AGENDA
FLUVANNA COUNTY PLANNING COMMISSION
Organizational Meeting
Circuit Courtroom
Fluvanna Courts Building
January 22nd 2014
7:00 p.m.

2014 Organizational Meeting of the Fluvanna County Planning Commission

1-CALL TO ORDER, PLEDGE OF ALLEGIANCE

Election of Chairman and Vice Chairman **D**
Selection of Dates for the Commission Meetings **E**
Resolution entitled "Organizational Meeting of the Fluvanna County Planning Commission 2014" **F**
Adoption of Planning Commission By-Laws and Rules of Procedures G

AGENDA
FLUVANNA COUNTY PLANNING COMMISSION
Regular Meeting
Circuit Court Room
Fluvanna Courts Building
January 22nd 2014
Immediately following Organizational Meeting

2- PLANNING DIRECTOR'S REPORT
Mr. Jason Stewart, Planning & Zoning Administrator H

3-PUBLIC COMMENTS #1 (3 minutes each)

4-APPROVAL OF MINUTES:
December 16, 2013 I

5-PRESENTATIONS (normally not to exceed 10-minute limitation)

6-PUBLIC HEARINGS:

7-SITE DEVELOPMENT PLANS:

8-SUBDIVISIONS:

9-UNFINISHED BUSINESS:
Reconsideration of additional information regarding ZMP 12:02 & SUP 13:02 – Hotel Street Capital, LLC J

10-NEW BUSINESS: February Work Session regarding Comprehensive Plan Review

11-PUBLIC COMMENT #2 (3 minutes each)

For the Hearing-Impaired – there is a listening device available at the Circuit Court Room upon request. TTY access number is 711 to make arrangements.
For persons with Disabilities – if you have special needs, please call the County Administrator's Office at 591-1910 and relay your request.

12-ADJOURN

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Pledge of Allegiance

I pledge allegiance to the flag
of the United States of America
and to the Republic for which it stands,
one nation, under God, indivisible,
with liberty and justice for all.

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ORDER

1. It shall be the duty of the Chairman to maintain order and decorum at meetings. The Chairman shall speak to points of order in preference to all other members.

2. In maintaining decorum and propriety of conduct, the Chairman shall not be challenged and no debate shall be allowed until after the Chairman declares that order has been restored. In the event the Commission wishes to debate the matter of the disorder or the bringing of order; the regular business may be suspended by vote of the Commission to discuss the matter.

3. No member or citizen shall be allowed to use abusive language, excessive noise, or in any way incite persons to use such tactics. The Chairman and/or the County Planner shall be the judge of such breaches, however, the Commission may vote to overrule both.

4. When a person engages in such breaches, the Chairman shall order the person's removal from the building, or may order the person to stand silent, or may, if necessary, order the person removed from the County property.

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FLUVANNA COUNTY PLANNING COMMISSION
PUBLIC HEARING RULES OF PROCEDURE

1. Purpose:
   The purpose of a public hearing is to receive testimony from the public on certain resolutions, ordinances or amendments prior to taking action. A hearing is not a dialog or debate. Its express purpose is to receive additional facts, comments and opinion on subject items.

2. Speakers:
   Speakers should approach the lectern so they may be visible and audible to the Commission.
   Each speaker should clearly state his/her name and address.
   All Comments should be directed to Commission.
   Each speaker is limited to three minutes and time may not be donated from other audience members.
   All questions should be directed to the Chairman. Members of the Commission are not expected to respond to questions, and response to questions shall be made at the Chairman's discretion. Speakers are encouraged to contact staff regarding unresolved concerns or to receive additional information.
   Speakers with questions are encouraged to contact County staff prior to the public hearing.
   Speakers should be brief and avoid repetition of previously presented comments.
   County residents and taxpayers may be given priority in speaking order.

3. Action:
   At the conclusion of the public hearing on each item, the Chairman will close the public hearing. The Commission will proceed with its deliberations and will act on or formally postpone action on such item prior to proceeding to other agenda items. Further public comment after the public hearing has been closed generally will not be permitted.

For the Hearing-Impaired – there is a listening device available at the Circuit Court Room upon request. TTY access number is 711 to make arrangements.

For persons with Disabilities – if you have special needs, please call the County Administrator's Office at 591-1910 and relay your request.

MOTION: I move to elect _____ as Chairman of the Fluvanna County Planning Commission for the calendar year of 2014.

MOTION: I move to elect _____ as Vice Chairman of the Fluvanna County Planning Commission for the calendar year of 2014.

AGENDA PLANNING COMMISSION January 22nd 2014

SUBJECT: Election of Officers

TIMING: Routine

DISCUSSION: As has been your practice in the past, the Planning Director opens the meeting and calls for the nomination and election of the Chairman.

Upon the election of the Chairman, the elected chairman will then call for the nomination and election of the Vice Chairman.

The Annual or Organizational meeting of the Commission will be conducted first and then move to the Regular meeting and conduct of business.

Staff: Jason Stewart, Planning Director

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Planning Director's Use Only

_____

Jason Stewart, Planning Director

MOTION: I move the Fluvanna County Planning Commission adopt the Planning Commission 2014 regular Meeting Calendar as presented [which does not include any joint meetings or work sessions].

Staff: Jason Stewart, Planning Director

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Planning Director's Use Only

Comments:

_____

Allyson Finchum, Planning Director

2014

Organization

Suggested
Planning Commission
Meeting Dates
4th Wednesday of each month

- **January 22, 2014**
- **February 26, 2014**
- **March 26, 2014**
- **April 23, 2014**
- **May 28, 2014**
- **June 25, 2014**
- **July 23, 2014**
- **August 27, 2014**
- **September 24, 2014**
- **October 22, 2014**
- **November 24, 2014—Monday!**
- **December 22, 2014—Monday!**

Planning Commission Meeting Dates

Holidays

JANUARY

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

FEBRUARY

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MARCH

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30	31					

APRIL

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MAY

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JUNE

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29	30					

JULY

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AUGUST

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31						

SEPTEMBER

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28	29	30				

OCTOBER

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NOVEMBER

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23	24	25	26	27	28	29
30						

DECEMBER

S	M	T	W	T	F	S
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28	29	30	31			

PLANNING FOR THE FUTURE

FLUVANNA COUNTY
PLANNING COMMISSION

132 Main Street
P.O. Box 540
Palmyra, VA 22963

Phone: 434-591-1910
Fax: 434-591-1911
E-mail: jstewart@fluvannacounty.org

PLANNING COMMISSION
County of Fluvanna
Palmyra, Virginia

RESOLUTION

At a regular monthly meeting of the Fluvanna County Planning Commission held on Wednesday, January 22nd, 2014, in Palmyra, Virginia, the following action was taken:

Present	Vote
Lewis Johnson	
Barry A. Bibb	
Patricia Eager	
Donald Gaines	
Ed Zimmer	

On a motion by_____, seconded by _____, and carried by a vote of ___
the following resolution was adopted:

Organizational Meeting of the Fluvanna County Planning Commission 2014

WHEREAS, the Code of Virginia requires an annual organizational meeting for the Planning Commission for the election of officers and the conduct of such other business as to meeting times and dates and,

WHEREAS, the Planning Commission does now conduct such an organizational meeting.

NOW, THEREFORE BE IT RESOLVED by the Planning Commission that it does hereby designate the Circuit Courtroom in the Fluvanna Courts Building as its meeting place for regular meetings to be held on the fourth Wednesday of each month at 7:00 p.m. Except in the months of November and December when the meetings shall be on the third Monday at 7:00 p.m. due to the holidays.

Adopted this 22nd day of January 2014
by the Fluvanna County Planning Commission

ATTEST:

_____
Jason Stewart, Planning Director

January 22nd, 2014
Fluvanna County Planning Commission
By-laws and Rules of Practice and Procedures

CREATION

The Fluvanna County Planning Commission, hereinafter called the "Commission", is an appointed body provided by the Code of Virginia, Section 15.2-2210. The Commission consists of five (5) members, one (1) appointed from each election district and one (1) representative of the Board of Supervisors. The Board of Supervisors representative does not vote by directive of the Board of Supervisors.

PRINCIPAL OFFICE

132 Main Street, Palmyra, Virginia; Mailing Address: P.O. Box 540, Palmyra, VA 22963

CHAIRMAN

At the first meeting of the year, the Commission selects one of its members to serve as Chairman. The Chairman is a voting member and serves for one year.

VICE-CHAIRMAN

At the first meeting of the year, the Commission selects one of its members to serve as Vice-Chairman. The Vice-Chairman is a voting member and serves for one year.

COUNTY PLANNER

The County Planner shall be Clerk to the Commission and his general duty is set forth in the Code of Virginia, Section 15.2-2217. He shall maintain an office at the same address as the Commission.

COUNTY ATTORNEY

The County Attorney assists the Commission in analyzing the facts; provides advice and action in legal matters and represents the Commission in civil actions.

QUORUM FOR THE EXERCISE OF COMMISSION BUSINESS

A majority of the commission shall constitute a quorum for the purpose of conducting Commission business. A vote of the majority of those present is necessary to take action on an issue.

PUBLIC SESSIONS

1. Except as otherwise directed the regular public meeting of the Commission shall be held on the fourth Wednesday of each month at 7:00 p.m. at the Fluvanna Courts Building in the Circuit Courtroom in Palmyra, VA.
2. A special meeting may be held at the call of the Chair or by the application of three members given to the County Planner. There shall be at least seventy-two (72) hours written notice for a special meeting.

MEETING AND ATTENDANCE

1. All meetings and business shall be conducted in accordance with the Code of Virginia, Roberts Rules of Order Revised, and these by-laws.
2. Meetings will be held on the fourth Wednesday of each month. If the fourth Wednesday falls on a holiday, a new meeting date will be scheduled by the Chairman. Meetings shall start at the appointed time, and if the Chairman is not present, the Vice-Chairman shall preside. If neither the chairman nor the Vice-Chairman is present, the County Planner shall call the meeting to order and preside for the election of a Temporary Chairman.
3. Any person making a written presentation or demonstrating a matter by way of a plat, brochure, picture, or similar document for inclusion in the record of the hearing shall provide the County Planner five (5) copies of such item seven (7) days prior to the meeting at which such person wishes to make a presentation.
4. The County Planner shall list all items requested on the agenda. If, in the opinion of the County Planner, an item is not appropriate for consideration by the Commission, he shall inform the Chairman, and if the Chairman is in agreement, the Commission shall first discuss whether to entertain the item.
5. The County Planner and Chairman of the Commission shall allocate time to items on the agenda as is necessary for appropriate consideration
6. The Commission shall consider all items docketed on the agenda before taking any other items unless an undocketed item is brought by consent of the Commission.
7. Time permitting, items not on the agenda shall be heard as the final items of the Commission's business. If time does not, in the opinion of the Chairman of the Commission, permit hearing items on the agenda, they shall be carried over to the next regular or special meeting.
8. The Chairman's vote on all issues before the Commission shall be recorded as being given with the prevailing side, unless the Chairman clearly votes otherwise.
9. Meetings shall be adjourned no later than 11:00 p.m. unless continued by unanimous vote.

CONDUCT OF BUSINESS

1. When the question is called and there is no dispute, the Chairman shall call for the vote.
2. Any member abstaining on a vote shall so indicate following the call for the vote.
3. Exhibits before the Commission shall become the property of the Commission and shall be filed with the County Planner.
4. Citizens shall not speak at a meeting until they are recognized. Citizens shall request recognition by addressing "Mr. Chairman" or Ms. Chairman" (as appropriate) and await acknowledgement. At his or her discretion, the Chairman may permit a dialogue without individual recognition between members of the Commission or between a member and a citizen if such dialogue is orderly and contributes to the expedition of the business. Such discussion will be discouraged.
5. Prior to opening a meeting at which one or more public hearings will be held, the Chairman shall recount the rules under which the hearing shall be operated, but he/she may amend the rules during the hearing by giving notice of the change.
6. At the beginning of the public hearing, the Chairman shall call upon the County Planner or the Chairman of the committee handling the matter at hand or shall recount a description of the issue placed before the hearing.

7. Subject to revocation or extension by the majority of the commission assembled, the Chairman may in all matters establish a maximum time for consideration of the matter, and/or limit the amount of time available to each speaker on a matter and/or limit the number of times each speaker may address the Commission on a matter. Notwithstanding the foregoing statement, every Commission member shall be entitled to make a statement on every matter before the Commission and the call for the question shall not be entertained until all members who wish to exercise this right shall have done so.
8. All members or citizens shall limit their comments before the Commission. The Chairman has the option of requiring speakers to sign up before being authorized to address the Planning Commission.
9. The Commission has set forth the following rules for presentation time limits:
    a. Individual presentations placed on the Commission's agenda shall be limited to ten (10) minutes in duration.
    b. Individual presentation listed under the agenda item "Public Comments" shall be limited to three (3) minutes in duration.
    c. Statements from the public during the "Public Hearing" on individual agenda items shall be limited to three (3) minutes.
    d. Complete presentations on Commission action items shall be limited to not more than thirty (30) minutes.
    e. Either of the above limitations may be extended only by majority consent of the Commission.

ORDER

1. It shall be the duty of the Chairman to maintain order and decorum at meetings. The Chairman shall speak to points of order in preference to all other members.
2. In maintaining decorum and propriety of conduct, the Chairman shall not be challenged and no debate shall be allowed until after the Chairman declares that order has been restored. In the event the Commission wishes to debate the matter of the disorder or the bringing of order, the regular business may be suspended by vote of the Commission to discuss the matter.
3. No member or citizen shall be allowed to use abusive language, excessive noise, or in any way incite persons to use such tactics. The Chairman shall be the judge of such breaches.
4. When a person engages in such a breach, the Chairman may
    a. Order the person to stand silent,
    b. Order the person's removal from the building, or,
    c. Order the person removed from the County Property.

COMMITTEES

There will be no standing committees. Ad Hoc committees will be appointed by the Chairman as needed. Constitutional Officers may be appointed to committees.

RULES

1. The by-laws may be suspended at anytime by a majority vote of the Commission
2. The by-laws may be amended by a majority vote of the Commission, but only at the regular meeting next held after the proposed amendment has been announced at a regular meeting.

RECORD OF THE MEETING

The Clerk of the Commission (or another person acting in the capacity) shall electronically record each regular meeting. Recordings are the property of Fluvanna County. A stenographic record shall not be admissible as evidence of what transpired at a meeting, unless the person taking the record has been sworn prior to making the record. Interested persons may listen to the recordings in the County Planner's office or may obtain copies of the recording or portions of a recording by making appropriate arrangements with the County Planner's office. Costs will be borne by the person making the request. Audio recordings are also available on the county website www.fluvannacounty.org.

COUNTY OF FLUVANNA

"Responsive & Responsible Government"

P.O. Box 540 Palmyra, VA 22963 (434) 591-1910 FAX (434) 591-1911 www.co.fluvanna.va.us

To: Fluvanna County Planning Commission
From: Jason Stewart, AICP
Date: January 16, 2014
Re: Planning Director's Report

1. Board of Supervisors Actions:

January 8, 2014:

None.

January 15, 2014:

ZMP 13:02 – Cowboys, LLC (DEFERRED**)-** An ordinance to amend the Fluvanna County Zoning Map with respect to 2.631 acres of Tax Map 30, Section A, Parcel 84B to rezone the same from A-1, Agricultural, General to B-1, Business, General (conditional). The affected property is located on the southeast side of Route 15 (James Madison Highway), approximately 0.18 miles northeast of Route 53 (Thomas Jefferson Parkway). The property is located in the Fork Union Election District and is within the Palmyra Community Planning Area.

2. Board of Zoning Appeals Actions:

No January Meeting.

3. Technical Review Committee:

No January Meeting.

FLUVANNA COUNTY BUILDING INSPECTIONS
MONTHLY BUILDING INSPECTION REPORT
DECEMBER 2013

USE	Dec-12	VALUE	YTD 12	VALUE	Dec-13	VALUE	YTD 13	VALUE	Dec/Diff	VALUE	YTD PERMITS	VALUE
New Homes	5	806,000	72	12,968,689	6	1,100,000	76	14,406,483	1	294,000	4	1,437,794
Duplex	0	0	0	0	0	-	0	-	0	-	0	-
Single Family (Attached)	0	0	4	360,000	0	-	12	1,800,000	0	-	8	1,440,000
Adds&Alterations	17	216,486	258	3,945,023	29	757,161	301	4,213,267	12	540,675	43	268,244
Garages & Carports	0	0	11	225,160	1	24,762	16	488,502	1	24,762	5	263,342
Accessory Buildings	0	0	10	98,500	1	900	16	372,780	1	900	6	274,280
Single Wide MH	0	0	1	500	1	5,000	3	44,000	1	5,000	2	43,500
Swimming Pools	0	0	9	346,181	0	-	5	121,600	0	-	-4	(224,581)
Recreational Bldgs	0	0	0	-	0	-	0	-	0	-	0	-
Business Bldgs	1	575,000	3	1,394,850	0	-	0	-	-1	(575,000)	-3	(1,394,850)
Industrial Bldgs	0	0	5	1,182,509	0	-	1	50,000	0	-	-4	(1,132,509)
Other Buildings	1	2,000,000	10	3,220,219	0	-	10	653,905	-1	(2,000,000)	0	(2,566,314)
TOTALS	**24**	**3,597,486**	**383**	**23,741,631**	**38**	**1,887,823**	**440**	**22,150,537**	**14**	**(1,709,663)**	**57**	**(1,591,094)**

FEES	Dec-12	PREV TOT	YTD 12	Dec-13	PREV TOT	YTD 13	DIFFERENCE	DIFFERENCE YTD
Building Permits	$ 19,529.37	105,549.04	125,078.41	$ 9,751.91	99,165.10	108,917.01	(9,777.46)	(16,161.40)
Land Disturb Permits	$ 875.00	39,045.00	39,920.00	$ 2,675.00	26,137.50	28,812.50	1,800.00	(11,107.50)
Zoning Permits/Proffers	$ 950.00	40,250.00	41,200.00	$ 1,000.00	39,800.00	40,800.00	50.00	(400.00)
TOTALS	**$ 21,354.37**	**184,844.04**	**206,198.41**	**$ 13,426.91**	**165,102.60**	**178,529.51**	**$ (7,927.46)**	**(27,668.90)**

	Dec-12	PREVIOUS	YTD 12	Dec-13	PREVIOUS	YTD 13		
INSPECTIONS	138	1,709	1,847	149	1,667	1,816	11	-31

Darius S. Lester
Building Official

( ) represents a negative

Monthly Approval Report for November 2013

District	Action	ID#	Description	Tax Map	Parcels	Total Acreage	Number of Lots
Columbia							
	Approved						
		SUP 13-008	Commercial Kennel	21	(12) 4, 5	26.602	
Cunningham							
	Approved						
		SDP 13-008	Major Site Plan	17	(21) A	1.24	
		SUB 13-018	Family Subdivision	36	(A)51	36.802	2
Fork Union							
	Approved						
		SDP 07-024	125' Telecommunications Tower	53	(A)79	107.14	

AFD - Agricultural Forestal District
BSP - Boundary Survey Plat
BZA - Board of Zoning Appeals (Variance)
CCE - Code Compliance Enforcement
CPA - Comprehensive Plan Amendment
SDP - Site Development Plan
SUB - Subdivisions
SUP - Special Use Permits
ZMP - Zoning Map Proposal (Rezoning)
ZTA - Zoning Text Amendment

Pending Meetings Report

Action	Action Date	District	ID#	Applicant Name	Tax Map Parcels	Description
Pending BOS Meeting						
	1/15/2014	Fork Union	ZMP 13-002	Cowboys, LLC	30 (A)84B	Conditional Rezoning

Fluvanna County Planning Department Code Compliance Projects	
Staff Contact	Scott Miller (Code Compliance Officer)
Dates	January 1, 2013 thru December 31, 2013 unless otherwise noted **

Project	Status
Special Use Permit (SUP/ZUP) Inspections for Compliance **August 2013 thru December 2013	• Compliance – Sound Levels [Tenaska] ○ All requirements and conditions for sound levels compliant (monitored monthly) • Compliance with site inspection for ZUP 12:001 – All requirements compliant • Compliance with site inspection for SUP 12:004 – All requirements compliant • Compliance with site inspection for SUP 12:008 – All requirements compliant • Compliance with site inspection for SUP 11:001 – All requirements compliant • Compliance with site inspection for SUP 11:003 – All requirements compliant • Compliance with site inspection for SUP 11:005 – All requirements compliant • Compliance with site inspection for SUP 11:006 – All requirements compliant • Compliance with site inspection for SUP 10:004 – All requirements compliant • Compliance with site inspection for SUP 10:006 – All requirements compliant • Compliance with site inspection for SUP 09:002 – All requirements compliant • Compliance with site inspection for SUP 09:005 – All requirements compliant • Compliance with site inspection for SUP 09:006 – All requirements compliant • Compliance with site inspection for SUP 09:007 – All requirements compliant • Compliance with site inspection for SUP 08:001 – All requirements compliant • Compliance with site inspection for SUP 08:006 – All requirements compliant • Compliance with site inspection for SUP 07:016 – All requirements compliant • Compliance with site inspection for SUP 05:008 – All requirements compliant • Compliance with site inspection for SUP 04:019 – All requirements compliant
Special Use Permit (SUP) Applications **August 2013 thru December 2013	• SUP required (automobile repair service establishment), Jason Farren, TMP 17-(16)-4, SUP 13:003 • SUP required (commercial kennel), Andrew and Jess Boyle, TMP 4-(41)-3, SUP 13:004 • SUP required (commercial greenhouse), Lori L. Roberts, TMP 29-(A)-89, SUP 13:005 • SUP required (automobile repair service establishment), Gregory Cox, TMP 16-(14)-4, SUP 13:006 • SUP required (automobile repair service establishment), Brad Kennedy, TMP 29-(A)-12, SUP 13:007 • SUP required (commercial kennel), Mary E. Marks, TMP 21-(12)-4,5, SUP 13:008
Zoning Violations, Complaints **SEE NEXT PAGE CONTINUED**	• Illegal Use, TMP 23-(8)-1A, (inoperative vehicles), James A. Baugher, CCE 13:009, closed • Illegal Use, TMP 33-(A)-57, (trash, debris), Gail Bruce ET AL, CCE 13:011, closed • Illegal Use, TMP 3-(27)-7, (setback violation), Rita C. Cline, CCE:13:007, closed • Illegal Use, TMP 3-(10)-9, (trash, debris), Donald K. Cline, closed • Illegal Use, TMP 16-(14)-4, (inoperative vehicles, auto garage SUP), Gregory P. & Ann Cox, closed • Illegal Use, TMP 17-(24)-22, (inoperative vehicles), Jeffrey T. & Bonnie J. Davison, CCE 13:006, closed • Illegal Use, TMP 30A-(1)-2A, (violating single family dwelling def.), Frank M. & Diane L. Dowell, closed • Illegal Use, TMP 23-(10)-A1, (violating single family dwelling def.), Michael E. & Sandra C. Falciglia, open • Illegal Use, TMP 31-(A)-104, (dilapidated structure per/Health Dept. complaint), Charles Franklin, closed • Illegal Use, TMP 48-(A)-71, (trash, debris), John R. Hamshar, CCE 13:004, closed

Zoning Violations, Complaints **CONTINUED**	• Illegal Use, TMP 3-(18)-10, (inoperative vehicles), Frederick L. & Vivian H. Hensley, CCE 13:010, closed • Illegal Use, TMP 51-(A)-22, (outside storage of materials), JWS Enterprises LLC, CCE 12:001, open • Illegal Use, TMP 3-(A)-31,32, (contractor's storage yard), JWS Enterprises LLC, CCE 12:002, open • Illegal Use, TMP 28-(A)-12, (inoperative vehicles, auto garage SUP), Brad Kennedy, closed • Illegal Use, TMP 28-(A)-60, (violation of SUP, noise, hours), Jay Landseadel, CCE 11:017, closed • Illegal Use, TMP 33-(9)-1A, (trash, debris), Liberty Homes LLC, ET ALS, CCE 13:012, closed • Illegal Use, TMP 27-(17)-8,9, (inoperative vehicles), David M. & Sandra M. Marks, CCE 13:002, closed • Illegal Use, TMP 29-(5)-7, (trash, debris), Janet, Melvin & Valerie Morris, CCE 13:001, closed • Illegal Use, TMP 18A-(11A)-C, (debris, noise), closed • Illegal Use, TMP 32-(11)-C, (trash, debris), Penny Pittman, CCE 13:003, closed • Illegal Use, TMP 33-(A)-33, (contaminants in watercourse per DEQ), P. Michael & Linda Roane, closed • Illegal Use, TMP 12-(A)-32, (setback violation, noise, lighting), Ryalls Living Trust, CCE 13:008, closed • Illegal Use, TMP 5-(A)-59, (violation of business type), Kenneth Thomas, closed • Illegal Use, TMP 4-(22)-14, (trash, debris, burning), Kimberly & Samuel A. Wells, CCE 13:005, closed
Signage – Removal of Illegal Signage in road right-of-ways and placement/removal of required County signs	• Removed two hundred and twenty seven (247) illegal signs, June 5, 2013 thru December 31, 2013 • Placement of fifteen (15) required County zoning signs • Removal of thirteen (13) required County zoning signs
Assisting Dept. of Building Inspections, Dept. of Public Works and other agencies	• Evaluate Palmyra Fire Station storm sewer pipe failure, take survey measurements • Evaluate FUMA Maintenance Shop soil and erosion control measures, take survey measurements • Evaluate Fluvanna County High School retention basin and storm sewer facilities, take survey measurements • Evaluate Pleasant Grove Park baseball field retention basin, take survey measurements, DPW • Evaluate Zion Station Sub. for continuing failure of retention basins and ditches, take survey measurements • Evaluate, locate, uncover/mark benchmark info. at closed County Landfill, take survey measurements, DPW • Evaluate Biosolid spill on Cedar Lane, DEQ • Evaluate and advise Biosolid Monitor for failure to display required setback markers at application site • Evaluate parcel line boundaries for dredging operations on Boston creek at Rivanna River • Attend Certification for ESRI GIS Mapping • Develop GIS mapping material for Economic Development Dept. • Attend Certification for Playground Safety Inspector
Miscellaneous	• Proactive compliance evaluation of all visible properties in the county – 50% complete • Deliver packets for upcoming Board of Supervisor's and Planning Commission meetings • Facilitate the purchase of five (5) additional public hearing signs to replace destroyed signs

Fluvanna County Planning Department Long-Range Planning Projects	
Staff Contact	Jay Lindsey (Planner)
Date	January 15, 2013

Current/ Complete Projects	**Status**
Maps and Media	• Maps for Mozell Booker • Poster Size maps for ROI meetings • Redo "Know Your District" poster for new BOS • Parcel research/ maps for citizens

Long Range Planning	• Development Activity Report (DAR)
	  ○ Compile and Edit data from Planning, Code Compliance, Building Inspections, and Commissioner of Revenue
	  ○ Analyze housing data
	  ○ Create DAR book
	• Comparison of development fees in neighboring localities

Additional/ Extra-Departmental Tasks	• Assist with Stormwater Ordinance for State DEQ • Assist with ROI assumptions and Spreadsheet • Facilitate 5 ROI public meetings
Interim Program Assistant Functions	• Upload PC Packets • Submit Public Ads • Procure hard copies of Comp Plan for new BOS • Code billing for public ads • Assist with phone and in-person inquiries

FLUVANNA COUNTY PLANNING COMMISSION
REGULAR MEETING MINUTES
Circuit Courtroom
Fluvanna County Courts
December 16, 2013
7:00 p.m.

MEMBERS PRESENT: Barry Bibb, Chairman
Patricia Eager, Vice-Chairman
Donald Gaines
Ed Zimmer
Joe Chesser, Board of Supervisors Representative

ALSO PRESENT: Frederick Payne, Fluvanna County Attorney
Steve Nichols, Fluvanna County Administrator
Robert Popowicz, Director of Community Development
Cheryl Wilkins, Emergency Services Coordinator
Wayne Stephens, Director of Public Works
Jason Smith, Director of Parks and Recreation
Eric Dahl, Budget Analyst
Jason Stewart, Planning and Zoning Administrator
Steven Tugwell, Senior Planner
Jay Lindsey, Planner
Heather Poole, Senior Program Assistant

CALL TO ORDER

Chairman Bibb called the Planning Commission meeting of December 16, 2013 to order at 7:00 p.m. in the Circuit Court room of the Fluvanna County Courts Building in Palmyra, Virginia. After the meeting was called to order, the Pledge of Allegiance was recited.

Mr. Robert Popowicz, Director of Community Development, introduced Fluvanna County's new Planning and Zoning Administrator, Mr. Jason Stewart.

PLANNING DIRECTOR'S REPORT

Mr. Steve Tugwell, Senior Planner, gave the monthly report to the Planning Commission.

- **Board of Supervisors**
  - **November 20, 2013**
    - **CPA 13:01 – Fluvanna County – Comprehensive Plan Text Amendment**
      Approved (3-2, Ullenbruch & Weaver) to amend the Infrastructure and Land Use chapters of the Comprehensive Plan, along with any other associated changes to the plan as a result of the additions. Portions of the existing text within the Infrastructure and Land Use chapters will be replaced with new text and illustrations prepared by the Board of Supervisors. The proposed amendment to the Comprehensive Plan adjusts Land Use goals and provides new text and an illustrative map in the Infrastructure chapter in order to better reflect the Interjurisdictional Agreement regarding the James River Water Pipeline: "An Agreement between Louisa County, Virginia, Fluvanna County, Virginia, the Louisa County Water Authority, and the James River Water Authority regarding the James River Water Pipeline." The amendment is generally consistent with other chapters of the Comprehensive Plan.
    - **SUP 13:04 – Andrew & Jessica Boyle**
      Approved (5-0) a request for a Special Use Permit (SUP) to allow for a Commercial Kennel with respect to 4.067 acres of Tax Map 4, Section 41, Parcel 3. The property is zoned A-1 (Agricultural, General) and is located on the south side of Richmond Road (Route 250) 0.15 miles east of its intersection with Blue Ridge Turnpike (Route 708). The property is located in the Palmyra Election District and is within the Zion Crossroads Community Planning Area.
    - **SUP 13:05 - Lori L. Roberts**
      Approved (5-0) a request for a Special Use Permit (SUP) to allow for a Commercial Greenhouse with respect to 3.581 acres of Tax Map 29, Section A, Parcel 89. The property is zoned A-1 (Agricultural, General) and is located on the south side of Thomas Jefferson Parkway (State Route 53) approximately 0.60 miles east of its intersection with Ruritan Lake Road (Route 619). The property is located in the Fork Union Election District and is within the Rural Residential Planning Area.
    - **SUP 13:06 – Gregory Cox**

Approved (5-0) a request for a Special Use Permit (SUP) to allow for an automobile repair service establishment with respect to 10 acres of Tax Map 16, Section 14, Parcel 4. The property is currently zoned A-1 (Agricultural, General) and is located on Rock Lane, approximately 0.60 miles south of its intersection with State Route 619 (Ruritan Lake Road). The property is located in the Cunningham Election District and is within the Rural Residential Planning Area.

- **SUP 13:07 – Brad Lee Philip Kennedy**
  Approved (5-0) a request for a Special Use Permit (SUP) to allow for an automobile repair service establishment with respect to 25.422 acres of Tax Map 29, Section A, Parcel 12. The property is currently zoned A-1 (Agricultural, General) and is located on the west side of State Route 660 (Sclaters Ford Road), approximately 0.25 miles south of State Route 619 (Ruritan Lake Road). The property is located in the Fork Union Election District and is within the Rural Residential Planning Area.

- **Board of Zoning Appeals Actions –** *No December Meeting*

- **Technical Review Committee –** *No December Meeting*

PUBLIC COMMENTS #1
Chairman Bibb opened the floor for the first section of public comments.
With no one wishing to speak, Chairman Bibb closed the first section of public comments.

APPROVAL OF MINUTES
MOTION:
Ms. Eager moved to **approve** the November 18, 2013 Planning Commission meeting minutes as presented.

Mr. Zimmer seconded. The motion carried with a vote of 4-0. AYES: Bibb, Eager, Gaines and Zimmer. NAYS: None.

PUBLIC HEARINGS:
ZMP 13:02 – Cowboys, LLC - An ordinance to amend the Fluvanna County Zoning Map with respect to 2.631 acres of Tax Map 30, Section A, Parcel 84B to rezone the same from A-1, Agricultural, General to B-1, Business, General (conditional). The affected property is located on the southeast side of Route 15 (James Madison Highway), approximately 0.18 miles northeast of Route 53 (Thomas Jefferson Parkway). The property is located in the Fork Union Election District and is within the Palmyra Community Planning Area.

Mr. Steve Tugwell, Senior Planner, presented the rezoning request to amend the Fluvanna County Zoning Map with respect to 2.631 acres of Tax Map 30, Section A, Parcel 84B to rezone the same from A-1, Agricultural, General to B-1, Business, General (conditional).

Chairman Bibb opened the public hearing.
With no one wishing to speak, Chairman Bibb closed the public hearing.

Ms. Eager stated this request did meet Fluvanna County's Comprehensive Plan view of Palmyra village and would add another business which the county needs.

MOTION:
Ms. Eager moved to **recommend approval** of ZMP 13:02, an ordinance to amend the Fluvanna County Zoning Map with respect to 2.631 acres of Tax Map 30, Section A, Parcel 84B to rezone the same from A-1, Agricultural, General to B-1, Business, General (conditional).

Mr. Gaines seconded. The motion carried with a vote of 4-0. AYES: Bibb, Eager, Gaines and Zimmer. NAYS: None.

FY2015 – FY2019 Capital Improvement Plan - Review and recommendation of the Capital Improvement Plan (CIP) for fiscal years 2015 through 2019 (FY2015 – FY2019), which is to be submitted in conjunction with the Fluvanna County Budget for fiscal year 2015 (FY2015). The CIP lists major construction and acquisition efforts planned for the next five (5) fiscal years, and describes proposed methods of financing for each project.

Mr. Jay Lindsey, Planner, presented the FY2015 – FY2019 Capital Improvement Plan to the Planning Commission.

Chairman Bibb opened the public hearing.
With no one wishing to speak, Chairman Bibb closed the public hearing.

Chairman Bibb stated his concern over the large amount of repair projects listed and that the Planning Commission felt those projects should be seen as priority before any new projects went forward.

The Planning Commission discussed which items to prioritize in the Capital improvement Plan for FY 2015 – FY2019.

Mr. Nichols, County Administrator, Mr. Dahl, Budget Analyst and Mr. Wayne Stephens, Director of Public Works, addressed the questions presented by the Planning Commission regarding drinking water for the Fork Union Sanitary District (FUSD).

MOTION:
Mr. Gaines moved to **recommend approval** of the FY2015 – FY2019 Capital Improvement Plan (CIP) as presented, with a list of funding priorities prepared by the Planning Commission.

Ms. Eager seconded. The motion carried with a vote of 4-0. AYES: Bibb, Eager, Gaines and Zimmer. NAYS: None.

PRESENTATIONS:
None

SITE DEVELOPMENT PLANS:
None

SUBDIVISIONS:
None

UNFINISHED BUSINESSS:
ZMP 12:02 & SUP 13:02 – Hotel Street Capital, LLC
ZMP 12:02 - An ordinance to amend the Fluvanna County Zoning Map with respect to 222.03 acres of Tax Map 30, Section A, Parcel 110, and 10 acres of Tax Map 19, Section A, Parcel 39C (former Rivanna Resort) to rezone the subject properties from R-3 (Residential, Planned Community) with proffers to PUD (Planned Unit Development). The subject property is located within the Palmyra Election District on the western side of U.S. Route 15 (James Madison Highway) at its intersection with State Route 644 (Friendship Road), approximately 0.25 miles north of State Route 661 (Rescue Lane). The proposed amendment would allow a maximum of 952 residential units (a mixture of single-family detached units, townhouses, and multi-family units) and 180,000 square feet of commercial space. According to the 2009 Comprehensive Plan, the property is located within the Palmyra Community Planning Area.

SUP 13:02 - A request for a special use permit to allow for major utilities in conjunction with a Planned Unit Development (PUD) with respect to 222.03 acres of Tax Map 30, Section A, Parcel 110, and 10 acres of Tax Map 19, Section A, Parcel 39C. The property is currently zoned R-3 (Residential, Planned Community) and is located on the western side of State Route 15 (James Madison Highway) at its intersection with State Route 644 (Friendship Road), approximately 0.25 miles north of State Route 661 (Rescue Lane). The property is located within the Palmyra Election District. According to the 2009 Comprehensive Plan, the property is within the Palmyra Community Planning Area.

Chairman Bibb discussed his various concerns regarding the PUD application with the Planning Commission. Chairman Bibb stated his belief that portions of the application did not include sufficient information.

Mr. Nichols, County Administrator, inquired when the Planning Commission planned on making their recommendation to the Board of Supervisors. Planning Commission members discussed and decided on taking action at their meeting scheduled for January 22, 2014.

NEW BUSINESS:
None

PUBLIC COMMENTS #2
Chairman Bibb opened the floor for the second section of public comments.

- Mr. Al Talley, 14307 James Madison Highway, stated he was thankful for the staff and Planning Commission's hard work. Mr. Talley also suggested rethinking where the county invests its money; and, that instead of investing so much in Pleasant Grove or water at Zion Crossroads, the county should think about investing at Ferncliff where growth is apparent.

With no one wishing to speak, Chairman Bibb closed the second section of public comments.

ADJOURN

There being no further business, Chairman Bibb adjourned the Planning Commission meeting of December 16, 2013 at 9:41 p.m.

Minutes recorded by Heather Poole.

_____

Barry A. Bibb, Chairman
Fluvanna County Planning Commission

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October 22, 2013

Hotel Street Capital, LLC
31 Garrett Street
Warrenton, VA 20186

REF: ZMP 12:02 & SUP 13:02 (Tax Map parcels 30-A-110 & 19-A-39C)

Dear Applicant:

This letter serves as notification of the action taken by the Fluvanna County Board of Supervisors at their meeting on October 16, 2013, with regard to the requests referenced above. By a vote of 4-1, your request to amend the zoning map from R-3 (conditional) to PUD (conditional), and the Special Use Permit request for major utilities, has been remanded to the Planning Commission for further consideration. The Board requested additional review of the project with particular emphasis on the following issues:

- Water: Requires satisfactory information to demonstrate adequate water source(s), and that the use of such sources will not negatively impact adjacent properties;

- Sewer: Must demonstrate a specific plan for the operability of the site's sewerage system, including, among other things, the suitability of the property for onsite land disposal of wastewater;

- Traffic: Additional VDOT report is required with revised information regarding multiple relocations of a public road (i.e., demonstration that an uncontrolled "T" intersection with State Route 644 and Route 15, James Madison Highway, provides reasonable access and an acceptable level of service for Phase I alone).

This issue has been placed on the Planning Commission agenda for discussion at their next meeting on Wednesday, October 23, 2013.

Please contact my office if you require further assistance.

Sincerely,

Allyson L. Finchum
Planning Director

cc:
Mr. Keith B. Smith, 35 Acre Lane, Palmyra, VA 22863
Mr. Justin M. Shimp, Shimp Engineering, P.C., 201 E. Main Street, Charlottesville, VA 22902

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DATE: November 15, 2013
TO: Steve Tugwell - Acting Planning & Zoning Administrator
FROM: J. Wayne Stephens, PE - County Engineer

SUBJECT: Walker's Ridge proposed development – Groundwater and Soils information submitted in support of proposed on-site central drinking water and sewage systems:

1) Letter dated October 30, 2013 from Justin Shimp, PE, to Allyson Finchum RE: "Hydrogeological Studies and Impacts for Groundwater for Phase 1 Development
2) Document prepared by Eaton Geological Consulting, LLC, titled: *Feasibility Study of Groundwater Potential for The Walker's Ridge Development.*
3) Undated letter (received by County on 10/31/2013) from Nick H. Evans, PhD of CSG, to Justin Shimp, PE
4) Letter dated November 1, 2013 from Justin Shimp, PE, to Allyson Finchum RE: "Preliminary drainfield analysis, soils studies..."
5) Document prepared by NCS Wastewater Solutions, titled: *Preliminary Feasibility Assessments of Drainfield Capacity for Supporting Walker's Ridge Development On-Site Wastewater System.*
6) Letter dated October 29, 2013, from Environmental Soil Consultants (ESC) to NCS Wastewater Solutions, RE: *Soil Feasibility: Walker's Ridge Development...*

Following are my observations and comments resulting from my review of the subject documents:

Groundwater

- In my opinion, the documentation provided does not constitute a complete Phase 1 Hydrogeologic Study.

- 300 gpd per unit is a reasonable and correct usage figure for water source requirements and on central water systems in Virginia. While actual consumption per unit is usually less than 300 gpd, this figure takes in to account losses due to system leakage, filter backwash cycles, required flushing, etc. In any event, I recommend a minimum 300 gpd per unit be used in the design of any central water system being constructed in the County.

- For groundwater systems, the VDH Waterworks Regulations require 0.5 gpm of well capacity per Equivalent Residential Connection (ERC, aka EMU). For purposes of sustainability and system redundancy, 1.0 gpm per EMU is often required by localities when adopting their own central water system design criteria. In any event, the state standard must be met.

- The 306 EMUs proposed in Phase 1 of the project will require a total sustainable groundwater yield of at least 153 gpm. Using the reported 8 gpm median yield in the documentation provided, approximately 20 wells would be needed to provide water for Phase 1 of the project.

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- Groundwater recharge which may be realized from proposed on-site drainfields should not be used in any water balance computations for the project. The letter from Mr. Shimp seems to state an intent to include drainfields in these computations. Section 2.1 of the Eaton document states the following assumption: "groundwater withdrawls are consumptive; that is, there is no return of water to the on-site aquifer via infiltration"; while Section 7.0 of that same document suggests that 50% of extracted water should be assumed to return to the groundwater via infiltration. These discrepancies should be cleared up, and the developer's intent made clear.

- The Eaton document states an assumption that the developed site will have an overall 5% impermeability (i.e. 95% of the site will contribute to groundwater recharge) . While no preliminary stormwater computations were provided, this seems unrealistic for a PUD development, even assuming that some of the SWM/BMP facilities are designed to allow some infiltration.

- It appears from the documentation provided that no field work had been performed to confirm the initial photolineament study. Independent field mapping of the site, including locations, orientations and sizes of visible rock outcroppings are needed in order to complete the fracture trace analysis. These are used to help confirm (or refute) the apparent fracture orientations and locations inferred from the photolineament analysis. It is my opinion that Fracture Trace Analyses cannot be considered complete without this field observation, verification and comparison work being completed.

- It is likely I will have more comments when more complete information is available.

Soils & Drainfield Feasibiility

- The documentation provided indicates that some preliminary field work has been performed, including the digging of auger holes and recordation of soil profiles. A map should be prepared and submitted showing all auger locations, and accompanied by soils profile information.

- The soils chart included in the NCS document lists the soils, and approximate areas of those soils, for about 212 acres of the site. Of these, approximately 83 acres of those soils are classified by the USDA-NRCS as having a high potential of being hydric soils (Nf, Tc and Td). Hydric soils are not suitable to be used for drainfields. Until the actual soils are classified for the site, it is not reasonable to assume that these areas will be suitable for use as drainfields.

- Also in the included soils chart, approximately 109 acres of land is listed as being in soils with average slopes greater than 15%, with about 10 acres of that being in soils greater than 25%. Drainfield suitability declines as slopes increase, and the Me and Mg soil classifications

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are already considered only 'Moderately' suitable for use as drainfields. Even when soils are suitable, steep slopes require that drainfields be designed with larger spacing between drain lines than on flatter slopes. This results in larger areas being needed for both primary and reserve drainfields.

- The ESC letter states: "The soils on the property that occur on less than 15% slopes can generally be utilized in mass drainfields". I agree with this statement, although it eliminates a large percentage of the soils listed in the NCS document from contention for use as drainfields.

- The ESC letter makes reference to limitation on their assessment of suitability for areas contained within the greens, sand traps and tees of the old golf course located on the site. The letter further states that former fairway areas will need to be "evaluated carefully for cut and fill areas", since these areas would not be suitable for use as drainfields.

- It is my opinion that despite the conclusions drawn by the developer's consultant, the documents and information provided by the developer indicate that a very high percentage of the proposed development site will not be suitable for use as mass drainfields. This is apparent even without knowing the locations of the truly suitable soils in relation to proposed roads, houses, buildings, parking lots, SWM/BMP facilities, etc., the construction of which is likely to further reduce the usability of these suitable soil areas.

SHIMP ENGINEERING, P.C.
PROJECT MANAGEMENT
CIVIL ENGINEERING
LAND PLANNING

Received
NOV 0 1 2013
Fluvanna County

November 1st, 2013

Ms. Allyson Finchum
Planning Director
Fluvanna County

Regarding: **Walkers Ridge, Preliminary Drain field Analysis, Soil Studies and VDOT Right of Way And Traffic responses.**

Dear Ms. Finchum

As requested in your letter of October 22nd, 2013 we have completed an analysis demonstrating that the soils on the Walkers Ridge development are adequate for the proposed shallow drip or mass drain field systems that we have proposed. Our consultant, NCS Wastewater Solutions, has performed onsite soil evaluations and mapped the soils for the property to determine the area required for drain fields. They have identified ample qualified soils and available locations for our proposed disposal systems.

You also requested that we confirm that VDOT will approve our request to create a temporary intersection as shown on the phase I plans that may be subsequently abandoned. VDOT has confirmed that concept is acceptable as presented. A copy of our correspondence from VDOT has been attached for your reference. You have also asked for documentation that the proposed Phase I entrance will function from a traffic operations standpoint. Bill Wuensch, PE, PTOE, of EPR, P.C. has prepared a Phase I traffic impact analysis that reviews the impacts of the traffic generated from Phase I on the proposed Phase I entrance. EPR has found that the level of service is acceptable for all movements with only minimal delay occurring for vehicles exiting the development. In addition, the study identifies the proposed turn lane and storage lane lengths to be adequate.

The reports and correspondence with VDOT that we have provided address the remaining request of your October 22nd letter that were not previously addressed with a separate submittal. Please let me know if you have any questions about the information we have presented. We look forward to bringing this information back to the Planning Commission and Board of Supervisors at the earliest opportunities.

Sincerely,

Justin Shimp, P.E.

Attachments:
Walkers Ridge Phase I Development Traffic Impact Check, EPR, P.C.
Email from Mark Wood, VDOT, on 10-28-13
Preliminary Feasibility Assessments of Drainfield Site Capacity, NCS

Justin Shimp

From: Wood, Mark (VDOT)
Sent: Monday, October 28, 2013 6:09 PM
To: Justin Shimp
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County

Importance: High

Justin

VDOT has reviewed your email and attachment below and we have the following comments:

- Yes, VDOT would approve the creation and later abandonment of a Right of Way for a secondary road, however, even if it is to be a temporary State facility it would still need to be constructed to VDOT's standards, including the Road Design Manual. The design would have to incorporate the appropriate geometric design standards as per Appendix A (horizontal curve radius, pavement width, shoulder width, etc.) as well as entrance spacing standards per VDOT's Access Management Design Standards (Appendix F).
- How much development is planned to be built before the ultimate location for the facility is constructed?
- Has a traffic analysis been performed to show what improvement(s) would be needed at the temporary connection to Route 15?

If the developer wants to construct Walker's Ridge using a phasing plan for the development, VDOT can review the phasing plan and provide you with comments.

J. Mark Wood, P.E., L.S.
Area Land Use Engineer
Virginia Department of Transportation
Land Development – South
P.O. Box 1017
11430 James Madison Highway
Troy, VA 22974
Phone: (434) 589-7932
Cell: (540) 223-5240
Fax: (434) 589-3967
Email: Mark.Wood@VDOT.Virginia.gov

From: Justin Shimp [mailto:justin@shimp-engineering.com]
Sent: Monday, October 21, 2013 10:47 AM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT)
Subject: Walkers Ridge Entrance on Route 15

Hello Mark,

The County attorney in Fluvanna has asked a question as to whether or not VDOT would approve the creation and later abandonment of ROW for a secondary road associated with the Walkers Ridge development.

I've attached our proposed phase I entrance, it shows the squaring off of route 644 into a perpendicular intersection in roughly the same location as the current intersection. To do this we will need to abandon the current 644 ROW. We own the land on both sides of the road where this is to occur. Can you confirm that VDOT will allow this to happen?

Secondly, our phase I entrance will be temporary in nature (maybe 6-12 years) we propose to construct the roundabout as part of phase II (proposed ROW lines are shown on the sheet) and at that time would abandon our phase I entrance ROW (or perhaps relocate is the better word). Same as In the first item, can you confirm VDOT would allow this to occur?

Obviously all of these proposals are with the caveat that all design/construction/etc must be in conformance with all applicable VDOT standards.

Thanks!

Justin M. Shimp, P.E.
President
Shimp Engineering, P.C.
201 E. Main Street, Suite M
Charlottesville, VA 22902

E: Justin@shimp-engineering.com
P: 434-953-6116 (Direct)
P: 434-207-8086 (Office)
F: 804-302-7997

EPR, P.C. "ENGINEERING & PLANNING RESOURCES"
637 BERKMAR CIRCLE, CHARLOTTESVILLE, VA 22901

TO: JUSTIN SHIMP, P.E.	FROM: BILL WUENSCH, PE, PTOE
ORGANIZATION: SHIMP ENGINEERING	DATE: NOVEMBER 1, 2013
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE: WALKERS RIDGE PHASE I DEVELOPMENT TRAFFIC IMPACTS	YOUR REFERENCE NUMBER:

MEMORANDUM

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY X FOR YOUR USE

Walkers Ridge Phase I Development Traffic Impact Check

1. Introduction

EPR examined traffic impacts for the first phase of development for the Walkers Ridge development. The planned Phase I Development of Walkers Ridge includes: 173 single-family detached houses, 99 townhomes, 34 single-family attached houses, 27,000 square feet offices, 6,000 square feet specialty retails, and 4,000 square feet high-turnover restaurants.

The access to this initial phase of the development will be via an unsignalized entrance at the intersection of Route 15 and the realigned Route 644 (Friendship Road). The intersection will consist of a northbound through lane, a northbound left turn lane, a southbound through lane and a southbound right turn lane on Route 15, as well as a combined eastbound left/right turn lane on the realigned Route 644.

2. Existing and Background Conditions

The existing and background traffic volumes were calculated from 2012 traffic count data in last Walkers Ridge TIS report by using a 1% per year background growth rate.

Figure 1 and **Figure 2** illustrate the existing (2013) and the future year (2018) no-build traffic volumes.

3. Site Trip Generation and Distribution

Site trip generation was calculated per ITE Trip Generation (9th Edition). Land use code 210 was used for single-family detached houses, land use code 230 was used for both townhomes and single-family attached houses, land use code 710 was used for offices, land used code 826 was used for specialty retails, and land used code 932 was used for the high-turnover restaurants.

Table 1 summarizes the trip generation for the Phase I of Walkers Ridge Development.

Table 1 Site Trip Generation

				AM		PM	
Use Description	**ITE**	**Qty**	**Daily**	**in**	**out**	**in**	**out**
Single Family Detached	210	173	1,739	33	98	108	64
Townhomes/Single Family Attached	230	133	824	11	54	51	25
Office	710	27,000	485	59	8	18	90
Specialty Retail	826	6,000	266	0	0	16	20
High-Turnover (Sit-Down) Restaurant	932	4,000	509	24	19	24	16
	total		3,823	127	179	217	215
internal capture			189	12	4	9	19
(15% of smaller of residential uses or others)							
Peak Hour Trips After Reductions (driveway trips)			3,634	114	175	209	196
Pass-by			194	6	5	10	9
(25% of Specialty Retail and Restaurant)							
Primary Trips			3,441	108	170	199	187
	total peak		3,441	279		386	

Site trip distribution was developed based on an examination of the existing traffic volumes travelling from north and south on Route 15. **Figure 3 and Figure 4** illustrates the site trip distribution percentages and site trips. This distribution is consistent with that used in the previous full traffic impact study.

4. Build Conditions

Figure 5 illustrates the future year (2018) build traffic volumes.

5. Analysis Results

The future year (2018) build conditions were simulated with Synchro and SimTraffic and the resulting levels of service for the proposed configuration of the intersection were shown in **Table 2**.

Table 2 Build Condition LOS, Delay, and Queuing

			Build 2018 (Phase I)				
			AM				
No.	Intersection	Movement	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue
			(sec/veh)		(ft)		
1	**Route 15 at Entrance (Friendship Road)**						
	Entrance EB	Left/Right	17.4	C	50	9.6	112
	Route 15 NB	Left	8.2	A	4	5.9	40
	Route 15 NB	Through	0.0	A	0	1.0	0
	Route 15 SB	Through	0.0	A	0	1.1	0
	Route 15 SB	Right	0.0	A	0	4.5	0
	Intersection		4.3	A	54	3.1	152

			Build 2018 (Phase I)				
			PM				
No.	Intersection	Movement	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue
			(sec/veh)		(ft)		
1	**Route 15 at Entrance (Friendship Rd)**						
	Entrance EB	Left/Right	19.1	C	62	11.5	126
	Route 15 NB	Left	8.7	A	8	7.0	47
	Route 15 NB	Through	0.0	A	0	1.1	0
	Route 15 SB	Through	0.0	A	0	2.2	0
	Route 15 SB	Right	0.0	A	0	5.1	13
	Intersection		4.9	A	70	4.1	186

The analysis results indicate that the proposed geometry and configuration at the intersection of Route 15 and the realigned Route 644 will provide adequate capacity for satisfactory levels of service at the entrance intersection and the proposed lengths for northbound left turn lane and southbound right turn lane will provide adequate space for the turning queues.

Figure 1 Existing (2013) Traffic Volumes

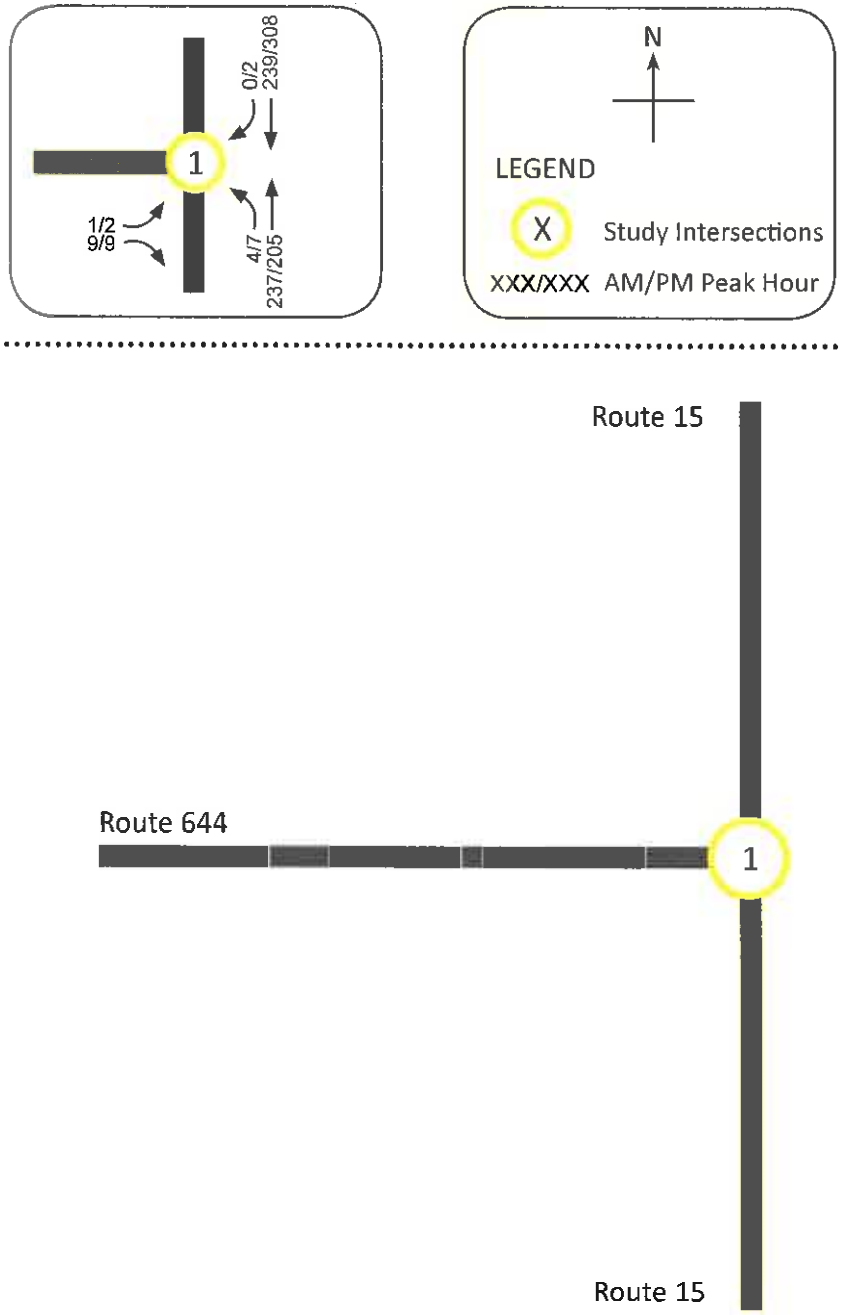


Figure 2 Future (2018) No Build Traffic Volumes

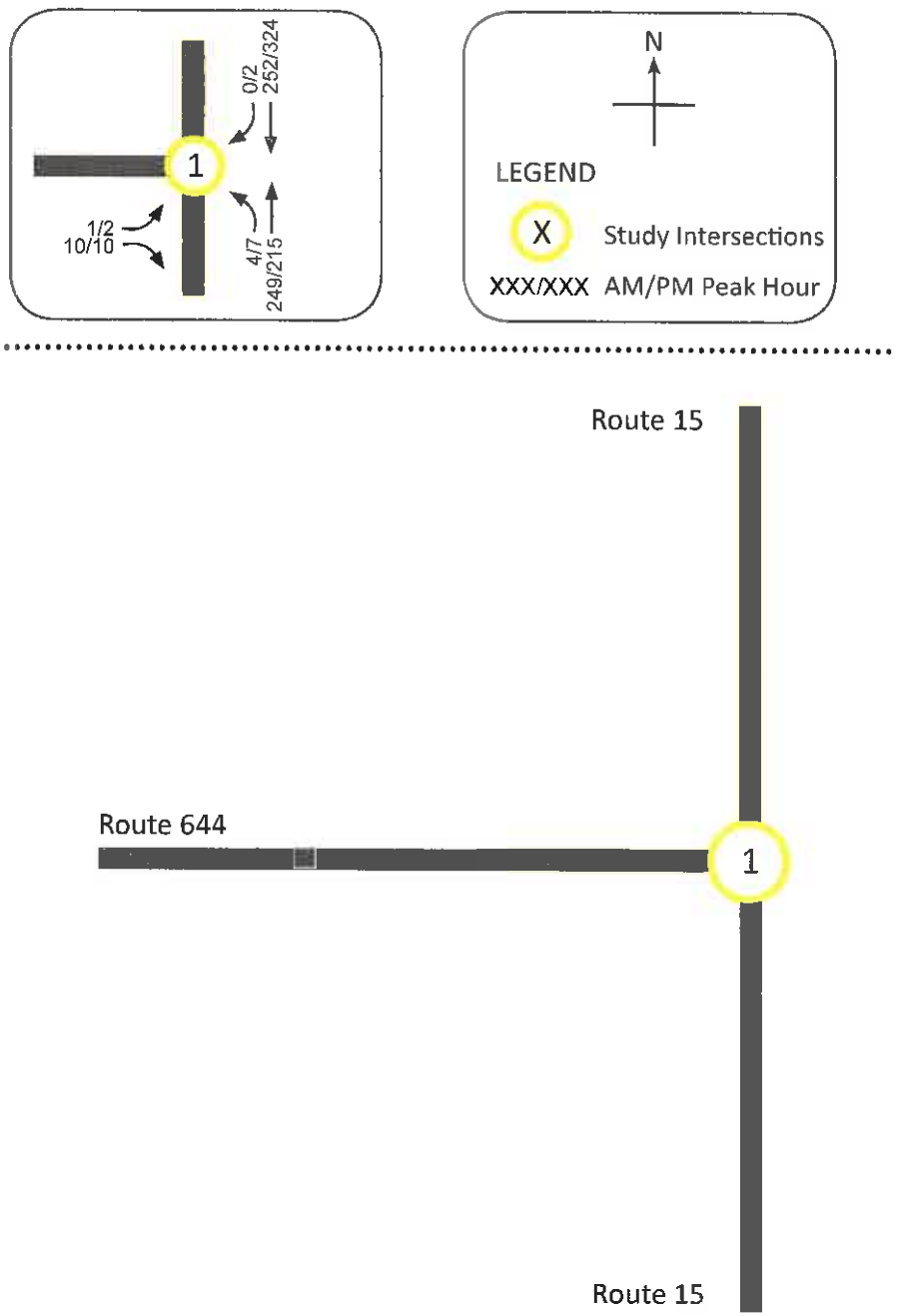


Figure 3 Site Trip Distribution

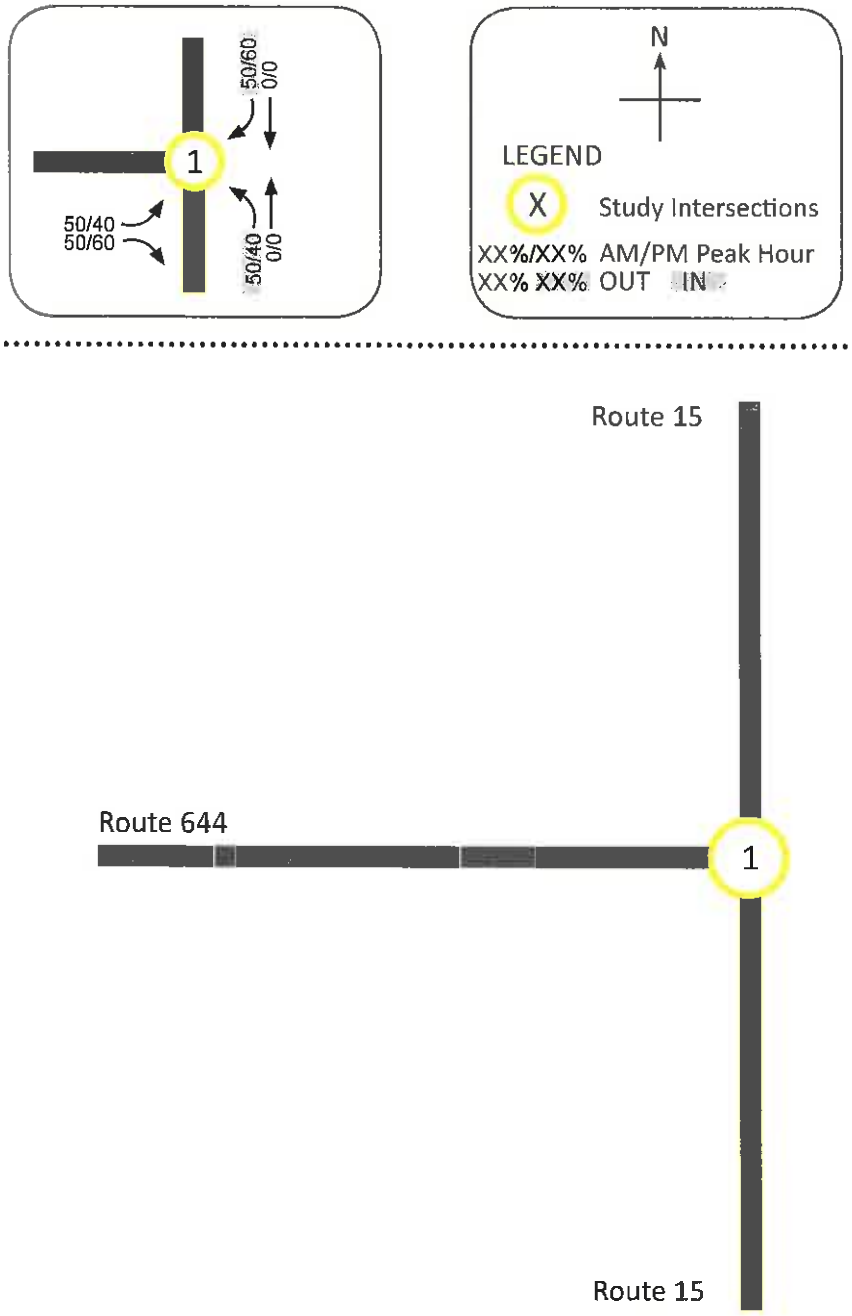


Figure 4 Site Trips

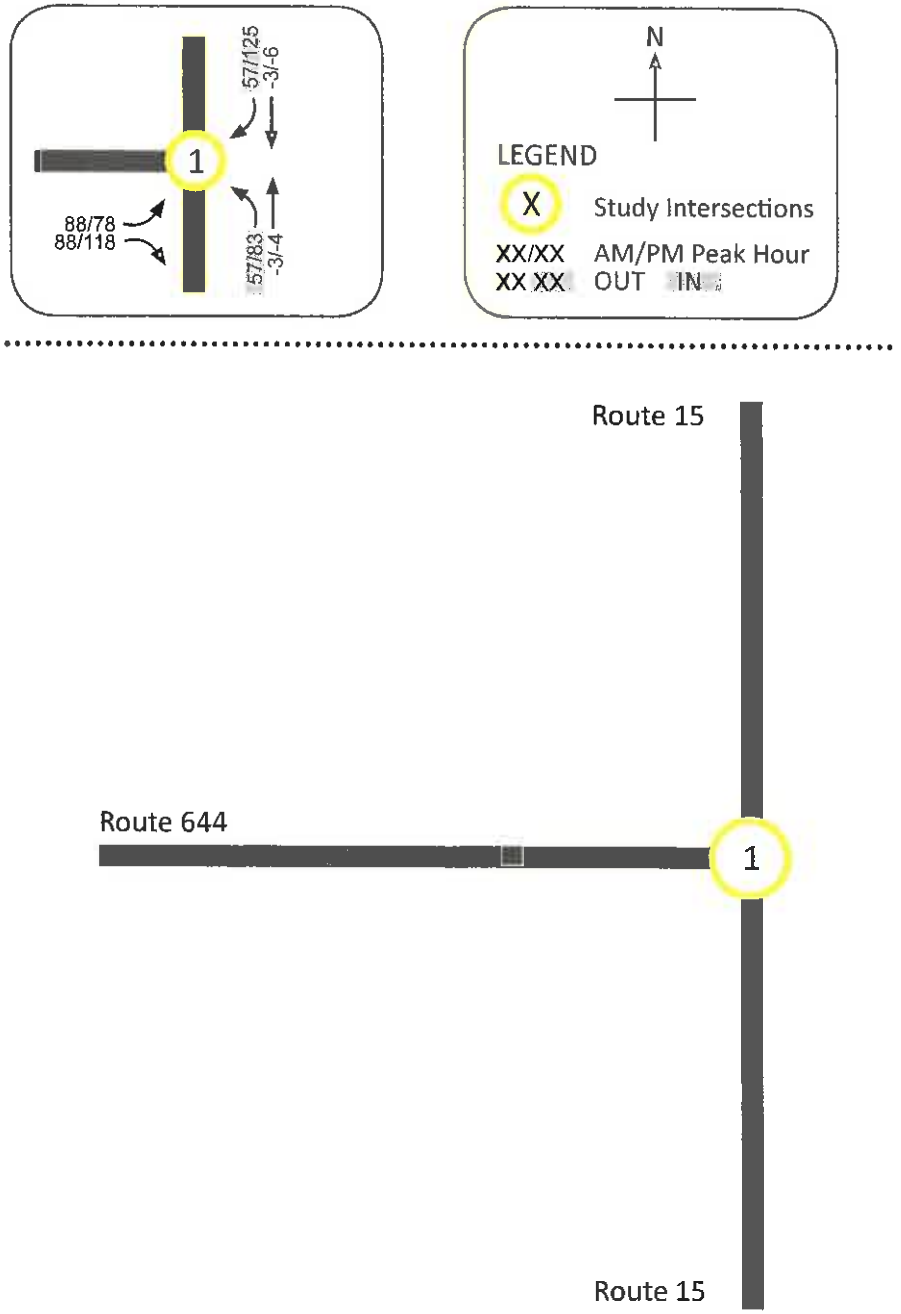
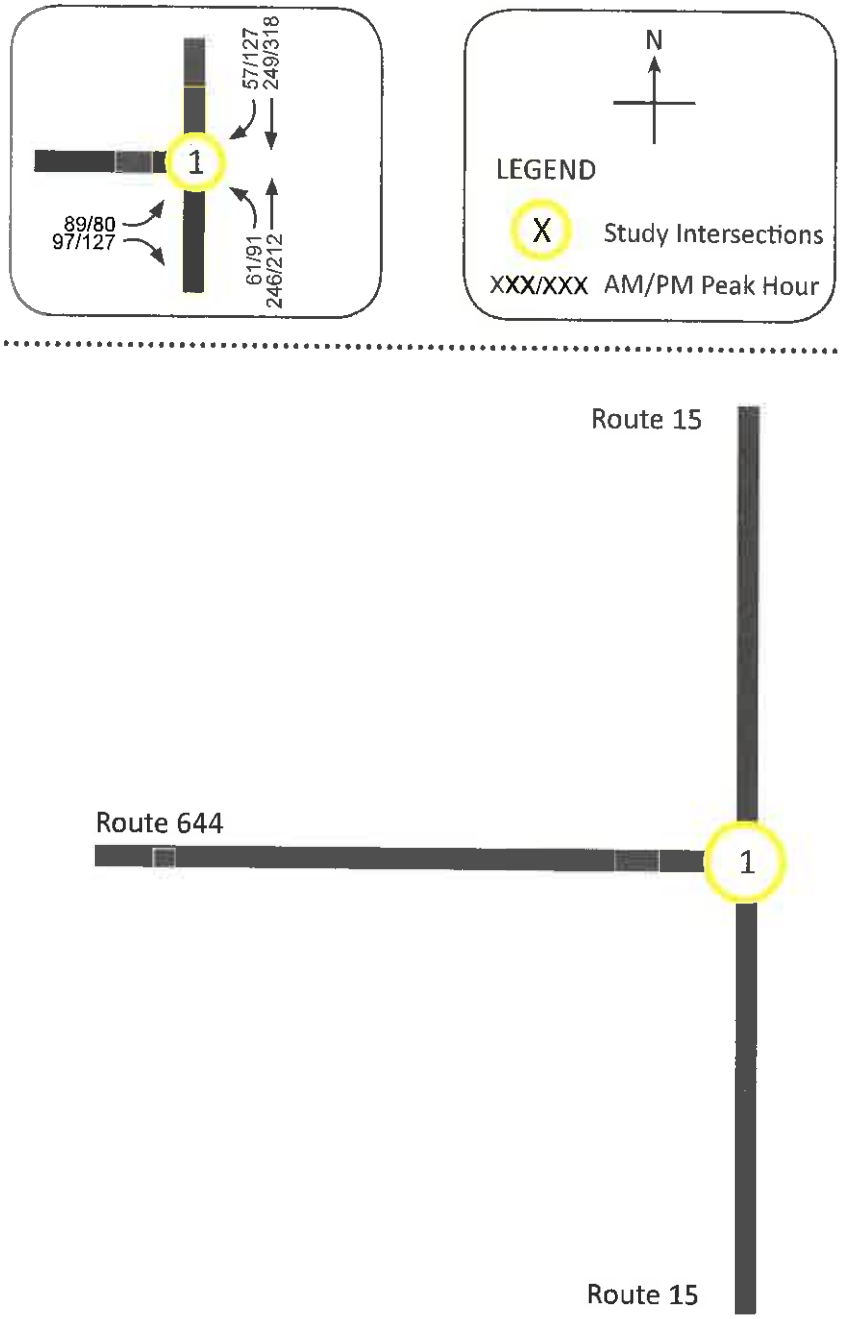
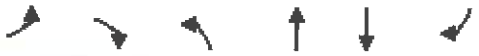


Figure 5 Future (2018) Build Traffic Volumes





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	89	97	61	246	249	57
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.77	0.84	0.92
Hourly flow rate (vph)	97	105	66	319	296	62
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	749	296	358			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	749	296	358			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	86	94			
cM capacity (veh/h)	359	743	1200			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	202	66	319	296	62
Volume Left	97	66	0	0	0
Volume Right	105	0	0	0	62
cSH	491	1200	1700	1700	1700
Volume to Capacity	0.41	0.06	0.19	0.17	0.04
Queue Length 95th (ft)	50	4	0	0	0
Control Delay (s)	17.4	8.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	17.4	1.4		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	80	127	91	212	318	127
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.89	0.88	0.92
Hourly flow rate (vph)	87	138	99	238	361	138
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	797	361	499			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	797	361	499			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	80	91			
cM capacity (veh/h)	322	683	1065			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	225	99	238	361	138
Volume Left	87	99	0	0	0
Volume Right	138	0	0	0	138
cSH	477	1065	1700	1700	1700
Volume to Capacity	0.47	0.09	0.14	0.21	0.08
Queue Length 95th (ft)	62	8	0	0	0
Control Delay (s)	19.1	8.7	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	19.1	2.6		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:07	8:07	8:07	8:07	8:07	8:07	8:07
Total Time (min)	70	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1	1
Vehs Entered	803	781	853	786	818	744	786
Vehs Exited	803	781	851	786	820	738	780
Starting Vehs	4	5	7	7	8	2	5
Ending Vehs	4	5	9	7	6	8	11
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	2	0	0	0	0
Travel Distance (mi)	264	257	279	259	270	245	258
Travel Time (hr)	6.9	6.7	7.5	6.8	7.2	6.2	6.6
Total Delay (hr)	0.7	0.8	1.0	0.8	1.0	0.6	0.7
Total Stops	213	190	223	202	201	171	188
Fuel Used (gal)	11.0	10.4	11.6	10.6	11.1	9.7	10.3

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:07	8:07	8:07	8:07
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	793	817	786	797
Vehs Exited	797	819	787	796
Starting Vehs	6	10	5	3
Ending Vehs	2	8	4	7
Denied Entry Before	0	1	0	0
Denied Entry After	0	0	0	0
Travel Distance (mi)	262	268	259	262
Travel Time (hr)	6.9	7.4	6.7	6.9
Total Delay (hr)	0.8	1.0	0.7	0.8
Total Stops	189	231	199	201
Fuel Used (gal)	10.6	11.2	10.6	10.7

Interval #0 Information Seeding

Start Time	6:57
End Time	7:07
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:07
End Time	8:07
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	803	781	853	786	818	744	786
Vehs Exited	803	781	851	786	820	738	780
Starting Vehs	4	5	7	7	8	2	5
Ending Vehs	4	5	9	7	6	8	11
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	2	0	0	0	0
Travel Distance (mi)	264	257	279	259	270	245	258
Travel Time (hr)	6.9	6.7	7.5	6.8	7.2	6.2	6.6
Total Delay (hr)	0.7	0.8	1.0	0.8	1.0	0.6	0.7
Total Stops	213	190	223	202	201	171	188
Fuel Used (gal)	11.0	10.4	11.6	10.6	11.1	9.7	10.3

Interval #1 Information Recording

Start Time	7:07
End Time	8:07
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	793	817	786	797
Vehs Exited	797	819	787	796
Starting Vehs	6	10	5	3
Ending Vehs	2	8	4	7
Denied Entry Before	0	1	0	0
Denied Entry After	0	0	0	0
Travel Distance (mi)	262	268	259	262
Travel Time (hr)	6.9	7.4	6.7	6.9
Total Delay (hr)	0.8	1.0	0.7	0.8
Total Stops	189	231	199	201
Fuel Used (gal)	10.6	11.2	10.6	10.7

3: Entrance & Route 15 Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.2	0.1	0.1	0.1	0.1	0.1	0.7
Delay / Veh (s)	9.6	5.2	5.9	1.0	1.1	4.5	3.1
Total Stops	91	95	15	0	0	0	201
Travel Dist (mi)	11.7	12.2	11.4	45.2	36.9	8.6	126.1
Travel Time (hr)	0.7	0.6	0.4	0.9	0.8	0.3	3.7
Avg Speed (mph)	18	20	38	50	48	42	37
Fuel Used (gal)	0.4	0.4	0.3	1.5	1.4	0.2	4.2
HC Emissions (g)	4	4	3	41	74	5	131
CO Emissions (g)	167	192	179	1316	2059	225	4138
NOx Emissions (g)	11	13	13	136	197	15	385
Vehicles Entered	91	95	62	246	245	58	797
Vehicles Exited	91	95	62	246	245	58	797
Hourly Exit Rate	91	95	62	246	245	58	797
Input Volume	89	97	61	246	249	57	799
% of Volume	102	98	102	100	98	102	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	0.8
Delay / Veh (s)	3.6
Total Stops	201
Travel Dist (mi)	262.1
Travel Time (hr)	6.9
Avg Speed (mph)	39
Fuel Used (gal)	10.7
HC Emissions (g)	324
CO Emissions (g)	11171
NOx Emissions (g)	964
Vehicles Entered	797
Vehicles Exited	796
Hourly Exit Rate	796
Input Volume	1598
% of Volume	50
Denied Entry Before	0
Denied Entry After	0

Intersection: 3: Entrance & Route 15

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	112	40
Average Queue (ft)	43	11
95th Queue (ft)	83	33
Link Distance (ft)	670	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:07	8:07	8:07	8:07	8:07	8:07	8:07
Total Time (min)	70	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1	1
Vehs Entered	957	942	1022	950	971	916	926
Vehs Exited	955	936	1019	942	967	911	919
Starting Vehs	3	4	7	5	8	8	5
Ending Vehs	5	10	10	13	12	13	12
Denied Entry Before	0	0	1	1	0	0	0
Denied Entry After	0	0	0	0	1	1	2
Travel Distance (mi)	311	308	331	307	317	299	303
Travel Time (hr)	8.6	8.6	9.6	8.8	8.8	8.2	8.2
Total Delay (hr)	1.1	1.3	1.6	1.3	1.2	1.1	1.1
Total Stops	258	237	269	263	231	226	233
Fuel Used (gal)	13.3	12.8	14.1	12.9	13.2	12.4	12.6

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	8:07	8:07	8:07	8:07
Total Time (min)	70	70	70	70
Time Recorded (min)	60	60	60	60
# of Intervals	2	2	2	2
# of Recorded Intvls	1	1	1	1
Vehs Entered	986	968	952	960
Vehs Exited	985	967	955	955
Starting Vehs	8	10	6	6
Ending Vehs	9	11	3	8
Denied Entry Before	0	0	2	0
Denied Entry After	1	0	0	0
Travel Distance (mi)	320	317	312	312
Travel Time (hr)	9.2	8.9	8.7	8.8
Total Delay (hr)	1.4	1.3	1.2	1.3
Total Stops	264	257	262	250
Fuel Used (gal)	13.5	13.4	13.2	13.1

Interval #0 Information Seeding

Start Time	6:57
End Time	7:07
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:07
End Time	8:07
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	957	942	1022	950	971	916	926
Vehs Exited	955	936	1019	942	967	911	919
Starting Vehs	3	4	7	5	8	8	5
Ending Vehs	5	10	10	13	12	13	12
Denied Entry Before	0	0	1	1	0	0	0
Denied Entry After	0	0	0	0	1	1	2
Travel Distance (mi)	311	308	331	307	317	299	303
Travel Time (hr)	8.6	8.6	9.6	8.8	8.8	8.2	8.2
Total Delay (hr)	1.1	1.3	1.6	1.3	1.2	1.1	1.1
Total Stops	258	237	269	263	231	226	233
Fuel Used (gal)	13.3	12.8	14.1	12.9	13.2	12.4	12.6

Interval #1 Information Recording

Start Time	7:07
End Time	8:07
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	986	968	952	960
Vehs Exited	985	967	955	955
Starting Vehs	8	10	6	6
Ending Vehs	9	11	3	8
Denied Entry Before	0	0	2	0
Denied Entry After	1	0	0	0
Travel Distance (mi)	320	317	312	312
Travel Time (hr)	9.2	8.9	8.7	8.8
Total Delay (hr)	1.4	1.3	1.2	1.3
Total Stops	264	257	262	250
Fuel Used (gal)	13.5	13.4	13.2	13.1

3: Entrance & Route 15 Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	0.2	0.2	0.2	0.1	0.2	0.2	1.1
Delay / Veh (s)	11.5	6.4	7.0	1.1	2.2	5.1	4.1
Total Stops	79	132	38	0	0	1	250
Travel Dist (mi)	10.1	17.0	16.9	38.1	47.7	19.7	149.6
Travel Time (hr)	0.6	0.9	0.6	0.8	1.1	0.7	4.7
Avg Speed (mph)	17	19	35	51	46	38	35
Fuel Used (gal)	0.3	0.6	0.4	1.3	1.8	0.6	5.0
HC Emissions (g)	4	7	5	43	48	9	118
CO Emissions (g)	177	303	243	1319	1846	487	4375
NOx Emissions (g)	13	22	19	135	146	26	361
Vehicles Entered	79	133	92	207	318	131	960
Vehicles Exited	78	132	92	207	316	131	956
Hourly Exit Rate	78	132	92	207	316	131	956
Input Volume	80	127	91	212	318	127	955
% of Volume	98	104	101	98	99	103	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	1.3
Delay / Veh (s)	4.7
Total Stops	250
Travel Dist (mi)	312.4
Travel Time (hr)	8.8
Avg Speed (mph)	37
Fuel Used (gal)	13.1
HC Emissions (g)	304
CO Emissions (g)	12277
NOx Emissions (g)	947
Vehicles Entered	960
Vehicles Exited	955
Hourly Exit Rate	955
Input Volume	1910
% of Volume	50
Denied Entry Before	0
Denied Entry After	0

Intersection: 3: Entrance & Route 15

Movement	EB	NB	SB
Directions Served	LR	L	R
Maximum Queue (ft)	126	47	13
Average Queue (ft)	50	20	1
95th Queue (ft)	93	43	7
Link Distance (ft)	670		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		200	200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

NCS Wastewater Solutions
A Division of Northwest Cascade, Inc.
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Puyallup, WA 98373
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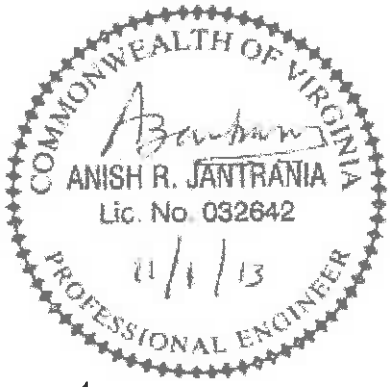

November 1, 2013

Preliminary Feasibility Assessments of Drainfield Site Capacity

For Supporting

Walker's Ridge Development On-Site Wastewater System
Fluvanna County, Virginia
Tax Map #30, Section A, Parcel 110 and
Tax Map #19, Section A, Parcel 39C

Prepared for:

Mr. Justin Shimp, P.E.
SHIMP ENGINEERING, P.C.
201 East Main Street, Suite M
Charlottesville, VA 22902

I. Introduction

Walker's Ridge is a proposed Planned Unit Development (PUD) project in Fluvanna County on two properties totaling about 223 acres. The two properties are Tax Map #30, Section A, Parcel 110, and Tax Map #19, Section A, Parcel 39C.

Public sewer is not available in the area, thus an on-site system is considered for adequate treatment and disposal of the wastewater generated from the proposed PUD.

On-site wastewater systems typically have three main components: collection, treatment, and disposal. While the feasibility for designing collection and treatment components is not dependent on soil characteristics, feasibility for designing subsurface disposal system is very much dependent on the soil characteristics and overall site conditions present on the property.

The first step in determining if an on-site wastewater system is feasible for a PUD like the Walker's Ridge is to conduct a preliminary assessment of the soil and site conditions for the proposed property and determine if there is adequate amount of land area available to support subsurface disposal for the projected volume of wastewater.

Permitting of an on-site wastewater system is done by Virginia Department of Health (VDH) and soil/site requirements are specified in the VDH regulations. While deep, well-drained soil on a relatively flat topography is the most preferred site condition for conventional on-site wastewater systems, i.e., septic systems, sites with moderate to poorly drained soil on a sloping topography are also being accepted under the VDH regulations for alternative on-site wastewater systems.

Alternative on-site wastewater systems include a secondary or advanced secondary treatment system (in addition to a septic tank) and some type of engineered disposal option such as a low-pressure-pipe or a drip system or other forms of pressured time-dosed effluent dispersal. When an alternative on-site wastewater treatment and effluent dispersal technology is used along with maintenance provided by a responsible management entity or a regulated utility, VDH will accept an engineered design for this site.

NCS Wastewater Solutions, a Division of Northwest Cascade, Inc. (www.nwcascade.com) specializes in designing, installing, and operating alternative on-site wastewater systems for a large PUD like Walker's Ridge. We are currently offering wastewater services to the Fox Glen subdivision in Fluvanna County, albeit quite small in size compared to the proposed Walker's Ridge subdivision. However, we have successfully completed a comparable size project in Georgia, called Still Water Cove's in Lincoln County. We have also completed several projects in other counties in Virginia, namely Lancaster County and Charles City County. Visit our website for case-studies on some of our projects.

We were asked to conduct a preliminary soil/site assessments to determine if adequate drain field capacity exists on the site that is proposed for Walker's Ridge PUD in Fluvanna County. We received the site map of the project site and details on the proposed development in terms of number and size of residential and commercial units from Shimp Engineering, the site engineers. This report presents results of our assessment of the project site for drain field capacity.

II. Wastewater Flow Projections

The amount of land required for subsurface effluent dispersal system (disposal system) will depend on several factors; one of which will be the amount of wastewater (daily flow measured in gallons) expected from the proposed development.

The VDH regulations contain a table that specifies the design flow for different types of dwelling and for different activities expected from a residential and commercial development. However, for a large project like this, the VDH allows professional engineers to propose the design flow based on their judgment, experience, and actual data from similar projects.

Based on the development plan proposed for Walker's Ridge PUD, we have analyzed projected wastewater flow data. Table 1 presents the details on daily flow of wastewater projected from each of the proposed block of the Walker's Ridge PUD. The unit flow values used for projecting the daily flow have adequate safety factors. Projected daily flow values that we have used in our calculation is 283,000 gallons per day (GPD).

VDH allows design and construction of a large scale on-site wastewater system in phases and sub-phases if necessary. However, VDH requires the design engineer to show that adequate amount of land area is available on the property for the ultimate capacity necessary at the built-out. In the current economic conditions, phased development is a preferred option.

The Walker's Ridge PUD is planned in three phases. Shimp Engineering has identified the type of development proposed for each of the three phases. We have estimated wastewater flow expected from each phase. Table 2 presents the projected GPD from each phase as well as the cumulative (total) GPD at the end of each phase. Note that development activities proposed for Phase 1 and 3 are significantly larger than the Phase 2, thus the projected GPD values for the Phase 1 and 3 are significantly larger than the value for the Phase 2.

Construction and operation of a large on-site wastewater treatment in phases allows the responsible management entity to work with the VDH to justify the assumptions used in the design and make adjustment to the system capacity when needed. Overall, this approach allows the responsible management entity to offer wastewater services to the PUD cost-effectively.

Table 1: Projected Daily Flow (GPD) on Complete Built-Out

Wastewater Flow Data Projections					
Block #	Dwelling Types	GPD/Unit	Unit		GPD
A-1	12,000 SF of Bank	200	1,000	SF	2,400
	25,000 SF of Retail	200	1,000	SF	5,000
A-2	20,000 SF of Retail	200	1,000	SF	4,000
	20,000 SF of Retail	200	1,000	SF	4,000
	80 Multi-Family 144 people	100	1.8	people/Home	14,400
A-3	7,500 SF Restaurent - 1 seat/200 SF	50	37.5	seats	1,875
	15,000 SF Retail	200	1,000	SF	3,000
	20,000 SF Office	200	1,000	SF	4,000
	70 Multi-Family 126 people	100	1.8	people/Home	12,600
A-4	6,500 SF Drive Through - 1 seat/200 SF	50	32.5	seats	1,625
	5,500 SF C-Store	200	1,000	SF	1,100
	14,000 SF of Retail	200	1,000	SF	2,800
	70 Townhomes 140 people	100	2	people/Home	14,000
B-1	37 Single Family Detached 148 people	100	4	people/Home	14,800
B-2	42 Single Family Detached 168 people	100	4	people/Home	16,800
B-3	55 Townhomes 110 people	100	2	people/Home	11,000
C-1	64 Single Family Attached 256 people	100	3	people/Home	19,200
C-2	49 Townhomes 98 people	100	2	people/Home	9,800
	29 Single Family Detached 116 people	100	4	people/Home	11,600
C-3	5,000 SF Restaurent - 1 seat/200 SF	50	25	seats	1,250
	5,000 SF of Retail	200	1,000	SF	1,000
	150 Multi-Family 270 people	100	1.8	people/Home	27,000
D-1	34 Single Family Attached 102 people	100	3	people/Home	10,200
D-2	32 Single Family Detached 128 people	100	4	people/Home	12,800
D-3	40 Townhomes 80 People	100	2	people/Home	8,000
	11 Single Family Detached 44 people	100	4	people/Home	4,400
D-4	38 Townhomes 76 people	100	2	people/Home	7,600
	24 Single Family Detached 96 people	100	4	people/Home	9,600
D-5	7 Townhomes 14 people	100	2	people/Home	1,400
	36 Single Family Detached 144 people	100	4	people/Home	14,400
E-1	51 Single Family Detached 204 people	100	4	people/Home	20,400
E-2	14 Townhomes 28 people	100	2	people/Home	2,800
	19 Single Family Detached 76 people	100	4	people/Home	7,600
			TOTAL PROJECTED GPD =		282,450

Table 2: Projected Daily Flow (GPD) for each Phase

Phase and Block #	GPD	Total GPD
1: A-1, D-1, D-2, D-3, D-4, D-5, E-1, E-2	106,600	106,600
2: A-4, B-1	34,325	140,925
3: A-2, A-3, B-2, B-3, C-1, C-2, C-3	141,525	282,450

III. Soil and Site Condition Assessments

The land use summary table prepared by Shimp Engineering (presented on the site plan sheet number 8 of 15) designates about 110 acres, or 47% of the total area, as open space for the proposed development. Area designated as open space in a development is typically used for designing and installing a subsurface effluent dispersal (drain field) system.

Soil and site conditions present in the open space area will dictate if the available area is sufficient for disposal of the projected daily flow from the proposed development, which in this case is 283,000 GPD. We have used a conservative area loading rate of 2 cm/day (about 0.5 gallons per day per square foot) for estimating the drain field area for this project.

At the area loading rate of 2 cm/day, approximately 14 acres primary and 14 acres reserve or a total of 28 acres of drain field area will be required for this project. Note that the VDH regulations allow for higher loading rates based on the field soil testing (conductivity test) results. Higher loading rate will reduce the amount of area required for drain field.

For preliminary feasibility analysis, we have used 30 acres as the maximum drain field area that will be required to support the subsurface effluent disposal for this project. This includes 100% reserve area, i.e., 15 acres primary and 15 acres reserved area. Our projected maximum drain field area is less than 30% of the total area designated as open space for this project.

USDA-NRCS soil survey maps are a great place to start the site feasibility analysis. Shimp Engineering has prepared a soils overview map for the proposed project area and has identified soil names (soil type) present within the boundaries. Figure 1 shows the soils overview map and list of the soil series prepared by Shimp Engineering. We reviewed the USDA-NRCS web-soil information database to determine the soil types that offer potential for locating drain field sites. Table 3 presents the soil types that offer potential for drain field sites and basic characteristics that influence the design of drain field (effluent dispersal) systems.

While the USDA-NRCS soil information is a good starting point for site feasibility analysis, the information is very broad and requires field verification. NCS retained services from John D. Harper, Licensed Professional Soil Scientist, to conduct the preliminary feasibility analysis for this project. John used the USGS-NRCS soil map data as well as preliminary field investigation to assess the soil and site conditions and to prepare a map that shows the suitability ratings for supporting drain field systems on the property. John Harper's complete report along with his assessment of the potential areas for drain field locations are contained in Appendix A, and his findings are summarized in this section. Harper's assessment must be considered as preliminary for planning purpose and not a substitute for detailed field evaluation, which will be necessary for designing drain fields and getting VDH permit approval.

Figure 1: Soil survey overview map.

Table 3: Soil basic information from USDA-NRCS web-soil database.

Soils Basic								
Soil Series and Approximate Area (Acres)	Slope %	Depth (inches)		Ksat Limiting			Typical Soil Profile
		to restriction	to WT	inch/hr	cm/day	Midpoint	
Me—Manteo silt loam, hilly phase (99.6 Acres)	15 - 25	10 - 20	> 80	0.00 - 5.95	0 - 360	180	0 to 6 inches: Silt loam 6 to 15 inches: Very channery silt loam 15 to 25 inches: Bedrock
Mf—Manteo silt loam, rolling phase (0.4 Acres)	8 - 15	10 - 20	> 80	0.00 - 5.95	0 - 360	180	0 to 6 inches: Silt loam 6 to 15 inches: Very channery silt loam 15 to 25 inches: Bedrock
Mg—Manteo silt loam, steep phase (9.8 Acres)	25 - 50	10 - 20	> 80	0.00 - 5.95	0 - 360	180	0 to 6 inches: Silt loam 6 to 15 inches: Very channery silt loam 15 to 25 inches: Bedrock
Nf—Nason silt loam, rolling phase (1.0 Acres)	8 - 15	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 5 inches: Silt loam 5 to 40 inches: Clay 40 to 60 inches: Silt loam
Ng—Nason silt loam, undulating phase (5.0 Acres)	2 - 8	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 5 inches: Silt loam 5 to 40 inches: Clay 40 to 60 inches: Silt loam
Tb—Tatum silt loam, rolling phase (5.4 Acres)	8 - 15	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 4 inches: Silt loam 4 to 48 inches: Silty clay loam 48 to 62 inches: Bedrock
Tc—Tatum silt loam, undulating phase (75.1 Acres)	2 - 8	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 4 inches: Silt loam 4 to 48 inches: Silty clay loam 48 to 62 inches: Bedrock
Td—Tatum silty clay loam, eroded rolling phase (7.0 Acres)	8 - 15	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 7 inches: Silty clay loam 7 to 44 inches: Silty clay loam 44 to 62 inches: Bedrock
Te—Tatum silty clay loam, eroded undulating phase (6.7 Acres)	2 - 8	40 - 60	> 80	0.00 - 0.06	0 - 4	2	0 to 7 inches: Silty clay loam 7 to 44 inches: Silty clay loam 44 to 62 inches: Bedrock

Preliminary field investigation was done by walking the project area looking for site conditions and soil profile based on augur holes. John took several pictures of the site to support his observations and assessments of the site. Picture 1 and 2 are good examples of the soil area and soil profile that John has characterized as "Fair" for drain field sites.

Picture 1: Example of "Fair" open area for installing drip system.

Picture 2: Soil profile indicating no major limitation for drain field siting.

In Appendix A, the last page shows the boundaries of Soil Feasibility Groups 1 through 4, where Group 1 and 2 with the most potential for drain field sites. About 40 acres on the property are classified as Soil Feasibility Group 1, which is more than the maximum drain field area required (30 acres) to support the subsurface effluent disposal for this project.

Detailed soil evaluation will be required within the boundaries of Group 1 and 2 to determine soil depth and conductivity values for sizing drip or other similar effluent dispersal system. Values of the critical design parameters such as area loading rate and depth of installation can only be determined based on the detailed soil evaluation and field testing.

IV. Summary

On-site wastewater systems offer an alternative to public sewer connection for a project like Walker's Ridge PUD. Subsurface disposal of treated wastewater is a component of an on-site wastewater system that requires adequate amount of land area that would meet the VDH requirements for soil and site conditions. Projected wastewater flow rate of 283,000 GPD was used for determining maximum area (about 30 acres) that may be required for drain fields to support the on-site wastewater system for this project.

Preliminary feasibility assessments of the soil and site conditions show that there is at least 40 acres available on the property that is noted by our soil scientist as Soil Feasibility Group 1, "Fair" for locating potential drain field sites. About 110 acres out of total 232 acres of this project area are classified as "Open Space," where drain field sites can be located after detailed field evaluation. Areas noted as Soil Feasibility Group 2, "Marginal to Poor" may also be used if necessary, for drain field sites. Thus, we feel confident that adequate amount of area is available to support an on-site wastewater disposal system for the proposed Walker's Ridge PUD.

Use of an on-site wastewater system under a responsible management entity model is recommended for this project. A responsible management entity offers design-build-operate services and takes full responsibility for the performance and permit compliance to the PUD customers. A responsible management entity will charge a sewer fee to cover life-cycle operating costs, thus offering sewer services to the home and business owners similar to what is done by public sewer authority.

NCS-NWC acts as a responsible management entity in Virginia and currently manages the wastewater system for Fox Glen in Fluvanna County. We are ready to offer similar services to the property owners of the Walker's Ridge PUD when it is ready for development.

APPENDIX – A

JOHN HARPER'S SOIL REPORT

Total 5 pages to follow.

Environmental Soil Consultants, LLC

Soil Mapping, Soil Evaluations & Drainfield Designs

October 29, 2013

NCS Wastewater Solutions
10412 John Bananola Way East
PO Box 73399
Puyallup, WA 98373

RE: Soil Feasibility Study: Walker's Ridge Development
232 ± Acres, Route 644
Fluvanna County, Virginia

Dear Sirs:

Scope of Study

This Soil Report and Map are designed to provide a planning tool for the layout potential mass drainfields on the proposed Walker's Ridge project. The soil map represents the results of a preliminary field evaluation and is intended for use as a general planning map and decision making tool. Soil areas intended for use with drainfield systems will require detailed documentation followed by coordination with the local health department.

The soil map units represent landscape topographic positions and were sketched based on field evaluations and landscape analysis; consequently, some fluctuation in the location of the delineation is anticipated.

Recommendations pertaining to soil area require detailed documentation for each drainfield area and are based on observed soil characteristics and how they relate to current State Department of Health Regulations regarding mass drainfield suitability. Information contained in the Sewage Handling and Disposal Regulations, published by the State Health Department, was used to estimate infiltration rates for the soil map units that follow.

General Soil and Site Conditions

The soils within the vicinity of the soil feasibility map are deep to moderately deep and well drained with moderate permeability. They are formed in residuum from sericite schist, phyllite, or other fine-grained metamorphic rocks in the Piedmont Physiographic Province. The soils found in drainways and low areas have potential for Waters of the United States including wetlands.

The site investigated was an abandoned golf course. Consequently, the Soil Feasibility Map units

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will contain areas of cut and fill that occurred during the construction of the golf course. Areas in and around the greens, Tees and sand traps will need to be excluded from drainfield use. Additionally, areas along the fairways that are planned for use with the mass drainfields will require detailed investigation for cut and fill activities in the pass and this may affect their suitability for drainfield use.

Soil Rating System

The Soil Feasibility Map Units in this report are rated using a good to poor system. The soil rating system is based on the frequency and severity of several limiting factors as prescribed in the Virginia Health Department (VDH) regulations. Depth to limiting zone, soil absorption rate and topographic landscape features are the three main categorizes that affect the quality and rating of the soil map units. A brief description for each limiting category as well as an explanation of Environmental Soil Consultant's Soil Map Unit system is shown below to illustrate the factors associated in rating the soils.

The following is a brief description of the soil feasibility ratings:

- **Good**- These soils will have little or no significant limiting factors.
- **Fair**- These soils will have some limitations to one or more limiting factors listed above. The specific site limitations will need to be addressed to obtain drainfield sites.
- **Marginal**- These soils will have significant limitations to one or more limiting factors. The specific site limitations will need to be addressed to obtain drainfield sites. The drainfield will often dictate the home site location, lot layout and lot size.
- **Poorly Suited**- These soils will have severe limitations to one or more limiting factors and should be considered unusable. These limiting factors preclude the installation of drainfield systems in accordance with Virginia Health Department regulations. Drainfield sites in some cases may be found in inclusions of better rated soil.

The depth to limiting zone is an important factor when rating soil map units. The Virginia Department of Health regulations have set minimum standards for the vertical separation distance between a drainfield absorption trench and a limiting zone in the soil. Several common soil limiting zones are depth to water table, bedrock, pans, or impermeable zone in the soil. The depth to limiting zone determines if a drainfield site is available as well as determining whether or not the system will require conventional or pretreated drainfields.

The soil absorption rate is an important factor when rating soil map units. The absorption rate is a measure of how fast the soil can accept effluent expressed in minutes per inch (mpi). The estimate of the soil absorption rate is affected by the soil texture (proportion of sand, silt, and clay) and soil structure. The Virginia Department of Health considers soils that have a soils absorption rate greater than 120 mpi to be unusable. The absorption rate defines the size of the drainfield.

Topographic features are another important factor when rating soil map units. Topography is a

description of the physical surface features of the landscape. Some of these features are percent slope, streams, drainways, swales, gullies and areas of excessive erosion. The Virginia Department of Health regulations designate setback distances from various topographic landscape features such as streams, springs, wetlands and sinkholes. The Virginia Department of Health regulations prohibit the placement of any drainfield in drainways, swales or concave topographic positions. Other topographic features such as slope and excessive erosion significantly affect the placement of drainfields and the rating of the soil map unit. The lot yield, system type, and lot layout can be affected in areas that have significant topographic limitations.

All of the soil limitations discussed above effect the amount of soil area needed to assure that a drainfield area can be documented on a soil map unit. An estimate of the minimum soil area required for drainfield documentation has been made for each soil feasibility map unit. This estimate of minimum soil area is not a recommendation for lot sizes. The total lot area should take into account the soil area needed to assure documentation of a drainfield as well as other factors including house and well location.

MAP UNIT DESCRIPTION:

SOIL FEASIBILITY GROUP NO. 1: The soils of this feasibility group are deep, gently sloping to moderately steep (2 to 15 percent) and well drained. They have developed from the weathering products of sericite schist, phyllite, or other fine-grained metamorphic rocks of the Piedmont Physiographic Province and are rated **fair** for use as mass drainfield sites. Estimated percolation rates of 50 to 90 minutes per inch are anticipated. Seasonal perched water tables are usually more than five feet below the soil surface. Permanent water tables are 45 to 70 feet below the soil surface. Inclusions of the soils of feasibility group #2, #3 and #4 may be found within these units.

SOIL FEASIBILITY GROUP NO. 2: The soils of this feasibility group are deep to moderately deep, moderately steep(12 to 25 percent) and well drained. They have developed from the weathering products of sericite schist, phyllite, or other fine-grained metamorphic rocks of the Piedmont Physiographic Province and are rated **Marginally suited** for use as mass drainfield sites due to slope and potential shallow rock. Estimated percolation rates of 50 to 90 minutes per inch are anticipated. Seasonal perched water tables are usually more than five feet below the soil surface. Permanent water tables are 45 to 70 feet below the soil surface. Inclusions of the soils of feasibility group #1, #3 and #4 may be found within these units.

SOIL FEASIBILITY GROUP NO. 3: The soils of this feasibility group are moderately deep to shallow, moderately steep(greater than 25 percent) and well drained. They have developed from the weathering products of sericite schist, phyllite, or other fine-grained metamorphic rocks of the Piedmont Physiographic Province and are rated **poorly suited** for use as mass drainfield sites due to slope and shallow rock.

SOIL FEASIBILITY GROUP NO. 4: The soils of this feasibility group are deep and moderately well to poorly drained. They have developed from loamy and silty deposits of alluvial origin and from rocks of the Piedmont. These soils are rated **poorly suited** for use in mass drainfields. These soils usually occur along drainways and are subject to flooding after heavy rainfall incidents. State Health Department Regulations prohibit placement of any drainfield within 50 feet of a drainway.

Some sites within this feasibility group meet some or all of the hydric soil, vegetative and hydrology definitions of nontidal wetlands as outlined by current guidelines. Detailed field mapping will be necessary to determine the location and extent of the nontidal wetlands.

We recommend that development of these mapping units be limited to necessary uses. Careful evaluation of "wetland" criterion is warranted for any construction disturbance. Construction or environmental permits may be required.

Remarks:

We estimate a minimum of 40 acres of soils in Feasibility Map Unit 1 are available on the property for detailed evaluation for us in a mass drainfields. The soils on the property that occur on less than 15% slopes can generally be utilized in mass drainfields. Limitations on this general statement will be within the old golf course in areas around the greens, sand traps and tees. Any drainfield areas on the fairways will be evaluated carefully for cut and fill areas. Drainfield areas may extend into the areas of slopes of between 15 and 20 percent where there are no other limiting factors present.

Soil feasibility groups are identified by the numbers on the map that accompanies this report and the number sequence is solely applicable to this report. Local ordinances regarding zoning were not considered when soil feasibility units were rated.

If you have any questions please call our office.

Sincerely,

Environmental Soil Consultants, LLC

J Harper

John D. Harper, LPSS

COMMONWEALTH OF VIRGINIA
10/29/13
JOHN D HARPER SR
#3401000274
LICENSED
PROFESSIONAL SOIL
SCIENTIST

Walker's Ridge PUD
Fluvanna County, Virginia

Soils Overlay Map

SHIMP ENGINEERING, P.C.
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SHIMP ENGINEERING, P.C.

PROJECT MANAGEMENT
CIVIL ENGINEERING
LAND PLANNING

Received
OCT 31 2013
Fluvanna County

October 30th, 2013

Ms. Allyson Finchum
Planning Director
Fluvanna County

Regarding: Walkers Ridge, Hydrogeological Studies and Impacts from Groundwater Withdrawal For Phase I Development.

Dear Ms. Finchum

As requested in your letter of October 22nd, 2013 we have completed two hydrogeological studies to address the questions raised by your letter. The first question is that of capacity, to determine capacity from a technical permitting aspect we have been working with Dr. Louis Scott Eaton. Dr. Eaton has prepared a summary report of the expected groundwater yields from the project area and conservatively projects a yield of 707 equivalent residential units (ERU's). His approach was to review the project from a permitting approach and has identified preliminary locations for wells via fracture trace analysis. It should be noted that the permitting requirement of 300 gallons per day per unit is well above actual usage in communities like Walkers Ridge. Dr. Eaton's feasibility study and resume are attached.

A second report has been prepared by Dr. Nick Evans, a Certified Professional Geologist and president of the Center for Sustainable Groundwater His report reviews the projected groundwater recharge from the site to determine if the project would use water in excess of the natural groundwater recharge which could potentially have an adverse impact on adjoining properties. Dr. Evans finds that the total available groundwater for our site to be 263,668 gallons per day. This is in excess of his projection for water usage for the complete development of our site and in excess of projections previously prepared by the Fluvanna County Public Works Director based upon a higher proposed density. Dr. Eaton projected a slightly lower daily recharge due to using a very conservative assumption of overall groundwater efficiency. Dr. Evans utilized his prior extensive research on Fluvanna County to prepare his projections. Even in the most conservative case there is expected adequate groundwater recharge to accommodate the development of Phase I in Walkers Ridge.

During prior discussions about the proposed water and sewer systems for Walkers Ridge we have consistently stated that our proposal is to recharge the groundwater supply by utilizing onsite drain fields and shallow drip systems. Dr. Evans has stated that "to the extent that waste water is to be disposed of through on-site drainfield(s), overall water usage for this project would not be consumptive of groundwater". Dr. Eaton has identified a conservative recharge rate from onsite sewer systems of 50%. Using this conservative figure effectively doubles the available groundwater capacity for the development and would provide for adequate capacity for 1,414 ERU's based on Dr. Eaton's findings. The two hydrogeological studies demonstrate that the site is of adequate area and geology to provide sufficient groundwater recharge, or balance for the development of Phase I within Walkers Ridge.

In addition to demonstrating sufficient groundwater recharge for the development, it is noted in both reports that geotechnical investigations to locate wells that are not hydrologically connected to wells on adjoining properties will remove the risk of impact to adjoining properties. Our geologist will provide us with the information required to properly site the wells to avoid any adverse impacts to adjoining properties.

The reports we have provided address the request of your October 22nd letter. We are diligently working on responses to the other items and will provide them on the schedule that we have previously committed too. Please let me know if you have any questions about the information we have presented. We look forward to bringing this information back to the Planning Commission and Board of Supervisors at the earliest opportunities.

Sincerely,

Justin Shimp, P.E.

Attachments:
Feasibility Study of Groundwater Potential of The Walkers Ridge Development; Eaton Geological Consulting
Resume for Dr. Eaton
Walkers Ridge Groundwater Impacts; The Center for Sustainable Groundwater
Resume for Dr. Evans

CC.
Dr. Nick Evans
Dr. Scott Eaton
Keith Smith

L. SCOTT EATON - CURRICULUM VITAE

ADDRESS

Department of Geology and Environmental Science
395 South High St., MSC 6903
James Madison University
Harrisonburg, Virginia 22807
540.568.3339
eatonls@jmu.edu

POSITION

Professor of Geology, James Madison University

EDUCATION

Ph.D., Environmental Sciences
Department of Environmental Sciences, University of Virginia; 1999.
Dissertation: *Debris flows and Landscape evolution in the Upper Rapidan Basin, Blue Ridge Mountains, Central Virginia*
Advisor: Dr. Alan D. Howard.

M.S., Geology
Department of Geology, Southern Illinois University, 1991. Thesis: *Fluvial-Geomorphic Analysis of Wolf Creek Basin, Alexander County, Illinois.*
Advisor: Dr. Margaret E. Berry.

B.S., Geology
James Madison University, 1988. Honors Thesis: *Depositional History of the Lowest North River Terrace at Bridgewater Air Park, Virginia.*
Advisor: Dr. W. Cullen Sherwood.

PROFESSIONAL WORK EXPERIENCE

Field Geologist (faculty appointment), U.S. Geological Survey, Reston, Virginia, 1996 - present.
Principal investigator in mapping debris flow and flood deposits in the Blue Ridge Mountains of Central Virginia, including documentation of the stratigraphy and sedimentology of prehistoric surficial deposits.

Geological Consultant, 1996 – present.
Responsible for locating high yielding water wells using fracture trace analysis in conjunction with geophysical methods of investigation.

TEACHING ACTIVITY

Courses Taught:
Physical Geology, Geomorphology, Hydrogeology, Stream Ecology, Field Course in Ireland, Field Course in New Mexico, Surface Processes, Natural Hazards, Soils and Land Use, Engineering Geology, Undergraduate Student Research, Undergraduate Internship.

New Courses Developed/Modified Since Tenure/Promotion:
Surface Processes, Field Course in Ireland, Natural Hazards, Stream Ecology, Engineering Geology

SCHOLARLY ACTIVITY

(undergraduate student research, publications, abstracts, presentations, and funding)

JMU Undergraduates Collaborating in Research with L. Scott Eaton
Summary:

- Forty-three research students in the past 14 years
- In the past 7 years (since tenure and promotion):
  - 38% received outside funding to support their research
  - 35% presented at regional or national conferences
  - 8% coauthors in international geoscience journals

Bold of student name indicates external funding for student support

Year	Student Name	Title of Project	Product
2010-11	Brendan McGowan	Hydrogeology Project: T.B.A.	T.B.A.
	Brad Fitzwater	The Surficial Geology of the Luray Quadrangle, Virginia	(Projected) Publication of mapping as VGDMR product
2009-10	Alben Sellers	The application of fracture trace analysis in locating high-yielding water wells in sedimentary rocks of the Shenandoah Valley, Virginia	Presentation at Dept. Student Forum
2008-09	**Holly Polivka** **Elizabeth Weisbrot**	Using soils and sedimentology for deciphering the origins of geomorphic surfaces near Massanutten Mountain, eastern Rockingham County, Virginia	Presentation at Dept. Student Forum GSA presentation and publication in regional journal
	Timothy Heltzel	Man and Moo: The effects of channelization, cattle grazing, and elimination of grazing on a pasture land stream, western Albemarle County, Virginia	Presentation at Dept. Student Forum Potential GSA presentation and publication in regional journal
	Nicholas Bass	Summer internship at ECS, Manassas	Presentation at Dept. Student Forum

JMU Undergraduates Collaborating in Research with L. Scott Eaton (continued)

2008-09	Meghan Sibbard	Groundwater Inventory of Madison County, VA	GIS Database with analysis for Madison County Planning Commission
2007-08	Alyssa Melberg	Concentrations of floodplain soils along the South River, Shenandoah Valley, VA	Presentation at Dept. Student Forum
	Katie Jepson	Historic record of debris flows in the central Appalachians	**Data published in USGS Professional Paper**
2006-07	**Sarah Roberts**	Mixing Geomorphology and Ecology: Relationships between fish populations and stream bed permeability	**Presented at Geological Society of America National Meeting**
	Tanner Simensen	Bedload transport of sediment at Smith Creek, Rockingham County, VA	Presentation at Dept. Student Forum
	Sara Rangel	A water budget for the South River, Shenandoah Valley, VA	Student Research Credit
2005-06	Dan Bosener Clark Weigel	Surficial drainage patterns and geomorphic history of the Paine and Meadow Runs, Crimora, VA	Presentation at Dept. Student Forum
	Scott Nash	The applicability of the combined use of hydrological and geophysical methods for monitoring landfill leachate in areas at risk for groundwater contamination	Presentation at Dept. Student Forum
2004-05	**Robert Sas**	Geologic Controls of Basin Denudation from Debris Flows in Rockbridge County, VA,	NE regional *Geological Society of America abstract sectional meeting* Presentation at Dept. Student Forum ***Publication in Landslides Journal***
	Sam Powell	*Magneto-Telluric and Streaming Potential Embankment Seepage Analysis of the Blue Ridge School Dam*	Presentation at Dept. Student Forum
	Jackie Hess	*Paleoflood Discharges and Origins of Surficial Deposits of Meadow Run, Augusta County, VA*	Presentation at Dept. Student Forum
2003-04	**Kristin Felker** **Meredith Benedict**	Sedimentology and geomorphic processes of Blackrock block stream, Shenandoah National Park, Virginia.	Presentation at Dept. Student Forum *SE Geological Society of America abstract sectional meeting*
	Melissa Orndorff	Geomorphic processes and inventory of block streams in the Paine Run drainage, Grottoes, Virginia	Presentation at Dept. Student Forum *SE Geological Society of America abstract sectional meeting*
	Eric Turner	Reactivation of slope failures along Meadow Run, Shenandoah Valley, Virginia	Presentation at Dept. Student Forum *SE Geological Society of America abstract sectional meeting* ***Publication in Landslides Journal***
	Erin Peebles	Geomorphic history of Meadow Run Flood Plain, Crimora, Virginia	Presentation at Dept. Student Forum *SE Geological Society of America abstract sectional meeting*
	Joanie Clark	Karst processes of Southeast Asia	Presentation at Dept. Student Forum

JMU Undergraduates Collaborating in Research with L. Scott Eaton (continued)

2003-04	John Lacombe	Defining the Rosgen Method of Stream Restoration	Presentation at Dept. Student Forum
2002-03	Sargent Bray Harry Hibbitts	Rotational slides in saprolitized alluvium on the western flank of the Blue Ridge near Grottoes, Virginia.	Presentation at Dept. Student Forum *Journal Article in conjunction with USGS (in progress)*
	Stephen Reynolds	Trends in Vegetation Reestablishment on the Kinsey Run Debris Fan, Madison County, Virginia	Presentation at Dept. Student Forum *SE Geological Society of America abstract sectional meeting*
2001-02	Russel Pace	The Study and Application of Fracture Trace Analysis, Harrisonburg Quad.	Presentation at Dept. Student Forum
	Andrew McNown	Analysis of Longitudinal Variations of Particle Size, Shape, and Orientation of the Blackrock Block Slope, Shenandoah National Park, Virginia	Presentation at Dept. Student Forum. *Geological Society of America abstract National meeting*
	Jennifer Allen Matthew Tymchak	Developing Regional Curves for Stream Hydraulic Geometry in the Central Blue Ridge, and their Application in Stream Restoration	Presentation at Dept. Student Forum *Pilot study for Jeffress grant proposal; submitted April, 2003.*
	Brian Neeley	Grain Size Analysis of Debris Fans, Madison County, Virginia	Presentation at Dept. Student Forum Presentation at Virginia Academy of Sciences,
2000-01	Chris Printz	Karst development of the Hurricane Ridge and Union Cave Spring Drainage Basin, Monroe County, WV.	Presentation at Dept. Student Forum Presentation at Virginia Academy of Sciences
	Todd Burton	Fracture Trace Analysis of the Dayton, Virginia Area	Presentation at Dept. Student Forum
1999-00	Todd Waldrop	Fracture Trace Analysis: Effectiveness and Application	Presentation at Dept. Student Forum
	Chris Printz	Characterization of the Isopod Habitat, Shenandoah Valley, VA	*Report Prepared for US Fish and Wildlife Service* Presentation at Dept. Student Forum
	Ryan Sensenig	Integrated Earth Science Field Study for Teachers: An Online Resource.	Web Page for State High School Applications.
1998-99	Christy McQuiddy Mary Sherrill	A periglacial stratified slope deposit in Madison County, Virginia	Presentation at Dept. Student Forum *Data used for Geomorphology Publication (Eaton et al., 2003)*
	Stephanie Booth	Trends of river terraces of the Rapidan River	*Data used for Geomorphology Publication (Eaton et al., 2003)*
1997-98	Heather Shroyer	Selected sedimentologic aspects of the June, 1995 flood event of Madison County, Virginia	*Publication in Geomorphology (Springer et. al., 2001)*

Publications (*indicates peer-reviewed)

*__Eaton, L.S.__, Kochel, R.C., Hubbard, D.A., Simoni de Cannon, F.V., and Mose, D.G., (in press), Geologic Hazards of Virginia, *in* Bailey, C.M., Eaton, L.S., and Sherwood, W.C. (eds.), *The Geology of Virginia*, Virginia Division of Geology and Mineral Resources, Charlottesville.

*Whittecar, G.R., Newell, W.L., and **Eaton, L.S.,** (in press), Landscape evolution in Virginia, *in* Bailey, C.M., Eaton, L.S., and Sherwood, W.C. (eds.), *The Geology of Virginia*, Virginia Division of Geology and Mineral Resources, Charlottesville.

*Heller, M., and **Eaton, L.S.**, (2010), Surficial Geology of the Elkton West Quadrangle, Virginia: Virginia Division of Geology and Mineral Resources Publication.

*Sherwood, W.C., Hartshorn, A., and **Eaton, L.S.,** 2010, Geology, Soils, and Land Use in the Eastern Blue Ridge and Western Piedmont of Central Virginia, Geological Society of America, Boulder, CO.

Bailey, C.M., Southworth, S., **Eaton, L.S.,** Hancock, G., Lamoreaux, M.H., Litwin, R.J., Burton, W.C., and Whitten, J., 2009, The Geology of the Shenandoah National Park Region, Virginia Geological Field Conference Guide Book.

*Wieczorek, G.F., **Eaton, L.S.,** Morgan, B.A., Wooten, R.M., and Morrissey, M., 2009, An examination of selected historical rainfall-induced debris flow events within the central and southern Appalachian Mountains of the Eastern United States, *U.S. Geological Survey Professional Report Series 2009-1155.*

*Kochel, R.C., Nickelsen, R.P., and **Eaton, L.S.**, 2009, Catastrophic Middle Pleistocene Jökulhlaups in the Upper Susquehanna River: Distinctive Landforms from Breakout Floods in the Central Appalachians, *Geomorphology*, v. 110, p. 80-95.

*May, C.L., **Eaton, L.S.**, and Whitmeyer, S., 2009, Integrating student-led research in environmental geology into traditional field courses: a case study from James Madison University's field course in Ireland, In S.J. Whitmeyer, D.W. Mogk, & E.J. Pyle (Eds.), *Field geology education: Historical perspectives and modern approaches*: GSA Special Paper 461. Boulder, CO: Geological Society of America.

Publications (continued)

*Sas, R.J., Jr., and **Eaton, L.S.**, 2008, Quartzite terrains, geologic controls, and basin denudation by debris flows: their role in long-term landscape evolution in the central Appalachians, *Journal of Landslides*, v. 5, no. 1, p. 97-106.

*Sas, R.J., Jr., Sklar, **L.S., Eaton**, L.S., and Davis, J., 2008, A Method for Developing Regional Road-Fill Failure Hazard Assessments Using GIS and Virtual Fieldwork, *Environmental and Engineering Geosciences*; v. 14:221-229.

*Wieczorek, G.F., **Eaton, L.S.,** Yanowsky, T.M., and Turner, E.J., 2006, Landslide activity along Meadow Run, Shenandoah Valley, Virginia, *Journal of Landslides*, v. 3, pp. 95-106.

Eaton, L.S., 2005, Assessment of the Geologic and Geomorphologic Resources of Shenandoah National Park, Virginia, *Technical Report*, National Park Service.

Eaton, L.S., Bailey, C.M., and Gilmer, A. K. 2004, The Debris Flows of Madison County, Virginia. Virginia Geological Field Conference Guidebook., 27 p.

*Litwin, R.J., Morgan, B.A., **Eaton, L.S.**, and Wieczorek, G.F., 2004, Assessment of Late Pleistocene to recent climate-induced vegetation changes in and near the Shenandoah National Park (Blue Ridge Province, VA), *USGS Open File Report 2004-1351.*

***Eaton, L.S.**, Morgan, B.A., Kochel, R.C., and Howard, A.D., 2003, Role of debris flows in long-term landscape denudation in the central Appalachians of Virginia. *Geology*, v. 31, p. 339-342.

***Eaton, L.S.**, Morgan, B.A. Kochel, R.C., and Howard, A.D., 2003, Quaternary deposits and landscape evolution of the central Blue Ridge of Virginia, *Geomorphology*, v. 56, p. 139-154.

*Morgan, B.A., **Eaton, L.S.**, Wieczorek, G.F., 2003, Pleistocene and Holocene colluvial fans and terraces in the Blue Ridge region of Shenandoah National Park, Virginia, *U. S. Geological Survey, Report: OF 03-0410*, 25 pp., 1 Sheet.

***Eaton, L.S.**, Morgan, B.A. Kochel, R.C., and Howard, A.D., 2003, Quaternary deposits and landscape evolution of the central Blue Ridge of Virginia, *Geomorphology.*

*Wieczorek, G.F., Larsen, M.C., **Eaton, L.S.,** Morgan, B.A. and Blair, J. L., 2002, Debris-flow and flooding deposits in coastal Venezuela associated with the storm of December 14-16, 1999: U.S. Geological Survey, Geologic Investigation Series Map I-2772.

Publications (continued)

*Eaton, L.S., Morgan, B.A., and Blair, J.L., 2001, Surficial geology of the Fletcher, Madison, Stanardsville, and Swift Run Gap, 7.5-minute quadrangles, Madison, Greene, Albemarle, Rockingham, and Page Counties, Virginia, US Geol. Surv. OFR 01-92. 1 table, 1 appendix, 4 plates, 1 CD.

*Larsen, M.C., Wieczorek, G.F., **Eaton, L.S.,** Torres-Sierra, H., Morgan, B.A. 2001, Natural Hazards on Alluvial Fans; The Venezuela Debris Flow and Flash Flood Disaster, USGS Fact Sheet.

*Larsen, M.C., Wieczorek, G. F., **Eaton, L.S.,** Morgan, B.A., and Torres-Sierra, H., 2001, Natural hazards on alluvial fans: the debris-flow and flash-flood disaster of northern Venezuela, December 1999: EOS, Transactions: American Geophysical Union, v. 82, p. 572-574.

*Springer, G.S., Dowdy, H.S., and **Eaton, L.S.,** 2001, Sediment budgets for two mountainous basins affected by a catastrophic storm: Blue Ridge Mountains, Virginia: Geomorphology, v. 37, p. 135–148.

*Wieczorek, G.F., Larsen, M.C., **Eaton, L.S.,** Morgan, B.A. and Blair, J. L., 2001, Debris-flow and flooding hazards associated with the December 1999 storm in coastal Venezuela and strategies for mitigation: U.S. Geological Survey Open File Report 01-144, 40p., 3 tables, 2 appendices, 3 plates, 1 CD.

*Larsen, M.C., Wieczorek, G. F., **Eaton, L.S.,** and Torres-Sierra, H., 2000, The Venezuela landslide and flash flood disaster of December 1999, In: Mugnai, A., Guzzetti, R., and Roth, E. (Eds.), Mediterranean Storms, Proceedings of the 2nd Plinius Conference, October, 2000, Siena, Italy, p. 519-529.

Eaton, L.S., 1999, Debris flows and Landscape evolution in the Upper Rapidan Basin, Blue Ridge Mountains, Central Virginia, Ph.D. thesis, University of Virginia, 154 p.

Eaton, L.S., Lin, M.A., and Lynn, C., 1998, Assessment of opportunities for enhanced cooperation in acquiring and disseminating weather data among selected Virginia government agencies; Virginia Transportation Research Council, Report Number VTRC 98-R16.

Abstracts

(JMU student authors are shown in **bold**)

Eaton, L.S., Baedke, S.J., Haynes, J., Johnson, E.A., Leslie, S.A., Pyle, E.J., Whitmeyer, S., Whitmeyer, S.J., 2009, Dueling Topics: Success using a two track option in the James Madison University Ireland Field Course, Geological Society of America Abstracts with Programs, Portland, OR.

Eaton, L. S., **Polivka, H., and Weisbrot, L.**, 2009, Using soils and sedimentology for deciphering the origins of geomorphic surfaces near Massanutten Mountain, central Shenandoah Valley, Virginia, , Geological Society of America Abstracts with Programs, Portland, OR.

Eaton, L.S., 2008, Long term rates of landscape denudation of the central Appalachians, and their significance on sedimentation in the Chesapeake Bay , US EPA Proceedings on Fine Grain Sedimentation within the Chesapeake Bay, Baltimore, MD. *INVITED SPEAKER*.

Eaton, L.S., 2008, Effects of land use changes and channelization on the stability of streams: A case study from the Shawnee Hill country of southern Illinois, Geohazards in Transportation in the Appalachian Region, Charleston, WV, Aug. 5-7, 2008. *SESSION ORGANIZER AND CHAIR*.

Eaton, L.S., May, C.L., Moore, K.R., Harris, M.J., and Whitmeyer, S.J., 2007, Integrating student-led research in environmental geology into traditional field courses: a case study from James Madison University's field course in Ireland, Geological Society of America Abstracts with Programs, Vol. 39, No. 6, p. 622.

Sas, R.J., Jr., and Eaton, L. S., 2007, An integrative approach to assessing potential road-fill failures and downslope hazards, Geological Society of America Abstracts with Programs, Vol. 39, No. 6, p. 363.

Harris, M.J., Whitmyer, S., Kelly, S., Whitmyer, S. J., Feely, M., and Eaton, L. S., 2006, Digital Mapping and 3D Visualization in a geology summer field course, Geological Society of America Abstracts with Programs.

Roberts, S. M., May, C. L., Eaton, L. S., and Hudy, M., 2006, Mixing Geomorphology and Ecology: Relationships between fish populations and stream bed permeability, Geological Society of America Abstracts with Programs.

Sas, R.J., Jr. and Eaton, L. S., 2006, Landslide Warning Action Plan: Prioritizing Areas of High Risk Along Blue Ridge Parkway Using VisiData, Eos, Transactions, American Geophysical Union.

Abstracts (continued)

Eaton, L.S., 2005, Rates of landscape denudation of the central Appalachians, International Consortium on Landslides, National Academy of Sciences, Washington, D.C. *INVITED SPEAKER.*

Sas, R.J., Jr. and Eaton, L. S., 2005, Geologic controls of basin denudation from debris flows in Rockbridge County, Virginia, Geological Society of America Abstracts with Programs.

Eaton, L.S., 2004, The role of debris flows in long-term denudation and landscape evolution in the central Appalachians, Eos, Transactions, American Geophysical Union.

Felker, K.C., Benedict, M.L., and Eaton, L.S., 2004, Sedimentology and geomorphology of Blackrock block stream, Shenandoah National Park, Virginia, Geological Society of America Abstracts with Programs, Vol. 36, No. 2, p. 73.

Frangos, W., and Eaton, L.S., 2004, Case History: Merging the Tools of DC Resistivity and Fracture Trace Analysis for Locating High Yield Domestic Water Wells in Karst Terrain, Shenandoah Valley, Virginia, USA, (abstract), AGU Montreal Meeting, May, 2004.

Litwin, R.J., Morgan, B.A., and Eaton, L.S., 2004, Proxy climate trends in the Blue Ridge of Virginia, 0-45 KA, and comparison to the Greenland ice core record, Geological Society of America Abstracts with Programs, Vol. 36, No. 2, p. 114.

Peebles, E.K., and Eaton, L.S., 2004, The past, present, and future locations of the stream of Meadow Run, Blue Ridge Mountains, Virginia, Geological Society of America Abstracts with Programs, Vol. 36, No. 2, p. 114.

Turner, E.J., and Eaton, L.S., 2004, Reactivation of slope failures along Meadow Run, Shenandoah Valley, Virginia: Geological Society of America Abstracts with Programs, Vol. 36, No. 2, p. 120.

Wieczorek, G.F., Eaton, L.S., and **Turner, E.J.** 2004, Landslide activity along Meadow Run, Shenandoah Valley, Virginia, Geological Society of America, vol.36, no.2, pp.149.

Eaton, L S., Yanosky, T.M, and Wieczorek, G.F., 2003, Use of dendrochronology for determining the chronology of landslide activity along Meadow Run, Shenandoah Valley, Virginia, USA, Eos, Transactions, American Geophysical Union, vol.84, no.46.

Abstracts (continued)

Kochel, R.C., Nickelsen, R.P., Eaton, L.S., 2003, Elongated low-gradient debris fans; jokulhlaups resulting from tributary damming by pre-Wisconsinan glacial ice lobes moving up the Buffalo Creek valley in central Pennsylvania, Abstracts with Programs - Geological Society of America, vol.35, no.6, pp.335.

Eaton, L.S., Yanosky, T.M., and Wieczorek, G.F., 2003, Use of Dendrochronology for Determining the Chronology of Landslide Activity along Meadow Run, Shenandoah Valley, Virginia USA, Invited Talk, AGU Annual Meeting, San Francisco.

Kochel, R.C., Nickelsen, R.P., and Eaton, L.S., 2003, Elongated low-gradient debris fans: Jokulhlaups resulting from tributary damming by Pre-Wisconsinan glacial ice lobes moving up the Buffalo Creek Valley in central Pennsylvania, Geological Society of America, National Annual Meeting, Program Abstracts, Seattle, WA, October 2003.

Bierman, P.R., Pavich, M., Eaton, L.S., Finkel, R., and Larsen, J., 2002, The boulders of Madison County, Abstracts with Programs - Geological Society of America, 34(6), p.127; Geological Society of America, 2002 annual meeting, Denver, CO, Oct. 27-30, 2002.

Eaton, L.S., 2002, Denudation from catastrophic flooding in northern Venezuela, December, 1999, Virginia Journal of Science, 52(2), p.113; 79th annual meeting of the Virginia Academy of Science, Harrisonburg, VA, May 22-25, 2001.

Eaton, L.S., Wieczorek, G.F., Morgan, B.A., **McNown, A.W.**, Smoot, J.P., and Litwin, R.J., 2002, Periglacial slope processes and deposits in the Blue Ridge Mountains of central Virginia, Abstracts with Programs - Geological Society of America, 34(6), p.276; Geological Society of America, 2002 annual meeting, Denver, CO, Oct. 27-30, 2002.

Eaton, L.S.; **Reynolds, S.H.**, 2002, Trends in vegetation recovery of the Kinsey Run debris fan, Madison County, Virginia, Abstracts with Programs - Geological Society of America, 34(2), p.8; Geological Society of America, Southeastern Section, 51st annual meeting; Geological Society of America, North-Central Section, 36th annual meeting, Lexington, KY, Apr. 3-5, 2002.

Neely, B.,H., and Eaton, L.S., 2002, Soil pedogenesis of debris fans, Graves Mill, VA Virginia Journal of Science, 52(2), p.111; 79th annual meeting of the Virginia Academy of Science, Harrisonburg, VA, May 22-25, 2001.

Abstracts (continued)

Printz, C.M., and Eaton, L.S., 2002, The karst development of the Union and Hurricane Ridge Cave systems, Dickson Spring drainage basin, Monroe County, West Virginia, Virginia Journal of Science, 52(2), p.111; 79th annual meeting of the Virginia Academy of Science, Harrisonburg, VA, May 22-25, 2001.

Eaton, L.S., Wieczorek, G.F., and Morgan, B.A., 2001, Weathering characteristics and ages of debris-flow deposits at Graves Mill, Virginia, SE Geological Soc. America Abs. with programs.

Larsen, M.C., Wieczorek, G.F., Eaton, L.S., and Torres-Sierra, H., 2001, Natural hazards on alluvial fans: the debris flow and flash flood disaster of December 1999, Vargas State, Venezuela, in W.F. Sylva, ed., Proceedings of the 6th Caribbean Islands Water Resources Congress, Mayaguez, Puerto Rico, February 22-23, 2001, unpaginated CD.

Larsen, M.C., Wieczorek, G.F., Eaton, L.S., and Torres-Sierra, H., 2001, The rainfall-triggered landslide and flash-flood disaster in northern Venezuela, December 1999: 7th Federal Interagency Sedimentation Conference, March, 2001, Reno, Nevada, p. IV-9 to IV-16.

Eaton, L.S., Larsen, M.C., Wieczorek, G.F., Torres-Sierra, H., 2000, Landslides and catastrophic flooding in northern Venezuela, December, 1999, Geological Society of America Abstracts with Programs, v. 32.

Larsen, M.C., Wieczorek, G. F., Eaton, L.S., and Torres-Sierra, H., 2000, The Venezuela landslide and flash flood disaster of December 1999, 2nd Plinius Conference, October, 2000, Siena, Italy.

Wieczorek, G.F., Larsen, M.C., Eaton, L.S., Garcia-Martinez, R., Jimenez-Diaz, V., Perez-Hernandez, D., Rodriquez, J.A., and Urbani, F., 2000, Catastrophic landslides and flooding in coastal Venezuela, December 16, 1999, Abstracts with Program, Association of Engineering Geologists Annual Meeting, San Jose, California, Sept. 21-24, p. 120.

Eaton, L.S., Howard, A.D., Kochel, R.C., and Sherwood, W.C., 1997, Debris flow and stratified slope wash deposits in the central Blue Ridge of Virginia, Geological Society of America, National Annual Meeting, Program Abstracts, Salt Lake City, UT, October 20 - 23, 1997.

Eaton, L.S., and McGeehin, J.P., 1997, Frequency of debris flows and their role in long term landscape evolution in the central Blue Ridge, Virginia; Geological Society of America, National Annual Meeting, Program Abstracts, Salt Lake City, UT, October 20 - 23, 1997.

Abstracts (continued)

Kochel, R.C., Eaton, L.S., Daniel, N., and Howard, A.D., 1997, Impact of 1995 debris flows on geomorphic evolution of Blue Ridge debris fans, Madison County, Virginia, Geological Society of America, National Annual Meeting, Program Abstracts, Salt Lake City, UT, October 20 - 23, 1997.

Nash, C.L., and Eaton, L.S., 1997, Rapid mass movement events in the central Blue Ridge and landscape evolution: implications for the study of native settlement patterns in upland fan locations, Program Abstracts, Third International Conference on Soils, Geomorphology, and Archeology, Annual Meeting, Woodstock, Virginia, May 22 - 24, 1997.

Sherwood, W.C., and Eaton, L.S., 1997, Landscape evolution and land use in the Blue Ridge Mountains of central Virginia, Program Abstracts, Symposium on Culture-History of the Mountainous Eastern United States, Harrisonburg, VA, May 16-18, 1997.

Eaton, L.S., 1996, Prehistoric debris flows and landscape evolution in Madison County, Virginia; Virginia Association of Professional Soil Scientists Fall Meeting, Culpeper, VA, November 13, 1996.

Kochel, R.C., Eaton, L.S., and Howard, A.D., 1996, Catastrophic debris flows in the central Appalachians: Considerations of their role in the evolution of Piedmont geomorphology, Geological Society of America, National Annual Meeting, Program Abstracts, Denver, CO, October 28 - 31, 1996.

Invited Presentations:

General Topic: *The role of debris flows in landscape evolution of the Blue Ridge Mountains, central Virginia.*

- Dept. of Geology and Environmental Science, JMU, 2009
- US EPA Fine Sediment and the Chesapeake Bay Conference, 2008
- National Academy of Sciences, Washington, D.C., 2005
- Dept. of Geology, Humboldt State University, Sept. 2003
- Dept. of Geology, South Carolina University, Feb. 2002
- Dept. of Geology, East Carolina University, Nov. 2001
- Stewards of the upper Rapidan, Madison, VA July 2002.
- Dept. of Environmental Sciences, Univ. of Virginia, Jan. 2001
- Dept. of Geology, College of William and Mary, Nov. 1999
- Harrisonburg Rotary Club, April 25, 1999.

Invited Presentations (continued):

General Topic: *Groundwater resources of Virginia*

- West Virginia Dept. of Natural Resources, September 2009.
- Naturalist, Old Rag Chapter, October 2006
- Virginia Nursery Association Annual Meeting, Middletown, VA, April 2003.
- Virginia and West Virginia State Horticulture Society Annual Meeting, Williamsburg, VA, January 24, 2001.
- Winchester Rotary Club, March 15, 2001.
- US Natural Resources Conservation Service-Sponsored *Drip Irrigation Conference*, Middletown, VA, December, 1999.

General Topic: *Integrating student-led research in environmental geology into traditional field courses: a case study from James Madison University's field course in Ireland.*

- The Cutting Edge: Teaching Geoscience in the Field in the 21st Century; Bozeman, MT, 2010.

General Topic: *Effects of land use changes and channelization on the stability of streams:*

- Geohazards in Transportation in the Appalachian Region, Charleston, WV, Aug. 2008.

General Topic: Landslides and catastrophic flooding in northern Venezuela, December, 1999.

- Dept. of Geology, South Carolina University, Feb. 2002.

Funding:

Meierjurgen Faculty Fellowship, University of Oregon, ($15,000), spring/summer 2011.

Virginia Division of Geology and Mineral Resources, *Surficial Geology of the Luray Quadrangle, Virginia,* ($7500), fall/spring, 2010-11.

Virginia Division of Mineral Resources, *Surficial Geology of the Elkton West Quadrangle, Virginia,* ($8000*), summer and fall, 2008.
*of which $1000 for **student support**

College of Science and Mathematics, JMU, *A novel approach for measuring and predicting streambed mobility during natural and experimental floods in a large regulated river* ($4000), summer, 2008.

Funding (continued):

US Geological Survey, *Landslide Warning Action Plan: Prioritizing areas of high risk along Blue Ridge Parkway,* (~$10,000), 2006-2007. (Grant covers travel expenses, and supports one faculty and **two students**)

Canaan Valley Institute, Geomorphology of Smith Creek, Rockbridge County Virginia
Student support ($3000) summer, 2006.

US Geological Survey, *Geologic Controls of Basin Denudation from Debris Flows in Rockbridge County, VA.*
Student support ($1500) for field research, 2004/2005 academic year

US Geological Survey, *Surficial Geology of Shenandoah National Park,*
Faculty research support ($2,000), Fall, 2005

National Park Service, *Assessment of the Geologic and Geomorphologic Resources of Shenandoah National Park, Virginia,*
Faculty research support ($10,000) summer/fall 2005

Virginia Division of Mineral Resources, *Surficial Geologic Investigation on the Grottoes and Vesuvius 7.5-minute Quadrangles*
Faculty support ($2500), 2005/2006.
Student support ($1000) 2006/2007

US Geological Survey, *Surficial Geology of Shenandoah National Park,*
Student research support ($2,500), Fall, 2004

SERVICE (major contributions)

Department

- **Chair**: Search Committee; Soils and Engineering Geology (Fall 2009)
- **Chair**: Academic Program Review (spring 2007- Spring 2008)
- **Chair**: Department Newsletter (2008-present)
- Member: Department Recruitment (2007-present)
- Member: Ali Dortery Scholarship committee (2006-present)
- Member: Search Committee; Geophysics position (2005)
- Member: Search Committee; Structural Geology position (2004)
- Member: Search Committee; Geologic Education Position (2003)
- Geologic Education Position Search Committee (2003)
- Geophysics Search Committee (2000, 2005)

Service (continued):

College

- Member: College Council (1999; 2007-2010)
    - **Chair (2009 -2010)**
- Member: Faculty Assistance Committee (2000-2007)
- Member: Search Committee (Biology); Stream Ecology position search (2007)
- Cluster 3, Package A representative, General Education (2000-2003)
- Cluster 3, Package A, Mathematics subcommittee representative (2002-2003)

University

- Member: Faculty Senate (2005-2007)
- Member: General Education Cluster 3 committee (2003-2005)
- Member: General Education Faculty Assistance Committee (2005)

Profession

- **Co-editor**: *The Geology of Virginia* (2008-present)
- **Leader**: Virginia Geological Field Conference (2004, 2009)
- **Leader**: GSA regional field trip (2010)
- **Board of Directors**: Geohazards in Transportation in the Appalachians (2008-present)
- Member: Eastern landslide rapid response team (2000-present)
- Member: USGS storm team advisory board (2004-present)
- Chair: Fluvial processes session, Geohazards in Transportation in the Appalachians conference (2008).

Professional Affiliations

- Member: Geological Society of America
- Member: American Geophysical Union
- Member: Virginia Association of Professional Soil Scientists

Feasibility Study of Groundwater Potential of The Walker's Ridge Development

Fluvanna County, Virginia

Prepared by:

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Staunton, Virginia 24401
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25 October 2013

Executive Summary

Eaton Geological Consulting, LLC has conducted a feasibility study of groundwater potential at Walker's Ridge, Fluvanna County, Virginia.

A theoretical groundwater availability analysis suggests that recharge available on site is capable of supporting sustainable withdrawals on the order of **212,239 gallons per day** (GPD). Based on a 300 GPD ECR, this amount of recharge could in theory support a maximum of **707 ECRs**.

The site is entirely within the Mine Run Complex geological formation. In a database containing 103 wells drilled within three miles of this site, the median reported yield is 8.0 GPM. Approximately 68% of the wells are in the 0 to 120 GPM range; the highest reported yield of a well within this formation is 100 GPM. Quartz veins are locally present in the bedrock; these represent favorable targets for groundwater development.

Soils on the eastern portion of the property in general have thickness and permeability that are favorable to groundwater storage and transmission. Soils on the western portion are thinner, but still favorable.

The Rivanna River, located on the western boundary of the property, has the capability of buffering groundwater levels and perhaps providing additional recharge to the system. This may be an asset in terms of groundwater development on the property to the extent that connectivity exists with bedrock fractures.

Fracture trace analysis has identified a significant number of lineaments that may correlate with water-bearing bedrock fractures.

Overall, groundwater potential on this site is moderate. Although yields of randomly sited wells in this geology typically yield in the range of 0 to 15 GPM, yields in the 25 to 35 GPM range have been achieved elsewhere in this geology when sited using a combination of fracture trace analysis and geophysical survey.

Eaton Geological Consulting, LLC finds that the groundwater potential of this site is sufficiently favorable that it would be feasible to conduct geophysical survey work and drill test wells.

1.0 Introduction

In order to assess the feasibility of groundwater development on the Walker's Ridge property (Figure 1), Eaton Geological Consulting, LLC has examined physical aspects of the site, and drawn upon data and field experience gained conducting hydrogeologic investigations on similar sites elsewhere in the western Piedmont physiographic province of Virginia. This report summarizes all available information and draws conclusions regarding the groundwater potential of the

site. Recommendations are presented as to proceeding with geophysical investigations, and drilling test wells in favorable groundwater zones.

2.0 Theoretical Groundwater Availability Analysis

A groundwater availability analysis has been conducted for Walkers Ridge in order to estimate the theoretical yearly rate of recharge of the bedrock aquifer, and to provide a hypothetical projection of the number of Equivalent Residential Connections (ERCs) that could be supplied by onsite groundwater. This approach is based on the theory that, over the long term, a maximum sustainable groundwater withdrawal rate could be considered to be approximately equal to the natural recharge rate. Ideally, this would require that the fracture network in the bedrock be interconnected throughout the property with all supply wells, at 100% efficiency, so that all available groundwater on-site is actually captured by the wells. Since this is seldom the case in the natural world, a conservative, and estimated efficiency factor of 50% has been assigned based on our knowledge of the geology at Walker's Ridge.

2.1 Assumptions

- Groundwater withdrawals are consumptive; that is, there is no return of water to the on-site aquifer via infiltration.
- The source of groundwater recharge is precipitation only.
- 95% per cent of the entire site contributes to groundwater recharge by precipitation, including storm water retention ponds that capture and slowly return surface water to the ground via infiltration. The remaining 5% represents impervious areas such as roofs and roads, and ephemeral stream channels and near-stream zones, which exit the basin via surface flow.
- On-site groundwater moves from storage, through bedrock fractures and into water supply wells with an overall efficiency rate of 50%.

2.2 Recharge Estimate

According to published NOAA data, the average annual precipitation normal for Fluvanna County (1971-2000) is 43.7 inches (NOAA Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971 – 2000). In this region approximately 2/3 of precipitation is lost to a combination of surface water runoff and evapotranspiration. To the extent that this proportion is accurate, the average annual precipitation that is available for groundwater recharge is estimated at 10.5 inches or 0.875 feet (U.S. Geological Survey Scientific Investigations Report 2011-5198).

The Walker's Ridge drainage basin and associated tributaries that contribute to groundwater recharge to the site comprises approximately 572 acres, or

24,916,320 square feet. Assuming that 95% of that area, or 23,670,504 square feet, contributes to recharge, and a 50% efficiency rate of groundwater movement into supply wells, the theoretical recharge available to supply wells is 10,355,846 cubic feet per year, or 212,239 gallons per day (GPD). Based on a 300 GPD ECR, this amount of recharge could in theory support a maximum of 707 ECRs.

3.0 Regional Geologic Setting and Water Well Productivity

Walker's Ridge is situated within a regionally extensive geologic formation called the Mine Run Complex (Figure 2). This formation is primarily Cambrian-age sedimentary rock that has been folded, faulted, and metamorphosed during tectonic events that span the past 450 million years.

In this part of the Virginia Piedmont, groundwater occurs within fractured bedrock aquifer media. Water well productivity is a direct function of the density of fractures within the bedrock, and the efficiency with which fractures conduct groundwater out of storage, and into wells that penetrate the rock. The degree to which various rock-types respond to tectonic stress by brittle fracture, as opposed to ductile shearing and folding, is largely a function of the mineralogy of the rock. Generally speaking, rocks that contain a substantial percentage of micaceous minerals, as do schists and phyllites of the Mine Run Complex, have a tendency to deform by ductile shear rather than brittle fracture. These rocks tend not to contain the widespread, extensive water-bearing fractures that are characteristic of rocks such as granite that contain a higher percentage of minerals such as quartz and feldspar.

In our database of almost 130 wells located within a radius of three miles of Walker' Ridge, the median reported yield is 8.0 GPM. Approximately 68% of the wells are in the 0 to 120 GPM range. Parcels contiguous to the study site that have wells within the Mine Run Complex show yields ranging from 0-15 GPM (Figure 3). It should be noted that the vast majority of the wells in the database are randomly-sited domestic wells, and that zero-yield wells, or "dry holes" are also included in the database. Hence, we used the median value rather than the mean to better represent the 'middle' value of water well yields in this region of the County.

4.0 Walker's Ridge Site Characterization

4.1 Physiography and Topography

The Walker's Ridge site is situated in rolling terrain typical of Virginia's western Piedmont (Figure 1). There is about 160 feet of topographic relief on site, with elevations ranging from about 230 feet along the Rivanna River on the western boundary of the property, to above 390 feet along the drainage divide of the eastern boundary.

The topography is a result of incision of the landscape by tributaries of the Rivanna River, giving distinct topographic expressions in the western portion of the property versus the eastern portion. The level of incision, or down-cutting by these small tributaries, is deeper in the western portion of the property than in the eastern portion. Bedrock outcrops are common in stream bottoms and side slopes in the southwestern portion of the property. In contrast, bedrock exposures are less common in the eastern uplands of the property, which is covered by a thick mantle of soils and saprolite.

4.2 Bedrock Geology

Geologic mapping by the U.S. Geological Survey shows that the entire parcel is underlain by the Mine Run Complex (Figure 2). These rocks are dominantly phyllites, schists, and mélange-type characteristics, and are highly deformed via ductile shear rather than brittle fracture. These rocks tend not to contain the widespread, extensive water-bearing fractures that are characteristic of rocks such as granite that contain a higher percentage of minerals such as quartz and feldspar.

The quality of bedrock exposures in the vicinity of the property is generally poor (typical of Mine Run schists and phyllites), making it difficult to identify small-scale structures in the rock. In most outcrops, a primary schistosity defined by the orientation of mica crystals was the only discernable structural element. The north to northeast strike, and moderate southeasterly dip of the schistosity are typical of Mine Run rocks in this part of Virginia. The orientation of the dominant schistosity appears to have influenced the orientation of some local streams. In some outcrops, small-scale folds are visible; locally, there are minor fractures associated with these folds, but these joints do not generally appear to extend beyond the limits of the outcrop. Generally, through-going joint sets are absent in outcrop.

The bedrock contains numerous lenses of white quartz, which was precipitated during metamorphism. These chunks of quartz (which does not decompose during the weathering process) are ubiquitous in the soils and saprolite that overlie bedrock. Whereas quartz in isolated lenses is not necessarily significant in terms of groundwater movement, quartz in continuous veins can be very significant in creating zones of water storage and transmission.

4.3 Soils and Saprolite

A review of published NRCS soils maps indicates that that the gently sloping hilltops and moderately steep sideslopes are dominated by variants of the Tatum and Nason soils (Figure 4). In general, these two soil series are deep and well drained. The subsoil of both soils is strongly acid and permeability is moderate.

These soils are relatively favorable in terms of groundwater transmission and storage capabilities.

Manteo Silt loams variants are locally present in small drainageways, upland flats and depressions at the base of slopes. These soils are generally thin and moderately drained, and are relatively favorable in terms of groundwater transmission and storage capabilities.

In general, soils and saprolite in the eastern upland portion of the property are thicker than in the western, incised portion. As such, the soils and saprolite constitute a more favorable storage medium for groundwater in the southern portion of the property than in the northern portion.

5.0 Fracture Trace Analysis

Eaton Geological Consulting, LLC reviewed stereo aerial photography covering the subject property. The photos include a set obtained from the Virginia Department of Transportation (scale 1:16,800, date 04Feb1968) The photographs were stereoscopically analyzed and a fracture trace analysis was performed over the subject site and surrounding area. For this locality, the lineaments/fracture traces are moderately well-expressed by topographic features across portions of the landscape. The individual trace locations that were identified on the photos were transferred to a 2009 aerial photograph depicting Walker's Ridge (Figure 5). Locations where fractures intersect are considered prime targets for potential high producing water wells (targets shown as green circles in the Figure). These sites will be physically located on the ground via flagging pending arrangement of schedules of the client and Eaton Geological Consulting. LLC.

6.0 Prioritized Groundwater Potential Zones

The fracture trace analysis results and available geologic mapping have been utilized to locate areas on site that are favorable to geophysical survey and drilling of test wells (Figure 5).

Eaton Geological Consulting, LLC has identified four sites (green circles, Figure 5) considered to possess the best potential to develop groundwater resources within the parcel. Two of these areas are in the low lying terrain and likely have the best potential for high water yields (sites 1 and 2 in Figure 5). The other two sites are on upland flats. Each site will require consideration with regards to feasibility of permitting by the Virginia Department of Health (VDH), and ease of access for drilling equipment.

These areas should be considered "starting points" for groundwater exploration of the site, and represent a minimum of groundwater prospecting areas

necessary to fully characterize the property. It is anticipated that additional zones will be explored as geophysical investigation proceeds.

7.0 Discussion

By all indications the groundwater potential on this site is moderate. Historical well data, theoretical recharge modeling, and the physical characteristics of the site suggest likely achievable well yields in the range of 10 to 35 gallons per minute. There are positive attributes to the site that may lead to better-than-average yields. These attributes include a significant number of lineaments that may correlate with water-bearing bedrock fractures, and thus higher than average sustainable yields. In addition, the eastern portion of the property is underlain by a relatively thick overburden of soils and saprolite that are favorable to groundwater storage and transmission to bedrock fractures. The Rivanna River flows along the western boundary of the property; this serves as direct recharge to bedrock fractures that are connected to the river bed.

Additionally, the water budget model used for this study was purposely *conservative*; that is, groundwater withdrawals were assumed consumptive and there was no return of water to the on-site aquifer via infiltration from septic systems. However, numerous studies have shown that septic systems are largely non-consumptive in water use; and that a large portion (35% to 90%) of the extracted water is eventually returned to the groundwater system via septic field inputs. Being that the soils are well-drained and have good porosity and permeability, a conservative value of 50% is suggested for the volume of water returned to the water budget via septic system delivery. Therefore, the data derived for this study suggest that this additional source of recharge not factored into the water budget provides a buffer in water supply availability; and helps to minimize the unlikely event of impacting the water supply of adjoining properties.

In summary, the data suggest that the water availability in the Walkers Ridge drainage basin (707 ECRs) meets the proposed 306 ECR requirements by a factor of two.

8.0 Limitations

This report represents compilation of existing information, and site characterization conducted in accordance with generally accepted industry standards. There is no guarantee, stated or implied, as to the aggregate yield of wells drilled during further phases of this project.

Figure 1. Approximate property boundary of Walker's Ridge.

Figure 2. Geologic map of the Walker's Ridge area (Source: U.S. Geological Survey compilation map).

Figure 3. Proximal water wells and associated yields at the time of well completion. Units are in gallons per minute.

Figure 4: Soils map of the Walker's Ridge study area. Symbols "T", "N", and "M" represent the Tatum, Nason, and Manteo soil series, respectively. Lower case letters denote degree of slope, with slope increasing proportionally from 'a' to 'g'.

Figure 5: Fracture trace analysis of the Walker's Ridge property, Fluvanna County, Virginia. Numbers proximal to green dots denote site name and are not to be used as a favorability ranking of water well yield.

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Education

Phillips Exeter Academy
University of Virginia, 1973, BA Environmental Sciences
Virginia Tech, 1984, PhD Geology
The Princeton Course, Groundwater Pollution and Hydrology, 1995
Sorensen Institute for Political Leadership, 2000

Experience

2002 to present: **Virginia Groundwater LLC, President and Chief Hydrogeologist**

- Conduct geologic and hydrologic assessments of land parcels for groundwater characterization and water well siting: recharge potential, hazards to water quality, flow direction and availability; clients include individual landowners, developers, industry, agriculture and local government.
- Design, conduct and interpret geophysical surveys to map groundwater in the subsurface.
- Design, conduct and interpret aquifer tests and water quality tests to characterize water well performance and long term sustainability.
- Provide consulting services and technical expertise in areas of structural geology, geophysics, hydrology, water supply planning and water resources management.

1999 to present: **Thomas Jefferson Soil & Water Conservation District, Director and Chairman**

- Oversee District programs in support of responsible stewardship of water resources.
- Build consensus among District board members in support of innovative programs that enhance the District's role in water resources protection and conservation.
- Build partnerships with citizen groups, local governments, State and Federal agencies, and non-profit organizations that broaden the reach of District programs and leverage District resources through grant funding and volunteer activities.
- Foster informed public policy in water resources management by providing technical expertise, written comment, and oral presentations to citizens, planners and elected government officials.
- Created the Thomas Jefferson Water Resources Protection Foundation under auspices of TJSWCD, to administer the District's riparian conservation easement program (2002).
- Co-chair, Task Force on Erosion and Sediment Control and Storm Water Management Law for the Virginia Association of Soil & Water Conservation Districts (2001).
- Initiated regional Water Resources Advisory Committee, jointly sponsored by TJSWCD and the Thomas Jefferson Planning District Commission (2000). Chaired

WRAC technical studies of sedimentation in the South Fork Rivanna Reservoir (2000) and water supply planning for TJPDC's Eastern Planning Initiative (2001).

1984 to 2002: **Virginia Department of Mines, Minerals and Energy, Senior Geologist**

- Project team member and coauthor, Albemarle County Hydrogeologic Assessment Phase 1: Mechums River and Ivy Creek Basins (2000-2002).
- Pioneered development of computer-based geology map/water well database for Albemarle County (1995-2002) in partnership with the County and the Virginia Department of Health.
- Convened two Piedmont Water Summits in central Virginia which brought together elected State and local officials and planners to discuss water resources issues affecting multiple jurisdictions (1999, 2000).
- Partnered with TJPDC, private-sector consultants, and local planners in Louisa and Fluvanna counties to evaluate groundwater and surface water resources in support of comprehensive water supply planning (1995-2000).
- Developed geology/water well databases as planning tools for Louisa (1996) and Fluvanna (1997) counties.
- Project team member, Albemarle County Pilot Groundwater Study for the North Fork/South Fork Hardware River Watershed (1994).
- Team leader for twenty people from DMR, USGS, academia and the private sector in coordinating production of the Blue Ridge and Piedmont portion of the 1993 Geologic Map of Virginia.
- Completed numerous Geologic Quadrangle mapping projects in southwestern, western and central Virginia (1984 – 2002).

Professional Affiliations

- Albemarle County Groundwater Committee (1999 to present)
- Chairman, Area II, Virginia Association of Soil & Water Conservation Districts (2004)
- Scientific Advisory Board, Wintergreen Nature Foundation (1999 to present)
- Virginia Certified Professional Geologist #2801-001041
- Virginia Licensed Air-Rotary Drilling Contractor #2705-080012
- Eagle Scout

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Justin M. Shimp, P.E.
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Dear Mr. Shimp:

At your request I have done a preliminary assessment of the potential for off-site impacts of groundwater usage at the proposed Walkers Ridge development. I have conducted this study using resources available in my files and on the internet; I have not visited the site.

It is my understanding that this project could entail as many as 952 residential units plus a commercial center at build-out. Groundwater supply from on-site wells is proposed for the initial phase of development (Phase 1, 306 residential units plus limited commercial); subsequent phases will not use additional groundwater from on-site wells for water supply. Waste water will be handled through centralized on-site drainfield(s).

My findings are summarized below:

1) Theoretical natural groundwater recharge to the site averages about 1136 gallons per day per acre, or **263,668** gallons per day (GPD) for the whole 232 acres (see water budget model, below; Evans and Collins, 2010). Residential water demand for the project at build-out of 952 residential dwellings would be on the order of 95,200 to 142,800 GPD, assuming 100 to 150 GPD water usage per household (commonly accepted figures for US households that are not conservation-minded). Commercial water demand at build-out would be approximately 32,000 GPD. Thus total water demand for the project at build-out would be approximately **127,200 to 174,800** GPD.

   Residential water demand for Phase 1 (306 residential dwellings) would be 30,600 to 45,900 GPD; phase 1 commercial demand would be approximately 7,500. Total water demand for Phase 1 of the project would be approximately **38,100** to **53,400** GPD. On the basis of this model, it appears that even if water for the entire project were to be supplied by groundwater (instead of just Phase 1), there would be sufficient natural recharge on the site to meet the demand.

2) To the extent that waste water is to be disposed of through on-site drainfield(s), overall water usage for this project would not be consumptive of groundwater. A significant

proportion (most) of the groundwater used would be returned to the ground as recharge, through a sanitary drainfield system.

3) Surface water bodies on site include 4 ponds and the adjacent Rivanna River. Each of these constitutes a hydrologic buffer that recharges groundwater contained in the surrounding rocks. These surface water features have the effect of stabilizing or augmenting groundwater levels by supplementing the recharge that comes from rainwater.

4) The average yield of 155 Fluvanna County wells drilled in the same type of bedrock that underlies Walkers Ridge (chlorite-muscovite phyllite) is **7.8** gallons per minute (GPM), with a maximum of **60** GPM (Evans and Hostettler, 2001). Water demand for Phase 1 (38,100 to 53,400 GPD) is equivalent to about **26** to **38** GPM. These numbers suggest that several wells would be required to supply demand at build-out, and likely more than one well in order use groundwater just for Phase 1 water supply.

   Off-site impacts are not likely from this amount of groundwater withdrawal, given factors cited in points 1, 2 and 3, above. However wells that are located in geologic structures that are hydrological connected with off-site wells could potentially cause impacts to those wells. Geotechnical investigations on site would help locate optimal drilling sites for wells, both to ensure sustainability of yield and to minimize any possibility of off-site impacts.

5) The greatest potential threat to groundwater (both on- and off-site) from this project is the creation of impervious surfaces (roofs, pavement, degradation of natural land cover) that alter the percentage of precipitation entering the ground as recharge. A significant increase in surface water runoff due to additional impervious surfaces could ultimately affect groundwater levels in both on-site and off-site wells, and potentially impact the hydrology of the Rivanna River. These adverse impacts could be mitigated by implementing aggressive storm water management strategies that minimize off-site runoff, and preserve the natural hydrologic cycle on site.

Please contact me if you have questions or would like to discuss the above. I will be glad to provide further assistance as needed.

Sincerely,

Nick H. Evans

Water budget model

It is instructive to model the natural hydrologic cycle on the property by developing a theoretical water budget. This uses the best available scientific data to define the relationship among precipitation, evapotranspiration by plants and trees, groundwater recharge and surface water runoff. The water budget can be expressed by the equation:

total precipitation = (surface water runoff) + (groundwater recharge) + (water lost to evapotranspiration).

Accurate numbers exist for annual precipitation in central Virginia thanks to many decades of record-keeping by the UVa Climatology Office. Accurate numbers for surface water runoff in central Virginia are available from the US Geological Survey in the form of discharge data from the gaging station on the James River at Cartersville. The James River basin above Cartersville comprises a 6252 square mile watershed that includes Fluvanna County.

Precipitation = 42.7 inches per year, or 3221 gallons per day (GPD) per acre.

Runoff = (3793352914 GPD at Cartersville / 4,001,280 watershed acres) = 948 GPD per acre.

Evapotranspiration and groundwater recharge rates are affected by many variables that are difficult to measure. However, we do know that the sum (groundwater recharge + evapotranspiration) equals the quantity (precipitation – runoff). For the Cartersville watershed in central Virginia, we can calculate this quantity as

(3221 GPD) – (948 GPD) = (2273 GPD), or 70.6% of precipitation.

Researchers who have studied the relationship between groundwater recharge and evapotranspiration in the mid-Atlantic region have generally agreed that the two terms can be considered approximately equal in proportion to each other. Under this assumption, groundwater recharge and evapotranspiration would each comprise 35.3% of precipitation, or 1136.5 gallons per day per acre. Using this model, theoretical total daily groundwater recharge on the Walkers Ridge site would be

(1136.5 gallons per acre) x (232 acres) = **263,668 GPD.**

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Rivanna River Basin Commission
A CONFLUENCE OF INTERESTS

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April 30, 2013

Hon. Shaun Kenney, Chairman, Board of Supervisors
Mr. Barry A. Bibb, Chairman, Planning Commission
County of Fluvanna
P.O. Box 540
Palmyra, VA 22963

Re: Comment on proposed Walker's Ridge PUD

Dear Mr. Kenney and Mr. Bibb,

By this letter, the Rivanna River Basin Commission offers comments on the PUD proposed rezoning, Walker's Ridge, on the Rivanna River near the Village of Palmyra. We have concern about the size and number of units at build-out, the configuration of the development, and the proximity of the development to the Rivanna River and the resources it provides to citizens and aquatic species.

The Rivanna River Basin Commission (RRBC) is empowered, by Virginia statute, to "provide guidance and make recommendations to local, state, and federal legislative and administrative bodies, and to others as it deems necessary and appropriate, regarding the use, stewardship, and enhancement of the [Rivanna] Basin's water and other natural resources." Fluvanna County has been a member since RRBC's inception in 2007, and our staff has worked with Fluvanna County staff on numerous occasions to enhance our collective understanding of the impacts of development on the health of natural and water resources throughout the watershed. We offer the following specific comments to help inform decision-makers charged with evaluating this project.

Impact on Virginia State Scenic River Status. The Rivanna holds a special place in the history of Fluvanna, and it was precisely because of this, and the Rivanna's relatively unspoiled character, that Fluvanna citizens were instrumental in obtaining Virginia state scenic river status for the Rivanna at the inception of the Commonwealth's program in the 1970s. Maintaining this special status depends on maintaining views from the river that are not cluttered by signs of human development. A development of this size and character, so close to – and visible from – the river will change the character of this stretch of the river, which is directly across from the Pleasant Grove, a public, but minimally developed facility.

Impacts on Groundwater Recharge. The 2009 Fluvanna County Comprehensive Plan states, "Groundwater recharge is critical in sustaining stream flow in dry weather." The proposed development will rely on several wells for obtaining groundwater from this site to serve the residents. There is already anecdotal evidence from long-time Fluvanna residents that the stream flows in Fluvanna's

portion of the Rivanna have decreased over the years. Department of Environmental Quality's Director, Mr. David Paylor, reported on April 10, 2013, at the Environment Virginia conference that USGS studies are showing reduced overall stream flows throughout the Commonwealth.

The 1999 TJPDC report, *Water Resources in Fluvanna*, notes that the county should [italics added]

> establish a groundwater hydrogeologic testing program to ascertain the effects of new wells on existing wells. *This is particularly important when approving new subdivisions, which will be dependent on groundwater.* Incorporate data from all hydrogeologic tests performed in the County into the hydrogeologic database.

Without the necessary data from such a program, the county is risking depletion of groundwater resources that help maintain adequate flow to neighboring wells and to the Rivanna to the detriment of aquatic and terrestrial organisms that rely on these resources.

Presence of globally rare and threatened species of freshwater mussels. The section of the Rivanna River located adjacent to the proposed development is identified by the Department of Conservation and Recreation (Division of Natural Heritage) as containing aquatic natural heritage resources that are either globally rare or threatened (see Attachment A). Specifically, these natural heritage resources are one or both of two mussel species, *Fusconaia masoni* (Atlantic Pigtoe) and *Lasmigona subviridis* (Green Floater). Both are sensitive to excessive sedimentation and other water quality issues. Greater stormwater flow volumes from increased impervious surfaces generated from the proposed development will threaten natural heritage resources in the Rivanna River, here and downstream.

Change in land use due to proposed development. The overarching issue for this site is that the proposed development will result in a major land cover change, decreasing forest cover and increasing the amount of impervious surface. Even with state-mandated stormwater management requirements in the design of this development, these changes will result in less infiltration for groundwater recharge and additional, harmful runoff to the Rivanna River.

The local water quality-monitoring group, StreamWatch, developed a model that predicts water quality within sub-watersheds based on land use. Given current land use within the sub-watershed in which the development is proposed, water quality in the river and streams is likely to be in "fair to good" condition (and leaning towards fair). In other words, the waterways in the sub-watershed are likely to be "on the cusp," not meeting Virginia water quality standards for aquatic resources. There is potential for water quality improvement if measures are taken to improve conditions in the sub-watershed (see Attachment B).

The StreamWatch *Land Use Study* (2011) shows that changes from forested land cover to impervious surface in our Rivanna watershed result in degradation of habitat and water quality that do not support biological life, including fish for fishermen and aquatic life that non-human species rely on.

Thus, changes in forest and impervious land cover at Walker's Ridge could determine whether this area's streams meet or fail Virginia water quality standards. Using 2009 RRBC Land Use/Land Cover Map data, RRBC estimates that roughly 60% of existing forest will be eliminated from the site based on the current plans proposal (see Attachment C).

Human waste management. RRBC is concerned about the addition of an "innovative" on-site drain field used to handle multiple units at once, being sited close to the Rivanna River. While cluster development is a hallmark of low impact design (LID), clustering housing works best when municipal sewage treatment systems are utilized. In addition, unrelated and potentially uncoordinated alternative systems, designed to meet the needs of sites for single family homes, have the potential to be overwhelmed by capacity needs, resulting in unintended infiltration to groundwater or, worse, overland flow to the Rivanna, resulting in a human health problem and direct impacts on the aesthetics and safety during recreational uses of the Rivanna and its adjacent properties due to bacterial contamination.

In addition, Fluvanna County estimated 6,067 septic systems (as of January 2012) for county's Chesapeake Bay WIP II submission, a number based based on the total amount of housing units from the 2010 census minus the number of homes on public sewer. The county's total estimated load was based on this number along with other factors. Providing centralized sewer (and water supply) are important ways that Fluvanna County can ensure environmental safety and economic development. The increase in the number of separate systems will impede Fluvanna's ability to achieve the required nutrients and sediment reductions called for by the Chesapeake Bay TMDL. See
http://www.rivannariverbasin.org/docs/ChesBayTMDL/Fluvanna_WIPIISubmittal_12Feb01.pdf

If the Walker's Ridge PUD moves forward with Fluvanna's approval, RRBC recommends the following be included in the rezoning:

1. *Riparian Buffers.* RRBC recommends that the 100-foot riparian buffer be reforested before other phases of construction are begun and the floodplain be reforested during initial phases of construction to provide additional filtration and replacement for existing forest that is to be eliminated. The July 2012 Walker's Ridge rezoning plan proposes that the Rivanna's floodplain become a "wooded area," and RRBC commends this. However, according to 2009 RRBC Land Use/Land Cover Map data, the majority of the floodplain is not currently forested, including sections of the Rivanna's 100-foot riparian buffer, A fully forested 100-foot stream buffer can reduce 97% of sediment (as well as 80% of nitrogen and 77% of phosphorus) from entering the river.

2. *Walker's Ridge as an example of the best in stormwater management in Fluvanna County.*
RRBC recommends that Fluvanna require the Walker's Ridge PUD to utilize stormwater best management practices beyond those minimally required by the Virginia stormwater management permit. These include low impact development techniques, large-scale rainwater harvesting and reuse, water conservation features, individual rain gardens, tree planting in open space, and constructed wetlands for water quality and quantity treatment. The 2009 Fluvanna County Comprehensive Plan notes, "All of these techniques can be used in both residential and commercial/industrial development, and should either be strongly encouraged or required." The Walker's Ridge development could serve as a model for how to minimize the effects of land use change by requiring the development to go beyond the minimum requirements.

RRBC understands that the decision about the Walker's Ridge PUD proposal is, in part, a decision about investing in Fluvanna's economic future. RRBC believes that economic development can go hand-in-hand with sound environmental planning. RRBC recommends that the county consider how a development of this scale adjacent to the Rivanna River will impact water quality, groundwater flows, stream flows, aquatic and terrestrial species, and the quality of life for Fluvanna well in to the future.

Sincerely,

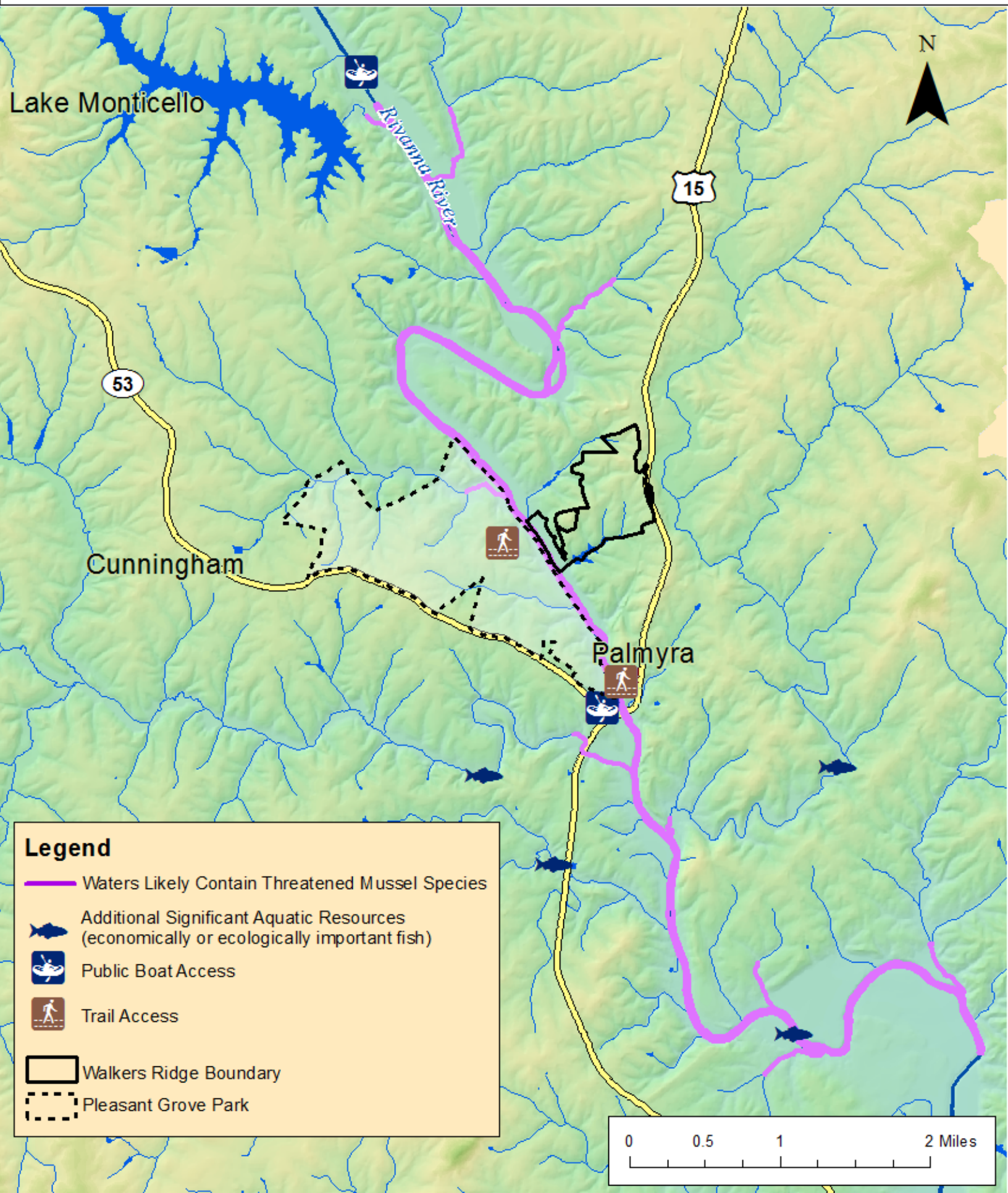
Leslie Middleton, Executive Director, on behalf of the RRBC

cc:
Fluvanna Board of Supervisors
Fluvanna Planning Commission
Ms. Allyson Fincham, Planning Director

Attachment A: Aquatic Resources and Recreation
Attachment B: StreamWatch Predicted Stream Health of Subwatersheds
Attachment C: Proposed Walker's Ridge Subdivision Land Use Evaluation (RRBC)

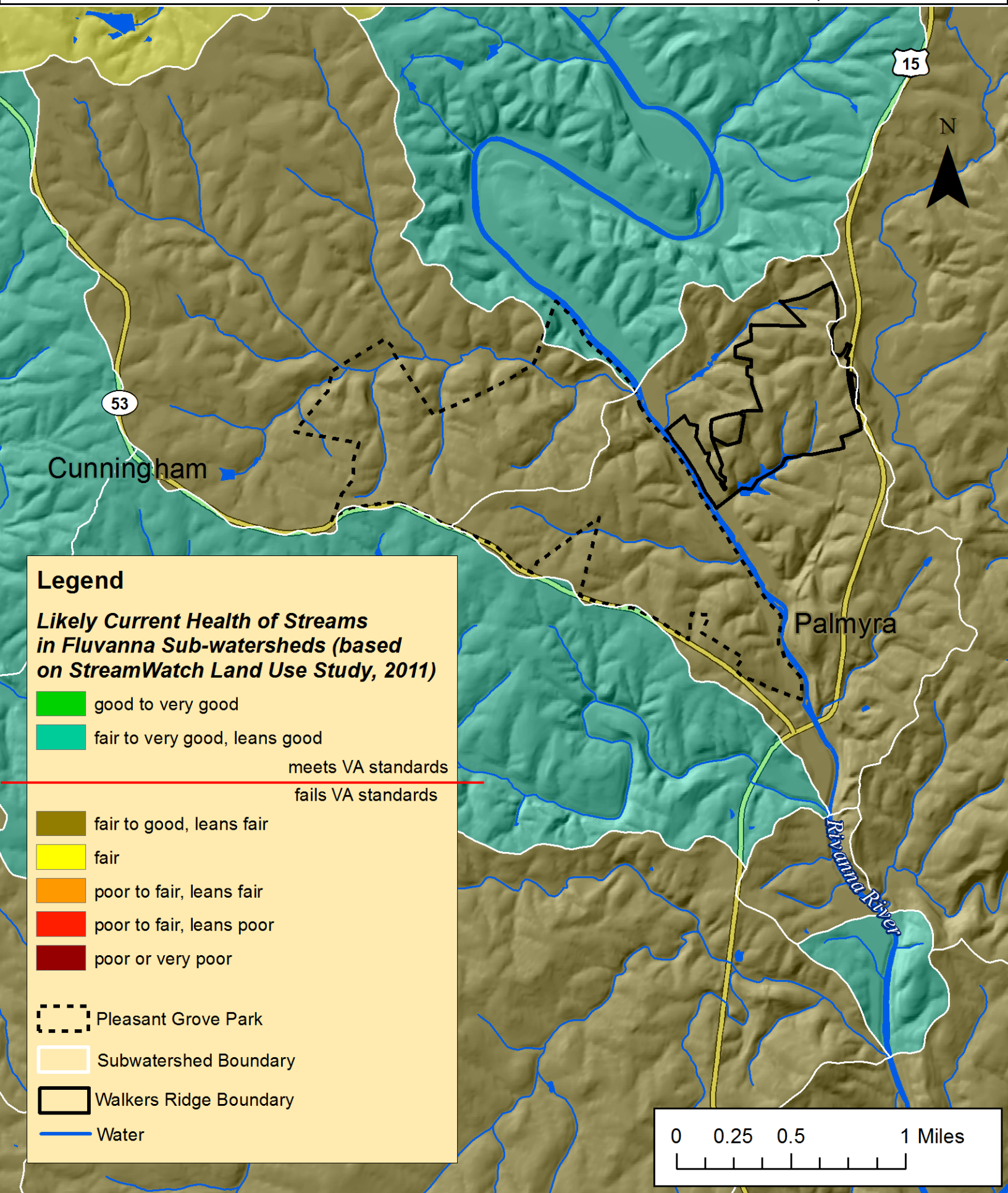
Rivanna River Vicinity Map: Aquatic Resources and Recreation

Attachment A
Map Created 4/19/2013



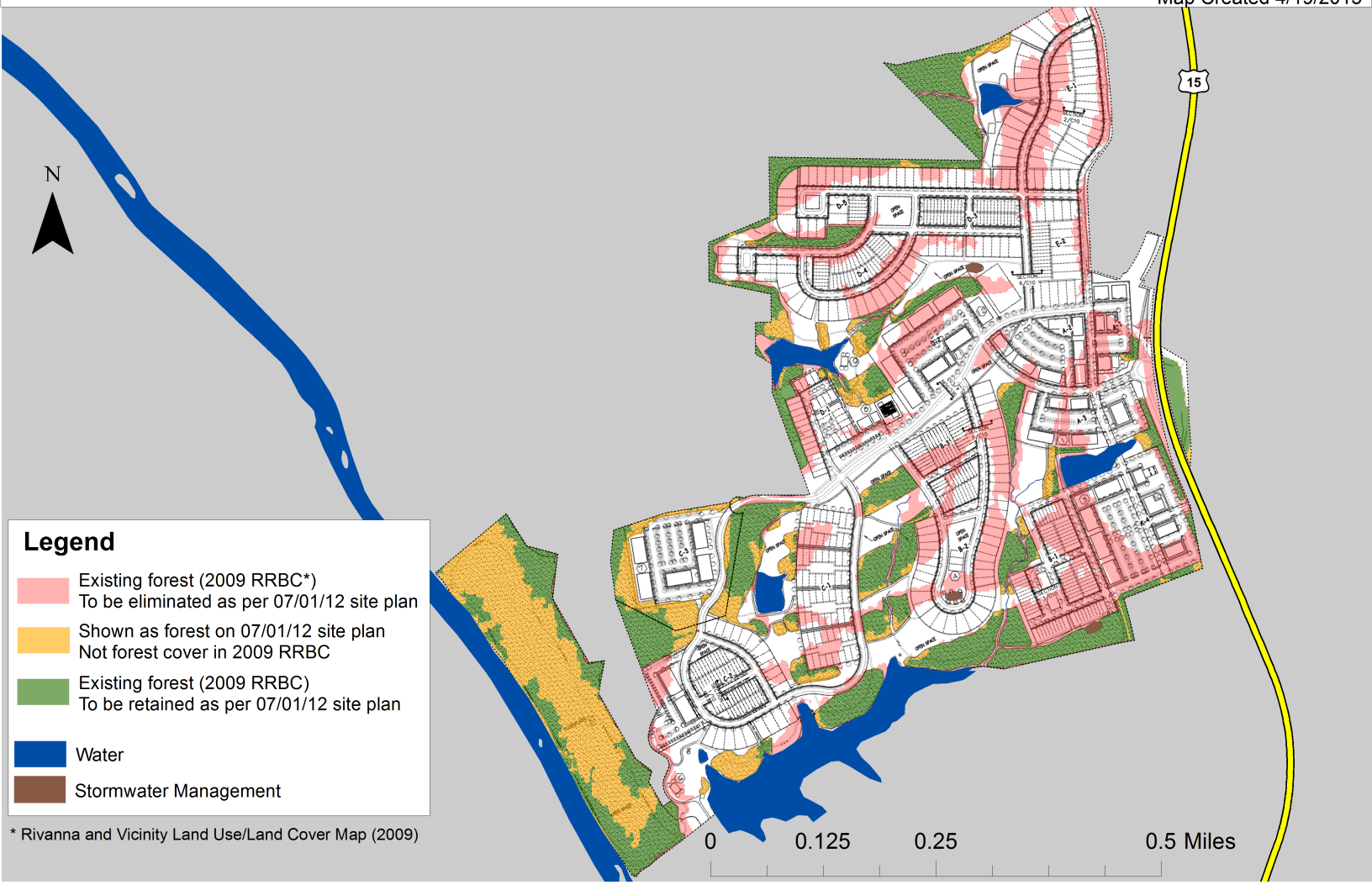
Rivanna River Vicinity Map: StreamWatch Predicted Stream Health of Subwatersheds

Attachment B
Map Created 4/19/2013



Proposed Walkers Ridge Subdivision Land Use Evaluation (RRBC)

Attachment C
Map Created 4/19/2013



* Rivanna and Vicinity Land Use/Land Cover Map (2009)

EPR-ENGINEERING & PLANNING RESOURCES
637 BERKMAR CIRCLE, CHARLOTTESVILLE, VA 22901

TO: JUSTIN SHIMP, P.E.	FROM: BILL WUENSCH, P.E., PTOE
ORGANIZATION: SHIMP ENGINEERING	DATE: NOVEMBER 13, 2013
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
RE: WALKERS RIDGE – PHASE 1 DEVELOPMENT TURN LANE WARRANT FOR NORTHERN ROUTE 644	YOUR REFERENCE NUMBER:

MEMORANDUM

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY X FOR YOUR USE

This memorandum responds to the question about the potential northbound left turn lane need, under the first phase of development, at the northerly Route 644 at Route 15 intersection. Also addressed is the question about a potential need for a 2nd egress lane at that same intersection to separate out the rights and lefts.

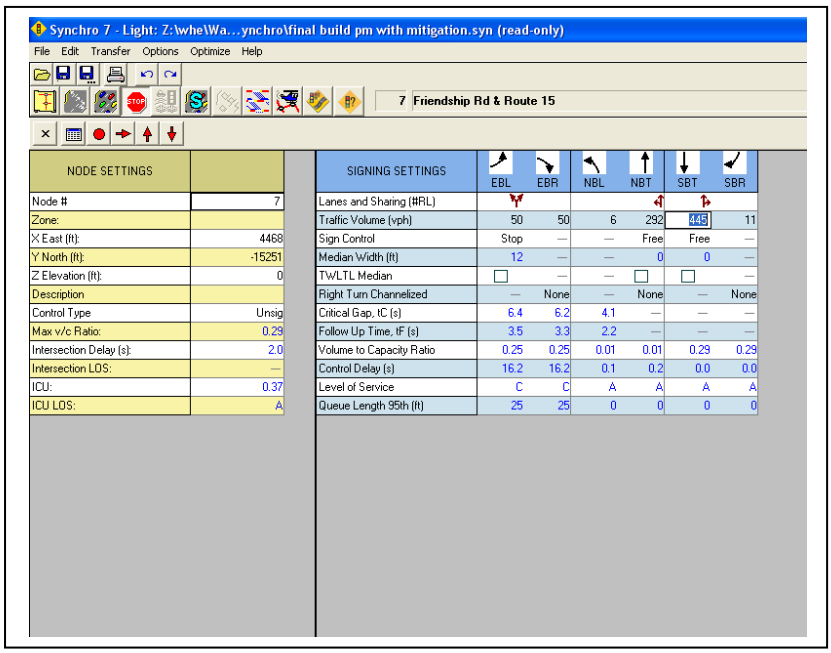
The projected traffic along Route 15 was generated using the growth rate per all previous memos for this study. The site traffic was then applied to the background growth, consistent with the memorandum dated 11-1 that summarized intersection operations for the re-aligned southern end of Route 644 at Route 15.

The need for the left turn lane on the northern intersection of Route 644 at Route 15 was examined using the VDOT (based on FHWA) turn lane warrants. Based on the warrants, as many as 27 and 23 northbound left turns in the AM and PM peak hour, respectively, could be accommodated before a left turn lane would be warranted. This would constitute between ½ and 1/3 of the overall site trips in the peak hours using the northern Route 644 intersection for the northbound left movement. Note that at present, there are zero left turns occurring from Route 15 onto the northern entrance to Route 644 in the AM and PM peak hours of the day.

Based on this assessment of the turn lane warrants and per the layout of the site plan for phase 1, it seems unlikely that the phase 1 development would result in turn volumes at the northerly Route 644 intersection to warrant the northbound left turn lane.

The need for the 2nd egress lane was studied base on projecting the traffic shown in the attached Figure 5 up to the north. (same data as used for the left turn lane analysis as described above). It was found that with the phase 1 development, projected to occur by year 2018, as many as 50 rights and lefts (100 total) could access Route 15 at that intersection while still maintaining a LOS C, all within one egress lane (i.e. shared left / right lane). We wouldn't expect these levels of volumes, but this analysis proves that there is no capacity or

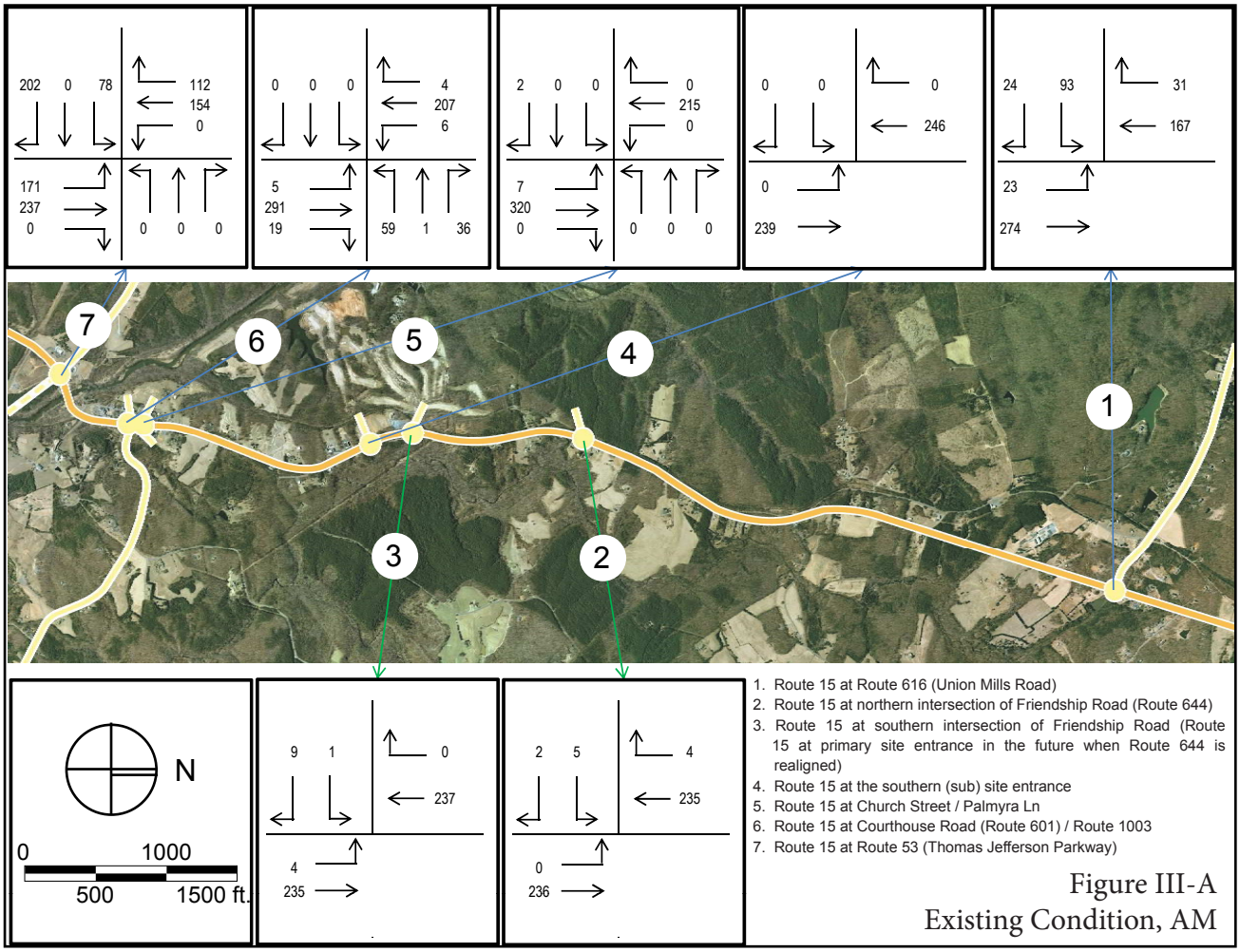
delay issue at that location under the phase 1 development scenario. The screenshot below is from Synchro unsignalized analysis.



END of MEMORANDUM

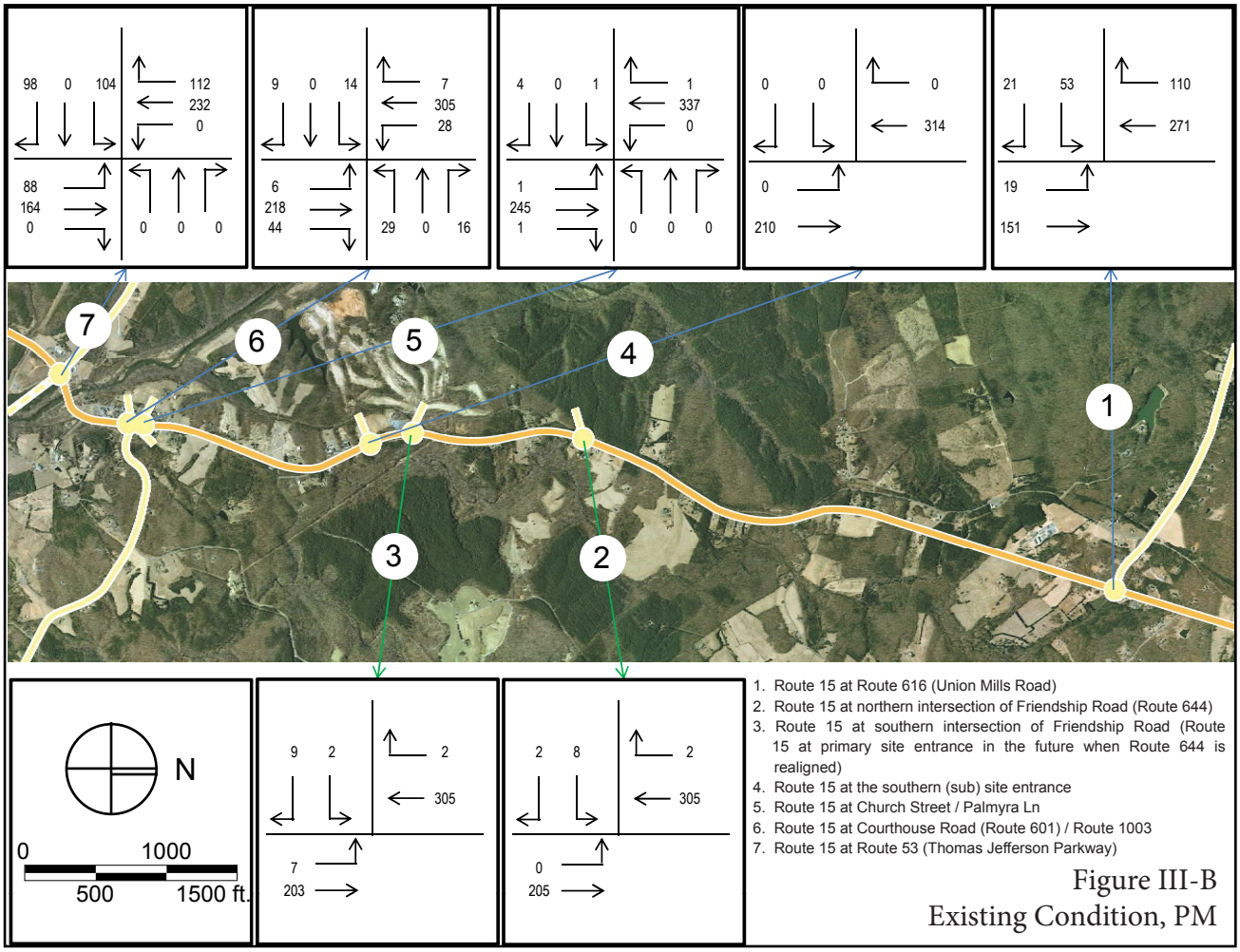
Attachments:

1. Existing volumes summary
2. Excerpt of prior memo site volumes at the southerly entrance
3. Warrant forms for the northerly entrance (volumes deduced from the volume summary for the southerly entrance)



1. Route 15 at Route 616 (Union Mills Road)
2. Route 15 at northern intersection of Friendship Road (Route 644)
3. Route 15 at southern intersection of Friendship Road (Route 15 at primary site entrance in the future when Route 644 is realigned)
4. Route 15 at the southern (sub) site entrance
5. Route 15 at Church Street / Palmyra Ln
6. Route 15 at Courthouse Road (Route 601) / Route 1003
7. Route 15 at Route 53 (Thomas Jefferson Parkway)

Figure III-A
Existing Condition, AM



1. Route 15 at Route 616 (Union Mills Road)
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3. Route 15 at southern intersection of Friendship Road (Route 15 at primary site entrance in the future when Route 644 is realigned)
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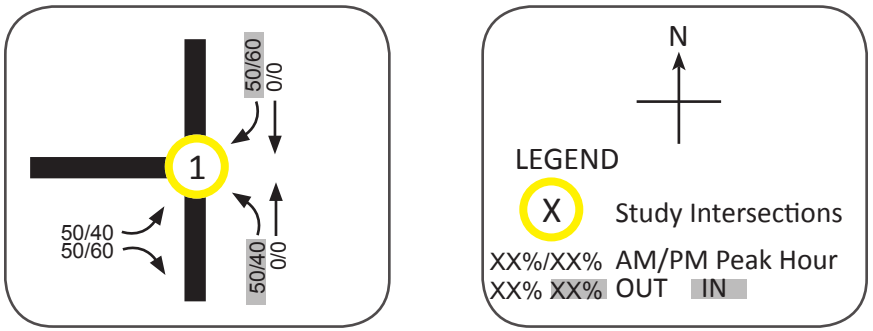
5. Route 15 at Church Street / Palmyra Ln
6. Route 15 at Courthouse Road (Route 601) / Route 1003
7. Route 15 at Route 53 (Thomas Jefferson Parkway)

Figure III-B
Existing Condition, PM

Figure 3 Site Trip Distribution



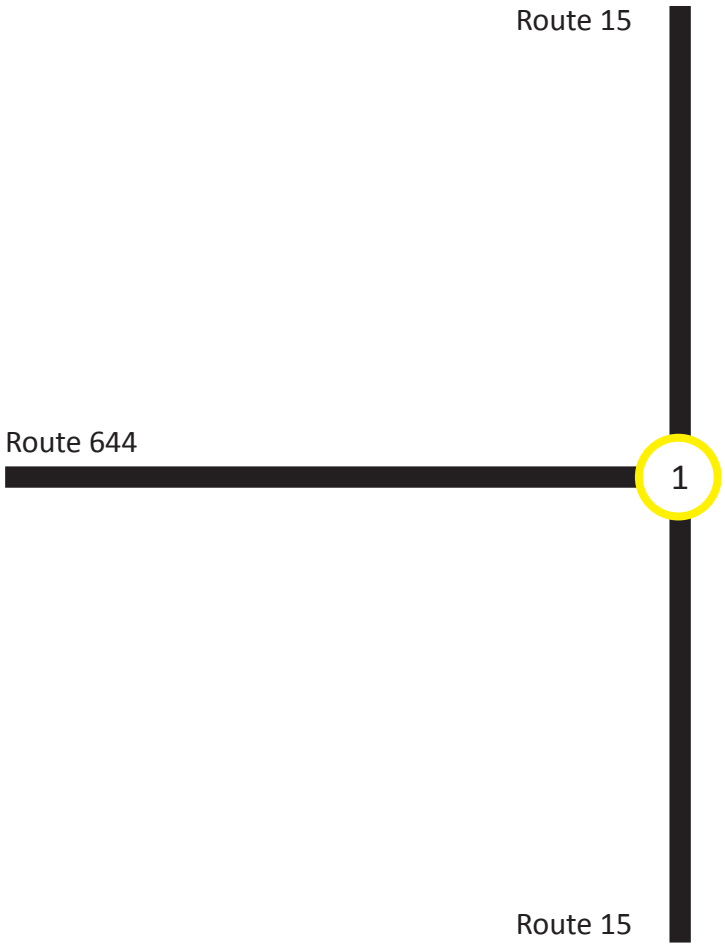
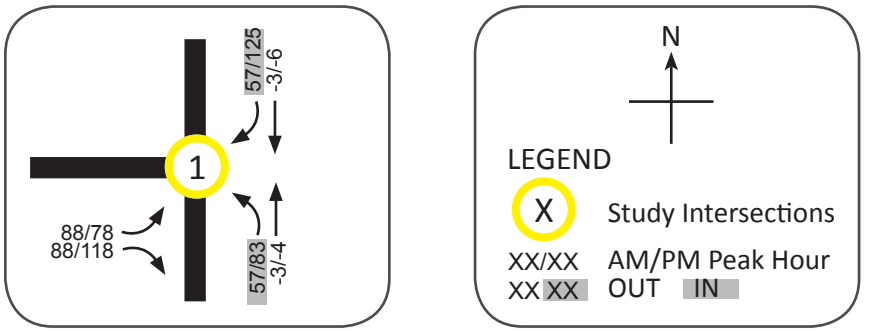


Figure 4 Site Trips



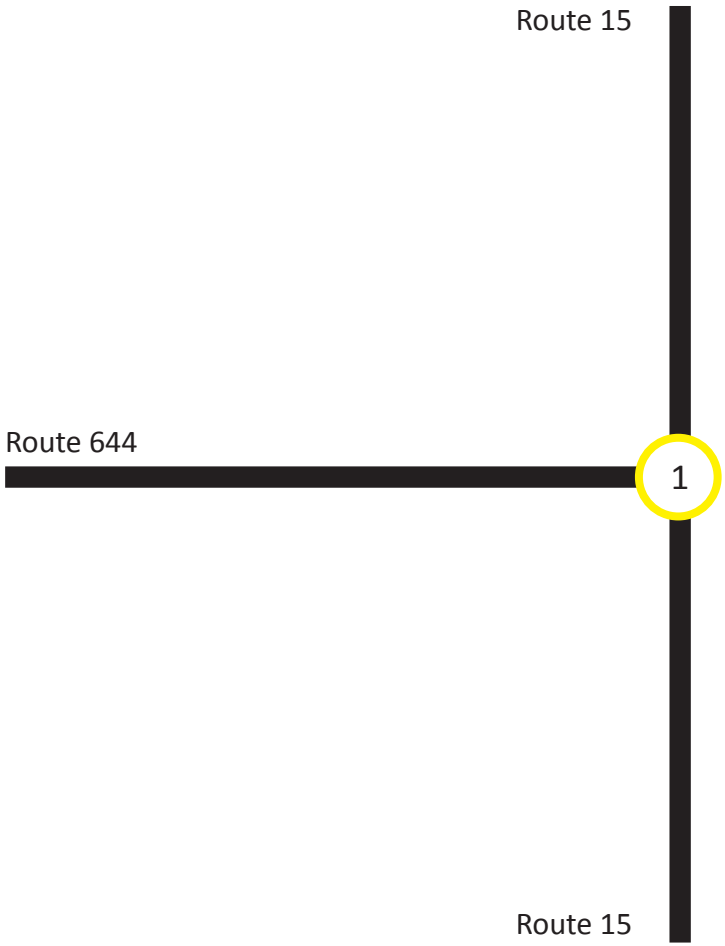
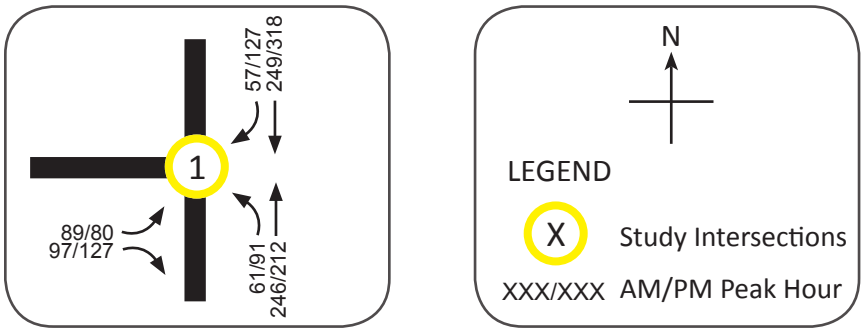
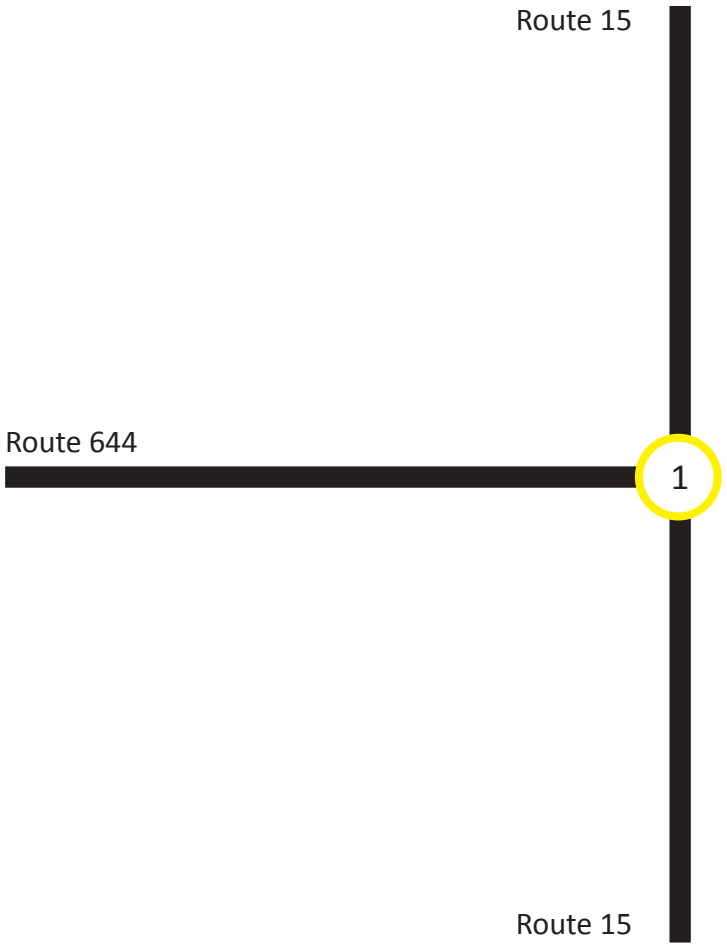


Figure 5 Future (2018) Build Traffic Volumes





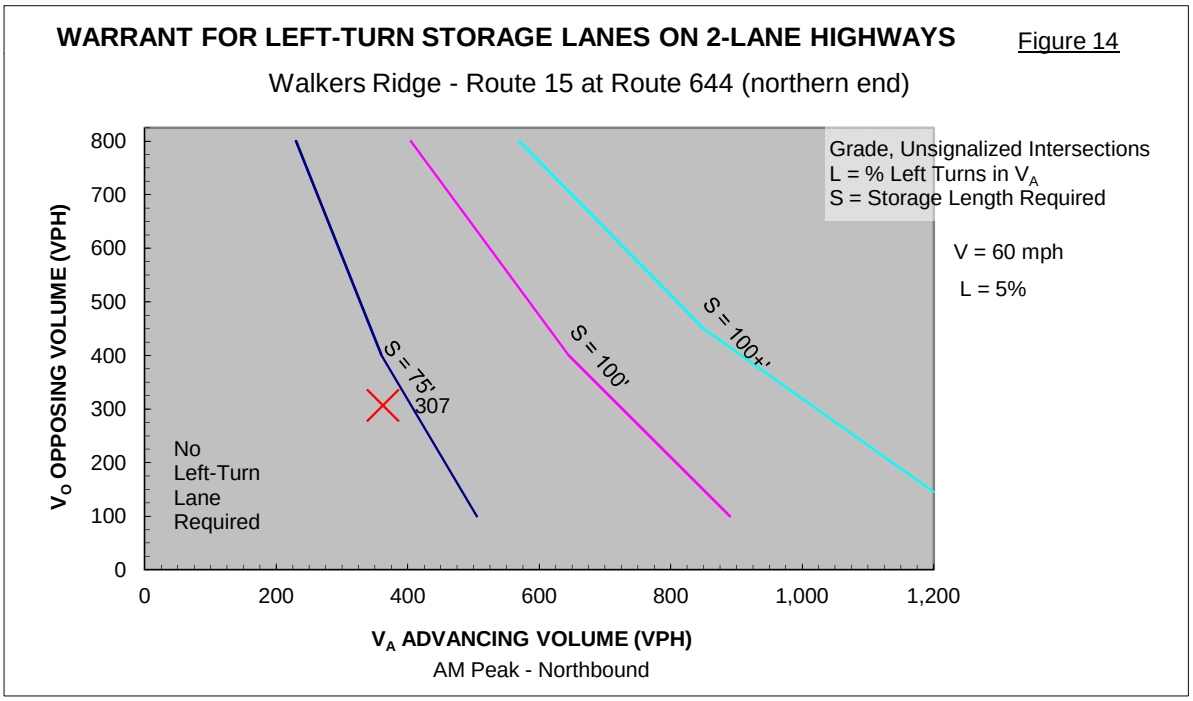
WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

Project:	Walkers Ridge	Analysis Date:	2018
Intersection:	Route 15 at Route 644 (northern end)	Data Date:	2018
Approach Direction:	Northbound	Projection Year:	2018
Peak Hour:	AM Peak		

Peak Hour Left Turns (V_L):	27	vph
Advancing Volume (V_A):	362	vph (Northbound Approach)
Opposing Volume (V_O):	307	vph (Southbound Approach)
Operating/Design Speed (V):	**60**	mph

% Left Turns in V_A (L):	**5%**	(Calculated Value: 7.5%)
Optional % Left Turn Override:		
		(0' storage required based on chart)
% Trucks in V_L:	0%	(0' additional storage for trucks)

CONCLUSION: **No Left-Turn Lane Required**



Source: Highway Research Record Number 211 - Figure 14

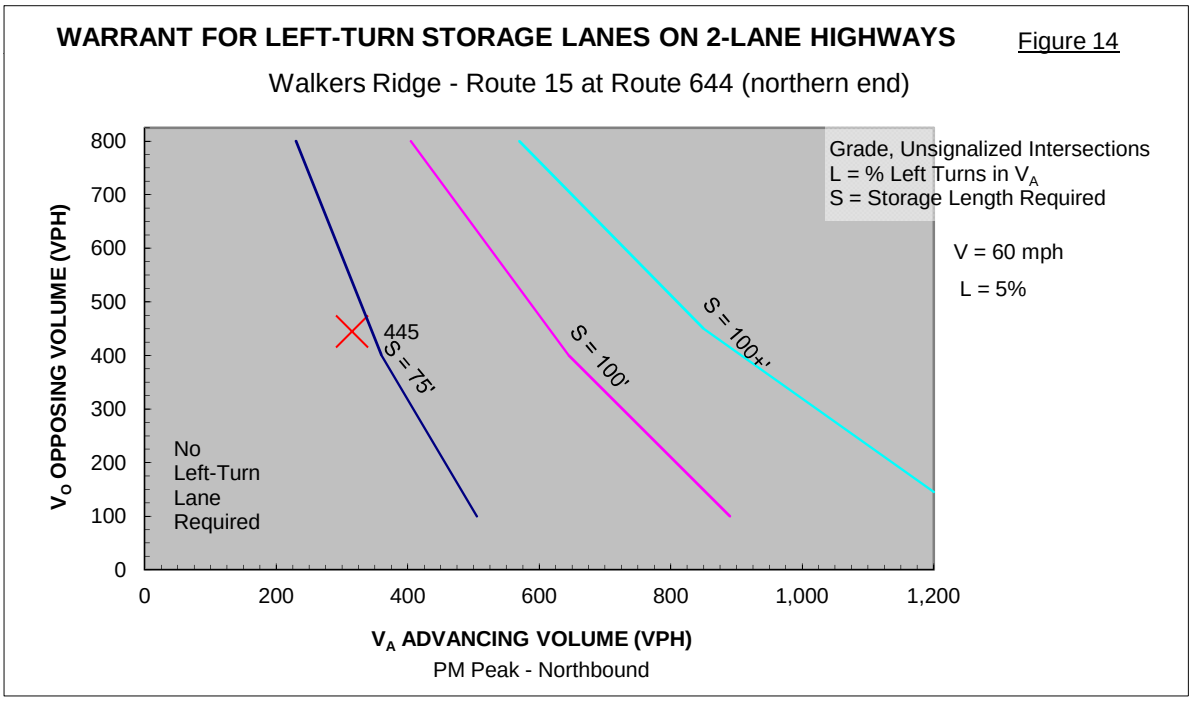
WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS

Project:	Walkers Ridge	Analysis Date:	2018
Intersection:	Route 15 at Route 644 (northern end)	Data Date:	2018
Approach Direction:	Northbound	Projection Year:	2018
Peak Hour:	PM Peak		

Peak Hour Left Turns (V_L):	23	vph
Advancing Volume (V_A):	315	vph (Northbound Approach)
Opposing Volume (V_O):	445	vph (Southbound Approach)
Operating/Design Speed (V):	**60**	mph

% Left Turns in V_A (L):	**5%**	(Calculated Value: 7.3%)
Optional % Left Turn Override:		
		(0' storage required based on chart)
% Trucks in V_L:	0%	(0' additional storage for trucks)

CONCLUSION: **No Left-Turn Lane Required**



Source: Highway Research Record Number 211 - Figure 14

Experts in non-sewered development

A Division of Northwest Cascade Inc.

November 21, 2013

Justin M. Shimp, P.E.
President
Shimp Engineering, P.C.
201 E. Main Street, Suite M
Charlottesville, VA 22902

Subject: Response to County Engineer's Comments on Soils & Drainfield Feasibility Report for the proposed Walker's Ridge development.

Dear Justin:

I have reviewed Mr. J. Wayne Stephens, P.E. (the County Engineer) comments on the Soils and Drainfield Feasibility Report that we prepared earlier this month for the proposed Walker's Ridge development in Fluvanna County. I will address the comments and concerned raised by the County Engineer related to the soils and drainfield feasibility report for this project in this letter.

Overall, it appears that the County Engineer is concerned over availability of "suitable" land area to support subsurface effluent disposal system. Based on our preliminary field assessment and review of the USDA-NRCS soil information, and our experience in designing large drip systems, we are confident that there is an adequate amount of land area available on the property for installing a drip system.

Our preliminary field evaluation did not indicate "high potential" of hydric soils in the proposed open area where soils are classified as Nason silt loam, rolling phase (Nf), Tatum silt loam, undulating phase (Tc), or Tatum silty clay loam, eroded rolling phase (Td). The USDA-NRCS soil report classifies these soil types as "Well drained" soils with depth to water table more than 80 inches. While the USDA-NRCS soil report classifies capacity of the most limiting layer to transmit water as "Very low to moderately low" with Ksat values less than 4 cm/day, when we conduct field testing for these type of soils we typically observe Ksat values greater than 2 cm/day in the upper soil horizons.

We have used a very conservative application rate of 2 cm/day to determine the drip area necessary for this project. Field testing of Ksat along with detailed description of soil profile and mapping of soil testing locations will be performed during the VDH permitting process, if this project moves forward. For preliminary field assessments to determine if the site as a whole provides the opportunity for adequate area for drip systems a detailed soil evaluation is not required.

Drip systems are suitable for the type of soil and site conditions observed on the property proposed for the Walker's Ridge development. Drip systems have been successfully used in Virginia and in other states on sites with moderate to steep slopes.

Following three pictures show use of drip in area with steep to moderate slopes. While the first picture is out-of-state picture not taken by me, the rest of the pictures are from Virginia taken by me.

Photo from Geoflow drip system. Geoflow drip system installation at Yosemite West, steep slope.

The above pictures shows potential of using a drip system on sites with extreme slope. This type of site conditions are not present on the property prosed for Walker's Ridge development. The above picture is included just to show how drip technology is used to overcome adverse site conditions where conventional low-pressure-pipe type system cannot be used for subsurface effluent disposal.

Drip system installed at the Explorer Park, Roanoke, VA, side-slope of the parking lot.

Drip system installed at Greentown Gaskin Road, Lancaster County, VA, gentle slope.

Sites with slope in the range of 15-25% are approved by VDH for drip system because the drip emitters allows extremely low discharge rates (typically less than 1 gallon/hour per emitter), and the spacing between drip tubing does not have to be increased as typically necessary for a low-pressure pipe drain line system mainly because high discharge rate (typically more than 60 gallon/hour per discharge point).

During our preliminary field evaluation of the proposed site, we saw site conditions throughout the site as shown in the following three pictures, which we believe would be ideal and acceptable by VDH for installing drip systems. Preliminary soil evaluations in the area done by our soil scientist indicated no hydric soil conditions and good soil texture and structure indicating adequate conductivity to support hydraulic loading rate greater than 2 cm/day. Drip systems are typically installed in shallow soil horizons within top 18 inches of the ground surface to take advantage of the most robust natural soil treatment possible for polishing effluent.

Relatively flat area found on the proposed property.

Area with gentle slope less than 15%

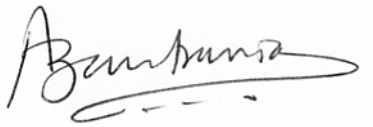
Long and narrow area within the abandon golf course

We are confident that there is adequate area (approximately 30 acres) of suitable soils outside the limits of the proposed development, and within the more than 100 acres of open space for the design and installation of a drip system for the proposed development.

Our detailed soil and site evaluation will focus first within the area shown in the above three pictures, and we will explore other areas with slopes steeper than what is seen in the above three pictures only if necessary. The area we will identify for installing drip system will be acceptable by the VDH for approving this project under the current laws and regulations.

Please let me know if you or the County have any additional questions related to wastewater system for the proposed Walker's Ridge development.

Sincerely,



Anish Jantrania, Ph.D., P.E.
Senior Project Manager.

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Monday, January 06, 2014 9:29 AM
To: Steven Tugwell
Cc: Keith Smith
Subject: RE: Walker's Ridge questions

Hello Steve,

In response to the questions below:

1) The reports from our geologist addressed the phase I water requirements specifically. Required (From Dr. Evans report, page 1, Par 4) is estimated at between 38,100 and 53,400 GPD for Phase I. Note that a the total available water from the site is estimated at 263,688 GPD by Dr. Evans.
2) Storage capacity is dictated by the Waterworks Regulations. The minimum is 200 GPD/residential connection at minimum pressure. The storage requirement may be greater for commercial type uses as they have a larger fire flow requirement. This design is coordinated between the VDH drinking water office and the local building and fire officials during the site plan process. This number may be much larger than the required volume for use. For example, an office might need only 1000 GPD, but require 40,000 gallons (or more) of storage for fire protection. That number is based on the size of the building, class of construction, etc. Those are the items that require coordination with the local building and fire officials. These details are worked out in the siteplan stage as specific engineering for the location of fire lines, building types, etc are all required to complete the computation. As we have noted before, siteplan approval would be contingent on addressing all of these issues.

From the prior email:

Testing data, for contamination is only available on public drinking wells, we know of three wells on the property, only one of which is classified as public (the golf course well). There are several other wells in the area that we pulled data on as well look at contamination history. The wells closest to our property are:

Rivanna Woods GC Well (on our site, at the clubhouse), Yield 5 GPM
Fluvanna County School Board Well (At old Palmyra School), Yield 7 GPM
Palmyra VFD, Yield 60 GPM

We pulled the available testing history from the Rivanna Woods well and the School Board well available on the VDH database and found no reports of non-compliance, exceedances of the permit limits, or contamination.

In regard to traffic, I can only direct Mr. Bibb to our studies that have been reviewed and vetted by VDOT that determine that our proposal meets the standards and will not cause excessive delays on route 15.

Likewise, on the storm water, it is the State (via DEQ) that sets the rules that must be adhered to.

Please let me know if you have any additional questions.

Thanks,

-Justin

From: Steven Tugwell [mailto:stugwell@fluvannacounty.org]
Sent: Friday, January 03, 2014 11:48 AM
To: Justin Shimp
Cc: Keith Smith
Subject: FW: Walker's Ridge questions

FYI I have a few additional questions from Mr. Bibb after speaking with him on the phone this morning. They are:

1. How much water is anticipated to be required and/or used for the Phase I development?
2. How much storage capacity will there be?

As asides- Mr. Bibb commented that he has heard that 5 times as much storage capacity should be available than what is needed or used. He also commented that he is concerned about the impact on the Rivanna River, traffic, and stormwater management.

Ahead of our work session on the 8th, please respond to the questions above, and Mr. Bibb's question in his email dated December 30th as soon as you're able.

Thanks!
Steve

From: Barry Bibb
Sent: Monday, December 30, 2013 11:05 AM
To: Steven Tugwell
Cc: Planning Commission
Subject: Re: Walker's Ridge questions

I would like information on wells already on property. We heard from a former owner of part of this property who said that a well was dug and at 500 feet they got only 1/2 gal. Per minute. I would like to know gal. Per minute and whether they are still active and if any are contaminated. I would like to inquire this from both applicant and the Health Department. Through all of this we have not heard what is already available?
Barry

Sent from my iPad

On Dec 30, 2013, at 9:45 AM, "Steven Tugwell" <stugwell@fluvannacounty.org> wrote:

> Hi Commissioners:
>
> Hope everyone had a great Christmas!
>
> I wanted to follow-up with you from our December 16th meeting. You all were going to let me know if you had any additional questions regarding Walker's Ridge. Since I haven't received any questions, may I assume that you are satisfied with the information that has been provided?

If you do have questions, please contact me at your convenience, and I will promptly forward them to the applicant.

Thanks!
Steve

Steve Tugwell
Senior Planner
Dept. of Planning & Community Development
Fluvanna County, VA
434-591-1910
stugwell@co.fluvanna.va.us


please conserve, do not print this e-mail unless necessary

Steven Tugwell

From: Zimmer, Edward H. (DOF) <Ed.Zimmer@dof.virginia.gov>
Sent: Monday, January 06, 2014 1:24 PM
To: Steven Tugwell
Subject: Walkers Ridge Info

Sorry this is so late. I took copious notes from the material you provided and then lost the notebook. I found it yesterday and, if there is time, would like you to forward to the applicant and the rest of the PC, if possible.

Hydrogeologic Study

- The study states the applicant will be recharging groundwater from onsite drain fields. What mechanism is in place to ensure that happens? Is it a proffer, a permit requirement, or simply a stated intention that is not binding?
- The math in the document does not always add up to me. How does a 50% recharge rate double the water capacity? It seems like a 50% recharge rate would increase the 707 ERUs to 1060, not 1414.
- One main concern of local citizens was the impact to other wells in the area. The document says that appropriate siting of wells can ensure there will be no impact. Again, is that a proffer, a regulatory requirement, or simply a promise/intention that may or may not be binding?

Eaton Report

- Some of the math here looks strange. The assumption that only 5% of the area will be impervious seems optimistic, given the building footprint.
- In the map, neighboring wells have a mean output of only 6 gal/min, with a median of 5.5. The assumption that wells can be drilled that will produce significantly above that seems optimistic and unsupported by the closest, best evidence. How was that conclusion arrived at?

Evans Report

- Just to clarify – has the proffer been modified to state that development after the 306 residential units in Phase 1 will not utilize additional groundwater, as the report states?
- It seems strange that the gauging station at Cartersville was used for the report, rather than the seemingly more appropriate one at Palmyra. There may be a great reason for this. Is there?

Miscellaneous

- There was no evidence presented to support the claim that wells in the 25-35 gpm range are available. Neighboring wells seem to contradict this claim. How was it arrived at?
- Has the stated intention that the sewage system will be a central one and be operated by a licensed utility been assured by a proffer, or does the SUP cover that?

Rivanna River Basin Commission Comments

- Throughout this process, I do not remember the concerns of the RRBC being addressed.
    - How are the impacts to the Rivanna viewshed being addressed?
    - Will forest cover be reduced by 60%, as the RRBC letter claims?

Again, sorry for the late submittal. Let me know if any of my comments or questions need clarification.

Ed Zimmer
Regional Forester
Virginia Department of Forestry
Central Region
900 Natural Resources Drive, Suite 800
Charlottesville, VA 22903
Office: 434-220-9178
Cell: 757-653-7511
Fax: 434-220-9189
Email:
Web:
VDOF: Protecting and Serving since 1914

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Monday, January 06, 2014 9:29 AM
To: Steven Tugwell
Cc: Keith Smith
Subject: RE: Walker's Ridge questions

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Testing data, for contamination is only available on public drinking wells, we know of three wells on the property, only one of which is classified as public (the golf course well). There are several other wells in the area that we pulled data on as well look at contamination history. The wells closest to our property are:

Rivanna Woods GC Well (on our site, at the clubhouse), Yield 5 GPM
Fluvanna County School Board Well (At old Palmyra School), Yield 7 GPM
Palmyra VFD, Yield 60 GPM

We pulled the available testing history from the Rivanna Woods well and the School Board well available on the VDH database and found no reports of non-compliance, exceedances of the permit limits, or contamination.

In regard to traffic, I can only direct Mr. Bibb to our studies that have been reviewed and vetted by VDOT that determine that our proposal meets the standards and will not cause excessive delays on route 15.

Likewise, on the storm water, it is the State (via DEQ) that sets the rules that must be adhered to.

Please let me know if you have any additional questions.

Thanks,

-Justin

From: Steven Tugwell [mailto:stugwell@fluvannacounty.org]
Sent: Friday, January 03, 2014 11:48 AM
To: Justin Shimp
Cc: Keith Smith
Subject: FW: Walker's Ridge questions

FYI I have a few additional questions from Mr. Bibb after speaking with him on the phone this morning. They are:

1. How much water is anticipated to be required and/or used for the Phase I development?
2. How much storage capacity will there be?

As asides- Mr. Bibb commented that he has heard that 5 times as much storage capacity should be available than what is needed or used. He also commented that he is concerned about the impact on the Rivanna River, traffic, and stormwater management.

Ahead of our work session on the 8th, please respond to the questions above, and Mr. Bibb's question in his email dated December 30th as soon as you're able.

Thanks!
Steve

From: Barry Bibb
Sent: Monday, December 30, 2013 11:05 AM
To: Steven Tugwell
Cc: Planning Commission
Subject: Re: Walker's Ridge questions

I would like information on wells already on property. We heard from a former owner of part of this property who said that a well was dug and at 500 feet they got only 1/2 gal. Per minute. I would like to know gal. Per minute and whether they are still active and if any are contaminated. I would like to inquire this from both applicant and the Health Department. Through all of this we have not heard what is already available?
Barry

Sent from my iPad

On Dec 30, 2013, at 9:45 AM, "Steven Tugwell" <stugwell@fluvannacounty.org> wrote:

> Hi Commissioners:
>
> Hope everyone had a great Christmas!
>
> I wanted to follow-up with you from our December 16th meeting. You all were going to let me know if you had any additional questions regarding Walker's Ridge. Since I haven't received any questions, may I assume that you are satisfied with the information that has been provided?

If you do have questions, please contact me at your convenience, and I will promptly forward them to the applicant.

Thanks!
Steve

Steve Tugwell
Senior Planner
Dept. of Planning & Community Development
Fluvanna County, VA
434-591-1910
stugwell@co.fluvanna.va.us


please conserve, do not print this e-mail unless necessary

Steven Tugwell

From: Zimmer, Edward H. (DOF) <Ed.Zimmer@dof.virginia.gov>
Sent: Monday, January 06, 2014 1:24 PM
To: Steven Tugwell
Subject: Walkers Ridge Info

Sorry this is so late. I took copious notes from the material you provided and then lost the notebook. I found it yesterday and, if there is time, would like you to forward to the applicant and the rest of the PC, if possible.

Hydrogeologic Study

- The study states the applicant will be recharging groundwater from onsite drain fields. What mechanism is in place to ensure that happens? Is it a proffer, a permit requirement, or simply a stated intention that is not binding?
- The math in the document does not always add up to me. How does a 50% recharge rate double the water capacity? It seems like a 50% recharge rate would increase the 707 ERUs to 1060, not 1414.
- One main concern of local citizens was the impact to other wells in the area. The document says that appropriate siting of wells can ensure there will be no impact. Again, is that a proffer, a regulatory requirement, or simply a promise/intention that may or may not be binding?

Eaton Report

- Some of the math here looks strange. The assumption that only 5% of the area will be impervious seems optimistic, given the building footprint.
- In the map, neighboring wells have a mean output of only 6 gal/min, with a median of 5.5. The assumption that wells can be drilled that will produce significantly above that seems optimistic and unsupported by the closest, best evidence. How was that conclusion arrived at?

Evans Report

- Just to clarify – has the proffer been modified to state that development after the 306 residential units in Phase 1 will not utilize additional groundwater, as the report states?
- It seems strange that the gauging station at Cartersville was used for the report, rather than the seemingly more appropriate one at Palmyra. There may be a great reason for this. Is there?

Miscellaneous

- There was no evidence presented to support the claim that wells in the 25-35 gpm range are available. Neighboring wells seem to contradict this claim. How was it arrived at?
- Has the stated intention that the sewage system will be a central one and be operated by a licensed utility been assured by a proffer, or does the SUP cover that?

Rivanna River Basin Commission Comments

- Throughout this process, I do not remember the concerns of the RRBC being addressed.
    - How are the impacts to the Rivanna viewshed being addressed?
    - Will forest cover be reduced by 60%, as the RRBC letter claims?

Again, sorry for the late submittal. Let me know if any of my comments or questions need clarification.

Ed Zimmer
Regional Forester
Virginia Department of Forestry
Central Region
900 Natural Resources Drive, Suite 800
Charlottesville, VA 22903
Office: 434-220-9178
Cell: 757-653-7511
Fax: 434-220-9189
Email:
Web:
VDOF: Protecting and Serving since 1914

SHIMP ENGINEERING P.C.

PROJECT MANAGEMENT
CIVIL ENGINEERING
LAND PLANNING

November 22nd, 2013

Mr. Steven Tugwell
Acting Planning and Zoning Administrator
Fluvanna County

Regarding: Response to letter by J. Wayne Stephens, Groundwater and Sewer Capacity for Walkers Ridge PUD.

Dear Mr. Tugwell,

Thank you for forwarding the letter from J. Wayne Stephens to us. His letter outlines some concerns and makes a few general statements about central water and sewer systems. In reviewing both the information that was submitted to the County and the response from Mr. Stephens it is paramount to understand that these documents were provided to address specific questions raised by the Board of Supervisors in their action letter dated October 22nd, 2013 actually were. Concerning water, the letter stated:

Water: Requires satisfactory information to demonstrate adequate water source(s), and that the use of such sources will not negatively impact adjacent properties.

In response to the bullet point statements by Mr. Stephens, please consider the following:

- Dr. Eaton's report is titled "Phase I Hydrogeological Assessment". Dr. Eaton has a Ph.D in environmental sciences and has been working professionally as a geologist since 1996. He has been published over 20 times in peer reviewed journals. While we understand that there is no set delineation of scope for a phase I assessment we do feel confident that if Dr. Eaton considers the report to be one, that it is reasonable to be considered as such. Please note that the Board action letter did not require any particular titled study, so this first comment may not be particularly relevant to the question at hand.
- We agree with Mr. Stephens that 300 GPD is generally the VDH rule for water system planning, and that actual consumption will be less. This was reflected in the report by Dr. Evans that used a value more closely associated with the actual water usage in his analysis.
- We agree with Mr. Stephens that the health department requires a 0.5 Gallons Per Minute flow rate per ERU. An important distinction to make here is that we are not preparing VDH permit drawings or applications at this time. The analysis done by Dr. Evans, which indicated a lower required gallon per minute yield reflects the anticipated average withdrawal rate from the ground. The request by the Supervisors was to "... *demonstrate adequate water source(s)"* and to show that the use of those sources *"will not negatively impact adjacent properties"* The information provided by our consultants is in response to this request. Based on their findings the proposed phase I development has ample water supply that will be recharged at a greater rate than the rate of withdrawal. There is no reason to expect any negative impacts on neighboring properties.

- Concerning the number of wells, it is the professional opinion of Dr. Eaton that wells in the 25-35 GPM range will be available. This flow rate would considerable reduce the number of wells required for the development. Even if 20 wells are needed to achieve an adequate flow rate, this would not be an unusual number for a residential development of approximately 88 acres (The Phase I area). It would be significantly less than the number of wells typically required for a 232 acre residential development.
- Groundwater recharge from the on-site drain fields (which release treated water below ground) should be considered in the study, however we have performed the baseline calculations assuming no recharge from these drain fields. This makes Dr. Eaton's calculation of 707 units particularly conservative. He notes later in the report that in actuality the expected connectivity between effluent discharge from the drip system and groundwater for the wells is between 35% and 90% with 50% being a reasonable value for planning purposes. This was the basis of the statement provided in my prior letter. It should be noted, that Dr. Evans, who has studied Fluvanna County groundwater extensively, believes that the connectivity between the drip systems and groundwater supply would be closer to 100% and he notes that this project would be minimally consumptive of groundwater in this case.
- It should be noted that as our proffer restricts on-site wells to the phase I development area we have computed the baseline area for recharge based on that fact. Approximately 88 acres out of 232 would be developed, thus an effective loss area of 13% from phase I. We believe this is reasonable especially considering the upcoming changes in SWM regulations that will require infiltration practices and other means of treatment designed to minimize groundwater loss from development.
- Dr. Eaton has provided the professional background information in response to the Board of Supervisors action letter. Upon approval, this project will require a significant amount of additional time to determine appropriate placement of wells.

Concerning sewer, Mr. Stephens' comments were forwarded to Anish Jantrania, our soils engineer. Mr. Jantrania has drafted a response, which I have attached. In summary it would appear that Mr. Stephens did not consider that drip systems may be utilized on slopes greater than 15%. Please refer to the attached letter from Mr. Jantrania which addresses this issue in detail.

The Board of Supervisors did not request a full Virginia Department of Health permit package for design and installation of the drip system, but rather:

Sewer: Must demonstrate a specific plan for the operability of the site's sewerage system, including among other things the suitability of the property for onsite land disposal of wastewater;"

In many prior meetings and public hearings it was clearly stated that the site's system would be a central system operated by a licensed utility operator with pre-treatment works and a sub-surface drip or mass drain field system. Mr. Jantrania has been on the site with a soil scientist and has identified an area required for the drip systems based upon the design effluent discharge and has further identified adequate soils for this system. This area is outside of the limits of the proposed construction of buildings and infrastructure and within the open space of the development.

Lastly, we wish to point out that upon notice that a special use permit was required for the central utility (received many months after the initial submittal) an application was submitted and you scheduled a technical review committee meeting for the request. It is our understanding that only you, Mike Brent (Chief of

Fluvanna County Fire Department), and the Applicant's representative, Keith Smith was in attendance. No specific additional information for the special use permit was requested (in writing and form similar to the October 22 Action Letter) by County Staff and it was our understanding that further information and comments would not be provided until the site plan review stage. We found that to be reasonable as that is typically the time to review detailed engineering drawings. We have no new information to provide on the water and sewer other than the clarifications provided above and in the attached letter from Mr. Jantrania.

In addition to the summary information contained herein regarding water and sewer we have also forwarded to you correspondence and follow up traffic memorandums with VDOT which answer all traffic related concerns outlined in the October 22nd Board Action Letter.

As always, we welcome the opportunity to meet with you or any County Staff, Planning Commissioner or Supervisor to discuss this matter further and will make ourselves available at your convenience. We have provided adequate documentation to address the three issues raised by the Supervisors as documented in the October 22nd letter. We respectively request that this project be heard by the Planning Commission at its December 16th meeting.

Sincerely,

Justin Shimp, P.E.

Attachments:
Letter from Anish Jantrania, Ph.D, P.E. Dated November 21, 2013.

CC:
Dr. Nick Evans
Dr. Scott Eaton
Mr. Anish Jantrania
Mr. Keith Smith

Justin Shimp

From: Wood, Mark (VDOT)
Sent: Monday, October 28, 2013 6:09 PM
To: Justin Shimp
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County

Importance: High

Justin

VDOT has reviewed your email and attachment below and we have the following comments:

- Yes, VDOT would approve the creation and later abandonment of a Right of Way for a secondary road, however, even if it is to be a temporary State facility it would still need to be constructed to VDOT's standards, including the Road Design Manual. The design would have to incorporate the appropriate geometric design standards as per Appendix A (horizontal curve radius, pavement width, shoulder width, etc.) as well as entrance spacing standards per VDOT's Access Management Design Standards (Appendix F).
- How much development is planned to be built before the ultimate location for the facility is constructed?
- Has a traffic analysis been performed to show what improvement(s) would be needed at the temporary connection to Route 15?

If the developer wants to construct Walker's Ridge using a phasing plan for the development, VDOT can review the phasing plan and provide you with comments.

J. Mark Wood, P.E., L.S.
Area Land Use Engineer
Virginia Department of Transportation
Land Development – South
P.O. Box 1017
11430 James Madison Highway
Troy, VA 22974
Phone: (434) 589-7932
Cell: (540) 223-5240
Fax: (434) 589-3967
Email: Mark.Wood@VDOT.Virginia.gov

From: Justin Shimp [mailto:justin@shimp-engineering.com]
Sent: Monday, October 21, 2013 10:47 AM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT)
Subject: Walkers Ridge Entrance on Route 15

Hello Mark,

Steven Tugwell

From: Wood, Mark (VDOT) <James.Wood@VDOT.virginia.gov>
Sent: Tuesday, October 29, 2013 8:03 AM
To: Steven Tugwell
Subject: FW: Walkers Ridge Entrance on Route 15, Fluvanna County

Importance: High

Steve,

F.Y.I., VDOT's response to an inquiry from Justin Shimp, P.E.

J. Mark Wood, P.E., L.S.
Area Land Use Engineer
Virginia Department of Transportation
Land Development – South
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Troy, VA 22974
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Fax: (434) 589-3967
Email:

From: Wood, Mark (VDOT)
Sent: Monday, October 28, 2013 6:09 PM
To: Justin Shimp
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County
Importance: High

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- Yes, VDOT would approve the creation and later abandonment of a Right of Way for a secondary road, however, even if it is to be a temporary State facility it would still need to be constructed to VDOT's standards, including the Road Design Manual. The design would have to incorporate the appropriate geometric design standards as per Appendix A (horizontal curve radius, pavement width, shoulder width, etc.) as well as entrance spacing standards per VDOT's Access Management Design Standards (Appendix F).
- How much development is planned to be built before the ultimate location for the facility is constructed?
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Cell: (540) 223-5240
Fax: (434) 589-3967
Email: Mark.Wood@VDOT.Virginia.gov

From: Justin Shimp [mailto:justin@shimp-engineering.com]
Sent: Monday, October 21, 2013 10:47 AM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT)
Subject: Walkers Ridge Entrance on Route 15

Hello Mark,

The County attorney in Fluvanna has asked a question as to whether or not VDOT would approve the creation and later abandonment of ROW for a secondary road associated with the Walkers Ridge development.

I've attached our proposed phase I entrance, it shows the squaring off of route 644 into a perpendicular intersection in roughly the same location as the current intersection. To do this we will need to abandon the current 644 ROW. We own the land on both sides of the road where this is to occur. Can you confirm that VDOT will allow this to happen?

Secondly, our phase I entrance will be temporary in nature (maybe 6-12 years) we propose to construct the roundabout as part of phase II (proposed ROW lines are shown on the sheet) and at that time would abandon our phase I entrance ROW (or perhaps relocate is the better word). Same as In the first item, can you confirm VDOT would allow this to occur?

Obviously all of these proposals are with the caveat that all design/construction/etc must be in conformance with all applicable VDOT standards.

Thanks!

Justin M. Shimp, P.E.
President
Shimp Engineering, P.C.
201 E. Main Street, Suite M
Charlottesville, VA 22902

E: Justin@shimp-engineering.com
P: 434-953-6116 (Direct)
P: 434-207-8086 (Office)
F: 804-302-7997

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Friday, November 22, 2013 4:16 PM
To: Steven Tugwell
Subject: FW: Walkers Ridge Entrance on Route 15, Fluvanna County
Attachments: Walkers Ridge Phase I Development Traffic Impact analysis.pdf; 19-39-ZMA-sheet 7 phasing.pdf

From: Justin Shimp [mailto:justin@shimp-engineering.com]
Sent: Friday, November 01, 2013 7:46 AM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County

Mark,

Thank you for clearing up the ROW issue for us. In response to your questions Bill has prepared a traffic memo which demonstrates adequate capacity of our proposed Phase I development. Our plan and proffers stipulate that we will not build beyond Phase I without constructing the round-a-bout. The phase I numbers are: 306 residential units and up to 37,000 SF of commercial.

I have attached Bill's memo and a copy of the phasing sheet.

-Justin

From: Wood, Mark (VDOT) [mailto:James.Wood@VDOT.virginia.gov]
Sent: Monday, October 28, 2013 6:09 PM
To: Justin Shimp
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County
Importance: High

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- Yes, VDOT would approve the creation and later abandonment of a Right of Way for a secondary road, however, even if it is to be a temporary State facility it would still need to be constructed to VDOT's standards, including the Road Design Manual. The design would have to incorporate the appropriate geometric design standards as per Appendix A (horizontal curve radius, pavement width, shoulder width, etc.) as well as entrance spacing standards per VDOT's Access Management Design Standards (Appendix F).
- How much development is planned to be built before the ultimate location for the facility is constructed?
- Has a traffic analysis been performed to show what improvement(s) would be needed at the temporary connection to Route 15?

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Friday, November 22, 2013 3:59 PM
To: Steven Tugwell
Subject: FW: Walkers Ridge Entrance on Route 15, Fluvanna County

From: Proctor, Charles C. (VDOT) [mailto:]
Sent: Monday, November 04, 2013 12:51 PM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Justin Shimp
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County

Was any consideration given to the impact on the northern Route 644 intersection with Route 15. Based on the layout the northern portion of the development may head north on Route 644 to north on Route 15.

Other than that the study provide a worst case scenario for the proposed temporary intersection with adequate turning lanes.

Let me know if there are any questions.

Thanks,

Chuck
Charles C. Proctor II
Culpeper District
Planning and Land Development Section
Phone 540-829-7553

From: Justin Shimp [ ]
Sent: Friday, November 01, 2013 7:46 AM
To: Wood, Mark (VDOT)
Cc: Bill Wuensch; DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT)
Subject: RE: Walkers Ridge Entrance on Route 15, Fluvanna County

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I have attached Bill's memo and a copy of the phasing sheet.

Justin

From: Wood, Mark (VDOT) [mailto:]
Sent: Monday, October 28, 2013 6:09 PM

Steven Tugwell

From: Wood, Mark (VDOT) <James.Wood@VDOT.virginia.gov>
Sent: Friday, November 15, 2013 4:51 PM
To: Justin Shimp
Cc: Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT); DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Wolfrey, Sharon A. (VDOT); Steven Tugwell; Bill Wuensch
Attachments: Geometry of Temporary Through Road.pdf

Importance: High

Justin,

As a follow up to our phone conversation this afternoon, VDOT has the following comments based on your most recent submissions:

- The temporary alignment of Rte. 644 has to be built to state standards which will include a horizontal curve instead of the "T" intersection as shown on Revision #5, dated 09/17/2013 for the "Rezoning Application Plan for Walker's Ridge". See attached .pdf entitled "Geometry of Temporary Through Road" for the location of horizontal curve.
- Was a study conducted to determine the impact on the northern Route 644 intersection with Route 15 (approximately 0.85 miles north)?. Based on the layout of the proposed development, traffic from the northern portion of the development may head north on Route 644 to gain access to Route 15 when travelling towards the Zion Crossroads area.

J. Mark Wood, P.E., L.S.
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Email:

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Saturday, November 16, 2013 12:01 PM
To: Wood, Mark (VDOT)
Cc: Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT); DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Wolfrey, Sharon A. (VDOT); Steven Tugwell; Bill Wuensch
Subject: RE:
Attachments: Phase 1 turn lane at northern 644 rev 11-13.pdf

Mark,

We did evaluate the 644 intersection for phase I traffic. The results are that no additional turn lanes are required based on what I believe to be a very high assumption of north bound vehicles that would turn left and then double back to the site on 644. Please see the attached memo from Bill Wuensch which provides the details for this scenario.

-Justin

From: Wood, Mark (VDOT) [mailto:]
Sent: Friday, November 15, 2013 4:51 PM
To: Justin Shimp
Cc: Barron, L. Marshall (VDOT); Proctor, Charles C. (VDOT); DeNunzio, Joel D., P.E. (VDOT); Goodale, James E. (VDOT); Wolfrey, Sharon A. (VDOT); ; Bill Wuensch
Subject:
Importance: High

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Fax: (434) 589-3967

Steven Tugwell

From: Justin Shimp <justin@shimp-engineering.com>
Sent: Saturday, January 18, 2014 11:06 AM
To: Steven Tugwell
Cc: Keith Smith
Subject: FW: Answers to Water Questions

Hello Steve,

I had not yet received any specific questions from you via email but I wanted to respond to what I had noted from the last meeting prior to the meeting of the 22nd. Please let us know if there are any additional clarifications needed. As we have always said, we would welcome the opportunity to meet with any commissioners at your offices if there are specific concerns that need more attention.

I sent Dr. Evans the questions that Mr. Bibb and Mr. Zimmer had asked at the last meeting and he has responded as follows:

From Dr. Evans:

I used the Cartersville gaging data because there is a long period of historical records extending from 1899 to present, and the watershed is representative of central Virginia geology overall.

There is a Rivanna gage at Palmyra with a period of record 1934 to present, however this does not span the entire drought of the 1930s. I would be happy to redo the calculations using the Palmyra data, though I doubt there will be a significant change in the end result.

Precipitation data is from the UVa climatology office with a period of record 1893 to present.

I also sent Dr. Eaton the questions that remained unanswered from Mr. Zimmer's email and have received the following response: (original questions in italic).

From Dr. Eaton:

Some of the math here looks strange. The assumption that only 5% of the area will be impervious seems optimistic, given the building footprint.

In the years that predate our current storm water management programs, I would have used a value of 10-20% for impervious surfaces given the type of residential development proposed for this project (data are derived from "C" values used for the Manning Equation). However, my presumption is that the large majority of rainfall intercepted by rooftops, and (to a lesser extent) roadways, infiltrates back into the soil via underground drain tiles from dwellings, or stored and slowly released via infiltration in retention ponds. Additionally, you will note in the report that the soils are of the Tatum and Nason series, which are known to be deep in their profile thickness (high storage capacity), well-drained, and possess moderate permeability. In summary, the above conditions led to my choice of "5%" for the impervious area.

In the map, neighboring wells have a mean output of only 6 gal/min, with a median of 5.5. The assumption that wells can be drilled that will produce significantly above that seems optimistic and unsupported by the closest, best evidence. How was that conclusion arrived at?

I understand the concern of ensuring that the water yield of wells meets the minimum requirement to sustain the water demand for this development. The short answer is 'location, location, location.' In numerous areas throughout the Piedmont in which I have studied, I have seen well yields range from 2 gmp to over 100 gpm over the short distance of 50 meters. Many of these existing wells were located based on convenience (proximity to power and the structure) rather than relying on the local geology to maximize yield and minimize well depth. Many of these low producing wells are situated over low permeability zones in the rock formation. In contrast, the fact that one proximal well (Fire Station) to the project yields 60 gpm suggest that these volumes are attainable, and further geological investigations (i.e., fracture trace analysis, electrical resistivity, drilling and pump tests) will both give targets of where to drill, and the expected yields from these wells. In summary, I don't think these estimates are overly optimistic, but realistic given the data we have at hand.

Another question that was specifically asked was what the impact of the development would be on the quality of groundwater.

All construction projects bring some level of environmental disturbance, primarily in the realm of sediment pollution from overland runoff. State standards are in effect that mitigate the impacts of these disturbances, and are usually based on the Universal Soil Loss Equation. With regards to groundwater contamination, I am not aware of any direct threats to the local groundwater system as long as the project abides by the rules set forth by the Virginia Department of Environmental Quality, and standard building materials of the trade are used. The soils are permeable, but not excessively drained (see earlier comment on soil characteristics); and would capture and slowly release water back into the water table. Also, the geology is not conducive to rapid drainage and discharge into underground conduits (which is a problem with the limestone-karst terrains in the Shenandoah Valley).

Justin M. Shimp, P.E.
President
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