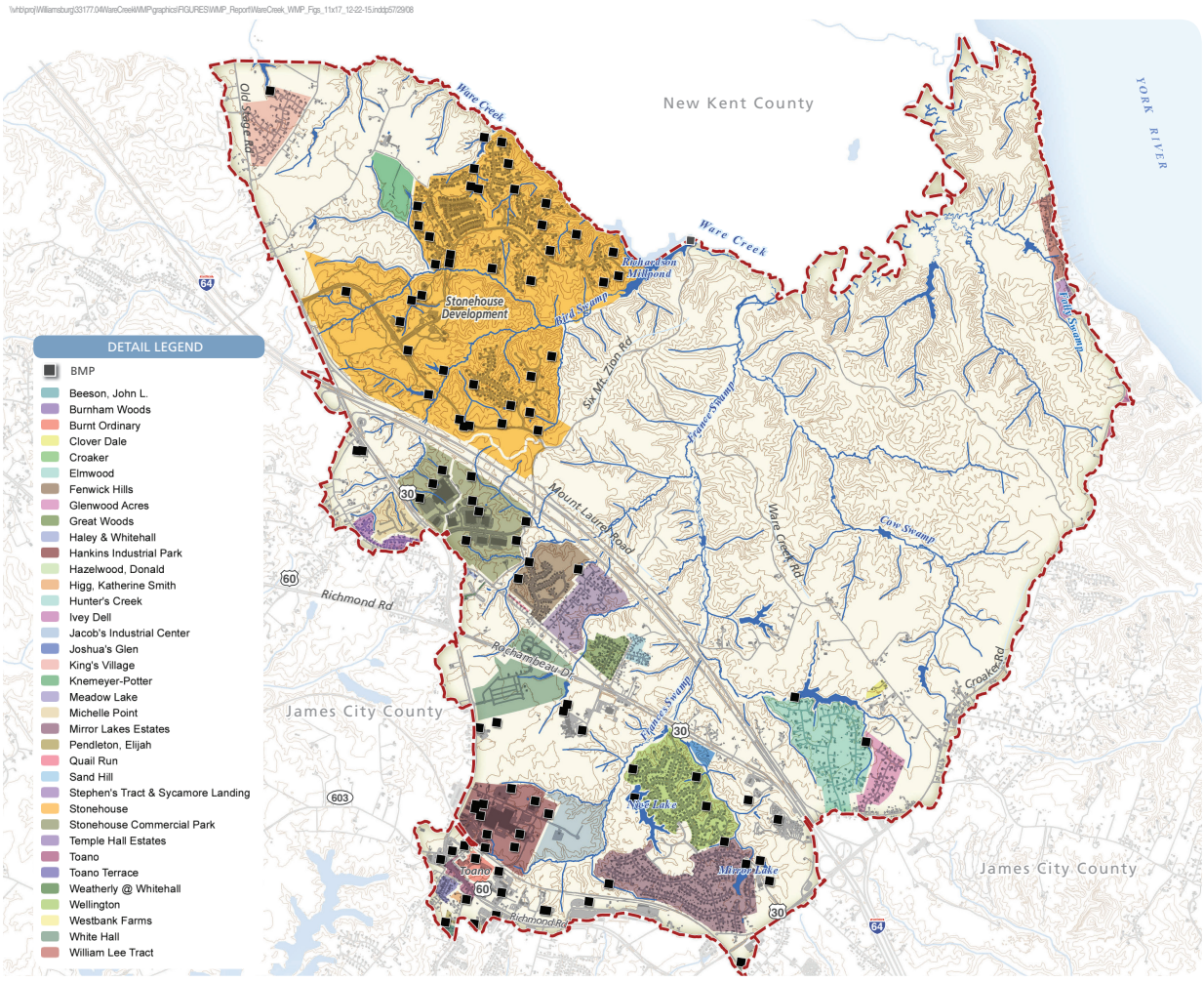

Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 3,000 ft.

Figure 1-5
Subdivision and BMP Map

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1.2 The Need for Watershed Management and Watershed Goals

Each of the County's watersheds has unique attributes related to size, location and the extent and age of development. While watershed management is important for all watersheds, the goals of a watershed plan should reflect the specific needs of each. The Ware Creek watershed, while possessing some significant residential communities, is largely undeveloped and what development exists is relatively new. The impervious cover within the Ware Creek watershed is small, and a substantial portion of the developed areas, greater than 50%, is treated by stormwater management facilities. Moreover, these facilities and other stormwater infrastructure mirror the younger age of the development they are treating, meaning that the technology for this infrastructure is up to date. However, like the situation in the more developed watersheds like Mill Creek, existing stormwater management infrastructure is still a concern for the Ware Creek watershed planning process.

In addition to the percent of impervious surface and the characteristics and age of the stormwater network that routes runoff from these surfaces, numerous other issues should be evaluated in the planning process. These include the distribution and condition of the sanitary sewer system and the location of other utilities and infrastructure to areas threatened by erosion. Perhaps the most important factor for an undeveloped watershed such as Ware Creek is the implementation of smart development – understanding the baseline conditions and projected progression through the evaluation of zoning. By characterizing the environmental susceptibility of the watershed, appropriate steps can be instilled to provide for conservation of important natural resources that could not be undertaken after development has occurred. Understanding the extent and implications of potential resource impacts and developing plans to resolve and provide protection are a couple of reasons for pursuing watershed management planning. The conditions within the Ware Creek watershed that provide the impetus for such planning are described briefly below.

1.2.1 Existing Stormwater Infrastructure and Watershed Conditions

As previously stated, the Ware creek watershed is largely undeveloped and existing stormwater infrastructure is generally performing due to the newer age of development. Conversely, other JCC watersheds such as Mill Creek are much older and have been nearly built to capacity. In the Mill Creek watershed, impervious cover is high and stormwater infrastructure is older, less substantial and outdated. Despite these watersheds' proximity to one another, their differences are integral to the assessment of watershed health and determination of what strategic actions are the most important.

For older development in James City County, designs for methods of stormwater conveyance and treatment followed long-standing and conventional norms, which typically focused on routing runoff from source to outlet as expeditiously as possible. For example, some of subdivisions within the Mill Creek watershed include concrete-lined drainage ditches and others route runoff through underground pipes. Both of these means of conveyance offer no opportunity for stormwater

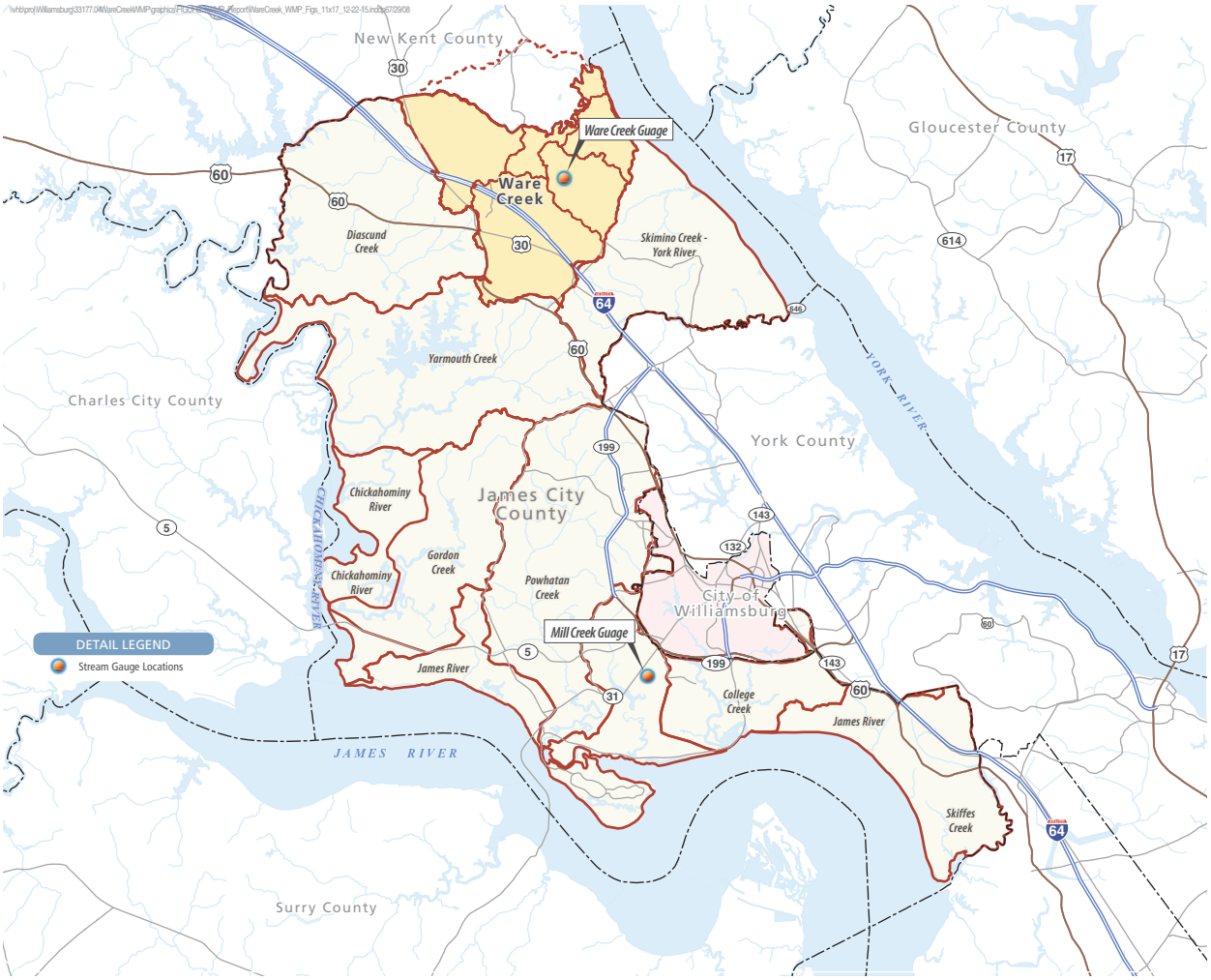
infiltration. Furthermore, the design of these stormwater conveyance systems often gave little consideration to the interface between the end pipe and the natural system to which it discharges. The combination of rapid stormwater conveyance and a lack of energy dissipation at the outfall can result in focused discharge that triggers erosion in the receiving area, be it a stream channel, wetland or floodplain. Headwater streams are particularly vulnerable to such increased discharge and often become incised. The resulting erosion can impact downstream aquatic habitat and water quality, stream bank stability and threaten adjacent infrastructure. Moreover, because conventional stormwater management systems offer limited opportunities for infiltration or storage along their pathway, any pollutants liberated from the surfaces where the runoff was generated will be discharged untreated. This includes sediment, heavy metals, bacteria and nutrients.

By contrast, newer stormwater management, such as what is primarily in place in the Ware Creek watershed, takes into account the way infiltration and retention can curtail excessive discharge velocities and pollutant dispersal. Although only approximately 25% of the Ware Creek watershed is developed, over 90 BMPs exist to treat stormwater, significantly reducing the potential for the problems noted in the Mill Creek watershed. The differences in physical composition of the Ware Creek and Mill Creek watersheds is readily apparent in the way that each responds to significant precipitation events. In 2011, as a sub-task to the development of these Watershed Management Plans, James City County contracted Hydrologic Data Collection, LLC. to install and monitor stream gauges in the Ware Creek and Mill Creek watersheds. Monitoring began in August of 2011 and continues today.. The Ware Creek stream gauge was installed in Cow Swamp a short distance from Ware Creek Road in a large undeveloped parcel. The Mill Creek gauge was installed South of Jamestown Road (State Route 31) in a residential neighborhood along an unnamed tributary to Lake Powell (Figure 1-6).

The overlain hydrographs for these two gauges, shown on Figures 1-7 and 1-8 for the 2012 water year (October 2011 through August 2012) and 2013 water year (October 2012 through September 2013), illustrate the way impervous cover and stormwater infrastructure can affect stormwater response. The Ware Creek watershed gauge maintains a higher baseflow discharge because its drainage area (approximately 9 square miles) is nearly three times that of the Mill Creek watershed gauge (3.16 square miles). However, the Mill Creek watershed gauge shows a more “flashy” response to significant or even moderate precipitation events, depicted on the hydrograph as daily precipitation data recorded at the Williamsburg Airport, frequently exceeding the discharge rate of the Ware Creek watershed gauge. Meanwhile, the Ware Creek watershed gauge shows a much more subtle response to precipitation, illustrating that the drainage area is not significantly impervious and/or the area is being treated appropriately by stormwater management infrastructure. The Mill Creek watershed gauge tells the opposite story. Its drainage area is either highly impervious or not treated appropriately for stormwater. As was discussed in the Mill Creek Watershed Management Plan, these concepts were the primary concerns for that watershed, and the watershed goals were tailored to accommodate those needs.

1.2.2 Threats to Other Utilities and Infrastructure

Stream bank erosion can lead to channel widening and migration. When this occurs in close proximity to utilities, road surfaces and other public or private infrastructure, these resources may become threatened, with safety issues and property damage occurring. Such stream channel instabilities and their potential repercussions may be difficult to identify. Typically, this type of erosion begins in headwaters, often in conjunction with antiquated stormwater infrastructure. However, even watersheds with limited impervious cover and adequate stormwater infrastructure can experience erosion problems. As previously stated, the majority of the soils in the Ware Creek watershed are highly succeptable to erosion.



Ware Creek
Watershed Management Plan
James City County, Virginia

LEGEND

- County Boundary
- City of Williamsburg
- James City County Watersheds
- Ware Creek Watershed
- Streams
- Open Water

North

0 1,000 ft.

Figure 1-6
Gauge Location

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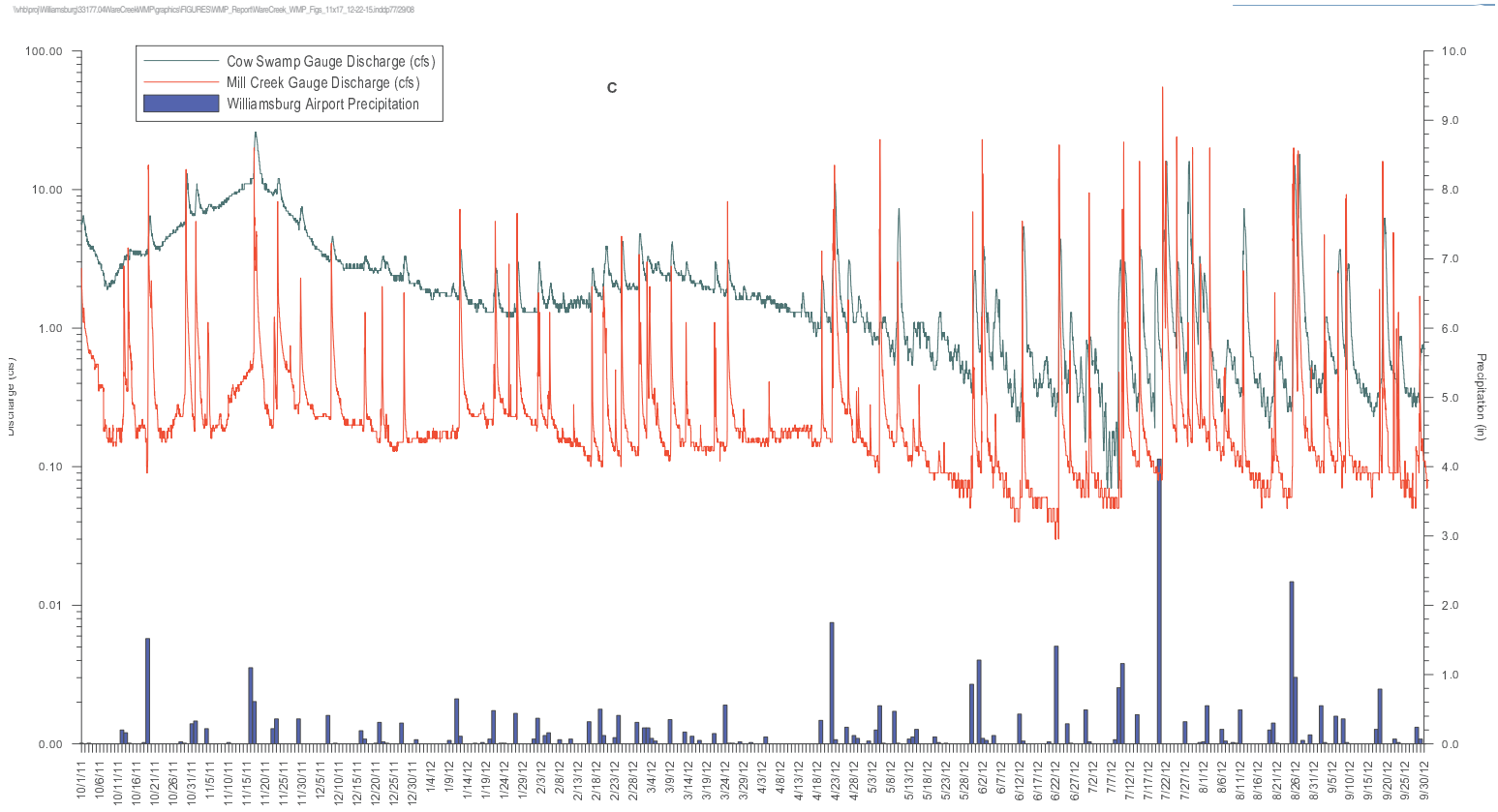


Figure 1-7
Cow Swamp and Mill Creek Gauge Hydrographs

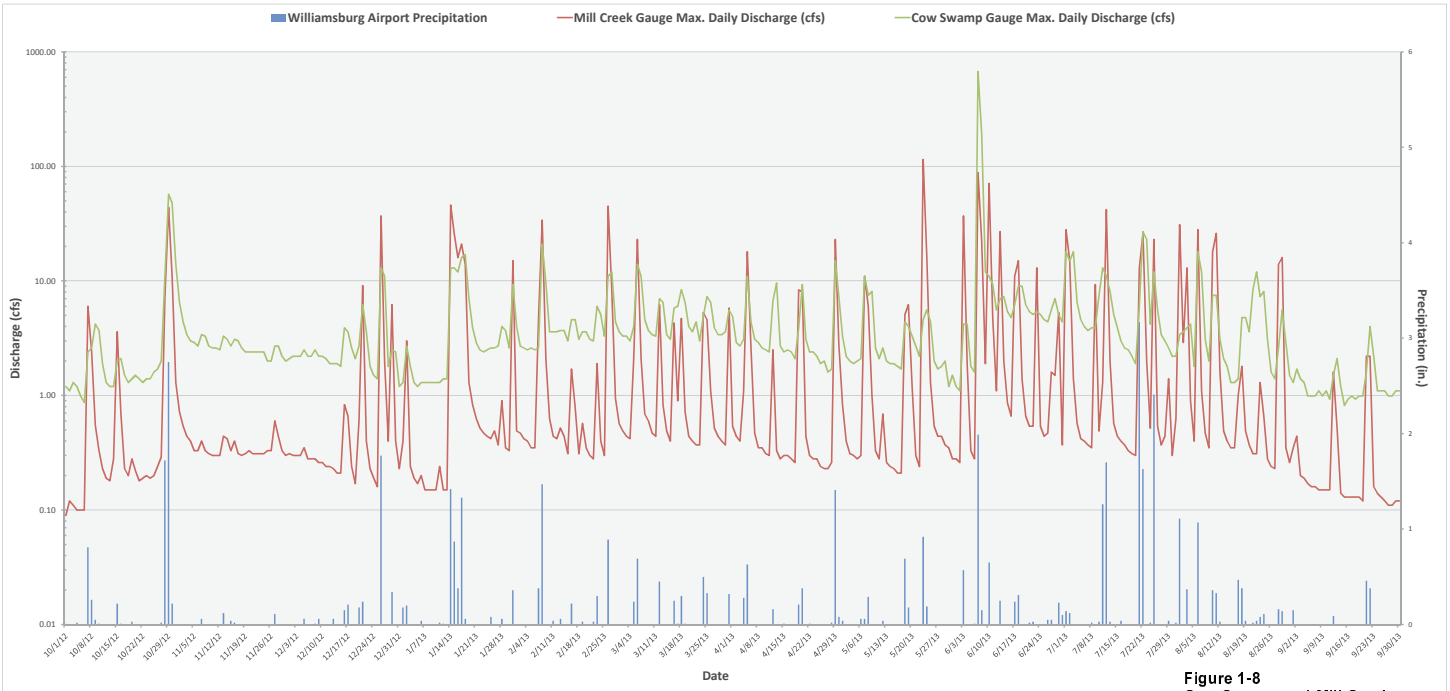


Figure 1-8
Cow Swamp and Mill Creek Gauge-Hydrographs (2013)

1.2.3 Water Quality and Total Maximum Daily Loads (TMDLs)

The Virginia Department of Environmental Quality (DEQ) has been testing Virginia's rivers, lakes, reservoirs and tidal waters and developing lists of "impaired waters" since 1992. Through extensive monitoring of pollutants, individual segments of streams, lakes and estuaries that violate water quality standards are reported to the citizens of Virginia and the US Environmental Protection Agency (EPA) in the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report, which is prepared on even-numbered years. The reports describe the nature of the impairment including the suspected cause and source of the pollutant when sufficient data exists. The DEQ, with input from the public, has been developing plans called Total Maximum Daily Loads (TMDLs) in an effort to restore and maintain the water quality for the impaired waters. The term TMDL represents the total volume of a specific pollutant a water body can assimilate and still meet approved water quality standards.

The draft 2012 report listed three waterways situated within the Ware Creek watershed as impaired on the 305(b)/303(d) listing, meaning they fall within category 4 or 5 in accordance with EPA definitions. The state of Virginia further defines subcategories with alpha suffix designations attached to the numeric EPA categories. All Ware Creek watershed impairments fall within categories 4A and 5A, which are defined as follows:

- Category 4A – Water is impaired or threatened for one or more designated uses but does not require a TMDL. A new TMDL is not necessary to address the newly identified impaired tributaries if TMDL modeling, source identification and reductions cover the entire watershed and the TMDL has been approved by EPA. These waters are primarily related to shellfish and/or recreational bacteria impairments but could include benthic impairments;
- Category 5A – A Water Quality Standard is not attained. The water is impaired or threatened for one or more designated uses (excluding shellfish use) by a pollutant(s) and requires a TMDL (303d list).

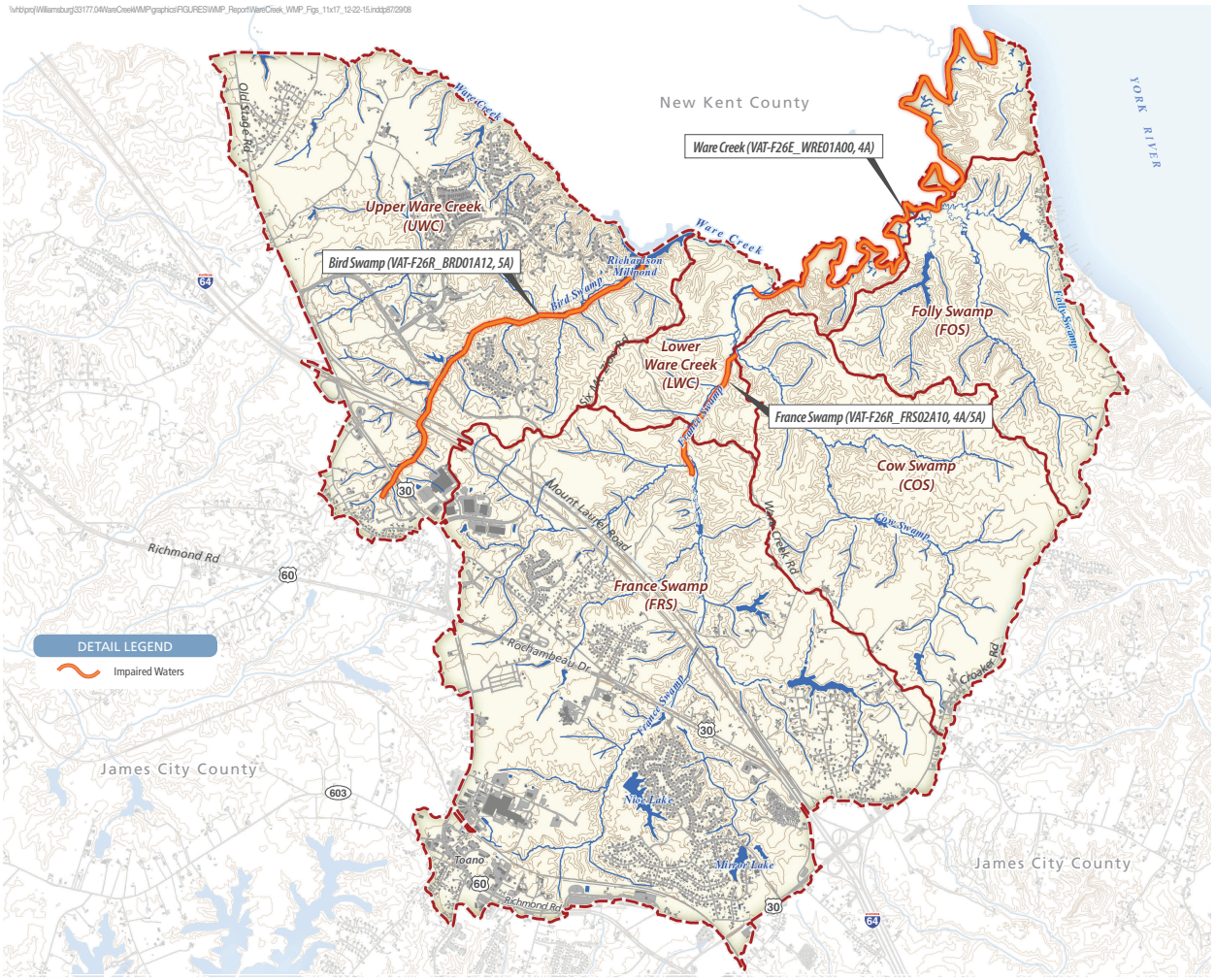
The tidal portion of Ware Creek, originally listed in 1998 for fecal coliform and designated as category 5B in the latest final report from 2010, was lowered to category 4A during the 2012 cycle. This waterway has been condemed for shellfishing, and a TMDL for fecal coliform was approved by the EPA on March 25, 2012. The middle mainstem of France Swamp, originally listed as impaired during the 2010 cycle, was listed as impaired in 2012 for both aquatic life and recreation uses. The Aquatic Life impairment is listed as category 5A due to exceedance of the dissolved oxygen threshold reported at monitoring station 8-FRS001.17. The Recreation Use impairment was listed furing the 2010 cycle for the exceedance of the E. coli threshold. However, as France Swamp is located within the study area for the approved Ware River Shellfish TMDL, the Recreation impairment was lowered to category 4A during the 2012 cycle as those impairments are considered nested. Lastly, a new impairment listing for Aquatic Life was reported during the 2012 cycle due to a slightly impaired benthic community at freshwater probabilistic monitoring station 8-BRD000.43. A summary of the impaired waterways within the Ware Creek watershed is presented in Table 1-1, and all three impairments are depicted on Figure 1-9.

Table 1-1: List of Impaired Waters (Draft 2012 305(b)/303(d) list)

Assessment Unit	Water Name	Use	Cause Category	Cause Name	Cycle First Listed	TMDL Schedule	Size
VAT-F26R_FRS02A10	France Swamp (Middle Downstream)	Aquatic Life, Recreation	5A, 4A	Dissolved oxygen, E. coli	2010	2022	River 0.85 mi
VAT-F26E_WRE01A00	Ware Creek	Shellfishing	4A	Fecal coliform	1998	2010*	Estuary 0.08 sq mi
VAT-F26R_BRD01A12	Bird Creek	Aquatic Life	5A	Benthic-macroinvertebrate bioassessments	2012	2024	River 2.43 mi

One major cause of impairment of the aquatic life for Bird Creek and France Swamp is low dissolved oxygen concentration. All aquatic life depends on oxygen, and when it is depleted to the point where aquatic life is no longer sustainable, a water is said to be hypoxic. Hypoxia can result from natural processes, such as in slow-moving swamp waters that have large amounts of decaying plant material. It can also naturally occur in lakes and reservoirs when the water column becomes thermally stratified. However, chronic hypoxia often occurs for anthropogenic reasons. Nutrient pollution can cause hypoxia by promoting the growth of algae blooms. Excessive algae produce floating mats on the water surface which keep light from reaching rooted vegetation, therefore limiting its growth. Moreover, as algae die and settle to the bottom, decay processes reduce oxygen levels and create unfavorable conditions for other aquatic organisms. Fish kills often result from hypoxic conditions. Stormwater runoff, which often carries lawn and agricultural fertilizers and nutrient-rich animal wastes, is a major contributor of nitrogen and phosphorus pollution..

The major cause of impairment of the recreation and shellfishing uses in Ware Creek is excessive bacteria as documented in the *TMDL Report for Chesapeake Bay Shellfish Waters*. Bacterial Source Tracking (BST) was used to identify sources of fecal contamination. Potential sources of fecal coliform bacteria consist primarily of non-point source contributions, as there are no permitted point source discharges that directly impact the identified impairment in the watershed. Nonpoint sources include wildlife, livestock, land application of bio-solids, recreational vessel discharges, uncontrolled discharges (straight pipes conveying gray water from kitchen and laundry areas of private homes, etc.) and failed, malfunctioning, or non-operational septic systems. As approximately 78% of the Ware Creek watershed lies within the JCC Primary Service Area (PSA), most existing residences are connected to the municipal sanitary sewer and the majority of future development will be. To take advantage of gravity flow, sanitary sewer pipes in the Ware Creek watershed run through many bottomland areas in close proximity to streams and wetlands. This setting means that should accidental discharges of sanitary sewage occur via pipeline obstructions, untreated effluent can quickly enter streams and be carried some distance downstream. The results of the TMDL study reveal that the primary sources of fecal coliforms for the Ware Creek watershed are livestock (28.4%), wildlife (28.2%), and human (26.0%). The BST study indicates that pets (17.4%) are also a significant source of bacteria in this watershed.



Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 3,000 ft.

Figure 1-9
Impaired Waters Map

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1.2.4 Overarching Watershed Goals

In light of these challenges, JCC has developed four overarching goals for watershed protection and restoration:

- Minimize the further degradation of water quality and preserve, restore and maintain the outstanding quality of all streams within the watershed as well as tidal and nontidal wetlands.
- Develop in a manner that is consistent with the protection of living resources: avoid habitat fragmentation and encourage the preservation of riparian and wildlife corridors.
- Promote active stewardship among residents, community associations, businesses and seasonal visitors.
- Promote viable traditional and emerging rural economic initiatives (production of local agricultural and forestry commodities, agri-tourism, eco-tourism, etc.).

Achieving these goals is accomplished through a stepwise watershed management planning process. The first step is performing a ***Baseline Assessment***; a desktop analysis and field effort that identifies where these stormwater and utility issues are occurring. The second step is involving watershed stakeholders in the process by holding a ***Public Meeting*** to discuss the results of the Baseline Assessment and gather feedback from attendees and isolate watershed-specific issues that may not have been considered to date. Lastly, a ***Watershed Management Plan*** is developed that provides recommendations or "**Strategic Actions"** for the rectification of watershed issues.

Similar to other approved Watershed Management Plans, each of these steps has been undertaken for the Ware Creek watershed. The Ware Creek Watershed Baseline Assessment is available on James City County's website. The first public meeting was held on March 29, 2012 and focused on the results of the Baseline Assessment. A second stakeholder meeting was conducted on November 29, 2012 and presented watershed goals and proposed strategic actions. At both meetings, public input was gathered to help prioritize the proposed actions presented in this plan.

1.3 Realizing Watershed Goals through Strategic Actions

Realizing JCC's overarching watershed goals and addressing watershed issues involves the implementation of two types of **Strategic Actions**. These represent the core of the watershed management plan.

Watershed Restoration Projects such as restoring degraded stream channels, retrofitting BMPs and addressing sanitary sewer maintenance in a timely manner; and

Programatic / Technical and Educational Efforts aimed at increasing JCC staff and stakeholder awareness, fostering watershed stewardship, augmenting baseline information about watershed resources and realizing opportunities for land conservation and redevelopment through the pursuit of shared goals and transparent communication with and between property owners.

The remainder of the *Ware Creek Watershed Management Plan* consists of the following Chapters:

Chapter 2 summarizes the Baseline Assessment.

Chapter 3 describes the development of Watershed Goals and Strategic Actions.

Chapter 4 discusses the methods used to select candidate Watershed Restoration Projects and presents their location within the watershed.

Chapter 5 presents an Implementation Plan for the Strategic Actions, outlining the tentative timeframe for their execution, approximate cost and responsible parties.

Chapter 6 includes individual Subwatershed Management Plans that summarize conditions within the five subwatersheds. These are designed to act as quick reference guides for JCC staff.

2 Watershed Assessment

2.1 Field Data Collection

The data provided in the Ware Creek Watershed Baseline Assessment Report was collected by VHB and KCI scientists and engineers in the field in June, July and August of 2011. Specific methodologies, protocols and field forms are discussed in the Baseline Assessment Report and are highlighted in this chapter. To provide the best quality data and to expedite the extensive field collection duties, VHB utilized ArcGIS™ software to digitally record and maintain a database of all field data. To minimize field and office time associated with paper forms, VHB translated all appropriate forms into an electronic ArcPad™ format using ArcPad Studio™ software. The created feature classes and their associated forms were then easily checked out of a database to applications running on tablet computers for mobile data collection. These computers were connected to an internal GPS receiver that assisted with navigation in the field and more accurate spatial analysis of specific features. After each field effort, feature class data was checked back into the existing database. Records were checked in the office, and photos taken in the field were linked to the appropriate features. This method of data collection allows for VHB to provide the County with the full database of field data as well as spatial definition for all evaluated features.

2.2 Subwatershed Designations and Limits of the Assessment

For planning purposes, the Ware Creek watershed was subdivided into five subwatersheds through coordination with the County and a detailed examination of topography, road surfaces and drainage pathways. These subwatersheds are France Swamp, Upper Ware Creek, Cow Swamp, Folly Swamp and Lower Ware Creek, and range in area from approximately 1.5 to 6.9 square miles (Figure 2-1). For all evaluations, each subwatershed was given a three-character alpha designation to provide consistency among the three components of the Baseline Assessment Report – FRS, UWC, COS, FOS and LWC, respectively.

The France Swamp (FRS) subwatershed consists of 4395.7 acres, with a highly varied mixture of land uses. Natural lands include 36 percent forested land and five percent wetlands. Developed areas include 20 percent in single-family residential, 13 percent in transportation and a combined

eight percent in industrial and institutional uses. Three percent of the watershed is commercial and agricultural uses and meadow make up 15 percent of thewatershed.

Upper Ware Creek (UWC) subwatershed consists of 3,036.3 acres, and has the highest density of new development. The largest use is forested land making 41 percent of the total area. Twelve percent is agricultural and another 12 percent is in rural meadow. Seventeen percent of the subwatershed is residential with the majority part of the Stonehouse subdivision and eight percent is transportation. Commercial sites cover about 3 percent and the remaining area is wetlands and water.

Cow Swamp (COS) subwatershed consists of 1,826.3 acres, with 82 percent of the area made up of forested land, eight percent agricultural and six percent wetlands. Only three percent of the subwatershed consists of residential uses, primarily along the southern border of the subwatershed. About one percent of the area is in other developed uses.

Folly Swamp (FOS) subwatershed consists of 1,195.5 acres, with 83 percent of the area made up of forested land, nine percent wetlands, six percent in residential uses and the remainder in roads and water.

Lower Ware Creek (LWC) subwatershed consists of 952.3 acres, with 73 percent of the area made up of forested land and 26 percent in wetlands and water. No major development exists within the subwatershed and transportation use makes up only one percent of the total area.

Because the vast majority of development in the Ware Creek watershed has occurred within the Upper Ware Creek and France Swamp subwatersheds, the Ware Creek Baseline Assessment focused on these areas. The remainder of the watershed is comprised of large portions of developable land, so consistent with good watershed management, this Watershed Management Plan serves to address each subwatershed individually as well as the entire Ware Creek Watershed.

2.3 Land Use and Imperviousness

The Ware Creek watershed is approximately 17.8 square miles in extent. It is 26 percent urbanized and based on zoning information, it is not close to its maximum level of development. The developed land is primarily residential, with fourteen percent of the watershed in residential lots, seven percent in transportation uses, and four percent in commercial and institutional areas. The major transportation corridors in the watershed are I-64, which crosses the central part of France Swamp subwatershed and travels into the southern tip of Upper Ware Creek subwatershed and Rochambeau Drive, which also crosses the central portion of France Swamp subwatershed. The Ware Creek watershed is largely rural land (74 percent of the watershed). Forest makes up the majority of the undeveloped land, totaling 53 percent of the watershed. Eight percent of the watershed is agriculture, eight percent is open water and wetlands and about five percent is in open space or meadow.

Impervious surfaces are those that don't allow precipitation to infiltrate through soils into groundwater. They include roadways, parking lots, sidewalks, roofs, and driveways. Imperviousness is one of the causes of degradation of urban streams and waterbodies. Impervious area was estimated for the Watershed by using the GIS coverage developed by Sanborn and provided by the County. It includes the following types of features: derived from the County's planimetric mapping:

- Road (Streets, Parking Lots)
- Buildings (Apartment/Townhouse, Church, Commercial, Garage/Shed, Residential, Schools, Trailers, Other)
- Other (Driveways, Sidewalks, Minor Parking Lots)

In order to provide input for pollutant load modeling and to forecast future imperviousness, the impervious areas were overlaid with the land use. The results are shown in Table 2-1:

Table 2-1: Percent Impervious by Land Use (acres)

Land Use	Total Area (ac)	Buildings (ac)	Pavement (ac)	Driveways and Other (ac)	Total Impervious Area (ac)	Percent Impervious (%)
URBAN						
Single-family, rural, wooded	165.3	2.7	5.2	4.9	12.8	7.7
Single-family, rural, turf	190.1	2.7	1.8	4.2	8.7	4.6
Single-family, large lot	507.4	20.2	0.8	23.9	44.9	8.8
Single-family, small lot	678.7	76.4	1.0	54.5	131.9	19.4
Multi-family and townhouse	11.6	1.5	2.0	0.6	4.1	35.3
Commercial	215.8	22.2	30.7	4.9	57.8	26.8
Institutional	117.6	7.3	14.5	2.5	24.3	20.7
Industrial	222.0	21.3	41.4	8.3	71.0	32.0
Transportation	836.4	0.1	256.1	20.7	276.9	33.5
RURAL	**827.2**					
Agriculture	886.2	3.3	1.1	4.5	8.9	1.0
Open space, meadow	624.8	0.8	7.3	8.0	16.1	2.6
Forest	6,026.7	0.6	4.8	6.0	11.4	0.2
Water	149.6	0.0	0.0	0.0	0.0	0.0
Wetland	783.2	0.2	0.0	0.6	0.8	0.1
TOTAL	**11,406.1**	**159.3**	**366.7**	**143.6**	**669.6**	**5.9**

Using these estimates, there are approximately 670 impervious acres, for an overall watershed imperviousness of 5.9%. Table 2-2 shows that France Swamp and Upper Ware Creek are the most developed subwatersheds and have relatively similar imperviousness, while the remaining areas have very little development with less than one percent of imperviousness. Figures 2-1 to 2-3 shows the impervious area mapped from the GIS planimetric layers.

Table 2-2: Impervious Area by Subwatershed (acres)

Subwatershed	Impervious Area (ac)	Subwatershed Area (ac)	Percent Impervious
Cow Swamp	13.8	1,826.3	0.8%
Folly Swamp	9.9	1,195.5	0.8%
France Swamp	417.8	4,395.7	9.5%
Lower Ware Creek	3.1	952.3	0.3%
Upper Ware Creek	224.9	3,036.3	7.4%
Total	**669.5**	**11,406.1**	**5.9%**

Impervious cover and land use results specific to each of the five subwatersheds is presented in the Ware Creek Baseline Assessment Report. Those findings are applicable to the proposed subwatershed-specific recommendations presented in this Watershed Management Plan.

2.4 Stream and Floodplain Inventory and Assessment

The majority of the stream reaches located within the Ware Creek watershed are stable systems that are well connected to their floodplains. The most significant stream and floodplain systems are the broad, flat waters and wetlands located closest to the York River to the north, where the entire watershed drains. Since substantial development is primarily concentrated around the headwater systems, the lower flat water systems are not significantly impacted from stormwater runoff and pollutant sources. Furthermore, almost all existing development is relegated to the Upper Ware Creek and France Swamp subwatersheds, leaving the central, northern, and eastern portions of the watershed relatively untouched.

The headwater streams, because they have the largest potential for impairment, were the primary subject of VHB's stream and floodplain field assessment. Most of these systems were stable E and B channels that were defined by natural topography and groundwater seepage. VHB assessed 228 individual stream reaches, of which 121 were E channels and another 44 were B channels. The remaining reaches were either classified as unstable G (24) or F (1) channels or stable C (19) or D (1) channels. The majority of the streams assessed were in good condition. The assessment does not include the broad floodplain settings that are located lower in the watershed. These larger systems are most certainly in good condition given the undeveloped nature of the immediate watershed.

Likewise, most of the assessed reaches were still in Stage I of the evolution process. In fact, 166 reaches (89% of total assessed length) were in Stage 1. The remaining 11% were downcutting (Stage II) or widening (Stage III) streams relegated mostly to the highly developed portions of the Upper Ware Creek and France Swamp subwatersheds.

Most stream reaches (117 or 56%) exhibited a fair habitat rating, mostly due to low scores from excess sedimentation instead of bank erosion or downcutting. Another 48 SARs fell in the Poor

habitat range, again mostly due to excess sedimentation but also in concert with erosional problems associated with excessive stormwater flows. However, these headwater reaches are typically short compared to the downstream assessment reaches and this is illustrated by the fact that those 48 SARs only correspond to 12% of the total length of assessment. The remaining 35% of the total length fell in the Good to Excellent category.

The floodplain assessment provided higher ratings overall, 84% of the total assessment length falls in the Good or Excellent range. In fact, only 1% of the total length (1 SAR) fell in the Poor range. Floodplains generally were rated higher as the assessment proceeded in a downstream direction which also corresponds to less developed riparian zones.

A total of 87 stormwater outfalls were assessed as part of the study. While there were some stormwater issues in the Ware Creek watershed, only eight (8) outfalls were given a severity of 4 or 5. Likewise, only 1 of the 49 assessed stream crossings was given a severity rating greater than 3. Five utility crossings were assessed with 1 given a severity greater than 3. Eleven severe erosion locations were identified, most located within the Upper Ware Creek watershed. Additionally, 9 trash and debris sites and 1 impacted buffer site were identified as part of the baseline assessment.

From a stream habitat and floodplain standpoint, the biggest issue in the Ware Creek watershed is the high degree of sedimention located within the beds and floodplains in so many of the wetland systems. This sedimentation was most evident in the developed Upper Ware Creek and France Swamp subwatersheds and appears to be almost completely void in the undeveloped Lower Ware Creek, Folly Swamp, and Cow Swamp subwatersheds. The underlying soils and general topography throughout the Ware Creek watershed is very similar, so the sedimentation is likely a product of past development and unstable soils.

Soil mapping shows the prevalence of highly erodible soils throughout the watershed, specifically around headwaters. Development in the watershed is very similar in age and since little evidence of discrete and/or recent sediment sources was found during the assessment, it is hypothesised that most of the sediment was deposited at some point in the past in association with the existing development. While the majority of the Ware Creek watershed is not yet built-out, the prevalence of this sediment in the developed areas should provide some important giudance as remaining lands in the watershed undergo similar development plans.

2.4.1 Stream Inventory Assessment

In June, July and August of 2011, environmental scientists and engineers from VHB performed a stream and floodplain assessment of the Ware Creek watershed. Field assessments were carried out in a manner consistent with previously completed watershed management plans prepared by the Center for Watershed Protection and VHB.

Field efforts associated with these plans focused on the implementation of two field data forms from the Environmental Protection Agency's (EPA) "Rapid Bioassessment Protocols" (Barbour et al. 1999): the Habitat Assessment and Floodplain Assessment. VHB employed these as well as additional field protocols to evaluate the level of protection afforded to the streams and their

riparian areas under existing County administrative and regulatory codes, to document occurrences of stream instabilities and to help prioritize potential stormwater retrofit, stream restoration and riparian buffer management opportunities. These additional protocols include the Rosgen Classification of Natural Rivers (Rosgen 1994) and the Channel Evolution Model or "CEM" (Schumm et al., 1984), used to document the physical characteristics and general stability of the stream reaches, respectively. Furthermore, six forms contained within the CWP's Urban Subwatershed Restoration Manual No. 10: Unified Stream Assessment were also completed as conditions warranted. These include stormwater outfalls (OT), severe bank erosion (ER), impacted buffer (IB), stream crossing (SC), trash and debris (TR) and utility impacts (UT).

Based on County GIS information, over 15 miles of stream channel is mapped within the Ware Creek watershed. These previously mapped streams represented just one aspect of the effort. Many topographic depressions within the watershed have no mapped streams, yet were found to have natural channels. These features were often times associated with inland-point RPA fingers.

Because it was not feasible to assess all stream channels within the watershed, VHB's assessment included a snapshot approach. Priority areas and subwatersheds were determined in coordination with the County. Because the Folly Swamp, Cow Swamp and Lower Ware Creek subwatersheds are so sparsely developed, the least amount of field work was conducted in these areas. However, as these subwatersheds represent a large portion of the overall watershed area, provide ideal baseline conditions and will be subject to future development plans, representative assessments were conducted in these areas as well. The majority of the field work was completed in the more developed France Swamp and Upper Ware Creek subwatersheds, areas where stormwater management has been implemented and where the opportunity for instabilities is most likely.

Headwater reaches were the primary focus, as these areas have the highest chances of being unstable due to development and/or improper stormwater management. As top-down restoration of such unstable headwater streams can have beneficial effects on water quality in receiving streams and can represent a cost-effective approach, these valleys were studied with particular scrutiny.

2.4.2 Rapid Bioassessment Protocol

Numerous techniques have been developed for assessing stream channel conditions. The most common techniques utilize a semi-quantitative method of assigning a score to various habitat parameters of a stream reach by comparing what is seen at points along the stream to a series of descriptions. The total number of assessment parameters varies depending on the complexity of the assessment method chosen. The RBP was employed for the Ware Creek Stream and Floodplain Assessment.

The RBP "Stream Habitat Assessment" consists of ten questions that address various channel and riparian attributes. Each question has an associated point value on a 10-point or 20-point scale. VHB scientists also utilized the "Floodplain Assessment" form that was adapted originally for the Powhatan Creek Watershed Assessment. Possessing a similar structure to the Stream Habitat Assessment form, the Floodplain Assessment consists of seven metrics that serve to characterize

the impairment of the floodplain, each measured on a 10-point scale. Appendix A includes a detailed description of each of the parameters used in the Habitat and Floodplain Assessments.

Following the field data collection using the RBP, the relative degree of stream and floodplain impairment can be estimated by comparing the assessment scores recorded at select study reaches to those found at the least impaired reaches within the watershed, or "reference reaches." The reference streams do not necessarily represent the best attainable condition for the study area, as 100% evaluation coverage was not attained as part of this assessment. However, while field reconnaissance focused primarily on the more-developed areas of the watershed to better ascertain problematic reaches, a considerable portion of the study focused on reaches within the large undeveloped portion of the watershed. As expected, good reference reaches were available for comparison purposes. Ranking stream reaches in a comparative manner assists in prioritizing potential restoration efforts. To determine the breakpoints between assessment categories, the three highest scores for the watershed were averaged. Stream Habitat and Floodplain Assessment scores totaling over 90 percent of that value are considered EXCELLENT; between 81 and 90 percent are GOOD; between 61 and 80 are FAIR; and below 60 are POOR.

2.4.3 Other Assessment Techniques

VHB scientists utilized the Rosgen Classification of Natural Rivers (Rosgen, 1994) and the Channel Evolution Model (Schumm et al., 1984) to document the physical characteristics and general stability of the stream reaches, respectively. In brief, the Rosgen classification is a broad delineation consisting of seven stream types allowing for rapid initial field assessment.

- Stable systems generally fall into categories A, B, C, D, and E (though D is reserved for braided systems).
- F and G streams are entrenched systems that have experienced a rejuvenation in downcutting and widening in response to land use changes in the watershed or natural uplift.

All Rosgen classifications were estimated using a cursory evaluation and best professional judgment, and no detailed geomorphic assessment was carried out or measurements recorded.

CEM is a simple, linear model that describes stream evolution in response to changes in the contributing watershed via five stages. Stage I is stable; Stage II is incision, or downcutting; Stage III is widening; Stage IV is stabilizing; and Stage V is the reattainment of stable conditions via the development of a new floodplain at a lower elevation.

Finally, VHB scientists utilized the following forms from Chapter 10 of the CWP's Unified Stream Assessment: A User's Manual, Version 2.0 (CWP 2005) to chronicle instances of stream impairment:

- OT: Storm Water Outfalls
- ER: Severe Bank Erosion
- IB: Impacted Buffer

- SC: Stream Crossing
- TR: Trash and Debris
- UT: Utility Impacts

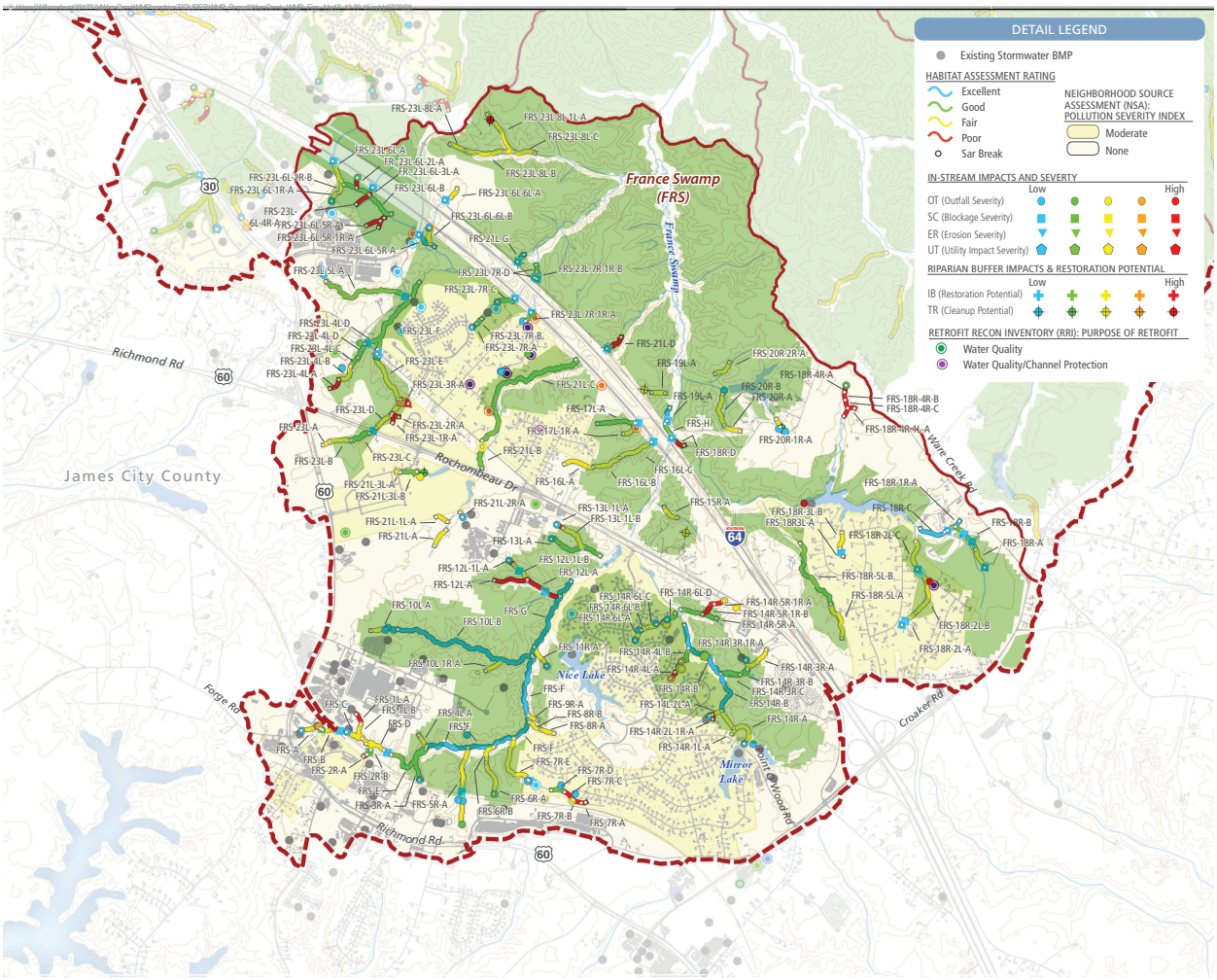
In an effort to streamline the field data collection process, VHB personnel translated all of the forms and protocols mentioned above into electronic format using ArcGIS®, ArcPad®, and ArcPad Studio®. The forms were created for use with tablet computers, allowing scientists to collect data and populate the forms directly while in the field. This process allows for all of the data to be contained within a single personal geodatabase which will be transferred to the County and readily updated in the future as new projects or development in the watershed occur.

Equipped with a tablet computer and an integrated GPS receiver to collect all field data, field scientists walked along the candidate stream corridors, delineating "Stream Assessment Reaches," or "SARs," where stream channel and bank attributes and riparian cover were relatively homogenous. The breakpoints between SARs were typically based on:

- a change in stage of the Channel Evolution Model; and/or
- a change in stream type per the Rosgen classification of Natural Rivers.

Within each of the designated SARs, the Habitat and Floodplain Assessment data forms were completed and the CEM stage and Rosgen classification determined. Specific observations, concerns, and potential recommendations for future action were recorded.

The results of the Baseline Assessment are mapped on Figures 2-1 through 2-3. The Rosgen Classification for each SAR is provided in brackets at the end of each SAR name. For example, SAR 201-D(G) is a G-type stream. The results of the Habitat Assessment are referenced by the color of the individual SAR. The results of the Floodplain Assessment are not depicted, but are discussed in the following sections. Recommended remedial actions to address observed concerns are discussed in detail in Chapter 4, *Watershed Restoration*, and in Chapter 6, *Subwatershed Management Plans*.



Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)
- Forest Buffer

North

0 2,000 ft.

Figure 2-1
Summary of Existing Watershed Conditions - France Swamp

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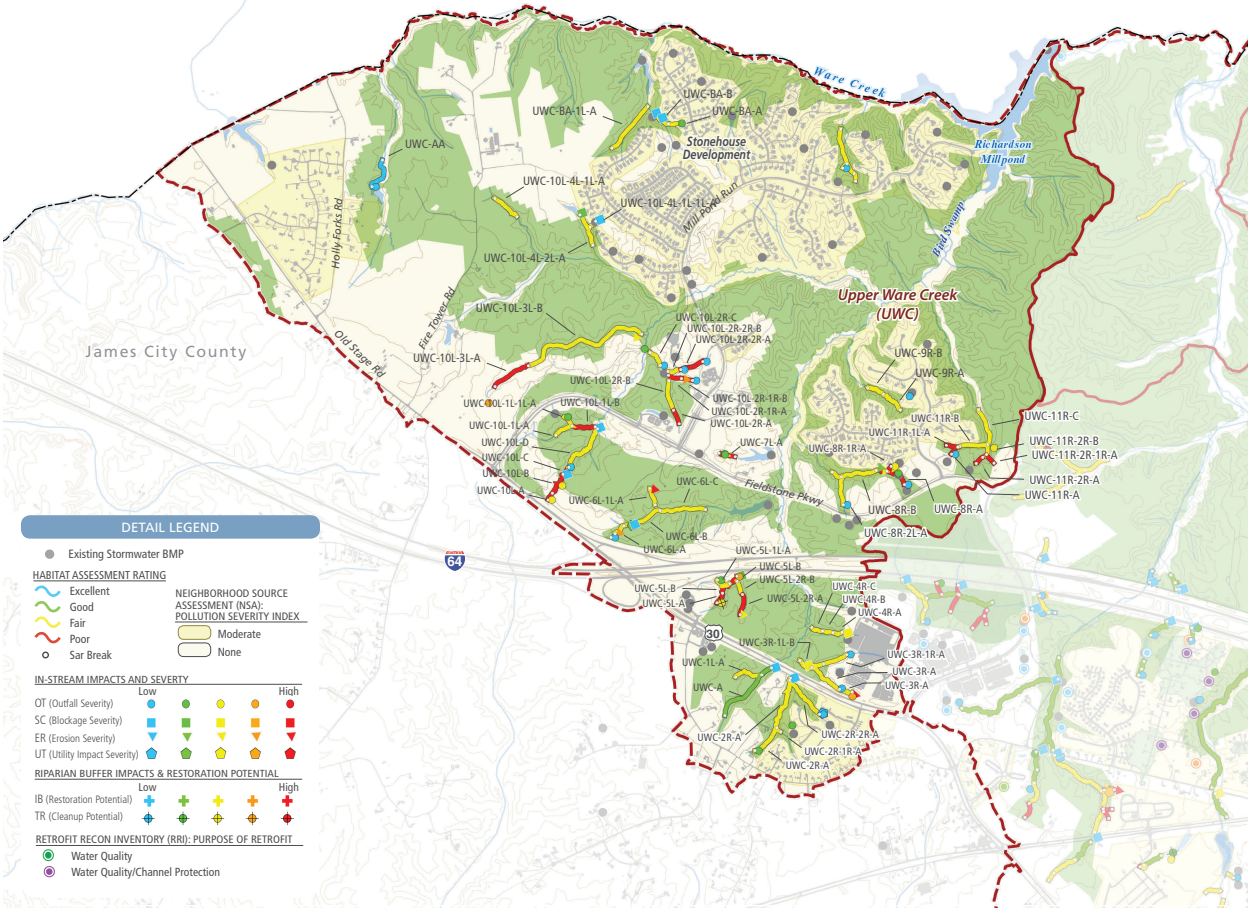
Ware Creek
Watershed Management Plan
James City County, Virginia



DETAIL LEGEND

- Existing Stormwater BMP

HABITAT ASSESSMENT RATING
- Excellent
- Good
- Fair
- Poor
- Sar Break

NEIGHBORHOOD SOURCE ASSESSMENT (NSA): POLLUTION SEVERITY INDEX
- Moderate
- None

IN-STREAM IMPACTS AND SEVERTY

	Low				High
OT (Outfall Severity)					
SC (Blockage Severity)					
ER (Erosion Severity)					
UT (Utility Impact Severity)					

RIPARIAN BUFFER IMPACTS & RESTORATION POTENTIAL

	Low				High
IB (Restoration Potential)					
TR (Cleanup Potential)					

RETROFIT RECON INVENTORY (RRI): PURPOSE OF RETROFIT
- Water Quality
- Water Quality/Channel Protection

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)
- Forest Buffer

North

0 1,750 ft.

Figure 2-2
Summary of Existing Watershed Conditions - Upper Ware Creek

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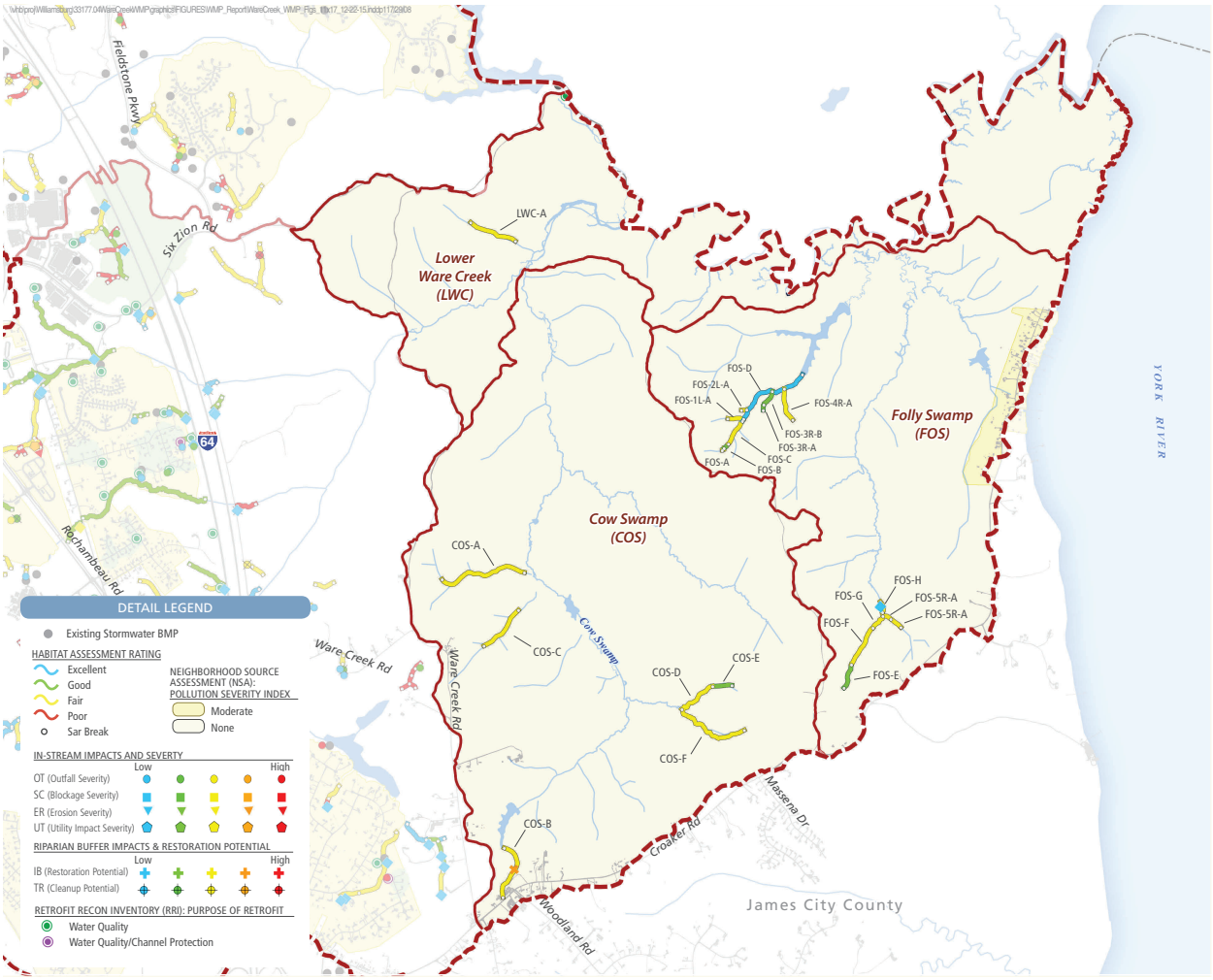

Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 2,000 ft.

Figure 2-3
Summary of Existing Watershed Conditions - Cow Swamp, Folly Swamp, Lower Ware Creek

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2.4.4 Stream Classification and the Channel Evolution Model

Photo 1: FRS-23L-6L-4R, located near I-64 in the Stonehouse Commercial Park.

In general, the results vary according to whether the assessed reach falls within an undeveloped subwatershed (Cow Swamp, Folly Swamp or Lower Ware Creek) versus a developed subwatershed (France Swamp or Upper Ware Creek). In the undeveloped areas, headwater channels, while sometimes located along a steep gradient, are still relatively stable B-type streams (Photo 1). Proceeding downstream, most streams in the Ware Creek watershed become well-connected with their floodplain, coincident with their contact with natural valleys. At this point, they become E-type streams, characterized by sinuous channels flowing on gentle slopes (Photo 2).

By contrast, while the channels in the developed areas still eventually turn into E channels lower in their profile, the headwaters often experienced significant downcutting associated with excessive runoff and the highly erodible Emporia soils. In these developed areas of the France Swamp and Upper Ware subwatersheds, excessive sedimentation often prevented the channel dimensions from measuring as G or F channels due to the artificial shallowing effect resulting from the high sediment load.

Overall, the Ware Creek watershed is typified by stable E-type channels, though the few G-type erosional reaches are of significant concern from a stability standpoint (Photo 2). Most channels in the developed areas had a sand bed that was sometimes observed to have a depth in excess of 5 inches. In total, 68% of the reaches assessed were E-types, while another 27% were classified as either C, B, or D channels. Only 5% of the SARs were classified as G or F streams, almost all within the

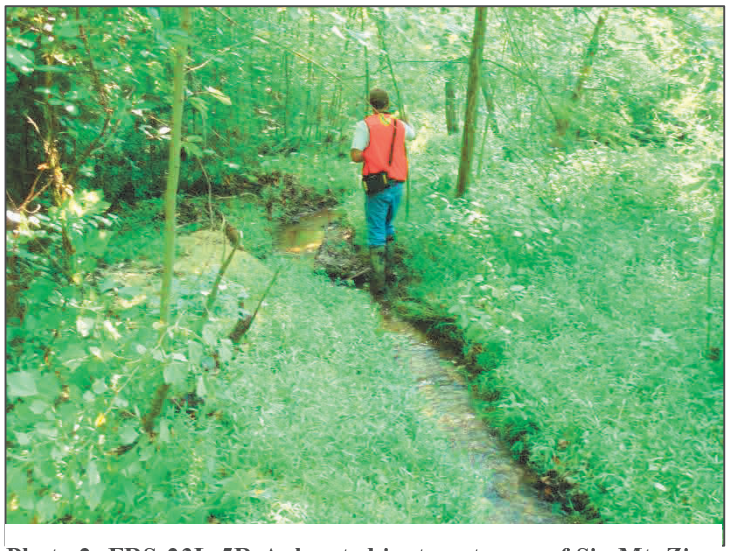


Photo 2: FRS-23L-5R-A, located just upstream of Six Mt. Zion Road in the Stonehouse Commercial Park.

France Swamp and Upper Ware Creek subwatersheds. This means that, with a few notable exceptions, channel instability from erosion is not a major concern in the Ware Creek watershed at this time.

The dominant geomorphic process in the Ware Creek subwatershed was Stage I of the CEM, typical of the sinuous E-type channels passing through an undeveloped wetland floodplain. However, the field study provided plenty of examples of instable Stage II (incising) or Stage III (widening) channels, particularly in the France Swamp and Upper Ware Creek subwatersheds (Photo 3). Though the development is still fairly young and the instabilities are often located some distance from any structures, these features can still pose a serious threat to infrastructure, private property and public safety. Out of all the reaches assessed, 89% were stable Stage 1 systems, while only 11% fell in Stage II or III, further illustrating the lack of stream stability issues within the watershed. Notable exceptions in stability are coincident with the Severe Erosion (ER) locations, which are decribed in the following section of this report.

Photo 3: Headcut located within the Stonehouse Commercial Park at upstream end of SAR UWC-3R-A.

Along each bottomland in the Ware Creek watershed, tree throws caused by recent storm events as well as from beaver activity are plentiful. In many places, trees have fallen or beaver dams have been created across the stream channel, resulting in the upstream accumulation of flood debris and causing floodwaters to be shunted out of the primary channel and into secondary channels within the floodplain. These occurrences can result in multiple channels that are active not only during flood events, but even as baseflow channels. However, based on their location along the stream profiles, most of these "natural" impediments are not causing any instability in channel or floodplain structure or habitat.

2.4.5 In-Stream Habitat

An evaluation of stream habitat found that the vast majority of streams fall into the fair category (56%), with 16% classified as good, 5% as excellent and 23% as poor. The Habitat Assessment metric that typically scored the lowest for the Ware Creek watershed was Pool Variability and Pool Substrate Characterization. Studies have shown that first and second order streams typically do not exhibit well-developed pools. This is especially true in the sand-bed and low-gradient streams of the Ware Creek watershed. Nevertheless, the lack of defined pools can be an indicator of a surplus in sediment transport from upstream reaches, especially where uncontrolled stormwater discharge is occurring. Many E streams were observed to have freshly deposited fine sand, liberated from

the upstream channels and banks of G or B-type headwater streams. Such a changeable substrate also tends to diminish the score for epifaunal substrate / available cover. Pool Characteristics, Flow Status, and Sinuosity also registered relatively low scores. Due to the general low-relief and sizable wetland floodplain settings, it is not surprising that most channels did not exhibit a very strong baseflow. Sinuosity appears to be artificially low because the assessments focused on the headwater channels, which are straighter than the E-type channels winding through the lower floodplains. Those areas were largely excluded from the study because they are assumed to be stable.

Photo 4: High degree of sedimentation along UWC-10L-2R-1R-B in the Stonehouse development along the golf

It should also be noted that the Habitat Assessment considers factors outside the channel as well as in-stream. For those streams having residential or commercial development in close proximity, the score for Riparian Vegetative Zone Width in some SARs was correspondingly low.

2.4.6 Floodplain Habitat

Overall floodplain conditions scored good with 31% ranked as excellent, 43% of streams ranked as good, 24% as fair and just 1% as poor. Floodplain connectivity is typically optimal or suboptimal wherever E-type streams were found. Concentrated flow outside the channel is common (Photo 5), particularly with the high degree of seepage typical in these vallies and frequency of beaver activity noted in the watershed. The scouring is a result of the stream accessing the floodplain more frequently and enhancing the floodplain hydrology.

Photo 5: Floodplain scouring in the Folly Swamp Subwatershed.

The "Floodplain Habitat" metric was often scored as marginal because a diversity of wetland and upland settings are rare in the bottomlands, with the former being dominant.

2.4.7 Outfalls, Utilities, and other Point Impacts

Figures 2-1 through 2-3 include locations of observed CWP point feature assessments for stormwater outfalls, stream and utility crossings and stream impairments regarding buffer quality, trash and erosion. Each feature assessed was assigned a severity rating from 1 to 5 which is color-

coded on the figures. The total number of outfalls and impairments are summarized by subwatershed in Table 2-3, along with a summary of the impervious cover. A total of 87 stormwater outfalls were assessed as part of the study, and while there were some stormwater issues in the Ware Creek watershed, only eight (8) outfalls were given a severity of 4 or 5. Likewise, only 1 of the 49 assessed stream crossings was given a severity rating greater than 3. Only five utility crossings were assessed with 1 given a severity greater than 3. Eleven severe erosion locations were identified, though these were almost entirely located within the Upper Ware Creek watershed. Additionally, 9 trash and debris sites and 1 impacted buffer site were identified as part of the baseline assessment.

Table 2-3: Stream Impairments by Subwatershed

				Impervious Area Impact Class			CWP Point Features Assessed					
Subwatershed	Area (Ac)	Impervious Cover (ac)	Impervious Cover (%)	% pave	% bldgs	% other	OT	SC	UT	ER	IB	TR
Cow Swamp	1,826	13.7	0.8%	0.1%	0.4%	0.2%	0	0	0	0	1	0
Folly Swamp	1,196	9.9	0.8%	0.2%	0.4%	0.2%	0	1	0	0	0	0
France Swamp	4,420	422	9.5%	2.3%	5.4%	1.8%	56	37	3	1	1	8
Upper Ware Creek	3,314	228	6.9%	1.7%	3.5%	1.7%	31	11	2	10	0	1
Lower Ware Creek	953	3.1	0.3%	0%	0.3%	0%	0	0	0	0	0	0
TOTALS:	11,708	676	5.8%	--	--	--	87	49	5	11	2	9

As is evident from the table, certain point features are associated with specific subwatersheds. For examples, all 87 outfalls fall within the developed France Swamp and Upper Ware Creek subwatersheds, the majority of the severe erosion locations fell within the Upper Ware Creek subwatershed and most of the trash sites were located in France Swamp. Outfall severity was gauged by physical stability (Photo 6) rather than by discharge observations or water quality, since these were assessed solely as a snapshot of existing conditions. Stream Crossings were assessed in the same manner. The majority of the Trash and Debris sites consisted of illegal tire dumping. Each of the severe erosion locations corresponded with actual stream bank instabilities and headcutting due to excess stormwater runoff from nearby development or roadways. There were very few utility crossings or impacted buffer sites documented during the study.

Photo 6: Eroded outfall located at the head of FRS-14R-4L-A in Mirror Lakes Estates residential development.

2.5 Conservation Areas

A natural resource assessment was completed as part of the baseline assessment for watershed planning purposes for James City County. VHB scientists were tasked with the evaluation and assessment of upland contiguous forest communities, wetland functions, and rare, threatened and endangered (RTE) species. Fieldwork was conducted by qualified VHB scientists, which included an interdiciplanary team of wildlife biologists, wetland ecologists, aquatic biologists, foresters, hydrologists and environmental scientists.

Contiguous forests are large blocks of forested land unfragmented by significant breaks, such as roadways, power lines, or other clearings. The value of these tracts is measured by interior area, also referred to as 'interior forest.' Potential tracts of contiguous forest were identified in ArcGIS™ using a review of 2007 digital orthophotography provided by the County. Because of the relatively developed condition of the Upper Ware Creek and France Swamp subwatersheds, only three tracts of forested land meeting the general screening criteria of being 100 m [330 feet (ft)] square were identified in those portions of the Ware Creek watershed. In contrast, a total of seven tracts were identified within the Folly Swamp, Cow Swamp and Lower Ware Creek subwatersheds, which are largely comprised of agricultural land, forested land and rural development. After field verifying these locations, a total of eight tracts were chosen for field evaluation of forest structure, condition and intactness. One "Upland Contiguous Forest" (UCF) form was completed at each of the eight locations. Data collected include dominant tree species and diameter at breast height (DBH) for trees enumerated using a prism factor of 10. Results of the Upland Contiguous Forest Assessment is presented in Appendix A Table A-1. The data collected at each site indicates that forest structure, forest composition, forest diversity and seral stages are well diversified thoughout the Ware Creek watershed.

A functional assessment was completed for wetland areas within the watershed that had previously been identified in the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) in

concert with the County's GIS RPA layer. The Evaluation for Planned Wetlands (EPW) assessment model was used to complete this study, the purpose of which was to establish baseline wetland conditions at the time of the evaluation (September 2011). Candidate sites for EPW assessment were selected by identifying those NWI-mapped wetlands that lie outside the RPA buffer and thus are not subject to the protection afforded by RPA status. A total of five NWI-mapped wetlands positioned outside of the counties RPA buffer were identified within the Ware Creek watershed. Of the five, three were unable to be assessed as no wetlands were present in those specific locations. The other two remaining NWI-mapped wetlands were located in the northern portion of the Ware Creek watershed. Utilizing the format outlined in Bartoldus et al. (1994), VHB's Professional Wetland Scientist (PWS) analyzed the functional characteristics of these two wetland areas. Scores for each wetland are summarized in Table A-2. Based on this assessment and utilizing the two NWI mapped wetlands located within the watershed, EPW 2 was determined to be a regional exemplar of a non-tidal, forested, seasonally flooded, depressional wetland system.

Current status of RTE species within the Ware Creek watershed was reviewed through online database information obtained from various natural resource agencies, including USFWS, VA DCR and VA DGIF. Furthermore, multiple site visits were performed throughout the summer and fall of 2011 by qualified VHB scientists to document current field conditions and confirm agency database searches. Existing RTE species populations reported in the Ware Creek watershed include those for the bald eagle and small whorled pogonia, as shown in the natural resource agency search results depicted in Tables 2-1 through 2-4. The Ware Creek Conservation Site also includes tidal freshwater marsh, tidal oligohaline marsh and tidal mesohaline/polyhaline marsh communities, which are reported by DCR-DNH as having high significance (B3) and conservation value. Mapped locations of these RTE resources, as well as specific occurrence details from each agency are provided in Appendix C. Based on DCR-DNH database review and supporting information from other state and federal agencies, the following conclusions may be drawn regarding previously documented RTE species within the Ware Creek Watershed:

- the active and occupied bald eagle nests reported by natural resource agencies reflect the presence of suitable nesting and foraging habitat both in and around the watershed;
- known small whorled pogonia populations are present in the watershed, as well as abundant potential forested upland habitat; and
- potential habitat for other federally listed (sensitive joint-vetch) and state-listed (Mabee's salamander, Henslow's sparrow, and loggerhead shrike) RTE species exists within the watershed.

In order to properly conserve the known and potential RTE resources within the Ware Creek watershed, proactive regulatory agency coordination and conservation management techniques (e.g., buffer restrictions) should be considered during future land planning in James City County.

2.6 Assessment of Existing Stormwater Management Practices

An overview of JCC regulations regarding stormwater management requirements, allowable practices and stormwater facility maintenance and inspection is provided in Appendix B. The following section describes existing stormwater management facilities within the Ware Creek watershed specificially.

2.6.1 Existing Stormwater Management Facilities

Approximately half of the urbanized area of the watershed was developed within the last 10 years. Even with the amount of older, pre-stormwater treatment development, the amount of newer development has resulted in a considerable area of the watershed being treated. Over half of the developed area of the watershed (54 percent) is treated by BMPs. Figures 2-1 to 2-3 show the extent of the treated area.

Based on the County's SWM database, as of 2011, there were 90 stormwater facilities located in the watershed. Drainage areas were delineated for all systems, giving a treatment area of approximately 3,749 acres, or 32 percent of the watershed. Table 2-4 shows a summary of the type of facility, treatment provided, number of facilities, and approximate drainage area.

Table 2-4: Stormwater Management Facilities in Ware Creek

SWM Type	Treatment Provided	Number of Systems	Treated Area (acres)	Treated Impervious Area (acres)
Constructed Stormwater Wetland	Quality	4	34.8	8.0
Detention Basin	Quantity	41	610.4	138.9
Extended Detention Basin	Quantity and Quality	6	60.1	13.8
General Infiltration Practices	Quality	17	110.8	27.8
Manufactured BMP Systems	Quality	3	36.5	3.9
Retention Basin	Quantity and Quality	19	2,896.8	231.8
TOTAL		**90**	**3,749.4**	**424.3**

*Area is calculated assuming that BMP drainage areas are not overlapping (i.e. no additional treatment is provided by downstream BMPs) as a conservative approach to avoid duplicate treatment accounting.

In general, treatment for residential areas is provided by retention and detention basins and the majority of treatment for commercial areas is provided by retention basins.

2.6.2 Upland Reconnaissance

Two elements of the Unified Subwatershed and Site Reconnaissance were conducted as part of the watershed assessment effort: the Hotspot Site Investigation and Neighborhood Source Assessment, which evaluate pollution-producing behaviors and restoration potential in upland areas of the watershed. These assessments are "windshield surveys" where field crews drive streets in the watershed to determine specific pollution sources and identify areas outside the stream corridor where pollution prevention possibilities exist. The goal of the reconnaissance is to quickly identify source areas that are contributing pollutants to receiving waters and recommend methods to reduce these pollutant loads through source controls, outreach, change in current practice or improved municipal maintenance operations. Additional information on the reconnaissance procedure is found in Wright et al. (2004).

Field crews assessed 14 potential hotspots in the Toano area of Upper Ware Creek and 26 residential neighborhoods within the Upper Ware Creek, France Swamp and Folly Swamp subwatersheds. Detailed results of the HSI/NSA assessments are presented in the subwatershed write-ups which follow in Chapter 6. General findings for the watershed are as follows:

2.6.2.1 Neighborhood Source Assessment (NSA)

The Neighborhood Source Assessment (NSA) was conducted to evaluate pollution source areas, stewardship behaviors and restoration opportunities within individual residential areas. The assessment looks specifically at yards, lawns, rooftops, driveways, sidewalks, curbs and common areas.

Neighborhoods were assessed in five general categories:

- Characterization involved age, lot size and degree of infill or remodeling.
- Yard and lawn condition assessed landscaping, tree cover, lawn maintenance and general upkeep.
- Driveways, sidewalks and curbs were rated on condition, drainage and debris or litter.
- Rooftops were reviewed primarily to identify whether they drained directly to storm drains, impervious areas or were disconnected by draining to impervious areas.
- Common areas were assessed for evidence of resident stewardship (i.e., storm drain stenciling, pet waste management signage, etc.).

Each site was assigned a pollution severity rating of "severe", "high", "moderate" or "low" using a set of benchmarks set forth in Wright et al. (2004). Pollution severity is an index of the amount of non-point source pollution a neighborhood is likely generating based on easily observable features (i.e. lawn care practices, drainage patterns, oil stains, etc.). A restoration potential rating of high, moderate or low was also assigned to each neighborhood. Restoration potential is a measure of how feasible onsite retrofits, such as bioretention or swales, or behavior changes, such as installation of rain barrels or change in fertilizer use, would be based on space, number of opportunities, presence of a strong homeowner association (HOA) and similar factors.

Neighborhood Characterization

Most development is recent. Over half of the residential parcels were developed since 2000 with only a few neighborhoods dating back to the 1970s or 1980s. Residential development is currently underway, as there was evidence of development in several of the areas assessed. Most single-family lots were less than 1acre in size and impervious coverage of each lot was estimated to be from about 10 to 20 percent on the larger lots and 20 percent to 50 percent on smaller lots. Tree canopy on residential lots varied widely, from no cover in newer, small lot subdivisions to 50 percent in some of the older areas.

Roof runoff was disconnected to a large degree, even in the multi-family areas, with 80 percent of the downspouts estimated to be directed onto pervious areas rather than driveways, parking lots or streets. In general, only one downspout on each dwelling was directed to the driveway, draining from 1/6 to 1/4 of the roof area. There was no evidence anywhere in the watershed of roof drainage connected to storm drains or sewers. Storm drainage in the older residential areas was primarily in open-section grassed ditches at the edge of pavement. The newer areas were constructed with curb, gutter and storm drain. There were no markings or stenciling seen on any inlets. There was also very little accumulation of litter or organic material in the gutters.

Potential Pollutant Sources

The assessment ruled out a number of potential pollutant sources. No litter or pet waste was seen in either private areas or common areas. There was no evidence of litter, trash or dumping in streets or gutters and very few instances of accumulation on private lots.

The most significant potential pollutant source in the newer subdivisions was lawn care. In these areas, over half the lawns assessed could be described as high maintenance. High percentages of turf cover were found in both newer and older areas. Septic systems are a potential source of nitrogen in the older areas as well.

Recommendations

The results of the NSA investigation provide some guidance for outreach to property owners and for internal County activities. Regarding outreach, the most effective improvements will be to restore some of the hydrological effects of the original forested condition in the watershed. Outreach, education and assistance in tree planting to improve the canopy coverage in residential areas is a primary approach. Encouraging native landscaping to replace lawns with native vegetation is another potential program. Finally, although downspout disconnection was not a high priority in the watershed neighborhoods, continuing to promote rain barrel and rain garden programs will help residents to learn more about runoff and streams. An additional recommendation for the County is to continue to coordinate with VDOT the program for marking storm drain inlets. Although they are not prevalent in the watershed, no markings or stenciling was observed anywhere.

2.6.2.2 Hotspot Site Investigation (HSI)

The Hotspot Site Investigation (HSI) is used to evaluate commercial, industrial, municipal and transport-related sites that have a high potential to contribute contaminated runoff to the storm drain system or directly to receiving waters. At hotspot sites, field crews look specifically at vehicle operations, outdoor materials storage, waste management, building conditions, turf, landscaping and stormwater infrastructure to evaluate potential pollution sources. Based on observations at the site, field crews may recommend enforcement measures, follow-up inspections, illicit discharge investigations, retrofits or pollution prevention planning and education.

The overall pollution prevention potential for each hotspot site is assessed based on observed sources of pollution and the potential of the site to generate pollutants that would likely enter the storm drain network. A hotspot designation criterion set forth in Wright et al. (2004) was used to determine the status of each site based on field crew observations. Sites are classified into four initial hotspot status categories:

- Low – no observed pollutant; few to no potential sources
- Potential hotspot – no observed pollution; some potential sources present
- Confirmed hotspot – pollution observed; many potential sources
- Severe hotspot – multiple polluting activities directly observed

Potential Pollutant Sources

Approximately 80 parcels were identified from the GIS mapping as potential hotspots based on their classification as commercial, industrial or institutional sites. Review of the sites with County staff narrowed the assessment down to the Hankins Industrial Park and Toano industrial / commercial area. Fourteen sites were assessed. They varied from warehouses, to building and material supplies, to commercial and retail sites.

Of the sites, only one, a gas station / grocery conducted vehicle operations. Eight of the sites were assessed for outdoor material storage, seven for waste management and all but one for the physical plant and landscaping. The hotspot status for all the sites were classified as either “low” or “potential”. No pollution was observed during the assessment. One observation was that most potential sources of runoff from material storage were reduced through storage on pervious areas rather than on hard surfaces. The SWM facility mapping indicates that many of the areas are treated, even though BMPs may not have been observed in the field.

Recommendations

Periodic follow-up inspections are recommended, particularly if there are complaints from watershed residents. Inspection using the HSI form could help focus the review on specific pollutant sources.

2.6.3 Pollutant Load Modeling

Pollutant loading models were developed for each of the five subwatersheds in Ware Creek. The models are spreadsheet-based and have been developed using the Beta version of the Watershed Treatment Model (WTM) published by the Center for Watershed Protection in 2010.

The model has been selected because it allows the watershed manager to assess loads from a wide range of wet weather and dry weather land uses found in urban and agricultural watersheds. It provides output on the the sources of pollutants and estimates nitrogen, phosphorus, total suspended solids and bacterial loads in the watershed.

The Beta version has changed from the WTM used for the earlier Mill Creek assessment by incorporating the Virginia Runoff Reduction method of estimating runoff. This approach increases modeled runoff from agricultural and undeveloped areas by estimating a runoff coefficent based on soil type rather than simply on imperviousness as in the earlier version.

It is also capable of estimating the effects of future developments on pollutant loads and assessing the effects of BMPs, retrofits and some non-structural measures on reducing pollutant loads.

The model is set up with worksheets to report loads for three scenarios: Existing Conditions, as of the date of the watershed assessment; New Development Conditions, which is forecast from zoning, build out or other land planning data; and Proposed Conditions, which includes proposed changes resulting from in stormwater management, stream restoration projects or non-structural programs.

The loads are calculated using several input worksheets, as follows (Caraco, 2010):

Primary Sources

This worksheet summarizes the loads from sources that can be determined solely by land cover of land use. It requires basic land use information and calculates surface runoff loads. In addition, it requires basic watershed data such as annual rainfall, stream length and soils distribution. The loads calculated in this worksheet incorporate data from the "turf management" section of the "Existing Management Practices" tab and model default values reflect typical lawn care practices.

Secondary Sources

Secondary sources are pollutant sources that cannot be calculated based on land use information alone. Many of these sources, such as CSOs and SSOs, are at least partially composed of wastewater.

Existing Management Practices

This sheet reflects programs currently in place to control loads from urban land. Users need to input information about the effectiveness and level of implementation of various programs and practices.

Proposed Management Practices

This sheet reflects the planned extent of programs to control loads from urban land. By default,the model populates this sheet with values from the "Existing Management Practices" sheet. The user then enters data that describe proposed or "future" management practices.

Retrofit Worksheet

Stormwater retrofits are BMP put in place after development has occurred. The retrofit worksheet allows the user to input individual stormwater retrofit practices. These are then reported in the "Proposed Management Practices" sheet.

Future Land Use

In this sheet, the user enters the projected future land use in the watershed. Land use can be determined from comprehensive planning or zoning documents, or forecasted using other methods. If no data are entered in this tab, the model default is to assume no growth in the watershed.

New Development

This sheet calculates the loads from future development, based on future development in the watershed and proposed future treatment. The sheet calculates new "primary source" loadings based on the increase in area of certain land uses, then asks the user to describe the types of stormwater controls on new development. Next, it adds secondary sources, such as loads from new septic customers and wastewater treatment plant loads. Finally, it calculates the loads from active construction as land is developed.

Display Sheets

Three sheets display final loads and runoff volumes: *Existing Loads, Loads with Proposed (renamed from Future) Practices*, *Loads with New Development*. These sheets simply sum up the loading from other sheets and partition them into surface (both storm- and non-storm) and groundwater loads.

One additional display sheet has been added in order to simplify creating tables for the watershed plan: *Surface_Loads_Table4Rpt*. It simply transfers results from the other display sheets into an easy-to-print format.

Model Input

- **Primary Sources**
    - Land Use and Percent Impervious: Existing land use for the Ware Creek watershed plan and the modeling was developed using analysis of GIS layers, including parcels, subdivisions and zoning, along with overlays of Roth-photography. Imperviousness was developed from the GIS layer provided by Sanborn for James City County.
    - Pollutant Loading Concentration: For urban land use Event Mean Concentration (EMC) values were derived from the National Stormwater Quality Database (Pitt et al,

2004). For rural land use, default data from the WTM model was used for export coefficients.

- Active Construction: The worksheet includes a line to replace a portion of the other existing land uses with construction. While there is considerable activity in the watershed, construction sediment loads were not modeled for this draft of the model.

- **Secondary Sources**
  - Septic systems: Loads from septic systems were based on the number of dwellings in the watershed not connected to the sanitary sewer system, estimated from GIS analysis of residential and agricultural parcels.
  - Sewer overflows (SSO): Sanitary overflows loads are calculated by estimating the number of overflows per 1000 miles of sewer. Local information on dwelling units and sewer length was calculated from GIS layers and the James City Service Authority (JCSA) data and used for modeling the rate of overflows.
  - Illicit connections: Loads from illicit connections was calculated separately for residential and commercial land uses. For residential areas they are calculated as the fraction of population illicitly connected to the storm drains. Loads from commercial sources are calculated by counting the number of businesses illicitly connected. Due to recent developments, rates will be lower than the default value.
  - Stream erosion: The model estimates the sediment from streams as a fraction of the overall watershed load. Based on the assessment that channels were largely stable, the lowest value of 25% was selected.
  - Livestock: TMDL information estimated that about 30 horses and 20 cattle were in the watershed.
  - Marinas: There were no loads from marinas.
  - Road sanding: Loads from road sanding were not modeled.
  - Point sources: These include loads from NPDES dischargers like wastewater treatment plants and they can be estimated from flow and concentration data reported in Discharge Monitoring Reports required under NPDES regulations. Two areas are regulated under VAR 040037.
  - **Existing Management Practices**
  - Turf Condition and Management Practices – Residential: Three inputs are required for this calculation. Percent of bare or compacted lawns and percent of highly managed lawns was averaged from the NSA assessment for the subwatershed. Percent of homes less than 10 years old was derived from "YrBuilt" in the parcel coverage.
  - Turf Condition and Management Practices – Other: Commercial, roadway and industrial turf management can be entered as a comparison to residential turf. The default of "same" was used.
  - Pet Waste Education: Input is available to describe the program and its effectiveness. Pet Waste Program was considered in modeling.
  - Erosion and Sediment Control: Inputs are available to describe program effectiveness. Assumptions were made that 98% of building permits were regulated, and that bi-monthly inspections were conducted.

- Street Sweeping: Area swept, frequency and type of equipment can be input. For Ware Creek, no street sweeping is currently conducted and no swept area was input.
- Structural Stormwater Management Practices: Drainage area and impervious area for each type of treatment was derived from GIS layers created for the watershed plan. Removal efficiencies are based on current Chesapeake Bay Program standards.
- Riparian Buffers: Buffer length and width can be estimated from GIS layers.
- Catch Basin Cleanouts: No program was modeled.
- Marina Pumpouts: No program was modeled.

- **Proposed Management Practices**
  - This worksheet was not used for the Baseline Assessment.
- **Retrofit Worksheet**
  - This worksheet was not used for the Baseline Assessment.
- **Future Land Use**
  - Future Land Use: Input for this worksheet was developed from a GIS analysis of existing land use, zoning and protected areas, including RPA, conservation easements and greenways.
- **New Development**
  - Additional Development and Percent Impervious: The model calculates the area of Additional Development as the change between existing and future conditions. For each land use, an estimate was made for impervious cover based on averages of the overall Ware Creek watershed, as follows: Calculations of % Turf and % Woods/Landscaping are embedded in cell formulas. Changes to the formula were made for SFW and MFR to adjust the proportion of woods and turf.

Table 2-5: Land Cover Breakdown for Each Type of Land Use

LU Code	Description	% Impervious	% Woods / Landscaping	% Turf
SFW	Single-family, rural, wooded	7.5%	74.0%	18.5%
SFR	Single-family, rural, turf	7.5%	18.5%	74.0%
SFL	Single-family, large lot	10.0%	18.0%	72.0%
SFS	Single-family, small lot	20.0%	16.0%	64.0%
MFR	Multi-family and townhouse	35.0%	6.5%	58.5%
COM	Commercial	25.0%	15.0%	60.0%
INS	Institutional	20.0%	16.0%	64.0%
IND	Industrial	35.0%	13.0%	52.0%
TRNS	Transportation	50.0%	10.0%	40.0%
FUTURE LANDUSE				
PDR	PUD - Residential	20.0%	48.0%	32.0%
PDC	PUD - Commercial	32.0%	38.0%	30.0%

- Stormwater Controls on New Development and Construction . Options are provided to set the assumptions for stormwater management. The option to meet a specific removal rate was selected and the rates used were the Bay Programs SWM to the MEP values, TN = 50%, TP = 6-%, and TSS = 90%. Bacteria removals were the average of the WTM defaults for wet ponds and LID: FC = 80%.

  The option to require channel protection was selected.

- Data to Quantify Wastewater Loads: SSO and septic system loads were based on an assumed number of dwelling units (DU) to be constructed with new development. Using the area of additional development calculated by the model along with an assumed density for each residential land use, the total number of DUs could be estimated. For purposes of calculating loads, it was assumed that the large lot areas (SFW and SFR) would be on septic, all others would be on sewer. SSOs per 1,000 miles were set at 25% of the default value, or 35, to reflect the fact of new construction.

Table 2-6: Estimated Residential Densities in Ware Creek

LU Code	Description	Density (DU/ac)
SFW	Single-family, rural, wooded	0.33
SFR	Single-family, rural, turf	0.33
SFL	Single-family, large lot	0.5
SFS	Single-family, small lot	2.0
MFR	Multi-family and townhouse	8.0
PDR	PUD - Residential	2.4

2.7 Future Land Use and Imperviousness

Future land use is forecast to be much more urbanized than existing conditions. Overall, forest cover will be reduced by about 33 percent but it will be up to twice that amount in the three currently lightly developed watersheds: 47 percent in Lower Ware Creek, 61 percent in Folly Swamp and 62 percent in Cow Swamp. In the watershed as a whole, residential area (including PUD-Residential) will increase by 34 percent, over six square miles, representing the majority of the new development.

Table 2-7 shows a comparison of existing conditions, the forecast changes and the resulting future land use and imperviousness. The impervious cover in the watershed is forecast to more than double, from 5.8% to 12.7%.

Table 2-7: Future Land Use and Imperviousness in Ware Creek

Land Use		Existing Area	Changed Area	Future Area	Existing IA	Changed IA	Future IA	EX % Imp	FUT % Imp
URBAN									
Single-family, rural, woods	SFW	165.3	668.9	834.2	12.8	50.2	63.0	7.8%	7.6%
Single-family, rural, turf	SFR	190.1	355.9	545.9	8.7	26.7	35.4	4.6%	6.5%
Single-family, large lot	SFL	507.4	5.1	512.5	44.9	0.5	45.4	8.8%	8.9%
Single-family, small lot	SFS	678.7	347.1	1,025.8	131.9	69.4	201.3	19.4%	19.6%
Multi-family / townhouse	MFR	11.6	5.0	16.5	4.1	1.7	5.8	35.2%	34.4%
PUD, residential	PDR	-	2,552.0	2,552.0	-	428.8	510.4		20.0%
Commercial	COM	215.8	162.9	378.7	57.7	40.7	98.4	26.7%	26.0%
Institutional	INS	117.6	16.6	134.2	24.3	3.3	27.6	20.7%	20.6%
PUD, commercial	PDC	-	279.5	279.5	-	89.4	89.4		32.0%
Industrial	IND	222.0	58.2	280.2	71.0	20.4	91.3	32.0%	32.6%
Transportation	TRANS	827.2	-	827.2	279.8	0.5	279.8	33.2%	33.2%
RURAL		-	-	-	-	-	-		
Agriculture	AGR	885.9	(437.2)	448.7	8.9	(4.4)	4.5	1.0%	1.0%
Open space, meadow	TURF	624.8	(250.8)	374.1	16.1	(5.0)	11.1	2.6%	3.0%
Forest	FOR	6,026.7	(3,763.2)	2,263.5	11.4	-	11.4	0.2%	0.5%
Water	WAT	149.7	-	149.7	0.0	-	0.0	0.0%	0.0%
Wetland	WETL	783.4	-	783.4	0.8	-	0.8	0.1%	0.1%
TOTAL		**11,406.1**	**(0.0)**	**11,406.1**	**669.5**	**803.4**	**1,472.8**	**5.9%**	**12.9%**

3

Watershed Goals and Strategic Actions

Through the process of completing each previous Watershed Management Plan, including those for Powhatan Creek, Yarmouth Creek, Gordon Creek, and Mill Creek, JCC has distilled four overarching goals for watershed protection and restoration of the Ware Creek Watershed. These are:

1. *Minimize the further degradation of water quality and preserve, restore and maintain the outstanding quality of all streams within the watershed as well as tidal and nontidal wetlands.*

2. *Develop in a manner that is consistent with the protection of living resources: avoid habitat fragmentation and encourage the preservation of riparian and wildlife corridors.*

3. *Promote active stewardship among residents, community associations, businesses, and seasonal visitors.*

4. *Promote viable traditional and emerging rural economic initatives (production of local agricultural and forestry commodities, agri-tourism, eco-tourism, etc.).*

Having these fundamental goals allows for a consistent and focused approach to planning. Recognizing that each watershed has unique characteristics, JCC developed a Baseline Assessment Report (summarized in Chapter 2 and available on the County website) and solicited stakeholder input. Armed with this information, the eight tools of watershed protection (CWP 1998) and a review of actions included in previous watershed management plans, a suite of **Strategic Actions** for the Ware Creek watershed was developed to achieve these Watershed Goals. JCC staff from various departments collaborated on the development and refinement of the Strategic Actions. This process ensured input from a broad pool of individuals having knowledge and experience in different disciplines and thus made certain all aspects of watershed management planning were addressed.

The process of establishing the Strategic Actions for the Ware Creek watershed was governed by four basic principles. Strategic Actions should:

- be cost-effective and capable of being readily executed by JCC Staff;

- encourage responsible development;
- promote transparent interactions between JCC and stakeholders and foster a sense of community and shared responsibility in watershed stewardship; and
- address known problem areas with effective and long-term solutions.

A total of 21 Strategic Actions were developed and are included in Table 3-1, cross-referenced with the Watershed Goal(s) to which they address. Many of the resulting Strategic Actions that are considered as Programatic / **Technical and Educational Efforts** are universal, amounting to a County doctrine for watershed protection and restoration. Others, particularly the **Watershed Protection Projects**, are watershed-specific.

The 21 Strategic Actions are discussed below and grouped according to how they address six of the eight tools of watershed protection (CWP 1998), which are:

- Land Use Planning;
- Better Site Design (BSD);
- Aquatic Buffers;
- Watershed Education And Stewardship Programs; and
- Stormwater Treatment Practices.
- Conservation Areas

The tools of watershed protection that have been omitted are:

- Non-Stormwater Discharges: There are no point source discharges from wastewater treatment plants within the Ware Creek watershed. While one instance of sanitary sewer overflow (SSO) was noted issuing from a manhole, it was believed to be the result of a grease plug; a result of improper disposal of cooking by-products in gray water. This issue is discussed under Watershed Eduation and Stewardship Programs.
- Erosion and Sediment Control, which is already regulated by JCC and the State.

As per previous watershed plans, the Strategic Actions presented in Table 3-1 have been prioritized based on stakeholder input and their importance to successful watershed management. Planning level cost estimates are provided along with the JCC departments that will be required to coordinate to enact each Strategic Action. An estimated $25,000 to $30,000 per year would be required over four years to implement these Strategic Actions, plus the costs of watershed restoration project design and permitting (costs of which are dependent on final prioritization and number of projects selected at a given time). Additional details are provided in Chapter 5, *Strategic Action Plan*.

TABLE 3-1. WARE CREEK WATERSHED PROTECTION AND RESTORATION GOALS AND STRATEGIC ACTIONS

a. Watershed-Wide Protection and Restoration Goals

Goal	Description
1	Minimize the further degradation of **water quality** and preserve, restore and maintain the outstanding quality of all streams within the watershed as well as tidal and nontidal wetlands.
2	Develop in a manner that is consistent with the protection of **living resources**: avoid habitat fragmentation and encourage the preservation of riparian and wildlife corridors.
3	Promote active **stewardship** among residents, community associations, businesses, and seasonal visitors.
4	Promote viable traditional and emerging rural **economic initatives** (production of local agricultural and forestry commodities, agri-tourism, eco-tourism, etc.)

b. Strategic Actions for Watershed Protection and Restoration and Estimated Costs

Goals	Strategic Action	Priority	Watershed Location	Cost to County and Action
ALL	Provide incentives for development to add intermittent stream buffers, expanded RPA and mainstem buffers, preserve identified conservation areas, minimize impervious cover and maximize contiguous open space.	1	watershed wide & County wide	HIGH: >$200K
ALL	Identify areas within the watershed where riparian corridors are in an unnatural condition and seek ways, including incentives, to restore those areas to their natural condition.	2	watershed wide & County wide	MODERATE: $15-25K
1, 2	Implement Special Stormwater Criteria for all new plans for development (except those with approved plans or in review)	3	watershed wide	SMALL: program ongoing
ALL	Promote the Purchase of Development Rights (PDR) program for special resource areas (e.g., riparian buffers and conservation areas).	4	watershed wide	HIGH: $1M+ / year
2, 3, 4	Identify key stakeholders within the watershed (landowners, schools, etc.) that can help implement watershed planning objectives. Work with them to develop a shared vision for preserving natural resources through community actions and provide opportunities for them to contribute to the attainment of watershed management goals.	5	watershed wide	SMALL: explore academic or volunteer consulting input
1, 3	Continue to fully implement the requirements of the County's MS4 permit in relation to watershed management throughout County.	6	watershed wide & County wide	SMALL: already underway
1	Update or develop new Better Site Design (BSD) educational materials to be made available to developers, homeowner's associations and citizens and conduct training.	7	watershed wide	SMALL: largely internal coordination
1	Continue to work with County departments to incorporate BSD requirements into applicable ordinances, into state/county stormwater management regulations and to develop consistent review procedures.	8	watershed wide	SMALL: largely internal coordination
1, 2, 3	Work with private landowner(s) to develop feasibility plans for the dam at Richardson's Mill Pond, including but not limited to evaluating potential funding sources for the repair, monitoring and maintenance of the dam and associated roadway, assessment for archaeological resources, potential impacts to archaeological and environmental resources and public health and safety associated with dam failure.	9	all subwatersheds except 202 (tidal mainstem)	MODERATE: $30-60K ea.

1, 2, 3	Use subwatershed maps to ensure James City County staff and stakeholder awareness of existing locations for restoration and potential conservation areas.	10	watershed wide	SMALL: internal coordination
ALL	Continue to support and grow a citizen/volunteer-based team of individuals to routinely perform assessments of stream health, including sampling for benthic macroinvertebrates, water quality indicators and photodocumentation.	11	watershed wide	SMALL: already underway
1, 2, 3	Improve the availability of educational materials by developing materials for use by HOA's and neighborhood associations. Educate people about watershed awareness including proper disposal of fats, oils, grease, and other chemicals, pet waste, onsite waste disposal systems, trash, on-lot rainwater harvesting and biofiltration techniques.	12	watershed wide	SMALL: Use stakeholder meetings for insight
1	Conduct additional feasibility assessments, validate, and carry out the stormwater retrofits, outfall repairs and stream restorations identified in this watershed plan	13	all but tidal mainstem	HIGH: >$2M
1, 2, 3	Continue to utilize available regional / state / federal data in the County GIS database, including but not limited to data from the DHR-DSS, DCR-DNH and DGIF to: a) assist in prioritizing conservation areas; b) ensure that potential development opportunities fully appreciate the cultural and natural resources within the footprint; and c) be sensitive to potential resources when and where any emergency action is needed.	14	watershed wide & County wide	SMALL: if data available for exchange from State agencies
3	Enhance stewardship by specifically addressing litter and shoreline erosion.	15	subwatershed 202	SMALL: use stakeholder meetings for insight
2, 3, 4	Consider participation in the Virginia Big Tree or similar recognition program to identify historic and specimen trees and promote the importance of trees to the landscape	16	watershed wide & County wide	SMALL: explore academic or volunteer consulting input
1	Develop an inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure (e.g., leaking sewer lines, storm-related or unpredictable channel and bank erosion, hazmat spills, etc.)	17	watershed wide & County wide	SMALL: largely internal coordination
1	Develop guidelines to lessen steep slope threshold to 15% from 25% in areas with highly erodible soils	18	watershed wide	SMALL: taskgroup
1, 2, 3	Develop guidelines for the management of invasive plant species	19	watershed wide & County wide	SMALL: engage native plant society, William and Mary
1, 3, 4	Promote the use of nutrient management planning for existing residential areas	20	watershed wide & County wide	SMALL: link to existing programs (DCR, Turf Love, etc)
ALL	Promote responsible agriculture or forestry land uses, including coordination with the Colonial Soil and Water District, USDA-NRCS and VDOF	21	watershed wide & County wide	MODERATE: staff coordination, ongoing program internal coordination

3.1 Land Use Planning

Since only two of the five subwatershed in the Ware Creek are moderately developed, the need for responsible development and careful land use planning is critical to achieving the watershed goals. By understanding where known watershed issues occur and the sensitive resources are located, proposed new development and redevelopment activities can proceed in the most informed way possible. Where applicable, watershed restoration opportunities can be realized as part of these developments.

Priority #10 - Strategic Action: Use subwatershed maps to ensure James City County staff and stakeholder awareness of existing locations for restoration and potential retrofits.

Mapping developed during the Baseline Assessment overlain with the locations of recommended Watershed Restoration Projects constitutes a key tool of this watershed management plan: subwatershed management planning maps. These maps synthesize the elements of the planning process in a stand alone product that can be used by JCC staff to gain a snapshot of subwatershed conditions and recommendations. They also represent valuable tools for stakeholder interaction and outreach.

Priority #1- Strategic Action: Provide incentives for new development and redevelopment to add intermittent stream buffers, expanded RPA and mainstem buffers, minimize impervious cover, and maximize remaining contiguous open space.

This watershed management plan includes no new requirements for enhanced riparian buffers. Rather, JCC recognizes that incentives are effective for establishing or enhancing buffers for new development and redevelopment, as well as the maximizing remaining open spaces, especially in headwater locations. Such areas would only include those not already subject to regulatory protection of some kind (e.g., Chesapeake Bay Protection Areas and their buffers). Similarly, incentives could also be sought for the restoration of previously disturbed areas. Two Strategic Actions are included to address such an approach:

Priority #2 - Strategic Action: Identify areas within the watershed where riparian corridors have been damaged, disturbed or are in an unnatural condition and seek ways, including incentives, to restore those areas to their natural condition.

The Conservation Area Report included in Appendix A identified potential tracts of contiguous forest in the Ware Creek watershed. Because of the relatively developed condition of the Upper Ware Creek and France Swamp subwatersheds, only three tracts of forested land meeting the general screening criteria of being 100 m [330 feet (ft)] square were identified in those portions of the Ware Creek watershed. In contrast, a total of seven tracts were identified within the Folly Swamp, Cow Swamp and Lower Ware Creek subwatersheds which are largely comprised of agricultural land, forested land and rural development. Based on forest structure, condition and intactness, a total of eight tracts provide conservation opportunities.

In 1970, the 4-H and Future Farmers of America initiated the Virginia Big Tree Program, aimed at locating and recognizing the importance of large specimen trees in the landscape. This program continues at present and may provide an educational opportunity that can introduce potential stewards to the breadth of their watershed. Moreover, the search for and identification of big trees may uncover particular value in the surrounding woods.

In keeping with the conservation minded recommendations discussed above, the following Strategic Action is included with respect to the Virginia Big Tree Program:

Priority #16 - Strategic Action: Consider participation in the Virginia Big Tree or similar recognition program to identify historic and specimen trees and promote the importance of trees to the landscape.

3.2 Better Site Design (BSD)

Better Site Design (BSD) is a development technique used to maintain existing hydrology, preserve contiguous open space and minimize impacts from impervious surfaces. The Local Site Planning Roundtable in JCC was modeled after the National Site Planning Roundtable, the 22 Model Development Principles and four basic objectives:

- Reduce overall site impervious cover
- Preserve and enhance existing natural areas
- Integrate stormwater management
- Retain a marketable product

The JCC Local Site Planning Roundtable was established to review existing development codes and identify regulatory barriers to environmentally sensitive residential and commercial development at the site level. The Roundtable recommendations include suggested general and specific code and ordinance revisions that will increase flexibility for site design standards and promote the use of open space and flexible design development in JCC (JCC 2007a). This process was focused on model development principles at the site level and did not include discussions on zoning or land use.

Better Site Design in James City County: Report and Findings from the Better Site Design Implementation Committee, dated September 2007, summarizes the 24 model principles and the Committee's proposed implementation recommendations. The Committee noted that knowledge of BSD principles and techniques varies among JCC staff, legislators, planners and engineers within the development community. This inconsistency and lack of knowledge and training is a major hurdle in implementing the BSD principles. Opportunities are lost during the design review process if staff or legislators do not request inclusion of BSD features in a development plan. The Committee recommended that JCC conduct a one-day internal BSD training seminar to educate staff, Planning Commissioners and the Board of Supervisors that was recommended by the BSD Committee. This internal seminar should train attendees on the benefits of BSD; how to encourage

applicants, early in the design and approval process, to apply BSD techniques; and how to respond to typical misconceptions associated with BSD techniques (JCC 2007a).

Many of the principles have been implemented already, but the following items are still pending

- Develop a BSD checklist;
- Incorporate BMP manual revisions for Low Impact Development (LID) and BSD elements;
- Consider ordinance changes (Cluster Ordinance) and policy development regarding street widths; and
- Develop or continue using a variety of educational materials.

Considering the preceding points, the following Strategic Actions regarding BSD are included:

Priority #7- Strategic Action: *Update or develop new Better Site Design (BSD) educational materials to be made available to developers and homeowner's associations and conduct training.*

Priority #8- Strategic Action: *Continue to work with County departments to incorporate BSD requirements into applicable ordinances and into the County BMP Manual, and to develop consistent review procedures.*

JCC realizes that the responsibility for the implementation of BSD cannot necessarily lie solely with developers and their engineers and that JCC must be proactive about staying abreast of current technology and methods and trends in BSD. This is especially true with respect to redevelopment, which presents particular challenges due to site constraints (i.e., site size, abutters, location of existing infrastructure and utilities). JCC recognizes that internal training is also necessary to ensure staff members in various government divisions are familiar with BSD tenets and applications and that they recognize the importance of BSD in watershed protection, especially early in the site design process. Once a site is developed with BSD, the property owner takes over responsibility for maintenance of the systems. Often, homeowners, business owners and owner associations do not understand how to best maintain BSD measures.

3.3 Aquatic Buffers

Priority # 1 - Strategic Action: Provide incentives for new development and redevelopment to add intermittent stream buffers, expanded RPA and mainstem buffers, preserve identified conservation areas, minimize impervious cover and maximize contiguous open space.

Priority # 2 - Strategic Action: Identify areas within the watershed where riparian corridors are in an unnatural condition and seek ways, including incentives, to restore those areas to their natural condition.

Unexpected failures of road surfaces, embankments, stormwater management facilities and sanitary sewer lines can occur in response to major storm events, transportation accidents and inadequate

monitoring and maintenance. For instance, many residences continue to dispose of cooking-related oils, fats, and grease by flushing it down sink drains. These materials can cause sanitary sewer line blockages that result in surcharges of untreated sewage from manholes where it can migrate to nearby watercourses.

Roadbed and BMP failures and SSOs can have dramatic and cascading effects on stream and wetland heath, including stream channel and bank erosion, excessive sediment deposition and associated habitat loss, downstream transportation of bacteriological hazards or other hazardous materials. These impacts, along with the potential loss of infrastructure, are compounded if the problems are not quickly identified and addressed and responsible parties held accountable for reparations to failed facilities and the restoration of affected natural resources. For this reason, the following Strategic Action has been included:

Priority # 17 - Strategic Action: Develop an inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure (e.g., leaking sewer lines, storm-related or unpredictable channel and bank erosion, hazmat spills, etc.)

3.4 Watershed Education and Stewardship Programs

Priority #12 - Strategic Action: Improve the availability of educational materials by developing materials for use by HOA's and neighborhood associations. Educate people about watershed awareness including proper disposal of fats, oils, grease and other chemicals, pet waste, onsite waste disposal systems, trash, on-lot rainwater harvesting and biofiltration techniques.

Priority #15 - Strategic Action: Enhance stewardship by specifically addressing litter and shoreline erosion.

The Ware Creek watershed is an actively developing watershed. As such, there are many pathways by which household and commercial waste material can enter the stormwater and/or sanitary sewer networks. Careless disposal of rubbish can result in serious blockages in stormwater drains, manholes, pipes and culverts. These blockages can create flooding in upstream areas and erosion where floodwaters cascade over road surfaces or the sides of stormwater BMPs. Illicit dumping of hazardous materials poses a considerable water quality problem at locations within the Ware Creek watershed and in JCC in general. Items such as car batteries, antifreeze and spent motor oil have been observed along with less noxious but nevertheless undesirable refuse such as washers, water heaters and so on.

Direct deposit of feces from wildlife into streams and deposition in neighboring forested areas represents a relatively minor non-point source of bacteria to Ware Creek at 3% and 6%, respectively (DEQ 2008). Management of wildlife so as to limit such occurrences is difficult. The longest stretches of contiguous forest and hence preferred corridors for wildlife correspond with streams and their floodplains, most of which are protected by RPAs. Therefore, wildlife preferentially

inhabit these areas and opportunities for direct deposit are higher than in relatively undeveloped watersheds.

JCC is not proposing any reduction of wildlife populations or natural background conditions as a means of decreasing non-point sources of bacteria in the watershed. Alternately, the TMDL IP proposes Wildlife Contribution Controls such as reducing turf and open areas around ponds to discourage resident wildlife populations, particularly geese and other waterfowl.

Providing educational materials for property and business owners would provide a sense of the importance of water quality issues to the overall environmental health within the Ware Creek watershed and instruction on the proper disposal of both hazardous materials and those items which may have previously been considered relatively benign (e.g., cooking oils and animal fats). Actively engaging watershed residents can promote feelings of ownership and responsibility for local resources, a number of which have already been impacted by land development.

Specific areas to be addressed through an education program should include: preferred practices for lawn and garden care, invasive species management/control, pet waste disposal, environmentally sensitive car maintenance practices, septic system inspections and repair when necessary, and the proper disposal of household hazardous wastes, including cooking oils and animal fats. Many riparian buffer areas within the watershed are located on private property and are often subject to encroachment, homeowners should be educated on the benefits of maintaining undisturbed vegetated buffers along stream and wetland areas.

Specific actions that JCC can take to maximize the potential success of an educational watershed program include:

- Continue to support and promote the JCC Turf Love program to educate property owners on preferred lawn and garden care;
- support and help promote volunteer litter prevention efforts;
- utilize existing communication tools for the residents of the watershed to distribute educational materials on actions residents can take to protect their water resources;
- provide workshops for residents to showcase on-going restoration projects, BMP examples and daily practices they can implement to protects water quality;
- expand the use of social media to reach a broad range of County citizens and to promote workshops and volunteer opportunities; and
- support volunteer water quality monitoring efforts (both for baseline data collection and in areas of concern).

A specific Strategic Action has been added with respect to this last point:

Priority #11 - Strategic Action: Continue to support and grow a citizen/volunteer-based team of individuals to routinely perform rudimentary assessments of stream health, including sampling for benthic macroinvertebrates, water quality indicators and photodocumentation.

JCC is currently carrying out semi-annual sampling for benthic macroinvertebrates using JCC specific protocol. Volunteers trained by JCC staff have been actively engaged in monitoring activities since 2008. In 2009, JCC began monthly Coliscan Easygel monitoring at five locations in the Mill Creek watershed to screen for the presence of fecal coliform in the waterway. In 2010, volunteers took over this effort and JCC is looking to expand the number of sites.

Performing routine assessments of stream health offers multiple benefits, including:

- baseline information against which future studies can be compared, offering the ability to link trends in water quality improvement / decline to activities in the contributing subwatershed; and
- educate the public with respect to wildlife habitat and biodiversity, stream health, vectors for water quality degradation and the importance of watershed stewardship.

The continued promotion of watershed education would also provide residents with a voice in County decision making processes concerning development within their watershed. Providing landowners with adequate information regarding the role they can play in protecting their aquatic resources can potentially offset the level of effort required by JCC in the form of stormwater retrofits and BMP maintenance.

Priority #20 - Strategic Action: Promote the use of nutrient management planning for existing residential areas.

3.5 Stormwater Treatment Practices

Priority #13 - Strategic Action: Conduct additional feasibility assessments, validate and carry out the stormwater retrofits and stream restoration opportunities identified in this watershed plan.

The methodology for identifying and ranking the candidate Watershed Restoration Projects is provided in Chapter 4, *Watershed Restoration* and the selected sites are summarized and mapped for easy reference in Chapter 6, *Subwatershed Management Plans*.

Priority #9 - Strategic Action Work with private landowner(s) to develop feasibility plans for the dam at Richardson's Mill Pond, including but not limited to evaluating potential funding sources for the repair, monitoring and maintenance of the dam and associated roadway, assessment for archaeological resources, potential impacts to archaeological and environmental resources and public health and safety associated with dam failure.

The Richardson's Mill Pond serves as a major BMP providing water quality treatment for the Stonehouse development including the residential and commercial phases. Repair, monitoring and maintenance of the pond and dam are imperative to the water quality downstream of the dam.

Priority #3 - Strategic Action: Implement Special Stormwater Criteria for all new plans for development (except those with approved plans or in review).

Priority #6 - Strategic Action: Continue to fully implement the requirements of the County's MS4 permit in relation to watershed management throughout the County.

JCC is required to have a Virginia Stormwater Management Program (VSMP) permit to discharge stormwater into local waterways. The specific permit is referred to as the Municipal Separate Storm Sewer System (MS4) General Permit and is issued by the State Department of Environmental Quality (DEQ). The State program was established in response to federal requirements under the Clean Water Act and is administered by the Environmental Protection Agency (EPA).

The permit requires JCC to develop a stormwater management program that addresses six specified minimum control measures. The six minimum control measures to be used in the County's program are the following:

- Public Education and Outreach on Stormwater Impacts
- Public Involvement/Participation
- Illicit Discharge Detection and Elimination (IDDE)
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management in New Development and Redevelopment
- Pollution Prevention/Good Housekeeping for Municipal Operations

Each control measure has an extensive list of initiatives with measurable goals, metrics for determining success and timelines. JCC's plan to implement the MS4 permit can be found at http://www.jamescitycountyva.gov/992/MS4-Permit.

3.6 Conservation Areas

Additional watershed management recommendations include utilization of the Purchase of Development Rights (PDR) program to support conservation areas identified in this watershed plan. JCC should play an active role in facilitating discussions between stakeholders and strategic partners such as the Williamsburg Land Conservancy, The Nature Conservancy, The Virginia Outdoors Foundation and James River Association.

Priority #4 - Strategic Action: Promote the Purchase of Development Rights (PDR) program with regards to special resource areas (e.eg., buffers and conservation areas), working with the stakeholder watershed group to identify and conserve these lands.

Priority #5 - Strategic Action: Identify key stakeholders within the watershed (landowners, schools, etc.) that can help implement watershed planning objectives. Work with them to develop a shared vision for preserving natural resources through community actions and provide opportunities for them to contribute to the attainment of watershed management goals.

4 Watershed Restoration

4.1 Stream Restoration Assessment

Field data collected during the Baseline Assessment represent the foundation for decision-making with respect to potential stream restoration and enhancement activities aimed at addressing unstable drainages within the watershed. The habitat assessments and field notes associated with all mapped SARs and point impacts were processed to identify locations for potential remedial action and to determine the best course of action. The following sections describe the methodology used to evaluate the data and select appropriate watershed restoration projects.

4.1.1 Methodology for Identifying Candidate Projects: Stream Assessment Reaches

As previously described in Section 2.4, each SAR was assessed utilizing both the Habitat Assessment and Floodplain Assessment and then placed into one of four Assessment Rating categorizes: EXCELLENT, GOOD, FAIR or POOR. To determine the breakpoints between Assessment Rating categories, the three highest scores in the watershed for both the Habitat and Floodplain Assessments were averaged. Scores totaling over 90 percent of that value are considered EXCELLENT; between 81 and 90 percent are GOOD; between 61 and 80 are FAIR; and below 60 are POOR. This procedure was applied to both the Habitat and Floodplain Assessment scores. Only those SARs which received POOR or FAIR scores for either Habitat or Floodplain were evaluated for potential remedial action. The suite of potential remedial actions are described in th efollowing three sections below, as defined by the Wilmington District of the U.S. Army Corps of Engineers (USACE 2003):

4.1.1.1 Stream Restoration

Stream restoration is generally considered the process of converting an unstable, altered or degraded stream corridor, including adjacent riparian zone and flood-prone areas, to its natural stable condition considering recent and future watershed conditions. This process should be based on a reference condition/reach for the valley type and includes restoring the appropriate geomorphic dimension (cross-section), pattern (sinuosity) and profile (channel slopes), as well as reestablishing

the biological and chemical integrity, including transport of the water and sediment produced by the stream's watershed in order to achieve dynamic equilibrium.

4.1.1.2 Stream Enhancement

Stream rehabilitation activities undertaken to improve water quality or ecological function of a fluvial system are considered stream enhancement. Enhancement activities generally will include some activities that would be required for restoration. These activities may include in-stream or stream-bank activities and often are used to improve functions on an already adequately functioning stream. In other situations, enhancement activities may fall short of restoring one or more of the geomorphic variables: dimension, pattern and profile. Any proposed stream enhancement activity must demonstrate long-term stability.

4.1.1.3 Streambank Stabilization

The in-place stabilization of an eroding streambank can utilize a number of stabilization techniques, which include primarily natural materials, like root wads and log crib structures, as well as sloping stream banks and revegetating the riparian zone. In addition to performing the the Habitat and Floodplain Assessments, field scientists also used best professional judgment to categorize each SAR for both Restoration Potential (High, Moderate, Low or None) and Restoration Access (Difficult, Moderate or Good). The former metric considered a variety of non-quantitative criteria (e.g., potential damage to private property and infrastructure, etc.) and represented a means for the field scientist to identify potential candidate sites in instances where the more formal field protocols may otherwise suggest benign conditions are present. Similarly, this same option allowed scientists to call out stream reaches that may score as FAIR or POOR, but clearly have little or no need for remediation.

4.1.1.4 Considering Local Conditions in Floodplain Scoring

As described in Section 2.4, the floodplain connectivity is typically optimal or suboptimal wherever E-type streams were found. The overall floodplain score was often diminished by low scores for "Flood Flow Status" and "Floodplain Surface Scouring". This is because concentrated flow outside the channel is common, particularly with the high degree of seepage typical in these valleys and frequency of beaver activity noted in the watershed. Moreover, the "Floodplain Habitat" metric was often scored as marginal because a diversity of wetland and upland settings are rare in the bottomlands, with the former being dominant. This should not be considered a detraction but merely a reflection of local conditions. Lower scores for these metrics ocassionally brought the overall floodplain score into the FAIR category and thus triggered an evaluation for stream restoration potential.

4.1.2 Methodology for Identifying Candidate Projects: Point Impacts

As noted in the Stream and Floodplain Assessment / Conservation Area Report, all assessed point features (e.g., stormwater outfalls, utility and stream crossings, etc.) were assigned a severity score from one to five based on the perceived degree of instability or impact on stream resources. Any point impact with a severity score of three, four or five was deemed to warrant consideration of some means of remediation, while features with a severity score of one or two were considered relatively fairly stable and required no action. Exceptions were made if the judgment of the field scientist determined that the point impact may have consequences not fully categorized by the method of assessment on the field data form.

4.1.3 Selection of Candidate Watershed Restoration Projects

Candidate projects were determined based on the methodologies listed above. The following sections discusses the results of the assessment, culminating with the list of potential watershed restoration projects.

4.1.3.1 Stream Assessment Reaches

A total of 165 SARs were determined to have Habitat and/or Floodplain Assessment Ratings of POOR or FAIR and therefore were earmarked for closer scrutiny. Also, SARs that score as having POOR or FAIR Habitat or Floodplain Assessment Ratings but which exhibit a Restoration Potential rating of Low or None were re-evaluated as well. This process trimmed the list of SARs warranting potential remediation to 27, encompassing a total of 9,503 linear feet or 1.8 miles. The entire list of candidate SARs is presented in Table C-1 in Appendix C and organized by subwatershed, including the specific action identified as most appropriate based on the preliminary field assessment. The locations of the 27 final candidates are provided in Figures 6-1 to 6-3 in Chapter 6 Subwatershed Management Plans.

4.1.3.2 Point Impacts

A total of 44 stormwater outfalls were assessed as part of the study and while there were some stormwater issues in the Ware Creek watershed, fifteen (15) outfalls were given a severity of 4 or 5. These are shown in Table C-2 in Appendix C. More detailed plans specific to each outfall are subject to additional studies. This is especially true if they are associated with a SAR that is proposed for remediation, as the conceptual design for the restored stream may have implications on the design location and elevation of the outfall as it ties into the restored stream reach. Outfall stabilization techniques may include pipe replacement, velocity dissipaters such as plunge pools or step pools, bank grading and stabilization, and regenerative stormwater conveyance applications.

One utility impact was identified as in need of repair or maintenance (Table C-2). This feature is a sanitary sewer crossing located on SAR FRS-23L-D. Four stream crossings identified as FRS-

21L-B, FRS-23L-6L-6L-B, UWC-3R-B, and UWC-4R-A require restoration treatment to remove sediment and debris from the upstream end of the culvert. Both UWC-3R-B and UWC-4R-A located on Old Road are completely blocked at the upstream end.

The potential for stream bank stabilization was identified for ten severe bank erosion locations (Table C-2). Four of the ten location correspond to a larger stream initiative. The remaining six severe bank location identified require spot treatments. Two impacted buffer locations were identified as requiring action. One, COS-B, located along Cow Swamp requires buffer planting to restore the previously cleared buffer. The other, FRS-23L-D, requires the removal of sediment and debris from the buffer.

For each of the nine trash and debris impact locations, the specific action is simply "Local Clean-up" (Table C-2, Figures 6-1 and 6-2). The majority of the sites are small (local dumping of household trash, paint cans, etc.) but two of the sites FRS-23L-8L-1L-A and UWC-5L-A contain a large amount of contruction and automotive debris that may require construction equipment to be removed.

4.2 Stormwater Retrofit Assessment

4.2.1 Methodology for Identifying Stormwater Retrofits: Desktop Assessment

A desktop assessment of the watershed was conducted to identify preliminary locations for potential stormwater retrofit opportunities. The desktop assessment involved reviewing GIS and aerial imagery for individual parcels or locations where stormwater retrofit opportunities may be ideal given readily available data and without considering site-specific constraints or other feasibility issues that require an on-the-ground site assessment to be identified. Candidate retrofit sites were identified in the following manner.

4.2.1.1 Retrofit Existing Ponds

Pond retrofit sites were identified using the County's GIS database of stormwater facilities. Both dry ponds and wet ponds were included. Goals for pond retrofits included adding storage volume, converting dry ponds to wet ponds, revising outlet characteristics to trade quantity storage for water quality or adding internal design features to increase pollutant removal.

4.2.1.2 Storage Above Roadway Crossings

Also known as culvert retrofits, these sites can provide water quality storage upstream of existing road culverts through installation of an embankment and excavation of a micropool. Sites were

identified with topographic mapping by looking for headwater or intermittent streams flowing through a culvert.

4.2.1.3 Storage or Other Treatment at Outfalls

Outfall retrofits include off-line storage, bioretention or other treatment for smaller storms, adding energy dissipation or level spreaders to reduce impacts on the stream system, or constructing a step-pool storm conveyance (SPSC) treatment system. The desktop assessment focused on outfalls with sufficient distance between the outfall and the stream system to provide treatment.

4.2.1.4 Parking Lot Retrofits

Parking lot retrofits include a mix of treatment alternatives for water quality treatment, including bioretention, sand filters, infiltration or swales. Sites include islands, medians or perimeter areas. Sites were identified with GIS coverages of impervious area, topography and drainage. Municipal or institutional ownership was also considered.

4.2.1.5 Treatment in the Conveyance System

Conveyance retrofits create storage or water quality treatment in existing ditches or swales by installing checkdams or conversion to wetland, bioretention or wet swale cells. Potential sites were identified with GIS coverages of the drainage network and topography to identify flow paths upstream of mapped streams.

4.2.2 Methodology for Identifying Stormwater Retrofits: Field Assessment

The field assessment was performed using the Retrofit Reconnaissance Investigation (RRI) protocol developed by Schueler et al. (2007). The primary focus of the RRI was to develop design concepts in the field and identify constraints to design and implementation.

For most projects, design concepts were focused on providing water quality treatment for areas which were either untreated or treated with quantity controls alone. Onsite retrofits were assessed to determine if the topography and existing conveyance system was suitable for adding filtration, infiltration or bioretention to capture flow from untreated impervious areas.

New ponds and culvert retrofits were assessed to estimate if the topography, particularly valley walls, would be suitable for detention storage without significant excavation. Culvert location and elevation were checked to see if the required secondary embankment was feasible at the site.

Existing ponds were assessed to estimate if it was feasible to add additional volume through excavation or revising the embankment height. Where it was easily accessible, the downstream channel was inspected to assess if there were channel erosion problems immediately downstream,

in which case a note was made that channel protection storage should also be considered in the retrofit design.

Field assessment of constraints was performed for all sites and included the following information:

4.2.2.1 Adjacent Land Use

Impacts to adjacent land owners are variable but depend to a large extent on how successfully the stormwater control is designed into its site and the aesthetic value of its landscaping. Land use conflicts can include potential safety issues in residential areas or loss of parking area in commercial areas. Potential benefits from adjacent land use are primarily for public outreach and education. Several treatment options can be sited and designed to improve public access and can be provided with signs and outreach materials which educate visitors about the benefits of the stormwater management system. If properly landscaped, wetlands, marshes and buffers can provide passive recreation opportunities, particularly if combined with bike paths, picnic areas or playgrounds.

4.2.2.2 Construction Access

The ability to move construction equipment to the site and to perform the work safely once there is an important constraint. Access constraints included physical factors such as steep slopes and soft ground which could cause difficulty bringing in construction equipment and supplies. Potential environmental impacts also were noted, particularly where the field scientist believed that the impacts might outweigh the benefits of the treatment system. Any readily observable utility conflicts along the access to the site were noted

4.2.2.3 Utility Conflicts

Utilities, which include water and sewer lines, gas lines, pipelines and electric or communications cables, may preclude construction of any of the proposed treatment systems if they are located on or adjacent to the site. Utility conflicts may not necessarily prevent the use of a particular system. However, in many cases they can be relocated as part of the project at an additional cost in design, coordination and construction. Notes were made for readily observable evidence of existing utilities at the project site. These included aboveground indicators of water lines, such as fire hydrants, sewer manholes, cable, power, telephone connections and pipeline markers.

4.2.2.4 Permitting Factors

Candidate sites were assessed to determine if the project could require environmental permitting. Permitting may be triggered by impoundment of a free-flowing stream, impacts to existing wetlands, fill or excavation of floodplains, tree removal or other forest impacts. If work would be required on an existing pond embankment, the potential for a dam safety permit was noted, regardless of the size of the pond.

4.2.3 Selection of Candidate Retrofits

A total of 29 individual sites were identified as being candidates for improvments based on the desktop assessment and NSA survey. Table C-3 in Appendix C describes the sites and the preliminary assessment of potential retrofit approaches. A total of 13 of the 29 individual sites were considered suitable for additional study and retrofit. Recomendations with detailed notes are provided for each site based on the feasability assessment. The locations of the 13 retrofit sites are provided on Figures 6-1 to 6-3 in Chapter 6 Subwatershed Management Plans.

4.3 Prioritizing Candidate Watershed Enhancement Projects

Once the distilled list of feasible stream and stormwater retrofit projects was finalized, the next step in the evaluation process was to rank the 27 SARs and 13 retrofit sites in terms of priority. To accomplish this goal, a Decision Support System (DSS) was developed to support organizational decision making activities based on a consideration of watershed goals and the degree to which a project can satisfy these goals based on eight Prioritization Factors and eight Possible Conflicts. These are provided in Table 4-1.

Table 4-1: DSS Prioritization Factors and Possible Conflicts

Prioritization Factors	Possible Conflicts
Water Quality / Runoff Quantity	Utility Conflicts
Restore Floodplain Connectivity	Construction Access
Aquatic Habitat	Neighborhood Impact
Sedimentation	Physical Feasibility
Environmental Awareness	Level of Design
Project Size / Scope	Private Property
Channel Condition	Permitting Issues
Condition of Contributing Watershed	Negative Environmental Impacts

The full text of the DSS, including procedures for determining scores associated with each Prioritization Factor and Possible Conflict, is included as Appendix D.

The DSS employs five general categories or “Proposed Treatments” for watershed restoration activities. These are provided in Table 4-2, along with the “Specific Actions” that can fall under each category.

Table 4-2: DSS Proposed Treatment Categories and Related Specific Actions

Proposed Treatment Categories	Specific Actions	
	Stream Projects	Stormwater Retrofit Projects
Restoring Degraded Channel	Stream Enhancement Stream Restoration	Regenerative Stormwater Conveyance
Channel Stabilization / Energy Dissipation	Stream Bank Stabilization Stream Channel Stabilization	Regenerative Stormwater Conveyance
BMP Retrofit	N/A	Culvert Retrofit Extended Detention Wet Pond Extended Detention Dry Pond Stormwater Wetland
Infiltration	N/A	Bioretention Dry Swale
Water Capture / Reuse	N/A	None Proposed for Ware Creek

For the purposes of the Ware Creek Watershed Management Plan, a spreadsheet matrix was created that will allow JCC to rank and prioritize stream and stormwater retrofit projects using the DSS. This is provided as Table 4-3. The projects contained therein are summarized and mapped within Chapter 6, *Subwatershed Management Plans*. Ranking is preliminary and was carried out using the scores for the Prioritizaton Factors only. Assigning scores for Possible Conflicts requires the collection of additional information that is beyond the scope of this watershed management plan. This information will be gathered and incorporated by JCC during subsequent feasibility studies and the ranking as provided in Table 4-3 may change accordingly.

TABLE 4-3: SELECTED AND PRIORITIZED STREAM AND STORMWATER RETROFIT PROJECTS

Project ID	Watershed/ Subwatershed	Associated Point Features Requiring Treatment	Drainage Area Land Use	Proposed Treatment					Estimated Cost	Prioritization Factors								SCORE: Level of Benefit	Potential Constraints					SCORE: Degree of Complexity	SCORE: Prioritization Level	*Prioritization Level Rank*
				Restore Degraded Channel	Enhance Degraded Channel	Channel Stabilization/ Energy Dissipator	BMP Retrofit	Infiltration		Water Quality / Runoff Quantity	Restore Floodplain Connectivity	Restore Aquatic Habitat	Reduce Sedimentation	Project Size / Scope	Channel Condition	Condition of Contributing Watershed	Increase Environmental Awareness		Conflicts with Existing Utilities	Construction Access	Neiborhood Impact	Physical Feasibility	Level of Design			
STREAM PROJECTS																										
FRS-12L-A	Ware Creek/ France Swamp	--	INS		X				$510,779	3	3	4	4	3	1	0	2	20	0	2	0	0	1	3	**17**	***15***
FRS-14R-4L-A	Ware Creek/ France Swamp	OT-1	SFS		X				$44,697	3	3	4	4	1	2	2	1	20	2	0	2	1	1	6	**14**	***19***
FRS-14R-5R-1R-A	Ware Creek/ France Swamp	OT-1	SFS			X			$98,695	4	5	4	4	2	4	4	1	28	2	2	2	1	1	8	**20**	***11***
FRS-14R-5R-1R-B	Ware Creek/ France Swamp	--	SFS		X				$149,414	3	5	2	2	3	4	2	1	22	2	4	2	2	1	11	**11**	***25***
FRS-16L-B	Ware Creek/ France Swamp	--	SFS		X				$249,267	3	5	2	2	3	2	2	1	20	0	4	0	2	1	7	**13**	***22***
FRS-16L-C	Ware Creek/ France Swamp	--	SFS	X					$433,496	3	3	4	4	3	4	2	1	24	0	4	0	2	1	7	**17**	***14***
FRS-18R-3L-B	Ware Creek/ France Swamp	--	SFR	X					$152,230	3	5	4	2	3	2	2	1	22	1	2	2	1	1	7	**15**	***18***
FRS-1L-A	Ware Creek/ France Swamp	--	IND			X			$85,375	4	4	3	3	2	3	4	1	24	2	0	0	1	1	4	**20**	***10***
FRS-21L-2R-A	Ware Creek/ France Swamp	--	INS			X			$41,714	3	4	4	3	1	4	4	1	24	0	0	0	1	1	2	**22**	***5***
FRS-21L-3L-A	Ware Creek/ France Swamp	--	TURF			X			$29,279	4	5	4	4	1	4	2	1	25	1	0	1	1	1	4	**21**	***6***
FRS-23L-1R-A	Ware Creek/ France Swamp	--	TURF			X			$67,933	4	5	4	4	2	4	3	1	27	1	2	1	1	1	6	**21**	***8***
FRS-23L-2R-A	Ware Creek/ France Swamp	--	TURF			X			$69,990	4	5	4	4	2	4	3	1	27	1	2	1	1	1	6	**21**	***9***
FRS-23L-3R-A	Ware Creek/ France Swamp	ER-1	SFS			X			$63,467	4	5	4	4	2	4	3	1	27	1	2	1	1	1	6	**21**	***7***
FRS-23L-4L-A	Ware Creek/ France Swamp	--	AGR	X					$166,041	3	5	4	4	2	2	2	2	24	0	4	0	2	1	7	**17**	***14***
FRS-23L-6L-1R-A	Ware Creek/ France Swamp	--	COM			X			$99,066	3	3	3	2	2	2	4	1	20	1	2	0	1	1	5	**15**	***17***
FRS-23L-6L-5R-A	Ware Creek/ France Swamp	--	COM		X				$173,043	3	1	4	2	3	2	4	2	21	1	4	0	1	1	7	**14**	***20***
FRS-23L-B	Ware Creek/ France Swamp	--	AGR	X					$205,073	4	4	3	4	3	4	3	2	27	0	1	0	1	1	3	**24**	***2***
FRS-7R-C	Ware Creek/ France Swamp	--	SFS	X					$105,857	4	5	4	3	2	3	3	1	25	1	1	2	1	1	6	**19**	***12***
FRS-D	Ware Creek/ France Swamp	--	IND	X					$193,555	5	5	3	4	3	3	4	2	29	0	2	0	2	2	6	**23**	***3***

TABLE 4-3: SELECTED AND PRIORITIZED STREAM AND STORMWATER RETROFIT PROJECTS

Project ID	Watershed/ Subwatershed	Associated Point Features Requiring Treatment	Drainage Area Land Use	Proposed Treatment					Estimated Cost	Prioritization Factors								SCORE: Level of Benefit	Potential Constraints					SCORE: Degree of Complexity	SCORE: Prioritization Level	*Prioritization Level Rank*
				Restore Degraded Channel	Enhance Degraded Channel	Channel Stabilization/ Energy Dissipator	BMP Retrofit	Infiltration		Water Quality / Runoff Quantity	Restore Floodplain Connectivity	Restore Aquatic Habitat	Reduce Sedimentation	Project Size / Scope	Channel Condition	Condition of Contributing Watershed	Increase Environmental Awareness		Conflicts with Existing Utilities	Construction Access	Neighborhood Impact	Physical Feasibility	Level of Design			
UWC-10L-2R-1R-B	Ware Creek/ Upper Ware Creek	--	TURF		X				$62,789	3	2	4	2	2	2	2	1	18	1	0	2	1	1	5	**13**	***21***
UWC-10L-A	Ware Creek/ Upper Ware Creek	--	TRNS/COM/ FOR			X			$36,410	2	2	3	2	1	1	1	1	13	0	0	0	1	1	2	**11**	***26***
UWC-11R-2R-1R-A	Ware Creek/ Upper Ware Creek	--	SFS/FOR			X			$78,068	3	2	3	2	1	3	2	1	17	1	4	2	2	1	10	**7**	***27***
UWC-11R-A	Ware Creek/ Upper Ware Creek	--	SFS/FOR			X			$74,922	4	4	3	4	1	3	1	1	21	0	2	0	1	1	4	**17**	***13***
UWC-5L-2R-A	Ware Creek/ Upper Ware Creek	ER-1	FOR	X					$167,416	4	5	4	4	3	4	1	1	26	0	1	0	1	2	4	**22**	***4***
UWC-5L-B	Ware Creek/ Upper Ware Creek	OT-1	TRNS/FOR	X					$234,271	5	5	4	4	3	4	2	2	29	0	1	0	1	2	4	**25**	***1***
UWC-7L-A	Ware Creek/ Upper Ware Creek	ER-1	TURF		X				$87,695	4	2	4	2	1	0	2	1	16	0	2	0	2	0	4	**12**	***23***
UWC-8R-1R-A	Ware Creek/ Upper Ware Creek	ER-1	SFS			X			$40,855	3	3	2	2	1	2	2	1	16	1	0	2	0	1	4	**12**	***24***
UWC-CA-A	Ware Creek/ Upper Ware Creek	--	SFS	X					$47,532	3	5	3	4	1	2	2	1	21	1	2	2	0	1	6	**15**	***16***

5

Strategic Action Plan

A draft Strategic Action Plan is provided in tabular format in Tables 5-1, 5-2 and 5-3. Table 5-1 includes goals and planning level cost estimates for Year 1, with Table 5-2 providing the same information for Years 2 through 10. Table 5-3 includes goals and planning level cost estimates for Annual Goals (Year 1-4). Costs associated with Year 1 are largely attributable to relatively inexpensive administrative and land use planning goals that set the stage for carrying out more involved and costly retrofit projects in subsequent years. The emphasis in Year 1 is establishing working alliances and making a concerted effort to promote watershed education and facilitate citizen involvement on the ground.

Table 5-1 Strategic Action Plan and Order of Magnitude Cost Estimate: Annual Goals

Watershed Protection Tool	Strategic Action or Evaluation Measure	Level of County Effort and Expense	Funding Stream	Estimated Cost
	ANNUAL GOALS			
Land Use Planning	Consider participation in the Virginia Big Tree or similar recognition program to identify historic and specimen trees and promote the importance of trees to the landscape	SMALL: - County will solicit volunteer support	within realm of current staff responsibilities?	$ -
Land Use Planning	Provide incentives for new development to add intermittent stream buffers, expanded RPA and mainstem buffers, preserve identified conservation areas, minimize impervious cover, and maximize contiguous open space. See Appendix A.	SMALL: - already underway, but may be necessary to update existing codes and ordinances to support incentives	within realm of current staff responsibilities	$ 50,000
Land Use Planning	Identify areas within the watershed where riparian corridors are in an unnatural condition and seek ways, including incentives, to restore those areas to their natural condition.	MODERATE: - may have consultant provide watershedwide assessment - may be opportunity to have developer propose with plan(s) of development	General Fund	$ 5,000
Stormwater Treatment Practices	Continue to fully implement the requirements of the County's MS4 permit in relation to watershed management throughout County.	SMALL: - already underway	within realm of current staff responsibilities	$ -
Stormwater Treatment Practices	Develop France Swamp and Bird Creek TMDL Implementation Plan in response to ongoing water quality concerns.	SMALL to HIGH: - overall Management Options encapsulate high expense items such as watershed restoration projects - administrative actions are already underway	within realm of current staff responsibilities	$ -
			TOTAL	**$ 55,000**

Table 5-2. Strategic Action Plan and Order of Magnitude Cost Estimate: Year 1

Watershed Protection Tool	Strategic Action or Evaluation Measure	Level of County Effort and Expense	Funding Stream	Estimated Cost
	YEAR 1			
Land Use Planning	Use of subwatershed maps to ensure local staff and stakeholder awareness of existing locations for restoration and potential conservation areas.	SMALL: - internal coordination, distribution of paper maps and County GIS database updated	within realm of current staff responsibilities	$ -
Watershed Education / Stewardship	Improve the availability of educational materials by developing materials for use by HOA's and neighborhood associations. Also use the PRIDE website. Educate people about watershed awareness including proper disposal of fats, oils, grease, and other chemicals, pet waste, onsite waste disposal systems, rubbish, and boat wakes.	SMALL: - public notices - development and distribution of printed materials - assistance identifying permanent funding stream	General Fund	$ 5,000
Better Site Design	Update or develop new Better Site Design (BSD) educational materials to be made available to developers and homeowner's associations and conduct training. Continue to work with County departments to incorporate BSD requirements into applicable ordinances and into the County BMP Manual, and to develop consistent review procedures.	SMALL: - public notices - development and distribution of printed materials - administrative actions	General Fund	$ 5,000
Stormwater Treatment Practices	Complete final ranking of watershed restoration projects and select highest priority projects to move forward as the Ware Creek Integrated Stormwater Master Plan	SMALL: - coordinate review with Stormwater Program Advisory Committee - complete DSS for Possible Conflicts scoring	within realm of current staff responsibilities	$ -
Watershed Education / Stewardship	Continue to support and grow a citizen/volunteer-based team of individuals to routinely perform rudimentary assessments of stream health, including sampling for benthic macroinvertebrates, water quality measurements for coarse indicators, and photodocumentation. Enhance the stewardship of Ware Creek by specifically addressing wildlife management and proper disposal of fats, oils, and grease.	SMALL: - explore academic and volunteer input from consulting community	within realm of current staff responsibilities	$ -
			TOTAL COST	**$ 10,000**

Table 5-3. Strategic Action Plan and Order of Magnitude Cost Estimate: Years 2 - 10

Watershed Protection Tool	Strategic Action or Evaluation Measure	Level of County Effort and Expense	Funding Stream	Estimated Cost
	YEAR 2			
Stormwater Treatment Practices	Incorporate capital projects into the Ware Creek Integrated Stormwater Master Plan and submit as part of the JCC 6-year Capital Improvement Program for funding and phased implementation	MODERATE - completed plan set - all permits secured or in process - construction-ready plans ready for bid	CIP: Stormwater Projects	$ 250,000
Aquatic Buffers	Commence the process of developing an inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure.	SMALL: - select County representative from each dept - hold kick-off meetings to discuss goals	within realm of current staff responsibilities	$ -
			TOTAL	**$ 250,000**
	YEAR 3			
Stormwater Treatment Practices	Submit the Ware Creek Integrated Stormwater Master Plan as part of the JCC 6-yr Capital Improvement Program for funding and phased implementation	HIGH: - completed plan set - all permits secured or in process construction ready plans submitted for bid	CIP stormwater Projects	$ 250,000
Aquatic Buffers	Complete and apply the inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure. (also included in Strategic Actions for the Gordon Creek and Mill Creek Watershed, but is anticipated to be a one-time fee)	SMALL: - systems in place for proper coordination among team members (administrative, mapping, telecommunications, etc.)	within realm of current staff responsibilities	$ -
			TOTAL	**$ 250,000**
	YEARS 4 through 10			
Stormwater Treatment Practices	Implement the Ware Creek Integrated Stormwater Master Plan as part of the JCC 6-yr Capital Improvement Program for funding and phased implementation	HIGH: - completed plan set - all permits secured or in process construction ready plans submitted for bid	CIP stormwater Projects	$ 250,000
			TOTAL (per annum)	**$ 250,000**

Table 5-3. Strategic Action Plan and Order of Magnitude Cost Estimate: Years 2 - 10

Watershed Protection Tool	Strategic Action or Evaluation Measure	Level of County Effort and Expense	Funding Stream	Estimated Cost
	YEAR 2			
Stormwater Treatment Practices	Incorporate capital projects into the Ware Creek Integrated Stormwater Master Plan and submit as part of the JCC 6-year Capital Improvement Program for funding and phased implementation	MODERATE - completed plan set - all permits secured or in process - construction-ready plans ready for bid	CIP: Stormwater Projects	$ 250,000
Aquatic Buffers	Commence the process of developing an inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure.	SMALL: - select County representative from each dept - hold kick-off meetings to discuss goals	within realm of current staff responsibilities	$ -
			TOTAL	**$ 250,000**
	YEAR 3			
Stormwater Treatment Practices	Submit the Ware Creek Integrated Stormwater Master Plan as part of the JCC 6-yr Capital Improvement Program for funding and phased implementation	HIGH: - completed plan set - all permits secured or in process construction ready plans submitted for bid	CIP stormwater Projects	$ 250,000
Aquatic Buffers	Complete and apply the inter-departmental rapid response protocol and team to deal with unforeseen and emergency threats to water quality and infrastructure. (also included in Strategic Actions for the Gordon Creek and Mill Creek Watershed, but is anticipated to be a one-time fee)	SMALL: - systems in place for proper coordination among team members (administrative, mapping, telecommunications, etc.)	within realm of current staff responsibilities	$ -
			TOTAL	**$ 250,000**
	YEARS 4 through 10			
Stormwater Treatment Practices	Implement the Ware Creek Integrated Stormwater Master Plan as part of the JCC 6-yr Capital Improvement Program for funding and phased implementation	HIGH: - completed plan set - all permits secured or in process construction ready plans submitted for bid	CIP stormwater Projects	$ 250,000
			TOTAL (per annum)	**$ 250,000**

6 Subwatershed Management Plans

6.1 France Swamp (FRS) Subwatershed

6.1.1 General Description

FRS subwatershed is the largest of the five evaluated subwatersheds in the Ware Creek watershed at 4,395.7 acres (Figure 6-1). It also has the highest percentage of impervious area at 9.5% (417.8 acres). The subwatershed southern boundary is located at Richmond Road in Toano and drains to France Swamp. France Swamp conveys to the north crossing Rochambeau Drive (SR 30) and Interstate 64 eventually flowing to the LWC subwatershed.

The majority of FRS subwatershed is single family small lot and large lot residential. It also includes an appreciable portion of commercial and industrial in the most southern portion of the subwatershed. Residential subdivisions within the subwatershed include Weatherly, Fenwick Hill, Temple Hall Estates, White Hall, Great Woods, Wellington, Mirror Lake Estates, Elmwood, Glenwood Acres, Burnt Ordinary and Toano Terrace. The Hankins and Jacobs Industrial Parks and commercial businesses located in Toano represent a significant concentration of impervious surface. The majority of the impervious surface within the FRS subwatershed is associated with transportation including roads, railroad and parking facilities. Forty percent of the subwatershed is mapped as wetlands and forested area mostly associated with RPA.

6.1.2 Soils

Sixty percent of the soils in FRS subwatershed are poorly drained type C soils, primarily complexes of Emporia, Craven and Kempsville soils. Type B soils make up 28 percent of the total and are largely comprised on Suffolk complex soils. The remaining soils include type A soils at six percent and type D soils at five percent. Type A soils include the Kenansville and Uchee complexes while the D soils are dominated by the Johnston complex.

6.1.3 Land Use and Impervious Area

6.1.3.1 Existing Conditions

FRS subwatershed consists of 4,395.7 acres, with a highly varied mixture of land use. Natural lands include 36 percent forested land and five percent wetlands. Developed areas include 20 percent in single-family residential, 12 percent in transportation and a combined seven percent in industrial and institutional use. Three percent of the watershed is commercial. Agricultural use makes up eight percent of the total watershed.

Total impervious cover is 417.8 acres, or 9.5 percent. Fifty-seven percent of the impervious cover is represented by paved roads and parking lots. A summary of the land use within the subwatershed is shown in Table 6.1-1 and a breakdown of the impervious area is in Table 6.1-2.

Table 6.1-1: FRS Subwatershed Existing Land Use

Land Use	Area (ac)	Percent of Subwatershed	Impervious Area (ac)
Urban			
Single-family, rural, wooded	119.8	2.7%	11.0
Single-family, rural, turf	23.9	0.5%	2.2
Single-family, large lot	336.9	7.7%	28.2
Single-family, small lot	415.0	9.4%	69.2
Multi-family and townhouse	11.3	0.3%	4.0
Commercial	119.3	2.7%	35.5
Institutional (churches, schools)	103.4	2.4%	20.9
Industrial	222.0	5.1%	71.0
Transportation (roads, RR, parking)	547.4	12.5%	166.0
Rural			
Agriculture (cropland and pasture)	365.9	8.3%	2.8
Open space, meadow	271.8	6.1%	4.3
Forest	1,589.3	36.1%	2.4
Water	56.4	1.3%	0.00
Wetland	213.5	4.9%	0.2
TOTAL	**4,395.7**	**100.00%**	**417.8**

Table 6.1-2: FRS Subwatershed Impervious Area

Impervious Type	Area (ac)	Percent of Subwatershed
Building	99.4	2.3%
Road	237.9	5.4%
Other	80.3	1.8%
TOTAL	**417.8**	**9.5%**

6.1.3.2 Future Conditions

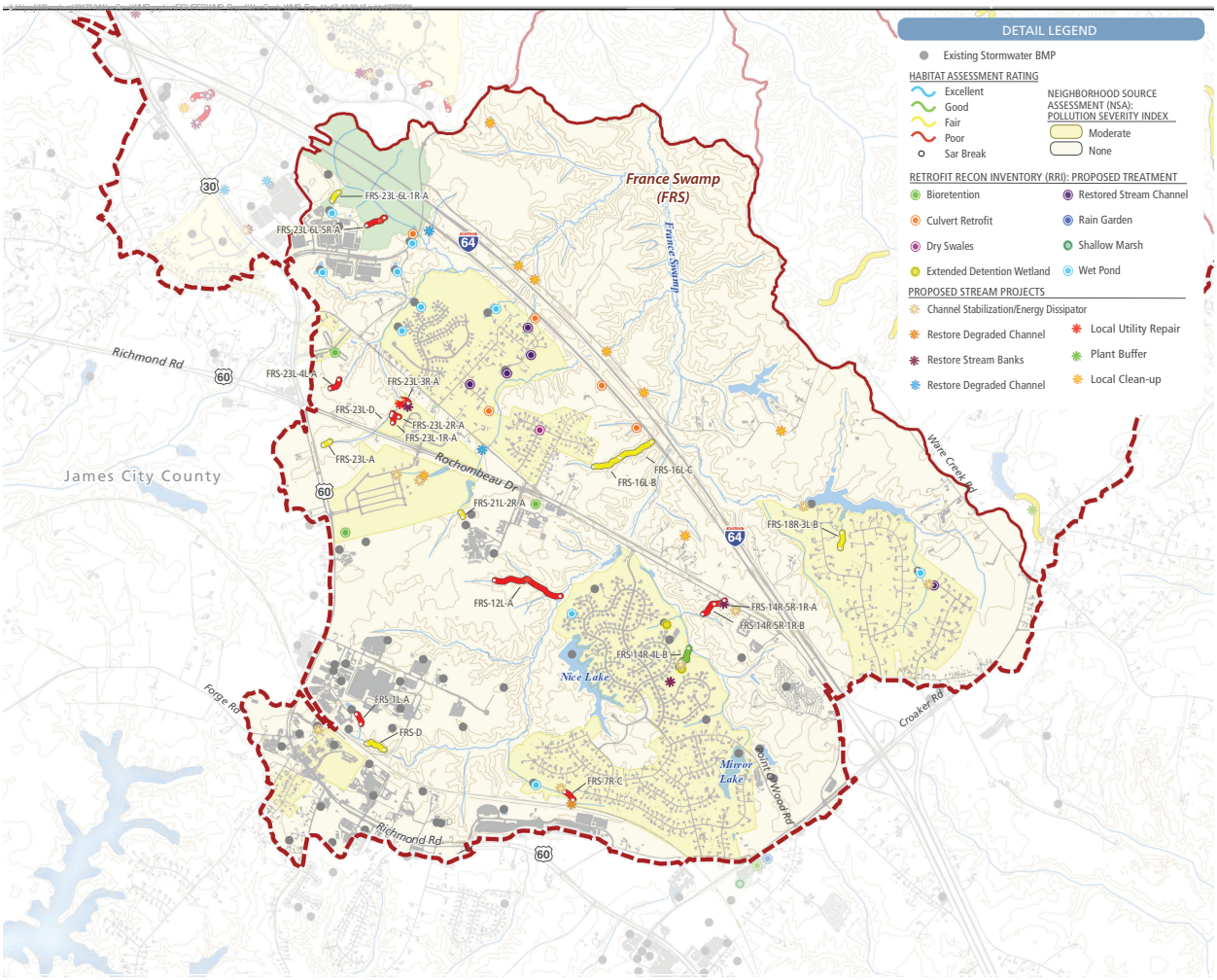
Forested lands are projected to decrease by 22 percent; however, wetlands will remain at the same percentage (5 percent) in the future. Residential planned development will account for nine percent of the subwatershed with planned commercial development at only two percent.

Total impervious cover is projected to increase to 660.2 acres, or 14.9 percent. Impervious area will increase based on a mixture of future land uses with transportation, single-family small lot and industrial, accounting for over half of the future impervious acreage. A summary of the future land use within the subwatershed is shown in Table 6.1-3.

Table 6.1-3: FRS Subwatershed Future Land Use

Land Use	Area (ac)	Percent of Subwatershed	Impervious Area (ac)
Urban			
Single-family, rural, wooded	434.0	9.9%	34.6
Single-family, rural, turf	211.6	4.9%	16.3
Single-family, large lot	328.4	7.5%	27.4
Single-family, small lot	654.7	14.9%	117.2
Multi-family and townhouse	15.5	0.4%	5.4
Planned development, residential	384.6	8.7%	76.9
Commercial	222.5	5.1%	61.3
Institutional (churches, schools)	120.0	2.7%	24.2
Planned development, commercial	102.0	2.3%	32.6
Industrial	280.2	6.4%	91.3
Transportation (roads, RR, parking)	547.4	12.5%	166.0
Rural			
Agriculture (cropland and pasture)	147.7	3.4%	0.6
Open space, meadow	45.3	1.0%	0.0
Forest	632.1	14.3%	2.4
Water	56.4	1.3%	0.0
Wetland	213.5	4.9%	0.2
TOTAL	**4,395.7**	**100.0%**	**656.5**

*Percentages may not add up to 100 due to rounding errors.



Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 2,000 ft.

Figure 6-1
Subwatershed Management Plan - France Swamp

vhb www.vhb.com

6.1.4 Stormwater Management

There are 46 stormwater management facilities in the subwatershed, consisting of 15 detention basins, 13 retention basins, 13 general infiltration practices and two other types of facilities, shown in Table 6.1-4. They treat approximately 1,400.4 acres of the subwatershed, or 32% of the area. Fifty-five percent of the subwatershed's impervious area (233.3 acres) is considered treated by some stormwater management, however a smaller percentage (41 percent) is treated for water quality with the exclusion of the detention basin treatment type. Retention basins make up the majority of the treatment by both treated area (951.8 acres, 22 percent) and treated impervious area (126.2 acres, 30 percent).

Table 6.1-4: FRS Subwatershed Stormwater Management

BMP Type	Water Quality Treatment	Number of Systems	Treated Area (ac) *	Treated Impervious Area (ac) *
Constructed Stormwater Wetland	Y	3	24.9	7.5
Detention Basin	N	15	278.6	62.1
Extended Detention Basin	Y	2	40.3	9.8
General Infiltration Practices	Y	13	104.9	27.7
Manufactured BMP Systems	Y		0.0	0.0
Retention Basin	Y	13	951.8	126.2
Total		46	1,400.4	233.3

*Area is calculated assuming that BMP drainage areas are not overlapping (i.e. no additional treatment is provided by downstream BMPs) as a conservative approach to avoid duplicate treatment accounting.

6.1.5 Stream Assessment

Approximately 39,250 linear feet of streams were evaluated in the France Swamp subwatershed (Figure 6-1). The France Swamp subwatershed has the highest percent of impervious cover at 9.5 percent and it is reflected in the stream habitat conditions. All but one SAR had a fair or poor score for stream habitat. Pool Variability scored relatively high, most likely because flows in those channels are accentuated by concentrated (diverted) stormwater runoff. However, the metrics for substrate, available cover, sediment deposition, bank stability and vegetative protection scored lower on average for the assessed streams. The France Swamp subwatershed experienced a much higher degree of in-stream sediment deposition exacerbated by local development. By default, increased sedimentation also lowers in-stream habitat quality. Erosion causes bank stabilty, which in turn, depreciates the vegegation protection and vice versa.

The majority of the stream reaches scored fair to excellent in the floodplain assessment rating. Floodplain connectivity was assessed optimal or suboptimal wherever E-type streams were found. Although, the overall floodplain score was often lowered because of floodplain surface scouring and lack of vegetative diversity.

Six of the nineteen prioritized SAR's exhibited stream stability but lacked adequate habitat conditions. For these SAR's, stream enhancement was recommended as the proposed treatment. The enhancement involves the installation of habitat grade control structures, constructing riffles and excavating pools to enhance the stream bed form and improve habitat conditions.

The remaining thirteen prioritized SAR's were assessed as G or F Rosgen Stream Types and exhibited vertical or lateral instability or some instances both. For these SAR's, stream restoration was recommended as the proposed treatment. The proposed treatement involve restoration of the stream pattern, dimension and profile to provide stream stability, bed form diversity and improve habitat conditions. The prioritized stream projects for FRS are presented in Table 6.1-5.

Table 6.1-5: Prioritized stream projects and associated cost estimates: FRS Subwatershed

Site ID	Associated Point Impacts	Drainage Area Land Use	Priority in FRS	Overall Priority	Specific Action	Estimated Cost
FRS-12L-A	--	INS	12	15	Enhancement	$510,779
FRS-14R-4L-A	OT-1	SFS	16	19	Enhancement	$44,697
FRS-14R-5R-1R-A	OT-1	SFS	9	11	Restoration	$98,695
FRS-14R-5R-1R-B	--	SFS	19	25	Enhancement	$149,414
FRS-16L-B	--	SFS	18	22	Enhancement	$249,267
FRS-16L-C	--	SFS	13	14	Restoration	$433,496
FRS-18R-3L-B	--	SFR	15	18	Restoration	$152,230
FRS-1L-A	--	IND	8	10	Restoration	$85,375
FRS-21L-2R-A	--	INS	3	5	Restoration	$41,714
FRS-21L-3L-A	--	TURF	4	6	Restoration	$29,279
FRS-23L-1R-A	--	TURF	6	8	Restoration	$67,933
FRS-23L-2R-A	--	TURF	7	9	Restoration	$69,990
FRS-23L-3R-A	ER-1	SFS	5	7	Enhancement	$63,467
FRS-23L-4L-A	--	AGR	11	14	Restoration	$166,041
FRS-23L-6L-1R-A	--	COM	14	17	Restoration	$99,066
FRS-23L-6L-5R-A	--	COM	17	20	Enhancement	$173,043
FRS-23L-B	--	AGR	1	2	Restoration	$205,073
FRS-7R-C	--	SFS	10	12	Restoration	$105,857
FRS-D	--	IND	2	3	Restoration	$193,555

Additionally, twenty-four point impacts have been prioritized for treatment in FRS. Treatment measures were proposed for the following point impacts: Storm Water Outfalls (OT), Severe Bank Erosion (ER), Impacted Buffers (IB), Stream Crossing (SC), Trash and Debris (TR) and Utility Impacts (UT). These priotized point impacts are summarized in Table 6.1-6.

Table 6.1-6: Occurrences of point impacts within FRS Subwatershed

SAR ID	Object ID	Severity	Proposed Treatment	Specific Action
FRS-14R-4L-A	OT-1	4	Restore Stream Banks	Larger Stream Initiative
FRS-14R-4L-B	OT-1	4	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-14R-5R-1R-A	OT-1	3	Restore Stream Banks	Larger Stream Initiative
FRS-14R-5R-A	OT-1	3	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-18R-2L-B	OT-1	5	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-18R-D	OT-1	5	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-21L-3L-A	OT-1	3	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-21L-3L-B	OT-2	3	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-7R-C	OT-1	3	Restore Degraded Channel	Local Repair
FRS-7R-D	OT-4	3	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-A	OT-2	4	Channel Stabilization/ Energy Dissipator	Local Repair
FRS-23L-D	UT-1	4	Restore Degraded Channel	Local Utility Repair
FRS-21L-B	SC-2	3	Restore Degraded Channel	Local Utility Repair
FRS-23L-6L-6L-B	SC-2	4	Restore Degraded Channel	Local Utility Repair
FRS-23L-3R-A	ER-1	5	Restore Stream Banks	Larger Stream Initiative
FRS-15R-A	TR-1	3	--	Local Clean-up
FRS-21L-3L-B	TR-1	2	--	Local Clean-up
FRS-23L-G	TR-1	3	--	Local Clean-up
FRS-23L-7R-D	TR-1	3	--	Local Clean-up
FRS-19L-A	TR-1	3	--	Local Clean-up
FRS-23L-8L-1L-A	TR-1	5	--	Local Clean-up
FRS-21L-D	TR-1	3	--	Local Clean-up
FRS-20R-1R-A	TR-1	2	--	Local Clean-up
FRS-23L-B	IB-1	--	--	Local Clean-up

6.1.6 Upland Reconnaissance

Most of the residential land use in France Swamp were evaluated during 13 NSA assessments. The NSA Sites evaluated are presented on Table 6.1-7. They were all developed in different decades, at different densities and did not have a lot of characteristics in common. The newer subdivisions are drained with curb, gutter and closed storm drain systems while the older ones rely on grass ditches to convey stormwater. Impervious cover ranged from a low of 15% in a large lot neighborhood to a high of 80% in a new multi-family development. Roof drains were substantially disconnected in every area assessed, even in the highest density multi-family site.

The most significant pollutant source was high-maintenance lawns. All of the Stonehouse neighborhoods met the threshold of 40% of the turf showing evidence of high fertilizer use.

Except for one neighborhood with 50% coverage, there was not a significant amount of tree canopy in the France Swamp residential areas. Many of the areas with low canopy cover also had a high portion of lawn, so there is a potential for a tree planting to improve cover over time.

There was only one site with a high enough percentage of high-maintenance lawns to be identified as a pollutant source. The others varied from 0% to 20%. There were also very few low-maintenance lawns in these areas.

Table 6.1-7: NSA Sites: FRS Subwatershed

Site ID	Location	Type	Lot Size	Age	Curb and Gutter	% Infill	% IA	% Lawn	% Canopy	% High Mgmt Lawns	% Disconnected Downspouts
WC-FRS-N01	Weatherly	MFR	1/8	2010	Y	None	80	10	0	0	90
WC-FRS-N02	Fenwick Hill	SFS	1/4	2000	Y	None	40	55	0	10	80
WC-FRS-N03	Temple Hall Estates	SFS	1/2 - 1	1970-2000	N	None	20	40	30	10	90
WC-FRS-N04	White Hall North	MFR	1/8	2010	Y	None	70	25	0	0	50
WC-FRS-N05	White Hall South	SFS	1/4	2010	Y	None	50	40	0	0	100
WC-FRS-N06	Great Woods	SFS	1/2 - 1	1990	N	None	30	60	5	10	90
WC-FRS-N07	Sand Hill	SFS	1/2	1970	N	None	20	70	15	0	100
WC-FRS-N08	Wellington	SFS	1/2 - 1	2000	Y	None	30	55	5	40	90
WC-FRS-N09	Mirror Lakes Estates	SFS	1/2 - 1	1980	N	<5%	30	60	5	20	90
WC-FRS-N10	Elmwood	SFL	>2	1970	N	None	15	25	50	5	95
WC-FRS-N11	Glenwood Acres	SFL	>1	1990	N	None	20	40	35	5	95
WC-FRS-N12	Burnt Ordinary	MFR	Apt	UNK	Y	None	45	30	20	0	50
WC-FRS-N13	Toano Terrace	SFS	1/4	20th Cent	N	<5%	35	50	10	10	80

Pollution sources, severity and restoration actions are shown in Table 6.1-8. Both pollution severity and restoration ranked in the lowest two categories. The neighborhoods were in good condition with few opportunities for restoration improvements.

Pollution sources varied. Neighborhoods built in the 1970s through 1990s relied on septic systems for sanitation, which are a source of nitrates in groundwater and could potentially be a source for bacteria if they fail. Several areas at a variety of densities had high turf cover and a low amount of canopy coverage. Bare soil was a factor in one area and directly connected downspouts were a potential source of runoff issues in two others.

Replacing turf cover with native landscaping was recommended in every neighborhood, because they were estimated to have less than 25% of the lot in landscaping. Tree plantings were another recommended outreach program that could be applied throughout this subwatershed. None of the storm drain inlets were stenciled or marked, so a program to begin this activity is recommended.

Table 6.1-8: NSA Results: FRS Subwatershed

Site ID	Location	Pollution Severity	Pollution Sources	Restoration Potential	Potential Action
WC-FRS-N01	Weatherly	NO	None	LOW	Native landscaping, tree planting
WC-FRS-N02	Fenwick Hill	MOD	Turf cover	MOD	Native landscaping, trees, SD marking
WC-FRS-N03	Temple Hall Estates	MOD	Septic	LOW	Native landscaping, tree planting
WC-FRS-N04	White Hall North	MOD	Roof connection	LOW	Native landscaping, trees, SD marking, downspouts
WC-FRS-N05	White Hall South	NO	None	MOD	Native landscaping, trees, SD marking
WC-FRS-N06	Great Woods	MOD	Septic, turf cover	MOD	Native landscaping, trees, rain garden
WC-FRS-N07	Sand Hill	MOD	Septic, turf cover	LOW	Native landscaping, tree planting
WC-FRS-N08	Wellington	MOD	Turf cover, high maint lawns	MOD	Native landscaping, trees, lawn care
WC-FRS-N09	Mirror Lakes Estates	MOD	Septic, turf cover	LOW	Native landscaping, trees
WC-FRS-N10	Elmwood	MOD	Septic, street gutter	LOW	Native landscaping
WC-FRS-N11	Glenwood Acres	MOD	Septic	LOW	Native landscaping, tree planting
WC-FRS-N12	Burnt Ordinary	MOD	Roof connection	MOD	Native landscaping, trees, SD marking, downspouts
WC-FRS-N13	Toano Terrace	MOD	Turf cover, bare soil	LOW	Native landscaping, tree planting

6.1.7 Pollutant Loads

6.1.7.1 Existing Conditions Pollutant Loads

Urban runoff is by far the largest source of pollutants and runoff volume in France Swamp, as shown in Table 6.1-9. Forest cover and channel erosion both contributed sediment loads as well.

Bacteria sources from all sources of runoff generated about 72% of the total in the watershed, with septics, illicit connections and SSOs contributing all but a minor portion of the remainder.

Table 6.1-9: Existing Condition Pollutant Loads: FRS Subwatershed

EXISTING CONDITIONS	Acres	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	1,899.0	14,450	2,717	375,571	120,616	2,373
Septic Systems		548	91	3,653	10,477	-
SSOs		5	1	35	4,022	-
Illicit Connections		110	50	943	35,569	-
Active Construction	33.8	98	20	66,905	-	58
Channel Erosion		201	78	251,721	-	-
TOTAL URBAN	1,932.7	15,414	2,957	698,829	170,685	2,431
RURAL SOURCES						
Rural	603.9	2,778	423	60,386	23,551	188
Forest	1,802.8	4,507	361	180,276	21,633	172
Water	56.4	721	28	8,736	-	-
Wetlands			included w/ forest			
Livestock		263	30	-	1,000	-
TOTAL RURAL	2,463.0	8,269	841	249,401	46,185	360
POINT SOURCES						
Municipal / Industrial		-	-	-	-	-
Marinas		-	-	-	-	-
TOTAL POINT SOURCES		-	-	-	-	
TOTAL	**4,395.7**	**23,682**	**3,798**	**948,229**	**216,870**	**2,791**

The totals for urban runoff shown above are the net amounts of pollutants after treatment. Existing treatment systems reduce the urban runoff load through BMPs already in place by about 10 – 12%.

Table 6.1-10: Load reductions from existing runoff treatment: FRS Subwatershed

TREATMENT TYPE	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
Erosion / Sediment Control	60	12	40,659	0	0
Structural Stormwater Management Practices	747	258	46,634	15,704	24

6.1.7.2 Future Conditions

Pollutant loading will change from existing conditions as areas zoned for Planned Unit Development and other areas are converted from forest to residential and commercial uses. No loss of wetlands or water is forecast, as they are entirely within the preservation areas.

Table 6.1-11 shows the effect of build-out on the pollutant loads. All the loads are expected to increase except sediment, where a reduction from the loss of rural land uses is not matched by an

urban increase. Septic system and SSO loads will increase as a function of additional residents in the watershed. All other sources were assumed to remain the same.

Table 6.1-11: Forecast change in pollutant loading from future development: FRS Subwatershed

CHANGED LOADS EXISTING TO FUTURE	Acres	TN	TP	TSS	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	1,401.8	4,928	958	81,354	54,219	1,175
Septic Systems		315	52	2,098	6,018	-
SSOs		0	0	2	265	-
Illicit Connections		-	-	-	-	-
Active Construction	(34)	(3)	(1)	(1,982)	-	-
Channel Erosion		-	-	-	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	**1,368.0**	**5,240**	**1,010**	**81,473**	**60,502**	**1,175**
RURAL SOURCES						
Rural	(410.8)	(1,890)	(288)	(41,081)	(16,022)	(145)
Forest	(957.2)	(2,393)	(191)	(95,720)	(11,486)	(91)
Water	-	-	-	-	-	-
Wetlands			included w/ forest			
Livestock	-	-	-	-	-	-
TOTAL RURAL	**(1,368.0)**	**(4,283)**	**(479)**	**(136,801)**	**(27,508)**	**(236)**
POINT SOURCES						
Municipal / Industrial	-	-	-	-	-	-
Marinas	-	-	-	-	-	-
TOTAL POINT SOURCES		**-**	**-**	**-**	**-**	
TOTAL LOAD	**-**	**957**	**531**	**(55,328)**	**32,994**	**939**

6.1.8 Candidate Sites for Improvements

Twenty-nine stormwater retrofit sites were identified from the desktop assessment and NSA survey. They included retrofit of existing SWM ponds, culvert retrofits, on-site improvements for parking lots, conveyance improvements and outfall treatment to provide filtration and reduce erosion. Table 6.1-12 describes the sites and the preliminary assessment of potential retrofit approaches.

Table 6.1-12: Candidate Sites for Retrofits: FRS Subwatershed

Site ID	Location	Type of Site	Ownership	Goal	Desktop Assessment
WC-FRS-R01	LaGrange Pkwy	Culvert	Unknown	WQ	Site is forested and undeveloped. Add embankment and outlet structure at culvert under Parkway to provide WQ or CP storage upstream.
WC-FRS-R02	Temple Hills Estates	Outfall	Unknown	WQ, CP	ID during NSA. Good site for RSC to provide outfall stabilization and stormwater treatment.
WC-FRS-R03	VDOT I-64 Culvert	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R04	Louise Lane outfall	Outfall	Unknown	WQ	ID during NSA. Good site for RSC to provide outfall stabilization and stormwater treatment.
WC-FRS-R05	Welstead Lane outfall	Outfall	Unknown	WQ	ID during NSA. Potential site for RSC downstream of drop structure to provide outfall stabilization and stormwater treatment.
WC-FRS-R06	End of Joanne Ct	Culvert	Private	WQ	ID during NSA. Potential culvert retrofit under driveway / road embankment.
WC-FRS-R07	I-64, Sand Hill East	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R08	I-64, Sand Hill West	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R09	Sand Hill	Conveyance	DOT	WQ	ID during NSA. Retrofit grass drainage ditches to increase filtration / infiltration.
WC-FRS-R10	WC082	Existing pond	Private	WQ	Dry pond conversion. Add storage volume, new riser, water quality features to improve treatment.
WC-FRS-R11	WC083	Existing pond	Private	WQ	Dry pond conversion. Add storage volume, new riser, water quality features to improve treatment.
WC-FRS-R12	Timber Lane	Outfall	Unknown	WQ, CP	ID during NSA. Eroded area is a potential site for RSC to stabilize outfall and provide stormwater treatment.
WC-FRS-R16	WC084	Existing pond	Unknown	WQ	Excavate for additional volume, reconstruct riser. Add forebay, micropool plantings or other features to improve treatment.
WC-FRS-R17	WC061	Existing pond	Private	WQ	Convert to wet pond, excavate for additional volume, convert riser and add water quality features.
WC-FRS-R18	WC062	Existing pond	Private	WQ	Dry-to-wet pond conversion. Excavate for additional volume, reconstruct riser.
WC-FRS-R19	WC063	Existing pond	Private	WQ	Dry-to-wet pond conversion. Excavate for additional volume, reconstruct riser.
WC-FRS-R20	Norman Davis Dr	Outfall	Unknown	WQ	ID during NSA. Potential RSC to treat roadway runoff.
WC-FRS-R21	WC015	Existing pond	None	WQ	Add forebay, micropool plantings or other features to improve treatment.
WC-FRS-R22	WC048	Existing pond	Unknown	WQ	Retention pond. Add forebay, micropool or other features to improve treatment.
WC-FRS-R23	Williamsburg Christian Academy	Parking lot	Private	WQ	Bioretention, swales or rain gardens to treat parking lot and roof runoff.
WC-FRS-R24	Weathers Blvd	Development	Private	WQ	Bioretention, swales or rain gardens to treat pavement and roof runoff.

Site ID	Location	Type of Site	Ownership	Goal	Desktop Assessment
WC-FRS-R25	Hickory Neck Blvd	Development	Private	WQ	Bioretention, swales or rain gardens to treat pavement and roof runoff.
WC-FRS-R26	WC035	Existing pond	Private	WQ	Add micropool, aquatic bench, plantings or other features to improve treatment.
WC-FRS-R27	WC097	Existing pond	Private	WQ	Add micropool, aquatic bench, plantings or other features to improve treatment.
WC-FRS-R28	WC068	Existing pond	Public	WQ	Dry-to-wet pond conversion. Excavate for additional volume, reconstruct riser.
WC-FRS-R29	WC047	Existing pond	Private	WQ	Add forebay, micropool, aquatic bench, plantings or other features to improve treatment.

Results of the field assessment showed 14 sites were feasible for retrofit projects. Permitting would be required for most of the sites. Access constraints generally involved the potential for tree removal and there was one potential utility conflict. None of the constraints were determined to be significant enough to preclude construction.

Table 6.1-13: Results of Field Assessment: FRS Subwatershed

Site_ID	Adjacent Land Use	Land Use Conflicts	Access Constraints	Potential Utility Conflicts	Potential Permitting Factors	Feasible	Recommendation
WC-FRS-R01	COM, FOR	No	No	No	Yes	No. Significant permitting issues and wetland impacts.	No project
WC-FRS-R02	RES	No	No	No	Yes	Yes	RSC
WC-FRS-R03	FOR, TRNS	Yes	Slope	No	Yes	No, difficult access, steep slope from I-64	No project
WC-FRS-R04	RES	No	Trees	No	Yes	Yes	RSC
WC-FRS-R05	RES	No	Slope, trees	No	Yes	Yes	RSC
WC-FRS-R06	RES	Private ownership	Slope, trees, ownership	No	Yes	No, ownership, access constraints, environmental impacts	No project
WC-FRS-R07	FOR, TRNS	No	Slope	No	Yes	No, low priority, residential roofs disconnected, roadways drain through grass channels, I-64 access	No project
WC-FRS-R08	FOR, TRNS	No	Slope, trees	No	Yes	No, difficult access, steep slope from I-64	No project
WC-FRS-R09	RES	Yes	No	No	No	Yes; however, residential roofs disconnected, landowner landscaping of ditches observed	Dry swales
WC-FRS-R10	RES	No	No	No	Yes	Yes	ED Wetland
WC-FRS-R11	RES	No	No	No	Yes	Yes	ED Wetland
WC-FRS-R12	RES,FOR	No	Trees	No	Yes	Yes	RSC
WC-FRS-R16	RES,FOR	No	N/A	N/A	N/A	No	No project

Site_ID	Adjacent Land Use	Land Use Conflicts	Access Constraints	Potential Utility Conflicts	Potential Permitting Factors	Feasible	Recommendation
WC-FRS-R17	RES	No	No	No	Yes	No. Developer needs to do work for surety release.	No project
WC-FRS-R18	RES	No	No	No	Yes	No. Developer needs to do work for surety release.	No project
WC-FRS-R19	RES	No	No	No	Yes	No. Developer needs to do work for surety release.	No project
WC-FRS-R20	RES	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R21	RES	No	N/A	N/A	N/A	No, did not find in field	No project
WC-FRS-R22	RES	No	N/A	N/A	N/A	No access	No project
WC-FRS-R23	INS	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R24	RES	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R25	RES	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R26	COM	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R27	COM	No	N/A	N/A	N/A	No, already treated	No project
WC-FRS-R28	FOR	No	No	No	No	No, too small for wet pond	No project
WC-FRS-R29	COM	No	N/A	N/A	N/A	No, already treated	No project

6.1.8 Recommendations for Improvements

This section provides a brief description of each recommended project. Appendix C includes fact sheets which give more detailed information on each project, including benefits, constraints and costs.

WC-FRS-R02

This site was identified during the NSA assessment. The retrofit would be a Regenerative Stormwater Conveyance (RSC) which would provide both outfall stabilization and stormwater treatment for the residential area upstream on Louise Lane. The project would replace the riprap which has been placed downstream from the outfall for protection. Topography is acceptable for this type of restoration with a slope that transitions from steep to a broad shallow floodplain. The site is approximately 50 ft long and 15 ft wide.

WC-FRS-R04

This site was identified during the NSA assessment. The retrofit would be a Regenerative Stormwater Conveyance (RSC) to stabilize the outfall and provide stormwater treatment for the upstream residential area on Louise Lane. The RSC would be constructed below the existing stilling basin at the site of the current steep, rip-rapped slope.

WC-FRS-R05

This site was identified during the NSA assessment. The proposed project is a Regenerative Stormwater Conveyance (RSC) for outfall stabilization and water quality treatment of the runoff

from the upstream area. Drainage flows to a grate inlet to a drop structure with a 24" plastic outfall about 15 to 20 feet below. The RSC would replace the existing rip-rapped channel.

WC-FRS-R09
This site was identified during the NSA assessment. It would consist of retrofitting the existing grass drainage ditches to increase filtration / infiltration and would treat most of the Great Woods subdivision along Sand Drive, Barn Elm Rd and Water Oak Court. The existing site consists of streets drained with grass ditches which have mild slopes. Because of the lack of storm drains there is no opportunity for underdrains; however, the Type B soils indicate that infiltration may be feasible. The project may be a lower priority, as the residential roofs are substantially disconnected and the houses are set back from street, in mainly flat lots.

WC-FRS-R10
The proposed project is a conversion of a dry pond to improve water quality treatment. It would consist of adding storage volume, a new outlet structure, micropool and wetland planting to convert it to an extended detention shallow marsh. The existing pond currently holds a portion of the runoff and has established a wetland on the bottom. The downstream channel is stable, so channel protection storage is not recommended.

WC-FRS-R11
This project is a dry pond conversion to a wet pond or shallow marsh to improve water quality treatment. The existing pond has become partially filled in with sediment; there was some baseflow at the time of assessment. The retrofit would add a micropool, forebay and wetland planting.

WC-FRS-R12
This site was identified during the assessment of another retrofit opportunity. It is an outfall consisting of triple 12" plastic pipes with no end structure; the discharge area has been eroded and protected with riprap. It drains to a wide floodplain, and a stable stream with some sedimentation. The project would consist of constructing a Regenerative Stormwater Conveyance (RSC) to replace the rip-rapped area, stabilize the outfall and provide stormwater treatment for residential drainage from Timber Lane.

6.1.9 Pollutant Loads

Modeling of proposed conditions included implementation of the 7 structural controls for urban runoff identified during the retrofit inventory. No other watershed retrofits were proposed. The table below shows an estimate of the load reductions for each retrofit option.

Table 6.1-14: Pollutant Loads for Retrofit Sites: FRS Subwatershed

LOAD REDUCTION	Treated Area (ac)	Treated IA (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)
WC-FRS-R02	8.5	1.4	31.5	7.4	1,568.9
WC-FRS-R04	7.1	1.0	24.9	5.9	1,243.2
WC-FRS-R05	6.0	1.1	23.5	5.5	1,171.1
WC-FRS-R09	9.1	2.9	53.2	10.1	1,689.1
WC-FRS-R10	31.0	11.8	59.6	26.5	5,132.4
WC-FRS-R11	7.6	1.1	9.6	4.3	824.7
WC-FRS-R12	4.4	0.8	14.0	3.3	698.9
TOTAL	**73.7**	**20.1**	**216.3**	**63.0**	**12,328.3**

6.1.10 Cost Estimates

Construction costs for stormwater management and stream restoration projects were developed with a conceptual design to provide an estimate of quantities and unit prices for direct costs, such as excavation, underdrains, riser structure, topsoil, seeding and planting. Indirect costs, including site prep and erosion / sediment control, mobilization and maintenance of traffic or streamflow were estimated based on a percent of project construction costs, with a minimum cost of $4,000, with the exception of the rain garden project. Environmental studies, permitting, engineering and surveys were estimated similarly, with a minimum cost of $45,000. Again the rain garden was the exception as the engineering requirements for this option are less complex. The total estimated cost for the 7 options is $934,000.

Table 6.1-15: Cost Estimates for Candidate Sites for Retrofits: FRS Subwatershed

PROJECT ID	Base Construction Cost	Indirects	Contingency	Engineering, Survey, Permitting	Total (rounded up to $000)
WC-FRS-R02	$69,408	$13,882	$20,822	$45,000	$150,000
WC-FRS-R04	$62,084	$12,417	$18,625	$45,000	$139,000
WC-FRS-R05	$82,246	$16,449	$24,674	$45,000	$169,000
WC-FRS-R09	$98,460	$19,692	$29,538	$45,000	$193,000
WC-FRS-R10	$35,539	$7,108	$10,662	$45,000	$99,000
WC-FRS-R11	$8,423	$4,000	$3,106	$45,000	$61,000
WC-FRS-R12	$51,999	$10,400	$15,600	$45,000	$123,000
TOTAL	**$408,159**	**$83,948**	**$123,027**	**$315,000**	**$934,000**

6.1.11 Cost Effectiveness

RSC WC-FRS-R10 is one of the most cost-effective projects, because it is one of the projects treating a larger area. Four of the RSCs treating less than 10 acres (WC-FRS-R02, WC-FRS-R04,

and WC-FRS-R05 and WC-FRS-R12) are the least cost-effective projects in terms of both impervious area treated and phosphorus removal.

Table 6.1-16: Cost Effectiveness for Retrofit Sites: FRS Subwatershed

LOAD REDUCTION	Project Type	Treated Area (ac)	Treated IA (ac)	TP (lb/yr)	Total Cost	$/acre	$/IA	$/lb, TP
WC-FRS-R02	RSC	8.5	1.4	7.4	$150,000	$17,647	$103,806	$20,270
WC-FRS-R04	RSC	7.1	1.0	5.9	$139,000	$19,577	$139,839	$23,559
WC-FRS-R05	RSC	6.0	1.1	5.5	$169,000	$28,167	$148,246	$30,727
WC-FRS-R09	Pond Retrofit	9.1	2.9	10.1	$193,000	$21,209	$66,277	$19,109
WC-FRS-R10	RSC	31.0	11.8	26.5	$99,000	$3,194	$8,404	$3,736
WC-FRS-R11	RSC	7.6	1.1	4.3	$61,000	$8,026	$57,331	$14,186
WC-FRS-R12	RSC	4.4	0.8	3.3	$123,000	$27,955	$155,303	$37,273
TOTAL		**73.7**	**20.1**	**63.0**	**$934,000**	**$12,673**	**$46,405**	**$14,825**

6.2 Upper Ware Creek (UWC) Subwatershed

6.2.1 General Description

UWC subwatershed is the second largest of the five evaluated subwatersheds in the Ware Creek watershed at 3,036.3 acres (Figure 6-2). It also has the second highest percentage of impervious area at 7.4% (224.9 acres). The subwatershed's southern boundary mostly follows Old Stage Road and drains to Upper Ware Creek. Upper Ware Creek conveys to the north through Bird Swamp and ultimately draining to Richardson Mill Pond.

The majority of the developed portion of the UWC subwatershed is single family small lot and large lot residential. It also includes an appreciable portion of commercial and industrial in the most southern portion of the subwatershed. Residential subdivisions within the subwatershed include King's Village, Holly Forks, the Stonehouse sections of Leatherleaf, Laurel Ridge, Orchard Hill, Lisburn, Bent Tree, Walnut Creek, Hillcrest, Hollow Oak and Stonehouse Glen, Michelle Point, Burnham Woods, Whitehall, and Summerfield. The majority of the commercial development in the UWC subwatershed is within the Stonehouse Commerce Park located at Old Stage Road and Six Mount Zion Road. The majority of the impervious surface within the UWC subwatershed is associated with transportation including roads, railroad and parking facilities. The remaining areas of the subwatershed are mapped as agreicultural, meadow, forest and wetlands.

6.2.2 Soils

Seventy percent of the soils in Upper Ware Creek subwatershed are poorly drained type C soils, primarily complexes of Emporia, Craven, Kempsville and Slagle soils. The remaining soils are comprised of type B soils (21 percent), type D soils (six percent), and type A soils (two percent).

The major soil complexes making up the B, D and A types include Suffolk, Johnston, and Uchee soils respectively.

6.2.3 Land Use and Impervious Area

Upper Ware Creek subwatershed consists of 3,036.3 acres with a mixture of land uses. The largest use is forested land making up 41 percent of the total area. Twelve percent is agricultural and 12 percent is in turf. Seventeen percent of the subwatershed is residential and eight percent is transportation.

Total impervious cover is 224.9 acres, or 7.4 percent. Approximately half (51 percent) of the impervious cover is represented by paved roads and parking lots. A summary of the land use within the subwatershed is shown in Table 6.1-1 and a breakdown of the impervious area is in Table 6.2-2.

Table 6.2-1: UWC Subwatershed Existing Land Use

Land Use	Area (ac)	Percent of Subwatershed	Impervious Area (ac)
Urban			
Single-family, rural, wooded	27.1	0.89%	1.4
Single-family, rural, turf	143.3	4.72%	4.7
Single-family, large lot	123.9	4.08%	12.9
Single-family, small lot	236.4	7.79%	59.2
Multi-family and townhouse	0.3	0.01%	0.1
Commercial	95.0	3.13%	22.2
Institutional (churches, schools)	8.6	0.28%	1.6
Industrial	0.00	0.00%	0.00
Transportation (roads, RR, parking)	256.9	8.46%	99.5
Rural			
Agriculture (cropland and pasture)	371.5	12.23%	5.4
Open space, meadow	353.1	11.63%	11.8
Forest	1,256.7	41.39%	5.5
Water	35.2	1.16%	0.0
Wetland	128.5	4.23%	0.5
TOTAL	**3,036.3**	**100.00%**	**224.9**

*Percentages may not add to 100 due to rounding errors.

Table 6.2-2: UWC Subwatershed Existing Impervious Area

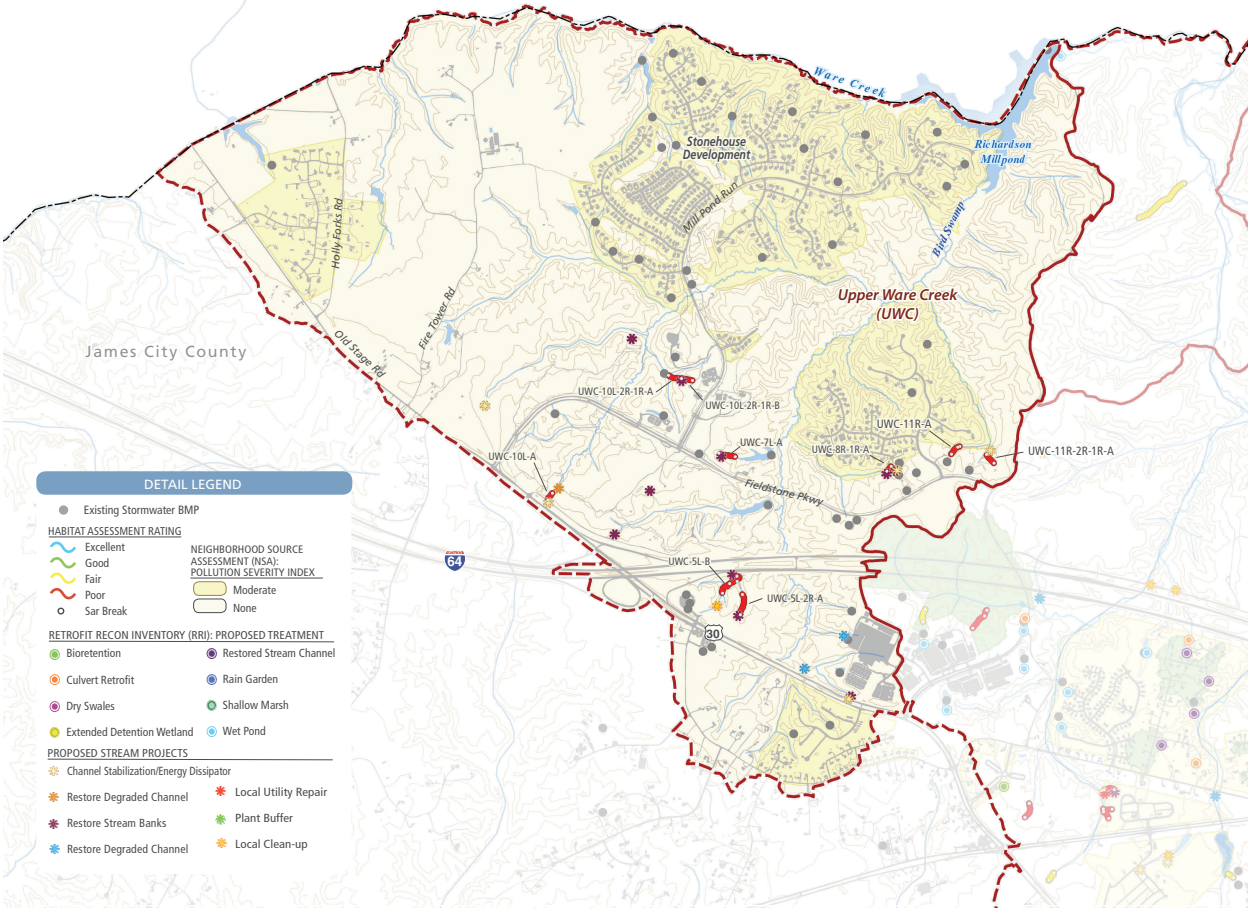
Impervious Type	Area (ac)	Percent of Subwatershed
Building	54.7	1.8%
Road	113.2	3.7%
Other	57.0	1.9%
TOTAL	**224.9**	**7.4%**

Table 6.2-3: UWC Subwatershed Future Land Use

Land Use	Area (ac)	Percent of Subwatershed	Impervious Area (ac)
Urban			
Single-family, rural, wooded	86.4	2.8%	5.8
Single-family, rural, turf	230.3	7.6%	11.3
Single-family, large lot	137.5	4.5%	14.3
Single-family, small lot	343.9	11.3%	80.7
Multi-family and townhouse	1.1	0.0%	0.4
Planned development, residential	199.1	6.6%	39.8
Commercial	154.7	5.1%	37.1
Institutional (churches, schools)	8.6	0.3%	1.6
Planned development, commercial	138.8	4.6%	44.4
Industrial	0.0	0.0%	0.0
Transportation (roads, RR, parking)	256.9	8.5%	99.5
Rural			
Agriculture (cropland and pasture)	233.5	7.7%	3.9
Open space, meadow	328.7	10.8%	11.1
Forest	753.1	24.8%	5.5
Water	35.2	1.2%	0.0
Wetland	128.5	4.2%	0.5
TOTAL	**3,036.3**	**100.00%**	**366.9**

*Percentages may not add to 100 due to rounding errors.

Ware Creek
Watershed Management Plan
James City County, Virginia



DETAIL LEGEND

- Existing Stormwater BMP

HABITAT ASSESSMENT RATING
- Excellent
- Good
- Fair
- Poor
- Sar Break

NEIGHBORHOOD SOURCE ASSESSMENT (NSA): POLLUTION SEVERITY INDEX
- Moderate
- None

RETROFIT RECON INVENTORY (RRI): PROPOSED TREATMENT
- Bioretention
- Culvert Retrofit
- Dry Swales
- Extended Detention Wetland
- Restored Stream Channel
- Rain Garden
- Shallow Marsh
- Wet Pond

PROPOSED STREAM PROJECTS
- Channel Stabilization/Energy Dissipator
- Restore Degraded Channel
- Restore Stream Banks
- Restore Degraded Channel
- Local Utility Repair
- Plant Buffer
- Local Clean-up

BASEMAP LEGEND
- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 1,750 ft.

Figure 6-2
Subwatershed Management Plan - Upper Ware Creek

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6.2.4 Stormwater Management

There are 44 stormwater management facilities in the subwatershed, consisting of 26 detention basins, six retention basins and several other facility types, shown in Table 6.2-4. They treat approximately 2,348.9 acres of the subwatershed, or 71% of the area. A large percentage (84 percent) of the subwatershed's impervious area is considered treated, however a significant portion (34 percent) is treated by the 26 detention basins which are not considered adequate for providing water quality treatment. Retention ponds, while not the most common treatment type, do treat the most area by total treated area (1,945.0 acres, 59 percent) and impervious area treated (105.6 acres, 46 percent).

Table 6.2-4: UWC Subwatershed Stormwater Management

BMP Type	Water Quality Treatment	Number of Systems	Treated Area (acres)	Treated Impervious Area (acres)
Constructed Stormwater Wetland	Y	1	9.9	0.5
Detention Basin	N	26	331.8	76.9
Extended Detention Basin	Y	4	19.9	4.0
General Infiltration Practices	Y	4	5.9	1.1
Manufactured BMP Systems	Y	3	36.5	3.9
Retention Basin	Y	6	1,945.0	105.6
TOTAL		**44**	**2,348.9**	**192.0**

*Area is calculated assuming that BMP drainage areas are not overlapping (i.e. no additional treatment is provided by downstream BMPs) as a conservative approach to avoid duplicate treatment accounting.

6.2.5 Stream Assessment

Approximately 27,455 linear feet of streams were evaluated in the UWC subwatershed (Figure 6-2, Table C-1). The UWC subwatershed is the second most impervious subwatershed in the Ware Creek Watershed and has an impervious cover at 6.9 percent. Like FRS subwatershed, the impervious areas have diminished the stream habitat conditions. All of the SAR's had a fair or poor score for stream habitat. The metrics for substrate, avalaible cover, sediment deposition, bank stability and vegetative protection scored lower on average for the assessed streams. The UWC subwatershed experienced a much higher degree of in-stream sediment deposition exacerbated by local development. By default, increased sedimentation also lowers in-stream habitat quality. Erosion causes bank stabilty, which in turn, depreciates the vegegation protection and vice versa.

All but one SAR scored fair to excellent in the floodplain assessment rating. Floodplain connectivity was assessed optimal or suboptimal wherever B and E-type streams were found due to the adequate floodplain connection. Even in areas where G streams were observed floodplain rating score were fair to good, although most exhibited a lack of wetland vegetation due to floodplain dissconnection.

Four of the nine prioritized SAR's exhibited stream stability but lacked adequate habitat conditions. For these SAR's, stream enhancement was recommended as the proposed treatment. The enhancement involves the installation of habitat grade control structures, constructing riffles and excavating pools to enhance the stream bed form and improve habitat conditions.

The remaining five prioritized SAR's were assessed as G or F Rosgen Stream Types and exhibited vertical or lateral instability or some instances both. For these SAR's, stream restoration was recommended as the proposed treatment. The proposed treatement involve restoration of the stream pattern, dimension and profile to provide stream stability, bed form diversity and improve habitat conditions. The prioritized stream projects for UWC are presented in Table 6.2-5.

Table 6.2-5: Prioritized stream projects and associated cost estimates: UWC Subwatershed

Site ID	Associated Point Impacts	Drainage Area Land Use	Priority in UWC	Overall Priority	Specific Action	Estimated Cost
UWC-10L-2R-1R-B	--	TURF	5	21	Enhancement.	$62,789
UWC-10L-A	--	TRNS/COM/ FOR	8	26	Enhancement.	$36,410
UWC-11R-2R-1R-A	--	SFS/FOR	9	27	Enhancement.	$78,068
UWC-11R-A	--	SFS/FOR	4	13	Restoration	$74,922
UWC-5L-2R-A	ER-1	FOR	3	4	Restoration	$167,416
UWC-5L-B	OT-1	TRNS/FOR	1	1	Restoration	$234,271
UWC-7L-A	ER-1	TURF	7	23	Enhancement.	$87,695
UWC-8R-1R-A	ER-1	SFS	6	24	Restoration	$40,855
UWC-CA-A	--	SFS	2	16	Restoration	$47,532

Additionally, nineteen point impacts have been prioritized for treatment in UWC. Treatment measures were proposed for the following point impacts: Storm Water Outfalls (OT), Severe Bank Erosion (ER), Impacted Buffers (IB), Stream Crossing (SC), Trash and Debris (TR) and Utility Impacts (UT). These priotized point impacts are summarized in Table 6.2-6.

Table 6.2-6: Occurrences of point impacts within UWC Subwatershed

SAR ID	Object ID	Severity	Proposed Treatment	Specific Action
UWC-10L-3L-A	OT-1	4	Channel Stabilization/ Energy Dissipator	Local Repair
UWC-10L-A	OT-1	3	Channel Stabilization/ Energy Dissipator	Local Repair
UWC-10L-B	OT-2	3	Restore Degraded Channel	Local Repair
UWC-11R-2R-B	OT-1	3	Channel Stabilization/ Energy Dissipator	Local Repair
UWC-3R-A	OT-1	4	Channel Stabilization/ Energy Dissipator	Local Repair
UWC-5L-B	OT-1	4	Restore Stream Banks	Larger Stream Initiative
UWC-8R-1R-A	OT-1	3	Channel Stabilization/ Energy Dissipator	Local Repair
UWC-3R-B	SC-1	3	Restore Degraded Channel	Local Utility Repair
UWC-4R-A	SC-1	3	Restore Degraded Channel	Local Utility Repair

SAR ID	Object ID	Severity	Proposed Treatment	Specific Action
UWC-5L-2R-A	ER-1	3	Restore Stream Banks	Larger Stream Initiative
UWC-3R-A	ER-1	5	Restore Stream Banks	Local Stream Repair
UWC-8R-A	ER-1	3	Restore Stream Banks	Local Stream Repair
UWC-8R-1R-A	ER-1	3	Restore Stream Banks	Larger Stream Initiative
UWC-6L-1L-A	ER-1	5	Restore Stream Banks	Local Stream Repair
UWC-6L-A	ER-1	4	Restore Stream Banks	Local Stream Repair
UWC-7L-A	ER-1	3	Restore Stream Banks	Larger Stream Initiative
UWC-10L-3L-B	ER-1	3	Restore Stream Banks	Local Stream Repair
UWC-10L-2R-1R-B	ER-1	4	Restore Stream Banks	Local Stream Repair
UWC-5L-A	TR-1	3	--	Local Clean-up

6.2.6 Upland Reconnaissance

Twelve neighborhoods were assessed in Upper Ware Creek. Eight of them (WC-UWC-N03 through N09 and N12) are part of the Stonehouse Planned Residential development. These subdivision were laid out with relatively small lots and a significant percentage of the area preserved in its natural undeveloped state. All the areas except Summerfield were developed after 2000. They are all drained with curb, gutter and closed storm drain. While the developed areas were estimated to be 35% to 50% impervious, the roof drains were disconnected from driveways and other impervious surfaces, reducing impacts from smaller storms.

The most significant pollutant source was high-maintenance lawns. All of the Stonehouse neighborhoods met the threshold of 40% of the turf showing evidence of high fertilizer use.

Tree canopy was low in all of the neighborhoods. There is insufficient space between the sidewalk and the curb to plant street trees; however, in many of the areas there is an opportunity to increase canopy on the privately-owned lots. It is also anticipated that canopy cover will increase as the existing young trees mature.

The neighborhoods that are not part of Stonehouse were more variable. Some developed as large lot subdivisions, some smaller and one (Michelle Point) as a mix of small lot single-family and multi-family housing. Imperviousness, percent of lawn and lawn maintenance was also highly variable.

The only site assessed with poor downspout disconnection was Michelle Point. Disconnection retrofits were not feasible. However, as the entire development is treated by a wet pond, it is not a critical factor in this instance.

Table 6.2-7: NSA Sites: UWC Subwatershed

Site ID	Location	Type	Lot Size (ac)	Age	Curb and Gutter	% Infill	% IA	% Lawn	% Canopy	% High Mgmt Lawns	% Disconnected Downspouts
WC-UWC-N01	King's Village	SFL	>1	1990	N	<5%	15	35	40	60	90
WC-UWC-N02	Holly Forks Rd	SFR	>2	20th Cent	N	None	10	50	40	0	100
WC-UWC-N03	Leatherleaf	SFS	1/2 - 1	2000	Y	None	35	40	10	90	85
WC-UWC-N04	Laurel Ridge	SFS	1/4 - 1/2	2000	Y	None	40	30	20	75	85
WC-UWC-N05	Orchard Hill	SFS	1/8 - 1/4	2000	Y	None	50	40	5	50	80
WC-UWC-N06	Lisburn	SFS	1/4 - 1/2	2000	Y	None	35	50	5	40	80
WC-UWC-N07	Bent Tree/ Walnut Creek/ Hillcrest/ Richardson's	SFS	1/2	2000-2010	Y	None	30	30	30	80	85
WC-UWC-N08	Hollow Oak	SFS	1/2 - 1	2000	Y	None	35	30	25	80	95
WC-UWC-N09	Stonehouse Glen	SFS	1/4 - 1	2000-2010	Y	None	35	55	5	90	80
WC-UWC-N10	Michelle Point	SFS/ MFR	1/8	2010	Y	None	50	45	0	5	0
WC-UWC-N11	Burnham Woods / Haley & Whitehall	SFS	1/2	1980	N	None	35	50	5	10	95
WC-UWC-N12	Summerfield	SFS	1/4 - 1/2	1990	Y	None	50	40	5	90	80

Table 6.2-8 shows the results of the NSA assessment. Pollution severity was ranked in the lowest two categories out of four and restoration potential was similar, ranking in the lowest two out of three categories. Essentially, the areas were in relatively good condition and there were few opportunities for improvements.

For the Stonehouse neighborhoods, high-maintenance lawns were the primary source of pollution. Septic systems were a potential source of nitrate in the other areas. As the developments are still fairly new, it is unlikely that the systems will be failing completely and exporting other pollutants.

Potential actions include replacing turf with native landscaping (BayScaping) everywhere. All of the neighborhoods were rated low for existing mulched landscape areas. Outreach for lawn care education and tree planting are also recommended. It was also noted that none of the inlets in the closed storm drain systems were stenciled or marked, so this program is also recommended.

Table 6.2-8: NSA Results: UWC Subwatershed

Site ID	Location	Pollution Severity	Pollution Sources	Restoration Potential	Potential Action
WC-UWC-N01	King's Village	MOD	Septic, high maint lawns	LOW	Native landscaping, lawn care
WC-UWC-N02	Holly Forks Rd	MOD	Septic, turf cover	LOW	Native landscaping
WC-UWC-N03	Leatherleaf	MOD	High maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N04	Laurel Ridge	MOD	High maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N05	Orchard Hill	MOD	High maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N06	Lisburn	MOD	Turf cover, high maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N07	Bent Tree/ Walnut Creek/ Hillcrest/ Richardson's	MOD	Turf cover, high maint lawns	LOW	Native landscaping, trees, lawn care
WC-UWC-N08	Hollow Oak	MOD	High maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N09	Stonehouse Glen	MOD	Turf cover, high maint lawns	MOD	Native landscaping, trees, lawn care, SD marking
WC-UWC-N10	Michelle Point	NO	None	MOD	Native landscaping, trees, SD marking
WC-UWC-N11	Burnham Woods / Haley & Whitehall	MOD	Septic, turf cover	LOW	Native landscaping, tree planting
WC-UWC-N12	Summerfield	MOD	Septic, turf cover, high maint lawns	MOD	Native landscaping, trees, lawn care

6.2.8 Pollutant Loads

6.2.8.1 Existing Conditions

Urban runoff is the largest source of pollutants and runoff volume in Upper Ware Creek, as shown in Table 6.2-9. Modeled loads showed Forest to be a significant contributor to sediment, as well as the other pollutants, in part due to the large amount of land area in this use. Channel erosion was the third largest source of sediment.

Bacteria sources included runoff from all land uses (about 75% of the total). Septics, illicit connections and SSOs contributed all but a minor portion of the remainder.

Table 6.2-9: Existing condition pollutant loads: UWC Subwatershed

EXISTING CONDITIONS	Acres	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	891.4	7,485	1,456	190,410	79,035	1,198
Septic Systems		182	30	1,213	3,478	-
SSOs		3	0	17	1,905	-
Illicit Connections		46	13	343	27,579	-
Active Construction	25.6	78	16	52,817	-	46
Channel Erosion		125	48	156,117	-	-
TOTAL URBAN	916.9	7,918	1,564	400,916	111,998	1,244
RURAL SOURCES						
Rural	699.0	3,215	489	69,895	27,259	264
Forest	1,385.2	3,463	277	138,524	16,623	143
Water	35.2	450	18	5,448	-	-
Wetlands			included w/ forest			
Livestock		375	63	-	188	-
TOTAL RURAL	2,119.3	7,503	846	213,867	44,069	407
POINT SOURCES						
Municipal / Industrial		-	-	-	-	-
Marinas		-	-	-	-	-
TOTAL POINT SOURCES		-	-	-	-	
TOTAL	**3,036.3**	**15,422**	**2,410**	**614,783**	**156,067**	**1,650**

The totals for urban runoff shown above are the net amounts of pollutants after treatment. Existing treatment systems reduce the urban runoff load through BMPs already in place by about 15%.

Table 6.2-10: Load reductions from existing runoff treatment: UWC Subwatershed

TREATMENT TYPE	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
Structural Stormwater Management Practices	349	143	24,448	10,383	2

6.2.9.2 Future Conditions

Pollutant loading is forecast to change somewhat from existing conditions, as areas zoned for Planned Unit Development are converted from forest to residential uses. Conservation easements and RPA will keep much of the area in its natural state. The change in acreage shown in Table 9 indicates that there is no loss of wetlands or water in the forecasted future land use, as they are entirely within the preservation areas.

Table 6.2-11 shows the effect of build-out on the pollutant loads. All are expected to increase except sediment, where a reduction from the loss of rural land uses is not matched by an urban increase. Septic system and SSO loads will increase as a function of additional residents in the watershed. All other sources were assumed to remain the same.

Table 6.2-11: Forecast change in pollutant loading from future development: UWC Subwatershed

CHANGED LOADS EXISTING TO FUTURE	Acres	TN	TP	TSS	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	665.9	2,183	433	32,822	25,030	626
Septic Systems		157	26	1,049	3,009	-
SSOs		0	0	1	32	-
CSOs		-	-	-	-	-
Illicit Connections		-	-	-	-	-
Active Construction	(26)	-	-	-	-	-
Channel Erosion		-	-	-	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	640.3	2,337	459	31,807	28,172	626
RURAL SOURCES						
Rural	(136.8)	(629)	(96)	(13,675)	(5,333)	(13)
Forest	(503.6)	(1,259)	(101)	(50,357)	(6,043)	(52)
Water	-	-	-	-	-	-
Wetlands			included w/ forest			
Livestock	-	-	-	-	-	-
TOTAL RURAL	(640.3)	(1,888)	(196)	(64,032)	(11,376)	(65)
POINT SOURCES						
Municipal / Industrial	-	-	-	-	-	-
Marinas	-	-	-	-	-	-
TOTAL POINT SOURCES		-	-	-	-	
TOTAL LOAD		**449**	**263**	**(32,225)**	**16,795**	**561**

6.3 Cow Swamp (COS) Subwatershed

6.3.1 General Description

COS subwatershed (Figure 6-3) is 1,826 acres in size with only 0.8 percent impervious cover mostly associated with roads and parking lots. Only a few residential areas are located in COS subwatershed mostly along the Ware Creek Road and Croaker Road which also serve as the southern ridge of the subwatershed. From Croaker Road and Ware Creek Road the subwatershed drains to Cow Swamp ultimately joining France Swamp at the confluence with Ware Creek. The vast majority of the subwatershed is forest and wetlands.

6.3.2 Soils

Sixty-nine percent of the soils in Cow Swamp subwatershed are poorly drained type C soils, primarily complexes of Emporia, Craven and Kempsville soils. Type B soils make up 21 percent and mainly consist of Kempsville and Suffolk soils. The remaining soils (10 percent) are split between type D and type A soils (six and four percent, respectively). These are complexes of Johnston, Kenansville, and Uchee soils.

6.3.3 Land Use and Impervious Area

Cow Swamp subwatershed consists of 1,826 acres, with 82 percent of the area made up of forested land, eight percent agricultural and six percent wetlands. Only three percent of the subwatershed consists of residential uses, primarily along the southern border of the subwatershed.

Total impervious cover is 13.8 acres, or 0.8 percent. Approximately half of the impervious cover is represented by roads and parking lots. A summary of the existing land use within the subwatershed is shown in Table 6.3-1 and a breakdown of the impervious area is in Table 6.3-2.

Table 6.3-1: COS Subwatershed Existing Land Use

Land Use	Area (ac)	Percent of Subwatershed
Urban		
Single-family, rural, wooded	0.2	0.01
Single-family, rural, turf	19.0	1.04
Single-family, large lot	19.0	1.04
Single-family, small lot	10.1	0.55
Multi-family and townhouse	0.0	0.00
Commercial	0.0	0.00
Institutional (churches, schools)	5.7	0.31
Industrial	0.0	0.00
Transportation (roads, RR, parking)	9.4	0.52
Rural		
Agriculture (cropland and pasture)	148.5	8.13
Open space, meadow	0.00	0.00
Forest	1490.9	81.65
Water	7.1	0.39
Wetland	116.1	6.36
TOTAL	**1826.0**	**100.00**

*Percentages may not add to 100 due to rounding errors.

Table 6.3-2: COS Subwatershed Existing Impervious Area

Impervious Type	Area (ac)	Percent of Subwatershed
Building	2.5	0.1%
Road	7.8	0.4%
Other	3.5	0.2%
TOTAL	13.8	0.8%

Table 6.3-3: COS Subwatershed Future Land Use

Land Use	Area (ac)	Percent of Subwatershed
Single-family, rural, wooded	252.85	13.85
Single-family, rural, turf	100.10	5.48
Single-family, large lot	18.96	1.04
Single-family, small lot	10.08	0.55
Multi-family and townhouse	0.00	0.00
Planned development, residential	873.05	47.81
Commercial	0.00	0.00
Institutional (churches, schools)	5.70	0.31
Planned development, commercial	0.00	0.00
Industrial	0.00	0.00
Transportation (roads, RR, parking)	9.41	0.52
Agriculture (cropland and pasture)	67.45	3.69
Open space, meadow	0.00	0.00
Forest	365.18	20.00
Water	7.12	0.39
Wetland	116.11	6.36
TOTAL	**1826.01**	**100.00**

*Percentages may not add to 100 due to rounding errors.

Table 6.3-4: COS Subwatershed Future Impervious Area

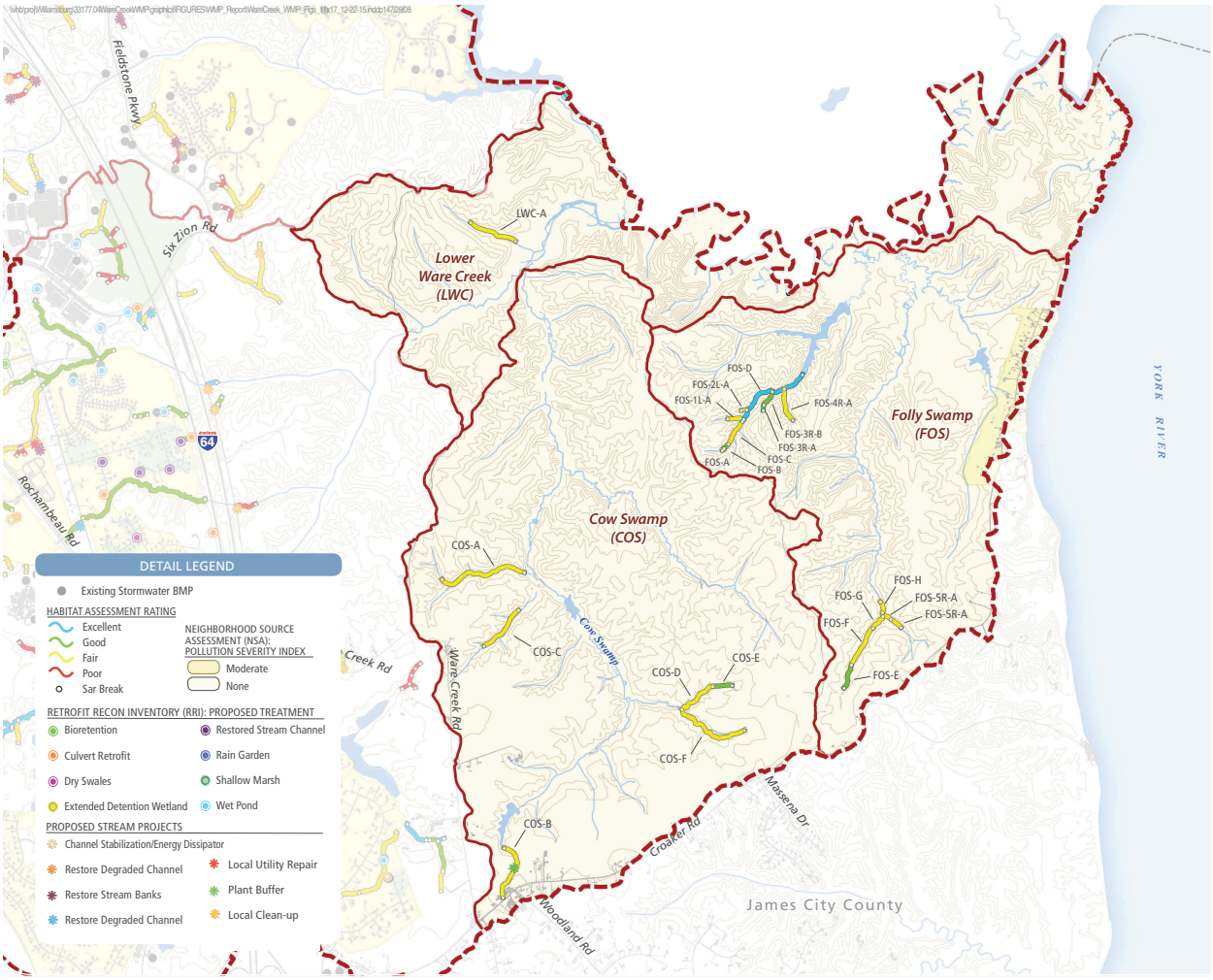
Land Use	Area (ac)	Percent of Subwatershed	Impervious Area (ac)
Urban			
Single-family, rural, wooded	252.9	13.8%	19.0
Single-family, rural, turf	100.1	5.5%	7.6
Single-family, large lot	19.0	1.0%	1.9
Single-family, small lot	10.1	0.6%	1.2
Multi-family and townhouse	0.0	0.0%	0.0
Planned development, residential	873.1	47.8%	174.6
Commercial	0.0	0.0%	0.0
Institutional (churches, schools)	5.7	0.3%	1.8
Planned development, commercial	0.0	0.0%	0.0
Industrial	0.0	0.0%	0.0
Transportation (roads, RR, parking)	9.4	0.5%	4.7
Rural			
Agriculture (cropland and pasture)	67.5	3.7%	0.0
Open space, meadow	0.0	0.0%	0.0
Forest	365.2	20.0%	2.1
Water	7.1	0.4%	0.0
Wetland	116.1	6.4%	0.0
TOTAL	**1826.0**	**3.7%**	**212.8**

6.3.4 Stormwater Management

There are no stormwater management facilities in the Cow Swamp Subwatershed.

6.3.5 Stream Assessment

Approximately 7,018 linear feet of stream channel was assessed in the COS subwatershed (Figure 6-3). All of the stream reaches exhibited a fair Habitat score and good to excellent Floodplain Assessment score. Also, all of the stream reaches were assessed as stable B or E Rosgen stream types and were a stable stage I in the channel evolution model. None of the SAR's warranted remediation. Only one impacted buffer site, COS-B, was observed throughout the subwatershed which could use remediation. COS-B is located near the residential parcels near the intersections of Ware Creek Road and Croaker Road. The proposed treament action would require buffer planting.



Ware Creek
Watershed Management Plan
James City County, Virginia

BASEMAP LEGEND

- Ware Creek Watershed
- Ware Creek Subwatersheds Boundary
- Streams
- Open Water
- County Boundary
- Buildings
- Roads/Pavement
- Topography (CI = 20 ft)

North

0 2,000 ft.

Figure 6-3
Subwatershed Management Plan - Cow Swamp, Folly Swamp, Lower Ware Creek

vhb www.vhb.com

6.3.6 Upland Reconnaissance

There were no HSI or NSA assessments conducted in this subwatershed.

6.3.9 Pollutant Loads

6.3.9.1 Existing Conditions

Cow Swamp is primarily undeveloped, with some areas of agricultural land in the southern portion and scattered sites of large lot residential and institutional uses. Most of the pollutant loads from existing conditions are from the natural forested and wetland areas. Model results show that channel erosion may be a significant contributor to sediment loads. Urban and rural development loads are approximately equal, despite the fact that there is over twice as much rural land generating runoff.

Table 6.3-5: Existing condition pollutant loads: COS Subwatershed

EXISTING CONDITIONS	Area (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	63.4	463	102	10,979	5,422	74
Septic Systems		53	9	354	1,015	-
SSOs		0	0	0	0	-
		-	-	-	-	-
	-	-	-	-	-	-
		45	18	56,693	-	-
Active Construction		-	-	-	-	-
TOTAL URBAN	**63.4**	**463**	**102**	**10,979**	**5,422**	**74**
RURAL SOURCES						
Rural	148.5	683	104	14,851	5,792	15
Forest	1,607.0	4,018	321	160,701	19,284	162
Water	7.1	91	4	1,104	-	-
Wetlands			Included w/ forest			
Livestock		263	30	-	1,000	-
Rural	148.5	683	104	14,851	5,792	15
TOTAL RURAL	1,762.6	5,054	459	176,656	26,076	176
TOTAL LOAD	**1,826.0**	**5,616**	**587**	**244,681**	**32,512**	**250**

6.3.9.2 Future Conditions

The urbanization of forest and rural land use in Cow Swamp has a significant effect on pollutant loading, increasing urban runoff loads by factors of 8 to 10. Table 6.3-6 shows that loads of all pollutants except sediment are forecast to increase. Septic system and SSO loads increase as well, due to the larger number of residents in the subwatershed. About five percent of the increased

dwelling units will be in areas zoned for lots larger than three acres: these are assumed to be on septic, while the other new residents will be connected to the sanitary sewer.

Table 6.3-6: Forecast change in pollutant loading from future development: COS Subwatershed

CHANGED LOADS EXISTING TO FUTURE	Area (acres)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	1,206.8	3,988	763	64,989	52,089	900
Septic Systems		210	35	1,403	4,024	-
SSOs		11	2	76	8,600	-
Illicit Connections		-	-	-	-	-
Active Construction		-	-	-	-	-
Channel Erosion		-	-	-	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	**1,206.8**	**4,209**	**799**	**66,468**	**64,712**	**900**
RURAL SOURCES						
Rural	(81.1)	(373)	(57)	(8,106)	(3,161)	(8)
Forest	(1,125.7)	(2,814)	(225)	(112,572)	(13,509)	(113)
Water	-	-	-	-	-	-
Wetlands			Included w/ forest			
Livestock	-	-	-	-	-	-
TOTAL RURAL	**(1,206.8)**	**(3,187)**	**(282)**	**(120,678)**	**(16,670)**	**(121)**
TOTAL LOAD	**-**	**1,022**	**518**	**(54,210)**	**48,042**	**779**

6.4 Folly Swamp (FOS) Subwatershed

6.4.1 General Description

FOS subwatershed (Figure 6-3) is 1,196 acres in size with only 0.8 percent impervious cover mostly associated with roads and parking lots. Only a few residential areas mostly associated with single family large lots are located in FOS subwatershed. The majority of the residential is located along Croaker Road which also serve as the eastern ridge of the subwatershed. From Croaker Road the subwatershed drains to Folly Swamp ultimately joining Ware Creek. The vast majority of the subwatershed is forest and wetlands.

6.4.2 Soils

Eighty-two percent of the soils in Folly Swamp subwatershed are poorly drained type C soils, primarily complexes of Emporia and Craven soils. The remaining soils include Type D soils making up 11 percent and type B soils at eight percent. The D soils are primarily Johnston and Bohicket complexes while the B soils include Norfolk, Suffolk and Bojac.

6.4.3 Land Use and Impervious Area

6.4.3.1 Existing Conditions

Folly Swamp subwatershed consists of 1,196 acres, with 83 percent of the area made up of forested land, nine percent wetlands and six percent in residential uses.

Total impervious cover is 9.9 acres, or 0.8 percent. Approximately half of the impervious cover is represented by roads and parking lots. A summary of the land use within the subwatershed is shown in Table 6.4-1 and a breakdown of the impervious area is in Table 6.4-2.

Table 6.4-1: FOS Subwatershed Existing Land Use

Land Use	Area (acres)	Percent of Subwatershed	Impervious Area (acres)
URBAN			
Single-family, rural, wooded	18.2	1.52%	0.4
Single-family, rural, turf	3.9	0.32%	0.3
Single-family, large lot	27.7	2.32%	1.8
Single-family, small lot	17.2	1.43%	2.3
Multi-family and townhouse	0.0	0.00%	0.0
Commercial	1.5	0.13%	0.0
Institutional (churches, schools)	0.0	0.00%	0.0
Industrial	0.0	0.00%	0.0
Transportation (roads, RR, parking)	8.1	0.68%	3.8
RURAL			
Agriculture (cropland and pasture)	0.0	0.00%	0.0
Open space, meadow	0.0	0.00%	0.0
Forest	993.7	83.12%	1.2
Water	14.7	1.23%	0.0
Wetland	110.4	9.24%	0.1
TOTAL	**1,195.5**	**100.00%**	**9.9**

*Percentages may not add to 100 due to rounding errors.

Table 6.4-2: FOS Subwatershed Existing Impervious Area

Impervious Type	Area (ac)	Percent of Subwatershed
Building	2.4	0.2%
Road	4.8	0.4%
Other	2.7	0.2%
TOTAL	**9.9**	**0.8%**

6.4.3.2 Future Conditions

Over to half of the Folly Swamp subwatershed (57 percent) is projected as planned development for residential land uses and existing forested land is reduced by approximately 60 percent. Total impervious cover is projected to increase to 150.4 acres, or 12.6 percent. The majority of future impervious area will be from planned residential development. A summary of the future land use within the subwatershed is shown in Table 6.4-3.

Table 6.4-3: FOS Subwatershed Future Land Use

Land Use	Area (acres)	Percent of Subwatershed	Impervious Area (acres)
URBAN			
Single-family, rural, wooded	61.0	5.10%	3.6
Single-family, rural, turf	3.9	0.32%	0.3
Single-family, large lot	27.7	2.32%	1.8
Single-family, small lot	17.2	1.43%	2.3
Multi-family and townhouse	0.0	0.00%	0.0
Planned development, residential	686.1	57.39%	137.2
Commercial	1.5	0.13%	0.0
Institutional (churches, schools)	0.0	0.00%	0.0
Planned development, commercial	0.0	0.00%	0.0
Industrial	0.0	0.00%	0.0
Transportation (roads, RR, parking)	8.1	0.68%	3.8
RURAL			
Agriculture (cropland and pasture)	0.0	0.00%	0.0
Open space, meadow	0.0	0.00%	0.0
Forest	264.8	22.15%	1.2
Water	14.7	1.23%	0.0
Wetland	110.4	9.24%	0.1
TOTAL	**1195.5**	**100.00%**	**150.35**

6.4.4 Stormwater Management

There are no stormwater management facilities in the subwatershed.

6.4.5 Stream Assessment

Approximately 3,916 linear feet of stream channel was assessed in the FOS subwatershed (Figure 6-3). All of the stream reaches exhibited a fair Habitat score and good to excellent Floodplain Assessment score. Also, all of the stream reaches were assessed as stable B or E Rosgen stream types and a stable stage I in the channel evolution model. None of the SAR's nor point features observed during the stream assessment warranted remediation.

6.4.6 Upland Reconnaissance

There were no Hotspots in the Folly Swamp subwatershed. Two subdivisions overlooking the York River were identified for the NSA assessment, and subsequently combined as one site during the field assessment. Characteristics of each lot are highly variable, as they appear to have been developed individually from 1900 through 2006, with about half of the lots developed in the 1950s and 1960s. Lot sizes ranged from about 1/3 acre to 3 acres, with a typical size of about 1 acre. There is only one street through the neighborhood, which is drained with open section drainage and sheet flow. The area had good canopy cover, low imperviousness, and all the downspouts appeared to be disconnected and draining to pervious areas.

Table 6.4-4: NSA sites: FOS Subwatershed

Site ID	Location	Type	Lot Size (ac)	Age	Curb and Gutter	% Infill	% IA	% Lawn	% Canopy	% High Mgmt Lawns	% Disconnected Downspouts
WC-FOS-N01	William Lee Tract / Sycamore Landing	SFL	1	20th Cent	N	<5 %	15	25	50	0	100

Table 6.4-5 shows the results of the NSA assessment. Pollution severity was ranked in the second lowest category and restoration potential was ranked in the lowest category. The only potential action recommended was BayScaping. The neighborhood was rated low for existing mulched landscape areas.

Septic systems are a potential pollutant source for nitrates and given the age of much of the area and the proximity to the York River, they may be a more serious concern than in some areas farther upstream.

Table 6.4-5: NSA Results: FOS Subwatershed

Site ID	Location	Pollution Severity	Pollution Sources	Restoration Potential	Potential Action
WC-FOS-N01	William Lee Tract / Sycamore Landing	MOD	Septic	LOW	BayScaping

6.4.7 Pollutant Loads

6.4.7.1 Existing Conditions

Reflecting the largely undeveloped nature of this subwatershed, urban runoff is not the largest source of any pollutant or runoff volume. Most of the area is currently forested or wetland and these land uses, which are combined in the modeling and are the primary sources of pollutants. Channel erosion was the second largest source of sediment. Active construction was not modeled and is not expected to be a large contributor in the short run.

Bacteria sources included runoff from all land uses, with Forest as the predominant source. Septic systems and illicit connections account for the remainder.

Table 6.4-6: Existing condition pollutant loads: FOS Subwatershed

EXISTING CONDITIONS	Area (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	76.6	434	102	10,335	5,583	70
Septic Systems		80	13	531	1,523	-
SSOs		-	-	-	-	-
Illicit Connections		-	-	-	-	-
Active Construction	-	-	-	-	-	-
Channel Erosion		30	12	37,334	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	76.6	543	127	48,199	7,106	70
RURAL SOURCES						
Rural	-	-	-	-	-	-
Forest	1,104.2	2,761	221	110,421	13,251	123
Water	14.8	189	7	2,288	-	-
Wetlands						
Livestock		-	-	-	-	-
TOTAL RURAL	1,762.6	5,054	459	176,656	26,076	176
TOTAL	**1,195.6**	**3,493**	**355**	**160,908**	**20,356**	**193**

6.4.9.2 Future Conditions

Pollutant loading is forecast to change very little from existing conditions. Approximately 2 acres, or less than 1% of the subwatershed, of open urban land and forest is projected to be developed as residential land use. Given that this is a small number acres relative to the area of the subwatershed and the fact that 24% of the subwatershed is already impervious, it is likely that future development will have little impact on the subwatershed's pollutant loads.

Table 6.4-7: Future condition pollutant loads: FOS Subwatershed

FUTURE CONDITIONS	Area (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	728.9	2,627	488	43,595	34,941	604
Septic Systems		28	5	190	544	-
SSOs		9	1	57	6,450	-
Illicit Connections		-	-	-	-	-
Active Construction		-	-	-	-	-
Channel Erosion		-	-	-	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	728.9	2,664	494	43,842	41,935	604
RURAL SOURCES						
Rural	-	-	-	-	-	-
Forest	(728.9)	(1,822)	(146)	(72,891)	(8,747)	(81)
Water	-	-	-	-	-	-
Wetlands						
Livestock	-	-	-	-	-	-
TOTAL RURAL	728.9	(1,822)	(146)	(72,891)	(8,747)	(81)
TOTAL	**-**	**842**	**348**	**(29,049)**	**33,188**	**523**

6.5 Lower Ware Creek (LWC) Subwatershed

6.5.1 General Description

LWC subwatershed (Figure 6-3) is 952 acres in size with only 0.6 percent impervious cover mostly associated with roads and parking lots. No other development is present in the LWC subwatershed. The subwatershed, which is predominantly forest and wetlands, drains to France Swamp then ultimately joining Ware Creek. The vast majority of the subwatershed is forest and wetlands.

6.5.2 Soils

Fifty-nine percent of the soils in LWC subwatershed are poorly drained type C soils, primarily complexes of Emporia and Craven soils. Type D and type B soils make up all but a very minor portion of the remaining soils (22 percent and 14 percent, respectively). These are Johnston, Kempsville and Bohicket complex soils. Type A soils are limited to three percent and are Kenansville and Uchee complexes.

6.5.3 Land Use and Impervious Area

6.5.3.1 Existing Conditions

LWC subwatershed consists of 952 acres, with 73 percent of the area made up of forested land and 23 percent in wetlands. No major development exists within the subwatershed and transportation use makes up only one percent of the total area.

Total impervious cover is 3.1 acres, or 0.3 percent. All of the impervious cover consists of roads and parking lots. A summary of the land use within the subwatershed is shown in Table 6.5-1 and a breakdown of the impervious area is in Table 6.5-2.

Table 6.5-1: LWC Subwatershed Existing Land Use

Land Use	Area (acres)	Percent of Subwatershed	Impervious Area (acres)
URBAN			
Single-family, rural, wooded	0.0	0.00%	0.0
Single-family, rural, turf	0.0	0.00%	0.0
Single-family, large lot	0.0	0.00%	0.0
Single-family, small lot	0.0	0.00%	0.0
Multi-family and townhouse	0.0	0.00%	0.0
Commercial	0.0	0.00%	0.0
Institutional (churches, schools)	0.0	0.00%	0.0
Industrial	0.0	0.00%	0.0
Transportation (roads, RR, parking)	5.4	0.57%	2.8
RURAL			
Agriculture (cropland and pasture)	0.0	0.00%	0.0
Open space, meadow	0.0	0.00%	0.0
Forest	696.1	73.07%	0.23
Water	36.3	3.81%	0.0
Wetland	214.8	22.55%	0.0
TOTAL	**952.5**	**100.00%**	**3.1**

*Percentages may not add to 100 due to rounding errors.

Table 6.5-2: LWC Subwatershed Existing Impervious Area

Impervious Type	Area (ac)	Percent of Subwatershed
Building	0.0	0%
Road	3.1	0.3%
Other	0.0	0%
TOTAL	**3.1**	**0.3%**

6.5.3.2 Future Conditions

Approximately 43 percent of the Lower Ware Creek Subwatershed is projected as residential development. Forested lands are projected to decrease by 47 percent. Wetlands will remain at 23 percent.

Total impervious cover is projected to increase to 97.3 acres, or 10.2 percent. The majority of future impervious area will be from planned residential and commercial development. A summary of the future land use within the subwatershed is shown in Table 6.5-3.

Table 6.5-3: LWC Subwatershed Future Land Use

Land Use	Area (acres)	Percent of Subwatershed	Impervious Area (acres)
URBAN			
Single-family, rural, wooded	0.0	0.00%	0.0
Single-family, rural, turf	0.0	0.00%	0.0
Single-family, large lot	0.0	0.00%	0.0
Single-family, small lot	0.0	0.00%	0.0
Multi-family and townhouse	0.0	0.00%	0.0
Planned development, residential	409.1	42.95%	81.8
Commercial	0.0	0.00%	0.0
Institutional (churches, schools)	0.0	0.00%	0.0
Planned development, commercial	38.7	4.06%	12.4
Industrial	0.0	0.00%	0.0
Transportation (roads, RR, parking)	5.4	0.57%	2.8
RURAL			
Agriculture (cropland and pasture)	0.0	0.00%	0.0
Open space, meadow	0.0	0.00%	0.0
Forest	248.3	26.07%	0.2
Water	36.3	3.81%	0.0
Wetland	214.8	22.55%	0.0
TOTAL	**952.5**	**100.00%**	**97.2**

*Percentages may not add to 100 due to rounding errors.

6.5.4 Stormwater Management

There are no stormwater management facilities in the subwatershed.

6.5.5 Stream Assessment

Approximately 1,065 linear feet of stream channel was assessed in the LWC subwatershed (Figure 6-3). The one stream reach that was assessed scored a fair Habitat score and excellent Floodplain

Assessment score. The stream reach was assessed as stable E Rosgen stream type and a stable stage I per the channel evolution model. This reach did not warrant remediation.

6.5.6 Upland Reconnaissance

There were no Hotspot or Neighborhood Site Assessments in the LWC subwatershed.

6.5.7 Pollutant Loads

6.5.7.1 Existing Conditions

LWC is essentially undeveloped, so the majority of pollutant loads from existing conditions come from natural forested and wetland areas. The small amount of loading from urban runoff is attributed to the roads in the subwatershed. Channel erosion was the second largest source of sediment. Active construction was not modeled and is not expected to be a large contributor in the short run.

Table 6.5-4: Existing condition pollutant loads – LWC Subwatershed

EXISTING CONDITIONS	Area (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	5.4	68	10	2,420	358	12
Septic Systems		-	-	-	-	-
SSOs		0	0	0	0	-
Illicit Connections		-	-	-	-	-
Active Construction	-	-	-	-	-	-
Channel Erosion		24	9	30,008	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	**5.4**	**92**	**20**	**32,428**	**358**	**12**
RURAL SOURCES						
Rural	-	-	-	-	-	-
Forest	910.8	2,277	182	91,082	10,930	100
Water	36.3	465	18	5,630	-	-
Wetlands						
Livestock		-	-	-	-	-
TOTAL RURAL	**947.1**	**2,742**	**200**	**96,712**	**10,930**	**100**
TOTAL	**952.5**	**2,834**	**220**	**129,140**	**11,288**	**112**

6.5.9.2 Future Conditions

Pollutant loading will change considerably from existing conditions. About half of the subwatershed is zoned for Planned Unit Development, which result in conversion of forest to residential uses. Model results in Table 6.5-5 show that urban runoff will be the main source of pollutants for every constituent except sediment. There are also new loads from SSOs, reflecting the increase in the number of residents, installation of sewers and new septic systems. Because no large lot (>3 acre) areas were zoned in this subwatershed, it was assumed that all wastewater would be treated without onsite septic systems.

Table 6.5-5: Future condition pollutant loads – LWC Subwatershed

FUTURE CONDITIONS	Area (ac)	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)	FC (billion/yr)	Runoff (ac-ft)
URBAN SOURCES						
Urban Runoff	447.8	1,522	289	25,092	20,111	393
Septic Systems		-	-	-	-	-
SSOs		6	1	38	4,300	-
Illicit Connections		-	-	-	-	-
Active Construction		-	-	-	-	-
Channel Erosion		-	-	-	-	-
Road Sanding		-	-	-	-	-
TOTAL URBAN	447.8	1,528	290	25,130	24,411	393
RURAL SOURCES						
Rural	-	-	-	-	-	-
Forest	(447.8)	(1,119)	(90)	(44,776)	(5,373)	(49)
Water	-	-	-	-	-	-
Wetlands						
Livestock	-	-	-	-	-	-
TOTAL RURAL	(447.8)	(1,119)	(90)	(44,776)	(5,373)	(49)
TOTAL	**-**	**408**	**200**	**(19,646)**	**19,038**	**344**

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Appendix A: Conservation Area Report Summary

The Conservation Area Assessment for the Ware Creek subwatershed utilized the same format, methodology and substance as previous reports presented to the County for the Powhatan, Yarmouth, Gordon Creek and Mill Creek watersheds. The conservation area assessment includes VHBs findings for the Upland Contiguous Forest, Non-RPA Wetlands and Rare, Threatened or Endangered (RTE) Species field investigations.

Based on a review of the Department of Conservation and Recreation (DCR) Division of Natural Heritage (DNH) database, supporting information from other federal and state agencies and field reconnaissance, the following conclusions may be drawn regarding previously documented RTE species within the Ware Creek watershed.

1. the active and occupied **bald eagle** nests reported by natural resource agencies reflect the presence of suitable nesting and foraging habitat both in and around the Ware Creek Watershed. Proactive regulatory agency coordination (e.g., Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act) and proper conservation management techniques should be considered in advance of changes to land use;
2. the presence of known **small whorled pogonia** populations and abundant potential forested upland habitat within the watershed indicate the need for regulatory agency coordination for this species prior to changes in land use within uplands;
3. the presence of potential habitat for other federally listed (**sensitive joint-vetch**) and state-listed (**Mabee's salamander, Henslow's sparrow, and loggerhead shrike**) RTE species may trigger natural resources agency review of any proposed impacts to potential habitat.

A.1 Conservation Area 1

Conservation Area 1 is located between Holly Forks Road and Fire Tower Road and is included entirely within parcel 0420100008. Area 1 is a depressional wetland feature, i.e. "vernal pool," that is positioned atop a topographical saddle. Saddles can provide excellent habitat for select wildlife species, being regularly used as travel corridors and as breeding and/or feeding grounds. The surrounding landscape adjacent to the wetlands has recently (i.e. <10 years) been logged, as indicated by the relative size of the adjacent pine and hardwood stands. Site hydrology has become altered as trees were removed, resulting in an excess of hydrology onsite to remain only until regenerative growth matures and replaces previous evapotranspiration rates. Vegetation present within EPW 1 is typical of the coastal plain physiographic province with red maple *(Acer rubrum),* sweetgum *(Liquidambar styraciflua)* and loblolly pine *(Pinus taeda)* dominating the shrub and sub-canopy layers, and broomsedge *(Andropogon virginicus),* soft rush *(Juncus effusus)* and seedbox *(Ludwigia palustris)* dominating the herb and forbs layers. Soils within the wetlands are chemically reduced and therefore meet the criteria for hydric soils established by the National Technical Committee for Hydric Soils (NTCHS), particularly the F3 hydric soil indicator (Depleted Matrix). Wetland soils are slightly greyish to brownish color with a matrix of 10YR 4/1 or 5/1 (65-90%) and redoximorphic features (e.g., iron-oxide concentrations) of 10YR 5/6 (35-10%) based on the Munsell Soil Color classification system.

Wetland hydrology includes many primary and secondary indicators including: surface water, high water table, saturation, water marks, inundation visible on aerial imagery, water-stained leaves, oxidized rhizospheres on living roots, drainage patterns, crayfish burrows and geomorphic position. Wildlife usage among depressional wetlands can be extremely high, and are commonly used as breeding grounds for amphibian species when species are absent. These "vernal pools" oftentimes provide necessary critical habitat for RTE amphibian species and support a variety of unique vegetation community assemblages. Additionally, several species of reptiles, small mammals, birds, insects and arthropods will use these depressional wetlands in some stage of their life cycle. No wildlife was encountered while the field investigation was conducted, however; white-tailed deer (*Odocoileus virginianus*) and eastern cottontail rabbit (*Sylvilagus floridanus*) scat and tracts were observed.

Photograph 1. EPW 1. Non-tidal forested wetland (i.e. vernal pool) located within parcel 0420100008. Positioned within a topographical saddle, wetland hydrology results from surface runoff from localized precipitation events.

A.2 Conservation Area 2

Conservation Area 2 is located west of Croaker Road and the site can be accessed from Croaker Road via a gated entrance. Area 2 is located within parcel 0630100005, which is owned by GS Stonehouse Green Land Sub 2, LLC and totals 3,031.43 acres. UCF points 5-7 are positioned within close proximity to EPW 2, as the majority of the total tract is forested with varying forested seral stages represented. Conservation Area 2 is located within the upper limits of a topographical drainage feature and hydrology has been altered resulting from the creation of an access road that bisects the drainage feature. A small culvert is present; however, debris is restricting flow, thus allowing water to remain stagnant and back up on the upstream side of the road. Currenty, parcel 0630100005, among others owned by GS Stonehouse Green Land Sub 2, LLC, is being leased by a local hunt club. Wetland vegetation and soils were found to be similar to EPW 1, with the addition of roundleaf greenbrier (*Smilax rotundifolia),* Japanese honeysuckle (*Lonicera japonica*) and royal fern (*Osmunda regalis*) present within the herbaceous and forbs layer. Wetland hydrology present includes surface water, high water table, saturation, water marks, inundation visible on aerial imagery, water-stained leaves, oxidized rhizospheres on living roots, drainage patterns, crayfish burrows, geomorphic position and FAC-Neural test positive. Light to moderate white-tailed deer browse was identified, specifically on young roundleaf greenbrier shoots and other soft and palatable vegetative species. No wildlife was encountered during the field investigation; however, habitat potential within the wetland community would be characteristic of species inhabiting the coastal plain physiographic region, which may include eastern gray squirrel (*Sciurus carolinensis*),

white-tailed deer, Eastern Wild Turkey (*Meleagris gallopavo silvestris*), Mourning Dove (*Zenaida macroura*), eastern coyote (*Canis latrans*), black racer snake (*Coluber constrictor priapus)*, copperhead (Agkistrodon *contortrix*), green tree frog (*Hyla cinerea)*, southern leopard frog (*Rana sphenocephala)*, Great-Horned Owl (*Bubo virginianus)*, Barred Owl (*Strix varia)* and many other mammal, bird, insect, reptile and amphibian species.

Photograph 2. EPW 2. Non-tidal forested wetland (i.e. vernal pool) located within parcel 0630100005, providing excellent wildlife habitat and breeding grounds for select amphibian and reptile species.

Appendix B: Stormwater Management in James City County

The JCC Environmental Division is responsible for review and approval of stormwater management practices, for compliance inspections of stormwater management facilities during construction, and for maintaining an updated database of best management practices (BMPs) in JCC.

JCC has three ordinances regulating stormwater management:

- James City County Code Chapter 18A: Stormwater Management: prohibits illicit discharges to the storm sewer system.

- James City County Code Chapter 8: Erosion and Sediment Control: requires the control of erosion and sediment and includes measures to reduce stream channel erosion downstream of development projects. Erosion and Sediment Control plans must be submitted for all projects disturbing greater than 2,500 square feet and must conform to the James City County Guidelines for Design and Construction of Stormwater Management BMPs (Guidelines) and to the Virginia Erosion and Sediment Control Regulations, including minimum standards, and the Virginia Erosion and Sediment Control Handbook. Single family residences are exempt from submitting plans but must have an Agreement in Lieu of a plan and a site plan showing erosion control measures is required before issuance of a Building Permit.

- James City County Code Chapter 23: Chesapeake Bay Preservation Ordinance: contains requirements for reducing pollutant loading associated with new impervious areas. The entire County is designated as Chesapeake Bay Preservation Area (CBPA); specifically a Resource Management Area, or RMA. Those lands having an intrinsic water quality function based on their ecologic and biologic characteristics are classified as Resource Protection Areas (RPAs) in accordance with Section 23-3. These include tidal wetlands, tidal shores, non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, as well as a 100-ft buffer extending from the limits of each of these features.

In addition to the ordinances and guidelines listed above, JCC regulates and tracks stormwater management practices through the following measures:

- *Stormwater Drainage Conveyance Systems (Non-BMP Related) General Design and Construction Guidelines* (James City County Environmental Division, March 2001) provides design and installation criteria for private stormwater conveyance systems located outside VDOT right of way.

- *Stormwater Management/BMP Facilities, Record Drawing and Construction Certification, Standard Forms & Instructions* (James City County Environmental Division) is used to ensure that BMPs were designed and installed per JCC requirements and requires that as-built drawings be supplied to JCC to maintain their BMP database.

- *Special Stormwater Criteria (SSC) in James City County, Virginia* (Special Stormwater Criteria Task Group, December 14, 2004 Revised July 1, 2014) was developed as a result of goals and priorities as established by approved watershed management plans in James City County and following a year long process involving a multi-disciplined stormwater task group. The criteria was approved by resolution of the Board of Supervisors by resolution date December 14, 2004 and revised administratively by the VESCP/VSMP authority due to local adoption of the Virginia Stormwater Management Program. Objectives of Special Stormwater Criteria (SSC) include:
  - Protection of specific stream reaches from accelerated channel erosion;
  - Protection of conservation areas from the impacts of stormwater runoff;
  - Protection of high quality wetlands from the effects of altered water level fluctuation;
  - Developing more effective criteria and locations for stormwater practices in watersheds for new development;
  - Retrofitting of existing facilities and uncontrolled areas of the watershed to improve water quality.

  Special Stormwater Criteria (SSC) was developed to achieve two primary goals. The first is to preserve pre-development hydrology to reduce impacts to high quality streams. The volume of recharge that occurs on a site depends on slope, soil type, vegetative cover, precipitation and evapo-transpiration. Sites with natural ground cover, such as forests and meadows, have higher recharge rates, less runoff and greater transpiration losses under most conditions. This helps to preserve existing water table elevations thereby maintaining the hydrology of streams and wetlands during dry weather. Because development reduces natural cover and increases impervious surfaces, a net decrease in recharge rates is inevitable.

  The second primary goal of Special Stormwater Criteria (SSC) is to provide enhanced water quality treatment of stormwater runoff. Current (traditional) stormwater management for water quality in watersheds is characterized by the use of a single structural BMP practice, namely a wet or dry pond, to manage stormwater from a contributing drainage area. However, many of these practices have not been properly maintained, reducing their pollutant removal capability. In addition, although the County's codes and ordinances allow for reduced impervious cover and open space preservation in site design, it does not appear that developers consistently exercise those options. More sensitive site design can play a significant role in reducing water quality and hydrologic impacts resulting from development.

  In general, Special Stormwater Criteria (SSC) are considered to be one step above and beyond traditional Virginia and County stormwater management criteria, focusing more on the aspects of site design and source control - as opposed to traditional stormwater treatment at the end of stormwater drainage collection and conveyance systems. Use of Special Stormwater Criteria (SSC) on a proposed development site does not remove the need to provide traditional

stormwater quality treatment and quality control in accordance with current County Chesapeake Bay Preservation, Erosion and Sediment Control, and Virginia Stormwater Management Program ordinances, the Virginia stormwater management BMP clearinghouse, the Virginia DEQ Stormwater Design Specifications, and the Virginia Erosion and Sediment Control and Stormwater Management Handbooks. The use of additional measures in the drainage basin beyond traditional methods may, however, subsequently affect post-development site hydrology and reduce the peak rate and volume of runoff, thereby perhaps reducing the size or storage volume requirements of traditional end-of-pipe detention or retention facilities.

B.1 Stormwater Management Requirements

The CBPA requires review and approval of a stormwater management plan for all new development and redevelopment sites over 2,500 square feet. Single family lots that are not part of a larger plan of development are typically exempt. Stormwater management plans must include location and design of stormwater controls and best management practices (BMPs) conforming to the *Virginia BMP Clearinghouse,* and "procedures for implementing non-structural stormwater control practices, and establishment of a long-term schedule for inspection and maintenance of stormwater management facilities."

Stormwater management requirements in JCC include the following:

- Provide Required Pollutant Load Removal
- Provide Required Virginia Runoff Reduction Method (VRRM)
- Meet Channel Protection Criteria
- Meet Flood Protection Criteria

B.1.1 Allowable Stormwater Practices

For a development project to achieve compliance with water quality regulations, the "…County currently allows over 20 structural BMP types, including wet ponds, wetland systems, infiltration practices, filtering systems, open channel systems and extended dry detention facilities." Each approved treatment practice is assigned a score, with all sites required to achieve a minimum of 10 points. Points are also available for non-structural BMPs, including:

- Preservation of dedicated natural open space through conservation easements;
- Open spaces which accept or treat stormwater from a development site; and
- Conservation areas directly adjacent to targeted environmentally sensitive areas such as wetlands, mature forest or RPAs.

B.1.2 Stormwater Practice Maintenance and Inspection

JCC requires an executed and recorded Declaration of Covenants – Inspection / Maintenance of Drainage System for all projects that involve the construction of stormwater management or drainage facilities, which are privately maintained. JCC requires facility-specific long term inspection and maintenance plans to be shown on the stormwater management plans for all stormwater management facilities.

JCC performs periodic BMP inspections during construction, and maintains a database of stormwater management practices in the County. JCC is currently inventorying BMPs countywide to identify potential problems in order to provide technical assistance to the BMP owners, to track on-going maintenance efforts, and to identify future BMP maintenance needs.

B.1.3 Watershed Education

JCC conducts watershed education through the Protecting Resources in Delicate Environments (PRIDE) program, which is the educational component of JCC's water quality program. The PRIDE program teaches residents about the importance of watershed protection while providing residents and neighborhoods with specific watershed restoration and protection tools. For example, the PRIDE website contains information on proper lawn care, downspout disconnection, and rain gardens.

Homeowner's Associations can earn PRIDE designations for their neighborhoods by engaging in watershed protection activities like BMP improvement, stream restoration, or tree planting. JCC will also make presentations and provide information for Homeowner's Association about how to maintain stormwater facilities.

B.1.4 Watershed Maintenance

The JCC Stormwater Division has a drainage improvement program that works in partnership with property owners and residents to remedy drainage and erosion problems that are adversely affecting residents and/or County waterways. The Stormwater Division provides technical guidance and assistance and, where appropriate, may provide financial assistance in the design and implementation of improvements. Projects are prioritized and scheduled based on specific criteria and available funding. In cooperation with VHB, a Decision Support System (DSS) has been developed (see Appendix D) to assist JCC in prioritizing stormwater retrofit opportunities based on a suite of criteria, including weighing projected water quality and natural resources benefits against potential project constraints.

To qualify for funding:

- The property must lie entirely within James City County.
- The problem must be located outside of the VDOT right-of-way.

- Prior to the use of any public funds, attempts will be made to resolve the problem within the private sector.
- The property must have an adequate maintenance/drainage easement, or the owner must be willing to grant such an easement.

B.1.5 Watershed Restoration

JCC's Stormwater or Water Quality Improvement Fund is a capital improvement fund dedicated to stormwater treatment/management and drainage related issues. In the past, the fund has been used for the design and construction of regional stormwater facilities and to address drainage problems. However, watershed restoration approaches are watershed specific and can vary markedly depending on the degree to which the watershed is developed and other local conditions (e.g., topographic setting, hydrologic soil group, etc.). Approaches can include stream restoration and enhancement, stream bank and channel stabilization, stormwater outfall stabilization or retrofit for velocity dissipation, retrofitting stormwater BMPs from dry ponds to wet ponds, increasing BMP capacity, methods to increase infiltration in dry roadside swales, and so on.

Appendix C: Candidate Sites for Watershed Restoration Activities

TABLE C-1: CANDIDATE LOCATIONS FOR STREAM REMEDIATION

SAR ID	SAR Length (ft)	CEM Stage	Rosgen	Habitat Score	Habitat Rating	Floodplain Score	Floodplain Rating	Restoration Potential	Restoration Access	Proposed Treatment	Specific Action	Notes
FRANCE SWAMP												
FRS-10L-1R-A	438	I	C5	136	Fair	56	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-10L-A	600	I	C5	132	Fair	46	Fair	None	Good	No Action	Stream Enhancement	Proposed restoration by reconnecting the channel to the floodplain and including grade control structures to prevent future incision.
FRS-11R-A	497	I	E6	114	Fair	55	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-12L-1L-A	146	II/III	G5	95	Poor	47	Fair	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
FRS-12L-1L-B	456	I	E5	110	Fair	52	Fair	Low	Good	No Action	No Action	No actions are recommended for this reach.
FRS-12L-A	1,572	I	E5	104	Poor	47	Fair	None	Fair	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-13L-1L-A	170	I	B6	93	Poor	45	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-13L-1L-B	637	I	E6	137	Fair	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-1L-A	138	I	E6	131	Fair	49	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-14R-2L-1R-A	102	I	B5a	95	Poor	51	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-2L-A	287	II	E5b	133	Fair	63	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-3R-1R-A	166	I	B6	118	Fair	51	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-3R-A	624	I	E6	129	Fair	58	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-14R-3R-B	187	II	G5	119	Fair	51	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-4L-A	179	II/III	E5	80	Poor	35	Poor	Moderate	Good	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-14R-5R-1R-A	232	II/III	G5c	43	Poor	19	Poor	High	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-14R-5R-1R-B	374	I	C5	80	Poor	50	Fair	Moderate	Difficult	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-14R-6L-A	276	I	E5	123	Fair	57	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-6L-B	154	III	E5	106	Fair	54	Good	Moderate	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-6L-C	209	I	E6	133	Fair	57	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-14R-A	1,136	I	C5	128	Fair	62	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-15R-A	390	I	E6	130	Fair	59	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-16L-A	678	I	C5	137	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-16L-B	623	III	B5	135	Fair	60	Excellent	Moderate	Difficult	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-16L-C	788	III	G5	124	Fair	60	Excellent	Moderate	Difficult	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-17L-1R-A	392	I	E6	129	Fair	63	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-2L-A	402	I	E6	122	Fair	52	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-18R-2L-B	1,113	I	E5	122	Fair	54	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-18R-2L-C	682	I	E5	134	Fair	57	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-3L-A	198	I	E6	95	Poor	56	Good	Low	Good	No Action	No Action	No actions are recommended for this reach.
FRS-18R-3L-B	358	II/III	G6	108	Fair	57	Good	High	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-18R-4R-1L-A	153	II/III	G5	94	Poor	51	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-4R-A	152	I	B5	94	Poor	51	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-4R-B	170	I	B5	94	Poor	51	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-4R-C	386	I	E6	94	Poor	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-18R-5L-A	861	I	E6	136	Fair	62	Excellent	Low	Good	No Action	No Action	No actions are recommended for this reach.
FRS-18R-A	434	I	E6	138	Fair	61	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-18R-B	861	I	E5	145	Good	65	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-18R-D	356	I	E5	94	Poor	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-19L-A	288	I	E6	137	Fair	64	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-1L-A	244	II/III	G4	64	Poor	42	Fair	High	Good	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-1L-B	370	I	E5	118	Fair	62	Excellent	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-20R-1R-A	185	I	E6	125	Fair	55	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-20R-2R-A	419	I	E6	137	Fair	63	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-20R-A	386	I	B5	111	Fair	49	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-20R-B	737	I	B5	116	Fair	53	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-21L-1L-A	284	III	E5	128	Fair	58	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-21L-2R-A	119	II/III	G5	116	Fair	49	Fair	Moderate	Good	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-21L-3L-A	84	II/III	G5	84	Poor	41	Fair	Moderate	Good	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-21L-A	427	I	B5	134	Fair	59	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-21L-D	462	I	E5	94	Poor	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.

TABLE C-1: CANDIDATE LOCATIONS FOR STREAM REMEDIATION

SAR ID	SAR Length (ft)	CEM Stage	Rosgen	Habitat Score	Habitat Rating	Floodplain Score	Floodplain Rating	Restoration Potential	Restoration Access	Proposed Treatment	Specific Action	Notes
FRS-23L-1R-A	160	II	G5	101	Poor	56	Good	Moderate	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-23L-2R-A	165	II	G5	96	Poor	56	Good	Moderate	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-23L-3R-A	195	II	C5	80	Poor	43	Fair	High	Fair	Restore Stream Bed Form, Banks, and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-23L-4L-A	302	II	G5	90	Poor	52	Fair	High	Difficult	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-23L-4L-B	464	I	C5	135	Fair	55	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-1R-A	233	I	G5	138	Fair	61	Excellent	Low	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-23L-6L-1R-B	229	I	E5	138	Fair	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-2L-A	227	I	B5a	94	Poor	56	Good	Moderate	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-3L-A	169	I	B5a	94	Poor	56	Good	Moderate	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-4R-A	347	I	B5a	94	Poor	56	Good	Moderate	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-5R-1R-A	146	I	B5a	94	Poor	56	Good	Moderate	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-5R-A	433	I	B5a	94	Poor	56	Good	Moderate	Difficult	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
FRS-23L-6L-6L-A	375	I	B5	105	Fair	53	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-6L-B	350	I	E5	117	Fair	54	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-6L-A	596	I	E6	137	Fair	60	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-8L-1L-A	1,030	I	E6	124	Fair	52	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-8L-A	369	I	B6	124	Fair	52	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-8L-B	861	I	E6	129	Fair	63	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-8L-C	677	I	E6	124	Fair	52	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-A	159	I	E5	119	Fair	61	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-23L-B	483	II/III	G5	139	Fair	53	Good	Low	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-23L-D	898	I	C5	121	Fair	55	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-23L-E	1,132	I	E5	105	Fair	53	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-2R-A	103	II/III	G6	79	Poor	43	Fair	High	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-2R-B	149	I	E6	116	Fair	52	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-4L-A	293	I	E6b	130	Fair	62	Excellent	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-5R-A	1,697	I	E6b	131	Fair	58	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-6R-A	745	I	E6b	125	Fair	58	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-6R-B	423	I	E6	138	Fair	59	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-7R-A	95	I	E4	75	Poor	45	Fair	None	Good	No Action	No Action	No actions are recommended for this reach.
FRS-7R-B	200	II	B6c	87	Poor	44	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-7R-C	249	II/III	G5c	91	Poor	29	Poor	High	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
FRS-7R-E	1,221	I	C5	133	Fair	60	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-8R-A	286	I	B5	109	Fair	51	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-8R-B	318	I	E6b	116	Fair	51	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FRS-9R-A	225	I	E5	116	Fair	56	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FRS-A	434	I	E5	112	Fair	49	Fair	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
FRS-B	236	IV	B5a	123	Fair	59	Good	Low	Good	No Action	No Action	No actions are recommended for this reach.
FRS-C	544	I	E5	126	Fair	58	Good	Low	Good	No Action	No Action	No actions are recommended for this reach.
FRS-D	455	III	G5c	126	Fair	56	Good	Moderate	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
UPPER WARE CREEK												
UWC-10L-1L-1L-A	223	I	B5	110	Fair	55	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-1L-A	346	I	B5	110	Fair	55	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-1L-B	442	II	B5	100	Poor	52	Fair	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-1R-A	204	II	E6	83	Poor	45	Fair	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-1R-B	251	III	C5	85	Poor	49	Fair	Moderate	Good	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
UWC-10L-2R-2R-A	437	III	E6	83	Poor	42	Fair	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-2R-B	251	I	E5	105	Fair	50	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-A	269	I	B5	100	Poor	52	Fair	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-B	551	I	E6	130	Fair	61	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-2R-C	316	I	E6	136	Fair	59	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-3L-A	734	I	C5b	92	Poor	50	Fair	Moderate	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-3L-B	2,513	I	E5b	109	Fair	55	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-4L-1L-1L-A	159	I	E5	115	Fair	60	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.

TABLE C-1: CANDIDATE LOCATIONS FOR STREAM REMEDIATION

SAR ID	SAR Length (ft)	CEM Stage	Rosgen	Habitat Score	Habitat Rating	Floodplain Score	Floodplain Rating	Restoration Potential	Restoration Access	Proposed Treatment	Specific Action	Notes
UWC-10L-4L-1L-A	544	I	E6	120	Fair	60	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-10L-4L-2L-A	619	I	C5	128	Fair	63	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-10L-A	146	II	B5	100	Poor	52	Fair	Moderate	Good	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
UWC-10L-B	430	I	B5	72	Poor	42	Fair	Low	Good	No Action	No Action	No actions are recommended for this reach.
UWC-10L-C	174	II	G5	75	Poor	42	Fair	Low	Good	No Action	No Action	No actions are recommended for this reach.
UWC-10L-D	1,049	I	E5	115	Fair	48	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-11R-1L-A	211	II	G5	89	Poor	53	Good	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
UWC-11R-2R-1R-A	195	I	B5	99	Poor	55	Good	Moderate	Difficult	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
UWC-11R-2R-A	165	II	B6	97	Poor	54	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-11R-2R-B	282	I	E5	130	Fair	52	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-11R-A	214	II	G5	84	Poor	53	Good	Moderate	Good	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
UWC-11R-B	519	III	E5	112	Fair	52	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-11R-C	703	I	E5	137	Fair	52	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-1L-A	551	I	E5	130	Fair	59	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-2R-1R-A	111	I	B6	120	Fair	57	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-2R-2R-A	848	I	E5	136	Fair	56	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-2R-A	1,707	I	E5	121	Fair	58	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-3R-1R-A	461	I	E5	129	Fair	56	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-3R-1R-B	232	I	E5	129	Fair	56	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-3R-A	267	I	E5	129	Fair	56	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-3R-B	953	I	E5	129	Fair	56	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-4R-A	172	I	G5	122	Fair	56	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-4R-B	203	I	E5	131	Fair	58	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-4R-C	213	I	C5	116	Fair	55	Good	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-5L-1L-A	317	II/III	E5	113	Fair	57	Good	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-5L-2R-A	394	II	G6	84	Poor	52	Fair	None	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
UWC-5L-2R-B	262	I	C5	106	Fair	60	Excellent	None	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-5L-A	229	I	C5	81	Poor	41	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-5L-B	551	III	F5	92	Poor	56	Good	Moderate	Fair	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
UWC-6L-1L-A	342	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-6L-A	227	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-6L-B	746	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-6L-C	861	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-7L-A	270	III	B5	98	Poor	55	Good	Moderate	Fair	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
UWC-8R-2L-A	533	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-8R-A	649	II	B5	103	Poor	52	Fair	Low	Fair	No Action	No Action	No actions are recommended for this reach.
UWC-8R-B	882	I	E5	124	Fair	52	Fair	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-8R-1R-A	117	II	G5	87	Poor	51	Fair	High	Good	Restore Degraded Channel	Priorty I Restoration	Stabilization required to prevent further incision upstream and aggradation downstream.
UWC-9R-A	483	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-9R-B	360	I	B5	129	Fair	61	Excellent	Low	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-BA-1L-A	1,013	I	E6	133	Fair	62	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-BA-A	176	I	C5	125	Fair	56	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-BA-B	227	I	E5	125	Fair	55	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-CA-1L-A	119	I	E5	122	Fair	58	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
UWC-CA-A	148	II	G6	106	Fair	55	Good	Moderate	Fair	Restore Stream Bed Form and Habitat	Stream Enhancement	Enhance stream riffle and pool complexes by incorporating log vane structures and constructing riffles, and excavating pools.
UWC-CA-B	883	I	E5	118	Fair	27	Poor	Moderate	Good	No Action	No Action	No actions are recommended for this reach.
COW SWAMP												
COS-A	1,996	I	E5	137	Fair	59	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
COS-B	1,308	I	E6b	107	Fair	58	Good	Low	Good	No Action	No Action	No actions are recommended for this reach.
COS-C	1,100	I	E6b	132	Fair	60	Excellent	None	Good	No Action	No Action	No actions are recommended for this reach.
COS-D	907	I	E6	110	Fair	57	Good	Low	Good	No Action	No Action	No actions are recommended for this reach.
COS-F	1,708	I	E6	137	Fair	58	Good	None	Fair	No Action	No Action	No actions are recommended for this reach.
FOLLY SWAMP												
FOS-1L-A	350	II/III	E6b	138	Fair	64	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-2L-A	115	I	E6b	138	Fair	64	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-4R-A	733	III	B6	138	Fair	57	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.

TABLE C-1: CANDIDATE LOCATIONS FOR STREAM REMEDIATION

SAR ID	SAR Length (ft)	CEM Stage	Rosgen	Habitat Score	Habitat Rating	Floodplain Score	Floodplain Rating	Restoration Potential	Restoration Access	Proposed Treatment	Specific Action	Notes
FOS-5R-A	275	III	B6c	132	Fair	52	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-5R-B	196	I	B6c	132	Fair	51	Fair	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-A	60	I-II	E6b	138	Fair	62	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-C	582	III	E6	136	Fair	64	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-F	925	II/III	B6c	132	Fair	60	Excellent	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-G	438	II/III	E6	127	Fair	58	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
FOS-H	243	II/III	B5c	131	Fair	59	Good	None	Difficult	No Action	No Action	No actions are recommended for this reach.
LOWER WARE CREEK												
LWC-A	1,065	I	E6b	137	Fair	63	Excellent	None	Good	No Action	No Action	No actions are recommended for this reach.

TABLE C-2: CANDIDATE LOCATIONS FOR REMEDIATION OF POINT IMPACTS

STORMWATER OUTFALLS (OT)

Subwatershed	Object ID	SAR ID	Severity	Proposed Treatment	Specific Action	Notes
France Swamp	OT-1	FRS-14R-4L-A	4	Restore Stream Banks	Larger Stream Initiative	See SAR FRS-14R-4L-A
France Swamp	OT-1	FRS-14R-4L-B	4	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-1	FRS-14R-5R-1R-A	3	Restore Stream Banks	Larger Stream Initiative	See SAR FRS-14R-5R-1R-A
France Swamp	OT-1	FRS-14R-5R-A	3	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-1	FRS-18R-2L-B	5	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-1	FRS-18R-D	5	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-1	FRS-21L-3L-A	3	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-2	FRS-21L-3L-B	3	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-1	FRS-7R-C	3	Restore Degraded Channel	Local Repair	
France Swamp	OT-4	FRS-7R-D	3	Channel Stabilization/ Energy Dissipator	Local Repair	
France Swamp	OT-2	FRS-A	4	Channel Stabilization/ Energy Dissipator	Local Repair	
Upper Ware Creek	OT-1	UWC-10L-3L-A	4	Channel Stabilization/ Energy Dissipator	Local Repair	
Upper Ware Creek	OT-1	UWC-10L-A	3	Channel Stabilization/ Energy Dissipator	Local Repair	
Upper Ware Creek	OT-2	UWC-10L-B	3	Restore Degraded Channel	Local Repair	
Upper Ware Creek	OT-1	UWC-11R-2R-B	3	Channel Stabilization/ Energy Dissipator	Local Repair	
Upper Ware Creek	OT-1	UWC-3R-A	4	Channel Stabilization/ Energy Dissipator	Local Repair	
Upper Ware Creek	OT-1	UWC-5L-B	4	Restore Stream Banks	Larger Stream Initiative	See SAR UWC-5L-B
Upper Ware Creek	OT-1	UWC-8R-1R-A	3	Channel Stabilization/ Energy Dissipator	Local Repair	

UTILITY CROSSINGS (UT)

Subwatershed	Object ID	SAR ID	Severity	Proposed Treatment	Specific Action	Notes
France Swamp	UT-1	FRS-23L-D	4	Restore Degraded Channel	Local Utility Repair	Stabilize area around exposed pipe

STREAM CROSSINGS (SC)

Subwatershed	Object ID	SAR ID	Severity	Proposed Treatment	Specific Action	Notes
France Swamp	SC-2	FRS-21L-B	3	Restore Degraded Channel	Local Utility Repair	
France Swamp	SC-2	FRS-23L-6L-6L-B	4	Restore Degraded Channel	Local Utility Repair	
Upper Ware Creek	SC-1	UWC-3R-B	3	Restore Degraded Channel	Local Utility Repair	
Upper Ware Creek	SC-1	UWC-4R-A	3	Restore Degraded Channel	Local Utility Repair	

SEVERE BANK EROSION (ER)

Subwatershed	Object ID	SAR ID	Severity	Proposed Treatment	Specific Action	Notes
France Swamp	ER-1	FRS-23L-3R-A	5	Restore Stream Banks	Larger Stream Initiative	See SAR FRS-23L-3R-A
Upper Ware Creek	ER-1	UWC-5L-2R-A	3	Restore Stream Banks	Larger Stream Initiative	See SAR UWC-5L-2R-A
Upper Ware Creek	ER-1	UWC-3R-A	5	Restore Stream Banks	Local Stream Repair	Install grade control to stabilize eroding areas
Upper Ware Creek	ER-1	UWC-8R-A	3	Restore Stream Banks	Local Stream Repair	Install grade control to stabilize eroding areas

TABLE C-3: CANDIDATE LOCATIONS FOR STORMWATER RETROFITS

Site ID	Location	Type of Site	Ownership	Goal	Desktop Assessment
WC-FRS-R01	LaGrange Pkwy	Culvert	Unknown	WQ	Site is forested and undeveloped. Add embankment and outlet structure at culvert under Parkway to provide WQ or CP storage upstream.
WC-FRS-R02	Temple Hills Estates	Outfall	Unknown	WQ, CP	ID during NSA. Good site for RSC to provide outfall stabilization and stormwater treatment.
WC-FRS-R03	VDOT I-64 Culvert	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R04	Louise Lane outfall	Outfall	Unknown	WQ	ID during NSA. Good site for RSC to provide outfall stabilization and stormwater treatment.
WC-FRS-R05	Welstead Lane outfall	Outfall	Unknown	WQ	ID during NSA. Potential site for RSC downstream of drop structure to provide outfall stabilization and stormwater treatment.
WC-FRS-R06	End of Joanne Ct	Culvert	Private	WQ	ID during NSA. Potential culvert retrofit under driveway / road embankment.
WC-FRS-R07	I-64, Sand Hill East	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R08	I-64, Sand Hill West	Culvert	DOT	WQ	Add embankment and outlet structure to culvert under I-64 to provide storage upstream.
WC-FRS-R09	Sand Hill	Conveyance	DOT	WQ	ID during NSA. Retrofit grass drainage ditches to increase filtration / infiltration.
WC-FRS-R10	WC082	Existing pond	Private	WQ	Dry pond conversion. Add storage volume, new riser, water quality features to improve treatment.
WC-FRS-R11	WC083	Existing pond	Private	WQ	Dry pond conversion. Add storage volume, new riser, water quality features to improve treatment.
WC-FRS-R12	Timber Lane	Outfall	Unknown	WQ, CP	ID during NSA. Eroded area is a potential site for RSC to stabilize outfall and provide stormwater treatment.
WC-FRS-R13	JCC Library, South Lot	Parking Lot	Public	WQ	Convert area to shallow marsh.
WC-FRS-R14	JCC Library, North Lot	Parking Lot	Public	WQ	Construct rain garden in swale draining north parking lot.
WC-FRS-R15	JCC Library, Center	Parking Lot	Public	WQ	Rain garden in wooded area to treat parking lot runoff.
WC-FRS-R16	WC084	Existing pond	Unknown	WQ	Excavate for additional volume, reconstruct riser. Add forebay, micropool plantings, or other features to improve treatment.
WC-FRS-R17	WC061	Existing pond	Private	WQ	Convert to wet pond, excavate for additional volume, convert riser, add water quality features.
WC-FRS-R18	WC062	Existing pond	Private	WQ	Dry-to-wet pond conversion. Excavate for additional volume, reconstruct riser.

Appendix D: The Decision Support System

Introduction

An essential component of any Watershed Management Plan and/or Stormwater Management Plan is the ability to identify, rank and prioritize potential retrofit and restoration opportunities. Vanasse Hangen Brustlin, Inc. (VHB) has been retained by James City County (JCC) to develop a Decision Support System (DSS) to address this need and to be used in conjunction with the County's Watershed Management Planning initiatives. The goals of creating and using a DSS include:

Provide an objective, yet technically accurate method of prioritizing projects.
Provide a consistent ranking procedure for potential projects.
Help to guide County Planning.

Various factors are taken into consideration with the development of a DSS, including the goals of the municipality in reference to stormwater control, water quality improvements, flooding issues, land use planning and regulatory requirements. The development of this tool, while informed by actual field data from JCC, can be tailored to meet the needs of any municipality depending on the goals of their management plans and the intrinsic environmental conditions at their location. Any DSS should be created with specific input from the personnel within the municipality that are intimately familiar with watershed and stormwater management activities and that will use the resulting DSS to prioritize and implement projects.

Decision Support System

By definition, a DSS is an information system that supports organizational decision making activities. A well designed DSS allows decision makers to compile data, technical knowledge and other useful information to identify and solve problems and/or make decisions. For the purposes of this DSS, VHB has created a spreadsheet matrix that will allow JCC to rank and prioritize stormwater retrofit and stream restoration and enhancement / channel stabilization opportunities within the County's watersheds. The ultimate goal is to improve water quality throughout the County by addressing areas that are currently impacted through development as well as those that will be developed in the future.

Various examples of DSSs used in other municipalities were compiled and analyzed to determine what type of DSS structure would best suit the needs of JCC. In addition to the previously developed examples, VHB conferred with JCC on their specific goals in using such a system to rank and prioritize possible projects throughout the County.

Project Identification

Potential project sites may be identified through a variety of channels of information. Potential sources of project identifications may include:

- Citizen Requests
- Master Planning of County
- Regulatory Requirements (i.e. TMDL Implementation Plan)
- Results of Watershed Assessments
- Inspections of Facilities by County Personnel

The County may elect to use the existing Capital Improvement Project (CIP) Request Form, or create a form that is specific to the ranking criteria within the DSS.

Project Prioritization

The ability to identify potential water quality/stormwater improvement projects is an important aspect of a Watershed Management Assessment Program. Once potential project areas are identified, they must then be stratified using results of analyses of the field data collected by the specified methodology during an assessment. This stratification allows for the projects with the most potential for retrofit and/or restoration to be identified. Following stratification, the sites may then be ranked for funding and implementation. The criteria used in such a ranking procedure should be representative of the goals of the County and may be adjusted over time as new issues arise or priorities change. A DSS is the logical tool to use for the purposes of this final ranking. The benefits of having a dynamic DSS tailored for the County or even a specific (sub) watershed include the ability to address management issues that may be indicative of particular land use(s), pollutant(s) of concern, inadequate infrastructure and other sources of water quality degradation.

Consistency of ranking criteria allows for comparison between sites and determination as to which projects will provide the most improvement and should be implemented first. For the purpose of the JCC DSS, the possible benefits associated with the projects were derived from the goals for the Watershed Plans as well as the field data collected during the watershed assessment(s). These benefits are then assigned a numerical score according to the degree of improvement offered by the chosen treatment method on a particular site or stream reach. The degree of improvement is assessed as having either primary, secondary, supplemental or no benefit. Each project area that is included in the DSS is attributed values for eight (8) Prioritization Factors and eight (8) Possible Conflicts. The DSS spreadsheet located in Appendix A is designed such that project sites are prioritized based on the highest to lowest scores afforded by the sum of the Prioritization Factor scores (Ranking: Level of Benefit) minus the sum of the Possible Conflict scores (Ranking: Degree of Complexity).

For JCC, opportunities for watershed restoration activities were broken into two general categories:

1. Stream Restoration and/or Channel Stabilization
2. Stormwater Management Treatment Opportunities

Prioritization Factors

Prioritization Factors for both categories are scored based on the Prioritization Factor Weighting Table (Appendix A), though the methodology for how the scores are derived differs between the two types of watershed restoration activities. These methodologies are discussed below in relation to the watershed activity.

Stream Restoration and/or Channel Stabilization

The Prioritization Factors (i.e., potential watershed benefits) for Stream Restoration and/or Channel Stabilization opportunities include:

- Water Quality/Runoff Quantity:
  - Significant Improvements – Indicates a significant reduction in pollutant loading, and/or quantity of runoff entering the reach during storm events; may possibly aid in meeting TMDL pollutant reduction requirements (5 points)
  - Minimal - Creates a minor reduction in pollutant loading and/or runoff quantity (3 points)
  - None - Creates no reduction in pollutant loading and/or runoff (0 points)

- Restore Floodplain Connectivity
  - Significantly increase connectivity – restoration efforts provide for access to a floodplain (either historical or newly created) at bankfull and greater flow events (5 points)
  - Maintain Existing – minimal access to a floodplain at bankfull events, more access during higher flow events (3 points)
  - No increase in connectivity – no increase in floodplain access within the reach (0 points)

- Restore Aquatic Habitat
  - Significant Improvement - Improvements in aquatic habitat as measured by increased diversity in aquatic organism population (4 points)
  - Minimal Improvement – Minimal improvement of aquatic habitat due to slight reductions in pollutant loading and/or physical channel instability (2 points)
  - Maintain - Maintain existing quality of aquatic habitat (0 points)

- Reduce Sedimentation
  - Significantly Reduce – Significantly reduce amount of sediment entering watershed through streambank erosion and/or poor Erosion & Sedimentation Control (E&S) practices related to land disturbing activities within the watershed (4 points)
  - Slight Reduction – Minimal reduction in sedimentation due to little improvement to existing channel instability and/or lack of improvement of poor E&S practices within the watershed (2 points)
  - Maintain - No change in sedimentation within project reach (0 points)

- Project Size/Scope
  - Significant – Proposed project length would provide for maximum water quality benefit; several adjacent project stream reaches may be restored as one larger project (3 points)
  - Moderate – Project length is moderate and/or adjacent to unstable stream reaches not to be restored (2 points)

  - Minimal – Project length is minimal and/or adjacent unstable stream reaches not to be restored (1 point)

- Channel Condition
  - Project reach is severely incised and has eroding stream banks (4 points)
  - Project reach is moderately incised and has some eroding stream banks (2 points)
  - Minimal incision present with little to no eroding stream banks (0 points)

- Condition of Contributing Watershed – Three factors are taken into consideration for this ranking factor: Total Impervious Area (TIA), Pollution Severity Index (PSI; average of Neighborhood Source Assessment [NSA] sites), and Hotspot Site Investigation (HIS; average of sites)
  - Developed watershed (4 points):
    - TIA - >25%
    - PSI – Any severe
    - HIS – Any severe
  - Developing watershed (2 points):
    - TIA – 10% - 25%
    - PSI – Any high
    - HIS – Any confirmed
  - Undeveloped watershed (0 points):
    - TIA - <10%
    - PSI – All others
    - HIS – All others

- Increase Environmental Awareness
  - High - Significant public involvement (associated with project location and/or community involvement; 3 points)
  - Medium - Project provides educational opportunities (2 points)
  - Low - Nearby residents may be aware of project/benefits (0 points)

Of the Prioritization Factors noted above, scores for Water Quality/Runoff Quantity, Restore Floodplain Connectivity, Restore Aquatic Habitat, Reduce Sedimentation, Project Size/Scope and Channel Condition can be informed largely by field data collected during stream and floodplain assessment activities. Field efforts associated with the DSS, as well as a detailed discussion of the Stream Restoration and/or Channel Stabilization Prioritization Factor evaluation, weighting scheme and calculation are provided as Appendix C.

Stormwater Management Treatment Opportunities

The Prioritization Factors (i.e., potential watershed benefits) for Stormwater Management Treatment Opportunities include:

- Water Quality/Runoff Quantity: Improving water quality and decreasing runoff quantity (this ranking is determined by the total removal percentage of the stormwater management facility):
  - Significant Improvements (5 points) – Indicates a significant reduction in pollutant loading, and/or quantity of runoff entering the reach during storm events; may possibly aid in meeting TMDL pollutant reduction requirements; quantified as:
    - TSS >80%
    - TN^2 >50%

        - TP[1] >50%
        - NO_3 >40%
        - Runoff Volume[1] >50%
    - Minimal (3 points) - Creates a minor reduction in pollutant loading and/or runoff quantity; quantified as:
        - TSS 0% - 80%
        - TN[2] 0% - 50%
        - TP[1] 0% - 50%
        - NO_3 0% - 40%
        - Runoff Volume[1] 0% - 50%
    - None (0 points) - Creates no reduction in pollutant loading and/or runoff quantity; quantified as:
        - TSS 0%
        - TN[2] 0%
        - TP[1] 0%
        - NO_3 0%
        - Runoff Volume[1] 0%

- Restore Floodplain Connectivity
    - Decrease stormflow – stormflow entering the receiving waterbody is reduced by 70 to 100% (5 points)
    - Maintain Existing – stormflow is decreased by 40-70% (3 points)
    - Increase stormflow – stormflow entering the waterbody is decreased by less than 40% (0 points)

- Restore Aquatic Habitat – This topic is not applicable to the Stormwater Management Treatment Opportunities

- Reduce Sedimentation
    - Reduce (4 points) – Significantly reduce amount of sediment entering watershed through streambank erosion and/or poor Erosion & Sedimentation Control (E&S) practices related to land disturbing activities within the watershed; quantified for the stormwater treatment options as a percent of the Total Volume (Tv) captured:
        - 70% - 100%
    - Maintain (2 points) – Percentage of Tv capture required to maintain the existing condition:
        - 40% - 70%
    - Increase (0 points) – Sedimentation is assumed to increase if the Tv is <40%

- Project Size/Scope
    - Significant (3 points) – The percentage of the sub-watershed that is included in the drainage being treated is >20%
    - Moderate (2 points) – The percentage of the sub-watershed that is included in the drainage being treated is 1% - 20%
    - Minimal (1 point) – The percentage of the sub-watershed that is included in the drainage being treated is <1%

- Channel Condition
    - Downstream of BMP is severely incised and has eroding stream banks (4 points)

  - Downstream of BMP is moderately incised and has some eroding stream banks (2 points)
  - Downstream of BMP has minimal eroding stream banks (0 points)

- Condition of Contributing Watershed: (Same as for stream projects)
  - Developed watershed (4 points):
    - TIA - >25%
    - PSI – Any severe
    - HIS – Any severe
  - Developing watershed (2 points):
    - TIA – 10% - 25%
    - PSI – Any high
    - HIS – Any confirmed
  - Undeveloped watershed (0 points):
    - TIA - <10%
    - PSI – All others
    - HIS – All others

- Increase Environmental Awareness
  - High (3 points) - Significant public involvement (associated with project location and/or community involvement); In close proximity to a school, community center or other educational opportunity
  - Medium (2 points) - Project provides educational opportunities; In close proximity to parks or pedestrian routes with potential for signage
  - Low (1 point) - Nearby residents may be aware of project/benefits; near commercial or industrial area with limited visibility

[1] Percentages from Table 2, TM: Runoff Reduction Method, April 2008
[2] Percentages from Table 3, TM: Runoff Reduction Method, April 2008
[3] CWP, National Pollutant Removal Performance Database, version 3, September 2007

Possible Conflicts

Once the potential benefits associated with improving a particular stream reach or BMP through one of the Proposed Treatments are defined and ranked appropriately for a given site, the constraints or conflicts are then taken into consideration. The constraints that are included in the JCC DSS were derived from the Retrofit Reconnaissance Inventory (RRI) data forms used by the CWP and are applicable to Stream Restoration and/or Channel Stabilization as well as the various Stormwater Management Treatment Opportunities.

The Possible Conflicts include:

- Conflicts With Existing Utilities
  - Significant (5 points) - Utilities will greatly impact project design and may require expensive relocation
  - Minimal (3 points) – Utilities are present in the project area and may constrain project design
  - None (0 points) - Utilities not present in the project area

- Construction Access
  - Major Restrictions (5 points) – Construction access will require creating roads with impacts to sensitive areas; no stockpile areas near site

  - Minimal Restrictions (2 points) – Some impact to landscaped areas will be required; limited stockpile areas
  - No Restrictions (0 points) – Site is open/there is access with paved surface; stockpile areas are available near the project site

- Neighborhood Impact
  - Dense Development (4 points) – Residential areas adjacent to site with easy access; Potential for standing water, mosquitoes, or safety issues
  - Some Development (2 points) – Residential areas at some distance/site can be fenced; shallow water with safety bench, gentle slopes, fenced
  - Open Space (0 points) – Site is either in open space or commercial or industrial land use with no nearby residential area; Project will not result in standing water

- Physical Feasibility
  - Poor (3 points) – Site constraints limit feasibility of project
  - Fair (2 points) – Some limitation, but project is feasible
  - Good (1 point) – Little to no limitations on site

- Level of Design
  - Major (4 points) – Significant level of effort required for project design
  - Moderate (2 points) - Reasonable level of effort required
  - Minor (0 points) – Minimal level of effort required

- Private Property
  - No Interest (5 points) - Site is entirely on private property and owners have no interest in project
  - Moderate Interest (3 points) - Site is either on private property with some owner interest or site is on publicly-owned land currently in other uses
  - High interest (0 points) – Site is either on private property with actively interested owners or site is on publicly-owned land available for the project

- Possible Permitting Factors
  - Major (5 points) – Wetland, Forest, and/or Waters of the U.S. impacts will be incurred and permits will be required
  - Moderate (3 points) – Wetlands are present but there will be no impacts associated with construction; Some tree removal will be necessary, and tree replacement will be required
  - Minor (0 points) – No impacts will be incurred resulting in additional permits being required

- Negative Environmental Impacts
  - Major (4 points) - Implementation of the proposed treatment for a particular project reach would have significant negative environmental impacts
  - Moderate (2 points) - Implementation of the proposed treatment for a particular project reach would have minimal negative environmental impacts
  - Minor (0 points) - Implementation of the proposed treatment for a particular project reach would not have negative environmental impacts

Implementation

The County may use the DSS to prioritize projects identified through watershed assessments as well as other methods. Following this ranking of potential retrofit and/or restoration sites, the County may elect to implement the highest ranked project(s) based on available funds. Issues, other than funding, that should be considered include:

- Relevancy of a project to a larger County or watershed goal, such as implementation of the TMDL plan.
- Coordination of a particular project with other on-going projects – such as stream restoration work adjacent to a culvert replacement.
- Limits of project boundaries need to be clearly defined to avoid redundancy and overlap.
- Project sequencing should be considered to maximize potential benefits and not jeopardize previously completed sites.
- Coordination between projects and County Departments should result in potential cost reduction, minimization of environmental and social impacts, and streamlining of the project implementation process.

While the DSS was carefully developed to act as a universal tool and not be watershed-specific, the values assigned to each category of benefit and constraint may be amended somewhat according to the feedback gleaned from initial prioritization efforts.

AGENDA ITEM NO. K.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board of Supervisors

FROM: Bryan J. Hill, County Administrator

SUBJECT: County Administrator's Report

ATTACHMENTS:

	Description	Type
	Report	Cover Memo

REVIEWERS:

Department	Reviewer	Action	Date
Board Secretary	Fellows, Teresa	Approved	9/14/2016 - 12:06 PM

M E M O R A N D U M

DATE: September 27, 2016

TO: The Board of Supervisors

FROM: Bryan J. Hill, County Administrator

SUBJECT: County Administrator's Report

The following is a summary of activities that took place September 7, 2016 through September 20, 2016:

September 7, 2016 (Wednesday)

- Attended Hampton Roads Chief Administrative Officers luncheon meeting

September 8, 2016 (Thursday)

- Speaking Engagement at the Operations Manager's Workshop
- Met with Paul Holt, Community Development Director
- Met with Russell Seymour, Economic Development Director
- Met with Russell Seymour, Economic Development Director, Robin Carson and Tom Tingle; update on progress with Greater Williamsburg Partnership
- Conference with David Joyner, VDOT Environmental Specialist; Longhill widening project

September 9, 2016 (Friday)

- Attended Williamsburg Health Foundation meeting
- Met with Richard Bradshaw, Commissioner of the Revenue
- Attended School Liaison Committee meeting

September 12, 2016 (Monday)

- Met with Brad Rinehimer, Police Chief
- Attended 2 - 4 p.m. Strategic Plan Open House
- Attended 6 - 8 p.m. Strategic Plan Open House

September 13, 2016 (Tuesday)

- Met with John Carnifax, Parks & Recreation Director
- Met with Employee Connection Committee: Terry Costello, Deputy Zoning Administrator and Vicki Thomas, Deputy Sheriff II
- Met with Jody Puckett, Communications Director and Latara Branch, Civic Engagement Coordinator

September 14, 2016 (Wednesday)

- Met with Russell Seymour, Economic Development Director, Don Patten and Steve Barr
- Met with Paul Holt, Community Development Director, Vaughn Poller, Administrator Neighborhood Development and Janet Green, CEO of Habitat for Humanity
- Met with Paul Holt, Community Development Director, Jason Purse, Assistant County Administrator and Russell Seymour
- Attended Executive Leadership Team meeting
- Met with Sherriff Deeds
- Conference call with Clarion
- Attended Triangle Arts Culture League event
- Attended Neighborhood Forum

September 15, 2016 (Thursday)

- Attended Hampton Roads Planning District Commission, Hampton Roads Transportation Planning Organization and Hampton Roads Transportation Accountability Commission meetings

September 16, 2016 (Friday)

- Met with Brad Rinehimer, Police Chief
- Attended New Employee Orientation
- Speaking Engagement: Williamsburg Area Association of Realtors Forum

September 19, 2016 (Monday)

- Attended Historic Triangle Collaborative meeting
- Met with Sue Mellen, FMS Director
- Met with Patrick Teague, HR Assistant Director

September 20, 2016 (Tuesday)

- Met with Sue Mellen, FMS Director and Patrick Page, Information Resources Management Director
- Met with Travis Crayosky, Stantec Environmental Engineer
- Met with Arlana Fauntleroy, Recreation Administrator, Parks & Recreation

BJH/nb
CAReport092716-mem

AGENDA ITEM NO. N.1.

ITEM SUMMARY

DATE: 9/27/2016

TO: The Board of Supervisors

FROM: Teresa J. Fellows, Administrative Coordinator

SUBJECT: Adjourn until 6:30 pm on October 11, 2016 for the Regular Meeting

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REVIEWERS:

Department	Reviewer	Action	Date
Board Secretary	Fellows, Teresa	Approved	9/14/2016 - 12:08 PM