STAKEHOLDER ADVISORY GROUP: STUDY OF TREE CANOPY AS A LAND COVER TYPE AND STORMWATER BEST MANAGEMENT PRACTICE

A Report to the Chairs of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources

Virginia Department of Environmental Quality

December 2021

List of Abbreviations

BMP - best management practice
CBP - Chesapeake Bay Program
DEQ - Department of Environmental Quality
HB - House Bill
NOIRA - Notice of Intended Regulatory Action
Rv - runoff coefficient
SAG - Stakeholder Advisory Group
USWG - Urban Stormwater Workgroup
VRRM - Virginia Runoff Reduction Method
VSMP - Virginia Stormwater Management Program

I. Executive Summary

The Department of Environmental Quality (DEQ) has prepared this report pursuant to Chapter 405 of the 2020 Virginia Acts of Assembly (House Bill [HB] 520). This legislation directed DEQ to convene a Stakeholder Advisory Group (SAG) "for the purpose of studying the planting or preservation of trees as an urban land cover type and as a stormwater best management practice (BMP)." DEQ selected members of the SAG as prescribed by Chapter 405 of the 2020 Virginia Acts of Assembly. Due to the COVID-19 pandemic the SAG's meetings were delayed until the fall of 2021. The SAG met twice during the fall of 2021 and reached several consensus recommendations described in the report below.

II. Process

During the course of the 2020 Session of the Virginia General Assembly, HB 520 was enacted into law as Chapter 405 of the 2020 Virginia Acts of Assembly. The legislation provides:

> 1. That the Department of Environmental Quality (DEQ) shall convene a stakeholder advisory group for the purpose of studying the planting or preservation of trees as an urban land cover type and as a stormwater best management practice (BMP).
>
> 2. The stakeholder advisory group shall be composed of representatives of the residential and commercial development and construction industry, the community associations industry, the linear infrastructure development industry, the Virginia Forestry Association, and local Virginia stormwater management program authorities; professional environmental technical experts; and other technical experts whom DEQ deems necessary.
>
> 3. Technical assistance shall be provided to DEQ by the Department of Forestry and the Department of Conservation and Recreation. All agencies of the Commonwealth shall provide assistance to DEQ for this study, upon request.
>
> 4. The Department of Environmental Quality shall publish on its website a report containing the findings of the stakeholder advisory group by November 1, 2020, and shall include in the report a recommendation as to whether the planting or preservation of trees shall be deemed a creditable land cover type or BMP and, if so, how much credit shall be given for its optional use. The Department of Environmental Quality shall, before the first day of the 2021 Session of the General Assembly, report the findings of the stakeholder advisory group to the Chairmen of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources.

DEQ selected members of the SAG in accordance with Chapter 405 of the 2020 Virginia Acts of Assembly and members were notified directly. Members of the SAG are listed in Attachment A.

The SAG met on September 21, 2021 and October 20, 2021 to discuss trees as a land cover type and as a BMP.[1] The agendas for the meetings are provided in Attachment B. Prior to the first meeting, members of the advisory group received the following documents:

- Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy Expansion (Law and Hanson, 2016).

- Chesapeake Bay Restoration Practices Fact Sheet Series: U-11, Urban Tree Planting Practices (Chesapeake Stormwater Network, 2017), and

- Sections 65 and 112 of the Virginia Stormwater Management Program (VSMP) Regulation (Virginia Administrative Code, 2021).

These background documents were used to help guide the SAG's discussions. Members of the public were encouraged to communicate through a member of the SAG who represented their interests and had the opportunity at each meeting to address the SAG.

At the end of the second meeting, recommendations were solicited from the advisory group for each of the two topics, trees as a land cover and trees as a BMP. The recommendations are provided in this report.

III. Background

Currently, the Virginia Stormwater Management Act and Regulations provide water quality provisions that are met through the Virginia Runoff Reduction Method (VRRM) in 9VAC25-870-65. This method includes three land cover types (impervious, managed turf, and forest/open space) and 15 BMPs that can be used to meet the total phosphorus reduction requirement of 0.41 pounds per acre per year. Detailed information on the VRRM and approved BMPs are available on the Virginia Stormwater BMP Clearinghouse Website (www.swbmp.vwrrc.vt.edu).

In addition to the VRRM, which is used for VSMP compliance, the SAG considered information provided by the Chesapeake Bay Program's (CBP) Urban Stormwater Workgroup (USWG). The USWG helps to coordinate the development of recommendations on emerging stormwater practices and technologies. These recommendations are developed by panels of experts in the field. The USWG convened an expert panel to study BMP effectiveness for urban tree canopy expansion and published a report of its recommendations in 2016.

[1] Initially, meetings were to be held during the summer and fall of 2020, and the report was due on November 1, 2020. However, because of the COVID-19 pandemic, it was not feasible to meet in person during the original timeframe.

IV. Virginia Stormwater Management Act

Contained within the VSMP regulations are two provisions of particular importance to this study. One provision, 9VAC25-870-65, covers the requirements for water quality compliance. The other provision, 9VAC25-870-112, focuses on the long-term maintenance of permanent stormwater management facilities. The most pertinent parts of these provisions are provided below:

> **9VAC25-870-65. Water quality compliance.**
> A. Compliance with the water quality design criteria set out in subdivisions A 1 and A 2 of 9VAC25-870-63 shall be determined by utilizing the Virginia Runoff Reduction Method or another equivalent methodology that is approved by the board.
>
> B. The nonproprietary BMPs listed in this subsection are approved for use in accordance with the Virginia Runoff Reduction Method. Other approved nonproprietary BMPs found on the Virginia Stormwater BMP Clearinghouse Website may also be utilized…
>
> **9VAC25-870-112. Long-term maintenance of permanent stormwater management facilities.**
> A. The VSMP authority shall require the provision of long-term responsibility for and maintenance of stormwater management facilities and other techniques specified to manage the quality and quantity of runoff. Such requirements shall be set forth in an instrument recorded in the local land records prior to state permit termination or earlier as required by the VSMP authority…

V. Stakeholder Advisory Group Meetings

As directed by Section 1 of Chapter 405 (HB 520) of the 2020 Acts of Assembly, DEQ convened the SAG "for the purpose of studying the planting or preservation of trees as an urban land cover type and as a [BMP]." The SAG met two times. DEQ provided background information to the SAG during its first meeting on September 21, 2021. During the second meeting on October 20, 2021, DEQ provided technical calculations for scenarios on tree canopy as a land cover and on trees as a BMP (Attachment C). The meeting concluded with recommendations from the group. Minutes from the meetings are provided in Attachment D.

VI. Stakeholder Advisory Group Recommendations

After discussion, the SAG reached consensus on the following recommendations:

- Continue to study the preservation/conservation of existing tree canopy that is not already deemed forest/open space as a fourth land-cover category within the VRRM.
    - When considering tree canopy as a land-cover category, the land-use and hydrologic soil group beneath the canopy must be considered.

- It would be easier to develop a creditable land-cover category for tree canopy planted over existing pervious cover than tree canopy planted over impervious cover.

- Additional study needs to be conducted to determine the appropriate runoff coefficient (Rv) that would correspond with a new land-cover category.

- Additional study by DEQ is needed to determine if the inclusion of a new land-cover category within the VRRM requires a future legislative and/or regulatory action.

- Develop a new BMP called "New Trees."

  - Utilize the total phosphorus reduction credit in Table E.1 of Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy Expansion (Law and Hanson, 2016). [Note: As shown in Attachment C, the total phosphorus reductions from tree canopy as a new BMP are minimal on an overall-basis. However, on a percentage-basis tree canopy as a new BMP could be very beneficial in urban and/or ultra-urban development scenarios.]

  - Develop design specifications for the new BMP. [Note: Once developed and prior to publication on the Virginia Stormwater BMP Clearinghouse, DEQ anticipates that the design specifications will be subject to a 30-day public comment period in accordance with Section 2.2-4002.1 (Guidance Documents) of the Administrative Process Act.]

  - Publish design specifications and pollutant removal efficiencies on the Virginia Stormwater BMP Clearinghouse for use within the VRRM. [Note: The existing Stormwater Management Act and associated VSMP regulations contemplate the addition of new BMPs to the Clearinghouse and no legislation is necessary to accomplish this task.]

- Reconvene the SAG, or a subset thereof that includes technical experts and VSMP authorities, to continue the work thus far initiated.

- Obtain additional information to help the SAG with future work, including but not limited to:

  - Pertinent publications and tools from Dr. Daniel McLaughlin at Virginia Tech.

  - Report on the reforestation efforts by the City of Virginia Beach.

  - Paper by Dr. Robert Pitt at the University of Alabama on runoff coefficients.

  - Pertinent publications and tools from the Green Infrastructure Center on protecting and restoring urban tree canopy for stormwater management.

VII. Conclusion

DEQ expects these recommendations to be part of the basis for future discussions during 2022. The SAG meetings highlighted the need for a continued effort to update the VRRM and to develop BMP design specifications if trees are to be used as a land-cover category and/or BMP.

VIII. References

Chesapeake Stormwater Network. 2017. Chesapeake Bay Restoration Practices Fact Sheet Series: U-11, Urban Tree Planting Practices. Available at https://chesapeakestormwater.net/bay-stormwater/fact-sheets/ (accessed October 27, 2021).

Law, N. and Hanson, J. 2016. Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy Expansion. Center for Watershed Protection and Chesapeake Stormwater Network, Ellicott City, MD. 236 pages.

Virginia Administrative Code. 2021. Title 9, Agency 25, Chapter 870: Virginia Stormwater Management Program (VSMP) Regulation. https://law.lis.virginia.gov/admincode/title9/agency25/chapter870/ (accessed October 27, 2021).

Attachment A

Trees as Best Management Practice (BMP)
Stakeholder Advisory Group (SAG) Members and Technical Advisors

SAG Members

Philip Abraham, Virginia Association for Commercial Real Estate – Commercial Development and Construction Industry

Andrew Clark, Home Builders Association of Virginia – Residential Development and Construction Industry (*alternate for Meeting #1: Evan Branosky*)

Jen Cobb, Henrico County – Virginia Stormwater Management Program Authority

Corey Connors, Virginia Forestry Association

Karen Firehock, Green Infrastructure Center, Inc. – Professional Technical Expert

Alex Forsate, Virginia Department of Transportation – Linear Infrastructure Development Industry

Brent Hunsinger, Virginia Conservation Network / Friends of the Rappahannock

Brian Keightley, Fairfax County – Urban Forest Management Division – Professional Technical Expert

Drew Mulhare, Virginia Common Interest Community Board – Community Associations Industry

Jason Papacosma, Arlington County – Virginia Stormwater Management Program Authority (*alternate for Meeting #1: Jennifer Fioretti*)

Peggy Sanner, Chesapeake Bay Foundation

Technical Advisors

Karl Huber, Virginia Department of Conservation and Recreation – Division of Soil and Water Conservation (*alternate for Meeting #1: Stuart Blankenship*)

Lara Johnson, Virginia Department of Forestry – Urban & Community Forestry Program Manager

Attachment B

Draft Agendas:
Trees as Best Management Practices (BMPs)
Stakeholder Advisory Group Meetings

September 21, 2021 and October 20, 2021

Draft Agenda

Trees as Best Management Practices (BMPs)
Stakeholder Advisory Group Meeting

Tuesday, September 21, 2021

Training Room
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060

10:00 AM

- **Welcome and Introductions** – Melanie Davenport, DEQ
- **Brief Overview of HB 520 and Schedule** – Melanie Davenport, DEQ
- **Review of Virginia Stormwater Management Program (VSMP) Regulation**
  - **Stormwater Management Plans (9VAC25-870-55)** – Erin Belt, DEQ
  - **Water Quality Design Criteria Requirements (9VAC25-870-63)** – Drew Hammond, DEQ
  - **Water Quality Compliance / VRRM (9VAC25-870-65)** – Drew Hammond, DEQ
  - **Long-term Maintenance of Permanent SWM Facilities (9VAC25-870-112)** – Erin Belt, DEQ
- **Review of Urban Tree Canopy Expansion Expert Panel Report** – Drew Hammond, DEQ
- **Group Discussion**
  - Tree Canopy as Urban Land Cover Type
  - Tree Canopy as Stormwater BMP
- **Next Meeting**
  - Wednesday, October 20, 2021
- **Public Forum**
- **Wrap Up**

Draft Agenda

Trees as Best Management Practices (BMPs)
Stakeholder Advisory Group Meeting

Wednesday, October 20, 2021

Training Room
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060

10:00 AM

- **Welcome and Introductions** – Melanie Davenport, DEQ
- **Brief Review of HB 520 and Schedule** – Melanie Davenport, DEQ
- **Tree Canopy as Urban Land Cover Type**
    - Review of Tree Canopy land cover scenario results
    - Group Discussion
    - Recommendations?
- **Tree Canopy as Stormwater BMP**
    - Review of Tree Canopy BMP results
    - Group Discussion
    - Recommendations?
- **Next Meeting (if necessary)**
    - Thursday, November 4, 2021
- **Public Forum**
- **Wrap Up**

Attachment C

Technical Calculations for Tree Canopy as a Land Cover and Trees as a Best Management Practice (BMP)

Virginia Runoff Reduction Method spreadsheet results for four scenarios of a 10,000-square-foot lot with various changes in tree canopy.*

High loss	Pre	Post		pre (acres)	post (acres)
Tree canopy	5000	1200	**-3800**	0.1148	0.0275
Turf	3000	5300		0.0689	0.1217
Impervious	2000	3500		0.0459	0.0803
Total	10000	10000			

	TP Removal Required (lbs)			
Development Type/Land Cover	A Soils	B Soils	C Soils	D Soils
New Dev/ (Imp, Turf, Canopy)	0.1228	0.1373	0.1435	0.1525
New Dev/ (Imp, Turf)	0.1329	0.1479	0.1523	0.1606
ReDev/ (Imp, Turf, Canopy)	0.0888	0.0946	0.0963	0.0994
ReDev/(Imp, Turf)	0.0756	0.0772	0.0779	0.0790

Medium loss	Pre	Post		pre (acres)	post (acres)
Tree canopy	3000	2000	**-1000**	0.0689	0.0459
Turf	5000	4500		0.1148	0.1033
Impervious	2000	3500		0.0459	0.0803
Total	10000	10000			

	TP Removal Required (lbs)			
Development Type/Land Cover	A Soils	B Soils	C Soils	D Soils
New Dev/ (Imp, Turf, Canopy)	0.1174	0.1301	0.136	0.1441
New Dev/ (Imp, Turf)	0.1341	0.1479	0.1506	0.1577
ReDev/ (Imp, Turf, Canopy)	0.0142	0.0754	0.0760	0.0769
ReDev/(Imp, Turf)	0.0755	0.0772	0.0779	0.079

Equivalent	Pre	Post		pre (acres)	post (acres)
Tree canopy	2000	2000	**0**	0.0459	0.0459
Turf	6000	4500		0.1377	0.1033
Impervious	2000	3500		0.0459	0.0803
Total	10000	10000			

	TP Removal Required (lbs)			
Development Type/Land Cover	A Soils	B Soils	C Soils	D Soils
New Dev/ (Imp, Turf, Canopy)	0.1174	0.1301	0.136	0.1441
New Dev/ (Imp, Turf)	0.1341	0.1479	0.1506	0.1577
ReDev/ (Imp, Turf, Canopy)	0.0142	0.0754	0.0760	0.0769
ReDev/(Imp, Turf)	0.0755	0.0772	0.0779	0.0790

Gain	Pre	Post		pre (acres)	post (acres)
Tree canopy	500	2000	**1500**	0.0115	0.0459
Turf	7500	4500		0.1722	0.1033
Impervious	2000	3500		0.0459	0.0803
Total	10000	10000			

	TP Removal Required (lbs)			
Development Type/Land Cover	A Soils	B Soils	C Soils	D Soils
New Dev/ (Imp, Turf, Canopy)	0.1174	0.1301	0.136	0.1441
New Dev/ (Imp, Turf)	0.1341	0.1479	0.1506	0.1577
ReDev/ (Imp, Turf, Canopy)	0.0142	0.0754	0.0760	0.0769
ReDev/(Imp, Turf)	0.0755	0.0772	0.0779	0.0790

*Based on information provided by Arlington County. In the calculations, the runoff coefficient for forest/open space was used for tree canopy.

Virginia Runoff Reduction Method results for scenarios assuming use of a 1,200-square-foot tree canopy BMP on a 10,000-square-foot project.*

High loss				
Land Cover Type	Pre (sq ft)	Post (sq.ft)	Pre (acres)	Post (acres)
Tree canopy	5000	1200	0.1148	0.0275
Turf	3000	5300	0.0689	0.1217
Impervious	2000	3500	0.0459	0.0803
Total	10000	10000		

Medium loss				
Land Cover Type	Pre (sq ft)	Post (sq.ft)	Pre (acres)	Post (acres)
Tree canopy	3000	2000	0.0689	0.0459
Turf	5000	4500	0.1148	0.1033
Impervious	2000	3500	0.0459	0.0803
Total	10000	10000		

Equivalent				
Land Cover Type	Pre (sq ft)	Post (sq.ft)	Pre (acres)	Post (acres)
Tree canopy	2000	2000	0.0459	0.0459
Turf	6000	4500	0.1377	0.1033
Impervious	2000	3500	0.0459	0.0803
Total	10000	10000		

Gain				
Land Cover Type	Pre (sq ft)	Post (sq.ft)	Pre (acres)	Post (acres)
Tree canopy	500	2000	0.0115	0.0459
Turf	7500	4500	0.1722	0.1033
Impervious	2000	3500	0.0459	0.0803
Total	10000	10000		

* 100% per = Assumes 1,200 square feet (sf) of a tree canopy BMP located over pervious cover.

50/50 = Assumes 600 sf of a tree canopy BMP over pervious cover, and 600 sf of a tree canopy BMP over impervious cover.

100% imp = Assumes 1,200 sf of a tree canopy BMP over impervious cover.

The pollutant removal efficiency for trees over pervious cover is 23.8%.

The pollutant removal efficiency for trees over impervious cover is 11%.

Hydrological Soil Group A

High Loss

Land Cover	Development Type	TP removal requirement	TP removed	Total TP remaining
100% per	New TP	0.1374	0.003	0.1344
	TP Redev	0.0888	0.003	0.0858
50/50	New TP	0.1374	0.0048	0.1326
	TP Redev	0.0888	0.0048	0.084
100% imp	New TP	0.1374	0.0065	0.1309
	TP Redev	0.0888	0.0065	0.0823

Medium Loss

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1174	0.005	0.1124
	TP Redev	0.0742	0.005	0.0692
50/50	New TP	0.1174	0.008	0.1094
	TP Redev	0.0742	0.008	0.0662
100% imp	New TP	0.1174	0.0109	0.1065
	TP Redev	0.0742	0.0109	0.0633

Equivalent

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1174	0.005	0.1124
	TP Redev	0.0742	0.005	0.0692
50/50	New TP	0.1174	0.008	0.1094
	TP Redev	0.0742	0.008	0.0662
100% imp	New TP	0.1174	0.0109	0.1065
	TP Redev	0.0742	0.0109	0.0633

Gain

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1174	0.005	0.1124
	TP Redev	0.0650	0.005	0.06
50/50	New TP	0.1174	0.008	0.1094
	TP Redev	0.0650	0.008	0.057
100% imp	New TP	0.1174	0.0109	0.1065
	TP Redev	0.0650	0.0109	0.0541

Hydrological Soil Group B

High Loss

Land Cover	Development Type	TP removal requirement	TP removed	Total TP remaining
100% per	New TP	0.1373	0.003	0.1343
	TP Redev	0.0946	0.003	0.0916
50/50	New TP	0.1373	0.0048	0.1325
	TP Redev	0.0946	0.0048	0.0898
100% imp	New TP	0.1373	0.0065	0.1308
	TP Redev	0.0946	0.0065	0.0881

Medium Loss

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1301	0.005	0.1251
	TP Redev	0.0754	0.005	0.0704
50/50	New TP	0.1301	0.008	0.1221
	TP Redev	0.0754	0.008	0.0674
100% imp	New TP	0.1301	0.0109	0.1192
	TP Redev	0.0754	0.0109	0.0645

Equivalent

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1301	0.005	0.1251
	TP Redev	0.0754	0.005	0.0704
50/50	New TP	0.1301	0.008	0.1221
	TP Redev	0.0754	0.008	0.0674
100% imp	New TP	0.1301	0.0109	0.1192
	TP Redev	0.0754	0.0109	0.0645

Gain

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1301	0.005	0.1251
	TP Redev	0.0634	0.005	0.0584
50/50	New TP	0.1301	0.008	0.1221
	TP Redev	0.0634	0.008	0.0554
100% imp	New TP	0.1301	0.0109	0.1192
	TP Redev	0.0634	0.0109	0.0525

Hydrological Soil Group C

High Loss

Land Cover	Development Type	TP removal requirement	TP removed	Total TP remaining
100% per	New TP	0.1435	0.003	0.1405
	TP Redev	0.0963	0.003	0.0933
50/50	New TP	0.1435	0.0048	0.1387
	TP Redev	0.0963	0.0048	0.0915
100% imp	New TP	0.1435	0.0065	0.1370
	TP Redev	0.0963	0.0065	0.0898

Medium Loss

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1360	0.005	0.1310
	TP Redev	0.0760	0.005	0.0710
50/50	New TP	0.1360	0.008	0.1280
	TP Redev	0.0760	0.008	0.0680
100% imp	New TP	0.1360	0.0109	0.1251
	TP Redev	0.0760	0.0109	0.0651

Equivalent

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1360	0.005	0.1310
	TP Redev	0.0760	0.005	0.0710
50/50	New TP	0.1360	0.008	0.1280
	TP Redev	0.0760	0.008	0.0680
100% imp	New TP	0.1360	0.0109	0.1251
	TP Redev	0.0760	0.0109	0.0651

Gain

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1360	0.005	0.1310
	TP Redev	0.0760	0.005	0.0710
50/50	New TP	0.1360	0.008	0.1280
	TP Redev	0.0760	0.008	0.0680
100% imp	New TP	0.1360	0.0109	0.1251
	TP Redev	0.0760	0.0109	0.0651

Hydrological Soil Group D

High Loss

Land Cover	Development Type	TP removal requirement	TP removed	Total TP remaining
100% per	New TP	0.1525	0.003	0.1495
	TP Redev	0.0994	0.003	0.0964
50/50	New TP	0.1525	0.0048	0.1477
	TP Redev	0.0994	0.0048	0.0946
100% imp	New TP	0.1525	0.0065	0.1460
	TP Redev	0.0994	0.0065	0.0929

Medium Loss

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1441	0.005	0.1391
	TP Redev	0.0769	0.005	0.0719
50/50	New TP	0.1441	0.008	0.1361
	TP Redev	0.0769	0.008	0.0689
100% imp	New TP	0.1441	0.0109	0.1332
	TP Redev	0.0769	0.0109	0.0660

Equivalent

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1360	0.005	0.1310
	TP Redev	0.0769	0.005	0.0719
50/50	New TP	0.1360	0.008	0.1280
	TP Redev	0.0769	0.008	0.0689
100% imp	New TP	0.1360	0.0109	0.1251
	TP Redev	0.0769	0.0109	0.0660

Gain

Land Cover	Development Type	TP removal requirement	TP removed	TP Remaining
100% per	New TP	0.1360	0.005	0.1310
	TP Redev	0.0769	0.005	0.0719
50/50	New TP	0.1360	0.008	0.1280
	TP Redev	0.0769	0.008	0.0689
100% imp	New TP	0.1360	0.0109	0.1251
	TP Redev	0.0769	0.0109	0.0660

Attachment D

Trees as Best Management Practice (BMP)
Stakeholder Advisory Group (SAG)
Meetings #1 and #2 Notes – Draft/Revised

September 21, 2021 and October 20, 2021

TREES AS BEST MANAGEMENT PRACTICE (BMP)
STAKEHOLDER ADVISORY GROUP (SAG)

MEETING #1 NOTES – DRAFT/REV

TUESDAY, SEPTEMBER 21, 2021

DEQ PIEDMONT REGIONAL OFFICE – TRAINING ROOM

Meeting Attendees

TREES AS BMP SAG MEMBERS	
Phillip F. Abraham – Virginia Association for Commercial Real Estate	Alex Foraste' – Virginia Department of Transportation
Evan Branosky Home Builders Association of Virginia – Alternate for Andrew Clark	Brent Hunsinger – Virginia Conservation Network
Corey Connors – Virginia Forestry Association	Brian Keightley – Fairfax County – Urban Forest Management
Jennifer Fioretti – Arlington County – Alternate for Jason Papacosma	Peggy Sanner – Chesapeake Bay Foundation

NOTE: SAG Members NOT in Attendance: Andrew C, Clark – Home Builders Association of Virginia; Jen Cobb, PE – Henrico County; Karen Firehock – Green Infrastructure Center, Inc.; Drew Mulhare – Virginia Common Interest Community Board; Jason Papacosma – Arlington County

PUBLIC/INTERESTED PARTIES	
Ilana Creinin – Arlington County	Samantha Sedivy – Reed Smith
Taylor Privott - Dewberry	Jill Sunderland - HRPDC

TECHNICAL ADVISORS AND DEQ STAFF	
Stuart Blankenship - DCR	Drew Hammond - DEQ
Brandon Bull - DEQ	Lara Johnson – Department of Forestry
Robert Cooper - DEQ	Bill Norris - DEQ
Melanie Davenport – DEQ	

The meeting convened at 10:00 a.m. and adjourned at 4:07 PM

1. Welcome/Meeting Logistics/Introductions – Melanie Davenport – DEQ:

Melanie Davenport, Director of DEQ's Water Permitting Division welcomes the members of the Stakeholder Advisory Group and members of the interested public/stakeholder community to the meeting. She thanked everyone for working within and abiding by the current COVID workplace protection protocols' She noted that there may be additional guidelines coming out from DEQ in the near future to address the latest Department of Labor's Pandemic Guidelines.

SAG Members; members of the public/interested stakeholders, and technical support staff were asked to introduce themselves and to indicate who they were representing at the meeting.

It was noted that there would be an opportunity for members of the interested public to make comments at the end of the meeting but given the size of the group and the nature of the task that all meeting attendees were encouraged to share their expertise and ideas during the discussions to assist with the work of the Advisory Group.

2. Brief Overview of HB520 and Schedule – Melanie Davenport - DEQ:

Melanie Davenport provided an overview of the requirements for the Stakeholder Advisory Group (SAG) as identified in HB520 and outlined the process and procedures under which the SAG was to operate.

During the course of the 2020 Session of the Virginia General Assembly, House Bill (HB) 520 was enacted into law as Chapter 405 of the Virginia Acts of Assembly – 2020 Session. Chapter 405 (HB520) provides that:

1. That the Department of Environmental Quality (DEQ) shall convene a stakeholder advisory group for the purpose of studying the planting or preservation of trees as an urban land cover types and as a stormwater best management practice (BMP).
2. The stakeholder advisory group shall be composed of representatives of the residential and commercial development and construction industry, the community association industry, the linear infrastructure development industry, the Virginia Forestry Association, and the local Virginia stormwater management program authorities; professional environmental technical experts; and other technical experts whom DEQ deems necessary.
3. Technical assistance shall be provided to DEQ by the Department of Forestry and the Department of Conservation and Recreation. All agencies of the Commonwealth shall provide assistance to DEQ for this study, upon request.
4. The Department of Environmental Quality shall publish on its website a report containing the findings of the stakeholder advisory group by November 1, 2020, and shall include in the report a recommendation as to whether the planting or preservation of trees shall be deemed a creditable land cover types or BMP and, if so, how much credit shall be given for its optional use.
5. The Department of Environmental Quality shall, before the first day of the 2021 Session of the General Assembly, report the findings of the stakeholder advisory group to the Chairman of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources.

The General Assembly directed DEQ to convene an advisory group and identified the members to be included. Since this is not a regulatory action and the participants are set out in Chapter 405 (HB520), there will not be a Notice of Intended Regulatory Action (NOIRA) soliciting members. The primary function of the Stakeholder Advisory Group (SAG) is to "study the planting or preservation of trees as an urban land cover type and as a stormwater best management practice (BMP)".

The creation of a SAG is the creation of a public body. All meetings of the group are public meetings. That means notice of the meeting has to be given to the public. In accordance with our Public Participation Guidelines, meetings of the SAG are to be posted on the Virginia Regulatory Town Hall website and the Commonwealth Calendar at least seven working days prior to the date of the meeting. Notice is to include the

name of the group; the date, time, and place of the meeting; a short description of the purpose of the meeting; and the name, address, phone, fax and email information of the contact for the meeting.

SAG meetings are subject to the requirements of the Virginia Freedom of Information Act and are open to the public. The Freedom of Information Act requires that minutes be prepared. DEQ staff participating on the SAG will prepare a summary of the meeting and provide those minutes to the Regulatory Affairs Director for posting to the Townhall. If the minutes must be approved by the group, a draft of the minutes must be posted within 10 days after the meeting with a final posted within 3 days of approval. If the minutes do not need to be approved by the group, the final must be posted within 10 days after the meeting. The minutes must include, but are not limited to, (i) the date, time and location of the meeting, (ii) the members of the public body recorded as present and absent, and (iii) a summary of the discussion on matters proposed, deliberated or decided, and a record of any votes taken. Minutes of regulatory advisory panels do not have to be officially approved by the group unless the group establishes that requirement. Meeting minutes are taken and posted on the Virginia Regulatory Townhall website (www.townhall.virginia.gov/).

Meetings of the SAG will take place at the DEQ Piedmont Regional Office Training Room located at 4848-A Cox Road, Glen Allen, VA 23060. Meetings of the SAG have been scheduled for: Tuesday, September 21, 2021; Wednesday, October 20, 2021 and (if needed) Thursday, November 4, 2021. All meetings are scheduled to start at 10:00 AM.

After the SAG completes its work and makes its recommendations, DEQ staff facilitating and assisting the group will summarize the deliberations, outcomes, and recommendations. DEQ management will then review and determine recommendations and finalize the report language for submission to the General Assembly. The report will also be sent to the members of the SAG as information.

Group Discussions:

- FOIA Requirements and Discussions among members of the SAG/Interested Stakeholder" Since this group is serving in an advisory capacity to DEQ, we will be following the FOIA guidelines and conversations and discussions outside of the scheduled meetings of the SAG are limited to no more than 2 members of the group.
- The ultimate output from these meetings will be a report to the General Assembly addressing the planting or preservation of trees as a creditable urban land cover type and evaluation of the use of trees as a stormwater best management practice.
- Most of today's meeting will be informational by DEQ Staff to identify how trees fit into the regulatory framework that exists within DEQ.
- What this group will need to consider is what recommendations will be developed through this SAG process to address the charge in HB520 and what are going to be the challenges associated with moving forward with those recommendations.

ACTION ITEM: DEQ staff will distribute a copy of the "Trees as Best Management Practice (BMP) Stakeholder Advisory Group (SAG) Process and Procedures document to the Members of the SAG and members of the Public and the Interested Parties after the meeting.

3. Review of the Virginia Stormwater Management Program (VSMP) Regulation – Stormwater Management Plans (9VAC25-870-55) - Drew Hammond – DEQ:

Drew Hammond provided an overview of Virginia's Stormwater Management Program (VSMP) Regulation – Stormwater Management Plans (9VAC25-870-55).

9VAC25-870-55. Stormwater management plans.

A. A stormwater management plan shall be developed and submitted to the VSMP authority. The stormwater management plan shall be implemented as approved or modified by the VSMP authority and shall be developed in accordance with the following:

1. A stormwater management plan for a land-disturbing activity shall apply the stormwater management technical criteria set forth in this part to the entire land-disturbing activity. Individual lots in new residential, commercial, or industrial developments, including those developed under subsequent owners, shall not be considered separate land-disturbing activities.

2. A stormwater management plan shall consider all sources of surface runoff and all sources of subsurface and groundwater flows converted to surface runoff.

B. A complete stormwater management plan shall include the following elements:

1. Information on the type of and location of stormwater discharges, information on the features to which stormwater is being discharged including surface waters or karst features if present, and predevelopment and postdevelopment drainage areas;

2. Contact information including the name, address, telephone number, and email address of the owner and the tax reference number and parcel number of the property or properties affected;

3. A narrative that includes a description of current site conditions and final site conditions or if allowed by the VSMP authority, the information provided and documented during the review process that addresses the current and final site conditions;

4. A general description of the proposed stormwater management facilities and the mechanism through which the facilities will be operated and maintained after construction is complete;

5. Information on the proposed stormwater management facilities, including (i) the type of facilities; (ii) location, including geographic coordinates; (iii) acres treated; and (iv) the surface waters or karst features into which the facility will discharge;

6. Hydrologic and hydraulic computations, including runoff characteristics;

7. Documentation and calculations verifying compliance with the water quality and quantity requirements of these regulations;

8. A map of the site that depicts the topography of the site and includes:

a. All contributing drainage areas;

b. Existing streams, ponds, culverts, ditches, wetlands, other water bodies, and floodplains;

c. Soil types, geologic formations if karst features are present in the area, forest cover, and other vegetative areas;

d. Current land use including existing structures, roads, and locations of known utilities and easements;

e. Sufficient information on adjoining parcels to assess the impacts of stormwater from the site on these parcels;

f. The limits of clearing and grading, and the proposed drainage patterns on the site;

g. Proposed buildings, roads, parking areas, utilities, and stormwater management facilities; and

h. Proposed land use with tabulation of the percentage of surface area to be adapted to various uses, including planned locations of utilities, roads, and easements;

9. If an operator intends to meet the requirements established in 9VAC25-870-63 or 9VAC25-870-66 through the use of off-site compliance options, where applicable, then a letter of availability from the off-site provider must be included; and

10. If payment of a fee is required with the stormwater management plan submission by the VSMP authority, the fee and the required fee form in accordance with Part XIII (9VAC25-870-700 et seq.) must have been submitted.

C. All final plan elements, specifications, or calculations of the stormwater management plans whose preparation requires a license under Chapter 4 (§ 54.1-400 et seq.) or 22 (§ 54.1-2200 et seq.) of Title 54.1 of the Code of Virginia shall be appropriately signed and sealed by a

professional who is licensed to engage in practice in the Commonwealth of Virginia. Nothing in this subsection shall authorize any person to engage in practice outside his area of professional competence.
D. A construction record drawing for permanent stormwater management facilities shall be submitted to the VSMP authority in accordance with 9VAC25-870-108 and 9VAC25-870-112. The construction record drawing shall be appropriately sealed and signed by a professional registered in the Commonwealth of Virginia, certifying that the stormwater management facilities have been constructed in accordance with the approved plan.

Drew reiterated that HB520 directs DEQ and this Stakeholder group to study the planting or preservation of trees as an urban land cover type and as a stormwater best management practice (BMP) and make recommendations on implementation. The questions that this group needs to look at are "What would those recommendations be?" and "What are the challenges of moving forward with those recommendations?" He noted that DEQ became responsible for the Stormwater Management Program when it was transferred from DCR and the Soil and Water Conservation Board on July 1, 2013.

He noted the following:

- 9VAC25-870-55 addresses Stormwater Management Plans and looks at "what is going to be implemented on the ground" and the "control of Post-Construction Water Quantity and Quality".
- Everyone in the room is probably pretty familiar with what the Stormwater Management Plan does, for the most part. There have been a lot of conversations centered around trees over the past several months. Basically, regulated land disturbing activities in the Commonwealth have to prepare a stormwater management plan as identified in Chapter 870 for structural and nonstructural BMPs and for operation and maintenance of those facilities and practices. Basically, we are dealing with the conversion or development of a piece of property from some pre-existing condition or use to a different condition or use. So ultimately there is a change in land use where we are going from some pre-construction land use to a post-construction condition. With that change in land use there is a resulting change in both the quantity of runoff but also the quality of that runoff from the site. The standard practice is that the developer works with a licensed professional (engineer, surveyor, architect, etc.) to go through the process of putting together a post-construction stormwater management plan that ends up addressing not only the increase in water quantity that happens as a result of additional impervious cover being put down. There is typically less infiltration as a result of the additional impervious cover resulting from the development of the site.
- Where this process relates to HB520 as it relates to the increase in water quantity and the decrease in infiltration is the question of changes in water quality. The Stormwater Management Plan also addresses water quality. The Plan identifies what the water quality condition is expected with the pre-construction condition to have. In the Commonwealth we don't focus on what the pre-construction water quality number is. In Virginia we have adopted a post-construction water quality standard. This standard was the result of work done by the Soil and Water Conservation Board and DCR with the assistance of a regulatory advisory panel over a many-year process.

- In the Commonwealth we have a post-construction water quality standard. That number was previously .45 pounds per acre per year of Total Phosphorus. That number was developed in the late 80's as part of the Chesapeake Bay Preservation Act. The method that was used for determining water quality compliance was called the "Simple Method" That method was derived from work done by Tom Schuler in the Northern Virginia Metropolitan Washington DC area. The Commonwealth looked Bay Watershed wide and determined what the regulations called the average land cover condition or the average amount of impervious cover in the Bay Watershed. At the time that number was calculated in the late 80's, it was 16% impervious cover. That 16% became the baseline. That 16% impervious cover became an input to the "Simple Method" equation and when you run that calculation out you end up with .45 pounds per acre per year as your baseline.
- Post July 1, 2014: During that regulatory advisory panel process the Commonwealth went through an exercise with a lot of negotiations on both sides with commercial real estate, home builders, other types of developers, members of the NGO community, and environmentalists on both sides. They were also looking at the Phase 5 Watershed Model for the Chesapeake Bay TMDL to see what changes in land use and what those increased water quality loadings were as a result of development occurring over time and what the Phase 5 watershed Model said. They put all that information in a "room" and worked through all those logistics and details and the new number that the Commonwealth came out with is .41 pounds per acre per year of total phosphorus.
- So, we went from .45 to .41 but we also did two other things during that time period. We recognized that at the Commonwealth level we were looking previously under the Simple Method we were looking at the first half-inch of rainfall that was happening. That was what we referred to as our water quality volume or our treatment volume. That was what we set in the late 80's when we set up the Simple Method under the Bay Act Program and then we extended that to the Stormwater Program. We really want to capture and treat the first half-inch of rainfall that happens over the impervious cover on the site. We took a very large leap forward when we adopted .41, we adjusted that number from the first half-inch of runoff to the first inch of runoff. In doing that, the analysis showed that we were moving the bar forward to the point of where back when this calculation was done that we were capturing and treating basically what equated to about the 90^{th} percentile storm event. So basically, by moving the ball forward starting this date, when we have a new development site and we put in stormwater management best management practices, etc. we expect to capture 90% of the rainfall or 90% of the storm events that happen and treat those for water quality purposes. The other thing that we did in that process, is that instead of just looking at impervious cover (this is where consideration of different land cover types comes in), we said that we're not only going to look at the first half-inch of runoff for the impervious cover on the site, we are going to look at an inch of runoff over the entire site. In doing that in order to keep the calculation process simple, the Commonwealth set up three land cover categories. The first land cover category is "Impervious Cover", which we have always had. The second Category is "Managed Turf", which is

essentially areas on a site that were disturbed during construction that were not either preserved or restored/open space and are not forest cover, so are not impervious. It is those pervious areas that at some point had construction equipment run over them. There was some compaction that happened that reduced infiltration or increased runoff in those areas. It is mostly lawns and landscaping in parking lots. This category doesn't look at just grassed areas, it looks at all the other types of pervious areas that are disturbed during construction that we basically don't put impervious surface down on. The third category is "Forest/Open Space" which are basically areas of forest and/or open space that were preserved during construction, so you didn't disturb them or areas that were disturbed but you went through the process of utilizing some of the stormwater best management practices on the BMP Clearinghouse, like soil amendments, etc. to reestablish the natural infiltrative capacity of the area, reestablish that open space cover and reestablish that canopy that may have been disturbed or cut down during construction then replanted and once it has been restored, keeping that area preserved in that state post-construction.

Group Discussions:

- Doesn't that mean that trees already get accounted for? That is exactly right – that is one of those areas that this group really needs to talk about, to make sure that we aren't potentially double counting or that we aren't potentially setting up another land cover category that we already have a creditable path forward. Based on conversation regarding the wording of HB520, that a land use category of "Urban Tree Canopy" or "Trees in an Urban Setting" may be slightly different than "Forest/Open Space Cover Category in the Runoff Reduction Method. The conversation will need to be "what the differences in those categories are" and "do we have enough information available to us to figure out what those differences are with respect to a land cover condition.
- For example: If there is a 100-acre parcel that is being turned into a" big-box store" and it is a forested 100-acres. If in the development process, 20 acres of that forest is not touched, that means that that land use conversion to that developed state has to apply post-construction stormwater practices to only that 80%. Whereas if the 100 acres were all clear cut and developed the practices would apply to the entire site. There is math in the calculation where what you have to treat at the end of development is less, if you have kept trees in place because there has been no land conversion, it was "Forest/Open Space" to begin with and it is still "Forest/Open Space".
- There is a difference between the impact of construction from a stormwater standpoint and the impact of construction from a local tree canopy ordinance standpoint. There may be different things captured in those two programs. What we are really focusing on is if a big piece of this would be able to meet your tree canopy requirements that you can count the stuff you did as part of your stormwater management plan. That then wouldn't be double counting to meet your tree canopy requirements. How are trees that you cut down or trees that you leave accounted for in meeting stormwater requirements? There are multiple different pathways underneath the

compliance method that we have. Staff will try to explain those differences when we talk about the Runoff Reduction Method in greater detail.

- Looking at the Expert Panel report and understanding kind of what the Bay Program was trying to do with their report, the crediting of trees as a stormwater best management practice creates a clearer pathway of thinking than the consideration of trees as a land cover type.
- The SAG received a reference document in advance of this meeting which contained a list of Best Management Practices related to water quality compliance (9VAC25-870-65). Looking at that list you can see in a very few of them that trees might be included but clearly, they don't stand out on the list. Quality was referenced as we started this discussion, one of the things that we heard about a lot at the General Assembly, especially in areas that have flooding is that trees play an important role in flooding so therefore it has to be a water quantity thing. So, we need to consider both the water quantity and the water quality aspects of trees. There is definitely a water quantity benefit that needs to be considered. The question is how do we work that piece into the technical calculation that the engineering companies do on a day-in-day-out basis?
- How do you calculate the post-construction load for a service area or an area of disturbance? If you have a 10,000 square foot area of disturbance, first how do you delineate the drainage areas and would you be calculating the post-construction load per drainage area or type of site – that type of information/clarification would be helpful. There are different pathways to come up with the necessary calculations that are acceptable using either approach. Using the example of the 100 acre site where only 80 acres was disturbed and that is where the development occurred, you have the ability to go through and center your calculations on that 80 acres, but you can also utilize the entire 100 acre site in the preservation of those trees to establishing/preserving those 20 acres in perpetuity as Forest/Open Space or until such time as a revised Stormwater Plan is submitted that would take into account that those trees were subsequently disturbed at a later date. This is where we get into all of the little technical calculation nuances. The conversations of the group will need to recognize and consider all of these different things and then potentially getting to a point where there may be a recommendation to move forward with something. We may not have time to explore all of the nuances but the goal should be to set the pathway forward.

In summary: The basic premise of Section 55 is that you put together a Stormwater Management Plan to implement the Commonwealth's Post-Construction water quantity and water quality criteria and you go through an exercise where you identify your stormwater management best management practices, you identify areas if you are choosing to implement preservation of existing tree canopy or existing open space or if you want to establish new forest cover or open space, you can go through the exercise of doing that. Then you put together your Post-Construction Stormwater Management Plan along with the traditional erosion and sediment control plans that are there during construction; you implement post-construction plans; you build your stormwater BMPs; you establish your preservation or reestablishment of forested open space, whatever else you are building, then you go through the final site stabilization in determining construction permit coverage and if it doesn't require construction permit coverage you terminate your local permit

with the local government.

4. Review of the Virginia Stormwater Management Program (VSMP) Regulation - Water Quality Design Criteria Requirements (9VAC25-870-63) - Drew Hammond – DEQ:

Drew Hammond provided an overview of Virginia's Stormwater Management Program (VSMP) Regulation – Water Quality Design Criteria Requirements (9VAC25-870-63).

9VAC25-870-63. Water quality design criteria requirements.

A. In order to protect the quality of state waters and to control the discharge of stormwater pollutants from regulated activities, the following minimum design criteria and statewide standards for stormwater management shall be applied to the site.

1. New development. The total phosphorus load of new development projects shall not exceed 0.41 pounds per acre per year, as calculated pursuant to 9VAC25-870-65.

2. Development on prior developed lands.

a. For land-disturbing activities disturbing greater than or equal to one acre that result in no net increase in impervious cover from the predevelopment condition, the total phosphorus load shall be reduced at least 20% below the predevelopment total phosphorus load.

b. For regulated land-disturbing activities disturbing less than one acre that result in no net increase in impervious cover from the predevelopment condition, the total phosphorus load shall be reduced at least 10% below the predevelopment total phosphorus load.

c. For land-disturbing activities that result in a net increase in impervious cover over the predevelopment condition, the design criteria for new development shall be applied to the increased impervious area. Depending on the area of disturbance, the criteria of subdivisions a or b above, shall be applied to the remainder of the site.

d. In lieu of subdivision c of this subsection, the total phosphorus load of a linear development project occurring on prior developed lands shall be reduced 20% below the predevelopment total phosphorus load.

e. The total phosphorus load shall not be required to be reduced to below the applicable standard for new development unless a more stringent standard has been established by a locality.

B. Compliance with subsection A of this section shall be determined in accordance with 9VAC25-870-65.

C. Upon completion of the 2017 Chesapeake Bay Phase III Watershed Implementation Plan, the department shall review the water quality design criteria standards.

D. Nothing in this section shall prohibit a locality's VSMP authority from establishing more stringent water quality design criteria requirements in accordance with § 62.1-44.15:33 of the Code of Virginia.

Drew noted that we have already covered some of the component and requirements of this section, but there are several items that need to be looked at. He noted the following:

- Under Section 1, the total phosphorus load for new development shall not exceed 0.41 pounds per acre per year. That is the new standard as of July 1, 2014. When you run the runoff reduction method at the end of the day, that is the number that you are looking for. So that when you are done with your piece of land, if that including preservation of trees or reestablishment of forest cover, in addition to your traditional best management practices and you plug that information into the calculations that your calculated post-construction load is 0.41 pounds per acre per year of total phosphorus.
- What is somewhat unique in Virginia, is that the 0.41 is not a measured quantity, we do not go out in the field to collect or measure to confirm that figure. We have implemented a program in Virginia, starting back with the "Simple Method" as a means of offsetting construction under the Chesapeake Bay Preservation Act Program. We utilize a calculation procedure and the best

available science and a lot of information on best management practices and what their expected pollutant removal efficiencies are.

- We do have a separate standard that we use if you are undertaking what we refer to as development of prior development lands or redevelopment. So if you have a "big box" store and you want to redevelop it into something else, whether it be residential use or some other mixed use, we still use the Virginia Runoff Reduction Method as the compliance measure but we do have a separate standard for redevelopment which depends upon how much land disturbance you are undertaking with redevelopment, whether it is equal to or greater than an acre, but the premise is that where you are doing development on prior developed lands, we want you to provide a reduction over whatever the pre-construction loading is. The redevelopment standard has been around since the late 80's. Back then it was a 10% reduction over pre-development calculated loading no matter what you were doing. What we have done now as a means of assisting us in achieving additional loading reductions across the Commonwealth, predominantly with respect to the Bay TMDL in urbanized areas is that if your total land disturbance is greater than an acre, we want to see a 20% reduction. If your project is less than an acre, then we want you to hold to the baseline that we had back in the 80's which was a 10% reduction.

5. Review of the Virginia Stormwater Management Program (VSMP) Regulation - Water Quality Compliance/VRRM (9VAC25-870-65) - Drew Hammond – DEQ:

Drew Hammond provided an overview of Virginia's Stormwater Management Program (VSMP) Regulation – Water Quality Compliance/VRRM (9VAC25-870-65).

9VAC25-870-65. Water quality compliance.

A. Compliance with the water quality design criteria set out in subdivisions A 1 and A 2 of 9VAC25-870-63 shall be determined by utilizing the Virginia Runoff Reduction Method or another equivalent methodology that is approved by the board.

B. The nonproprietary BMPs listed in this subsection are approved for use in accordance with the Virginia Runoff Reduction Method. Other approved nonproprietary BMPs found on the Virginia Stormwater BMP Clearinghouse Website may also be utilized. Design specifications and the pollutant removal efficiencies for all approved nonproprietary BMPs are found on the Virginia Stormwater BMP Clearinghouse Website.

1. Vegetated Roof (Version 2.3, March 1, 2011);

2. Rooftop Disconnection (Version 1.9, March 1, 2011);

3. Rainwater Harvesting (Version 1.9.5, March 1, 2011);

4. Soil Amendments (Version 1.8, March 1, 2011);

5. Permeable Pavement (Version 1.8, March 1, 2011);

6. Grass Channel (Version 1.9, March 1, 2011);

7. Bioretention (Version 1.9, March 1, 2011);

8. Infiltration (Version 1.9, March 1, 2011);

9. Dry Swale (Version 1.9, March 1, 2011);

10. Wet Swale (Version 1.9, March 1, 2011);

11. Sheet Flow to Filter/Open Space (Version 1.9, March 1, 2011);

12. Extended Detention Pond (Version 1.9, March 1, 2011);

13. Filtering Practice (Version 1.8, March 1, 2011);

14. Constructed Wetland (Version 1.9, March 1, 2011); and

15. Wet Pond (Version 1.9, March 1, 2011).

C. Nonproprietary BMPs differing from those listed in subsection B of this section shall be reviewed and approved by the director in accordance with procedures established by the department.

D. Proprietary BMPs listed on the Virginia Stormwater BMP Clearinghouse Website are approved for use in accordance with the Virginia Runoff Reduction Method.

1. Any proprietary BMP listed on the Virginia Stormwater BMP Clearinghouse Website prior to July 1, 2020, shall by December 31, 2021, provide documentation to the department showing that another state, regional, or national certification program has verified and certified its nutrient or sediment removal effectiveness. Any proprietary BMP that fails to provide the department with the documentation required by December 31, 2021, shall not be approved for use in any stormwater management plan submitted on or after January 1, 2022, until such proprietary BMP provides the department with such required documentation.

2. Any proprietary BMP approved for use after July 1, 2020, must meet the requirements of § 62.1-44.15:28 A 9 of the Code of Virginia.

E. A VSMP authority may establish limitations on the use of specific BMPs in accordance with § 62.1-44.15:33 of the Code of Virginia.

F. The VSMP authority shall have the discretion to allow for application of the design criteria to each drainage area of the site. However, where a site drains to more than one HUC, the pollutant load reduction requirements shall be applied independently within each HUC unless reductions are achieved in accordance with a comprehensive watershed stormwater management plan in accordance with 9VAC25-870-92.

G. Offsite alternatives where allowed in accordance with 9VAC25-870-69 may be utilized to meet the design criteria of subsection A of 9VAC25-870-63.

H. Any publicly owned treatment works that is permitted under the watershed general VPDES permit pursuant to § 62.1-44.19:14 of the Code of Virginia and is constructing or expanding the treatment works, wastewater collection system, or other facility used for public wastewater utility operations may, in accordance with § 62.1-44.19:21.2 C of the Code of Virginia, permanently retire a portion of its wasteload allocation to meet the design criteria of subsection A of 9VAC25-870-63. Notice shall be given by such applicant to the VSMP authority and to the department.

Drew noted the following:

- Under A, we are determining compliance utilizing the Virginia Runoff Reduction Method.
- So, this is where we say use the runoff reduction method or another equivalent methodology approved by the Board. As of today, the Board has not approved any other methodology.
- Under B, we do have a list of approved nonproprietary stormwater best management practices that are approved to be used in the runoff reduction method. There are 15 of them. You can see that the version numbers and dates are associated with 2011. These are the BMP standards that were in place when DCR and the Soil and Water Conservation Board originally adopted these regulations and said that these will become effective September 2011 with implementation delayed until July 2014.
- There is also a notation that other approved nonproprietary BMPs found on the Virginia Stormwater BMP Clearinghouse may also be utilized. So, there is a newer set of these 15 that are posted on the Clearinghouse. Those specifications were developed in early to mid-2013 right before the program transferred over to DEQ. There are some subtle and some not-so-subtle differences between the lists. We encourage folks to use the newer and updated 2013 specifications that are on the Clearinghouse because of the vast improvements that were achieved just by that update. We know that even that list may not be perfect. We recognize that in the eight years that we've been implementing the program that even those 2013 specifications need to be updated. We are slowly working through those specifications trying to take them from 2013 forward, because there has been some new science and new work done by other states that needs to be taken into consideration. It should be noted that these 15 specifications are not Virginia specific. A lot of work has been done to develop these 15 by the

Center for Watershed Protection and they have helped multiple states around Virginia to implement stormwater programs like runoff reduction and BMPs in these other states.

- Are we looking at the Watershed Implementation Plan and the Regulatory Requirements in Virginia and the tools from our programs to see the extent to which the tools we are using in the programs are actually successful in meeting our goals? We are actually in the process of looking at the 0.41 standard. In 9VAC25-870-63 C it says; *"C. Upon completion of the 2017 Chesapeake Bay Phase III Watershed Implementation Plan, the department shall review the water quality design standards."* We are working on that effort now. We have elicited assistance from the Bay Program in that effort. One of the things that has to be looked at in that examination is the change in land use that has occurred since the work was originally done in 2005 and what was projected to occur in the next 10 years or so and what has happened since then. Work is being done to evaluate a new land use number that has been incorporated into the most recent version of the Bay Watershed Model to determine whether the 0.41 standard in Virginia still remains "nutrient neutral". Once that work has been completed, we will look at the information on the change in land use and calculations in the new model and look to possible changes to the 0.41 standard through a stakeholder involvement regulatory process to determine what the number should be moving forward.
- The concepts of energy balance and quantity were discussed. Staff has not really delved into the quantity component. There are a number of different interpretations on how to address energy/power balance.

In summary, in Section 65 we have the list of 15 creditable nonproprietary BMPs. The BMP Clearinghouse also has an updated version of those BMPs. The most important thing in this section is Subsection C – *"Nonproprietary BMPs differing from those listed in subsection B of this section shall be reviewed and approved by the director in accordance with procedures established by the department."* Once approved, they make it to the Clearinghouse for use. In looking at the work done by the Expert Panel regarding the consideration of "trees as a best management practice", if it is a credible stormwater BMP then what are the next steps? What does it need to look like to get that to the Clearinghouse? To make it available for use by entities in their calculations? We have those nonproprietary BMPs on the Clearinghouse and we have an avenue to include "trees" as a BMP if that is the recommendation from this process.

6. Review of the Virginia Stormwater Management Program (VSMP) Regulation – Long-term maintenance of permanent stormwater management facilities. (9VAC25-870-112) – Drew Hammond – DEQ:

Drew Hammond provided an overview of Virginia's Stormwater Management Program (VSMP) Regulation – Long-term maintenance of permanent stormwater management facilities. (9VAC25-870-112).

9VAC25-870-112. Long-term maintenance of permanent stormwater management facilities.

A. The VSMP authority shall require the provision of long-term responsibility for and maintenance of stormwater management facilities and other techniques specified to manage the quality and quantity of runoff. Such requirements shall be set forth in an instrument recorded in the local land records prior to state permit termination or earlier as required by the VSMP authority and shall at a minimum:

1. Be submitted to the VSMP authority for review and approval prior to the approval of the stormwater management plan;

2. Be stated to run with the land;

3. Provide for all necessary access to the property for purposes of maintenance and regulatory inspections;

4. Provide for inspections and maintenance and the submission of inspection and maintenance reports to the VSMP authority; and

5. Be enforceable by all appropriate governmental parties.

B. At the discretion of the VSMP authority, such recorded instruments need not be required for stormwater management facilities designed to treat stormwater runoff primarily from an individual residential lot on which they are located, provided it is demonstrated to the satisfaction of the VSMP authority that future maintenance of such facilities will be addressed through an enforceable mechanism at the discretion of the VSMP authority.

C. In addition to the requirements of subsection A of this section, any owner of property that is zoned for residential use and on which is located a privately owned stormwater management facility serving one or more residential properties shall record the long-term maintenance and inspection requirements for such facility with the deed for the property.

He noted the following:

- Once the VRRM Calculations have been run and the chosen BMPs have been implemented and are in place and you calculate your removal efficiencies and it is shown that your phosphorus load is 0.41 pounds per acre or less, the next step, as a Virginia Stormwater Management Authority (VSMP), is long-term operation and maintenance of those permanent stormwater management facilities.
- The concept is that the implemented Best Management Practices need to remain on the site in perpetuity, unless there is a revised stormwater management plan prepared. The practices need to remain in place and continue to function as designed and intended to ensure that the 0.41 or less continues for perpetuity.
- The normal practice is to require the recording of a Stormwater Best Management Practices Maintenance Agreement.
- This relates to Section 4 of HB520: "*§ 4. The Department of Environmental Quality shall publish on its website a report containing the findings of the stakeholder advisory group by November 1, 2020, and shall include in the report a recommendation as to whether the planting or preservation of trees shall be deemed a creditable land cover type or BMP and, if so, how much credit shall be given for its optional use. The Department of Environmental Quality shall, before the first day of the 2021 Session of the General Assembly, report the findings of the stakeholder advisory group to the Chairmen of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources."* Specifically, the consideration of planting and preservation of trees as a best management practice. There is an avenue under the Expert Panel Report for crediting the planting of a tree as a BMP whether it is over impervious cover or pervious cover and there is a method by which to calculate how many pounds of phosphorus removed for use in the Runoff Reduction Method. At the end of the day, if X number of trees were planted to get the project below 0.41, just like any other BMP if

something goes haywire with that or if it is not properly implemented, operated and maintained to maintain compliance with the post-construction standard, what happens then? Part of the conversation that we need to have for the planting of a tree to be considered a BMP that gets us to the 0.41, how do we deal with long-term operation and maintenance requirements?

- Under the Nonpoint Source Nutrient Credit Certification Program, which for the large part is land use conversion which results in the planting of trees. For folks to be certified to create those Nutrient Banks, they have to have a deed restriction filed, they have to have financial assurance in case those trees don't survive to replant them. So, we do have some experience with what is required in the context of maintaining that "perpetual" tree or stand of trees. We know what we need to put in place to protect trees in perpetuity in that program. So, it should be similar for this program. A pretty rigorous amount of protection is needed.

Group Discussions:

- Is there a difference in the ability as part of the maintenance of a stormwater BMP to be able to plant a new tree somewhere else on the site and a Nutrient Bank where you are limited to where you mapped out where the bank was going to be? There would be an obligation on the owner of the Nutrient Bank and the owner/developer of a site to maintain the trees in perpetuity. On a development site, generally when talking about trees as BMPs, you are talking about a smaller number of trees then you would be establishing in a Nutrient Bank. You have opportunities to maintain and repair that just like you would have with any other BMP on the site. Maybe there could be different standards used for the different concepts (development site versus Nutrient Bank). There are different tree planting, maintenance and canopy requirements that would need to be taken into consideration. There are local governments that are their own VSMP Authorities that have their own Tree Planting and Preservation Ordinances and other protections in place that might provide information to these discussions and are much better suited for long-term operation and maintenance considerations of trees as BMPs.
- The concept of "financial assurance" requirements was discussed. In terms of a "Nutrient Bank" there are a number of financial assurance options available to assure that there is enough money available to replace X number of trees or to purchase X number of credits if their planting fails.
- How will the VSMP Authority inspect that stand of trees to identify that they are being properly preserved and maintained? What would the inspection look like? The Expert Panel report addressed that by looking at the "drip line" of the tree canopy. For purposes of crediting in the Bay Program, they look at the average 10-Year Canopy, whereas some local governments use an average 20-Year Canopy.
- Localities are more used to the use of "Canopy Ordinances". Adopting trees as BMPs are more likely to be used in the Urban Sector then in the Rural Sector. Local governments are being encouraged to adopt "Tree Canopy" ordinances.
- Local governments under State Water Control Law, even for BMPs listed on the Clearinghouse, have a lot more ability to restrict and direct the use of the BMPs than DEQ does. In looking at other state agencies and state projects, they have "Annual Standards and Specifications" in

place that will likely ensure the long-term operation, maintenance and preservation of these types of BMPs. The question is how do you maintain and preserve these practices through a Homeowners Association or Single-Family Residential Lots? Subsection B of Section112 provides that: *"At the discretion of the VSMP authority, such recorded instruments need not be required for stormwater management facilities designed to treat stormwater runoff primarily from an individual residential lot on which they are located, provided it is demonstrated to the satisfaction of the VSMP authority that future maintenance of such facilities will be addressed through an enforceable mechanism at the discretion of the VSMP authority."*

- Regarding a riparian tree buffer in an agricultural context versus individual trees in an urban context there is a minimum size of a tree buffer for credit under the Bay Model. In DC, in an urban context, they are providing 1 gallon of retention per year for each individual tree preserved or planted on a development site. In the nutrient trading context, the financial assurance is intended because that pollutant reduction is being used off-site, so there has to be that assurance there you will have a regulated site that will exist in perpetuity. In terms of post-Construction, all of the existing enforcement actions continue to exist is the concept of having "financial assurance" still as important? If you are going to be coming out on a 3-year inspection anyway, you can always impose a fine, or require maintenance whatever else is within DEQ's enforcement authority to make sure the BMP is maintained and preserved. With the exception of Nonpoint Source Nutrient Banks, in the VSMP world, DEQ has not done any Post-Construction Financial Assurance over the 8 years we have had the program.
- We are not limiting the ability of a locality of a Home Owners Association to use their own Escrow Account if that is what they would choose to do.
- In the post-construction world, we do need to be concerned with the long-term maintenance and preservation of these BMPs to ensure that water quality is maintained.
- A change that occurred as a result of the 2020 Session of the General Assembly is spelled out in Subsection C of Section 112: "*In addition to the requirements of subsection A of this section, any owner of property that is zoned for residential use and on which is located a privately owned stormwater management facility serving one or more residential properties shall record the long-term maintenance and inspection requirements for such facility with the deed for the property*." This provision was added to ensure that land transfers for properties with privately owned stormwater management facilities would have the long-term maintenance and inspection requirements included as part of the deed for the property so that homeowners knew what the expectations were.
- With the tree conservation ordinances that are implemented in Northern Virginia there are no long-term maintenance commitment by the local authority. Once the project goes "off-bond", unless there is a conservation easement that tree canopy subject to being cleared. Unless there is an additional protection such as an RPA, the 10-year tree canopy that is preserved in Fairfax, once the project gets released, it can be cut down. Fairfax is not making sure that the 10-year tree canopy is there in perpetuity. Fairfax does not have the authority to enforce that type of requirement.
- For MS4 localities that are under the Chesapeake Bay TMDL, the BMPs have to be cleared through the BMP Warehouse and they have to demonstrate that they will exist in perpetuity to continue to have a credit for those deductions. How do you make sure that those trees or that one tree or the equivalent of that one tree is around 12-years from now? There is a value to trees

and finding mechanisms for encouraging the planting and preservation of trees is great. It just doesn't seem to line up easily with either the MS4 or the Post-Construction Stormwater programs. One of the reasons we are here is that it just doesn't seem to fit with the mechanisms that we have in place. We are here to hear from the SAG on how it might fit. We might also need to have a conversation about clarifying the authorities.

- One of the reasons we are here today is because the current Clearinghouse BMPs often require the clearing of trees to put in other BMPs. This fits into what we will discuss when we get into VRRM is the other half of the equation which is the preservation or reestablishment of trees as an Urban Land Cover Category. If we can't credit it as a stormwater BMP, how do we get credit for it? Urban Tree Canopy doesn't seem to fit perfectly into the category of Forest/Open Space. So how can we encourage preservation and still get credit for the trees operating as they should?
- Is there a definition for Forest/Open Space land Use? Staff will be discussing this. It is not so much as an acreage but a characterization of the type of category. The characteristics of the Forest/Open Space land Use Category don't seem to fit a Preservation/Planting Trees Category.
- Are we talking about trees being planted on common areas of a subdivision or trees on individual lots or both? Who is the responsible party? We could be dealing with both scenarios. And both the Home Owner Association and/or the Homeowner could be responsible for preservation and maintenance requirements. There is nothing limiting it in the regulations.

7. Break for Lunch – 11:50 AM – 1:02 PM

8. Review of the Virginia Stormwater Management Program (VSMP) Regulation - Water Quality Compliance/VRRM (9VAC25-870-65) – CONTINUED - Drew Hammond/Robert Cooper – DEQ:

Melanie Davenport welcomed everyone back to the meeting and introduced the topic of the Virginia Runoff Reduction Method (VRRM). Drew Hammond provided an overview of the Virginia Runoff Reduction Method (VRRM). He noted the following:

- Back in 2016, Robert Cooper worked with the DEQ Training staff to write a guidance document at DEQ that basically provides background and implementation of the Runoff Reduction Method. So, we had the original instructions that were developed by the Center for Watershed Protection as a starting point. The regulations were first promulgated in 2011 and became effective in 2014. We looked at those original instructions and quickly realized that we needed to put some more meat on the bones and really try to give folks a better understanding of the runoff reductions spreadsheet itself. A lot of folks looked at that as a black-box calculator. The engineering community said that they wanted a better understanding of what's going on and how the numbers are happening. So, Robert and the Training Staff that teach this material on a day-in and day-out basis wrote a 94-page guidance document.

- Once the spreadsheet got out and started being used by the Engineering Community, errors started to pop up. Some of the calculations didn't make any sense, so an effort was made to get to work on fixing those errors. So, in that process we moved from Version 2.6 or 2.7 to Version 3.0. There were calculation errors in the spreadsheets that needed to be rectified so this was a timely and worthwhile effort.
- We changed a couple of things when we went with the Runoff Reduction Method from the Simple Method, not only were we looking at the first half-inch of rainfall over the impervious cover as being what our treatment volume or our water quality volume was, we bumped that number up to an inch, and it was an inch over the entire contributing drainage area. We also did a couple of other things to really bring us forward with respect to water quality in Virginia associated with post-construction. The underlying equation is really long and has a lot of factors in it. Those factors can be seen in the spreadsheet itself. But the underlying equation that is used for the Runoff Reduction Method is the same equation that is used for the Simple Method. The Runoff Reduction Method could be referred to as the Simple Method on steroids.
- Tom Schuler took a whole bunch of empirical data and measured phosphorus concentrations for work done in the Metropolitan Washington DC area and plotted it all and asked what are the different parameters that need to be considered. He basically fit an equation to that empirical data and that's where we came up with the Simple Method equation. The Center for Watershed Protection basically extended that equation out to include those additional land use categories but also to include the 1-inch treatment volume associated with it.
- So, in Virginia we currently have three different land cover categories which include Forest & Open Space; Managed Turf; and Impervious Cover. Attachment 1 – Table 1: Land Cover Guidance for VRRM Compliance Spreadsheets found in the Virginia Runoff Reduction Method Guidance Manual – Version 3 provides a description of these land cover categories. The Categories of Land Cover Types were reviewed with the group.

Table 1: Land Cover Guidance for VRRM Compliance Spreadsheets:

Forest & Open Space: Land that will remain undisturbed OR restored to a hydrologically functional state:

- Portions of residential lots that will NOT be disturbed during construction
- Portions of roadway rights-of-way that, following construction will be used as filter strips, grass channels, or stormwater treatment areas; MUST include soil restoration or placement of engineered soil mix as per design specifications
- Community open space areas that will not be mowed routinely, but left in a natural vegetated state (can include areas bush hogged no more than four times per year)
- Utility rights-of-way that will be left in a natural vegetated state (can include areas bush hogged no more than four times per year)
- Surface area of stormwater BMPs that are NOT wet ponds, have some type of vegetative cover, and that do not replace an otherwise impervious surface
    - BMPs in this category include bioretention, dry swale, grass channel, extended detention (ED) pond that is not mowed routinely, stormwater wetland, soil amended areas that are vegetated, and infiltration practices that have a vegetated cover
- Other areas of exiting forest and/or open space, including wetlands, that will be protected during construction and that will remain undisturbed.

Operational & management conditions for land cover in Forest & Open Space category:

- Undisturbed portions of yards, community open space, and other areas that will be considered

as forest/open space must be shown outside the limits of disturbance (LOD) on approved erosion and sediment control plans AND demarcated in the field (e.g., fencing) prior to commencement of construction

- Portions of roadway rights-of-way that will count as forest/open space are assumed to be disturbed during construction, and must follow the most recent design specifications for soil restoration and, if applicable, site reforestation, as well as other relevant specification if the area will be used as a filter strip, grass channel, bioretention, or other BMP
- All areas that will be considered forest/open space for stormwater purposes must have documentation that prescribed that the area will remain in a natural, vegetated state
    - Appropriate documentation includes: subdivision covenants and restrictions, deeded operation and maintenance agreements and plans, parcel of common ownership with maintenance plan, third-party protective easement, within public right-of-way or easement with maintenance plan, or other documentation approved by the local program authority
- Although the goal is to have forest/open space areas remain undisturbed, some activities may be prescribed in the appropriate documentation, as approved by the local program authority:
    - Forest management, control of invasive species, replanting and revegetating, passive recreation (e.g., trails), limited bush hogging to maintain desired vegetative community, etc.

Managed Turf: Land disturbed and/or graded for eventual use as managed turf:

- Portions of residential yards that are graded or disturbed, including yard areas, septic fields, residential utility connections
- Roadway rights-of-way that will be mowed and maintained as turf
- Turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings

Impervious Cover

- Roadways, driveways, rooftops, parking lots, sidewalks, and other impervious areas

This category also includes the surface are of stormwater BMPs that: (1) are wet ponds, OR (2) replace an otherwise impervious surface (e.g., green roof, pervious parking)

- This process and calculations are also tied to A, B, C & D soil types. Hydrologic Soil Groups defined by NRCS are factored in. The way that is actually factored in is in runoff coefficients. So, for impervious cover the runoff coefficient for A, B, C, and D soils is .95. So, if you put down a parking lot, you put down a building, we expect 95% of the rainfall to convert to runoff.
- The Virginia Runoff Reduction Method Compliance Spreadsheet inputs and examples of the calculations were reviewed with the group. It was noted that the "Green" cells on the spreadsheet are the input cells where site specific/project specific information is input into the calculations. The Runoff coefficients are fixed, because those are one of the variables that go into the long equation that is calculated. The .95 figure for impervious area has been a number that has been around for decades. There are some other constants in the Runoff Reduction Method that are being looked at. One of those constants is Annual Rainfall which has been set at 43 inches per year. That is generally what the rainfall rate was when the Simple Method was developed in the 80's. There were some variations of that rate that could originally be put into the calculations, but when the program was taken statewide to deal with private projects as well as state projects the average of 43 inches per year was selected as a constant input – it is a static number. In addition, the .26 milligrams per liter of total phosphorus have also been maintained as a constant. Holding the rainfall and the phosphorus numbers together as constants versus letting folks tweaking one or the other helps to maintain that loose connection between those

figures. The relationship between rainfall and phosphorus concentrations are likely to be looked at and any resulting recommended changes would have to be evaluated for impact on the overall calculations.

- If anything is recommended to be pulled out of the calculation tables and revised, it will require a regulatory action and a stakeholder advisory panel to evaluate and to make those changes.
- The basis for all these kinds of calculations is historical rainfall and with what we know is happening with precipitation and climate, we are always kind of playing catch up to what the historical record is versus what the future prediction is.
- The .26 number is the EMC (Event Mean Concentration). For a runoff event, the mean concentration of phosphorus coming off the project site is .26 milligrams per liter of total phosphorus. Rainfall converts to runoff via the runoff coefficient.
- For the spreadsheet, you would plug in your information based on the three land use categories, then it runs that information through the simple method equation on steroids taking into account the information in the "yellow" boxes then spits out an answer on what your load reduction is as it relates to your target Total Phosphorus (pounds per acre per year) - .41. If the calculation shows that the .41 is exceeded then Best Management Practices would need to be implemented to get that number to .41 or below.

This leads us to the two parts of the conversation outlined in the statute: Do we have a fourth land cover category that speaks to Urban Tree Canopy or do we have a Best Management Practice with an associated area that then provides a reduction to what we need for compliance with the .41 standard?

Group Discussions:

- So, what would it take to add an additional land cover? Would it take additional research or figuring out what other information and science might be available? That is part of the conversation that we have not had. What we have so far versus what we would need to actually plug in another land cover category. Is incorporating Urban Tree Canopy into the existing tree (forest) land cover is probably not a starting point for this discussion? We will need to start the conversation with "what is the best available science that we have". And identify where we are right now with science and information regarding tree canopies. We need to have that conversation to determine whether this group will recommend inclusion of an additional land cover type. What is the "GAP" Analysis? What are we missing to be able to do that? What would it take to do that at the end of the day? The first part of Number 4 in HB520 says "considering urban tree canopy as a land cover condition". That means expanding Table 1: Land Cover Guidance for VRRM Compliance Spreadsheet with a fourth category. To answer the question as to whether that is creditable, do we have enough information recognizing that a number of the inputs to the VRRM spreadsheet are constants. The piece that we need to look at with respect to that new category and implementing that in the overall equation is the runoff coefficients. So, it becomes a case of. Do we have enough information available to be able to say that use of an Urban Tree Canopy in a specific soil

type has a resulting associated runoff coefficient? So, when it rains in that area with that land cover type how much of that rainfall is changing the runoff? Those entries for the Runoff Coefficient Table in the spreadsheet are likely to be somewhere between "Managed Turf" and "Forest/Open Space".

- Is there a possibility that there might also be numerous additional categories of land cover that might need to be included at some later date? So, based on the different kinds of trees or even different land uses there might be need for additional land cover types.
- There is an incentive built into the spreadsheet to keep as much "Forest/Open Space" as possible. That is a great incentive to have, but for urban jurisdictions in particular that not a reality. Bringing it back to the purpose of why we are here is really trying to find a way to address these unique conditions in which many other jurisdictions will ultimately find themselves in as we continue to redevelop. The Urban Tree Canopy Expansion Expert Panel Report includes some data that helps to support the whatever rationale that is developed to come up with a runoff coefficient for an urban tree canopy land cover type over a specific soil type or over another land cover type, such as "managed turf".
- When there are cases where there is open space and or open space that folks are willing to preserve, we are asking that folks sign a Forest/Open Space Maintenance Agreement that defines that area on the plans, define that on your plat and record it in the courthouse. We set forth the expectations that all of the heirs, successors and assigns know what the expectations are, unless a revised plan and a revised plat is provided to DEQ. That does provide a big incentive. There also could be an incentive if you are providing tree canopy over managed turf or over impervious cover. We would want to make sure that if it was going into the spreadsheet that it is not subsequently being entered into as a best management practice so as to avoid double-counting. Moving forward, this would be one of the nuances that we would need to explain to folks. You either get credit this way or you get credit that way, both not both.
- In looking at the spreadsheet under land cover and acres it shows that you get down to the hundredths place. So, say in theory that we go to the task of putting in a fourth row, a fourth category and we literally have a residential lot where we have one tree here, one tree there, and another tree there and we can delineate the known areas. That is clearly going to be maybe one ten-thousandth of an acre. Is that even going to result in any pollutant reduction? Does the incentive there just become irrelevant? Sometime people just need that small amount of reduction. That is likely for single-family residential lots. We also need to keep in mind that the Chesapeake Bay Land Disturbing Activities – ones that are less than an acre – don't require Construction GP Coverage. There are redevelopment projects in Arlington and Fairfax where a person is knocking this house down and putting this house up or adding onto it or something like that incentive for urban land cover over some type of land category might be useful. The numbers will probably be more beneficial for those smaller land-disturbing activities versus the larger residential developments that the bigger land developers are probably used to.

- If we go with the land cover path, then we probably need to have a conversation about what is the smallest canopy or stand size that is even viable, even worth thinking about. That is one of the things that the Expert Panel tried to look at. For the purposes of the Bay Program. They used the "i-Tree Model" (https://www.itreetools.org), kind of figured out what the average canopy cover was and the Expert Panel Report decided on the 10-Year Canopy and that number was 144 square feet. They said that for the purposes of a creditable BMP under the Bay Program the minimum that we are going to accept is a 10-Year Canopy of 144 square feet. That would result in a 12X12 box being used for credit. The need for specific examples of development sites potentially using this small amount of urban tree land cover was discussed.
- Could a canopy planting become a forest and eventually become the other land cover type, say after 10 years? That is another good point in the Expert Panel Report on Urban Tree Canopy. That report also discusses something that is difficult to delineate, it talks about a tree planting BMP eventually becoming a land cover type. We are kind of dealing with those as two different things. We are discussing BMPs but we are also discussing land cover. So, how does a BMP after a while, after 10 years, because it finally becomes visible on GIS and can be recognized as a land cover. The current spreadsheet does take that transition into consideration.
- The big question becomes one of the practical implementation of a potential new land cover type.
- Isn't there better science available on the impact of trees as a BMP then there would be for a scientific basis for coming up with this fourth type of land cover? Based on the findings of the Expert Panel Report there is some science available for both of these approaches. In terms of implementation there are numbers already in the Expert Panel Report that would lead to a quicker implementation of a tree as a stormwater best management practice than a land cover condition. There appears to be so much overlap between Forest/Open Space and Managed Turf and this new category – there is overlap if you specifically define a BMP. From an Engineering standpoint, aren't you making an already complex process, more complicated by creating a fourth land cover type? It is a matter of scale. On a small lot by lot basis, if you are talking about a small land development, redevelopment of a single-family home lot, having that forth category probably provides you some benefit. On a larger residential, big planned community development, that would be the last place to look at – if you ran all of the calculations and worked out all of the site BMPs on the runoff reduction spreadsheet and showed that you met the 0.41 – then lumping stuff as managed turf, impervious cover and open space would be a reasonable approach – there would be no use in trying to split things out into a fourth category in this scenario.
- The concept of BMP efficiencies was discussed. There are valid BMP Efficiencies information that could be used for Trees as a BMP. The Expert Panel Report that was approved by the Water Quality Implementation Team and ultimately the Steering Committee is out there for MS4s to use. That report went down as far as 144 square feet of

trees planted over impervious cover and 144 square feet of trees planted over pervious cover and the report identifies the percent of phosphorus reduction in each case. So, there is a table in the report that basically says that for the purposes of treating this as a stormwater BMP, in doing calculations, here is how you do it. Isn't there some confirmation bias in that inherently because that report was to come up with BMPs, so it is not a peer reviewed study. It has not been submitted for "double blind" accuracy. It is an expert panel of folks whose task was to develop a BMP for trees. There were other subgroups that provided information on loading rates for use in the report. It should not be treated as an academic study, it is an expert panel, it is not peer-reviewed and it has not been published in an academic journal. It was noted that we have been relying on expert panels of that sort for information on best management practices for many years in Virginia.

- There are a lot of other non-proprietary BMPs that are listed in the regulations and up on the BMP Clearinghouse are also ones that have gone through the Bay Program Office for review and approval for use in compliance. In that case, do they need to submit data or are they relying on a literature review? Most of the work that has been done has been through literature reviews.
- An example of that 144 square foot figure would be a one-inch maple planted over 10-years and the extent of the resulting tree canopy. So, this is doable, especially when you are working around the margins, for example in Arlington, where more than 25% of the lots are around 8,000 square feet, so they are small and this type of use matters.
- On a project, if someone starts to plant new trees that aren't fully mature, how would you go about determining the area of the canopy? Generally, you would determine the potential extent of the canopy once they are mature and use that figure. Is that a 10-Year assumption? The Expert Panel Report uses a 10-Year Canopy in their calculations. Some localities use a different assumption. In Leesburg, a 20-year canopy. Fairfax and Williamsburg use a 10-year canopy figure. Generally, the Tree Canopy Ordinance or Statute requires the use of a 20-Year canopy.
- One of the questions that will need to be addressed with the implementation of a Trees as BMP approach is what do we tell folks to use as the tree canopy number to utilize?
- The benefits of the use of a tree as BMP are likely to be more noticeable on a micro-scale (small lot) level than for larger developments.

Drew noted that one of the reasons for this conversation today is to consider the question of whether "Urban Tree Canopy" serve as a "Land Cover Condition/Category"? When the Runoff Reduction Method was originally setup and all of the RV coefficients were decided upon, we got a general description of what Forest/Open Space looked like. In instances, like in Arlington County or other highly urbanized areas, to be able to say that all of those conditions were met is basically near too impossible. For Forest Cover, when we set to implement this is thinking truly forest cover, forest underbrush, etc., really providing that infiltration or runoff capacity associated with it. Recognizing, like they do in DC that there is a volume reduction in planting a tree. Recognizing that there is the science to at least show that through transpiration that there is some uptake that does occur through the planting of trees on a site.

Drew wrapped up a summary of the existing 3 big land use categories with a quick look at the Managed Turf land cover type, it is land that has been disturbed and graded, replanted with an eventual use as "managed turf". Recognizing from the expert panel report that having a tree canopy over that "managed turf" may or may not match those RV coefficients. The RV values could be a little less than those listed based on the science. He finalized his examination of the land use categories with a brief mention of the third category which is "Impervious Cover". One of the questions that he posed to the group was: "As we look at just urban tree canopy as a land cover condition and the VRRM Spreadsheet with a fourth category type with a set of different RV numbers for that category, etc. is how difficult would it be to get something that is defensible and then run an exercise to see what differences that would make. How would this group look to describe that fourth land cover type category?

Group Discussions:

- For example, for the linear development community, like the work that VDOT does, would this type of land cover category be something that VDOT would consider using on their projects? To fully consider that question, there needs to be a clear understanding of what we are looking at. A clear set of definitions would help with that process. A very simple table could be developed that identifies how the VRRM defines the "Forest/Open Space" category and then how an "Urban Tree Canopy" land cover type would be defined. Then we need to look at how the Expert Panel Report defines those different categories. There might need to be a minimum area for "trees" before it would be considered to be a forest. The perfect tree canopy or almost more of an individual tree as a BMP would be anything below that minimum threshold as a way to separate and clearly identify those individual categories. It will need to be clearly defined because the question that is being raised is why wouldn't it just fit into the Forest/Open Space category? Why do you need a separate "tree canopy" category? What exactly are the differences? One approach might be to tie the canopy area to what actually is underneath the canopy. Is it a natural thicker top soil or is it impervious area, or something different? We might just need to tease those differences out into a very simple table with specific definitions for the land cover categories. Then we could look at it from the perspective of is this another land use category or is it a Best Management Practice? From a linear project perspective, there are likely to be those larger corridors where you would have contiguous forested conditions so you might have the opportunity to use a tree canopy category. However, on smaller facilities and projects where there are parking lots and not contiguous forest areas it could be utilized. As a practice it could be very useful.
- The Expert Panel Report adjusted the Curve Numbers that they were evaluating based on underlying soil conditions.
- Smaller lots are not covered by the stormwater management program. They are covered by the Stormwater Program because of the nexus with the Chesapeake Bay Preservation Act. Does any of this count towards MS4 Requirements? This Expert Panel Report is out there and is available for all of the MS4 Communities to utilize for MS4 permit compliance.

- There was a lot of science that was done by the Expert Panel that have to evaluate as it applies to the Stormwater Management Program. We need to keep in mind that we still need to strive to maintaining/achieving a "net-neutral". It is the State's Water Quality Program for Post-Construction, the 0.41 that is our means of continuing to stay in compliance with the Chesapeake Bay TMDL,
- So, on the "Managed Turf" land use, if you plant a tree on a disturbed portion of the site, you don't get any credit for that because it is already "managed", it is going to be "managed turf" but it doesn't say anything about the tree. That would be where consideration of the "tree as a BMP" would come into play. So, the question is then what does a fourth category of land cover get you? With this scenario you would have your pre-construction stormwater management plan that you would submit and then you would have your final stormwater management plan that you would submit and there would be a land cover change from start to finish. Wouldn't there be a lower phosphorus post-construction requirement because of the land cover change? Would you get credit for a land cover change between starting (pre-construction) conditions and final (post-construction) conditions? The Expert Panel Report does look at land use and changes in those uses.

Drew provided several examples on the white board that looked at the impact of land cover changes on a site. He noted that in the review of plans that the pre-development conditions are not looked at. The key point of considerations is that the post-construction number is 0.41. So, a developer would look at the resulting amount of impervious area on the site and would determine how much of a lot reduction needs to be provided to achieve that 0.41 number, then determine what they need to do to achieve that reduction. It is possible that the needed reduction could be achieved by planting trees and providing that tree canopy over portions of the site. So, the question becomes, what reduction does a single tree with a 144 square foot 10-Year tree canopy provide? How many would you need to achieve the needed reduction?

Group Discussions:

- How are we going to incentivize NOT cutting down the existing trees, the existing forested areas on a site? That is one of the things from an NGO perspective that is being looked at. How do keep the existing trees instead of or in addition to encouraging the planting of new trees? The question becomes does leaving the existing trees on the site provide a bigger benefit than the planting of new trees or even maintaining existing trees over impervious cover as a best management practice. If we are talking about the difference between "managed turf" and "forest" from the runoff coefficients, the delta wasn't that great when compared to "impervious surface". When we are developing small lots, every credit counts but it is not likely that the differences would be huge. But on a small lot that small number might make a difference.
- Does maintaining a tree canopy over managed turf – preserving those trees and taking that into account in the runoff reduction spreadsheet as a land use category provide a bigger incentive than preserving those trees and leaving them there to function as a stormwater best

management practice? That may largely depend on what credit is assigned to them as a BMP.

- Regarding "tree canopy" ordinances: How would those plan a role in terms of the requirements to have a certain percentage of tree canopy there because you are building this house? Which program would take precedence in the overall design and construction requirements? Both programs would likely apply since you are doing two different things. You are trying to meet your tree canopy requirements as well as your stormwater requirements. The thrust here is what we are trying to achieve is getting people to keep the trees on a lot instead of clear cutting, if possible. And, in looking at a site, it is not always mature trees that we are dealing with. So, maybe you don't have to plant trees on your property or project site, but you could put money into a tree fund to have trees planted elsewhere. Currently, we are not making a lot of progress in getting trees planted on private property.
- For those people that are clear cutting their lot or redoing their house, would they then be required to put in a different type of stormwater BMP? They could. There could be some incentive for folks to maintain the tree canopy. That is the piece that has not been talked about yet. That is really important to this discussion. If the developer or landowner is going to be required to put in some sort of structured practice versus comparing a stand of trees as a stormwater BMP, how are those options going to be compared or chosen one over the other?
- The Tree Canopy Ordinances that we have been discussing are not mandatory, so a locality does not have to adopt such an ordinance. But presumably a tree ordinance adopted by localities would take into account some of the things that this group has been discussing so that they would all work together. Looking back at work done previously in Northern Virginia, there were two separate sections of the entire local ordinances, there was a stormwater section in Leesburg and there was a tree canopy section in Leesburg and a developer had to meet the requirements in both sections. There were screening and buffering requirements and then there was what was necessary for parking lot landscaping. There were just as many calculations for landscaping as there were for stormwater management. One of the areas that we have not really addressed is the concept of the use of "trees as BMPs". It really becomes the case when dealing with smaller, more compact sites, that a developer is being asked to plant trees either over turf or over impervious cover and it does provide a stormwater benefit. Can we calculate that and capture that to be able to provide a credit for the planting of trees as a BMP?
- It was noted that through another ongoing process, that work is being done to give all localities the authority to include tree preservation as a component of their tree canopy ordinance. Right now, that option is only available in Northern Virginia. There is a very complex statute that is used in Fairfax County. Under the statute that is being worked on, every locality would have a tree preservation target and that target is on pre-development conditions, so that would go a long way to incentivizing tree preservation. When we talk

about BMPs, we need to look at trees planting from the perspective of we have a load that we need to meet, how can we let trees count as a way of meeting that load in addition to what we are accomplishing through the tree canopy statute process?

- It was noted in relation to Tree Canopy Ordinances and the discussions of the group, DEQ does not administer or implement or have anything to do with local tree canopy ordinances. There is a lot of potential legislation that may be going on around the tree canopy ordinances but those efforts are not DEQ Agency legislation. Even though tree canopies may be relevant to our conversation it is important to keep in mind that DEQ does not administer that part of the Code of Virginia.
- Regarding the concept of "double-counting" that has been raised: ultimately that would be a locality's decision as to whether they would allow a tree that is planted to meet post-construction stormwater requirements to also count towards its tree canopy ordinance requirements.
- The group discussed the concept of "nature-based solutions" as referenced in the ongoing Chesapeake Bay Preservation Area regulatory amendments. The use of trees or a stand of trees as a means to meet stormwater requirements as well as their use as a "nature-based solution to deal with climate change was briefly discussed as also being an example of a locality's decision as to whether they would allow it to be used to meet both requirements. The determination of use of these alternatives really breaks down into looking at the nuances for every particular project – the devil is in the details.
- There are normally two pathways to compliance. You can plug in your entire site area and plug in a forest area that you are going to preserve (DEQ asks that you record a maintenance agreement on that so that it stays that way until a revised stormwater plan is submitted) then you identify the impervious areas of the site (roadways, managed turf, etc.), then you calculate it for the entire site and compare that to the 0.41 standard. Or you can just use your Limits of Disturbance (LOD).
- Modeling on the Micro Level was discussed. It was suggested that it might be useful to run some numbers on a quarter acre, maybe an 8,000 square feet site to see where that threshold for seeing some benefit occurs from the use of trees as a BMP. That really relates to our discussion about defining the category accurately to be able to see and consider those possible benefits. Where do you draw the line where someone can identify something as an urban tree canopy land cover type? On these really tight lots, everything counts, while on the larger lots the load reduction requirements are usually met through other broader means or options.
- In Fairfax which doesn't allow an agreement in lieu of a stormwater plan, they require developers to go through all the requirements for single family lots. Fairfax does employ the nutrient trading program, so sometimes we will see a ton of purchases of off-site nutrient credits at one hundredth of a pound here or two hundredths of a pound there or three hundredths of a pound there. It is possible that by enabling the use of "trees as a BMP" to be considered that the number of off-site nutrient credits might be cut back. It is likely to

provide at least some flexibility to the process. That could be useful since nutrient credits can be hard to come by, especially in Northern Virginia.

- One of the BMP specs is for "soil amendments", which is basically taking the land that has been impacted during construction and using a soil amendment to bring that land back to get the "Forest/Open Space credit". In that specification there are probably three sentences about reforesting as part of the soil amendment which probably needs to be highlighted and "more meat put on the bone" as something that is already in our program now that addresses the tree planning/preservation concept. This could provide an option for instead of purchasing a 10th or a 100th of a pound, it could be that you do a soil amendment, you do the land restoration to go back to Forest/Open Space instead of having Managed Turf as the land cover type. This approach needs to be further thought out but at least it is an option that could be considered.

ACTION ITEM: Provide links to the Updated Virginia Runoff Reduction Method Guidance Manual (GM16-2001-Virginia-Runoff-Reduction-Method_V3.pdf (vt.edu)**)and Spreadsheets (**VRRM_New_Compliance_Spreadsheet_v3_082017-1.xlsm (live.com)**) & (**VRRM_ReDev_Compliance_Spreadsheet_v3_082017-1.xlsm (live.com)**).**

ACTION ITEM: Members of the SAG with experience with smaller lot development were asked if they could provide specific examples and scenarios using a potential 4th category of land use – Urban Tree Canopy. Jennifer Fioretti and Jason Papacosma from Arlington were asked if they could provide specific spreadsheet scenarios to the group.

9. Review of the Virginia Stormwater Management Program (VSMP) Regulation - Water Quality Compliance/VRRM (9VAC25-870-65) – CONTINUED – BMP Worksheet - Drew Hammond/Robert Cooper – DEQ:

Drew reviewed the BMP Worksheet and the various input requirements. He reviewed possible inputs into the spreadsheet for a site development. He noted the following:

- The different land cover types would be plugged into the spreadsheet.
- You would want to make sure that if it was considered a post-development land cover category, we wouldn't also be treating it as a stormwater best management practice, because you are getting the benefit of that category with that reduced RV coefficient associated with it.
- If we were to consider the second half of Number 4 of HB520 , "Trees as a BMP", the process would be that you would plug that it, managed turf is what is underneath of the tress, so you would plug that information in, then we would have a BMP Specification, we would work through the Expert Panel Report, you would know the removal efficiency, the runoff reduction credit or the pollutant reduction credit that would be associated with a "tree as a BMP" planted over managed turf or planted over impervious cover or even retained at that particular point. Then you would know the area. The Expert Panel looked at the i-Tree model and used a 10-Year canopy with an average canopy of 144 square feet (that 12X12 box), you plug that in and

it ultimately calculates how much removal you got. Then you have to determine whether the reduction that you get is enough to you to the required standard without having to buy an additional 10^{th} of a pound or a 100^{th} of a pound of phosphorus credits from an off-site nonpoint nutrient bank?

Group Discussions:

- For purposes of calculating tree canopy, they are different for different types of trees. For purposes of these spreadsheet calculations, would you have to calculate the different results for the different types of trees or would you make generalizations then you can for tree canopy purposes? That consideration came up in the discussions of the Expert Panel and what that group stated was: "we recognize that these numbers are all different, but for the purposes of MS4 Stormwater Compliance, we are going to go with 144 square feet and that 144 square feet is what to expect for an average 10-year growth canopy for all of these different species of trees."
- The 144 square foot figure equates to a six-foot radius – a one- or two-inch tree would have a six-foot radius. That is factoring in a medium sized tree. A large oak would have a much bigger canopy versus a dogwood so they picked something that was squarely in the middle for their calculations.
- What if you have a patch of 10 trees that you want to preserve, would you use a survey group with LIDAR to delineate the area? If you have that LIDAR survey and a known number of trees, are you really looking at "forest cover" or is it really "urban tree canopy"? That is one of those cases where you probably need to fact-truth it on the ground. There is currently not a minimum square footage established for "Forest/Open Space".
- This approach from a developer's perspective has an advantage because it is more supportive of using trees as a treatment train for making them act as a multiplicative BMP when you would place a tree within a bioretention cell or a detention pond. If you have a tree in a bioretention cell that tree is there to make that bioretention function and to get the credit that's already been assigned to it. So, you would not be able to use that tree again, for the purposes that we have been discussing. If you have a forested area that you are calling it Forest/Open Space and using that as your Land Cover and then you put more trees in there, you can't do that, you can't double count. You would have to go through the list of: Here are my trees. Here is what they are being used for. Then split all that out based on the system that we have now to determine how many pounds or 10ths of pounds are left and then decide how many additional trees do I need to plant to give me the needed reduction to come into compliance? There needs to be some kind of hierarchy so that you filter things out and you are not double-counting.
- What about the scenario where you have trees scattered throughout the drainage area for a bioretention cell? In that case what would be the process? How would the calculation work for a drainage area that essentially has a mix of the land cover approach and the BMP approach? In this case you are looking at both quantity and quality at the same time. Those

trees that are that drainage area are kind of already being accounted for in the curve number that is being generated as the runoff going to the BMP practice. You would need to consider that curve number figure and then count the number of trees in the drainage area to get a quality credit. It is just another layer for consideration that makes the conversations around forests more complicated. Basically, you would need to assume that those trees are just part of the turf land cover. The overarching question related to trees on a site is are they being used as a land cover condition or are they being used as a best management practice? If they are being used as a land cover condition, you would just plug that in as a land cover condition draining to that bioretention basin and the effect would run through the loading that was coming into the base and using the runoff coefficients from that drainage area. But if you are using it as a best management practice, you could look at that as a treatment train, which is you have these little areas that are in the larger drainage area for that bioretention basin that are providing maybe a hundredth of a reduction here, a hundredth of a reduction here and a hundredth of a reduction here so then that remaining leftover load is running through that bioretention basin.

The group's continued discussions will need to look at how it would look to implement a tree as a BMP or as an urban land cover category. Some of the parameters for doing these things will need to be identified. We will need to consider that while we could do it a certain way, we will need to keep certain things in mind that we need to do and other things that we should not do in order to keep the implementation as simple as possible. We will need to identify those parameters because ultimately the report from this group goes to the General Assembly and they may or may not direct DEQ that as a result of this study we want to you to make trees a BMP. A specification for trees as a BMP would need to be developed. The question then is what are the parameters that would need to go into that specification that would make it to the Clearinghouse? Or the GA could say that they want DEQ to include trees as a land cover condition/category, in these circumstances and for use in these areas. That would require looking at that table in the VRRM spreadsheet and identifying where you would use it. The devil is in the details in terms of implementation.

Group Discussions:

- Would it help if the work group at some point gave a list of scenarios that could be a challenge to these proposals and by the October 20th meeting maybe have had time to consider those scenarios? Any input from the group would be appreciated. We are here to have the conversations with the group and to see what the thoughts of the group were and figure out what we need to document and how we needed to do it.
- It is important to keep in mind that these conversations and recommendations are going back to the legislature. Which means if we make recommendations to the legislature and they choose to do something then that could eliminate the need for a regulatory action. It is unknown what will happen once the legislature gets this group's recommendations.
- It is important to point out that the product of this group's efforts is a report, not a regulatory change. But as far as the next steps, that could vary based on what comes out

of this group. As mentioned earlier, there is a way to add a BMP to the Clearinghouse that would not require legislation, if everybody was in agreement. It would not require a full regulatory process. If the recommendation from this group was to do something around creating a fourth land use type, that would obviously be a different process than just adding something to the Clearinghouse. As far as next steps that sort of depends on where these conversations go, but we should not automatically assume that it necessarily leads to future legislation, although it very well could.

- If the report says that this practice or said practices should be given to the Clearing House to develop and articulate, how would that process work? This is a process that DEQ has never done before. We are stuck with the things that are currently on the Clearinghouse. The only things that have been added have been the manufactured treatment devices. But as far as nonproprietary/the standard suite of stormwater controls go, those have been there since the regulations were adopted in 2011. There was an original list of stormwater controls that existed in the old Part IIC requirements that were then subsequently carried over and approved as part of the newer requirements. They were BMPs that were listed and referenced in the 1999 Stormwater Handbook that had removal efficiencies that were in the older part of the regulations. Then they were subsequently revamped into new specifications and moved into the Part IIB regulations.
- Language related to the approval of innovative practices was briefly discussed.

9VAC25-870-65 C reads: *"C. Nonproprietary BMPs differing from those listed in subsection B of this section shall be reviewed and approved by the director in accordance with procedures established by the department."* DEQ has never gone through this process. The department has never written down the procedures as to how that would occur. The format for that procedure could be essentially looking at the other existing specifications, recognizing that there are limits on how you use the practice and how you calculate the removal efficiencies, etc. for the engineering community, the folks that are going to be reading that and utilizing that along with the local VSMP Authority, including DEQ. We would want to put some thought into potentially what a specification would look like if "trees as the Best Management Practice" was the pathway forward. We should probably also look at that if "Urban Tree Canopy as a Land Cover Condition was the pathway forward. There would need to be a conversation around the table as to what counts as "urban tree canopy"? We need to look at it from both the perspective of having an existing urban tree canopy that is getting plugged in and whether or not a new urban tree canopy is being established. In order the close this conversation up, the next steps look like largely depends on how the conversations of the SAG proceed. In looking back at the language in 9VAC25-870-65 C, if the will or consensus of the group is to add something as a nonproprietary BMP, it does not have to be legislation. It is not even really clear that legislation would make it move faster. We might also want to get some thought to the precedent that would be set by having the legislature deciding whether something is or is not a BMP.

Group Discussions:

- What is the process for changing the Runoff Reduction Spreadsheet and adding that new category of land use/land cover type? The regulation does speak to "nonproprietary BMPs differing from those listed but then would we have to amend the regulation to add something to

the existing list? It was suggested that we would not have to amend the regulation because of the 2013 specifications and the wording in 9VAC25-870-65 B which states that: "Other approved nonproprietary BMPS found on the Virginia Stormwater BMP Clearinghouse Website may also be utilized." One of the concepts that came over with the program was a Clearing House Committee. The idea was that we would have a group of experts who could take a look at these different BMPs, but it sort of devolved into focusing just on manufactured treatment devices and there was a lot of push and pull among the manufacturers and it didn't make sense to us to let them kind of self-regulate, so DEQ really changed the nature of that group. In addition, the General Assembly in 2020 changed the Code as it addressed manufactured treatment devices (MTDs) and now in Virginia we will only recognize MTDs based on reciprocity as opposed to the old way of doing things. This concept of a BMP Clearinghouse Committee certainly predated the Expert Panels of the Bay Program, which are kind of serving a similar function but for a different purpose, which is to get everybody in the Bay states thinking the same, but is still doing the same thing. It is evaluating the effectiveness of BMPs.

- The bottom line is how do we increase the BMP tools and how do we make sure that we have the right science behind them so that what we are approving and using is giving us the benefit that we are expecting?
- Could the Director just ask that a specific technical expert group be formed to advise him on this set of BMPs? That approach might make sense and would be a way of getting some level of outside validation. Now a lot of that work is being done by the Bay Program, so would a separate group be a duplicative effort?
- DEQ used to use an academic advisory committee to help with development of water quality standards, but the funding for that went away. The process relied heavily on DEQ reaching out to academic experts and asking for their help and they being willing to give it.
- What DEQ is looking for is a path forward where we make sure we have sound science behind whatever it is that we do. That is really the first step. Then we need to make sure that it doesn't conflict with any if these twists and turns in any of the existing regulations or other programs.

"What's the process for changing the Runoff Reduction Method?". 9VAC25-870-65 A reads: *"A. Compliance with the water quality design criteria set out in subdivisions A 1 and A 2 of 9VAC25-870-63 shall be determined by utilizing the Virginia Runoff Reduction Method or another equivalent methodology that is approved by the board."* The Runoff Reduction Method is a "Document incorporated by reference" into the regulations and it is a compliance tool but we are not sure of the logistics of adding a category and adding a different ser of runoff coefficients.

Group Discussions:

- It was noted that there is no Version Number identified on the current spreadsheet. The current instructions and documentation are identified as March 28, 2011. DEQ has not gone through a periodic review recently on these regulations, but once that is done DEQ would revise the

refenced documents to refer to Runoff Reduction Method 2016 and replace the link to refer to the 2016 Guidance.

- A question was raised as to whether the body of the regulation that talks about the Runoff Reduction Method get into a discussion or description of the use of different land cover types? All of that information is buried in the document that is incorporated by reference. All of that detail is in the instructions and guidance memo. The regulation just says use the Virginia Runoff Reduction Method.
- In looking at "trees as BMPs' if that is what is recommended could we either just use the Expert Panel findings/recommendations or develop it through DEQ Specifications. We need to think through the implementation steps that would be needed. Staff noted that they would be somewhat hesitant to just take the Expert Panel Report and post it on the Clearinghouse and here just use this. A qualification would need to be noted that might say "Based upon the science of the Expert Panel, here's what you need to do to implement this specification." Maybe pulling out a one or two pager that pulls out the important information from the report so that not only the stormwater plan reviewers but also the engineer working on stormwater management plans would have something to reference to. The Expert Panel Report is a really good document but it is really written for the MS4 Compliance world and not for the state only Stormwater Management Program.
- It was suggested that a greater review of the Expert Panel Report might help guide the next discussions of the group. In particular looking back at the drainage area piece, it was suggested that could potentially be misused because if you have a larger area you might end up with erosion and all kinds of unintentional kinds of things.

ACTION IEM: Staff discussed taking a small site and running some numbers so that we can see on a micro scale the impact of these various scenarios.

ACTION ITEM: Staff asked the group to provide whatever information, scenarios, examples and concerns related to the identification of "trees as a BMP" and "trees as a land cover condition/category" that the staff could review prior to the meeting on October 20th. Staff would appreciate any input that would inform the discussions at the next meeting.

ACTION ITEM: Staff will look into the process and method of making changes to the Runoff Reduction Method and report its findings back to the SAG at its next meeting.

ACTION ITEM: It was suggested that it might be useful for the SAG members to read through the recommendations in the Expert Panel Report in greater detail as a way to prepare for the needed discussions at the next SAG Meeting.

10. Wrap up of Long-Term Maintenance and Trees as BMPs and as a Land Cover Type Discussions (9VAC25-870-112) - Drew Hammond - DEQ:

Drew wrapped up the discussions on "Long Term Maintenance"; the use of "Trees as BMPs"; and "Trees as a Land Cover Type". He noted the following:

- We have had a lot of discussions regarding the consideration of "trees as BMPs". One of the things we need to look back at is 9VAC25-870-112 which addresses the long-term maintenance of permanent stormwater management facilities. We recognize that there are many mechanisms at the end of the day in terms of ensuring that those facilities remain there in perpetuity and function like they should. Where DEQ is the VSMP Authority, DEQ is not in the business of administering part of the program for Chesapeake Bay land disturbing activities on private property but we do it on state projects. We do ask the federal folks to comply with the requirements to the extent practicable. We do see CBPA land disturbing activities on state projects. State projects are a little bit different, because we don't go through and record BMP maintenance agreements on state lands, but we do have folks have on their approved stormwater management plans and their program documents identify what is necessary to ensure long-term operation and maintenance, etc.
- If a private developer was going to use three trees as a BMP on a bigger project site, then we would have them go through an exercise where we would sign a BMP maintenance agreement, the developer would identify that these three trees are used in the Runoff Reduction Method, here are what the expectations moving forward with respect to inspecting those and making sure that they are there and that they are not dead, dying or diseased and if they are here is the mechanism for their replacement to continue to ensure that the Best Management Practice is there and functioning.
- If the recommendation is to identify trees as a creditable land use category instead of using "trees as a BMP", there are similar maintenance agreements that we use for Forest/Open Space. That could be opened up to include that condition. For example, we could say that this area was either established or preserved on site underneath this category as a means of providing water quality benefits for post-construction stormwater management and here are the expectations. The expectations would essentially be the same as for other long-term maintenance agreements: routine inspections; reporting to the department when requested; access to the site, etc.
- 9VAC25-870-112 A also contains the phrase: *"...and other techniques specified to manage the quality and quantity of runoff..."* DEQ banks on that pretty hard especially with the preservation of Forest and/or Open Space, because they truly are, when they are entering that into the spread sheet and bringing that load reduction down, that is a technique that they are using to manage the quality of runoff on that particular site.
- Regarding templates for these processes: back in 2014 DEQ worked with the Attorney General's Office and our local VSMP partners and gathered information regarding this process

and set up templates based on that information. DEQ's templates are posted on the website and local government folks are directed to them all the time. There are a lot of folks that do come in and ask about possible tweaks for us to consider.

- So, if a plan were to come into the cue, whether it is the use of trees as a land cover condition or trees as a BMP, DEQ currently has the mechanisms in place that can be utilized for private development. It appears that local VSMP Authorities also have those mechanisms either through the local landscaping or tree preservation ordinances or the local stormwater program.

Group Discussions:

- One of the biggest concerns of using trees as BMPs from the perspective of the existing inventory of private maintenance agreements in Fairfax County, where we keep seeing our inventory increase. Fairfax County has taken over a lot of HOA ponds over the years, luckily there is a robust stormwater service district that's able to pay for all of this, but not everybody does. One of the major blocks for using individual trees as a BMP is the long-term viability of the practice: Who is tracking? How is it being maintained? Is there a mechanism available where the long-term maintenance for the practice could be assigned to a third-party outside of government? For example, someone develops their site. Their "trees as BMP" practice is going to have this long-term maintenance agreement that is signed over to an administrator who would then administer those maintenance requirements in perpetuity. One of the things that is currently in place and that routinely happens is that there are BMP Operation and Maintenance Companies that are signing contracts with, maybe not so much with residential developers but with commercial developers. They come out and basically get the operation and maintenance requirements from the stormwater plan from the engineers and they do the inspections of the BMPs once a year as required by the agreement as an obligation of the owners and provide those reports to the local VSMP Authorities once every three years. Some folks just don't have the ability to do those inspections in-house and are hiring third-party companies to do that work on their behalf. So, that third-party company will go out and do the inspection and provide that inspection report to the owner and say that it was inspected and everything looks fine or here are the corrective actions that are necessary and per your maintenance agreement with the VSMP Authority, you have 30 days to get these things done. A copy of that inspection report would also be provided by the third-party to the VSMP Authority.
- In the case of "trees as BMPs' we are dealing with a less structural and more biological practice. For the most part if individual trees are accepted as BMPs it is more of a presence/absence exercise in knowing that the tree is still there and functioning as opposed "maintenance" considerations. Replacement may be a requirement when needed or eventually maybe even pruning. Is there a company out there that is crediting "carbon" by trees that could be turned around and become the tracker of all things "tree BMP"? There is a task force running right now that was also required by legislation last session that is dedicated to looking at how to use natural processes, variously defined, in connection with carbon sequestration that is also required to come up with a report by the end of the year. It was suggested that from certain

perspectives it is likely that DEQ are the only people in the state that understand the kinds of accounting that needs to be done for an effective program like that. It adds a level of uncertainty when we start talking about someone out-of-state taking on that responsibility and would likely add more work to DEQ.

- The use of these Clearinghouse BMPs can be an Opt-In decision. There is a provision under Code that local VSMP Authorities can go through a process of restricting the use of BMPs.
- One way to look at and manage the inspection process could be to put the onus on the property owner to do self-inspections on whatever frequency that is and that is submitted. Right now, with all of the GIS technology there is a whole more that can be done and there is some automation that can happen to minimize the impact to staff. The difficulty with the "trees as BMPs" concern is when you start to have to replacing trees. Exploring alternatives is a good idea but it is likely that some localities might not look to implement them right away.
- VOF noted that they had discussed with their "tree give-away" program where they are trying to track the trees that are being given out. There is an idea of working with Master Naturalist or tree stewards or a trained army of people who understand what a tree looks like if it is healthy or not to go out to people's homes/properties to check on those trees. There have been some discussions as to what type of "tree confirmers", if you want to call them that, could be established. Some localities are likely to just try to get that kind of information from the existing BMP monitoring programs – the cost of that process is not insignificant. One locality noted that they had run the numbers and if they were to do something like this within 5 to 10 years, they would probably need one FTE. This would be a cumulative process and it is going to take time for localities to get staff to start to administer this type of program.
- It was noted that currently folks that are managing the private maintenance agreements for the existing standard BMPs are struggling significantly with the increased inventory, so adding trees would also significantly increase the workload.
- If there are BMPs to address something on the site anyway, so if it's not trees, it is going to be some other BMP that is going to require inspection – how would that produce more work if all of the BMPs are supposed to be there in perpetuity? That is a good point. Trees might even be an easier BMP type to inspect than an engineered structure.
- It was noted that in some areas that they had originally put a lot of private maintenance agreements on the onus of the landowner and then found it was problematic and the locality ended up taking over the inspection responsibilities.
- VOF noted that they have worked through a process of using volunteers to do inspections and have converted their internal forms for inspections of trees into an easy-to-use form that volunteers can use using Survey 123 On-line. It has been an interesting process, but internalizing and simplifying and making it very easy for a trained tree steward or volunteer to do that process has been helpful.
- One of the things that DEQ would have to look at to develop a specification for posting on the BMP Clearinghouse that the experts in the room would need to help with would be identifying what would the long-term viability section need to look like? Whether a private entity or a local

government is asked to do those inspections, what do we need to tell them to look for? What does DEQ need to look at? If there are standards out there that other agencies are using that could also be used for this process it would be useful to have that information.

- If trees are being treated as BMPs then one key consideration might be" Is each individual tree going to be a BMP or is this going to be a BMP where you have some way of categorizing three or five trees into one BMP? Once it gets entered into the database somewhere as either one or five then every time you do an inspection it is going to take a longer time to inspect the "five" rather than the "one". So potentially thinking about how you would categorize these types of BMPs might be important. One option would be to have an inspection report that would essentially say that there were 15 trees on the site that were being used as BMPs and those 15 trees are still there and they are not dead or dying or diseased and they meet these requirements. That would be an important consideration especially for folks that have to report on their BMPs each year.

ACTION ITEMS: Staff asked if folks in the room would be willing to share information on existing standards related to trees and their long-term viability and inspection methods and requirements that they were aware of that might be useful to this process. Please send those references to Bill Norris for distribution to the group for consideration.

11. Review of the Urban Tree Canopy Expansion Expert Panel Report (Expert Panel Report)- Drew Hammond - DEQ:

Drew provided a summary and an overview of the Expert Panel Report. He noted that we have talked a lot about the Expert Panel Report but we have not really delved into all of the details that are in the report. He noted the following:

- We have talked a lot about the ins and outs about this report and some of the nuance details in the report. We have addressed a lot of the details and recommendations of the report in our other discussions.
- It is important to note that one other state, Minnesota, is going through a process that is looking at a BMP specification or some type of crediting mechanism. They use formulas that they use in in regression models looking at ET formulas being applied to an individual tree in order to calculate the volume credit that you would get from planning some trees. Their program is volume based so they are looking at volume and nutrient reductions.
- So, there is a reference that we can access to start to see how another state is addressing some of these same questions.
- One of the things we really didn't delve into in the Runoff Reduction Spreadsheet with BMPs and the land cover types was all of the literature search that was done in developing those specification and the studies that they did have. They are not proprietary BMPs for the most part, they both have a two-part Phosphorus Removal component, of those is the Runoff Reduction component and one is the Pollutant Removal component. So basically, how much

phosphorus in the water did they suck up and how much phosphorus did they filter, so there is a double component.

- One of the things that did not jump out of the Expert Panel Report was the Runoff Reduction Component. Table E.1 in the Expert Panel Report identifies the Total Phosphorus Reduction for Canopy over Turfgrass as 23.8% and the Total Phosphorus Reduction for Canopy over Impervious as 11.0%. That kind of fits into the pollutant removal box not the runoff reduction box. So, the Expert Panel Report does appear to provide at least some starting numbers that we could use as starting pollutant removal numbers for consideration of trees as a stormwater best management practice.

Group Discussions:

- Could you use the Runoff Reduction numbers from the Soils Amendment BMP for consideration for a "Trees as BMP" BMP? It would appear to be very similar with the soils underneath the tree. There is runoff reduction because of infiltration underneath the tree, so there is some, right? We just need to make sure that we are all on the same page and are aware of what is and what is not included in the calculations in the spreadsheet. We will need to look at all of the numbers that are out there from Minnesota and Washington, DC and others and determine whether we have enough comparable information that we can come up with a respectable Runoff Reduction value that we can defend at the end of the day.
- Work that was done by Karen Firehock was referenced. She did a case study a number of years ago with multiple states. The study was called the Trees to Offset Water Tool. There were three communities in Virginia including Norfolk, Lynchburg and Harrisonburg and multiple other states including Georgia and North Carolina. Information from that study might be useful to the group. The project was funded by the Forest Service.
- Just for clarification, we have the nutrient and the sediment reductions pretty well figured out but the runoff volumes are what we are a little concerned about. The Expert Panel really focused on the pollutant removal efficiencies. Our state only program has this extra runoff reduction or volume reduction component to it. If the recommendation of the group is to go with "trees as a BMP", that will be one of those areas that we need to look at to say from the work that the expert panel did with the Bay Program, here is what the removal efficiency is for a tree planted over these areas and here is where that information came from. But if we were going to put it on the Clearinghouse and assign it also a runoff reduction component, we would just need to do some further investigation into some of this information we have either in Virginia or from other states that may help us define what that number is.
- A concern was raised regarding the use of trees as BMPs is the occurrence of significant flooding events repeatedly over a short period of time. A lot of the calculations are based off of a 1-inch rainfall event, but with climate change and current weather patterns we are having a 1-inch event, followed by another 1-inch event four hours later and then a 2-inch event the next day, so the trees and the soils are saturated and everything runs off. Could you address this by

looking at some sort of average between unsaturated and saturated conditions and taking that into consideration?

- In the Runoff Reduction Method, the 1-inch standard captures 90%. Back when the initial analysis was done 90% of the storms in Virginia were 1-inch or less. Isn't most of the pollution flush that happens in the Bay happen with events that are greater than 1-inch? Most of the pollution flush comes from the "first flush volume". That is where the requirement to capture and treat that first inch of rainfall comes from because the majority of the pollutants are in that first inch of rainfall. We normally see the greater concentration of pollutants is in that first flush.
- The discussions and considerations become more and more complicated and confusing when we start talking about comparing quantity and quality factors. These conflicts and differences will need to be taken into consideration moving forward. We need to talk about whether there is any appetite for RR, for the capability for runoff reduction or is it really a pollutant removal practice that we need to consider. Traditionally our manufactured treatment devices have not been assigned any runoff reduction values, they all get basically a pollutant reduction value – they are providing some pollutant filtering capability. That is basically where DEQ has stopped in their approvals on the Clearinghouse. As has been noted, some of those manufactured treatment devices are basically planting a tree over impervious cover.
- Maybe it is too difficult to consider the water quantity piece of this right now but maybe that could just be another basis for having a BMP – having an ancillary benefit. Why you want to do a BMP is because we know it has measurable pollution reduction benefits but it also has the ancillary benefit of reducing quantity but it is too difficult to measure and give a credit for that benefit, but it is certainly a reason why we should want to do it.
- There are a number of localities that would like to have another tool that they could use for volume reduction. That is understandable but the problem is having the data to be able to determine what that credit would be.

Drew noted in reference to an earlier question about the i-Tree model and the Expert Panel Report that the report goes through and lays out in detail how they used the i-Tree program, all the different species that they looked at and all the different canopies and the timeframe. Basically, for purposes of implementing the Expert Panel Report we are going with 144 square feet per tree. They did the conversion and said that was equivalent to 300 trees because that is how they do the crediting calculations under the MS4 Program. So, for consistency with what we are doing under the Bay Program and for consistency with the Expert Panel Report, for the purposes of writing a BMP specification do we just hold to the 144 square feet figure? What does that BMP specification need to look like? What does it need to include? Do we try to be consistent with the Bay Program and the Expert Panel Report or is there information that suggests a different approach?

Group Discussions:

- It was suggested that there might be Arborists who feel strongly as to what that number should be.

- Different localities are currently using different numbers in their "Tree Canopy" Ordinances but in reality, the numbers are all fairly consistent with the 144 square feet number from the Expert Panel Report. Research actually shows that you can have a 1-inch caliper; you can have a 2-inch caliper or even a quarter inch caliper tree and within 10 years you will have essentially the same sized tree because smaller trees grow at a faster rate and reach that size just as fast as a larger tree. For every inch of diameter, it is about a year of recovery before you would start doing standards. So, when you plant a 1-inch tree it is not going to start to gain canopy until that next year – two years after that – that is kind of the standard in the arboriculture industry. The bigger the tree the longer the recovery period.

Looking at tree canopy is one thing but the next thing is that we have someone that wants to implement this and DEQ is the VSMP Authority: What do we want to see on the plans? We probably would want to see some kind of tree planting detail; some type of schedule; species size requirements, etc. What would be the minimum level of information that would we need to put down for the engineering community or the landscape architect community to use to be able to help implement that practice? At that point too, DEQ would welcome the input from the local government folks that are already dealing with their own tree canopy ordinances and have experts on their staffs who are used to addressing the issue associated with trees and tree planting.

Group Discussions:

- It was noted that there are likely any number of localities with "Tree Canopy Ordinances" who would likely have tree planting details that they would be willing to share. There are some pretty standard protocols out there that are universally adopted that could be translated into something simple.
- It was suggested that while reaching out to experts in the field regarding trees and tree planting that we should also involve some private sector arborists. Input from these specialists could be very helpful in these discussions. Contacting the Virginia Nursery and Landscape Association was also suggested especially if we are talking about long-term maintenance in residential and commercial areas.
- If a specification was developed it would have to be state-wide so there would likely have to be a lot of variations build into it. How would we build those variations into the process? There will also be the issue of evergreen versus deciduous, so there are a lot of things that need to be considered. Growth rates are different for the different species and there are different climate considerations as you go from one area of the state to another. It would likely have some specifications identified for specific general physical provinces across the state.
- In our discussions about this 144 square foot number, were we making a generalization in terms of trying to come up with our specifications? We might need to have some regional different specifications but it wouldn't necessarily be based on a type of tree. But in that case, we wouldn't be generalizing. In thinking about the stormwater plan reviewers trying to figure out based on x number of trees and this is the BMP and this is how it is plugged into the spreadsheet. This gets back to our discussions about lumping in some areas and splitting in

others. If this is used on a larger scale, lumping in the spreadsheet or even on a particular site for canopy area with X-number of trees instead of parsing it out might be the preferred approach or most used option. There is also the potential for abuse. In Fairfax County they have an extensive table in their Public Facilities Manual that gives different canopy sizes by species and by tree size. It is a nightmare to administer. We want to keep it simple, but at the same time you get people that want to put the bare minimum of a tree in and count it for the full credit. So maybe we go the route of saying that there are 12 to 15 native tree species and size class (small, medium, and large) that we will accept and then make that a one-page table as opposed to having to list every tree species and every size. DEQ would love to be able to write a specification that basically would say that as a VSMP Authority, DEQ could apply statewide That specification could provide direction to the local VSMPs but would also recognizing that they would have the ability to restrict or further clarify the use of that BMP in their local jurisdictions. So, it would provide that flexibility that a locality would need to address the particulars of their local programs. One of the reasons that DEQ is asking for assistance statewide is that DEQ is the local VSMP Authority, not so much for the 54 jurisdictions scattered across the state, they are looking at state projects. If VDOT wants to use them or institutions of higher learning or the community college system (40 some campuses across the state), DEQ wants to be able to give them the kind of direction for what works in the various geographic areas that they are working in across the state.

- VDOF noted that when they do an urban tree canopy analysis for a community, they break the possible areas into small, medium and large classes just for simplification. So, there are three classes and then they search species within that class. It is a very simple process that everyone can understand instead of trying to look at it by species which is quite complicated.
- These discussions have centered around trees as a stormwater BMP, specifically in regard to planting trees. Would this stormwater BMP approach also address preservation of existing trees or existing tree canopy? Or is that envisioned as a separate BMP? The Expert Panel Report acknowledged that they focused on tree planting only and that tree preservation was something that was not considered in the report. This report is really just for tree planting BMPs.
- The charge to this group is to also consider tree preservation, so without the benefit of findings related to tree preservation in the Expert Panel Report that step might end up being a bigger one to take.
- When we have been talking before about the use of the spreadsheet and the notion that if you are talking about preserving trees on a parcel that is being developed, you are already receiving benefit because you are not making a land use change. You are not going from forested to managed turf or impervious. So, is the suggestion that we are looking at tree preservation elsewhere than on the site? For example, if you had a stand of trees in one corner of a site that really could meet the definition of forested condition, it has an understory, etc. or maybe you have a few trees around but there is not really understory and there is turf around we would want to keep those trees too if we can. It wouldn't necessarily be a land use; it would be this extra thing that is kind of like tree planting but the trees would already be in place. So, if there

were three existing trees on a site and we recognize that we have done everything we needed to do to preserve them, we didn't cut them down; we fit the development around them. Recognizing that the Expert Panel Report really speaks to building or setting up new tree canopy, but if the canopy is already existing and we have done what we needed to do to preserve and protect it so it stays in perpetuity, could you still calculate a pollutant removal associated with that? We certainly give credit for wetland preservation on site. The question then begs what do those three trees look like? Let's just say that those three trees have been there for 20 years and the canopy is going to be whatever a 20-year canopy is going to be, but we have gone through the exercise of preserving them; making sure that we have not disturbed the land around them; putting in the needed tree protections that are necessary; we haven't really messed up the critical root zone that they speak to in the E&S Handbook, etc. Those trees are still going to provide some level of benefit so can we calculate that or not? And is the benefit greater than just consideration of land cover? Using the i-Tree Tool, the benefit is much greater for a larger tree than a new tree. All the benefits are greater for that 20-year-old tree. You can use the i-Tree tool to calculate that versus the new installation because that tree has 2o years on that new tree. The benefits are much greater if we can preserve a larger tree over a new tree, but that is not always possible, so you have to make accommodations for and consider both approaches.

- It was noted that the type of analysis that we have been discussing is very parallel to the analysis that DEQ goes through in wetland mitigation in that there is a functional equivalency. In wetland mitigation, we know that we have some temporary loss of function, if we take a certain amount of wetland impact and replace it with permittee constructed wetland. The functionality isn't going to equal out for decades. So, these are common concepts.
- If an entire site were forested before you started development activities and you preserved say three trees so they didn't change in land cover, wouldn't they still be forested in the proposed conditions because they did not change from existing? So, then wouldn't it just be 144 square feet of forest and you wouldn't use the tree BMP because that would be double counting to get the credit for the forested condition and the credit for the tree. If you did what was necessary to preserve the critical root zone in that area then you would likely be dealing with a forested land cover condition. The bigger question starts to become how do you apply these concepts in the urban areas where the whole site is not forested and you have a few trees here and there and there is no understory? How do the Runoff Values function versus pollutant removal in an urban setting?
- Would it be possible within the regulations to allow trees and tree canopy to be used as a land cover type and/or as a BMP? The calculated benefits from a larger tree being used as a BMP for mitigation may be greater than what would be calculated off of the runoff coefficient. Double counting may be a problem, because we are really mitigation for the loss of whatever impervious surface that we are adding to the site, so by counting something as preserved you are not really mitigating, you are just counting something that is already there. So, if it was one

or the other, we either counted it on the front end or on the back end and didn't allow for double counting then it would be a little more meaningful.

- Part of the answer to this issue lies in determining whether the existing definition of "Turf Land Cover" assumes that there are some trees scattered throughout that turf area. We probably need some clarification on that. It gets back to the use of the term "managed turf" but when you look at the information behind the term, it is really the areas disturbed during construction. One of the ways that we could look at this would be if you went through a tree protection plan and actually implemented tree protection and protected the critical root zone. So, if you went through that particular effort, could you count those three existing trees as forest cover, because you didn't disturb the critical root zone underneath during the construction process? That is a great way of viewing the idea of dealing with preservation issues because most of it is already being counted under "forest". But if there is something that is not being counted and you preserve it then it could be counted towards that portion of the calculations where the tree is a BMP and not as part of the nutrient plan. Part of that process is going to be when you are putting together your E&S plan which has tree protection on it, part of it is going to be if you have a big tree on site that you want to preserve and to be able to count then you need to be able to identify the critical root zone and ensure when the site is developed that the area is clearly identified and that the area is not impacted during the development process.
- There is a lot of research that shows that preserving trees by preserving and protecting their critical root zone area helps preserve them and the tree canopy in the long-term.
- Long-term maintenance of a mature tree is a whole different challenge from maintaining a newly planted tree or stand of trees. What is the performance period? The when that tree fails it is not replaced by another mature tree. So, how does that delta get factored into the long-term credit calculation?

Drew noted that whether it is a BMP or a land use condition, in an ideal world those would be perfectly maintained and wouldn't change but we recognize that is not possible. DEQ goes out every day and find areas that have been cleared that shouldn't have been or BMPs that are not functioning like they should have. That is just the universe that we are living in and will have to work through it. That is part of the reason that the Code does speak to the situation where there are improperly functioning best management practices that there are some pathways under the nutrient certification program to help address those things in the long-term. Because it may be easier to go purchase credits versus going through the enforcement process.

ACTION ITEM: Staff will reach out to Karen Firehock with the Green Infrastructure Center to see if she would be willing to share details from her Trees to Offset H2O Tool with the group at the next meeting.

ACTION ITEM: In addition to trying to run some simple calculations at a small level, DEQ staff see what Minnesota is doing in this arena for consideration at the next SAG meeting.

ACTION ITEM: SAG Attendees were encouraged to share information regarding available tree planting details and protocols with Bill for routing to the group. In addition, staff will reach out

to localities with Tree Canopy Ordinances and try to get examples of their standard "tree planting details" to share with the group.

ACTION ITEM: The group was asked to share any contact information on private sector arborist and contacts for the Virginia Nursery and Landscape Association with Bill Norris so that staff could contact them for information and possible input to this process.

12. Final Thoughts – Drew Hammond/Melanie Davenport (DEQ):

Based on today's discussions, we will need to hold at least one more meeting of the SAG. We have had a lot of good discussions today and lots of good conversations. It seems like folks are at all at a similar level of understanding.

The next meeting is scheduled for Wednesday, October 20, 2021, here at the DEQ PRO Training Room starting at 10:00 AM.

If any of the SAG members or other meeting attendees has information or examples that they would like to share with the group please route that information to Bill Norris for distribution to staff and to the group.

13. Public Comment

An opportunity for members of the public who were in attendance to make any public comment to the group.

- **No Public Comment was offered.**

14. Adjournment

The meeting was adjourned at 4:07 PM

TREES AS BEST MANAGEMENT PRACTICE (BMP)
STAKEHOLDER ADVISORY GROUP (SAG)

MEETING #2 NOTES – DRAFT-Revised

WEDNESDAY, OCTOBER 20, 2021

DEQ PIEDMONT REGIONAL OFFICE – TRAINING ROOM

Meeting Attendees

TREES AS BMP SAG MEMBERS	
Phillip F. Abraham – Virginia Association for Commercial Real Estate – VECTER Corporation	Alex Foraste' – Virginia Department of Transportation
Evan Branosky – Home Builders Association of Virginia	Brent Hunsinger – Virginia Conservation Network – Friends of the Rappahannock
Corey Connors – Virginia Forestry Association	Brian Keightley – Fairfax County – Urban Forest Management
Jason Papacosma – Arlington County	Peggy Sanner – Chesapeake Bay Foundation
Karen Firehock – Green Infrastructure Center, Inc.	

NOTE: SAG Members NOT in Attendance: Andrew C. Clark – Home Builders Association; Jen Cobb, PE – Henrico County & Drew Mulhare – Virginia Common Interest Community Board

PUBLIC/INTERESTED PARTIES	
Taylor Privott - Dewberry	**Jill Sunderland - HRPDC**
Samantha Sedivy – Reed Smith	

TECHNICAL ADVISORS AND DEQ STAFF	
Erin Bell - DEQ	**Drew Hammond - DEQ**
Brandon Bull - DEQ	**Karl Huber - DCR**
Robert Cooper - DEQ	**Lara Johnson – DOF**
Melanie Davenport – DEQ	**Bill Norris - DEQ**

The meeting convened at 10:02 a.m. and adjourned at 4:05 PM

1. Welcome/Brief Overview of HB520 & Schedule/Introductions – Melanie Davenport/Drew Hammond – DEQ:

Melanie Davenport, Director of DEQ's Water Permitting Division welcomed the members of the Stakeholder Advisory Group and members of the interested public/stakeholder community to the 2nd meeting of the Advisory Group. She noted that DEQ has convened this conversation at the direction of the General Assembly (GA). She reminded the group that the GA identified who DEQ should reach out to and the topics that those stakeholders are to look at are "studying the planting and preservation of trees as an urban land cover type and as a stormwater best management practice". So, there are two elements to our charge and at our first meeting we went through a lot of background information and we will continue that process for part of today's meeting, but hopefully a bit more specific and a bit more detailed.

We are late in our development of the report required by this legislation. This was an assignment from the 2020 GA and between the Pandemic and all of the other legislative assignment, DEQ had to defer this effort until this year. So, we hope to have the conversations of this stakeholder group concluded and have something to the GA before the 2022 Session. There is currently a 3rd meeting of the SAG scheduled for November 4th but depending on today's discussions, that meeting may not be needed. She thanked those in attendance for their willingness to participate in these discussions. She noted that the meeting notes from the first meeting had been distributed to the group as information. It was noted that the meeting notes were extremely thorough and reminded the reader of all of the different things that were discussed at that first meeting and were very helpful. It was noted that the group does not have to approve the meeting minutes but the group is encouraged to share any questions, concerns or edits with Bill for incorporation into the final version of the minutes.

Drew Hammond noted that one of the things that DEQ has to do as part of the House Bill 520 required report is to include a summary of the SAG's meetings.

Melanie noted during the first meeting of the SAG that we had a lot of useful discussions and interactions and pleasant conversations. So, as was the case during the first meeting there are a few folks here today who are not assigned members of the Stakeholder Advisory Group so if there are no objections, we will let them participate freely in the discussions instead of holding their comments until a public participation period normally scheduled at the end of a stakeholder meeting. No objections were noted.

SAG Members; members of the public/interested stakeholders, and technical support staff were asked to introduce themselves and to indicate who they were representing at the meeting.

2. Tree Canopy as Urban Land Cover Type – Drew Hammond - DEQ:

Drew Hammond thanked everyone for joining us for the second meeting of the Trees as BMPs Stakeholder Advisory Group. He noted that two of the things that we were tasked with as a result of House Bill 520 was to take a look at trees as a land cover condition and trees as a stormwater best management practice. We had a lot of good conversations at our first meeting about those two different scenarios or situations. We used an illustration on the white board to look at what it would look like if urban tree canopy were an urban land cover type under the Virginia Runoff Reduction Method. That is the method that the regulations spell out with respect to water quality compliance. That is one of the areas where land cover considerations come into play with respect to determining whether or not you've met the specified regulatory input for land disturbing or construction activities in the Commonwealth. The other half of that conversation was taking a look at the Chesapeake Bay Program's Expert Panel report on Urban Tree Canopy Expansion and the pollutant removal properties that trees provide, i.e., basically functioning as a Stormwater Best Management Practice.

One of the things that DEQ committed to do at the last meeting was to look at a handful of different scenarios, utilizing the Runoff Reduction Method spreadsheet (the compliance spreadsheet) that we went over at the last meeting. The task was to look at these different scenarios on fairly smaller lot sizes. One of the things that we heard at our last meeting, at least in Arlington County's mind, was taking a look at tree canopy as a land cover type or taking a look at urban tree canopy as an urban stormwater management practice on those smaller urban lots and seeing what the numbers would look

like using the compliance spreadsheet. These examples were not sent out in advance of the meeting but we will send them out to the group.

The Compliance Spreadsheet small lot examples under the different scenarios were put up on the screen and the resulting numbers were reviewed with the group so that folks could begin to wrap their heads around the technical components in terms of the number crunching itself. It was noted that one of the things that became evident as you start to crunch the numbers for the different scenarios, based upon some of the information that was provided by Arlington was that some of the subtle differences and nuances were showing up way out in the decimal places with the number crunching.

Drew noted that the agenda has the topics of "Tree Canopy as Urban Land Cover Type" and "Tree Canopy as Stormwater BMP" broken down as two different agenda items, but these two topics are definitely tied together. So, if anyone in the group has a question about either scenario, please feel free to voice it at any time during today's discussions.

If at the end of today's conversations if we feel that we still have some ongoing conversations that are needed or if there is more stuff that we need to consider before the group finalizes its work, we already have a third meeting tentatively set up.

Drew started a discussion of the different scenarios provided in the Compliance Spreadsheet examples.

Group Discussions:

- Would "tree canopy" be just a single category or would it be two different ones with "tree canopy over impervious" and "tree canopy over pervious"? Staff responded: that distinction will come into play when we start to talk about some of the numbers in the spreadsheet. That will be discussed when we talk about the assumptions that staff used in terms of plugging numbers into the Runoff Reduction Method Spreadsheet to be able to generate some of the numbers to start to bracket some of the scenarios.
- We are going to get into runoff and pollutant reduction, which is the basis of post-construction stormwater requirements, but are there any regulatory drivers for quantity as well? Staff responded: we focus a lot on water quality, but under the Virginia Stormwater Management Regulations there are a couple of sections that deal with water quantity management. So, we are asking folks to mitigate the additional nonpoint source pollution, using Total Phosphorus as the keystone in Virginia. We have used that for many decades from work developed during the 80's under the Chesapeake Bay Program. But one of the things that also existed at that time too and actually predated that under the Erosion and Sediment Control Program was what we refer to as Minimum Standard 19. Part of Minimum Standard 19 had a component to it of looking at post-construction water quantity management. Think of it in terms of this concept, you've got a big, huge piece of land that is forested and you are going in doing construction activities. You put down a big box store and put down impervious cover and then it rains and the volume/rate of runoff has increased as a result of that change in land use. Just like before construction that water has to be discharged somewhere, it just doesn't infiltrate into the ground. It has to runoff the land surface and go somewhere. Traditionally, plans are developed that have storm sewer

infrastructure to handle that increased runoff. Generally, that conveyance system takes all of that stormwater from the big box store and parking lot areas channels it all into a system and then discharges it into a receiving channel/receiving stream. So, you get into this concept of a previously wooded condition with a receiving stream that was stabilized and not degrading. It is used to seeing a certain amount of volume of runoff during a rainstorm event. It is used to seeing a certain rate of runoff during a storm event, etc. The baseline condition is where the stream channel is stable and not degrading, there is not a lot of sediment transport occurring and there is not a lot of channel degradation, etc. This is an ideal condition which usually doesn't work on a day-to-day basis in the real world. So, then the site is developed and you have a big box store and all of a sudden you have a larger volume of runoff that is coming off the site and you have a larger rate of runoff that is now coming off the site. That has the ability wreak havoc on the receiving stream. So, under Minimum Standard 19 E&S Program there was a provision that basically said: As a result of your land disturbing activities, wherever your project discharges too you need to evaluate the adequacy of that receiving stream to be able to handle that increased volume and rate of runoff. And if the receiving stream is not adequate to handle that increased volume and rate, then one of the things that you have to do is implement a design that makes it adequate, by doing some form of stormwater management (detention, retention, volume reduction, etc.). We operated under that paradigm for many decades. There have been a lot of conversations over the years on this topic. There was a Regulatory Advisory Panel and a seven-to-eight-year regulatory effort to develop new technical criteria. One of those new technical criteria was the new water quantity technical criteria. It was a recognition that we had a quantity management program in the Commonwealth for many decades and in an ideal setting it worked well. But in the real world, we were still seeing stream degradation as a result of applying that technical criterion. So, the Commonwealth basically said that we needed to do a better job. So, we went through the regulatory process. Basically, there was a subcommittee of the larger Regulatory Advisory Committee, the Stormwater Quantity Committee, made up of engineers, policy specialists, etc. that were participating in the process. What came out of that effort was a new set of technical criteria. It still operates under the same concept of channel adequacy but it is slightly more complex. We are still looking to make sure that the receiving channel is still protected from erosion. We are still making sure that the receiving stream is not being flooded, or if it is being flooded that we don't make the flooding condition any worst. So, those general concepts are there, but they have been fleshed out in greater detail. One of the things that was done was instead of having a one size fits all criteria, like every receiving channel gets evaluated this way. It now depends on what your receiving channel is. So, if your project is discharging to a manmade system (a previously constructed storm sewer system or tying into a local government storm sewer system or a privately owned storm sewer system that is already there), you have the responsibility under the Virginia Stormwater Management Program Regulations to ensure that you meet the erosion and flooding criteria associated with that manmade channel criteria. If your project or portion of your project is discharging to a natural receiving system (a natural stream or a flood prone area that is adjacent to a natural stream) there is a separate set of criteria for those discharges. DEQ has done a lot of work in the

Northern Virginia area and in other parts of the Commonwealth to implement natural stream redesign concepts or basically stream restoration projects. There are a lot of design assumptions that go into those projects. So, if your project discharges into what we would call a restored conveyance system, then you would have to make sure that your design is protective of the initial stream restoration project. One of the things that we don't want to happen is after all of this money has been spent putting together a stream restoration project to all of a sudden have a big box store project that comes in with larger volumes and larger rates and no appropriate stormwater management components that then blows out the stream restoration project. We have broken it down into three types of receiving systems which are manmade, natural and restored. And then on top of that we further fleshed out the criteria for what we call channel protection. Channel erosion is another concept under that. And then we have separate criteria fleshed out for flood protection or localized flooding. The regulation says to evaluate the 10-year-24-hour storm. That is further broken out on whether or not localized flooding actually exists in the pre-development condition. DEQ's training staff that train the local VSMP Authority's administrators, plan reviewers and inspectors have fleshed out a lot of this information with good modules and flow charts, etc. All of that information can be found in Module 5 of the Stormwater Plan Reviewer training materials. In general, yes, we do have water quantity criteria that is separate and distinct from our water quality criteria, the Runoff Reduction Method. But those two methods are tied together via the concept of runoff reducing measures.

- Research work conducted by Dr. Daniel McLaughlin of Virginia Tech was mentioned. Dr. McLaughlin has been working on a two-phase project over the last several years to determine the volumetric uptake of forests throughout Southeast Virginia. He is determining if and how the modeling data supports site-specific application of forest benefits. He has some initial findings on transpiration, retention and detention volumes in terms of tree cover at various spatial scales. It was suggested that he might provide some interested input and insights on tree canopy and he might prove to be a helpful resource. Staff noted that what we have to do is to report on the findings of the group and then determine a recommendation and then what the crediting recommendation is going to be. We then pass that information on but there could be other subsequent steps needed in terms of working through the process to incorporate those recommendations into the existing program. It was noted that the Department of Forestry was working with the City of Virginia Beach to implement projects based on Dr. McLaughlin's work. They have been actually taking measure to install reforestation projects in areas that flood regularly. The Department of Forestry indicated that there was a report on this effort that could be shared with the group as information. It was noted that the trees planted through the City of Virginia Beach effort were not planted as a result of a development and that is different than what we are talking about today. It is important to make that distinction, because a lot of localities are implementing trees where they can on public lands for a lot of benefits. Not just quantity and flood mitigation but for all kinds of reasons. The discussions that we are having today are addressing just what is driven from a development project and the scale and acreage that we are talking about is different. It was suggested that even with the differences in scale

that the research by Dr. McLaughlin might still be relevant. Because, one of the options that we are considering is treating trees as a land cover change, but we are still doing that on very relatively small parcels. Even though it is at a vastly different scale there may be a corollary there where we could look at volumetric uptake that could be used to look at that might be consistent with the land cover change approach potentially that we are going to use.

- If we do use tree canopy as a land cover in the Virginia Runoff Reduction Method would there be an associated SCS curve number with that? Staff responded: In the quantity world, the most utilized method for doing quantity management and calculations is the NRCS Technical Report 55 or Technical Release 20 which has curve numbers in it. There has been a lot of work that has been done by Dr. Pitt that kind of relates those two together. One of the next steps is figuring out for a given amount of tree canopy what is the curve number that needs to be assigned to a specific tree canopy area. The Expert Panel Report actually has different numbers associated with different types of land cover. So, given that there is a volumetric reduction associated with tree canopy on a site then you have to look at what relationship best fits. Does Dr. Pitt's with Runoff Values (RVs) fit or does the NRCS Curve Numbers fit better? There are a handful of hydrologic methods that are listed in the regulations. The SCS method is included but the Commonwealth didn't go as far as to talk about that work that Dr. Pitt did in the hydrologic methods portion, but it is something that we could look at. That could be part of the conversation moving forward. The recommendation coming out of this group might be that we need to look at this other scope of work.
- Karen Firehock described work that she did on a case study that was called the Trees to Offset Water Tool. The "Trees and Stormwater Calculator Tool" uses the TR55 curve number, but it looks at both the volume of runoff and the water quality for nitrogen, phosphorus and sediment. Basically, we do a 1-meter by 1-meter mapping of the landcover so that we know whether that tree canopy is standing on turf or whether it is overhanging pavement. So, you know if there throughfall to the pavement that is running or is it going onto the lawn or whether it is an actual natural forest. So, we distinguish between urban trees planted on the landscape versus a forested condition where you would have a thicker turf layer and more infiltration. The tool brings into consideration the soils that are on the site because those are super important for how much infiltration you are actually getting. You know whether your tree is planted on hard pan clay or a Lewisburg Sandy Loam, which would be great drainage. We look at all these factors and the tool has a drop-down menu so you can look at the 1-year, 2-year, 10-year storm, etc. The model can be used to look at different storm events. The model brings in the actual land cover, the soils that are there and the NOAA weather data, so that you can know what your rainfall regime is like. The tool was designed to be used in large areas such as a master planning area for a city or in a watershed. It could be adapted to do work at the site scale but we usually told developers that we wouldn't recommend using it on less than a 5-acre site because it is a model. There is an old joke about models that says that they are all wrong and some are less wrong than others. TR55 is not a perfect method but it is the best available right now. Even with the great knowledge and science available at the end of the day we are still seeing streams being impaired even when everyone follows the science perfectly. So, there are tools that are out there to use

and are available on the Green Infrastructure Center's website. Whether the tree is standing over the grass or half of it is overhanging the pavement or if it's in the forest is a really important consideration as well as the soils that it is sitting in addition to the type of tree. There are method documentation materials available on the website.

- The RV was basically designed because the curve number approach breaks down when you are talking about just 1-inch which is the water quality volume. That was the thrust for why the RV got calculated. Dr. Pitt did studies and some tests and realized that the curve number does not hold very well for just one-inch of rainfall. There are a lot of coefficients out there that are used to relate to rainfall runoff and each one is designed for a particular methodology. RVs are used for small storms and small amounts of rainfall are tied to the water quality situation because we are only dealing with the one-inch rainfall event. Curve numbers are usually tied to the one-year, two-year or higher storm event. If you get less than a one-year you have a problem if you are using curve numbers so you have to switch over to something else. In looking at the work that Dr. Pitt did, a lot of his work focused on those smaller rainfall events but also on smaller sites. Even in the most ideal world you go with the best available science that you have at the time.

ACTION ITEM: Staff will share Module 5 of the Stormwater Plan Reviewer training materials.

ACTION ITEM: It was suggested that if there was some work or resources from the work by Dr. Daniel McLaughlin that could be made available to share with the group that it might be useful for any further discussion. Evan Branosky indicated that he would look into whether there were any available resources that could be shared with the group. Any materials related to this work will be sent to Bill for distribution to the group.

ACTION ITEM: The Department of Forestry offered to share a report on the work being done in the City of Virginia Beach on reforestation efforts with the group. That material will be sent to Bill for distribution to the group.

ACTION ITEM: DEQ staff was asked to look at the report on the work done using Dr. Daniel McLaughlin's research to see if it fits into the current discussions and determine if it is supportive of a recommendation in the final report.

ACTION ITEM: Karen Firehock with the Green Infrastructure Center offered to share the link to their website where various tools for looking at trees are available.

Drew Hammond thanked Jason and Jennifer from Arlington County for providing the spreadsheet information and examples of small site development scenarios considering tree canopy. Drew continued his presentation and review of those scenarios and associated spreadsheet inputs and outputs. These scenarios were run using a 10,000 square foot lot size. The scenarios looked at a high loss of canopy and a medium loss of canopy as well as an equivalent loss situation. Four different scenarios were run using the information provided by Arlington. The evaluation of these different scenarios gets into parsing out all of the different inputs that we spoke about in the last meeting in the Runoff

Reduction Method: the RV coefficients; the relationship between rainfall and runoff; the three categories for land cover conditions (impervious cover, managed or disturbed soil and forest/open space). So, as we discussed at the last meeting the RV coefficient for managed turf/disturbed area and the RV coefficient for forest/open space for A, B, C, and D soils that bracketed difference between the two of them is very minute. We did look at the work that Dr. Pitt did for RVs in his paper, which we can share with the group. One of the things that we quickly realized that there are a multiple of different categories for RVs to pick from. One of the things that did not immediately jump out was a coefficient for tree canopy over various land cover categories. So, for the purposes of the calculations and what is being presented we just said that there is such a minute difference between the RVs that we already had built into the spreadsheet for managed turf and forest/open space, the RV coefficient for forest/open space was used. The same RV coefficient that would be used for forest/open space was used for the purpose of calculating the numbers. The numbers in the calculation were run out to four decimal places. There are two compliance end-points for water quality purposes in the Commonwealth. There is the .41 that is required for new development and there is the 10% or 20% reduction for redevelopment. And then on top of that if you have additional impervious cover then that area has to meet the .41, so both of these were included in the spreadsheet scenarios to start the bracket it – to see what it would look like. This analysis is showing what it would look like if tree canopy was considered a fourth land cover condition in the Runoff Reduction Method. In this analysis all trees were considered to be in a forested condition. The assumption for assigning the RV equal to Forest/Open Space was done on purpose. In this first scenario, assuming a new development scenario, you have a 10,000 square feet 100% forested site. The runoff reduction spreadsheet is being developed. The numbers are entered and shows that there are 3,500 square feet of impervious cover; 5,300 square feet of turf and 1,200 square feet of tree canopy. Keep in mind that for this scenario the RV is set as equal to Forest/Open Space. There is not much of a gap between the RVs for the different land use categories in this example. So, the numbers are filled in the spreadsheet in acres for new development. The example is broken down into the three different land use categories for runoff reduction. In this scenario the pollutant removal requirement is .1373 pounds. That is what has to be removed to be able to meet the .41 standard for that particular project. You could also go through this example using these same numbers but acknowledging that we don't have that fourth land use category – that tree canopy is going to treated as managed turf instead. Running the same scenario with then only two land use categories you end up with only a hundredth of a pound difference at the end of the day. So, all of this work in establishing a fourth land cover condition for a site is basically resulting in all of that work and number crunching and parsing out that fourth number and trying to figure out what the RV would be associated with that fourth land use category is telling you to come up with a hundredth of a pound somehow of another. An RV number associated with Forest/Open Space was used just as a means of calculating the number for canopy.

Drew reviewed a similar scenario that was run using the Redevelopment Spreadsheet. The resulting numbers do appear at first to be counterintuitive but it is based on the pre-development numbers and how they set up and the big loss in canopy and the big change in impervious cover drives that number up and it only happens in this scenario. Looking at the spreadsheet for the redevelopment situation if you were to include tree canopy as a land cover condition or not include it you are only taking a couple hundredths of a pound.

Group Discussions:

- So, in the scenario being discussed if we didn't include a fourth category of tree canopy, we would just have Impervious and Managed Turf.
- In using the four decimal places in Arlington and it may seem trivial but a tenth of a pound is about 7% to 8% but the other one is 25%. The actual difference in the level of effort in that scenario is 25%. A caution was voiced about keeping the discussion to one of tenths versus relative proportions. Staff response: The world that DEQ works in as a stormwater authority we are talking about thousands and thousands of acres for solar projects whereas Arlington and Fairfax are actually running the spreadsheet calculations out to the four decimal places. A hundredth of a pound in those localities is a much bigger percentage than it would be for DEQ in looking at a solar project.
- In the spreadsheet for the scenario under new development there is impervious turf, when it says canopy is that Forested/Open Space? Staff Response: It uses the RV Coefficient for Forest/Open Space but is being treated as a fourth option. If we were to figure out the science associated with an RV Coefficient for Tree Canopy and determined a number, we would expect it to be slightly higher than Forest/Open Space.
- It was noted that these scenarios are treating tree canopy and actual forest as the same thing and they are not. Staff Response: That is correct, but that is a necessary part of the discussions that we will have to have moving forward in documenting these conversations for the report that we have to produce. One of the things that we do not have an answer for is if we were to include a fourth land cover condition in the Runoff Reduction Method, we have got to figure out the associated RV Coefficient that would be assigned to that land cover category.
- It was suggested that there probably should be a different one for Tree Canopy over turf and Tree Canopy over impervious. The currently available GIS information would allow you to get to that level of precision on a site. Staff Response: This is part of the exercise that we will need to go through. We can say that we can do this and we can credit it, but to be able to credit it we have to be able to identify the other things that we have to do to justify that the practice is creditable.
- A hundredth of a pound doesn't seem too significant but for a residential developer who's building five or six lots, couldn't that be a deciding factor on whether one has to purchase nutrient credits or not? If it is then that is likely to be very helpful in not having to go the route of purchasing nutrient credits. So, there are likely to be some significance and some protective benefits to this approach. In situations where there are no nutrient credits available but a project still needs to move forward this would be helpful.
- Staff noted that in the examples that DEQ was given and that were used in running these scenarios, a majority of these did not have any new trees planted. The last example in the spreadsheet showing a gain did have some new trees planted. Most of the numbers that are shown on the spreadsheet were for existing trees that were already on site and the loss is because the trees had to be removed either because of the increased size of the development or

the trees were in danger because of construction happening near the trees. The goal is to get credit for trees being planted.

- Regarding the goal of getting credit for trees being planted: we are only regulating on the post-construction land cover. How is there a benefit to planting versus conserving what is already there? So, how is the goal to provide benefit for additional tree planting? Staff Response: That probably falls into the second half of today's discussions when looking at Trees as a BMP. And it also goes back to looking at assigning a RV Coefficient to a canopy in the post-construction case, are we talking about an existing tree or a new tree and over what kind of existing land cover. How many different RV Coefficients do we need to consider? What is the infiltration capacity associated with those different scenarios and considerations?
- Regardless of whether we go land cover or BMP efficiency for the pollutant removal, there is still this whole quantity component that has to be flushed out on a very specific, almost individual tree basis.
- Does trying to get to a smaller resolution make the stormwater regulations even more complicated and unwieldly and even harder to calculate compliance? It was noted that it is very quick to generate that level of detail using the currently available GIS tools. One of the implementation steps that DEQ would have to undertake would be to provide much more clarity if we were to consider this as a fourth land cover category. We would need to develop a table similar to the one in the Runoff Reduction Method instructions and guidance that provides detail on what constitutes Forest/Open Space and this is what Managed Turf looks like and this is what Impervious Cover looks like for the Fourth Land Use category of Tree Canopy. Which would have to include details on what tree canopy over pervious and over impervious cover is. We would need to develop a robust description so that folks that are out of state and not used to doing work in Virginia or even new folks trying to figure out a new category of land cover will be able to work with the program.
- Staff Note: One of the reasons that we were asked to take a look at this is to identify whether either or both of the things that we are talking about (Trees as a BMP and Tree Canopy as a Fourth Land Cover Category) would assist in sort of an overall Commonwealth interest in preserving and maintaining trees. As much as we talk about these details and maybe the issues related to small development, is it still getting us to the point of are these technical and policy decisions that in the end protect or encourage trees? So, let's not forget that is the second part of this whole discussion.
- When we refer to tree canopy are we talking about tree canopy that exists upon completion of construction or the tree canopy that will be there 20 years after all of the trees that are planted are grown? The scenarios looked at the change in tree canopy from pre- to post-construction. There appear to be significant differences in the spreadsheet calculations between new development and redevelopment and it appears that this might disincentivize redevelopment by having higher pollution reduction requirements. Staff Response: Unfortunately, that is the way that the numbers worked out in the scenario for that particular case. It really depends on what

the assumptions were when the numbers were originally entered in and how much of a change occurred with the proposed activities on the site.

Drew noted that one of the assumptions that was used in running the various scenarios that we have been discussing is that they were all done looking only at hydrologic soil "B". Typically, you may not see it on a 10,000 square foot site but the numbers in the spreadsheet calculations are starting to get closer as you start to look at "C" Soils and "D" Soils. They will get further apart with "A" Soils. That is just because of the way that the RVs are calculated. Drew provided an illustration of the RVs if you are considering "B" Soils in the calculations:

	B Soils
IMP.	0.95
TURF	0.20
CANOPY	
F/O	0.03

The question of what the number actually is depends on how much you break it down, i.e., canopy over pervious; canopy over impervious. Is it any difference if it is canopy that is preserved or if it is new canopy that is planted? There could be four different values associated with canopy over B soils depending on the underlying land cover and whether the canopy is preserved or newly planted.

Group Discussions:

- The preserved canopy, generally if it has been there long enough would have more absorption values than new canopy. And, since you are likely looking at planting new trees of maybe 1-inch caliper, you would much rather preserve the existing canopy that might be 10-inch caliper.
- From an engineering standpoint, when the canopy runoff value gets closer to the turf value and the total phosphorus required to be removed gets closer to that for turf, you have to decide how much more time it would take to actually do the canopy. You have to take into consideration where you have to include additional plant sheets to call out where you are preserving trees. In addition, what's going to happen post-construction where you have to mark those trees to make sure that they are not taken down. You have to consider what additional time and effort would be required to put in tree canopy versus just buying another hundredth of a pound of nutrient credits. Staff Response: In Arlington and some of the other really urbanized areas, you are trying to decide whether you need to protect two or three more trees and make sure that you have tree protection adequately shown or do you do some other type of runoff reducing BMP, making it slightly bigger and capture a little bit more area that gets you the hundredth of a pound and then you are done. This is a very common occurrence not only in Arlington but also in the Middle Peninsula and the Northern Neck with Chesapeake Bay Land Disturbing Activities. You will see out there in a lot of the older subdivisions from the 40's; 50's; and 60's where you are working on a scale like we have been discussing. For example, you have fairly good soils to work in so let's make the micro bioretention basin a little bigger and capture a little bit more than the impervious cover from the driveway or the house. But then there are the

associated long-term operations and maintenance costs. The question then becomes do you require the single-family homeowner to do that or do you get them to protect that tree on the site during construction and that will get you the hundredth of a pound that you need so you don't need the structural BMP or the expansion of the structural BMP?

- It also depends on what the mechanism for protecting the tree looks like and what you actually have to do to protect it and to demonstrate that protection and how much time you have to put in doing that?
- There is an incentive to preserve that 1,200 square feet of canopy because you would have a smaller offside flow reduction requirement. Where does the tree preservation ordinance come in that requires a certain canopy on a site through a different program? How would that impact this scenario? The way the tree preservation ordinance is written in Arlington, we can't require preservation. You have to get a certain canopy percentage and that can be achieved through preservation or planting, we can't say that you have to protect "that" tree. There is just a performance standard of 20% canopy at 20 years post-development.
- Whatever is decided by this group, it shouldn't matter whether you have a canopy requirement or not, that is a locality's own decision. If we are going to put stormwater values on trees somehow through this process, that should be an independent consideration and not tied to a canopy requirement. Having stormwater values associated with trees would provide another tool but tree canopy requirements for a given site should be an independent consideration but can still exist in parallel.
- In looking at the tree preservation ordinance from a planning perspective, if you had the mechanism to enforce some type of canopy on that site, but you didn't add it as a land use here, not only would we get the canopy preserved but you would also get .14 of total phosphorus removed from some other means. You could potentially get more because you would get the canopy plus either credits or a stormwater BMP. The role of "tree preservation ordinances" in development projects is an important consideration where those types of ordinances are currently adopted. It was noted that there a number of jurisdictions who have not adopted such an ordinance or may even at this time not be able to adopt a "tree preservation ordinance". This concept has been around for 15 to 20 years and for whatever reason is not getting adopted locally.
- From a developer's perspective in a locality that is looking to adopt a tree preservation ordinance at the local level, that might receive more support if we could credit it on the back-end when it comes to doing stormwater management in the area. If there is a means of crediting whether it's a stormwater BMP or whether it is a land cover condition, then there could be less resistance to the adoption of a tree preservation ordinance. In Washington, DC, they give you more volume credits for existing trees – you get 20 cubic feet of volume credit for a preserved tree and 10 cubic feet of volume credit for a newly planted tree. So, there is an incentive to consider preservation as your first choice rather than razing the site and planting trees back. In DC they also do pre-construction and post-construction stormwater management plans. They

are able to consider both preservation and new tree plantings because they are focused on the change from pre- to post-construction conditions.

- Staff Note: The preservation piece is already built into the methodology through the preservation of the Forest/Open Space category. So, if you preserved more trees on the front-end, you could benefit in terms of how much phosphorus you have to remove on the back-end.

Drew continued presentation of the various scenarios to the group. One of the things that becomes evident is that to accurately take into consideration "tree canopy" that you need to look at what is under the canopy? Is it already managed turf? Or is it already impervious cover underneath that is staying, for example in a development scenario?

GROUP DISCUSSION:

- It was requested that staff add a column to the spreadsheet that showed the percent difference between including the canopy and not for new development and redevelopment. This would get it out of looking at it from the perspective of a 10^{th} of a pound or 100^{th} of a pound realm and put it into a level of effort as a percent difference. This might be a clearly way to show how it changes. This would be column "J" in the spreadsheet.
- On the discussion about existing trees versus new trees, is there any consideration of the loss of the new trees? In one example, 300 trees have been planted in the last decade and there have been years where up to 30% have been lost. On an average 15% of the trees are not still there on Year 3. Is that something that we need to take into consideration in these discussions. Staff Response: That is part of the conversation that we still need to continue to have. We discussed this a little bit at our first meeting on Forest/Open Space and what DEQ does as the VSMP Authority, when we have folks that are using Forest/Open Space Preservation as a means of offsetting their ultimate requirement. If we have tree canopy that is also be used to ultimately offset what our pollutant requirement is, what are the mechanisms and expectations for replacement of dead; dying or diseased trees? What happens when a hurricane rolls through and wipes out the trees? Whether it is a BMP or whether it is a land cover, ultimately those trees in the calculation are providing a benefit to installing some other type of structural best management practice.
- Some communities that are giving credits for trees are bonding those trees just like you would bond a stormwater pond or any other structural BMP. They still need to be there two to three years later, its inspected and if it is still standing it helps them get their bond back. In terms of maintenance, if you are a HOA (Subdivision X) there should be funds available in subdivision budget for maintaining your stormwater pond, as well as whatever trees are being used as BMPs and bio swells and underground cisterns – whatever those things are, they all need to be maintained. The tree is no different – trees are just a little more complicated because they are different sizes and hold different amounts of water. Looking at the concept of private BMPs, everyone thinks if you build it that it will be maintained by the homeowner or the HOA will take care of it, but we have seen time and time again that they don't and the local government

has to come in and take over maintenance of the BMP. The concern over growing that inventory is that the local government has not planned for it and does not have the staff or resources to manage and maintain those additional BMPs. If a HOA has a stormwater pond that is failing the cost to fix that is much higher than if they just hire a forester to come in and plant an acre of trees. The local government taking over maintenance of various BMPs is basically to enable the locality to continue to receive credit for the BMP – not so much of a MS4 credit but continuing to get the credit for the change in land use that happened, so that there is not an expectation that you have do additional MS4 projects.

- One pond is a discrete area that can be easily inspected, where trees could number in the hundreds and thousands. For instance, when you are trying to release development plans for new development to get them off bond, you could be inspecting hundreds of trees. That is a big drain on available resources, you end up telling your staff that if it looks like it meets the intent, check it off and move on to the next project.

Drew continued presentation of the various scenarios and noted that one thing that he wanted to do was to tie all of these discussions back to the Expert Panel Report. We had a lot of discussions previously about tree canopy size. The Expert Panel Report used a 10-year canopy at 144 square feet. That was a recommendation out of the i-Tree Model. That is a little over 8 trees, so maybe 14 trees. He reviewed the resulting numbers for high loss and medium loss and equivalent in the various scenarios and the percentage change calculations. He noted that in the new development scenario, the benefit of having a fourth land cover category of tree canopy in there, on that small scale is a 12% difference. One of the additional things that needs to be taken into consideration is the connections between the fourth land use category of tree canopy and the RV. Recognizing that there could potentially be four different RVs somewhere between 0.20 and 0.03 for B Soils. We are not sure what those actual RVs would be. The science is there but a large effort would be needed to figure out those values.

	B Soils	
IMP.	0.95	**Existing Canopy (over Pervious)**
TURF	0.20	**Existing Canopy (over Impervious)**
CANOPY	---------→	**New Canopy (over Pervious)**
F/O	0.03	**New Canopy (over Impervious)**

GROUP DISCUSSIONS:

- So, if you are preserving existing trees do you have an aerial survey where you identify the actual canopy or are you using the 10-year, 144 square feet calculation? The normal starting point should likely be the use of an aerial survey/photograph where you could easily calculate/delineate the extent of the tree canopy.
- In looking at the scenarios showing a net gain, in the real world with residential lots you really wouldn't have a gain. You might be able to plant a few trees and gain a little bit. Essentially

you are either going to keep what you've got or it is all going to be reduced. When you start considering trees as BMPs is where you start to get to the question of whether you are gaining.

- Staff Note: What you are showing here is the maximum difference. If you treat canopy as a fourth land cover type you are saying that the maximum difference in the lower level of effort needed would be roughly around 12%. Because, as we discussed earlier, the assumption that went in behind the RV for the canopy was more generous than it really should be. So, if you begin to break it out into what it should be that percentage will be lower.
- It was noted that there is current State Modeling available. We have trees as a classified layer in the state landcover dataset but it is of no use, because it could be a windbreak between agriculture fields; it could be a thin riparian buffer or it could be trees in a tree well. So, it is kind of considered as a modifier over the underlying land use. You still end up with just as many things but you have impervious and covered impervious as well as turf and covered turf. Is that a BMP? Does that actually ignore the land use? Staff Response: It is hard to see canopy as a land cover – maybe an established forest but an individual trees is another matter. What we are trying to focus on is the land cover and the land type itself and the infiltration capacity of the land. We are looking at what the soil conditions are; what is the permeability? The tree helps promote all of those things for that particular soil.
- Regarding the consideration of new trees in the spreadsheet scenarios: why would they have a different runoff coefficient? It appears that this land use class would be based on the preservation of existing trees. Staff response: It could be both. The spreadsheet calculations and scenarios were set up based on the preservation of existing trees. The numbers used in the calculations were bracketed in an attempt to keep it as simple as possible. The science shows that if you were to preserve an existing tree that the infiltration capacity, the RV number for that, (the rainfall/runoff relationship) would result in less runoff then a new tree planted over the same area. For example, if you had rainfall falling on an existing canopy over whatever the pervious cover that was there and you didn't touch it is going to generate less runoff then if you were to come through and grade the site and put a new tree that then grows up to the same size. A lot of that goes back to the fact of having the canopy there, the root system being in place, and having less compaction and decompaction happening over time.
- By adding a new land cover category, it could also encourage not just preservation but also the planting of additional trees. This is without talking yet about adding it to the Stormwater BMP Clearinghouse. So, just this piece could incentivize planting of trees. Staff Response: On a small scale it does incentivize the planting of trees.
- The thought was that the consideration of Trees as a Land Cover Category was the tree preservation piece of the puzzle and Trees as a BMP was the planting piece. Land use cover is basically preservation, because adding new trees, unless there is some sort of guarantee like a bond or conservation easement, we are not going to know whether that is going to be there long-term, so it is the existing land use cover at the end of development that is the important consideration. In general, we realize that if the site has been graded or disturbed and you plop a tree on top of it there is going to be very little benefit in Year-One. But with tree preservation

there is going to be a benefit in Year-One. Maybe just eliminating the tree planting option from the Land Cover Category consideration and just saying that it is just for preserved urban areas and that canopy is just for preservation. Staff Response: DEQ looks at Forest/Open Space in Table One can be Preserved Forest/Open Space or you can go through the process of reestablishing Forest/Open Space, which doesn't happen a lot in more urbanized jurisdictions. It does happen in some areas where DEQ is the Stormwater Authority. We do have folks that go through and do the soil amendments, etc., and reestablish it as Open Space – not so much as Forest Cover. Existing trees are already covered in the system as Forest/Open Space and we can see the gain that is involved with that. For nutrient planning, we have Spec 4 for Soil Amendments that does have a section about planting new trees and bringing impervious and managed turf back to a Forest/Open Space condition. So, all of these categories in a broader sense are already built into the existing program. If you did not use the existing trees and just call that what we already have in place, Forest/Open Space, you would just need two new RV numbers: one for new trees/canopy over impervious cover and new trees/canopy over pervious cover.

- If you just had one tree that was over a lot right now that is not counted as Forest/Open Space it is counted as Managed Turf. So, we are shifting this interpretation by what you have been saying. That is not the intent of this process.
- It was suggested that there could be a category of Forest and one for Existing Canopy – not pretending that they are the same, because they are not.
- We have that Forest/Open Space category where we have that incentive already built in to preserve forested land on your site. But based on Arlington's program it appears that their goal is to try to also incentivize preserving just individual trees on somebody's backyard. It doesn't make sense to group those two concepts. Staff Response: The examples used in the scenarios were simplified and grouped together to provide a simple example of the concepts to the group.
- There are many instances where trees over managed turf is just considered as managed turf.
- In this process we cannot ignore consideration of the long-term viability of newly planted trees. In the long run factoring the planting of new trees into a Tree Canopy Land Use Category could be difficult.

Drew posed a question to the group: In looking at reporting our findings and recommendations, etc., are we hearing that basically if the recommendations were to have a 4th Land Use Category of Tree Canopy, separate and distinct from Forest, that it really should be limited to tree preservation?

GROUP DISCUSSIONS:

- When you are looking at tree preservation you have to look at the technical requirements of tree preservation and the long-term maintenance and viability of the existing trees. You could have a tree on a 70-year-old lot, that may be 70-years old, there might not be a lot of life left to it. That tree could die in 5 years but that critical root zone is still providing some benefit. So not only do we need to take into consideration whether newly planted trees are in place and surviving and

that existing trees are healthy and how they will be replaced if they do die. What do we need to consider to have in place for trees that are diseased and dying or are taken out by a storm?

- We talked at the last meeting that sometimes people are doing a development or subdivision that they might designate say 200 acres of the 1,000-acre subdivision as already forested and they are going to keep it forested as a way of minimizing the things that they have to do. When people do that, we make them note it on the site plan and do some sort of a deed restriction. If we are going to add a land use category of Canopy and allow someone to keep canopy as a means of reducing what their effort needs to be, to be consistent would we also need a deed restriction regarding the amount of tree canopy to protect that canopy as a land use? Generally, that would be required. As a first step, DEQ could take their existing Forest/Open Space Agreement and modify it to include Tree Canopy.
- Implementation and maintenance and staffing concerns and issues were discussed.
- It was suggested that it might be useful to run any recommendations from the group through some developers to see if they would be an incentive. Review by the Home Builders Association might also be useful.

ACTION ITEM: Staff will make a copy of the paper done by Dr. Pitt on RVs available to the group.

ACTION ITEM: Staff will finalize the Compliance Spreadsheet small lot examples and have them sent to the Stakeholder Group following the meeting.

3. Break for Lunch – 12:30 PM – 1:35 PM

4. Tree Canopy as Stormwater BMP - Drew Hammond – DEQ:

Drew Hammond welcomed everyone back from lunch. We are going to pick up on the second half of the conversation, tree canopy as stormwater BMP, recognizing that it is still tied to the first half that we discussed this morning. These topics were broken down on the agenda but they are really interrelated. He reviewed the various scenarios that were developed and fleshed out based on the information provided by Arlington County. He noted that one of the other things that was done with the examples from Arlington in addition to the scenarios that were discussed this morning was to actually take a look at trees as a stormwater best management practice. He explained the use of the spreadsheet tables and what was done in terms of trying to simplify part of the analysis associated with the same categories of high loss; medium loss; equivalent and then a gain and how the numbers associated with that fell out. We used the same simplification in use of the Forest/Open Space RV number for Tree Canopy. In all four of these analyses, because tree canopy was going to be treated now as a stormwater best management practice, we did not plug that into the runoff reduction method as a separate land use category. He reviewed each of the scenarios in the spreadsheet. He noted that once again he tried to bracket trees as a stormwater management practice. In the Expert Panel Report there were two different removal efficiencies for trees as best management practices. There was tree canopy over pervious cover with a pollutant removal efficiency of 23.8% and tree canopy over impervious cover with a pollutant

removal efficiency of 11%. Three different scenarios were run assuming a stormwater best management practice of tree canopy of 1,200 square feet on a 10,000 square foot project: the First set tree canopy as located over 100% of the pervious cover; the Second set 600 square feet of tree canopy over pervious cover and 600 square feet of tree canopy over impervious cover; and the Third set the entire tree canopy area of 1,200 square feet as located solely over impervious cover. He noted that when you run the scenarios and look at the resulting numbers, they appear to be counterintuitive. Trees over pervious cover have a 23.8% removal efficiency while trees over impervious cover have an 11% pollutant removal efficiency. The numbers in the spreadsheet look backwards with respect to that. That has to do with the fact that the phosphorus concentration that is in the runoff reduction method, the .26, the event mean concentration, stays static. But the other piece is the RV coefficient, the rainfall to runoff relationship. The higher that number is, the larger the pollutant load that is generated to that area. And then the removal efficiency gets applied to that number. In the high loss scenario, you have a higher pollutant loading that is happening over the impervious cover than you do over the previous cover so you end up with the situation where the 11% removal with that larger number is greater than the 23.8% removal of the smaller number. He reviewed the other scenarios with the group.

GROUP DISCUSSIONS:

- Is there a definition of "tree canopy"? Yes, there is one in the Expert Panel Report. The Expert Panel looked at all of the output from the i-Tree Model and they recognized that there are these varying sizes and species of trees, etc. being planted. The Expert Panel Report basically said that for simplicity we are going to use the average 10-year canopy of 144 square feet. From our previous conversations, we recognize that Fairfax uses the 10-year canopy while Arlington uses the 20-year canopy in their respective programs. For the purposes of the scenarios being presented, DEQ used the 10-year; 144 square feet number so that we could be consistent with the Expert Panel Report in the pollutant removal efficiencies. In this scenario, if you were to plant 8 trees you would get three thousandths of a pound of pollutant removal.
- What does all this actually mean? On these small lots, predominantly what you are going to see is a lot of existing tree preservation or planting of new trees over pervious materials – so over lawns or grass. You are probably not going to see a lot of planting of new trees in a park. Trees and impervious cover usually don't play well together.
- Is it possible to accomplish the whole required TP removal with trees? Is that even feasible? Not likely. We were talking about shaving off a hundredth of a pound by having the third land use category in our conversations from earlier in the day. By plugging that in then you end up shaving off an additional three thousandths of a pound. So, we tried to avoid the situation of double counting.
- We are looking at these two concepts as completely separate. You would either use that tree as a BMP or you would use it as a different land use, but it wouldn't be both. Staff Response: When we ran the spreadsheet, we separated the two of them out. In our bio-retention specification that we have, the planting area can go into the runoff reduction land use category that is Forest/Open Space for that area. So, you can get a benefit on both sides, but we did not do that for this particular analysis because the Expert Panel report had a lot of good information and justification for not double-counting. It doesn't mean that we can't run the spreadsheet and

generate the numbers to see what they would look like if the two concepts were compounded on top of one another. The question that comes up is: There is a pollutant removal efficiency assigned to a tree but you are also getting some type of pollutant removal associated with a runoff coefficient so can you realistically count both?

- If this is going to make it to a recommendation, combining the two concepts might be another scenario worth evaluating. Staff will look at running the scenarios using a combined concept approach.
- In the scenarios, trees were looked at and treated the way that manufactured treatment devices are evaluated.
- A question was raised over the comment made earlier about the numbers in the scenarios being counterintuitive. Staff Response: The concentration of phosphorus remains consistent – that is consistent over every one of the land uses (.26). But what happens is then how that translates to the phosphorus that is available for a BMP to uptake and remove is tied to the RV. So, with the RV for impervious cover being .95 times the .26. When you multiply that by the 11% removal efficiency, you get a higher number than .26 times .2 times 23.8% - it is just in the math. Even though the pollutant removal efficiency is less there is more to start to start off with to take away.
- Is this factoring in preservation or is it factoring in tree planting? This scenario is looking at trees either way. We didn't parcel out whether it was a new tree being planted or an existing tree. We just said that you have x amount of tree canopy on your site – 1,200 square feet – after construction is over with. So, 1,200 square feet of tree canopy in this scenario that is what your pollutant removal efficiency is going to be, if a tree is counted as a stormwater best management practice.
- It is probably slightly easier to calculate it as a stormwater best management practice than as a land cover condition.
- One of the benefits of treating this as an individual BMP is that at a hyper small scale, they can be used to complement existing BMPs, so you end up with a treatment train almost. How would you calculate them in these scenarios in a treatment train approach? Staff Response: If you were going to handle a tree as a treatment train, the scenario that could be used would be rainfall hits tree canopy over turf (pervious cover), whatever makes it to the ground then runs off to a bio-retention basin. So, like that could be micro bio-retention. So, there was an area of the lot that didn't drain to another best management practice. You could set the treatment train up that way. What would happen would be whatever that pollutant load is that is coming down over that 144 square feet, 23.8% of that is being removed, and then that leftover pollutant concentration or pollutant loading is then routed to the best management practice (micro bio-retention) that is having 50 or 65% of that remaining concentration removed from that. It would have to be that the trees were inside of a larger watershed area served by another best management practice.
- So, this approach is supportive of the concept of a treatment train. Staff Response: Yes, it would work. Not sure how it would work on such a micro-scale but it is possible. Though you might be better off to get the 65% of the higher watershed number taken out of the best management

practice versus the smaller drainage area that has the full concentration for 65% removal and then a smaller concentration because the tree had taken out part of it and then been removed. You would have to see how the math played out.

- Trying to get a sense of these two approaches and which one would provide the greatest flexibility at a really small scale. It appears that both of them may provide a lot of flexibility.
- Staff Note: The final spreadsheet calculations include both Tree Canopy as a Land Cover Condition and Trees as a BMP. It was suggested that the concept of Trees as a BMP should be pulled out of the final spreadsheet and the numbers recalculated with that as a separate option.
- Are we going to have to choose one of these options over the other? Staff Response: What it really gets down to is when we start talking about trees as a stormwater BMP, do we treat it like we do bio-retention of do we separate them out. For bio-retention, we gave folks the benefit of the doubt when we wrote the specification that said that this area is full of trees and shrubs, we'll let you count it as Forest/Open Space, do we do the same thing with just regular tree canopy?
- Landscape folks are saying that currently you can get credit for building a rain garden but you can't get credit for planting a tree in the rain garden. But based on our discussions it appears that you can get credit for planting that tree. People always complain that once they put in say three river birches in a rain garden or bio-retention structure that they are not getting credit for those. You are getting credit for the soils and the infiltration in the soils but not for the trees that are actually doing the uptake. Staff Response: We just take what the planting area is, so say it is an acre and have them put that area (that acre) into the runoff reduction spreadsheet in the post-construction case as Forest/Open Space. So, you get the benefit that way but then you are also getting the benefit of the BMP being there and treating the watershed upstream of it. So, it sounds like some folks are not understanding that they are in fact getting credit for that Forest/Open Space. It just gives them inside that acre less of an area or less concentration that they are starting with.
- Does this mean that someone would get the same credit if they just put shrubs all over the bio-swale versus if they put in trees? Staff Response: The design specification doesn't let them do that. It specifies the number of large plantings and small plantings that are needed and here is the ratio. They would get credit for their Forest/Open Space as well as their bio-swale. They would still get their bio-swale removal efficiency of 50 or 65%.
- So, if they reforested that acre instead of planting a rain garden would they get the Forest/Open Space credit? Staff Response: If they amended that area and said that they wanted to replant it in forest, they could enter into their land use category spreadsheet that same acre and get the credit for that too. But maybe not as much credit if they had put in a bio-swale – dependent on the drainage area coming to it.
- Staff Note: One of the things that was brought up when this piece of legislation was proposed is we just don't want folks inadvertently cutting down Forest/Open Space as a means of building another structural best management practice.

- Some developers cut down Forest/Open Space areas because they say that they need a BMP and they don't understand what trees are doing so they are just cutting down the forests and putting in BMPs.
- Putting the numbers and the engineering calculations aside, if you are talking about a land cover conversion, it just seems obvious that the more trees you keep the less reduction you need to make.
- Food for Thought: Is there a way to skin this cat that doesn't involve turning it into a BMP or making it a land use cover? Is there another tool? Is there an easier or more intuitive way to do it?
- There is a breaking point. There is a point at where the existing trees on the site or reintroduced trees on the site provide that quality benefit and if the water is flowing through that forested area there is also a quantity benefit. But when there is too much turf or too much impervious area on the site that changes that balance of Forest/Open Space, then you have to have some kind of facility or structure that can attenuate that post-construction flow.
- Right now, there is just one number for Forest/Open Space (For B soils the number is .03). There is not a number for mature forests. Maybe there could be a lower number that could be plugged in for a long-standing forest that actually absorbs a lot more water than some trees sprinkled over a lawn. From an overhead view the two types might look the same but there is a different in terms of water volume as well as water quality.
- An illustration that is used to demonstrate runoff is one of volumes and bathtubs, because few people understand the volumes involved. A given roof can generate 85 bathtubs of water. There is not a mature forest that can absorb that amount of water at the edge of the property. No one is proposing that someone just use trees and say that you are done, but we are trying to get people to start with the trees, instead of "moon scaping" and then putting stuff back to try to replicate the functions that they destroyed.
- There were some concerns noted over the idea of having additional pollutant quantity benefits from existing trees compared to newly planted ones. It is a far more complex issue; we are starting to segment different trees and when they are planted or preserved. That is issue Number One. Number Two: it doesn't really recognize the requirements that exist in many jurisdictions for land grading, i.e., removing trees as part of the construction process. And not in many cases being able to protect existing trees that are on the site. And then also it doesn't necessarily recognize what could be the environmental benefits of having a tree get planted and be in place for its entire lifecycle. Recognizing the various environmental benefits that could be provided over its lifespan as opposed to preserving an existing tree that potentially may not be there for its entire life. There are benefits to preserving existing trees but not all trees are equally valuable. Not all old trees are good and not all forests are healthy. The concern is the value of reflecting within the stormwater runoff reduction method and the BMP pollutant removal efficiencies - an additional amount for any particular tree when that existing tree for example could be at the end of its lifespan; as opposed to encouraging the planting of a new tree that potentially could be providing greater environmental benefits.

- It was noted that in some other states when you take down a tree that is "X" diameter you have to replace it per caliper inch. So, you don't get to take down a bunch of 20-inch diameter trees and replace them with a bunch of 1-inch caliper trees and wait 40 years for them to even come close to what was lost.
- There are ongoing conversations taking place through another advisory process regarding maintaining trees and tree canopies at the local level with tree ordinance discussions. Our discussions then provide sufficient incentives to be consistent with some of those local ordinances. We start to segment out the different trees, based on potentially different BMP efficiencies for maintaining versus planting new.
- Staff Note: Staff has looked at potentially setting up a table/spreadsheet that had a standard input deck in it and running it with one tree is 144 square feet and two trees is this, etc., and then putting in the pollutant removal efficiencies. That would go to the recommendations in the Expert Panel Report (Expert Panel Report for the Expansion of Urban Tree Canopy) that addresses the planting of new trees and the pollutant removal efficiencies that are associated with that. Planting a new tree and treating that as a stormwater best management practice makes sense but trying to assign the same pollutant removal efficiency to a tree that has been preserved may not be the same. One of the things that stands out thinking back to the big box development and the fact that you have interior parking lot landscaping requirements and everything else that is done for development. So, you go to Walmart and you have the landscaping ordinance that you have to meet, where every island has a tree and shrubs – at this point you would be planting a tree over impervious cover and that would be an easy means of saying that is part of our overall stormwater management system for the site. For example, you have a sea of parking places and you have to plant 200 trees inside the parking lot to not only meet the local government's landscaping ordinance but that is also part of your overall stormwater management plan.
- Is this a possible tool that we can use right now or is there an issue because that planting trees is not currently credited as a BMP? Staff Response: The pathway forward to developing a specification that follows the Expert Panel Report for Trees as a BMP and making it to the Clearinghouse is a much faster pathway then amending the runoff reduction method to have a fourth category of land cover. Staff is still researching the question from our first meeting regarding what does it take to modify the runoff reduction method to have a fourth category. It isn't just the process of generating a new spreadsheet and putting it out there. But we do have a pathway available that talks about new BMPs being added to the Clearinghouse following approval from the Director. So, we could build off of the Expert Panel Report to say – you plant a new tree over impervious cover, here is how it goes in the spreadsheet and here's the removal efficiencies. The conversations that we would have to have after that are: What are the planting specifications that someone has to follow? What are the Operation and Maintenance specifications?
- Staff Note: The work product that is expected from this Stakeholder Advisory Group is a report with recommendations on what are the next steps to address the findings of the Expert Panel.

Adding trees as a BMP to the Clearinghouse is administratively a very straightforward, fairly simple next step to implement. If the recommendations in the report from this group in any way involves the idea of creating a fourth land cover type, the next step becomes a very interesting question of administrative law which could result in a very complicated implementation process.

- Adding the fourth land cover category from the perspective of the jurisdictions that are going to have to implement this, the onus is completely on the submitting applicant and engineer, where local government wouldn't necessarily inherit any kind of burden for inspection and maintenance in the long run. It is covered in the land development process. The application is submitted and approved – it is canopy. Once the development is completed, we're done. We don't have to go back and inspect them; we don't have to maintain them; we don't have to inventory it – there is something to be said for that.
- If you are getting credit for something in the development process doesn't there have to be a verification process associated with getting the credit? With the current Forest/Open Space land cover category – you develop your property; you have an area that is forested and you end up with an agreement signed with DEQ related to that area and the Operation and Maintenance of that land cover. So, the verification method would be a land cover category agreement. Staff Response: The stormwater program works very similar to the wetland mitigation program. On the most fundamental level, in order to meet your post-construction requirements, it has to be permanent – the permanency is not debatable. There has to be a way in the whole program to ensure permanence. Which is why we end up with logistical questions such as: If you plant a tree, how do you make sure it is permanent and what is it worth? As we talked about trees as a stormwater BMP, we have talked about the permanence question (whether it is maintenance agreements, etc.). Local governments have the ability under their current statutes, if we were to put this BMP on the Clearinghouse and work through that process, to put further limitations on the use of those best management practices. The flexibility for localities related to limitations on BMPs on the Clearinghouse are spelled out in statute. It was noted that this might be difficult in some localities to implement. It may end up being a strategic decision on a locality-by-locality basis as to whether the use of trees as a BMP would be allowed. It might be easier to sell on Commercial sites.
- It was suggested that we are just tying two things together, trees on a landscape level are great for stormwater, but we are trying to get more canopy on lots and we have a suite of legislation in the state that we can use that no one else is using and folks are working to approve it – we are trying to force this down the stormwater route. We can either look at what are the number of trees that we are talking about that are going to make a difference or we could have a straight up canopy calculations on the site and took stormwater out of the consideration. For example, if you knew that on residential properties that you had 35% canopy and you are going to get benefits from that – does it need to be calculated into the stormwater counts?
- The politics of trees in land development is not very strong. Even though some folks are saying if you do trees you don't have to do stormwater, that is not what we are saying. We are saying

that if you want to try to count trees then do it in a valid way, whether it is land cover or BMP. It provides another option – another lever to pull – it is not a game changer. You will not meet all of your stormwater needs by counting trees – it is just another tool in the tool box. There are still concerns related to post-construction verification that will need to be ironed out. On the front end of the process with looking at the science seeing how it fits into the VRRM – how do we do that in a legitimate way and then make a decision as to which one we want to recommend from there. If we don't do that, we risk the politics just staying open around the subject of trees and stormwater and we don't get closure on it and we will keep living it.

- There a lot of reasons why we are discussing trees but one of them is that people want to have trees in their neighborhoods. It was suggested that what we really need are canopy laws passed at the local level.
- In Albemarle County, they require tree planting for landscaping and parking lots but not for stormwater. There are no standards for how a tree is planted so that it would actually live very long. If trees were BMPs, then one could make the case that to be able to check that box with these trees that you would have to have certain planting specifications because it is not a BMP and you need to show that it is going to live for longer than three years. If you are using trees as a BMP then you really need to make sure those trees are not going to die and there are ways to plant them that will make them more likely to survive.
- Staff Note: We have an urban bio-retention device which is basically a small planter that you can get a lot of credit for and they take trees as part of that design. So, when you are talking about putting trees in parking lots and in sidewalks in urban environments, we have an urban planter that takes trees that can be used – that is one of the landscape options. There is a little bit of competition there in a sense, why would you consider having 2,000 square feet of trees that is giving you an 11 to 23.8% removal efficiency when you could use two urban planters, put trees in them and get a 45 to 55% removal efficiency. It was noted that on those urban BMP planters that they are seeing a 40% mortality rate. Some localities are debating whether they give 10-year tree canopy on urban planters anymore, the issue being that there is just so much sand that is required for the drainage. There are also some misconceptions on the diversity of species for use in those urban planters because there are only probably five tree species that can grow in that amount of sand.
- Staff Note: In the spreadsheet staff just used the tree canopy number, it was not set up to consider or include any additional drainage area coming to it. Staff tried to stick to the information from the Expert Panel report because that was the best available data. Part of it was also trying to look at keeping the implementation simple. Trees as a BMP for a new planting seems to make sense. Trees as a BMP for preservation seems to be a separate land use category. We need to keep in mind that the Expert Panel report was put together for the Bay Program for use by large MS4s that are implementing these watershed wide initiatives for urban tree canopy expansion and being able to conglomerate all of the work that they are doing. Whereas we talking about taking it all the way down to a very tiny small site level at 10,000 square feet. So, we can certainly rerun the spreadsheet that gives the double counting scenario where tree

canopy and tree as a stormwater BMP are both included to show them separately so it is only managed turf and then the tree separate just to see what the numbers are going to look like. They are probably going to change in that thousandths place again by a little bit, but there is a benefit to knowing what the pollutant removal associated with planting canopy – there is a benefit that can be shown but it is just far out in the decimal places.

- From a percentage perspective, the numbers look to be anywhere from a couple of percentage points to maybe close to 10% on the totals shown in the spreadsheet. That provides enough benefits to ask the question as to whether this is a tool that is worth pursuing or not. Can we use this practice to squeeze a little more credit out of the site? That is the big question for the group. Looking at it from a percentage perspective gives you a sense of the magnitude of it. It is not a lot but it could help. Staff Response: Some of the work that we would have to do to be able to get us from Point A to Point B for the Clearinghouse – some of that work has already been done with the Expert Panel Report, we could build off of that. Part of that work is trying to figure out what the planting detail needs to be. We have a lot of good experts in the room that understand that and know what that piece needs to include and what the O&M piece needs to include. We are looking at building a specification that is probably a little bit more straightforward than trying to expand Table 1 in the Runoff Reduction Method to say: this is what preservation of existing tree canopy needs to look like and here are all the factors that need to be checked off to be able to use that land use category in a runoff reduction spreadsheet. As has been said that approach is just a little more complicated pathway forward. From a purely Administrative Law standpoint, adding something to the Clearinghouse has a defined process while changing the Runoff Reduction Method is more challenging and trickier. Also from a technical perspective, identifying the needed RV values might be difficult. Identification of the needed RV values is one of the things that we would need to do. Originally, the Center for Watershed Protection was the one that developed the Runoff Reduction Method. Some of that work was done in kind of a "black box" process. They did some of that stuff working with the stormwater folks at DCR and they produced a couple of white papers on it but they really didn't delve into the RV selection piece and how they did that. They did take some site data and some phosphorus data from the original work that was done by Tom Schuler and the Simple Method. They utilized the RVs, especially the RV for Managed Turf as a knob to tweak to make the equation best match the observed data. Trying to reproduce that effort and figuring out how to work that piece out adds just a little bit more complexity to the whole process. We probably don't want to take a method that would have a process for calibrating a model and then all of a sudden add another variable in it and then not being able to true that up.
- From the spreadsheet examples for the various scenarios, except for the large loss scenario, basically they show that the VRRM is currently set up as more conservative, in other words it yields a higher pollutant load reduction requirement. So, except for the High Loss Scenario which was kind of an outlier, running the numbers, not accounting for tree canopy, yields a higher pollutant load reduction requirement then if you do account for canopy. So, in the spreadsheet, the Second and Fourth Rows on the right-hand side have higher numbers than the First and Third Rows. There is a challenge in thinking about Trees as a BMP and using the

Expert Panel Credit (the MS4 credit) because you get a credit for planting trees but no one is counting removal or loss. If we go the BMP route then that might not be a concern because this is saying that you are getting a higher pollutant load reduction obligation if you don't count the trees. Also, we have to look at whether we only count new trees as a BMP and not existing trees which adda another wrinkle to the conversation. Staff Response: For simplicity purposes the RV value that was used in the scenarios was the RV associated with Forest/Open Space, so it is going to get closer. But by having that Fourth Land Use Cover your pollutant removal requirement is always going to be slightly less.

Drew reviewed the Medium Loss Scenario in the spreadsheet examples, looking at redevelopment and the .077 value versus the .075 value. These numbers have both the credit for the land use category plus the tree treatment like bio-retention built into the spreadsheet, but the TP removed there that you would get would be .074. So, it is going down for that. You are dropping another thousandth by counting canopy as a best management practice. The worksheet does show that there is some added benefit to both a category and as a best management practice. But at a small scale the numbers are out there on the far end of the spreadsheet to three decimal places. But for a small lot in an urban area, that small amount may make the difference in someone deciding to do a project or not or change the project, i.e., instead of doing 2,000 square feet of canopy maybe it needs to be 2,500 square feet of canopy.

GROUP DISCUSSIONS:

- Are we looking at just a 1-inch rainfall event as the basis for the calculations? Staff Response: For water quality purposes, all of those numbers are annualized over the course of a calendar year. So, we assume that it is 43 inches of rainfall that happens over the course of the calendar year. That is how those numbers are calculated. But, yes, your traditional best management practices, like bio-retention in order to get those high pollutant removal efficiencies of 65% have to capture and treat that 1-inch of rainfall volume.
- In looking at the current rainfall and taking into consideration climate change are we going to be coming back in 5 or 10 years from now and adjusting that 1-inch rainfall volume requirement to a 1 and ½ or 2-inch volume requirement?
- Staff Note: Based on our conversations, it appears that there is some level of comfort within the group with contemplating the use of new trees as a BMP and tree canopy preserved – but not preserved the way we normally define it which is planted back but truly preserved or conserved as a possible fourth category of land cover. Did everyone else glean that from the discussions?
- We are not treating any volumes with these trees. Staff Response: We haven't brought volume considerations up at this point but there is certainly some science behind that. You would just end up using a lower curve number which would generate a lower volume to be managed.
- Regarding the use of trees as a BMP and tree canopy preservation/conservation: It was noted that the discussions seemed to be heading in that direction but there was some level of confusion on how you cold mix or match the two concepts. Maybe we could do one or the other. In the examples we have been looking at in the spreadsheets if you have canopy do you get the post-development canopy as land cover, if its preserved and as a BMP if it is new? What

about the existing canopy? Staff Response: In looking at this from the perspective of expansion of urban tree canopy as envisioned in the Expert Panel Report, if you are planting a new tree – adding new canopy – planting a new tree over pervious and impervious cover then here is the specifications that you need to follow. Here is how you can put it into the runoff reduction method. If you are conserving or protecting from land disturbance existing tree canopy that doesn't meet the category of Forest/Open Space, here is how you do that following that land use category and you can plug that into your spreadsheet as "X".

- When you have smaller lots, it becomes increasingly more difficult to do tree preservation. In some cases, you can get into a situation where one tree can meet your entire tree canopy requirement, which makes you wonder if that is the intent or not. At the end of the development process right now there is nothing committing the landowner to keeping any of those trees as trees. It appears that we are using a less than straight forward process for treatment. The intent of this process was for more tree canopy and we are trying to shove it into stormwater planning. Being tied to stormwater gives this some sort of regulatory requirement.
- Staff Note: If we were to go down the path of adding this to the Clearinghouse and that becomes available for the development community to utilize to submit on plans there are going to be a lot of tough conversations at the local government level, especially in the urbanized areas around the questions of: Who? What? When? And how? There will be a new tool in the tool box to use but it is one that has standards that go with it and comes with a level of expectation that wasn't there before.
- It was suggested that it appeared that there was more consensus for planting new trees as a BMP as opposed to preservation of trees. The apparent consensus was for newly planted trees to be classified as a BMP in accordance with the recommendations of the Expert Panel Report.
- At our last meeting, we did discuss the case of a small lot development and the preservation of a tree or trees on that site might serve as a useful BMP – to save that tree or trees on potentially some smaller lots in urbanized areas. Staff Response: That goes back to the land cover conditions and consideration of the stormwater BMP and how the group feels in terms of offering incentives for or is there science behind an existing tree being conserved over managed turf. And then do we tree an existing tree over managed turf as a stormwater BMP in the post-construction phase? In our conversations today, where we have gotten to is probably not so much the existing tree being conserved being treated as a stormwater BMP but you can treat that canopy area as a land cover use that has a lower runoff coefficient associated with it.
- What if you cleared the property and then used the soil amendment and replanted for those portions of the site where you don't have buildings? Where does that leave you? That would be another scenario to be run because it is that complicated. That is already an option on larger lots where you might have some compacted soils that you could do amendments and replant and get credit for it as Forest/Open Space. That falls more on the side of land cover than it does as a BMP.
- If at the end of the day you are trying to have more pervious land cover then everyone also needs to look at their parking standards.

- The group discussed the current definition of Forest/Open Space:

Table 1: Land Cover Guidance for VRRM Compliance Spreadsheets:

Forest & Open Space: Land that will remain undisturbed OR restored to a hydrologically functional state:

- Portions of residential lots that will NOT be disturbed during construction
- Portions of roadway rights-of-way that, following construction will be used as filter strips, grass channels, or stormwater treatment areas; MUST include soil restoration or placement of engineered soil mix as per design specifications
- Community open space areas that will not be mowed routinely, but left in a natural vegetated state (can include areas bush hogged no more than four times per year)
- Utility rights-of-way that will be left in a natural vegetated state (can include areas bush hogged no more than four times per year)
- Surface area of stormwater BMPs that are NOT wet ponds, have some type of vegetative cover, and that do not replace an otherwise impervious surface
    - BMPs in this category include bioretention, dry swale, grass channel, extended detention (ED) pond that is not mowed routinely, stormwater wetland, soil amended areas that are vegetated, and infiltration practices that have a vegetated cover
- Other areas of exiting forest and/or open space, including wetlands, that will be protected during construction and that will remain undisturbed.

Operational & management conditions for land cover in Forest & Open Space category:

- Undisturbed portions of yards, community open space, and other areas that will be considered as forest/open space must be shown outside the limits of disturbance (LOD) on approved erosion and sediment control plans AND demarcated in the field (e.g., fencing) prior to commencement of construction
- Portions of roadway rights-of-way that will count as forest/open space are assumed to be disturbed during construction, and must follow the most recent design specifications for soil restoration and, if applicable, site reforestation, as well as other relevant specification if the area will be used as a filter strip, grass channel, bioretention, or other BMP
- All areas that will be considered forest/open space for stormwater purposes must have documentation that prescribed that the area will remain in a natural, vegetated state
    - Appropriate documentation includes: subdivision covenants and restrictions, deeded operation and maintenance agreements and plans, parcel of common ownership with maintenance plan, third-party protective easement, within public right-of-way or easement with maintenance plan, or other documentation approved by the local program authority
- Although the goal is to have forest/open space areas remain undisturbed, some activities may be prescribed in the appropriate documentation, as approved by the local program authority:
    - Forest management, control of invasive species, replanting and revegetating, passive recreation (e.g., trails), limited bush hogging to maintain desired vegetative community, etc.

Managed Turf: Land disturbed and/or graded for eventual use as managed turf:

- Portions of residential yards that are graded or disturbed, including yard areas, septic fields, residential utility connections
- Roadway rights-of-way that will be mowed and maintained as turf
- Turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings

Impervious Cover

- Roadways, driveways, rooftops, parking lots, sidewalks, and other impervious areas

This category also includes the surface are of stormwater BMPs that: (1) are wet ponds, OR (2) replace an otherwise impervious surface (e.g., green roof, pervious parking)

- Staff Note: DEQ requires maintenance agreements when using land cover categories. The Runoff Reduction Method can be applied two different ways. So, you can apply the runoff reduction method to the area of the limits of disturbance on your lot. Some folks that have larger parcels of land where they are preserving and conserving trees will apply the Runoff Reduction Method to the entire parcel area and protect or preserve those areas so that they won't be touched in perpetuity. So, they are providing that means of reducing that Total Phosphorus removal requirement. With the big differential that happens between Managed Turf and Forest/Open Space, when looking at the RV numbers, DEQ has taken the case with Forest/Open Space, you know that there are portions of residential lots that will not be disturbed during construction but you have the balance is the fact that there are areas of that residential lot that will be routinely mowed and the amount of compaction that is happening in those areas because of that mowing. Staff realized that this needed to be considered after discussions with Dave Hirshman who used to work for the Center of Watershed Protection who was actually the author of Table 1 of the Runoff Reduction Method. It was a matter of trying to recognize that if you have a patch of trees that are in a residential area and there are lawns under those trees and you have been cutting that grass for decades that the infiltration capacity is not the same as that same patch of trees if it had scrub brush or whatever else underneath it, where the grass had never been cut – it was truly an area that had sat there undisturbed. The real question is how does the existing land cover support the associated rainfall-to-runoff coefficient assigned to it.
- Most developers are just calculating the runoff that they have to treat off of the areas of disturbance, so the mature forest that they are not touching is not considered in their calculations. Who are the developers who are going in and taking this portion of the site that they are not disturbing and counting that as part of their calculations? Staff Response: The Solar Industry takes that approach because of the large amounts of land disturbing that they are doing. The Solar Industry will come in and lease hundreds and hundreds of acres of Forest/Open Space above and beyond what they need to build their project to keep that overall phosphorus removal requirement lower. So, they are not required to calculate what volume of water is coming off an area that they are not touching. They are including that Forest/Open Space in their land cover tab for the simple fact that it exists on the site and balances out.
- Staff Note: We have pushed really hard to have a Forest/Open Space Maintenance Agreement on top of having a traditional BMP because we want them to really understand that with this area being designated/identified on your plan as a means of offsetting other nonpoint source pollution and as a result you are agreeing to do these things and really driving home that we don't really want you in that area, doing stuff unless you come to us and submit a revised stormwater plan that is going to mitigate that activity. On the Clearinghouse that Virginia Tech manages for us, we have copies of both the BMP Maintenance Agreement and the Forest/Open Space Maintenance Agreement which are very similar. But where the BMP Maintenance Agreement has a maintenance plan that details the specific structure that is being installed, we ask for specific metes and bounds associated with the area in the Forest/Open Space Agreement.

- Moving forward, would the BMP maintenance agreement need to be modified for tree planting? Staff Response: The question becomes are we treating a new tree as a best management practice or are we talking about it being the fourth land cover category where we would need to modify our existing Forest/Open Space Agreement?
- A question was raised about where the numbers used in the equations came from and that there might be some benefit on the front-end if those values were reevaluated.: Staff Response: The values are the result of work done by Dr. Pitt at the University of Alabama. The RV values in Runoff Reduction Method are annualized over the course of a year. The average annual rainfall for Virginia is 43 inches per year. The 1-inch is equated to the 90th percentile storm event back when it was adopted. If we were to reevaluate right now to identify the 90th percentile storm that it would probably be greater than an inch. The concept then was that over the course of the year we were going to get approximately 43 inches of rainfall and we were looking to capture and treat 90% of that.
- It was suggested that the Forest/Open Space land cover category might be better utilized if it was broken down into two separate land cover types: "Forest" and "Open Space". The Forest land use category has a lot more infiltration capacity than Open Space. When you go into the literature and try to identify an RV value for say, "Meadow" it is just basically the same as "Undisturbed". The refinement that we are trying to find here is very difficult if not impossible to identify. It was noted that the Forest Service did a nice review of trees and stormwater that might be useful.
- Would DEQ expect for the land cover piece that, whether a locality chooses a Maintenance Agreement or some other kind of mechanism, in one way or the other that those conserved trees for which credit was derived would be regulated post-construction or would you be going down the road locality by locality decision making on how they want to deal with that? Staff Response: Generally, this is handled on a locality-by-locality basis, especially with the Forest/Open Space maintenance piece. There is also a piece in the regulations that speak to recorded instruments not being necessary – this was an acknowledgement that some localities had the resources and ability to address these requirements without having to have a recorded instrument. So, we likely would still need to provide some level of flexibility with any new requirements or categories of use. When DEQ set up this program seven to eight years ago we charted our pathway forward and said if we are going to be a VSMP Authority then this is what we really think that we need to have in place. We were kind of following what was happening in the wetland mitigation world, with preservation on-site and identifying those areas. So, we already had this process laid out in the wetland world and kind of carried it over to the stormwater world. Where this has really worked out is where we had those wetland mitigation instruments where they were preserving those and mapping them and saving them in a database for us to go back and look at as subsequent wetland applications are received. That same GIS staff that was doing that work started taking the Forest/Open Space areas with metes and bounds and started mapping those. So, where DEQ is the VSMP authority in those 50 some jurisdictions, we are starting to collect and have all of that information mapped. So, if we get a subsequent stormwater plan, we have a layer that we can go in and look to identify areas that

were previously conserved for a particular project and now is being impacted so that we can request information from the applicant on how they are going to mitigate for what they are currently doing/proposing plus what was impacted on that previous project. We had mechanism that worked well for wetland mitigation and we just carried it over to stormwater.

- With the BMPs currently in the Clearinghouse they are expected to be in place and maintained for the life of the facility – for perpetuity. So, we could begin to get a lot of trees. Is there something realistic so that Fairfax or Arlington or some other municipality doesn't inherit a portfolio of trees that they then have to track? For implementation, one of the questions is what would be the expectation for replacement of a tree when it is no longer viable or has been damaged by a storm or is dead or diseased?
- It was suggested that it might be nice if there was a special category for trees where there was a time period, where at some point; 5, 7, 15 years they were released and were considered just part of the environment. Staff Response: That is how the Expert Panel Report is set up for the Bay Program, but that is a recognition that local governments are expanding their urban tree canopy and they can count it as a BMP for a period of 10 years, but then as the Bay Program revises its model and incorporates new land use change, they take it off of the BMP list and capture it as another land use category. That makes sense but then when you look at the flip-side, those trees were planted to offset a Walmart, Lowes or a Home Depot and the big parking lots or the big new house so what happens when those BMPs are gone? They are not replaced and there is not something else that happens that takes into account that land use change.
- During the big land cover analysis for the Bay, they are doing a change-analysis over a 5-year period and that is going to be published in February.
- The 10-year period in the Expert Panel Report for the Bay Program makes sense – the first 10 years is all about the best management practice and then it becomes land cover change because you can actually on an aerial image see what that canopy is and know that it is still there. Staff Response: The unique thing about that is that we have not seen any local governments that have used the Expert Panel Report for MS4 Permit compliance, but for us for compliance purposes, we'll report it to the Bay Program as a BMP and we will let it fall off the list. But inside of that local government's compliance plan we will always show it as a best management practice because that is how they are calculating credit with the reduction that we have asked them to do. So, there is a distinct difference is approach between the MS4 Compliance World and the Bay Program Model World and then there is VRM accounting that is yet another consideration.
- Ultimately, we will need to consider what is done in the case when a mature tree dies?
- Does this go down the path where this approach is optional? Is it an opt-in kind of mechanism locality by locality to do this or is that part of the recommendation of the group? Do we recommend that you should do it as an opt-in for trees on a locality-by-locality basis? Staff Response: The way the legislation is written it speaks to a report to the General Assembly on the findings of the group and any recommendations that we may have for the crediting for trees as BMPs or Land Cover Condition. (*The Department of Environmental Quality shall publish on its website a report containing the findings of the stakeholder advisory group by November 1, 2020, and shall include in the report a recommendation as to whether the planting or preservation of trees shall be deemed a creditable land*

cover type or BMP and, if so, how much credit shall be given for its optional use. The Department of Environmental Quality shall, before the first day of the 2021 Session of the General Assembly, report the findings of the stakeholder advisory group to the Chairmen of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources.) It was noted that all of the BMPs on the Clearinghouse are optional.

- Staff Note: This is where we can start to separate the two things. From the conversations that we have had today we can have trees as a stormwater best management practice. If that is the case, then what would the crediting be for that? We would follow what is in the Expert Panel Report. What needs to happen to be able to follow those recommendations? There needs to be some type of specification developed and that needs to be incorporated into the Clearinghouse. This process kind of lays out that yes, we believe that it is a creditable practice and here is what we think the credit should be following the work done by the Expert Panel Report. To get it implemented – to make it implementable – it has to make it to the Clearing House and we need to develop a specification that includes a set of basic things/requirements to get it on the Clearinghouse.
- It was noted that this approach is a very clean one and the simplest solution for going from Point A to Point B in this process. The Department of Forestry has some very specific specifications for tree planting and maintenance that could be used to help identify the requirements that would be needed. It would be a tool in the toolbox.
- Staff Note: If the recommendation from the group is: Yes, the preservation or conservation of existing tree canopy should be a fourth land cover category. It is creditable in this way or we don't know how to credit it, so we need to look into this to figure out how to credit it. But in doing that we also need to establish the ground rules behind that table. One of the other things that would have to developed is the various RV values that would need to be associated with the incorporation of an additional land use cover category into the Runoff Reduction Method and what information and resources are available that could be accessed in that evaluation. The possibility of having some additional conversations and input from the Advisory Group members and the sharing of their resources and reports was suggested.

ACTION ITEM: Staff will rerun the spreadsheet scenarios showing combing the two concepts of Tree Canopy as a Fourth Land Use Category and Trees as a Stormwater Best Management Practice and showing the two concepts as separate considerations and will share those analyses with the group.

ACTION ITEM: Copies of the BMP Maintenance Agreement and the Forest/Open Space Maintenance Agreement will be distributed to the group as information.

ACTION ITEM: Stakeholders were requested to share any available tree related specifications with Bill so that they could be shared with the group and possibly used as the required report is developed and implementation steps are considered.

5. Meeting Wrap-Up- Melanie Davenport/Drew Hammond - DEQ:

Melanie Davenport posed a question to the group: The question now becomes one of whether we think that this approach will satisfy the patron of the legislation. Is this getting to the issue that triggered the requests to study this.

Group Discussions:

- It was noted that a common comment and question is: Why aren't trees included on the BMP Clearinghouse?
- Staff Note: In the MS4 world that we live in with these action plans that are required for reductions, even at the big engineering firms, you are looking at what is allowed under the Bay Program Expert Panel Reports and at a high-level what crediting is allowed. Now we have this Expert Panel Report on trees, even though it is not a peer-reviewed paper, that has made these specific recommendations to the Bay Program and it made it through their whole hierarchy and review process. Their question then is why can't we get that same credit? Why can't that practice be listed on the Stormwater BMP Clearinghouse?
- The group discussed the need to look and consider the tree conservation recommendation as a topic that is likely to need further discussion and clarification.
- Staff Note: Would there be any value in drafting a report that says that the group does recommend this and that but we need some more time to do some additional technical work in order to get the crediting piece fleshed out for at least land cover and maybe BMP implementation. It is uncertain how long that type of technical work would take but the clock is ticking on the generation of the report required by this legislation. Originally the report was due on November 1, 2020, but that deadline was extended. With respect to the statutory charge: this statute directed DEQ to convene this group and to prepare a report to make recommendations around two things: Trees as a BMP and Trees as an additional Land Cover Type. The possibilities that this group could come up with is: Yes, to one and No to the other; Yes, to both; or no to both. As long as there is something that addresses a recommendation around each then this group has met the statutory charge. It is tempting to get into the head of patrons to try to identify "intent" but Virginia is not a legislative intent state. In Virginia we follow the plain meaning of the statute. The charge in the statute is not ambiguous, it is pretty straight forward. Regarding the report filing deadline: this report is approaching a year overdue. It got delayed because we wanted to bring this group together and last year it was not feasible to do so. We handled that informally, the DEQ Director had a conversation with the patron explaining why the report would not be on our website in November 1, 2020. The informal agreement was that we will get something up this Fall. We have been saying November 1, 2021 as the new due date. But if there needs to be an additional meeting and the report ends up being completed and posted by November 15, then that is still fine. The agency's Director made a commitment to the Delegate that we would get this done this Fall and the Director is not willing to go beyond that. Regarding the need for additional technical information, etc., the statute does not require the inclusion and spelling out of all the details as long as there is a recommendation. If the

recommendation ends up being that further study is needed then it needs to specify what additional information, etc., is needed and what else needs to be gathered. The Virginia Stormwater Regulations clearly contemplate the addition of BMPs in the future and the regulations spell out a very straightforward process for adding BMPs to the Clearinghouse. It gets much trickier when you start to look at making changes to the Virginia Runoff Reduction Method. The reason why is that when you read the regulation and you look at 870-65 it says: "compliance with the water quality design criteria shall be determined by utilizing the Virginia Runoff Reduction Method or another equivalent methodology". The Virginia Runoff Reduction Method itself is not in the regulation. If you get down to 9VAC25-870 Documents Incorporated by Reference, the Virginia Runoff Reduction Method, March 28, 2011 is incorporated by reference into the regulations. Where this now gets very interesting because since this time, the Registrar put out a regulation that prohibits, effective January 1, 2016, agencies from incorporating one of their own documents by reference, unless the agency establishes to the Registrar, that the documents or circumstances are unique and highly unusual. So, if we were to modify the Virginia Runoff Reduction Method, it becomes a DEQ document which we can't incorporate by reference. So, we would be looking at potentially needing to move the entire Virginia Runoff Reduction Method into the Virginia Administrative Code.

- It was noted that one of the things that this group could recommend is that the Virginia Runoff Reduction Method once modified be allowed to be incorporated by reference.
- Staff Note: One of the charges to the group from the legislation was to include a recommendation as to whether tree planting or the preservation of trees shall be deemed a creditable land cover type or BMP. It probably should be stated as "new trees as BMPs". That seems to be a common theme from our discussions. So, the next thing that we are required to do is to determine how much credit shall be given for its use. That is clearly defined in the Expert Panel Report, so we can certainly answer that. We can also point out too what needs to happen next is that there needs to be a specification written and then once it is written then it will go through the procedures adopted by the Department and then be posted on the Clearinghouse. The second piece to that would be looking at it as a creditable land cover type, so the question is do we have consensus around that – the preservation or protection of existing tree canopy that is not deemed Forest Cover. We have shown through the spreadsheet examples that there is a benefit to that fourth land use. The question is how much credit do we give for that? Under the Runoff Reduction Method, we are really not talking about credit. We are talking about what is the appropriate runoff coefficient to use with that land cover type? The answer to that may be that there needs to be more work done to determine that number and there may be other things that folks need to be aware of.
- It was noted that it might be worth trying to separate out pervious and impervious tree canopy. Tree canopy over pervious might just be easier calculated as impervious and then urban tree canopy over any other land use would be its own.
- It was noted that we could probably all agree that preservation or conservation of tree canopy would fit better as a land cover type, but those pieces, those nuances cannot be addressed within

the timeframe of getting the report completed by the deadline. But we agree that new tree planting is a much better fit as a BMP and we have a handle on how to support that moving forward.

- It was suggested that one of the recommendations in the report was that this group needs to be reconvened to flesh out the details needed to address the details revolving around a fourth land cover type. In addition, the legislators could also be made aware of the impasse created by the inability of the agency to incorporate their own document by reference, i.e., the Runoff Reduction Method.
- Staff Note:
    - New Tree as BMP → Expert Panel Report →BMP Specification → Clearinghouse
    - Preservation/Conservation of Existing Tree Canopy ~~over Existing Pervious Cover~~ as a Creditable Land Cover
    - Reconvene the Advisory Group →Additional Work for Credit Determination → VRRM?

Melanie Davenport noted that it sounds as if that is group in its entirety and the group established under the study legislation does not need to meet again, that we can put pen to paper and do this, but that some subset of folks needs to keep working on the preservation/conservation option and that there is also need for some additional input from some folks for development of the BMP specification.

GROUP DISCUSSIONS:

- Staff Note: Some assistance would be appreciated from some of our technical folks on the group for development of the BMP specification. Help with taking that Expert Panel Report and its recommendations and looking at the various tree species and all that stuff and getting that into something that can be digestible and clear to all those that will need to use it would be appreciated as to what the expectations are and what needs to be done for implementation.
- The report would reflect that the group feels that we can move forward with the development and implementation of a new tree as a BMP. The second item (land cover type) is something where there are additional steps that need to take place before we can proceed.
- It was suggested that it might be useful if DEQ staff could circulate a draft of the report to the group – they might be able to provide some useful comments before it is finalized.
- It was suggested that the hurdles to implementation of the various options outlined in the group's discussions should be identified and included in the report.

ACTION ITEM: DEQ staff will move forward with development of a draft report based on the discussions of the group and will work with the group to get additional information and assistance on wording for specific materials needed for the report. DEQ will share a draft of the report and additional references.

6. Adjournment

Melanie Davenport thanked everyone for attending and participating.

The meeting was adjourned at 4:05 PM